

What Is Another Name For Fuzzy Inference Systems?

A. Fuzzy Expert System

B. Fuzzy Modelling

C. Fuzzy Logic Controller

D. All of the above

Answer D

The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to

A. infinite

B.1

C.0

D.0.5

Answer D

Which is the set, whose membership only can be true or false, in bi-values Boolean logic---->>>>Crisp set

Fuzzy proposition P.Ram is efficient-->>0.4

In this mode of reasoning, the antecedents & consequents have fuzzy linguistic variables

Option A Qualitative Reasoning

Option B Categorial Reasoning

Option C Syllogistic Reasoning

Option D Dispositional Reasoning

Correct Answer A

What are the following sequence of steps taken in designing a fuzzy logic machine?

- (a) Fuzzification->Rule evaluation->Defuzzification
- (b) Rule evaluation->Fuzzification->Defuzzification
- (c) Fuzzy Sets->Defuzzification->Rule evaluation
- (d) Defuzzification->Rule evaluation->Fuzzification

Correct Answer A

fuzzy computing--->>>All of the above

. Ability to learn how to do tasks based on the data given for training or initial experience

A. Self Organization

B. Adaptive Learning----->>>>ans

C. Fault tolerance

D. Robustness

fuzzy inference system is also referred as --->>>Approximate

the number of elements in a set is called as --->>>Cardinality

a set with single element is called--->>>singleton

Artificial neural network used for

- A.Pattern Recognition
- B.Classification
- C.Clustering
- D.All of these --->>>ans

Falsification is

- A.Modular design of a software application that facilitates the integration of new modules
- B.Showing a universal law or rule to be invalid by providing a counter example--->>>ans
- C.A set of attributes in a database table that refers to data in another table
- D.None of these

Conversion of a fuzzy set to single crisp value is called

-
- a.fuzzification--->>ans
 - b.defuzzification
 - c.fuzzy logic
 - d.fuzzy rule

Consider a fuzzy set old as defined below

$\text{Old} = \{(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)\}$ Then the alpha-cut for alpha = 0.4

for the set old will be

- a.{(40,0.4)}
- b.{50, 60, 70, 80}
- c.{(20, 0.1), (30, 0.2)}
- d.{(20, 0), (30, 0), (40, 1), (50,1), (60, 1), (70, 1), (80, 1)}

Answer d

. Each connection link in ANN is associated with _____ which has information about the input signal.

- A.neurons
- B.weights-->>>ans
- C.bias
- D.activation function

Transparency

- A.The large set of candidate solutions possible for a problem
- B.The information stored in a database that can be retrieved with a single query
- C.Worth of the output of a machine learning program that makes it understandable for humans--->>>ans
- D.None of these

The room temperature is hot. Here the hot (use of linguistic

variable is used) can be represented by _____ .

- a) Fuzzy Set-->>>ans
- b) Crisp Set

Internal state of neuron is called _____, is the function of the inputs the neurons receives

Weight

B.activation or activity level of

neuron--->>>ans

C.Bias

D.None of these

Core of soft Computing is

A.Fuzzy Computing, Neural Computing, Genetic Algorithms--->>>ans

B.Fuzzy Networks and Artificial Intelligence

C.Artificial Intelligence and Neural Science

D.Neural Science and Genetic Science

Fuzzy relation is a fuzzy set defined on the Cartesian product of

--

a)single set

b)crisp set---->>>ans

c)union set d)intersection set

. Search space

A.The large set of candidate solutions possible for a problem--->>>ans

B.The information stored in a database that can be, retrieved with a single query.

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

. Expert systems

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution

C.an information base filled with the knowledge of an expert formulated in terms of if-then rules--->>>ans

D.None of these

What attempt was Mamdanis Fuzzy Inference Method Was Designed for?

ans-->>Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations

3.A formula which has all its interpretations recording true is known as a

a.

disjunction b.conjunction

c.tautology--->>ans

d.antecedent

fuzzy____ represents fuzzy truth value-->>>proposition

Which of the following is

not a principle step in

fuzzy technique--->>>none of the mention

Three main basic

features involved in

characterizing

membership function are--->>>Core, Support ,Boundary

Fuzzy relation is a fuzzy set defined on the Cartesian product of

--

a)single set

b)crisp set-->>>ans

c)union set d)intersection set

For what purpose

Feedback neural

networks are primarily

used?--->>>none of the mentioned

A robot is a-->>>Computercontrolled machine that mimics the motor activities of living things

The region of universe that is characterized by complete membership in

the set is called ---->>>core

fuzziness means--->>vagueness

This sheet is for 1 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions clearly	Cannot Distinguish two regions clearly	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguos	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neural computing,Genetic algorithm	Fuzzy network and artificial intelligence	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard bertrand	mc culloch	lofti a zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behaviour	deals with imprecise,probabilistic	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computing	conventional computing	non conventional computing	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behaviour	information processing paradigm	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search represents a guided approach while optimization is unguided	Blind search usually does not conclude in one step like some optimization methods.	Blind search cannot result in optimal solution whereas some optimization methods do	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can only be determined by an exhaustive enumeration testing of alternatives	a solution found in the least possible time and using the least possible computing resources	a solution that is the best based on criteria defined in the design phase	a solution that requires an algorithm for the determination	C
17	When is a complete enumeration of solution used?		When a solution that is "good enough" is fine and good heuristics are available	When there is enough time and computational power available	When the modeler requires a guided approach to problem solving	When there are an infinite number of solutions to be searched	B
18	All of the following are true about heuristics EXCEPT		heuristics are used when the modeler requires a guided approach to problem solving	heuristics are used when a solution that is "good enough" is sought	heuristics are used when there is abundant time and computational power	heuristics are rules of good judgement	C
19	Which approach is most suited to structured problem with little uncertainty		Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
21	What does the 0 membership value mean in the set		the object is fully inside the set	the object is not in the set	the object is partially present in the set	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a

23	The process of fuzzy interference system involves	membership functions	fuzzy logic operators	if-then rules	all the above	d
24	What does a fuzzifier do	converts crisp input to linguistic variables	converts crisp output to linguistic variables	converts fuzzy input to linguistic variables	converts fuzzy output to linguistic variables	a
25	Which of the following is not defuzzifier method	centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method	mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have	multiple part of antecedent, only single part of consequent	only single part of antecedent, multiple part of consequent	multiple part of antecedent, multiple part of consequent	only single part of antecedent, only single part of consequent	c
28	The a cut of a fuzzy set A is a crisp set defined by :-	$\{x u_A(x) > a\}$	$\{x u_A(x) \geq a\}$	$\{x u_A(x) < a\}$	$\{x u_A(x) \leq a\}$	b
29	The bandwidth(A) in a fuzzy set is given by	$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1/x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ B = $\{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?	$\{0/a, 0.7/b, 0.8/c, 0.2/d, 1/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.2/d, 1/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.7/d, 1/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 1/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ B = $\{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of AUB?	$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0.2/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.5/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.8/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ B = $\{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B ?	$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 1/e\}$	a

34	What denotes the support(A) in a fuzzy set?	$\{x u_A(x) > 0\}$	$\{x u_A(x) < 0\}$	$\{x u_A(x) \leq 0\}$	$\{x u_A(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?	$\{x u_A(x) > 0\}$	$\{x u_A(x) = 1\}$	$\{x u_A(x) \geq 0.5\}$	$\{x u_A(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designing a fuzzy logic machine	fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation>fuzzification>defuzzification	rule evaluation->defuzzification->fuzzification	a
38	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
39	Genetic algorithm belongs to the family of methods in the	artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
40	All of the following are suitable problems for genetic algorithm EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
41	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
43	mutation is applied on candidates.	one	two	more than two	none of these	a
44	recombination is applied on candidates.	one	two	more than two	none of these	b
45	LCS belongs to ___ based methods?	rule based learning	genetic learning	both a and b	none of these	a
46	Survival is ___ approach.	deterministic	non deterministic	semi deterministic	none of these	a

47	Evolutionary algorithms are a _____ based approach	heuristic	metaheuristic	both a and b	none of these	a
48	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by	Fredrik	Fogel	Frank	Flin	b
54	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
56	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover	discrete and intermediate	discrete and continuous	continuous and intermediate	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested.		1			B
61	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solution	none of these	c
62	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
63	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.	Simulation, Complex problem	Simulation, Easy problem	Genetics, Complex problem	Genetics, Easy problem	A
64	EC stands for?	Evolutionary Computations	Evolutionary computer	Electronic computations	none of these	a
65	GA stands for	genetic algorithm	genetic assurance	genetic algorithm	none of these	a
66	LCS stands for	learning classes system	learning classifier systems	learned class system	none of these	b
67	GBML stands for	Genetic based Machine learning	Genetic based mobile learning	Genetic based machine learning	none of these	c
68	EV is dominantly used for solving _____.	optimization problems	NP problem	simple problems	none of these	a
69	EV is considered as?	adaptive	complex	both a and b	none of these	c
70	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
72	Parameters that affect GA	initial population	selection process	fitness function	all of these	d

73	Fitness function should be		maximum	minimum	intermediate	none of these	b
74	Evolutionary algorithms are a ___ based approach		heuristic	metaheuristic	both a and b	none of these	a
75	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
77	mutation is applied on ___ candidates.		one	two	more than two	none of these	a
78	recombination is applied on ___ candidates.		one	two	more than two	none of these	b

79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offsprings	grand child	c
80	___ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection methods	both a and b	none of these	c
82	LCS belongs to ___ based methods?		rule based learning	genetic learning	both a and b	none of these	a
83	Survival is ___ approach.		deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called ___ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
90	For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c

92	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by _____		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3.): (5, 0), (6, 0.2) \}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.5}	{0.1, 0.5, 0.4, 0.2, 0.2}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3, 1), (0.6, 2), (1, 3), (0.7, 4), (0.2, 5)\}$ $B = \{(0.5, 11), (1, 12), (0.5, 13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max(x+y=z, \min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to		$\{(0.5, 12), (0.6, 13), (1, 14), (0.7, 15), (0.7, 16), (1, 17), (1, 18)\}$	$\{(0.5, 12), (0.6, 13), (1, 14), (1, 15), (1, 16), (1, 17), (1, 18)\}$	$\{(0.3, 12), (0.5, 13), (0.5, 14), (1, 15), (0.7, 16), (0.5, 17), (0.2, 18)\}$	$\{(0.3, 12), (0.5, 13), (0.6, 14), (1, 15), (0.7, 16), (0.5, 17), (0.2, 18)\}$	d

98	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy ≈ Prediction	Fuzzy ≈ Forecasting	Probability ≈ Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c

104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	----- defines logic funtion of two prepositions	prepositions	Lingustic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ---gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ---- - in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ---- - in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then $z=c$ (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigitype	Mamdani-type and Sugeno-type	Mihni-type and Sujganitype	c
113	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is	doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is	doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size changes dynamically	size=1	a
119	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size changes dynamically	size=1	b
120	Step size in self-adaptive EP	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size changes dynamically	size=1	c

121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)	(μ,λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

123	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126	(1+λ) ES	λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127	Termination condition for EA	maximally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming does not use crossover operators	d
130	(1+1) ES	Operates on population size of two	operates on population size of one	operates on population size of zero	operates on population size of λ	a
131	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

SCOA Unit I MCQ

- 1. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.**
A.True
B.False

- 2. The membership functions are generally represented in**
A.Tabular Form
B.Graphical Form
C.Mathematical Form
D.Logical Form

- 3. Membership function can be thought of as a technique to solve empirical problems on the basis of**
A.knowledge
B.examples
C.learning
D.experience

- 4. Three main basic features involved in characterizing membership function are**
A.Intuition, Inference, Rank Ordering
B.Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.sub normal fuzzy sets

B.normal fuzzy set

C.convex fuzzy set

D.concave fuzzy set

7. In a Fuzzy set a prototypical element has a value

A.1

B.0

C.infinite

D.Not defined

- 8. A fuzzy set wherein no membership function has its value equal to 1 is called**
- A.**normal fuzzy set
B.Subnormal fuzzy set.
C.convex fuzzy set
D.concave fuzzy set
- 9. A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe**
- A.**convex fuzzy set
B.concave fuzzy set
C.Non concave Fuzzy set
D.Non Convex Fuzzy set
- 10. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.**
- A.**Convex Fuzzy Set
B.Non convex fuzzy set
C.Normal Fuzzy set
D.Sub normal fuzzy set
- 11. The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to**

A.infinite

B.1

C.0

D.0.5

12. Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

B.False

14. Artificial neural network used for

A.Pattern Recognition

B.Classification

C.Clustering

D.All of these

15. A Neural Network can answer

- A.**For Loop questions
- B.**what-if questions
- C.**IF-The-Else Analysis Questions
- D.**None of these

16. Ability to learn how to do tasks based on the data given for training or initial experience

- A.**Self Organization
- B.**Adaptive Learning
- C.**Fault tolerance
- D.**Robustness

17. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

- A.**Adaptive Learning
- B.**Self Organization
- C.**What-If Analysis
- D.**Supervised Learning

18. In artificial Neural Network interconnected processing elements are called

- A.**nodes or neurons

B.weights

C.axons

D.Soma

19. Each connection link in ANN is associated with _____ which has information about the input signal.

A.neurons

B.weights

C.bias

D.activation function

20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.True

B.False

21. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.Weight

B.activation or activity level of neuron

C.Bias

D.None of these

22. Neuron can send _____ signal at a time.

- A.**multiple
- B.**one
- C.**none
- D.**any number of

23. Artificial intelligence is

- A.**It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations
- B.**Computational procedure that takes some value as input and produces some value as output.
- C.**Science of making machines performs tasks that would require intelligence when performed by humans
- D.**None of these

24. Expert systems

- A.**Combining different types of method or information
- B.**Approach to the design of learning algorithms that is structured along the lines of the theory of evolution
- C.**an information base filled with the knowledge of an expert formulated in terms

of if-then rules

D.None of these

25. Falsification is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

26. Evolutionary computation is

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.

C.Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.

D.None of these

27. Extendible architecture is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

28. Massively parallel machine is

A.A programming language based on logic

B.A computer where each processor has its own operating system, its own memory, and its own hard disk

C.Describes the structure of the contents of a database.

D.None of these

29. Search space

A.The large set of candidate solutions possible for a problem

B.The information stored in a database that can be, retrieved with a single query.

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

30. $n(\log n)$ is referred to

A.A measure of the desired maximal complexity of data mining algorithms

B.A database containing volatile data used for the daily operation of an organization

C.Relational database management system

D.None of these

31. Perceptron is

- A.**General class of approaches to a problem.
- B.**Performing several computations simultaneously
- C.**Structures in a database those are statistically relevant
- D.**Simple forerunner of modern neural networks, without hidden layers

32. Prolog is

- A.**A programming language based on logic
- B.**A computer where each processor has its own operating system, its own memory, and its own hard disk
- C.**Describes the structure of the contents of a database
- D.**None of these

33. Shallow knowledge

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be, retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

34. Quantitative attributes are

- A.**A reference to the speed of an algorithm, which is quadratically dependent on the size of

the data

B.Attributes of a database table that can take only numerical values

C.Tools designed to query a database

D.None of these

35. Subject orientation

A.The science of collecting, organizing, and applying numerical facts

B.Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.None of these

36. Vector

A.It do not need the control of the human operator during their execution

B.An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.The validation of a theory on the basis of a finite number of examples

D.None of these

37. Transparency

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

38. Core of soft Computing is

- A.**Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.**Fuzzy Networks and Artificial Intelligence
- C.**Artificial Intelligence and Neural Science
- D.**Neural Science and Genetic Science

39. Who initiated the idea of Soft Computing

- A.**Charles Darwin
- B.**Lofti A Zadeh
- C.**Rechenberg
- D.**Mc_Culloch

40. Fuzzy Computing

- A.**mimics human behaviour
- B.**doesn't deal with 2 valued logic
- C.**deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.**All of the above

41. Neural Computing

- A.**mimics human brain
- B.**information processing paradigm
- C.**Both (a) and (b)
- D.**None of the above

42. Genetic Algorithm are a part of

- A.**Evolutionary Computing
- B.**inspired by Darwin's theory about evolution - "survival of the fittest"
- C.**are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D.**All of the above

43. What are the 2 types of learning

- A.**Improvised and unimprovised
- B.**supervised and unsupervised
- C.**Layered and unlayered
- D.**None of the above

44. Supervised Learning is

- A.**learning with the help of examples
- B.**learning without teacher
- C.**learning with the help of teacher
- D.**learning with computers as supervisor

45. Unsupervised learning is

- A.**learning without computers
- B.**problem based learning

C.learning from environment

D.learning from teachers

46. Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

47. In supervised learning

A.classes are not predefined

B.classes are predefined

C.classes are not required

D. classification is not done

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

	<u>D.</u> experience	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p><u>A.</u>Intuition, Inference, Rank Ordering <u>B.</u>Fuzzy Algorithm, Neural network, Genetic Algorithm <u>C.</u>Core, Support , Boundary <u>D.</u>Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p><u>A.</u>Core <u>B.</u>Support <u>C.</u>Boundary <u>D.</u>Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p><u>A.</u>sub normal fuzzy sets</p>	B

	<u>B.</u> normal fuzzy set <u>C.</u> convex fuzzy set <u>D.</u> concave fuzzy set	
7.	In a Fuzzy set a prototypical element has a value <u>A.</u> 1 <u>B.</u> 0 <u>C.</u> infinite <u>D.</u> Not defined	A
8.	A fuzzy set wherein no membership function has its value equal to 1 is called <u>A.</u> normal fuzzy set <u>B.</u> subnormal fuzzy set. <u>C.</u> convex fuzzy set <u>D.</u> concave fuzzy set	B
9.	A fuzzy set has a membership function whose membership values	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesnt deal with 2 valued logic</p>	D

	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	Defuzzification is done to obtain a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above	a
13.	“The train is running fast”. Here ‘fast’ can be represented by a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned	a
14.	Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$ Then the crisp value of Young using MoM method is a) 25 b) 20 c) 35 d) 50	a
15.	f the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value. a) with the median of all the area	c

	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)\text{complement} \neq \text{---}(A\lambda)\text{complement}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is c then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

	d) None of the above	
26.	Fuzzy logic is a form of a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic	Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.
27.	Traditional set theory is also known as Crisp Set theory. a) True b) False	Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set. 3. The truth values of traditional set theory is _____ and that of fuzzy set is _____
28.	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Answer: a Explanation: Refer the

	a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1	definition of Fuzzy set and Crisp set.
29.	How many types of random variables are available? a) 1 b) 2 c) 3 d) 4	Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.
30.	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____. a) Fuzzy Set b) Crisp Set	Answer: a Explanation: Fuzzy logic deals with linguistic variables.
31.	The values of the set membership is represented by a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c	Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.
32.	What is meant by probability density function?	d

	a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables	
33.	Which of the following is used for probability theory sentences? a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned	Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.
34.	Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following. a) AND b) OR c) NOT d) EX-OR	Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;
35.	Fuzzy logic is usually represented as a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned	Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy

		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices. Rules are usually expressed in the form: IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <p>a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned</p>	<p>Answer: d Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <p>a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned</p>	<p>Answer: c Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

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Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

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	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intuition, Inference, Rank Ordering</p> <p>B.Fuzzy Algorithm, Neural network, Genetic Algorithm</p> <p>C.Core, Support , Boundary</p> <p>D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core</p> <p>B.Support</p> <p>C.Boundary</p> <p>D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

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	<p>B. normal fuzzy set C. convex fuzzy set D. concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A. 1 B. 0 C. infinite D. Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A. normal fuzzy set B. subnormal fuzzy set. C. convex fuzzy set D. concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

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	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesnt deal with 2 valued logic</p>	D

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	<p>B. mimics human behaviour</p> <p>C. deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D. All of the above</p>	
12.	Defuzzification is done to obtain a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above	a
13.	“The train is running fast”. Here ‘fast’ can be represented by a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned	a
14.	Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$ Then the crisp value of Young using MoM method is a) 25 b) 20 c) 35 d) 50	a

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15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area b) with the mean of all the area c) with the largest area d) with the smallest area 	c
16.	<p>Which of the following is not a centroid method?</p> <ul style="list-style-type: none"> a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM) 	d
17.	<p>What are the following sequence of steps taken in designing a fuzzy logic machine?</p> <ul style="list-style-type: none"> (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification 	a
18.	<p>If A is a fuzzy set, then $(A \lambda)$complement \neq $(A\lambda)$complement</p> <ul style="list-style-type: none"> (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ 	a
19.	<p>The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$</p> <ul style="list-style-type: none"> a) 2 	B

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	b) 5 c) 4 d) 1	
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$ c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	b
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d

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24.	<p>In triangular fuzzy number (l, m, u), what does 'm' represents:</p> <ul style="list-style-type: none"> a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above 	C
25.	<p>Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis?</p> <ul style="list-style-type: none"> a) Vector normalization b) Linear normalization c) Both A and B d) None of the above 	b
26.	<p>Fuzzy logic is a form of</p> <ul style="list-style-type: none"> a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic 	<p>Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.</p>
27.	<p>Traditional set theory is also known as Crisp Set theory.</p> <ul style="list-style-type: none"> a) True b) False 	<p>Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There is only two crisp values true or false. In case of fuzzy logic there are</p>

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		<p>many values. With weight say x the member is in the set.</p> <p>3. The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>
28.	<p>The truth values of traditional set theory is _____ and that of fuzzy set is _____</p> <p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	<p>Answer: a Explanation: Refer the definition of Fuzzy set and Crisp set.</p>
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p>	<p>Answer: a</p>

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	a) Fuzzy Set b) Crisp Set	Explanation: Fuzzy logic deals with linguistic variables.
31.	The values of the set membership is represented by a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c	Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.
32.	What is meant by probability density function? a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables	d
33.	Which of the following is used for probability theory sentences? a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned	Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.
34.	Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.	Answer: a, b, c

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	<p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b</p> <p>Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <p>a) Fuzzy Logic</p>	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty</p>

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	b) Probability c) Entropy d) All of the mentioned	involved in data. Represented by $H(\text{data})$.
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <p>a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned</p>	Answer: c Explanation: Local structure is usually associated with linear rather than exponential growth in complexity

Soft Computing & Optimization Algorithms [Multiple Choice Question] **UNIT No-03****Name of Content: Fuzzy Systems- Fuzzy Controller**

01	Fuzzy logic is :	
	Option A	Used to respond to questions in a human like way
	Option B	A new programming language used to program animation
	Option C	The result of fuzzy thinking
	Option D	A term that indicates logical values greater than one
	Correct Answer	A
02	What are the following sequence of steps taken in designing a fuzzy logic machine?	
	Option A	Rule evaluation->Fuzzification->Defuzzification
	Option B	Fuzzification->Rule evaluation->Defuzzification
	Option C	Fuzzy Sets->Defuzzification->Rule evaluation
	Option D	Defuzzification->Rule evaluation->Fuzzification
	Correct Answer	B
03	Fuzzy logic is a form of	
	Option A	Two-valued logic
	Option B	Crisp set logic
	Option C	Many-valued logic
	Option D	Binary set logic
	Correct Answer	C
04	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$	
	Option A	$h(A) = 0$
	Option B	$h(A) < 0$
	Option C	$h(A)=1$
	Option D	$h(A)<1$
	Correct Answer	C
05	Assumptions in Fuzzy Logic Control (FLC) Design	
	Option A	Existence of a knowledge body
	Option B	Range of precision
	Option C	The plant is observable and controllable
	Option D	All of the above
	Correct Answer	D

Name of Content: Fuzzy Rule Base & Approximate Reasoning

01	Fuzzy logic uses	
	Option A	Global variables
	Option B	Linguistic variables
	Option C	Local variables
	Option D	Approximate variables
	Correct Answer	B
02	_____ as an operator acts on fuzzy set representing meaning of its operand	
	Option A	Defuzzification
	Option B	Truth table
	Option C	Linguistic hedges
	Option D	Propositions
	Correct Answer	C
03	The major components of the FLC	
	Option A	Fuzzifier & Defuzzifier
	Option B	Fuzzy Rule Base & Knowledge Base
	Option C	Inference Engine
	Option D	All of the above
	Correct Answer	D
04	Which of the following not an Advantages of Fuzzy Logic Control	
	Option A	Cheaper
	Option B	Robust
	Option C	Reliability
	Option D	Expensive
	Correct Answer	D
05	Examples of Fuzzy quantifiers are words like	
	Option A	Most
	Option B	Many
	Option C	Few
	Option D	All of the above
	Correct Answer	D
06	Fuzzy truth qualification claims the degree of truth of fuzzy proposition	
	Option A	True
	Option B	False
	Correct Answer	A

07	Propositions in fuzzy logic involves	
	Option A	Fuzzy predicate
	Option B	Fuzzy Quantifier
	Option C	Fuzzy Qualifier
	Option D	All of the above
	Correct Answer	D
08	Formation of Rules: I: Assignment statement; II: Conditional statement; III: Unconditional statement	
	Option A	Only I
	Option B	Only I & II
	Option C	Only I, II & III
	Option D	Only II & III
	Correct Answer	C
09	Methods used for decomposition of rules	
	Option A	Multiple conjunctive antecedents
	Option B	Multiple disjunctive antecedents
	Option C	Conditional statement
	Option D	All of the above
	Correct Answer	D
10	Multiple conjunctive antecedents based on	
	Option A	Fuzzy union operation
	Option B	Fuzzy intersection operation
	Option C	Fuzzy condition operation
	Option D	Fuzzy difference operation
	Correct Answer	B
11	Two methods of Aggregation of fuzzy rules	
	Option A	Conjunctive system of rules
	Option B	Disjunctive system of rules
	Option C	Both a & b
	Option D	Neither a nor b
	Correct Answer	C
12	In disjunctive system of rules, output determined by performing fuzzy union of all individual rule consequents	
	Option A	True
	Option B	False
	Correct Answer	A

Name of Content: Fuzzy Reasoning and Fuzzy Inference system

01	In this form of reasoning, the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	
	Option A	Qualitative Reasoning
	Option B	Categorial Reasoning
	Option C	Syllogistic Reasoning
	Option D	Dispositional Reasoning
	Correct Answer	B
02	A Fuzzy syllogism can be expressed as $x=s_1$ A's are B's & $y=s_2$ C's are D's	
	Option A	$z=s_2$ C's are D's
	Option B	$z=s_2$ A's are B's
	Option C	$z=s_2$ C's are D's
	Option D	$z=s_3$ E's are F's
	Correct Answer	D
03	The Conjunction rule is	
	Option A	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \cap \sim B$
	Option B	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A - \sim B$
	Option C	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \ast \sim B$
	Option D	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \cap \sim B$
	Correct Answer	D
04	The negative rule of inference is	
	Option A	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } \sim A$
	Option B	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } A$
	Option C	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } A$
	Option D	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow x \text{ is } A$
	Correct Answer	A
05	In this mode of reasoning, the antecedents & consequents have fuzzy linguistic variables	
	Option A	Qualitative Reasoning
	Option B	Categorial Reasoning
	Option C	Syllogistic Reasoning
	Option D	Dispositional Reasoning
	Correct Answer	A

07	How many types are available in machine learning?	
	Option A	1
	Option B	2
	Option C	3
	Option D	4
	Correct Answer	C
08	How the decision tree reaches its decision?	
	Option A	Single test
	Option B	Two test
	Option C	Sequence of test
	Option D	No test
	Correct Answer	C
09	What Is Fuzzy Inference Systems?	
	Option A	The process of formulating the mapping from a given input to an output using fuzzy logic
	Option B	Changing the output value to match the input value to give it an equal balance
	Option C	Having a larger output than the input
	Option D	Having a smaller output than the input
	Correct Answer	A
10	Where Has Fuzzy Inference Systems Been Implemented?	
	Option A	Wireless services, heat control and printers
	Option B	Restrict power usage, telephone lines and sort data
	Option C	Simulink, boiler and CD recording
	Option D	Automatic control, decision analysis and data classification
	Correct Answer	D
11	What Is Another Name For Fuzzy Inference Systems?	
	Option A	Fuzzy Expert System
	Option B	Fuzzy Modelling
	Option C	Fuzzy Logic Controller
	Option D	All of the above
	Correct Answer	D
12	The Equation For Probabilistic: Prob(a,b) = a+b - ab	
	Option A	True
	Option B	False
	Correct Answer	A

Soft Computing & Optimization Algorithms [Multiple Choice Question] **UNIT No-04**

Name of Content: Basic Evolutionary Processes, EV: A Simple Evolutionary System

- 01 The tendency of population to remain in genetic equilibrium may be disturbed by
Option A Random mating
Option B Lack of migration
Option C Lack of mutations
Option D Lack of random mating

Correct Answer **D**

- 02 One of the important consequences of geographical isolation is:
Option A Random creation of new species
Option B No change in the isolated fauna
Option C Preventing Speciation
Option D Speciation through reproductive isolation

Correct Answer **D**

- 03 What is meant by the term Darwin fitness?
Option A The ability to survive and reproduce
Option B High aggressiveness
Option C Healthy appearance
Option D Physical strength

Correct Answer **A**

- 04 Diversification in plant life appeared:
Option A Due to abrupt mutations
Option B Suddenly on earth
Option C By seed dispersal
Option D Due to long periods of evolutionary changes

Correct Answer **D**

- 05 Chemical reactions could have converted simple organic compounds into _____ for the origin of life
Option A Micromolecules
Option B Nitrogen, oxygen and other gases
Option C Cells
Option D Macromolecules

Correct Answer **D**

- 06 Which one of the following sequences was proposed by Darwin and Wallace for organic evolution?
- Option A Overproduction, variations, constancy of population size, natural selection
- Option B Variations, constancy of population size, overproduction, natural selection
- Option C Overproduction, constancy of population size, variations, natural selection
- Option D Variations, natural selection, overproduction, constancy of population size
- Correct Answer** **C**
- 07 _____ is a subset of evolutionary computation,[1] a generic population-based meta-heuristic optimization algorithm
- Option A Genetic Algorithm
- Option B Evolutionary algorithm (EA)
- Option C Simulated Annealing
- Option D Artificial Intelligence
- Correct Answer** **B**
- 08 An EA uses mechanisms inspired by biological evolution, such as
- Option A mutation
- Option B recombination
- Option C selection
- Option D All of the above
- Correct Answer** **D**
- 09 Genetic Algorithms are
- Option A a class of algorithms that try and build solutions by introducing evolution and selection of the best in a population of candidate solutions
- Option B Methods, based on the theory of natural selection and evolutionary biology, for solving optimization problems.
- Option C A heuristic search method used in artificial intelligence and computing.
- Option D All of the above
- Correct Answer** **D**
- 10 Objects forming possible solutions within the original problem context are referred to as
- Option A Phenotypes
- Option B Genotypes
- Option C Genes
- Option D Chromosomes
- Correct Answer** **A**

Name of Content: Canonical Evolutionary Algorithms

- 01 In Evolutionary algorithm, An individual consist of
Option A Genotype and phenotypes
Option B Parent selection and crossover
Option C Genotype and a fitness function
Option D Mutation and recombination
- Correct Answer C**
- 02 Evolutionary Strategies were developed in the sixties by
Option A John Holland
Option B Rechenberg and Schwefe
Option C Allen and Karjalainen
Option D Ryan and Collins
- Correct Answer B**
- 03 EA heuristic follows
Option A Initialization
Option B Evaluation
Option C Mutation and selection
Option D All of the above
- Correct Answer D**
- 04 Selection is based on
Option A Ranking of the individual fitness
Option B Recombination of parents
Option C Mutation of parameter
Option D None of the above
- Correct Answer A**
- 05 The Simple evolution strategy operates on population of size two:
Option A The current point (parent)
Option B Result of its mutation (one offspring)
Option C Both a and b
Option D None of the above
- Correct Answer C**
- 06 Depending on search space & objective function, recombination & mutation of strategy parameter may or may not occur in specific algorithm
Option A True
Option B False
- Correct Answer A**

Name of Content: A Unified view of Simple EAs

01 EA consist of following elements

- | | |
|----------|---------------------------|
| Option A | Parent Population size |
| Option B | Survival selection method |
| Option C | Parent selection method |
| Option D | All of the above |

Correct Answer **D**

02 _____ which of the following method determines to be kept in the next generation

- | | |
|----------|--------------------|
| Option A | Parent selection |
| Option B | Mutation |
| Option C | Recombination |
| Option D | Survival selection |

Correct Answer **D**

03 Roulette wheel selection scheme is preferable when

- | | |
|----------|--|
| Option A | Fitness values are uniformly distributed |
| Option B | Fitness values are non-uniformly distributed |
| Option C | Needs low selection pressure |
| Option D | Needs high population diversity |

Correct Answer **A**

04 A genetic operator used in genetic algorithms for selecting potentially useful solutions for recombination.

- | | |
|----------|---------------------------------|
| Option A | Fitness proportionate selection |
| Option B | Roulette wheel selection |
| Option C | Rank selection method |
| Option D | Stochastic universal sampling |

Correct Answer **A & B**

05 _____ is a method of selecting an individual from a population of individuals in a genetic algorithm.

- | | |
|----------|-------------------------------|
| Option A | Roulette wheel selection |
| Option B | Rank selection method |
| Option C | Tournament selection |
| Option D | Stochastic Universal Sampling |

Correct Answer **C**

06 As selection pressure increases, fitter solutions are more likely to survive

- | | |
|----------|-------|
| Option A | True |
| Option B | False |

Correct Answer **A**

- 07 What are normally the two best measurement units for an evolutionary algorithm?
- Option A Number of evaluations
Option B Number of generations
Option C Elapsed & CPU time
Option D Both a & b
- Correct Answer D**
- 08 What is most important to be concerned with in the evolution of repetitive problems?
- Option A Do multiple runs until a good solution is found
Option B Execute one run until the solution is good enough
Option C Get a reasonably good solution every time
Option D Get a very good result just once
- Correct Answer C**
- 09 Evolutionary Strategies (ES)
- Option A (μ, λ) : Select survivors among parents and offspring
Option B $(\mu + \lambda)$: Select survivors among parents and offspring
Option C $(\mu - \lambda)$: Select survivors among offspring only
Option D $(\mu : \lambda)$: Select survivors among offspring only
- Correct Answer B**
- 10 Rank based selection
- Option A Use relative rather than absolute fitness
Option B Use absolute rather than relative fitness
Option C Results in less control of the selection pressure than fitness-proportionate selection
Option D Ranking can be either linear or non-linear
- Correct Answer A & D**

Subject: Soft computing Optimization Algorithm
MCQs Unit- I

1. Neural Computing
 - A. mimics human brain
 - B. information processing paradigm
 - C. Both (a) and (b)
 - D. None of the above

Ans: C

Explanation: NN is used for data processing modelled on human brain

2. Genetic Algorithm are a part of

- A. Evolutionary Computing
- B. inspired by Darwin's theory about evolution - "survival of the fittest"
- C. are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D. All of the above

Ans: D

Explanation: It is part of EA

3. What are the 2 types of learning

- A. Improvised and unimprovised
- B. supervised and unsupervised
- C. Layered and unlayered
- D. None of the above

Ans: B

Explanation: Supervised and unsupervised are two types

4. Supervised Learning is
 - A. learning with the help of examples
 - B. learning without teacher
 - C. learning with the help of teacher
 - D. learning with computers as supervisor

Ans: C

Explanation: Training data is present

5. Unsupervised learning is

- A. learning without computers
- B. problem based learning
- C. learning from environment
- D. learning from teachers

Ans: C

Explanation: without training data

6. Conventional AI is different from soft computing in the sense

- A. Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic
- B. Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data
- C. Both (a) and (b)
- D. None of the above

Ans: C

Explanation: Soft computing covers fuzzy, supervised NN algorithms

7. In Supervised learning:

- A. classes are not predefined
- B. classes are predefined
- C. classes are not required
- D. classification is not done

Ans: B

Explanation: Training data is present

8. A 4-input neuron has weights 1, 2, 3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. The output will be:

- a) 238
- b) 76
- c) 119
- d) 123

Ans: a

Explanation: The output is found by multiplying the weights with their respective inputs, summing the results and multiplying with the transfer function. Therefore:

$$\text{Output} = 2 * (1*4 + 2*10 + 3*5 + 4*20) = 238$$

9. ANN is composed of large number of highly interconnected processing elements (neurons) working in unison to solve problems.

A. True

B. False

Ans: A

Explanation: As per architecture it is true

10. Artificial neural network used for

A. Pattern Recognition

B. Classification

C. Clustering

D. All of these

Ans: D

11. A Neural Network can answer

A. For Loop questions

B. what-if questions

C. IF-The-Else Analysis Questions

D. None of these

Ans: B

Explanation: Generally used for prediction and classification

12. Ability to learn how to do tasks based on the data given for training or initial experience

A. Self Organization

B. Adaptive Learning

C. Fault tolerance

D. Robustness

Ans: B

Explanation: Adaption allows learn from self experiences

13. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

A. Adaptive Learning

B. Self Organization

C. What-If Analysis

D. Supervised Learnning

Ans: B

Explanation: SOM is unsupervised NN

14. In artificial Neural Network interconnected processing elements are called

- A. nodes or neurons
- B. weights
- C. axons
- D. Soma

Ans: A

Explanation: As per the definition

15. Each connection link in ANN is associated with _____ which has information about the input signal.

- A. Neurons
- B. Weights
- C. Bias
- D. activation function

Ans: B

Explanation: As per the definition

16. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

- A. True
- B. False

Ans: A

17. Internal state of neuron is called _____, is the function of the inputs the neurons receives

- A. Weight
- B. activation or activity level of neuron
- C. Bias
- D. None of these

Ans: B

Explanation: As per the definition

18. Neuron can send _____ signal at a time.

- A. multiple

- B. one
- C. none
- D. any number

Ans: B

Explanation: can receive multiple signals but send only one signal (single output)

19. What is perceptron?

- a) a single layer feed-forward neural network with pre-processing
- b) an auto-associative neural network
- c) a double layer auto-associative neural network
- d) a neural network that contains feedback

Ans: a

Explanation:

20. The perceptron is a single layer feed-forward neural network. It is not an auto-associative network because it has no feedback and is not a multiple layer neural network because the pre-processing stage is not made of neuron

21. Why is the XOR problem exceptionally interesting to neural network researchers?

- a) Because it can be expressed in a way that allows you to use a neural network
- b) Because it is complex binary operation that cannot be solved using neural networks
- c) Because it can be solved by a single layer perceptron
- d) Because it is the simplest linearly inseparable problem that exists.

Ans:d

Explanation: it is the simplest non linearly problem

22. What is back propagation?

- a) It is another name given to the curvy function in the perceptron
- b) It is the transmission of error back through the network to adjust the inputs
- c) It is the transmission of error back through the network to allow weights to be adjusted so that the network can learn
- d) None of the mentioned

Answer: c

Explanation: Back propagation is the transmission of error back through the network to allow weights to be adjusted so that the network can learn.

23. Neural Networks are complex _____ with many parameters.

- a) Linear Functions
- b) Nonlinear Functions

- c) Discrete Functions
- d) Exponential Functions

Answer: a

Explanation: Neural networks are complex linear functions with many parameters.

24. A perceptron adds up all the weighted inputs it receives, and if it exceeds a certain value, it outputs a 1, otherwise it just outputs a 0.

- a) True
- b) False
- c) Sometimes – it can also output intermediate values as well
- d) Can't say

Answer: a

Explanation: Yes the perceptron works like that.

25. The network that involves backward links from output to the input and hidden layers is called _____

- a) Self organizing maps
- b) Perceptrons
- c) Recurrent neural network
- d) Multi layered perceptron

Answer: c

Explanation: RNN (Recurrent neural network) topology involves backward links from output to the input and hidden layers.

26. Which of the following is an application of NN (Neural Network)?

- a) Sales forecasting
- b) Data validation
- c) Risk management
- d) All of the mentioned

Answer: d

Explanation: All mentioned options are applications of Neural Network.

27 Artificial neural networks

- A Are trained by adjusting the network size
- B Are trained by adjusting weights
- C The weights are either all positive or all negative
- D The learning rate controls the amount of weight change

Ans: B , D

28 Why use Multi Layer Perceptron instead of a single layer perceptron?

- A Faster learning

- B Easier programming
- C Can solve more complex problems
- D Can learn multiple decision boundaries

Ans: c,D

29. The activation function in a multilayer perceptron
- A Does thresholding to 0 or 1
 - B Is used to compute the output value of a node
 - C Is used for initialization of the network
 - D Makes it possible to train non-linear decision boundaries

And: B,D

30 Which of the following neural networks uses supervised learning?

- (A) Multilayer perceptron
- (B) Self organizing feature map
- (C) Hopfield network
- (D) M_P neuron

Ans: A

Explanation: Training is not possible for MP neuron

31. Identify the following activation function : $\phi(V) = Z + (1 / (1 + \exp(-x * V + Y)))$, Z, X, Y are parameters
- a. Step function
 - b. Ramp function
 - c. Sigmoid function
 - d. Gaussian function

Ans: C

Explanation: it is sigmoid function

- 32 . An artificial neuron receives n inputs $x_1, x_2, x_3, \dots, x_n$ with weights w_1, w_2, \dots, w_n attached to the input links. The weighted sum _____ is computed to be passed on to a non-linear filter Φ called activation function to release the output.
- a. $\sum w_i$
 - b. $\sum x_i$
 - c. $\sum w_i + \sum x_i$
 - d. $\sum w_i * x_i$

Ans: d

Explanation: It is net input calculated as $\sum w_i * x_i$

33. Which of the following can be used for clustering of data ?

- a. Single layer perception
- b. Multilayer perception
- c. Self organizing map
- d. Radial basis function

Ans: C

Explanation: SOM is unsupervised NN based on grouping of elements based on similarity

34. Perceptron learning, Delta learning and LMS learning are learning methods which falls under the category of

- a. Error correction learning - learning with a teacher
- b. Reinforcement learning - learning with a critic
- c. Hebbian learning
- d. Competitive learning - learning without a teacher

Ans: a

Explanation: It is one of the supervised learning algorithm.

35 Which of the following model has ability to learn?

- a) pitts model
- b) rosenblatt perceptron model
- c) both rosenblatt and pitts model
- d) neither rosenblatt nor pitts

Answer: b

Explanation: Weights are fixed in pitts model but adjustable in rosenblatt.

36 When both inputs are 1, what will be the output of the pitts model nand gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: a

Explanation: Check the truth table of simply a nand gate.

37 When both inputs are 1, what will be the output of the pitts model AND gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: b

Explanation: Check the truth table of simply a And gate.

38. When both inputs are 1, what will be the output of the pitts model OR gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: b

Explanation: Check the truth table of simply a OR gate.

39. When both inputs are 1, what will be the output of the pitts model XOR gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: a

Explanation: Check the truth table of simply a XOR gate.

40. Does McCulloch-pitts model have ability of learning?

- a) yes
- b) no

Answer: b

Explanation: Weights are fixed.

41. What is an activation value?

- a) weighted sum of inputs
- b) threshold value
- c) main input to neuron
- d) none of the mentioned

Answer: a

Explanation: It is definition of activation value

42. Positive sign of weight indicates?

- a) excitatory input
- b) inhibitory input
- c) can be either excitatory or inhibitory as such
- d) none of the mentioned

Answer: a

Explanation: Sign convention of neuron.

43. Negative sign of weight indicates?

- a) excitatory input
- b) inhibitory input
- c) excitatory output
- d) inhibitory output

Answer: b

Explanation: Sign convention of neuron.

44. The amount of output of one unit received by another unit depends on what?

- a) output unit
- b) input unit
- c) activation value
- d) weight

Answer: d

Explanation: Activation is sum of weighted sum of inputs, which gives desired output..hence output depends on weights.

45. The process of adjusting the weight is known as?

- a) activation
- b) synchronisation
- c) learning
- d) none of the mentioned

Answer: c

Explanation: Basic definition of learning in neural nets .

46. The procedure to incrementally update each of weights in neural is referred to as?

- a) synchronisation
- b) learning law
- c) learning algorithm
- d) both learning algorithm & law

Answer: d

Explanation: Basic definition of learning law in neural.

47. In what ways can output be determined from activation value?

- a) deterministically
- b) stochastically
- c) both deterministically & stochastically
- d) none of the mentioned

Answer: c

Explanation: This is the most important trait of input processing & output determination in neural networks.

48. How can output be updated in neural network?

- a) synchronously
- b) asynchronously

- c) both synchronously & asynchronously
- d) none of the mentioned

Answer: c

Explanation: Output can be updated at same time or at different time in the networks.

49. What is asynchronous update in neural netwks?

- a) output units are updated sequentially
- b) output units are updated in parallel fashion
- c) can be either sequentially or in parallel fashion
- d) none of the mentioned

Answer: a

Explanation: Output are updated at different time in the networks.

50. Who developed the first learning machine in which connection strengths could be adapted automatically?

- a) McCulloch-pitts
- b) Marvin Minsky
- c) Hopfield
- d) none of the mentioned

Answer: b

Explanation: In 1954 Marvin Minsky developed the first learning machine in which connection strengths could be adapted automatically & efficiebtly.

51. Who proposed the first perceptron model in 1958?

- a) McCulloch-pitts
- b) Marvin Minsky
- c) Hopfield
- d) Rosenblatt

Answer: d

Explanation: Rosenblatt proposed the first perceptron model in 1958 .

52. What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?

- a) associative nature of networks
- b) distributive nature of networks
- c) both associative & distributive
- d) none of the mentioned

Answer: c

Explanation: General characteristics of ANNs.

53. What was the name of the first model which can perform wieghted sum of inputs?

- a) McCulloch-pitts neuron model
- b) Marvin Minsky neuron model

- c) Hopfield model of neuron
- d) none of the mentioned

Answer: a

Explanation: McCulloch-pitts neuron model can perform weighted sum of inputs followed by threshold logic operation.

54. The cell body of neuron can be analogous to what mathematical operation?

- a) summing
- b) differentiator
- c) integrator
- d) none of the mentioned

Answer: a

Explanation: Because adding of potential(due to neural fluid) at different parts of neuron is the reason of its firing.

55. What is the critical threshold voltage value at which neuron get fired?

- a) 30mv
- b) 20mv
- c) 25mv
- d) 10mv

Answer: d

Explanation: This critical is founded by series of experiments conducted by neural scientist.

60 . Does there is any effect on particular neuron which got repeatedly fired ?

- a) yes
- b) no

Answer: a

Explanation: The strength of neuron to fire in future increases.

61. What is name of above mechanism?

- a) hebb rule learning
- b) error correction learning
- c) memory based learning
- d) none of the mentioned

View Answer

Answer: a

Explanation: It follows from basic definition of hebb rule learning.

62. What is hebb's rule of learning

- a) the system learns from its past mistakes
- b) the system recalls previous reference inputs & respective ideal outputs
- c) the strength of neural connection get modified accordingly

d) none of the mentioned

Answer:c

Explanation: The strength of neuron to fire in future increases, if it is fired repeatedly.

63. Who invented perceptron neural networks?

a) McCulloch-pitts

b) Widrow

c) Minsky & papert

d) Rosenblatt

Answer: d

Explanation: The perceptron is one of the earliest neural networks. Invented at the Cornell Aeronautical Laboratory in 1957 by Frank Rosenblatt, the Perceptron was an attempt to understand human memory, learning, and cognitive processes.

64. What is delta (error) in perceptron model of neuron?

a) error due to environmental condition

b) difference between desired & target output

c) can be both due to difference in target output or environmental condition

d) none of the mentioned

Answer: a

Explanation: All other parameters are assumed to be null while calculating the error in perceptron model & only difference between desired & target output is taken into account.

65. In neural how can connections between different layers be achieved?

a) interlayer

b) intralayer

c) both interlayer and intralayer

d) either interlayer or intralayer

Answer: c

Explanation: Connections between layers can be made to one unit to another and within the units of a layer.

66. Connections across the layers in standard topologies & among the units within a layer can be organised?

a) in feedforward manner

b) in feedback manner

c) both feedforward & feedback

d) either feedforward & feedback

Answer: d

Explanation: Connections across the layers in standard topologies can be in feedforward manner or in feedback manner but not both.

67. State whether Hebb's law is supervised learning or of unsupervised type?

a) supervised

b) unsupervised

c) either supervised or unsupervised

d) can be both supervised & unsupervised

Answer: b

Explanation: No desired output is required for its implementation.

68. Following approach has deterministic and well written rules:

- a. Soft Computing
- b. hard computing

Ans: b

Explanation: Hard computing is based on deterministic fixed algorithms

69. Uncertainty can be handled in ---

- a. Soft Computing
- b. hard computing

Ans:

Explanation: Fuzzy a type of soft computing is more suitable to handle uncertainty

70. Different soft computing approaches can be combined to improve efficiency:

- a. True
- b. False

Ans: a

Explanation: there are different hybrid approaches available.

Subject: Soft computing Optimization Algorithm

MCQs Unit- II and III (Fuzzy Logic)

1. The membership functions are generally represented in

- a. Tabular Form
- b. Graphical Form
- c. Mathematical Form
- d. Logical Form

Ans: b

Explanation: Membership functions are presented in the form of plots

2. Three main basic features involved in characterizing membership function are

- a. Intuition, Inference, Rank Ordering
- b. Fuzzy Algorithm, Neural network, Genetic Algorithm
- c. Core, Support , Boundary
- d. Weighted Average, center of Sums, Median

Ans: C

Explanation: As per the diagram of MF

3 A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

- a. sub normal fuzzy sets
- b. normal fuzzy set
- c. convex fuzzy set
- d. concave fuzzy set

Ans: b

Explanation: As per the definition

4 A fuzzy set wherein no membership function has its value equal to 1 is called

- a. normal fuzzy set
- b. subnormal fuzzy set.
- c. convex fuzzy set
- d. concave fuzzy set

Ans: b

Explanation: As per the definition

5. Who initiated the idea of Soft Computing

- a. Charles Darwin
- b. Lofti A Zadeh
- c. Mc_Culloch
- d. Rechenberg

Ans: b

6. Core of soft Computing is.....

- a. Fuzzy Computing, Neural Computing, Genetic Algorithms
- b. Fuzzy Networks and Artificial Intelligence
- c. Artificial Intelligence and Neural Science
- d. Neural Science and Genetic Science

Ans: a

Explanation: As per the definition

7. Fuzzy logic is usually represented as

- a. IF-THEN-ELSE rules
- b. IF-THEN rules
- c. Both IF-THEN-ELSE rules & IF-THEN rules
- d. None of the mentioned

Ans: b

Explanation: Rules are usually expressed in the form: IF variable IS property THEN action

8. Which of the following is not true regarding the principles of fuzzy logic?

- a. Fuzzy logic follows the principle of Aristotle and Buddha
- b. Fuzzy logic is a concept of 'certain degree'
- c. Japan is currently the most active users of fuzzy logic
- d. Boolean logic is a subset of fuzzy logic

Ans: b

Explanation: Fuzzy deals with uncertainty

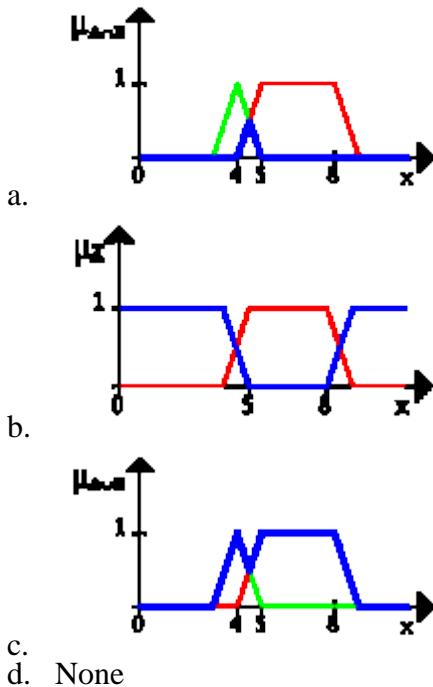
9. what are the following sequence of steps taken in designing a fuzzy logic machine?

- a. Fuzzification -> Rule Evaluation --> Defuzzification
- b. Rule Evaluation -->Fuzzification ->Defuzzification
- c. Defuzzification-->Rule Evaluation -->Fuzzification
- d. Fuzzy Sets-->Defuzzification-->Rule Evaluation

Ans: a

Explanation: fuzzification, rule evaluation and defuzzification are the general steps

10. Given these fuzzy graphs for member functions A and B.Which of the following graphs yields the result of the operation A OR B.



Ans: C

11. What Is Fuzzy Inference Systems?

- a. The process of formulating the mapping from a given input to an output using fuzzy logic
- b. Changing the output value to match the input value to give it an equal balance
- c. Having a larger output than the input
- d. Having a smaller output than the input

Ans: a

12. What Is another Name For Fuzzy Inference Systems?

- a. Fuzzy Expert System
- b. Fuzzy Modelling
- c. Fuzzy Logic Controller
- d. All the Options

Ans: a

13. _____ is/are the way/s to represent uncertainty.

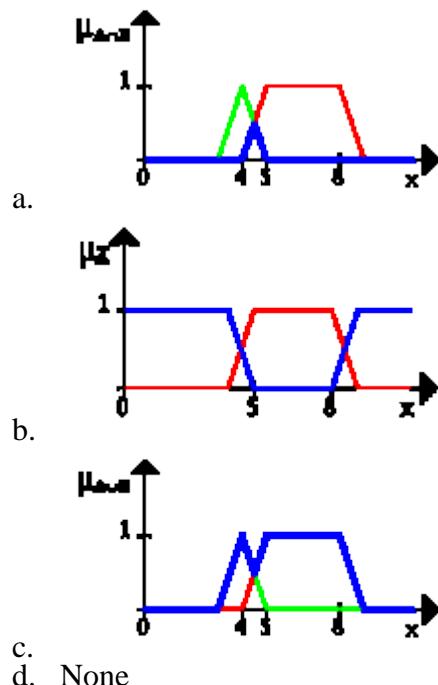
- a. Fuzzy Logic
- b. Probabilty

- c. Entropy
- d. All of the mentioned

Ans: d

Explanation: Entropy is amount of uncertainty involved in data.

14. Given these fuzzy graphs for member functions A and B. Which of the following graphs yields the result of the operation A AND B.



Ans: a

15. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.

- A. True
- B. False

Ans: A

16. Fuzzy Computing

- A. mimics human behaviour
- B. doesn't deal with 2 valued logic
- C. deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D. All of the above

Ans: D

Explanation: Fuzzy deals with imprecise, uncertain, ambiguous, inexact, or probabilistic can represent linguistic variables and partial membership in more than two sets

17 The region of universe that is characterized by complete membership in the set is called

A. Core

B. Support

C. Boundary

D. Fuzzy

Ans: A

Explanation: As per the definition

18 Three main basic features involved in characterizing membership function are

A. Intuition, Inference, Rank Ordering

B. Fuzzy Algorithm, Neural network, Genetic Algorithm

C. Core, Support , Boundary

D. Weighted Average, center of Sums, Median

Ans: C

Explanation: As per the definition

19 Membership function can be thought of as a technique to solve empirical problems on the basis of

A. knowledge

B. examples

C. learning

D. experience

Ans: D

Explanation: It depends on individual's perception

20 In a Fuzzy set a prototypical element has a value

A. 1

B. 0

C. infinite

D. Not defined

Ans: A

Explanation: As per the definition

21 A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe

- A. convex fuzzy set
- B. concave fuzzy set
- C. Non concave Fuzzy set
- D. Non Convex Fuzzy set

Ans: A

Explanation: As per the definition

22. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.

- A. Convex Fuzzy Set
- B. Non convex fuzzy set
- C. Normal Fuzzy set
- D. Sub normal fuzzy set

Ans: B

Explanation: As per the definition

23 The process of converting crisp input to fuzzy output is called as.....

- A. Fuzzification
- B. Defuzzification

Ans: A

Explanation: As per the definition

24 The process of converting fuzzy input to crisp output is called as.....

- A. Fuzzification
- B. Defuzzification

Ans: B

Explanation: As per the definition

25. Traditional set theory is called as....

- a. Fuzzy sets
- b. Crisp sets

Explanation: As per the definition

26. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **Intersection** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: A

27. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **Union** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: B

28. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **complement for A** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: C

29. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **complement for B** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: d

30 In propositional logic $P \Leftrightarrow Q$ is equivalent to (Where \sim denotes NOT):

- a. $\sim(P \vee Q) \wedge \sim(Q \vee P)$
- b. $(\sim P \vee Q) \wedge (\sim Q \vee P)$
- c. $(P \vee Q) \wedge (Q \vee P)$
- d. $\sim(P \vee Q) \rightarrow \sim(Q \vee P)$

Ans:B

31. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy **fuzzy min-max composition** is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: b

32. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy **fuzzy max-min composition** is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: a

33. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy **fuzzy max-product composition** is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: c

34. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **A Union B**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: a

35. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **A Intersect B**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: b

36. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **complement of A**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: c

37. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **complement of B**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: d

38. Following are defuzzification techniques

- a. Max-membership principle
- b. Centroid method
- c. Weighted average method.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques

39. Following are defuzzification techniques

- a. Lamdda cut method
- b. Centroid method
- c. Center of sums.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques

40. Following are defuzzification techniques

- a. Mean-max membership
- b. Center of large area
- c. First of maxima, last of maxima.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques

41. fuzzy approximate reasoning methods are

- a. categorical reasoning;
- b. qualitative reasoning;
- c. syllogistic reasoning;
- d. All of above

Ans: d

Explanation: All above are techniques of approximation

42. fuzzy approximate reasoning methods are

- a. categorical reasoning;
- b. qualitative reasoning;
- c. dispositional reasoning.
- d. All of above

Ans: d

Explanation: All above are techniques of approximation

43. Following are types of fuzzy Inference system

- a. Fuzzy controller
- b. Fuzzy expert system
- c. Mamdani FIS
- d. none of above

Ans: C

Explanation: Mamdani and Sugeno are types of FIS

44. Following are types of fuzzy Inference system

- a. Fuzzy controller
- b. Fuzzy expert system
- c. Sugeno FIS
- d. none of above

Ans: C

Explanation: Mamdani and Sugeno are types of FIS

45. Fuzzy propositions like short, Tall, Quick are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fu:zzy qualifiers

Ans: a

Explanation: Fuzzy predicates are tall, short , quick

46. Fuzzy propositions like moderately, rather, slightly are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy qualifiers

Ans:b

Explanation: As per the definition

47. Fuzzy propositions like most, several, many, & frequently are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fu:zzy qualifiers

Ans: C

Explanation: As per the definition

48. Fuzzy propositions that shows truth value or probability value are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy qualifiers

Ans: d

Explanation: As per the definition

49. Fuzzy propositions like rail, short, Tall, Quick are comes under

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy possibility qualification:

Ans: A

Explanation: As per the definition

50. In which type of FIS (fuzzy inference System) , output membership function is linear or constant

- a. Sugeno FIS
- b. Mamdani FIS

Ans: a

51. For describing fuzzy variables, modifiers like very, highly, slightly, moderately, plus, minus, fairly are called

- a. Linguistic variables
- b. Linguistic hedges

Ans: b

Explanation: As per the definition

52. For fuzzy variable Height, values like tall, small are called as

- a. Linguistic variables
- b. Linguistic hedges

Ans: a

Explanation: As per the definition

53. The values of the set membership is represented by _____

- a) Discrete Set
- b) Degree of truth
- c) Probabilities
- d) Both Degree of truth & Probabilities

Answer: b

Explanation: Both Probabilities and degree of truth ranges between 0 – 1.

54. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____

- a) Fuzzy Set
- b) Crisp Set
- c) Fuzzy & Crisp Set
- d) None of the mentioned

Answer: a

Explanation: Fuzzy logic deals with linguistic variables.

55. The truth values of traditional set theory is _____ and that of fuzzy set is _____

- a) Either 0 or 1, between 0 & 1
- b) Between 0 & 1, either 0 or 1
- c) Between 0 & 1, between 0 & 1
- d) Either 0 or 1, either 0 or 1

Answer: a

Explanation: Refer the definition of Fuzzy set and Crisp set.

56. Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.

- a) AND
- b) OR
- c) NOT
- d) All of the mentioned

Answer: d

Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;

57. Like relational databases there does exists fuzzy relational databases.

- a) True
- b) False

Answer: a

Explanation: Once fuzzy relations are defined, it is possible to develop fuzzy relational databases. The first fuzzy relational database, FRDB, appeared in Maria Zemankova dissertation.

58 What is the form of Fuzzy logic?

- a) Two-valued logic
- b) Crisp set logic
- c) Many-valued logic
- d) Binary set logic

Answer: c

Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.

59. What Is The Purpose Of Aggregation?

- A. To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs
- B. To gather all the possible inputs and use the average to gain an output
- C. To gather all the different fuzzy set outputs and averages them out to get a single value
- D. To subtract all the output fuzzy set values from the input values

Ans: A

Explanation: Aggregate operation combines them into single fuzzy set. (it is not a average)

60. What Are The Two Types Of Fuzzy Inference Systems?

- A. Model-Type and System-Type
- B. Momfred-Type and Semigi-Type
- C. Mamdani-Type and Sugeno-Type
- D. Mihni-Type and Sujgani-Type

Ans: C

Explanation: Mamdani and Sugeno are types of FIS

61. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be

- a. $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- b. $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- c. $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- d. None of the above

Answer:c

Explanation: e.g $0/2 < 0.5$ hence $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$

62. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 2$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {4, 5, 6, 7, 8, 9, 10}
- d. None of the above

Answer: d

Explanation: no membership value above 2

63. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / x$ Then the α cut corresponding to $\alpha = 1$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {4, 5, 6, 7, 8, 9, 10}
- d. None of the above

Answer: b

Explanation: all the values equal or above to α are considered in α cut

64. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x$ Then the α cut corresponding to $\alpha = 5$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {5, 6, 7, 8, 9, 10}
- d. None of the above

Answer:C

Answer: all the values equal or above to α are considered in α cut

65. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x$ Then the α cut corresponding to $\alpha = 8$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {9, 10}
- c. {8, 9, 10}
- d. None of the above

Answer:C

Explanation: all the values equal or above to α are considered in α cut

66 . Consider a fuzzy set old as defined below

Old = {(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)}

Then the alpha-cut for alpha = 0.4 for the set old will be

- a.** $\{(40, 0.4)\}$
- b.** $\{50, 60, 70, 80\}$
- c.** $\{(20, 0.1), (30, 0.2)\}$
- d.** $\{(20, 0), (30, 0), (40, 1), (50, 1), (60, 1), (70, 1), (80, 1)\}$

Ans: d

Explanation: all the values equal or above to α are considered in α cut

68 . Consider a fuzzy set old as defined below

$$\text{Old} = \{(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)\}$$

Then the alpha-cut for alpha = 1 for the set old will be

- a.** $\{(40, 0.4)\}$
- b.** $\{70, 80\}$
- c.** $\{(20, 0.1), (30, 0.2)\}$
- d.** $\{(20, 0), (30, 0), (40, 0), (50, 0), (60, 0), (70, 1), (80, 1)\}$

Ans: d

Explanation: all the values equal or above to α are considered in α cut

69. The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$

- a.** $h(A) = 0$
- b.** $h(A) < 0$
- c.** $h(A) = 1$
- d.** $h(A) < 1$

Ans: c

Explanation: Support of MF =1

70. A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$

- a.** Core
- b.** Support
- c.** Cross-over
- d.** α - cut

Ans: c

Explanation: Cross-over point =0.5

71. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.1, 0.5, 0.6, 0.1, 0.8\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: d

Explanation: intersection is minimum value of MF

72. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cup \mu_B$ will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.1, 0.5, 0.6, 0.1, 0.8\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: a

Explanation: Union is maximum value of MF

73. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of complement($\sim \mu_A$) will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.8, 0.5, 0.4, 0.9, 0.1\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: c

Explanation: complement is 1-mf

74. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of complement($\sim \mu_B$) will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.9, 0.5, 0.8, 0.3, 0.2\}$
- c. $\{0.8, 0.5, 0.4, 0.9, 0.1\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: b

Explanation: complement is 1-mf

75. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value of $A \cup B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: a

Explanation: Maximum of mf

76. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value of $A \cap B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: minimum of mf

77. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim A$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans:c

Explanation: 1- mf

78. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans:d

Explanation: 1- mf

78. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $A \cap \sim B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) min of mf

79. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $A \cup \sim B$ will be

- a. $\{0.5, 0.6, 0.8, 0.2\}$
- b. $\{0.1, 0.3, 0.1, 0\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: a

Explanation: i) 1- mf ii) max of mf

80. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim A \cup \sim B$ will be

- a. $\{0.5, 0.6, 0.8, 0.2\}$
- b. $\{0.9, 0.6, 0.5, 0.8\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) max of mf

81. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim A \cup B$ will be

- a. $\{0.5, 0.6, 0.8, 0.2\}$
- b. $\{0.9, 0.7, 0.5, 1\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) max of mf

82. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cap B)$ will be

- a. $\{0.5, 0.4, 0.1, 0.8\}$
- b. $\{0.9, 0.7, 0.5, 1\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: a

Explanation: i) 1- mf ii) min of mf

83. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cap \sim B)$ will be

- a. $\{0.5, 0.4, 0.1, 0.8\}$
- b. $\{0.9, 0.7, 0.8, 0.8\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) min of mf

84. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cap B)$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.5, 0.6, 0.5, 0\}$
- d. $\{0.9, 0.7, 0.9, 0.8\}$

Ans: d

Explanation: i) min of mf ii) 1- mf

85. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cup B)$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.5, 0.6, 0.5, 0\}$
- d. $\{0.9, 0.7, 0.9, 0.8\}$

Ans: b

Explanation: i) max of mf ii) 1- mf

86. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cup B)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.1, 0.5, 0.4, 0.2, 0.2\}$
- d. $\{0.1, 0.5, 0.4, 0.2, 0.3\}$

Ans: a

Explanation: Union is maximum of MF

87. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cap B)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.1, 0.5, 0.4, 0.2, 0.2\}$
- d. $\{0.1, 0.5, 0.4, 0.2, 0.3\}$

Ans: b

Explanation: Intersection is minimum of MF

88. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim \mu(A)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.4, 0.5, 0.9, 0.3, 0.2\}$
- d. $\{0.1, 0.8, 0.4, 0.2, 0.5\}$

Ans: c

Explanation: Complement is 1- of MF

89. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim \mu(B)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.4, 0.5, 0.9, 0.3, 0.2\}$

- d. {0.1, 0.8, 0.4, 0.2, 0.5}**

Ans: d

Explanation: Complement is 1- of MF

90. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim\mu(A \cup B)(x)$ will be

- a. {0.9, 0.5, 0.6, 0.8, 0.8}**
- b. {0.6, 0.2, 0.1, 0.7, 0.5}**
- c. {0.4, 0.5, 0.9, 0.3, 0.2}**
- d. {0.1, 0.5, 0.4, 0.2, 0.2}**

Ans: d

Explanation: Max of MF then 1- of MF

91. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cup \sim B)(x)$ will be

- a. {0.9, 0.5, 0.6, 0.8, 0.8}**
- b. {0.6, 0.2, 0.1, 0.7, 0.5}**
- c. {0.6, 0.8, 0.4, 0.7, 0.8}**
- d. {0.1, 0.8, 0.4, 0.2, 0.5}**

Ans: c

Explanation: Max of MF , 1- of MF

92. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(\sim A \cup B)(x)$ will be

- a. {0.9, 0.5, 0.6, 0.8, 0.8}**
- b. {0.6, 0.2, 0.1, 0.7, 0.5}**
- c. {0.4, 0.5, 0.9, 0.3, 0.2}**
- d. {0.9, 0.5, 0.9, 0.8, 0.5}**

Ans: d

Explanation: Max of MF , 1- of MF

93. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____

- a) Fuzzy Set
- b) Crisp Set
- c) Fuzzy & Crisp Set
- d) None of the mentioned

Answer: a

Explanation: Fuzzy logic deals with linguistic variables.

94. The values of the set membership is represented by _____

- a) Discrete Set
- b) Degree of truth
- c) Probabilities
- d) Both Degree of truth & Probabilities

Answer: b

Explanation: Both Probabilities and degree of truth ranges between 0 – 1.

95. Japanese were the first to utilize fuzzy logic practically on high-speed trains in Sendai.

- a) True
- b) False

Answer: a

Explanation: None.

96 Compute the value of adding the following two fuzzy integers:

$$A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$$

$$B = \{(0.5,11), (1,12), (0.5,13)\}$$

Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(y)))$

Then, $f(A+B)$ is equal to

- a. $\{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)\}$
- b. $\{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)\}$
- c. $\{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$
- d. $\{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$

Ans: d

Explanation: As per the formula

97. Let R and S be two fuzzy relations defined as follows. Then, the resulting relation, T, which relates elements of universe of X to elements of universe of Z using max-product composition is given by

$$R = \begin{matrix} & y_1 & y_2 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.7 & 0.5 \\ 0.8 & 0.4 \end{matrix} \right] \end{matrix}$$

and $S = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} y_1 \\ y_2 \end{matrix} & \left[\begin{matrix} 0.9 & 0.6 & 0.2 \\ 0.1 & 0.7 & 0.5 \end{matrix} \right] \\ z_1 & z_2 & z_3 \end{matrix}$

(A) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.68 & 0.89 & 0.39 \\ 0.76 & 0.72 & 0.32 \end{matrix} \right] \end{matrix}$

(B) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.68 & 0.89 & 0.39 \\ 0.72 & 0.76 & 0.32 \end{matrix} \right] \end{matrix}$

(C) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.63 & 0.42 & 0.25 \\ 0.72 & 0.48 & 0.20 \end{matrix} \right] \end{matrix}$

(D) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.05 & 0.35 & 0.14 \\ 0.04 & 0.28 & 0.16 \end{matrix} \right] \end{matrix}$

Ans: D

Explanation: As per the formula

98. Consider above example and compute Max_min composition, Min_max composition

Ans: []

Explanation: As per the formula i) max (min(u(R),u(s)), ii) min(max(u(R),u(s))

99. Let A be the set of comfortable houses given as follows. Then the set of comfortable and affordable houses is

$$A = \left\{ \frac{x_1}{0.8}, \frac{x_2}{0.9}, \frac{x_3}{0.1}, \frac{x_4}{0.7} \right\}$$

and B be the set of affordable houses

$$B = \left\{ \frac{x_1}{0.9}, \frac{x_2}{0.8}, \frac{x_3}{0.6}, \frac{x_4}{0.2} \right\}$$

(A) $\left\{ \frac{x_1}{0.8}, \frac{x_2}{0.8}, \frac{x_3}{0.1}, \frac{x_4}{0.2} \right\}$

(B) $\left\{ \frac{x_1}{0.9}, \frac{x_2}{0.9}, \frac{x_3}{0.6}, \frac{x_4}{0.7} \right\}$

(C) $\left\{ \frac{x_1}{0.8}, \frac{x_2}{0.8}, \frac{x_3}{0.6}, \frac{x_4}{0.7} \right\}$

(D) $\left\{ \frac{x_1}{0.7}, \frac{x_2}{0.7}, \frac{x_3}{0.7}, \frac{x_4}{0.9} \right\}$

Ans: B

Explanation: AND is Minimum of MF

100. Fuzzy membership function with only one member with value one is called..

- a. Singleton
- b. Core
- c. Boundary
- d. Support

Ans: a:

Explanation: As per the definition

101. Let $h(A)$ denote the height of a fuzzy set A. A is called a normal fuzzy set if

- a) $h(A)=0$
- b) $h(A)=1$
- c) $h(A)<1$
- d) $h(A)>1$

Ans: b

Explanation: As per the definition

102. Let A be a fuzzy set. Then 1-cut of A is usually called

- a)Support of A
- b) height of A
- c) Core of A
- d)cut of A5.

Ans: C

Explanation: core of MF has values 1

103. The boundary condition satisfied by the standard fuzzy complement is

- a) $c(0)=1$ and $c(1)=1$
- b) $c(0)=0$ and $c(1)=1$
- c) $c(0)=0$ and $c(1)=0$
- d) $c(0)=1$ and $c(1)=0$.

Ans: D

Explanation: Boundary is between 0 to 1 its complement is 1 to 0

104. Each fuzzy complement has atmost-----equilibrium.

- a)1
- b)2
- c) 3
- d) None of these

Ans: A

Explanation: MF is between 0 to 1

Subject: Soft computing Optimization Algorithm

Unit-4 Evolutionary Computing

1. Which of the following is not a discrete optimization problem?

- A Travelling salesman problem
- B Robot control
- C Chess playing program
- D Prediction of stock prices

Ans: B

Explanation: Robot control is controller system

2. Which of the following are discrete optimization problems?

- A Travelling salesman problem
- B Prediction of stock prices
- C Chess playing program
- D All of above

Ans: D

Explanation: All are applications of GA or EA

3. Exploration search is

- A Concerned with improving the current best solution by local search
- B Concerned with global search
- C Often resulting in getting stuck in local optima
- D None of above

Ans: B

Explanation: Exploitation means using already exist solutions and make refinement to it so it's fitness will improve

4. Evolutionary algorithm: Initialization

- A Individuals are normally generated randomly
- B Is concerned with generating candidate solutions
- C Heuristics for generating candidates can be applied
- D All of above

Ans: D

Explanation: All above are true

5. Evolutionary algorithm: Variation operators

- A Is a selection operator
- B Act on population level
- C Act on individual level
- D Are crossover and mutation

Ans: B, D

Explanation: variation operations are crossover and mutation

6. Evolutionary algorithm: Recombination

- A Also known as crossover
- B Combines elements of two or more genotypes
- C Also known as mutation
- D Also known as representation

Ans: A, B

Explanation: Recombination is also known as crossover

7. Evolutionary algorithm: Survivor selection

- A Is often stochastic
- B Also known as replacement
- C Can be fitness based
- D Can be age based

Ans: B,C,D

Explanation: Survivor selection can be based on fitness value, age

8. Evolutionary algorithm: Termination condition

- A Several termination criteria can be combined
- B Determines when to compute the fitness for a population
- C Should be avoided to get faster evolution
- D None of above

Ans: A

Explanation: Termination conditions like max iteration, time out, no change in fitness can be combined

9. Evolutionary algorithm: Termination condition

- A None of above
- B Determines when to compute the fitness for a population
- C Is checked in every generation
- D Should be avoided to get faster evolution

Ans: C

Explanation: checked after every iteration to end the search

10 Tree representation (choose multiple)

- A Is used in Genetic Programming
- B Mutation results in replacing a randomly chosen subtree by a randomly generated tree
- C Not suited for representing computer programs
- D Is used in Genetic Algorithms

Ans: A,B

Explanation: Suitable for GP to generate computer programs

11 Rank based selection

- A Results in less control of the selection pressure than fitness-proportionate selection
- B Use absolute rather than relative fitness
- C Ranking can be either linear or non-linear
- D None of above

Ans: C

Explanation: Chromosomes are ranked based on fitness value

12 Simple Genetic Algorithm (GA) (choose multiple)

- A Children compete with parents in survival selection
- B Both crossover and mutation are applied in each generation
- C The whole population is replaced with the resulting offspring
- D All of above

Ans: B,C

Explanation: Whole population get replaced with new child

13 Evolutionary Strategies (ES)

- A (μ , λ): Select survivors among parents and offspring
- B ($\mu+\lambda$): Select survivors among parents and offspring
- C ($\mu-\lambda$): Select survivors among offspring only
- D ($\mu:\lambda$): Select survivors among offspring only

Ans: B

Explanation: The form of $(\mu + \lambda)$ -ES models in which μ specified the size of the parent population and λ specified the size of the offspring population

14 What is most important to be concerned with in the evolution of repetitive problems?

- A Do multiple runs until a good solution is found
- B Execute one run until the solution is good enough
- C Get a reasonably good solution every time
- D Get a very good result just once

Ans: C

Explanation: Iterative process looking for good solutions in every iterations

15. What are normally the two best measurement units for an evolutionary algorithm?

- A Number of Generations
- B Elapsed time
- C CPU time
- D Population size

Ans: A, B

Explanation: CPU time is hardware dependent and number of population specifies size of search area.

16. What are normally the two best measurement units for an evolutionary algorithm?

- A Number of evaluations
- B Elapsed time
- C CPU time
- D Number of generations

Ans: B, D

Explanation: CPU time is hardware dependent and number of evaluations is not important

17 Tree representation (choose multiple)

- A Is used in Genetic Programming
- B Mutation results in replacing a randomly chosen subtree by a randomly generated tree
- C Suited for representing computer programs
- D All of above

Ans: D

Explanation: Suitable for GP to generate computer programs

18 Simple Genetic Algorithm (GA)

- A Fitness get evaluated at the end of every iteration
- B Both crossover and mutation are applied in each generation
- C The whole population is replaced with the resulting offspring
- D All of above

Ans: D

Explanation: Recombination-evaluation- replacement are steps of GA

19. In Evolutionary Strategy , individuals are represented as

- a. real value
- b. Binary
- c. tree
- d. Octal

Ans. A

Explanation: The focus of the evolution strategy (ES) paradigm was on real-valued function optimization. Hence, individuals were naturally represented as vectors of real numbers.

20. In early EA or ES, parent selection is based on

- a. Roulette Wheel
- b. Order of fitness
- c. Probabilistic normal distribution
- d. All of above

Ans: c

Explanation: parent selection is based on Probabilistic normal distribution

21. In EP, population is the combination of parent and child

- a. True
- b. False

Ans: a

Explanation: The evolutionary programming (EP) paradigm concentrated on models involving a fixed-size population of N parents, each of which produced a single offspring. The next generation of N parents was determined by combining both parents and children into a single population of size $2N$, rank ordering them by fitness and allowing only the top N to survive.

22. In GA, population is the combination of Parent and child

- a. True
- b. False

Ans: b

Explanation: parent gets replaced by child

23. In EA, the new offspring is forced to compete immediately for survival against an existing member of the population

- a. True
- b. False

Ans: a

Explanation: If the objective fitness of the child is greater than the selected member, the child survives and the old member dies off. Otherwise, the child dies without ever residing in the population.

24 In EA, the entire parent population dies off each generation and the offspring only compete with each other for survival

- a. non-overlapping models
- b. overlapping models

Ans: a

Explanation: As per definition

25 In EA, offspring compete with each other and parents for survival

- a. non-overlapping models
- b. overlapping models

Ans: b

Explanation: As per definition

26. In EA, premature convergence takes place due to

- a. Survival selection pressure
- b. Selection method

- c. Complexity of problems
- d. too much exploitation

Ans: d

Explanation: For problems that exhibit highly multi-modal (rugged) fitness landscapes or landscapes that change over time, too much exploitation generally results in premature convergence to suboptimal peaks in the space.

27. In EA, offspring compete with parent or other offspring is called...

- a. Survival Selection
- b. Tournament Selection
- c. Competition
- d. None of above

Ans: a

Explanation: As per the definition

28. In EV, $(\mu+\lambda)$ model is supported by

- a. Evolutionary Strategy
- b. Evolutionary Programming
- c. Evolutionary Algorithms
- d. All of Above

Ans: a

Explanation: The form of $(\mu + \lambda)$ -ES models in which μ specified the size of the parent population and λ specified the size of the offspring population

29. In EC, following are the selection methods

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. All are above

Ans: d

Explanation: These are non-overlapping generation modules

30. In EC, following are the selection methods

- a. Rank-Proportional Selection
- b. Tournament Selection
- c. Fitness-Proportional Selection
- d. All of above

Ans: d

Explanation: These are non-overlapping generation modules

31. In EC, genotype is selected based on maximum fitness value is called

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection

- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: b

Explanation: As per the definition

32. In EC, only the k most fit individuals are selected from a pool of individuals of size $r > k$ is ..

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: c

Explanation: As per the definition

33. In EC, selection based on sorting the members of a selection pool by fitness is ...

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: d

Explanation: As per the definition

34. In EC selection, picking q individuals from the selection pool using a uniform probability distribution with replacement and designating the winner of that tournament as the one with the best fitness is

- a. Rank-Proportional Selection
- b. Tournament Selection
- c. Fitness-Proportional Selection
- d. Fitness_biased

Ans: b

Explanation: As per the definition

35. The difference between rank proportional and tournament selection is that genotypes are sorted in order to fitness value in rank proportional

- a. True
- b. False

Ans: a

Explanation: A potential computational disadvantage to truncation and linear ranking selection methods is that they require the selection pool to be sorted by fitness.

36. The difference between truncation and tournament selection is that genotypes are sorted in order to fitness value in truncation proportional

- a. True
- b. False

Ans: a

Explanation: A potential computational disadvantage to truncation and linear ranking selection methods is that they require the selection pool to be sorted by fitness.

37. In EA, recombination operation on p1: AB|CD and p2: ab|cd produces

- a. ABab
- b. ABcd
- c. ABCD
- d. abCD

Ans: b

Explanation: Recombination operation in EA is crossover here at point 2

38. In EA, recombination operation on p1: ABC|DEF and p2: abc|def produces

- a. ABCabc
- b. ABCdef
- c. ABCDef
- d. abcDEF

Ans: b

Explanation: Recombination operation in EA is crossover here at point 3

Note: In evolutionary algorithms two parents produce single child, whereas in GA two parents produce 2 children.

39. In EA, recombination operation on p1: AB|CD|EF and p2: ab|cd|ef produces

- a. ABcdEF
- b. abCDEF
- c. ABCDef
- d. abcDEF

Ans: a

Explanation: Recombination operation in EA is crossover here at point 2 and 4

40. In EA, recombination operation on p1: A|BCDE|F and p2: a|bcde|f produces

- a. ABcdEF
- b. abCDEF
- c. AbcdeF
- d. abcDEF

Ans: c

Explanation: Recombination operation in EA is crossover here at point 2 and 4

41. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 1122 produces

- a. ABcd
- b. abCD

c. ABCD

d. abcd

Ans: a

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

42. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 2211 produces

a. ABcd

b. abCD

c. ABCD

d. abcd

Ans: b

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

43. In EA, recombination operation on p1: ABCDEF and p2: abcdef with flip sequence 221122 produces

a. ABcdcd

b. abCDef

c. ABCDef

d. abcdEF

Ans: b

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

44. In EA, recombination operation on p1: ABCDEF and p2: abcdef with flip sequence 112211 produces

a. ABcdEF

b. abCDef

c. ABCDef

d. abcdEF

Ans: a

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

45. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 1212 produces

a. ABcd

b. abCD

c. AbCd

d. abcd

Ans: c

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

46. In EA , parent selection and survival selection is same

- a. True
- b. False

Ans: b

Explanation: Offspring compute with parent or other offspring for survival is called survival selection

47. In Evolutionary Algorithm, the whole population is replaced with the resulting offspring

- a. True
- b. False

Ans: b

Explanation: population is combination of parents and offspring

48 Simple Evolutionary Algorithm (EA) (choose multiple)

- A Children compete with parents in survival selection
- B Both crossover and mutation are applied in each generation
- C The whole population is replaced with the resulting offspring
- D All of above

Ans: A, B

Explanation: population is combination of parents and offspring hence survival selection occurs

49. In EA, ----asexual operation is

- a. representation
- b. Recombination
- c. Mutation
- d. none of above

Ans: c

Explanation: Mutation is performed on single parent only

50. In EA, ----sexual operation is

- a. representation
- b. Recombination
- c. Mutation
- d. none of above

Ans: b

Explanation: Recombination (crossover) is performed on two parents

Unit-5 Genetic Algorithms

1 Genetic Algorithms: Variable length encoding is possible in

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans: A

Explanation: Variable size encoding is possible in Messy GA

2 Genetic Algorithms: parameters can be changes runtime

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans : B

Explanation: parameters can be changes runtime in adaptive GA

3. Genetic Programming: representation is

- A. binary encoding
- B: Tree encoding
- C: Hex encoding
- D: Real value encoding

Ans: B

Explanation: Tree encoding is used to represent computer programs in GP

4. Generation of Computer programs is possible in

- A: Genetic Algorithms
- B. Genetic Programming
- C. Evolutionary Algorithms
- D. Evolutionary Strategy

Ans: B

Explanation: Computer programs can be output in GP

5. Probability of sub string get propagated in next generation is derived by

- A. Schema theorem
- B. Holland Classifiers
- C. Roulette wheel
- D. fitness evaluation

Ans: A

Explanation: Schema theorem is used to compute Probability of sub string get propagated in next generation

6. Following are the evaluation parameters for schema theorem (Choose multiple answers)

- A. Schema order
- B. Schema length
- C. representation technique
- D. None of above

Ans: A, B

Explanation: order and length are used

7. Schema theorem defines, there is high probability for sub strings to propagate in next generation if

- A. high order and short length
- B. High order and long length
- C. Low order and short length
- D. Low order and long length

Ans: C

Explanation: As per the theorem

8. Genetic algorithm: Mutation operators

- A. Is a selection operator
- B. Act on population level
- C. Act on individual level
- D. Is an encoding technique

Ans: C

Explanation: mutation act on one parent at a time

9. Genetic algorithm: Selection operators

- A Is a mutation operator
- B Act on population level
- C Act on individual level
- D Is an encoding technique

Ans: B

Explanation: Selection is based on whole population

10. Genetic algorithm: Crossover operators

- A Is a mutation operator
- B Act on population level
- C Act two individual level
- D Is an encoding technique

Ans: c

Explanation: Crossover combines two parents to produce two childs

11. Genetic Algorithms: chromosomes are represented using:

- A binary
- B Octal
- C Real value
- D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string are way to represent chromosomes

12. Genetic Algorithms: Diversification is carried out due to

- A Selection
- B Mutation
- C Crossover
- D Fitness evaluation

Ans: B

Explanation: As per definition

13. Genetic algorithms: chromosomes are selected randomly in

- A. Roulette Wheel
- B. Tournament
- C. Rank Selection
- D. Random selection

Ans: D

Explanation: Random Selection selects chromosomes randomly

14. Genetic algorithms: chromosomes selected based on selective pressure by holding a tournament competition

- A. Roulette Wheel
- B. Tournament
- C. Rank Selection
- D. Random selection

Ans: B

Explanation: As per definition

15. Genetic algorithms: chromosomes are selected based on highest fitness value

- A. Roulette Wheel
- B. Tournament
- C. Rank Selection
- D. Random selection

Ans: C

Explanation: As per definition

16. Rank based selection

- A Use relative rather than absolute fitness
- B Use absolute rather than relative fitness
- C Results in less control of the selection pressure than fitness-proportionate selection
- D None of above

Ans: A

Explanation: As per definition

17. The process of taking two parent solutions and producing from them a child is called

- A. Selection
- B. Crossover
- C. Mutation
- D. Reproduction

Ans: B

Explanation: As per definition

18. The two mating chromosomes are cut once at corresponding points and the sections after the cuts exchanged.

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: A

Explanation: As per definition

19. The process of taking single parent solutions and producing a child is called

- A. Selection
- B. Crossover
- C. Mutation
- D. Reproduction

Ans: C

Explanation: As per definition

20. The two mating chromosomes are cut more than one at corresponding points and the sections after the cuts exchanged.

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: B

Explanation: As per definition

21. The two mating chromosomes are crossover with the help of mask

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: C

Explanation: As per definition

22. The three mating chromosomes are crossovered in

- A. Three parent crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: A

Explanation: As per definition

23. Probability of how often crossover will be performed can be mentioned in

- A. Three parent crossover
- B. Double point crossover
- C. Crossover probability
- D. Uniform crossover

Ans: A

Explanation: As per definition

24. A mutation chromosome generated by changing bit 0 to 1 and 1 to 0 is

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: B

Explanation: As per definition

25. A mutation chromosome generated by selecting random position and the bits next to that position are reversed

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: D

Explanation: As per definition

26. A mutation chromosome generated by exchanging bits at randomly selected positions is

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: A

Explanation: As per definition

27. How often parts of chromosome will be mutated is

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: C

Explanation: As per definition

28. Stopping criteria for Genetic Algorithms is

- A. No change in fitness
- B. Maximum generation
- C. Elapsed time
- D. All of above

Ans: D

Explanation: All are stopping criteria for GA

29. In this type of GA, the GA does the global optimization while local refinement is done by the conventional method

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans: d

Explanation: Hybrid allows combination of traditional approaches with GA

30. In this type of GA, task of a basic GA is distributed on different processors

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans: C

Explanation: Parallel GA allows parallel execution on different processor

31. Genetic algorithms are used if

- A. The search space is large, complex
- B. No mathematical analysis is available
- C. Traditional search methods fail
- D. All of above

Ans: D

Explanation: All are applications of GA

32. Application of Genetic Algorithm

- A. Optimization
- B. Machine and robotic learning

C. Economic Model

D. All of above

Ans: D

Explanation: All are applications of GA

33. Architecture-altering operation is special operation present in

- A. Genetic Algorithm
- B. Genetic Programming
- C. Evolutionary Algorithms
- D. Evolutionary Computing

Ans: B

Explanation: It is found in GP

34. Basic steps of GA

- A. selection- fitness evaluation- recombination
- B. recombination - selection- fitness evaluation
- C. Fitness evaluation- Selection-recombination
- D. Selection- recombination-fitness evaluation

Ans: D

Explanation: It is the general flow of GA

35. In GA , 10100011 is ----- chromosome representation

- a. Binary
- b. Octal
- c. Real value
- d. Hexadecimal

Ans: a

Explanation: it is binary encoding representation

36. In GA , 9CEF is ----- chromosome representation

- a. Binary
- b. Octal
- c. Real value
- d. Hexadecimal

Ans: d

Explanation: it is hexadecimal encoding representation

37. In GA , 2348 is ----- chromosome representation

- a. Binary
- b. Octal
- c. tree encoding
- d. Hexadecimal

Ans: b

Explanation: it is Octal encoding representation

38. In GA , 1 2 4 8 is ----- chromosome representation

- a. Binary
- b. Octal
- c. Permutation encoding
- d. Hexadecimal

Ans: c

Explanation: it is permutation or real valued encoding representation

39. In GA , 1.25 2.45 4.45 8.67 is ----- chromosome representation

- a. Binary
- b. Octal
- c. Value encoding
- d. Hexadecimal

Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

40. In GA , ABCD, DEFG is ----- chromosome representation

- a. Binary
- b. Octal
- c. Value encoding
- d. Hexadecimal

Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

41. In GA {right}, {back}, {white}is ----- chromosome representation

- a. Binary
- b. Octal
- c. Value encoding
- d. Hexadecimal

Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

42. In GA , {right}, {back}, {white} is one of chromosome representation

- a. True
- b. false

Ans: a

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

43. In GA , abcd, efgt is one of chromosome representation

- a. True
- b. false

Ans: a

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

44. In GA, p1: 1010, P2:1100 are parents chromosome, in single point , crossover point 2 (lsb) produces:

- a. c1: 1000 c2: 1110
- b. c1: 1010 c2:1110
- c. c1: 1000 c2:1111
- d. c1:1100 c2:1010

Ans: a

Explanation: interchange string after cross over point

45. In GA, p1: 1010, P2:1100 are parents chromosome, in single point, crossover point 3 (lsb) produces:

- a. c1: 1000 c2: 1110
- b. c1: 1010 c2:1110
- c. c1: 1000 c2:1111
- d. c1:1100 c2:1010

Ans: d

Explanation: interchange string after cross over point

46. In GA, p1: 101 00 000, P2:110 01 111 are parents chromosome, in two point, crossover point 3 ,5 (lsb) produces:

- a. c1: 100 00 111 c2: 111 00 111
- b. c1: 101 01 000 c2: 110 00 111
- c. c1: 100 01 000 c2: 110 01 111
- d. c1:110 00 000 c2:101 01 111

Ans: b

Explanation: interchange string between cross over point

47. In GA, p1: 101 00 000, P2:110 01 111 are parents chromosome, in two point, crossover point 2 ,7 (lsb) produces:

- a. c1: 1 000011 1 c2: 1 110011 1
- b. c1: 1 01 0000 1 c2: 1 10 01 11 0
- c. c1: 1 000100 0 c2: 1 100111 1
- d. c1:1 100000 0 c2:1 010111 1

Ans: b

Explanation: interchange string between cross over point

48. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 1010 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1111 c2: 0000
- c. c1: 0000 c2: 1010
- d. c1:1010 c2:1111

Ans: a

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

49. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 0101 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1010 c2: 0101
- c. c1: 0000 c2: 1010
- d. c1:1010 c2:1111

Ans: b

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

50. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 0001 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1010 c2: 0101
- c. c1: 0001 c2: 1110
- d. c1:1010 c2:1111

Ans: c

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

51. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 1212 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH

d. c1: EFAB

Ans: a

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

52. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 2121 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH
- d. c1: EFAB

Ans: b

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

53. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 1122 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH
- d. c1: EFAB

Ans: c

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

54. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 2211 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH
- d. c1: EFAB

Ans: d

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

55. In GA, p1: 4 1| 1 3| 6 5 , P2: 2 3|1 4| 5 6 are parents chromosome, in *order* crossover produces:

- a. c1: 4 1| 3 1| 6 5 c2: 2 3| 4 1| 5 6
- b. c1: 4 1| 1 3| 6 5 c2: 2 3| 4 1| 5 6
- c. c1: 4 1| 3 1| 6 5 c2: 2 3| 1 4| 5 6
- d. c1: 4 1| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: a

Explanation: child 1 inherits its left and right section from parent 1, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

56. In GA, p1: 4 1| 5 3| 6 5 , P2: 2 3|1 6| 5 6 are parents chromosome, in *order* crossover produces:

- a. c1: 4 1| 3 5| 6 5 c2: 2 3| 1 6| 5 6
- b. c1: 4 1| 1 3| 6 5 c2: 2 3| 4 1| 5 6
- c. c1: 4 1| 3 1| 6 5 c2: 2 3| 1 4| 5 6
- d. c1: 4 1| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: a

Explanation: child 1 inherits its left and right section from parent 1, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

57. In GA, p1: 4 6| 5 3| 1 5, P2: 2 3|1 6| 5 6 are parents chromosome, in *order* crossover produces:

- a. c1: 4 6| 5 3| 1 5 c2: 2 3| 6 1| 5 6
- b. c1: 4 6| 1 3| 6 5 c2: 2 3| 6 1| 5 6
- c. c1: 4 6| 3 5| 1 5 c2: 2 3| 1 6| 5 6
- d. c1: 4 6| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: c

Explanation: child 1 inherits its left and right section from parent 1, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

58. In GA, p1:0011 are parent chromosome, in *flipping mutation* chromosome 1001 produces:

- a. 1001
- b. 1000
- c. 1010
- d. 0011

Ans: c

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

59. In GA, p1:0011 are parent chromosome, in *flipping mutation* chromosome 0110 produces:

- a. 1001
- b. 1000
- c. 1010
- d. 0101

Ans: d

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

60. In GA, p1:1111 are parent chromosome, in *flipping mutation* chromosome 1001 produces:

- a. 1001
- b. 0110
- c. 1010
- d. 0011

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

61. In GA, p1:1111 are parent chromosome, in *flipping mutation* chromosome 1011 produces:

- a. 1001
- b. 1011
- c. 1010
- d. 0011

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

62. In GA, p1:1111 0000 are parent chromosome, in *flipping mutation* chromosome 0000 1111 produces:

- a. 1111 0000
- b. 1111 1111
- c. 0000 1111
- d. 0000 0000

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

63. In GA, p1:1111 0000 are parent chromosome, in *flipping mutation* chromosome 1111 0000 produces:

- a. 1111 0000
- b. 1111 1111
- c. 0000 1111
- d. 0000 0000

Ans: d

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

64. In GA, p1:11110000 are parent chromosome, in interchanging mutation at position 1 and 8 (lsb) produces:

- a. 01110001
- b. 1111 1111

c. 0000 1111

d. 0000 0000

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

65. In GA, p1:11110000 are parent chromosome, in interchanging mutation at position 2 and 7 (lsb) produces:

a. 10110010

b. 1111 1111

c. 0000 1111

d. 0000 0000

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

66. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 1 and 4 (lsb) produces:

a. 1001

b. 0110

c. 1010

d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

67. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 2 and 3 (lsb) produces:

a. 1001

b. 0110

c. 1010

d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

68. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 1 and 3 (lsb) produces:

a. 1001

b. 0110

c. 1100

d. 0101

Ans: c

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

69. In GA, p1:1101 are parent chromosome, in interchanging mutation at position 3 and 4 (lsb) produces:

- a. 1101
- b. 0110
- c. 1100
- d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

70. In GA, p1:1101 are parent chromosome, in interchanging mutation at position 3 and 2 (lsb) produces:

- a. 1101
- b. 0110
- c. 1010
- d. 0101

Ans: c

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

71. In GA, p1:11 01 are parent chromosome, in reversing mutation at position 2 (lsb) produces:

- a. 1001
- b. 0110
- c. 1010
- d. 1101

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

72. In GA, p1:1 101 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 1 001
- b. 0 110
- c. 1 110
- d. 1 101

Ans: c

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

72. In GA, p1:1 100 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 1 001
- b. 0 110
- c. 1 110
- d. 1 010

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

73. In GA, p1:110011 are parent chromosome, in reversing mutation at position 4 (lsb) produces:

- a. 11 0011
- b. 11 1001
- c. 11 1100
- d. 11 0100

Ans: b

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

74. In GA, p1:110011 are parent chromosome, in reversing mutation at position 2 (lsb) produces:

- a. 11 0011
- b. 11 1001
- c. 11 1100
- d. 11 0011

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

75. In GA, p1:110011 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 110 101
- b. 111 001
- c. 111 100
- d. 110 011

Ans: a

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

76. In schema theorem, 111**0, order of schema is...

- a. 2
- b. 3
- c. 1

d. None of above

Ans: a

Explanation: Order is number of * (don't care, i.e. 0 or 1)

77. In schema theorem, $1^*1^{**}0$, order of schema is...

a. 2

b. 1

c. 3

d. 6

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

78. In schema theorem, $1^{***}0$, order of schema is...

a. 2

b. 1

c. 3

d. 4

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

79. In schema theorem, $10^*0^*1^*$, order of schema is...

a. 2

b. 1

c. 3

d. 7

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

80. In schema theorem, 10^*0^* , order of schema is...

a. 2

b. 1

c. 3

d. 5

Ans: a

Explanation: Order is number of * (don't care, i.e. 0 or 1)

81. In schema theorem, 10^*0^* , length of schema is...

a. 2

b. 1

c. 3

d. 5

Ans: a

Explanation: length is number of elements in between first non *to last *

82. In schema theorem, 10^{**} , length of schema is...

- a. 2
- b. 1
- c. 0
- d. 5

Ans: c

Explanation: length is number of elements in between first non *to last *

83. In schema theorem, 100^{**} , length of schema is...

- a. 2
- b. 5
- c. 0
- d. 1

Ans: d

Explanation: length is number of elements in between first non *to last *

84. In schema theorem, $100^{**}0$, length of schema is...

- a. 4
- b. 5
- c. 0
- d. 1

Ans: a

Explanation: length is number of elements in between first non *to last *

85. In schema theorem, $1*00^{**}0$, length of schema is...

- a. 4
- b. 5
- c. 0
- d. 1

Ans: b

Explanation: length is number of elements in between first non *to last *

86. In schema theorem, $1*00^{**}$, length of schema is...

- a. 4
- b. 5
- c. 0
- d. 2

Ans: d

Explanation: length is number of elements in between first non *to last *

87. In schema theorem, 1^{***} , length of schema is...

- a. 4
- b. 5

c. 0

d. 2

Ans: c

Explanation: length is number of elements in between first non *to last *

88. In schema theorem, 1^{***} , length and order of schema is...

a. 4,1

b. 1,3

c. 0,3

d. 3,1

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of *

89. In schema theorem, $1^{***}1$, length and order of schema is...

a. 3,5

b. 1,3

c. 0,3

d. 3,3

Ans: d

Explanation: length is number of elements in between first non *to last * and order is no. of *

90. In schema theorem, 1^*1^*1 , length and order of schema is...

a. 3,2

b. 1,3

c. 0,3

d. 3,3

Ans: a

Explanation: length is number of elements in between first non *to last * and order is no. of *

91. In schema theorem, 10^*00^* , length and order of schema is...

a. 6,2

b. 6,4

c. 3,2

d. 2,3

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of *

92. In schema theorem, 10^*0^* , length and order of schema is...

a. 6,2

b. 6,4

c. 3,2

d. 2,2

Ans: d

Explanation: length is number of elements in between first non *to last * and order is no. of *

93. In schema theorem, 00^{**} , length and order of schema is...

a. 4,2

b. 2,4

c. 0,2

d. 2,2

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of *

94. Genetic Algorithms: chromosomes are represented using:

A binary

B Octal

C Hexadecimal

D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string are way to represent chromosomes

95. Genetic Algorithms: chromosomes are represented using:

A binary

B Tree

C Hexadecimal

D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string, tree are way to represent chromosomes

96. In GA: compute fitness of 00110011, where fitness function is number of ones

a. 2

b. 8

c. 4

d. 0

Ans: c

Explanation: Fitness is computed as number of ones

96. In GA: compute fitness of 0011, where fitness function is number of ones

a. 2

b. 8

c. 4

d. 0

Ans: a

Explanation: Fitness is computed as number of ones

97. In GA: compute fitness of 0011, where fitness function is number of ones, what would be the best solution

a. 2, 15

b. 8, 15

c. 4, 8

d. 0, 8

Ans: a

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

98. In GA: For fitness function is number of ones, what would be the best solution for 4 bit string

a. 8

b. 15

c. 4

d. 2

Ans: b

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

99. In GA: For fitness function is number of ones, what would be the global minimum solution for 5 bit string

a. 11111

b. 10000

c. 00000

d. 00101

Ans: c

Explanation: Fitness is computed as number of ones, hence 00000 will produce best solution

100. In GA: For fitness function equal to number of ones, what would be the best solution for 4 bit string

a. 0000

b. 1111

c. 1010

d. 1110

Ans: b

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

Unit-6 Swarm Intelligence

1. Swarm intelligence

- A Global behaviour appears as a result of centralized control
- B In Particle Swarm Optimization, velocity and position of particles are updated
- C The probability of choosing a new edge in ant colony optimization is proportional with the pheromone level of the edge
- D All of above

Ans: D

Explanation: All are types of swarm intelligence

2. Biologically inspired computation is appropriate for

- A Optimization
- B Modelling
- C Simulation
- D. All of above

Ans: D

Explanation: Biological processes are simulated, modelled to solve optimization problems

3. In PSO, at every iteration particle changes

- A. only position
- B. Only Velocity
- C. Position and Velocity both
- D. None of above

Ans: C

Explanation: At every iterations position and velocity is updating

4. In PSO particles position is depend upon

- A. Inertial
- B. Individual best position
- C. Global best position
- D. All of above

Ans: D

Explanation: Factors affecting position are inertia, global and local positions

5. ACO is used in

- A. Graph coloring problem
- B. Travelling Sales Man
- C. Network routing
- D. All of above

Ans: D

Explanation: All above are application of ACO

6. In ACO, pheromone level is directly proportional to the distance

A. True

B: False

Ans: B

Explanation: Minimum distance higher the pheromone level

7. In ACO, pheromone level is inversely proportional to the distance

A. True

B: False

Ans: A

Explanation: Minimum distance higher the pheromone level

8. Gradient descent is optimization technique used to find

A. Local maximum

B. Local Minimum

C. Both A and B

D. None of above

Ans B

Explanation: it optimizes problem of minimization

9. Gradient ascent is optimization technique used to find

A. Local maximum

B. Local Minimum

C. Both A and B

D. None of above

Ans A

Explanation: it optimizes problem of maximization

10. In ACO, pheromone amount get decreases with some fraction, called as

A. Evaporation rate

B. Decade rate

C. Pheromone trail

D. None of above

Ans: A

Explanation: As per the definition

11. Social behaviour of animals is observed and implemented artificially is called

A. Artificial neural network

B. Genetic Programming

C. Swarm Intelligence

D. Evolutionary computing

Ans: C

Explanation: As per the definition

12. In ACO, selection probability of next node by ant is

- A. proportional to pheromone level present on connection link
- B. inversely proportional to pheromone level present on connection link
- C. proportional to evaporation rate
- D. None of above

Ans: A

Explanation: probability is higher if pheromone is higher

13. In PSO, next position p is computed as

- A. $p=p+1$
- B. $p=p+velocity$

Ans: B

Explanation: As per the formula

14. Evaporation value is

- a. 0
- b. 1
- c. Between 0 to 1
- d. none of above

Ans: c

Explanation: Rate is in between 0 to 1

15. $T_{ij}(t + n) = p \cdot T_{ij}(t) + \Delta T$ is the formula for updating

- a. pheromone level
- b. evaporation rate

Ans: a

Explanation: p stands for evaporation rate

16. $T_{ij}(t + n) = p \cdot T_{ij}(t) + \Delta T$ in this formula p is set to

- a. 0
- b. 1
- c. $0 < p < 1$
- d. any value

Ans: c

Explanation: p stands for evaporation rate, set between 0 to 1

17. In TSP for an ant to decide which city to visit next is calculated based on

- a. greedy approach
- b. Genetic Algorithms
- c. ACO
- d. All are above

Ans: d

Explanation: TSP is non-deterministic problem can be solved by any of above technique.

18. In TSP for an ant to decide which city to visit next is calculated based on

- a. Transition probability
- b. Simple probability

Ans: a

Explanation: Values are normalized all over the values (i.e adjacent cities are considered)

19. In ACO based TSP transition probability is

- a. Combination of heuristic rules and pheromone level
- b. based on pheromone level only
- c. based on heuristic rules only
- d. none of above

Ans: a

Explanation: As per the formula, it is Combination of heuristic rules and pheromone level

20. In TSP, track of non-visited cities can be maintained by

- a. heuristic rules
- b. transition probability
- c. evaporation rate
- d. Pheromone updation rate

Ans: a

Explanation: Rules can be used to maintain list of visited and non-visited cities.

21. PSO is inspired from

- a. Birds behaviour searching for the food
- b. Ants searching for food
- c. Bees searching for the food
- d. All of above

Ans: a

Explanation: PSO is based on the behaviour of flock of birds or school of fish

22. ACO is inspired from

- a. Birds behaviour searching for the food

- b. Ants searching for food
- c. Bees searching for the food
- d. All of above

Ans: b

Explanation: ACO is based on the behaviour of ant colonies

23. In swarm intelligence control is decentralized.....

- a. True
- b. false

Ans: a

Explanation: Not having single point control

24. In PSO , number of particles present in search space are..

- a. 1
- b. 0
- c. any number
- d. none of above

Ans: c

Explanation: Depends on problem statement e.g. 20,30,100 etc

25. In PSO, if numbers of particles are less, algorithm will converge slowly

- a. true
- b. false

Ans. A

Explanation: If large number result will come faster

26. In swarm intelligence control is centralized.....

- a. True
- b. false

Ans: b

Explanation: Not having single point control

27. Compared with GA, all the particles tend to converge to the best solution quickly ...

- a. True
- b. false

Ans: a

Explanation: In PSO, only gBest (or lBest) gives out the information to others. It is a one - way information sharing mechanism. The evolution only looks for the best solution.

28. Particles update themselves with...

- a. evaporation rate
- b. Internal velocity
- c. fitness value
- d. All of above

Ans; b

Explanation: At every iteration position is updated by adding velocity

29. For optimizing function $f(x)=2x+2y$, how many minimum particles will be required

- a. 1
- b. 2
- c. infinite
- d. zero

Ans: b

Explanation: one for x and other for y

30. For optimizing function $f(x)=2x+2y+2z$, how many minimum particles will be required

- a. 1
- b. 2
- c. infinite
- d. 3

Ans: d

Explanation: one for x , one for y and other for z

31. For optimizing function $f(x)=2x+2y+2z$, which function is used for fitness evaluation

- a. $f(x)=1$
- b. $f(x)=0$
- c. $f(x)=2x+2y+2z$,
- d. $f(x)=\max[0,1]$

Ans: c

Explanation: In this case objective function is fitness function

32. For optimizing function $f(x)=2x$, which function is used for fitness evaluation

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=2x$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case objective function is fitness function

33. For optimizing function $f(x)=2$, how many minimum particles will be required

- a. 1
- b. 2
- c. infinite
- d. zero

Ans: d

Explanation: This function will not able to optimize because of constant value

34 For TSP, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{Min_distance}(i,j)$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the minimum distance or Euclidean distance

35 For TSP, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{Sqrt_root } (i^2-j^2)$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the minimum distance or Euclidean distance

36 In classification problem, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{error rate evaluation}$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the error rate or accuracy measure

37 In classification problem, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{Accuracy measure}$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the error rate or accuracy measure

38 In classification problem, function used for fitness evaluation is

- a. $f(x)= \text{Accuracy measure}$
- b. $f(x)= \text{error rate evaluation}$
- c. neither a nor b
- d. both a and b

Ans: d

Explanation: In this case fitness function will be the error rate or accuracy measure

39 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1,2 what would be the fitness value for each particle

- a. 0,1,2
- b. 1,2,1

- c. 1,1,1
- d. 2,1,1

Ans: b

Explanation: Put each value in the function separately

40 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1 what would be the fitness value for each particle

- a. 0,1,2
- b. 1,2,1
- c. 1,1,1
- d. -2,1,2

Ans: d

Explanation: Put each value in the function separately

41 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1 , which particle produce best solution

- a. P1
- b. P2
- c. P3
- d. All of above

Ans: c

Explanation: P3=1 produces 2 value (i.e. maximum solution)

42 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1 ,2 which particle produces optimal solution

- a. P1
- b. P2
- c. P3
- d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

43 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1 ,2 Optimal solution has value...

- a. 1
- b. 2
- c. 0
- d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

44. $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1, Optimal solution has value...

- a. 1
- b. 2
- c. 0
- d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

45. In PSO , $V=V+c_1r_1(ib-p) + c_2r_2(gb-p)$ where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

- a. $c_1r_2(ib-p)$
- b. $c_1r_1(ib-p)$
- c. $c_1r_1(ib-gb)$
- d. $c_1r_1(gb-ib)$

Ans: b

Explanation: $c_1r_1(ib-p)$ gives individual best

46. In PSO, $V=V+c_1r_1(ib-p) + c_2r_2(gb-p)$ where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

- a. $c_1r_2(gb-p)$
- b. $c_2r_2(gb-p)$
- c. $c_2r_2(ib-gb)$
- d. $c_2r_2(gb-ib)$

Ans: b

Explanation: $c_2r_2(gb-p)$ gives global best

47. In ACO, if B and C are adjacent node to A with pheromone level 2,3 respectively then, then ant starting with A will select node with transition probability ---

- a. B
- b. C

Ans: b

Explanation: transition probability without heuristic rule is calculated as for $c=3/2+3$,
 $b=2/2+3$

48. In ACO, if B and C are adjacent node to A with pheromone level 2,3 respectively then,
then ant starting with A will select node with transition probability ---

- a. 2/3
- b. 3/2
- c. 2/5
- d. 3/5

Ans: d

Explanation: transition probability without heuristic rule is calculated as for $c=3/2+3$,
 $b=2/2+3$

49. A real-valued function f defined on a domain X has
a global (or absolute) point at x^* if $f(x^*) \geq f(x)$ for all x in X .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: d

Explanation: Global X with maximum function value

50. A real-valued function f defined on a domain X has
a global (or absolute) point at x^* if $f(x^*) \leq f(x)$ for all x in X .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: c

Explanation: Global X with minimum function value

51. A real-valued function f defined on a domain X has a
local (or absolute) point at x^* if $f(x^*) \leq f(x)$ for all x in X within distance of x^* .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: a

Explanation: local X with minimum function value

52. A real-valued function f defined on a domain X has a local (or absolute) point at x^* if $f(x^*) \geq f(x)$ for all x in X within distance of x^* .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: b

Explanation: local X with maximum function value

This sheet is for 1 Mark questions							
S. r N o	Question	Image	a	b	c	d	Correct Answer
e. g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions clearly	Cannot Distinguish two regions clearly	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguous	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neural computing,Genetic algorithm	Fuzzy network and artificial intelligence	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard berger	mc culloch	lofti a zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behaviour	deals with imprecision	exact information	both a and b	d

			se,prob ablistic			
11	Hard computing is also called as	evolutionary computing	conventional computing	non conventional computing	probabilistic computing	b
12	Which computing produces accurate results	soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing	mimics human behaviour	information processing paradigm	both a and b	none of the above	c
14	Artificial neural network is used for	pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization	Blind search represents a guided approach while optimization is unguided	Blind search usually does not conclude in one step like some optimization method	Blind search cannot result in optimal solution whereas optimization method do	none of these	B
16	In modeling,an optimal solution is understood to be	a solution that can only be determined by an exhaustive enumeration	a solution found in the least possible time and using the	a solution that is the best based on criteria defined in the	a solution that requires an algorithm for the determination	C

		testing of alternatives	least possible computing resources	design phase		
17	When is a complete enumeration of solution used?	When a solution that is "good enough" is fine and good heuristics are available	When there is enough time and computational power available	When the modeler requires a guided approach to problem solving	When there are an infinite number of solutions to be searched	B
18	All of the following are true about heuristics EXCEPT	heuristics are used when the modeler requires a guided approach to problem solving	heuristics are used when a solution that is "good enough" is sought	heuristics are used when there is abundant time and computational power	heuristics are rules of good judgement	C
19	Which approach is most suited to structured problem with little uncertainty	Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belongs to the family of methods in the	artificial intelligence area	complete enumeration family of methods	Non computer based isolation area		A
21	What does the 0 membership value mean in the set	the object is fully inside the set	the object is not in the set	the object is partially present in the set	none of the above	b

22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a
23	The process of fuzzy interference system involves		membership functions	fuzzy logic operators	if-then rules	all the above	d
24	What does a fuzzifier do		converts crisp input to linguistic variables	converts crisp output to linguistic variables	converts fuzzy input to linguistic variables	converts fuzzy output to linguistic variables	a
25	Which of the following is not defuzzifier method		centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method		mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have		multiple part of antecedent, only single part of consequent	single part of antecedent, multiple part of consequent	multiple part of antecedent, multiple part of consequent	only single part of antecedent, only single part of consequent	c
28	The a cut of a fuzzy set A is a crisp set defined by :-		$\{x U_a(x) > a\}$	$\{x U_a(x) \geq a\}$	$\{x U_a(x) < a\}$	$\{x U_a(x) \leq a\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A) = x_1 - x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1/x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?		$\{0/a, 0.7/b, 0.8/c, 0.2/d, 1/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.2/d, 1/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.2/d, 1/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 1/e\}$	a

32	A={1/a,0.3/b,0.2/c,0.8/d,0/e} B={0.6/a,0.9/b,0.1/c,0.3/d,0.2/e} What will be the union of AUB?		{1/a,0.9/b,0.1/c,0.5/d,0.2/e}	{0.8/a,0.9/b,0.2/c,0.5/d,0.2/e}	{1/a,0.9/b,0.2/c,0.8/d,0.8/e}	{1/a,0.9/b,0.2/c,0.8/d,0.8/e}	c
33	A={1/a,0.3/b,0.2/c,0.8/d,0/e} B={0.6/a,0.9/b,0.1/c,0.3/d,0.2/e} What will be the intersection of A and B ?		{0.6/a,0.3/b,0.1/c,0.3/d,0/e}	{0.6/a,0.8/b,0.1/c,0.3/d,0/e}	{0.6/a,0.3/b,0.1/c,0.5/d,0/e}	{0.6/a,0.3/b,0.2/c,0.3/d,1/e}	a
34	What denotes the support(A) in a fuzzy set?		{x Ua(x)>0}	{x Ua(x)<0}	{x Ua(x)<=0}	{x Ua(x)<0.5}	a
35	What denotes the core(A) in a fuzzy set?		{x Ua(x)>0}	{x Ua(x)=1}	{x Ua(x)>=0.5}	{x Ua(x)>0.8}	b
36	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designning a fuzy logic machine		fuzzification->Rule Evaluation->Defuzzification	deffuzification->rule evaluation	rule evaluation->fuzzification->deffuzification	rule evaluation->defuzzification->fuzzification	a
38	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
39	Genetic algorithm belong to the family of method in the		artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
40	All of the follwing are suitable problem for genetic algorithm EXCEPT		pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
41	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b

43	mutation is applied on ___ candidates.		one	two	more than two	none of these	a
44	recombination is applied on ___ candidates.		one	two	more than two	none of these	b
45	LCS belongs to ___ based methods?		rule based learning	genetic learning	both a and b	none of these	a
46	Survival is ___ approach.		deterministic	non deterministic	semi deterministic	none of these	a
47	Evolutionary algorithms are a ___ based approach		heuristic	metaheuristic	both a and b	none of these	a
48	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?		line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by		Fredrik	Fodgel	Frank	Flin	b
54	Evolution Strategies is developed with		selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses		real-valued vector representations	vector representation	time based representation	none of these	a
56	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d

58	Elements of ES are/is		Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover		discrete and intermediate	discrete and continuous	continuous and intermediate	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested.		TRUE	FALSE			B
61	_____ cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solution	none of these	C
62	Discrete events and agent-based models are usually used for _____.		middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
63	_____ does not usually allow decision makers to see how a solution to a _____ evolves over time nor can decision makers interact with it.		Simulation, Complex problem	Simulation, Easy problem	Genetics, Complex problem	Genetics, Easy problem	A
64	EC stands for?		Evolutionary Computations	Evolutionary computer	Electronic computations	none of these	a
65	GA stands for		genetic algorithm	genetic assurance	genetic algorithm	none of these	a
66	LCS stands for		learning classes system	learning classifier system	learned class system	none of these	b
67	GBML stands for		Genes based Machine learning	Genes based mobile learning	Genetic based machine learning	none of these	c

68	EV is dominantly used for solving ____.		optimization problems	NP problem	simple problems	none of these	a
69	EV is considered as?		adaptive	complex	both a and b	none of these	c
70	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?		line representation	String representation	Circular representation	all of these	b
72	Parameters that affect GA		initial population	selection process	fitness function	all of these	d
73	Fitness function should be		maximum	minimum	intermediate	none of these	b
74	Evolutionary algorithms are a ___ based approach		heuristic	metaheuristic	both a and b	none of these	a
75	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
77	mutation is applied on ___ candidates.		one	two	more than two	none of these	a
78	recombination is applied on ___ candidates.		one	two	more than two	none of these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offspring	grand child	c
80	___ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection method	both a and b	none of these	c

82	LCS belongs to ____ based methods?		rule based learning	genetic learning	both a and b	none of these	a
83	Survival is ____ approach.		deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic	d

						environment	
90	For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c
92	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by _____		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1, 2, 3, 4, 5, 6, 7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(1, 1), (2, 1), (3, 0.3), (5, 0), (4, 1), (6, 0.2)\}$	$\{(3, 0.3), (6, 0.2)\}$		c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)(x)$ will be		$\{0.6, 0.2, 0.9, 0.5, 0.1, 0.8, 0.6, 0.4, 0.7, 0.3\}$	$\{0.1, 0.5, 0.5, 0.4, 0.2, 0.2, 0.3\}$			c

	Compute the value of adding the following two fuzzy integers: A = {(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)} B = {(0.5,11), (1,12), (0.5,13)} Where fuzzy addition is defined as $\mu_{A+B}(z) = \max(x+y=z)$ $(\min(\mu_A(x), \mu_B(y)))$ Then, f(A+B) is equal to		{(0.5, 12), (0.6, 13), (0.6, 13), (1, 14), (1, 14), (0.7, 15), (0.7, 15), (0.7, 16), (0.7, 16), (1, 17), (1, 17), (1, 18)}	{(0.5, 12), (0.6, 13), (0.6, 13), (1, 14), (1, 14), (0.5, 15), (0.5, 15), (0.5, 16), (0.5, 16), (1, 17), (1, 17), (1, 18)}	{(0.3, 12), (0.5, 13), (0.5, 13), (0.5, 14), (0.5, 14), (0.7, 15), (0.7, 15), (0.7, 16), (0.7, 16), (0.5, 17), (0.5, 17), (0.2, 18)}		
97	A U (B U C) =		(A ∩ B) ∩ (A ∩ C)	(A ∪ B) ∩ (A ∪ C)	B ∩ A ∪ C	b	
98	Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A, B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy ≈ Prediction	Fuzzy ≈	Probability ≈	None of these	b

				Forecasting	Forecasting		
10 3	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	C	
10 4	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b	
10 5	---- defines logic function of two prepositions	linguistic prepositions	truth hedges	truth tables	inference rules	c	
10 6	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b	
10 7	Multiple conjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a	
10 8	Multiple disjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a	
10 9	IF x is A and y is B then $z=c$ (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a	
11 0	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b	

11 1	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesizing a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesizing a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesizing a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesizing a set of linguistic control rules obtained from experienced human operations.	c
11 2	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfre d-type and Semigi-type	Mamda ni-type and Sugeno-type	Mihni-type and Sujgani-type	c
11 3	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
11 4	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)-selection based on the children only ($\mu+\lambda$)-selection based on both	Children replace the parent	All the mentioned	a

				the set of parent and children			
11 5	In Evolutionary strategy, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)-selection based on the children only ($\mu+\lambda$)-selection based on both the set of parent and children	Children replace the parent	All the mentioned	b	
11 6	In Evolutionary programming, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a	
11 7	In Evolutionary strategy, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce	uses various recombination operators	none of the mentioned	b	

				offspring			
11 8	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
11 9	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
12 0	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c

12 1	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
12 2	Evolutionary Strategies (ES)	(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivor(s) among offspring only	($\mu:\lambda$): Select survivors among offspring only		b
12 3	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned		b
12 4	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned		a
12 5	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of	offspring become parent by default	offspring never becomes parent	none of the mentioned		a

			next generation				
12 6	(1+λ) ES		λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
12 7	Termination condition for EA		maximally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
12 8	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
12 9	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming does not use crossover operators	d
13 0	(1+1) ES		Operates on population size of two	operates on population size of one	operates on population size of zero	operates on population size of λ	a
13 1	Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a

13 2	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
13 3	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A. True</p> <p>B. False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A. Tabular Form</p> <p>B. Graphical Form</p> <p>C. Mathematical Form</p> <p>D. Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A. knowledge</p>	D

	<p><u>B.</u> examples</p> <p><u>C.</u> learning</p> <p><u>D.</u> experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p><u>A.</u> Intuition, Inference, Rank Ordering</p> <p><u>B.</u> Fuzzy Algorithm, Neural network, Genetic Algorithm</p> <p><u>C.</u> Core, Support , Boundary</p> <p><u>D.</u> Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p><u>A.</u> Core</p> <p><u>B.</u> Support</p> <p><u>C.</u> Boundary</p> <p><u>D.</u> Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p><u>A.</u> sub normal fuzzy sets</p> <p><u>B.</u> normal fuzzy set</p> <p><u>C.</u> convex fuzzy set</p> <p><u>D.</u> concave fuzzy set</p>	B

7.	<p>In a Fuzzy set a prototypical element has a value</p> <p><u>A.</u>1</p> <p><u>B.</u>0</p> <p><u>C.</u>infinite</p> <p><u>D.</u>Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p><u>A.</u>normal fuzzy set</p> <p><u>B.</u>subnormal fuzzy set.</p> <p><u>C.</u>convex fuzzy set</p> <p><u>D.</u>concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p><u>A.</u>convex fuzzy set</p> <p><u>B.</u>concave fuzzy set</p> <p><u>C.</u>Non concave Fuzzy set</p> <p><u>D.</u>Non Convex Fuzzy set</p>	A
10.		B

	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A. Convex Fuzzy Set</p> <p>B. Non convex fuzzy set</p> <p>C. Normal Fuzzy set</p> <p>D. Sub normal fuzzy set</p>	
11.	<p>Fuzzy Computing</p> <p>A. doesn't deal with 2 valued logic</p> <p>B. mimics human behaviour</p> <p>C. deals with information which is vague, imprecise, unambiguous, inexact, or probabilistic</p> <p>D. All of the above</p>	D
12.	<p>Defuzzification is done to obtain</p> <ol style="list-style-type: none"> Crisp output The best rule to follow Precise fuzzy value None of the above 	a
13.	<p>“The train is running fast”. Here ‘fast’ can be represented by</p> <ol style="list-style-type: none"> Fuzzy Set Crisp Set Fuzzy and Crisp Set None of the mentioned 	a
14.	<p>Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$</p> <p>Then the crisp value of Young using MoM method is</p>	a

	a) 25 b) 20 c) 35 d) 50	
15.	f the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value. a) with the median of all the area b) with the mean of all the area c) with the largest area d) with the smallest area	c
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)$ complement \neq _____ $(A\bar{\lambda})$ complement (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$	b

	b) $A \times B) \cup (A \times C)$ c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B d) None of the above	b
26.	Fuzzy logic is a form of	Answer: c

	a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic	Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.
27.	Traditional set theory is also known as Crisp Set theory. a) True b) False	Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There is only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set. 3. The truth values of traditional set theory is _____ and that of fuzzy set is _____
28.	The truth values of traditional set theory is _____ and that of fuzzy set is _____ a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1	Answer: a Explanation: Refer the definition of Fuzzy set and Crisp set.
29.	How many types of random variables are available? a) 1 b) 2	Answer: c Explanation: The three types of random variables are Boolean,

	c) 3 d) 4	discrete and continuous.
30.	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____. a) Fuzzy Set b) Crisp Set	Answer: a Explanation: Fuzzy logic deals with linguistic variables.
31.	The values of the set membership is represented by a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c	Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.
32.	What is meant by probability density function? a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables	d
33.	Which of the following is used for probability theory sentences? a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned	Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.
34.	Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following. a) AND b) OR c) NOT d) EX-OR	Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum,

		maximum, and complement;
35.	Fuzzy logic is usually represented as a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned	Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices. Rules are usually expressed in the form: IF variable IS property THEN action
36.	_____ is/are the way/s to represent uncertainty. a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned	Answer: d Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.
37.	_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic. a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned	Answer: c Explanation: Local structure is usually associated with linear rather than exponential growth in complexity

1. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.

A.True

B.False

2. The membership functions are generally represented in

A.Tabular Form

B.Graphical Form

C.Mathematical Form

D.Logical Form

3. Membership function can be thought of as a technique to solve empirical problems on the basis of

A.knowledge

B.examples

C.learning

D.experience

4. Three main basic features involved in characterizing membership function are

A.Intuition, Inference, Rank Ordering

B.Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value

is unity is called

A.sub normal fuzzy sets

B.**normal fuzzy set**

C.convex fuzzy set

D.concave fuzzy set

7. In a Fuzzy set a prototypical element has a value

A.**1**

B.0

C.infinite

D.Not defined

8. A fuzzy set wherein no membership function has its value equal to 1 is called

A.normal fuzzy set

B.**Subnormal fuzzy set.**

C.convex fuzzy set

D.concave fuzzy set

9. A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe

A.**convex fuzzy set**

B.concave fuzzy set

C.Non concave Fuzzy set

D.Non Convex Fuzzy set

10. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.

A.Convex Fuzzy Set

B.**Non convex fuzzy set**

C.Normal Fuzzy set

D.Sub normal fuzzy set

11. The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to

A.infinite

B.1

C.0

D.0.5

12. Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

B.False

14. Artificial neural network used for

A.Pattern Recognition

B.Classification

C.Clustering

D.All of these

15. A Neural Network can answer

- A.For Loop questions
 - B.what-if questions
 - C.IF-The-Else Analysis Questions
 - D.None of these
16. Ability to learn how to do tasks based on the data given for training or initial experience
- A.Self Organization
 - B.Adaptive Learning
 - C.Fault tolerance
 - D.Robustness
17. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is
- A.Adaptive Learning
 - B.Self Organization
 - C.What-If Analysis
 - D.Supervised Learniing
18. In artificial Neural Network interconnected processing elements are called
- A.nodes or neurons
 - B.weights
 - C.axons
 - D.Soma
19. Each connection link in ANN is associated with _____ which has information about the input signal.
- A.neurons
 - B.weights
 - C.bias
 - D.activation function

20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.True

B.False

21. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.Weight

B.activation or activity level of neuron

C.Bias

D.None of these

22. Neuron can send _____ signal at a time.

A.multiple

B.one

C.none

D.any number of

23. Artificial intelligence is

A.It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations

B.Computational procedure that takes some value as input and produces some value as output.

C.Science of making machines performs tasks that would require intelligence when performed by humans

D.None of these

24. Expert systems

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution

C.an information base filled with the knowledge of an expert formulated in terms of if-then rules

D.None of these

25. Falsification is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

26. Evolutionary computation is

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.

C.Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.

D.None of these

27. Extendible architecture is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

28. Massively parallel machine is

A.A programming language based on logic

B.A computer where each processor has its own operating system, its own memory, and its own hard disk

C.Describes the structure of the contents of a database.

D.None of these

29. Search space

- A. The large set of candidate solutions possible for a problem
- B. The information stored in a database that can be, retrieved with a single query.
- C. Worth of the output of a machine learning program that makes it understandable for humans
- D. None of these

30. $n(\log n)$ is referred to

- A. A measure of the desired maximal complexity of data mining algorithms
- B. A database containing volatile data used for the daily operation of an organization
- C. Relational database management system
- D. None of these

31. Perceptron is

- A. General class of approaches to a problem.
- B. Performing several computations simultaneously
- C. Structures in a database those are statistically relevant
- D. Simple forerunner of modern neural networks, without hidden layers

32. Prolog is

- A. A programming language based on logic
- B. A computer where each processor has its own operating system, its own memory, and its own hard disk
- C. Describes the structure of the contents of a database
- D. None of these

33. Shallow knowledge

- A. The large set of candidate solutions possible for a problem
- B. The information stored in a database that can be, retrieved with a single query

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

34. Quantitative attributes are

A.A reference to the speed of an algorithm, which is quadratically dependent on the size of

the data

B.Attributes of a database table that can take only numerical values

C.Tools designed to query a database

D.None of these

35. Subject orientation

A.The science of collecting, organizing, and applying numerical facts

B.Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.None of these

36. Vector

A.It do not need the control of the human operator during their execution

B.An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.The validation of a theory on the basis of a finite number of examples D.None of these

37. Transparency

A.The large set of candidate solutions possible for a problem

B.The information stored in a database that can be retrieved with a single query

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

38. Core of soft Computing is

A.**Fuzzy Computing, Neural Computing, Genetic Algorithms**

B.Fuzzy Networks and Artificial Intelligence

C.Artificial Intelligence and Neural Science

D.Neural Science and Genetic Science

39. Who initiated the idea of Soft Computing

A.Charles Darwin

B.**Lofti A Zadeh**

C.Rechenberg

D.Mc_Culloch

40. Fuzzy Computing

A.mimics human behaviour

B.doesnt deal with 2 valued logic

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.**All of the above**

41. Neural Computing

A.mimics human brain

B.information processing paradigm

C.**Both (a) and (b)**

D.None of the above

42. Genetic Algorithm are a part of

A.Evolutionary Computing

B.inspired by Darwin's theory about evolution - "survival of the fittest"

C.are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics

D All of the above

43. What are the 2 types of learning

A.Improvised and unimprovised

B.supervised and unsupervised

C.Layered and unlayered

D.None of the above

44. Supervised Learning is

A.learning with the help of examples

B.learning without teacher

C.learning with the help of teacher

D.learning with computers as supervisor

45. Unsupervised learning is

A.learning without computers

B.problem based learning

C.learning from environment

D.learning from teachers

46. Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

47. In supervised learning

A.classes are not predefined

- B.classes are predefined
- C.classes are not required
- D. classification is not done

01 Fuzzy logic is :

- Option A Used to respond to questions in a human like way
- Option B A new programming language used to program animation
- Option C The result of fuzzy thinking
- Option D A term that indicates logical values greater than one

Correct Answer A

04 The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$

- Option A $h(A) = 0$
- Option B $h(A) < 0$
- Option C $h(A)=1$
- Option D $h(A)<1$

Correct Answer C

05 Assumptions in Fuzzy Logic Control (FLC) Design

- Option A Existence of a knowledge body
- Option B Range of precision
- Option C The plant is observable and controllable
- Option D All of the above

Correct Answer D

01 Fuzzy logic uses

- Option A Global variables
- Option B Linguistic variables

Option C Local variables

Option D Approximate variables

Correct Answer B

02 _____ as an operator acts on fuzzy set representing meaning of its operand

Option A Defuzzification

Option B Truth table

Option C Linguistic hedges

Option D Propositions

Correct Answer C

03 The major components of the FLC

Option A Fuzzifier & Defuzzifier

Option B Fuzzy Rule Base & Knowledge Base

Option C Inference Engine

Option D All of the above

Correct Answer D

04 Which of the following not an Advantages of Fuzzy Logic Control

Option A Cheaper

Option B Robust

Option C Reliability

Option D Expensive

Correct Answer D

05 Examples of Fuzzy quantifiers are words like

Option A Most

Option B Many

Option C Few

Option D All of the above

Correct Answer D

06 Fuzzy truth qualification claims the degree of truth of fuzzy proposition Option
A True Option

B False

Correct Answer A

07 Propositions in fuzzy logic involves

- Option A Fuzzy predicate
- Option B Fuzzy Quantifier
- Option C Fuzzy Qualifier
- Option D All of the above

Correct Answer D

08 Formation of Rules:

I: Assignment statement; II: Conditional statement; III: Unconditional statement

- Option A Only I
- Option B Only I & II
- Option C Only I, II & III
- Option D Only II & III

Correct Answer C

09 Methods used for decomposition of rules

- Option A Multiple conjunctive antecedents
- Option B Multiple disjunctive antecedents
- Option C Conditional statement
- Option D All of the above

Correct Answer D

10 Multiple conjunctive antecedents based on

- Option A Fuzzy union operation
- Option B Fuzzy intersection operation
- Option C Fuzzy condition operation
- Option D Fuzzy difference operation

Correct Answer B

11 Two methods of Aggregation of fuzzy rules

- Option A Conjunctive system of rules
- Option B Disjunctive system of rules
- Option C Both a & b
- Option D Neither a nor b

Correct Answer C

12 In disjunctive system of rules, output determined by performing fuzzy union of all individual rule consequents

Option A True

Option B False

Correct Answer A

01 In this form of reasoning, the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities

Option A Qualitative Reasoning

Option B Categorial Reasoning

Option C Syllogistic Reasoning

Option D Dispositional Reasoning

Correct Answer B

02 A Fuzzy syllogism can be expressed as $x=s_1$ A's are B's & $y=s_2$ C's are D's

Option A $z=s_2$ C's are D's

Option B $z=s_2$ A's are B's

Option C $z=s_2$ C's are D's

Option D $z=s_3$ E's are F's

Correct Answer D

03 The Conjunction rule is

Option A $\sim x$ is $\sim A$, $\sim x$ is $\sim B \Rightarrow \sim x$ is $\sim A \cap \sim B$

Option B $\sim x$ is $\sim A$, $\sim x$ is $\sim B \Rightarrow \sim x$ is $\sim A \cup \sim B$

Option C $\sim x$ is $\sim A$, $\sim x$ is $\sim B \Rightarrow \sim x$ is $\sim A \cap \sim B$

Option D $\sim x$ is $\sim A$, $\sim x$ is $\sim B \Rightarrow \sim x$ is $\sim A \pi \sim B$

Correct Answer D

04 The negative rule of inference is

Option A NOT ($\sim x$ is $\sim A$) $\Rightarrow \sim x$ is $\sim A$

Option B NOT ($\sim x$ is $\sim A$) $\Rightarrow \sim x$ is $\sim A$

Option C NOT ($\sim x$ is $\sim A$) $\Rightarrow \sim x$ is A

Option D NOT ($\sim x$ is $\sim A$) $\Rightarrow x$ is A

Correct Answer A

05 In this mode of reasoning, the antecedents & consequents have fuzzy linguistic variables

Option A Qualitative Reasoning

Option B Categorial Reasoning

Option C Syllogistic Reasoning

Option D Dispositional Reasoning

Correct Answer A

07 How many types are available in machine learning?

Option A 1

Option B 2

Option C 3

Option D 4

Correct Answer C

08 How the decision tree reaches its decision?

Option A Single test

Option B Two test

Option C Sequence of test

Option D No test

Correct Answer C

09 What Is Fuzzy Inference Systems?

Option A The process of formulating the mapping from a given input to an output using fuzzy logic

Option B Changing the output value to match the input value to give it an equal balance

Option C Having a larger output than the input

Option D Having a smaller output than the input

Correct Answer A

10 Where Has Fuzzy Inference Systems Been Implemented?

Option A Wireless services, heat control and printers

Option B Restrict power usage, telephone lines and sort data

Option C Simulink, boiler and CD recording

Option D Automatic control, decision analysis and data classification

Correct Answer D

11 What Is Another Name For Fuzzy Inference Systems?

Option A Fuzzy Expert System

Option B Fuzzy Modelling

Option C Fuzzy Logic Controller

Option D All of the above

Correct Answer D

12 The Equation For Probabilistic: Prob σ (a,b) = a+b - ab

Option A True

Option B False

Correct Answer A

01 The tendency of population to remain in genetic equilibrium may be disturbed by

Option A Random mating

Option B Lack of migration

Option C Lack of mutations

Option D Lack of random mating

Correct Answer D

02 One of the important consequences of geographical isolation is:

Option A Random creation of new species

Option B No change in the isolated fauna

Option C Preventing Speciation

Option D Speciation through reproductive isolation

Correct Answer D

03 What is meant by the term Darwin fitness?

Option A The ability to survive and reproduce

Option B High aggressiveness

Option C Healthy appearance

Option D Physical strength

Correct Answer A

04 Diversification in plant life appeared:

Option A Due to abrupt mutations

Option B Suddenly on earth

Option C By seed dispersal

Option D Due to long periods of evolutionary changes

Correct Answer D

05 Chemical reactions could have converted simple organic compounds into _____ for

the origin of life

Option A Micromolecules

Option B Nitrogen, oxygen and other gases

Option C Cells

Option D Macromolecules

Correct Answer D

06 Which one of the following sequences was proposed by Darwin and Wallace for

organic evolution?

Option A Overproduction, variations, constancy of population size,

natural selection

Option B Variations, constancy of population size, overproduction,

natural selection

Option C Overproduction, constancy of population size, variations,

natural selection

Option D Variations, natural selection, overproduction, constancy of

population size

Correct Answer C

07

_____ is a subset of evolutionary computation,[1] a generic population-based meta-heuristic optimization algorithm

- Option A Genetic Algorithm
 - Option B Evolutionary algorithm (EA)
 - Option C Simulated Annealing
 - Option D Artificial Intelligence
- Correct Answer B

08 An EA uses mechanisms inspired by biological evolution, such as

- Option A mutation
 - Option B recombination
 - Option C selection
 - Option D All of the above
- Correct Answer D

09 Genetic Algorithms are

Option A

a class of algorithms that try and build solutions by introducing evolution and selection of the best in a population of candidate solutions

Option B

Methods, based on the theory of natural selection and evolutionary biology, for solving optimization problems.

Option C

A heuristic search method used in artificial intelligence and computing.

- Option D All of the above
- Correct Answer D

10 Objects forming possible solutions within the original problem context are referred

to as

- Option A Phenotypes
 - Option B Genotypes
 - Option C Genes
 - Option D Chromosomes
- Correct Answer A

01 In Evolutionary algorithm, An individual consist of

- Option A Genotype and phenotypes
- Option B Parent selection and crossover
- Option C Genotype and a fitness function
- Option D Mutation and recombination

Correct Answer C

02 Evolutionary Strategies were developed in the sixties by

- Option A John Holland
- Option B Rechenberg and Schwefel
- Option C Allen and Karjalainen
- Option D Ryan and Collins

Correct Answer B

03 EA heuristic follows

- Option A Initialization
- Option B Evaluation
- Option C Mutation and selection
- Option D All of the above

Correct Answer D

04 Selection is based on

- Option A Ranking of the individual fitness
- Option B Recombination of parents
- Option C Mutation of parameter
- Option D None of the above

Correct Answer A

05 The Simple evolution strategy operates on population of size two:

- Option A The current point (parent)
- Option B Result of its mutation (one offspring)
- Option C Both a and b
- Option D None of the above

Correct Answer C

06 Depending on search space & objective function, recombination & mutation of strategy parameter may or may not occur in specific algorithm

- Option A True
- Option B False
- Correct Answer A

01 EA consist of following elements

- Option A Parent Population size
- Option B Survival selection method
- Option C Parent selection method
- Option D All of the above

Correct Answer D

02 _____ which of the following method determines to be kept in the next generation

Option A Parent selection

Option B Mutation

Option C Recombination

Option D Survival selection

Correct Answer D

03 Roulette wheel selection scheme is preferable when

Option A Fitness values are uniformly distributed

Option B Fitness values are non-uniformly distributed

Option C Needs low selection pressure

Option D Needs high population diversity

Correct Answer A

04 A genetic operator used in genetic algorithms for selecting potentially useful solutions for recombination.

Option A Fitness proportionate selection

Option B Roulette wheel selection

Option C Rank selection method

Option D Stochastic universal sampling

Correct Answer A & B

05 _____ is a method of selecting an individual from a population of individuals in a genetic algorithm.

Option A Roulette wheel selection

Option B Rank selection method

Option C Tournament selection

Option D Stochastic Universal Sampling

Correct Answer C

06 As selection pressure increases, fitter solutions are more likely to survive

Option A True

Option B False

Correct Answer A

07 What are normally the two best measurement units for an evolutionary algorithm?

Option A Number of evaluations

Option B Number of generations

Option C Elapsed & CPU time

Option D Both a & b

Correct Answer D

08 What is most important to be concerned with in the evolution of repetitive problems?

Option A Do multiple runs until a good solution is found

Option B Execute one run until the solution is good enough

Option C Get a reasonably good solution every time

Option D Get a very good result just once

Correct Answer C

09 Evolutionary Strategies (ES)

Option A (μ,λ): Select survivors among parents and offspring

Option B ($\mu+\lambda$): Select survivors among parents and offspring

Option C ($\mu-\lambda$): Select survivors among offspring only

Option D ($\mu:\lambda$): Select survivors among offspring only

Correct Answer B

10 Rank based selection

Option A Use relative rather than absolute fitness

Option B Use absolute rather than relative fitness

Option C Results in less control of the selection pressure than

fitness-proportionate selection

Option D Ranking can be either linear or non-linear

Correct Answer A & D

Sr. No .	Question	Option 1	Option 2	Option 3	Option 4	Answer
1	Core of soft Computing is-	Fuzzy Computing, Neural Computing, Genetic Algorithms	Fuzzy Networks and Artificial Intelligence	Artificial Intelligence and Neural Science	Neural Science and Genetic Science	1
2	Who initiated the idea of Soft Computing	Charles Darwin	Lofti A Zadeh	Rechenberg	Mc_Culloch	2
3	In supervised learning	classes are not predefined	classes are predefined	classes are not required	classification is not done	2
4	Artificial neural network used for	Pattern Recognition	Classification	Clustering	All of these	4

5	A Neural Network can answer	For Loop questions	what-if questions	IF-The-Else Analysis Questions	None of these	2
6	Hard computing produce	precise solutions	fuzzy solution	approximate solution	None of these	1
7	Hard computing is strictly	Parallel	sequential	Both	None of these	2
8	Principle component of soft computing is	Neural Network	Fuzzy Loguc	Genetic Algorithms	All of the mentioned	4
9	Which is supervised learning	clustering	regression	association	dimensionality reduction	2
10	In supervised learning, training set of data includes	Input	Output	Both input and output	None	3
11	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	1
12	Fuzzy – Genetic Hybrid system is a	Fuzzy logic in parallel with the Genetic algorithm	Fuzzy logic controlled Genetic algorithm	Genetic algorithm controlled Fuzzy logic	None of the above	2
13	Which of the following is not a hybrid system?	Embedded hybrid system	Sequential hybrid system	Auxiliary hybrid system	Parallel hybrid system	4

14	Command to start matlab fuzzy toolbox is	fis	fuzzy	fuzzybox	fuzzytool	2
15	In terms of computing we have	antecedent	consequent	mapping function	All of the mentioned	4
16	Fuzzy logic is a form of	Two valued logic	Many valued logic	Crisp set logic	Binary set logic	2
17	Traditional set theory is also known as Crisp set theory.	True	False			1
18	In a Fuzzy set a prototypical element has a value	1	0	Infinite	Not Defined	1
19	Which of the following is a type of Membership function?	Triangular	Trapezoidal	Sigmoid	All of the above	4
20	Which of the following is not a type of Membership function?	S-shape	Bell shape	Truncated Gaussian	None of these	4
21	What is the independent variable of fuzzy output?	Maturity	Membership	Generic Element	None of these	1
22	Fuzzy Implication is also known as	Fuzzy logic	Fuzzy IF-THEN rule	Fuzzy expert system	None of these	2
23	Ways to compute fuzzy rule A-> B is	A coupled with B	A entails B	Both	None of these	3

24	System is used for both MISO and MIMO	Mamdani	Sugeno	Takagi	None of these	1
25	Which is not the defuzzification method	Centre of gravity method	Centre of sum method	Centre of perimeter method	Centre of area method	3
26	Which of this is not a fuzzy controller	Domestic Shower Controller	Water purifier controller	Train brake power controller	Angular JS Controller	4
27	In Evolutionary algorithm _____ operator is prime operator	selection	mutation	recombination	initialization	2
28	In evolutionary algorithm selection is _____	deterministic	probabilistic	both	None of these	1
29	Evolutionary Algorithm deals with self adaptation	Yes	No			1
30	Problem domain of Evolutionary Algorithm is	discrete optimization	continuous optimization	combinatorial optimization	None of these	2
31	Evolutionary Algorithm solves _____ problem	NP-complete	NP-hard	P	None of these	2
32	Category of EP based on scaling function	Non adaptive	Non Dynamic	Non self-adaptive	Adaptive	1

33	Evolutionary algorithm differs from genetic algorithm as it does not have	Crossover	mutation	Selection	Reproduction	1
34	Evolutionary algorithms classified as	Evolutionary Programming	Evolutionary Strategies	Genetic Algorithms	All of the mentioned	4
35	compared to Traditional approach EA takes _____ CPU time	Large	Small	Equal	None of these	1
36	Genetic Algorithm is superset of Evolutionary Algorithm	True	False			2
37	Optimization in GA is	Metaheuristic	Stochastic	Discrete	Continuous	3
38	In GA individual memory is there	Yes	No			2
39	In GA individual operator is	Crossover point	Mutation	pbest	gbest	2
40	In _____ each individual survives for exactly one generation	Generation Model	Steady state Model	Population Model	Tournament Model	1
41	Which GA operation is computationally most expensive?	Initial population creation	Selection of sub-population for mating	Reproduction to produce next generation	Convergence testing	3

42	Which of these are adaptive heuristic search algorithms	evolutionary algorithms	genetic algorithms	Binary search	None of these	2
43	In Genetic algorithm string operate with	Real values	binary number	Decimal Number	None of these	2
44	Parallel GA	Generational	Steady state	Distributed	None of these	3
45	Examples of stopping criteria in GA can be	Generation limit	No change in fitness	Elapsed time	All of the mentioned	4
46	Category of GBML systems	Pittsburg Approach	Divide n conquer approach	Michi Approach	None of these	1
47	PGA is	Parallel Genetic Algorithm	Proportional Genetic Algorithm	Perceptron based Genetic Algorithm	None of these	1
48	Swarm intelligence (SI) introduced by	Gerardo Beni and Jing Wang	Gerardo Beni and James Gosling	George M and Jing Wang	None of these	1
49	The application of swarm principles to robots is called	swarm robotics	swarm behaviour	robotics	None of these	1
50	Methods of Swarm intelligence is	Particle swarm optimization	Ant colony optimization	Both	None of these	3

51	PSO stands for	Particle Swarm Optimization	Particle Selection Optimization	Portion Swarm Optimization	Portion Selection Optimization	1
52	ACO stands for	Analytical Colony Optimization	Ant Colony Optimization	Ant Coding optimization	None of these	2
53	Each particle of swarm maintains record of	pbest	gbest	Both pbest, gbest	None of these	3
54	pbest is	personal best	personal based	proper based	proper best	1
55	gbest is	global best	general best	global based	general based	1
56	Particle has	fitness value	velocity	pbest	All of the mentioned	4
57	In each iteration every particle in swarm we update	velocity	gbest	Both velocity ,gbest	None of these	3
58	In PSO important thing is	Communication	Learning	Both	None of these	3
59	PSO topology	Star	Ring	Adaptive random	All of the mentioned	4
60	“The train is running fast”. Here ‘fast’ can be represented by	Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	None of these	1

61	<u> </u> is/are the way/s to represent uncertainty.	Fuzzy Logic	Probabilty	Entropy	All of the mentioned	4
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SCOA UNIT 2 MCQs

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

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	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intuition, Inference, Rank Ordering B.Fuzzy Algorithm, Neural network, Genetic Algorithm C.Core, Support , Boundary D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core B.Support C.Boundary D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

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	<p>B.normal fuzzy set C.convex fuzzy set D.concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A.1 B.0 C.infinite D.Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A.normal fuzzy set B.subnormal fuzzy set. C.convex fuzzy set D.concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesn't deal with 2 valued logic</p>	D

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	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	<p>Defuzzification is done to obtain</p> <ul style="list-style-type: none"> a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above 	a
13.	<p>“The train is running fast”. Here ‘fast’ can be represented by</p> <ul style="list-style-type: none"> a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned 	a
14.	<p>Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$</p> <p>Then the crisp value of Young using MoM method is</p> <ul style="list-style-type: none"> a) 25 b) 20 c) 35 d) 50 	a
15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area 	c

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	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)$ complement \neq $(A\lambda)$ complement (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

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	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

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	d) None of the above	
26.	Fuzzy logic is a form of a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic	Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.
27.	Traditional set theory is also known as Crisp Set theory. a) True b) False	Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set. 3. The truth values of traditional set theory is _____ and that of fuzzy set is _____
28.	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Answer: a Explanation: Refer the

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	<p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	definition of Fuzzy set and Crisp set.
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p> <p>a) Fuzzy Set b) Crisp Set</p>	<p>Answer: a Explanation: Fuzzy logic deals with linguistic variables.</p>
31.	<p>The values of the set membership is represented by</p> <p>a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c</p>	<p>Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.</p>
32.	What is meant by probability density function?	d

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	a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables	
33.	Which of the following is used for probability theory sentences? a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned	Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.
34.	Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following. a) AND b) OR c) NOT d) EX-OR	Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;
35.	Fuzzy logic is usually represented as a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned	Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy

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		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices. Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <p>a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned</p>	<p>Answer: d Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <p>a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned</p>	<p>Answer: c Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

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SCOA Unit I MCQ

- 1. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.**
A.True
B.False

- 2. The membership functions are generally represented in**
A.Tabular Form
B.Graphical Form
C.Mathematical Form
D.Logical Form

- 3. Membership function can be thought of as a technique to solve empirical problems on the basis of**
A.knowledge
B.examples
C.learning
D.experience

- 4. Three main basic features involved in characterizing membership function are**
A.Intuition, Inference, Rank Ordering
B.Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.sub normal fuzzy sets

B.normal fuzzy set

C.convex fuzzy set

D.concave fuzzy set

7. In a Fuzzy set a prototypical element has a value

A.1

B.0

C.infinite

D.Not defined

8. A fuzzy set wherein no membership function has its value equal to 1 is called

A.normal fuzzy set

B.Subnormal fuzzy set.

C.convex fuzzy set

D.concave fuzzy set

9. A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe

A.convex fuzzy set

B.concave fuzzy set

C.Non concave Fuzzy set

D.Non Convex Fuzzy set

10. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.

A.Convex Fuzzy Set

B.Non convex fuzzy set

C.Normal Fuzzy set

D.Sub normal fuzzy set

11. The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to

A.infinite

B.1

C.0

D.0.5

12. Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

B.False

14. Artificial neural network used for

A.Pattern Recognition

B.Classification

C.Clustering

D.All of these

15. A Neural Network can answer

- A.**For Loop questions
- B.**what-if questions
- C.**IF-The-Else Analysis Questions
- D.**None of these

16. Ability to learn how to do tasks based on the data given for training or initial experience

- A.**Self Organization
- B.**Adaptive Learning
- C.**Fault tolerance
- D.**Robustness

17. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

- A.**Adaptive Learning
- B.**Self Organization
- C.**What-If Analysis
- D.**Supervised Learning

18. In artificial Neural Network interconnected processing elements are called

- A.**nodes or neurons

B.weights

C.axons

D.Soma

19. Each connection link in ANN is associated with _____ which has information about the input signal.

A.neurons

B.weights

C.bias

D.activation function

20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.True

B.False

21. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.Weight

B.activation or activity level of neuron

C.Bias

D.None of these

22. Neuron can send _____ signal at a time.

- A.**multiple
- B.**one
- C.**none
- D.**any number of

23. Artificial intelligence is

- A.**It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations
- B.**Computational procedure that takes some value as input and produces some value as output.
- C.**Science of making machines performs tasks that would require intelligence when performed by humans
- D.**None of these

24. Expert systems

- A.**Combining different types of method or information
- B.**Approach to the design of learning algorithms that is structured along the lines of the theory of evolution
- C.**an information base filled with the knowledge of an expert formulated in terms

of if-then rules

D.None of these

25. Falsification is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

26. Evolutionary computation is

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.

C.Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.

D.None of these

27. Extendible architecture is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

28. Massively parallel machine is

A.A programming language based on logic

B.A computer where each processor has its own operating system, its own memory, and its own hard disk

C.Describes the structure of the contents of a database.

D.None of these

29. Search space

A.The large set of candidate solutions possible for a problem

B.The information stored in a database that can be, retrieved with a single query.

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

30. $n(\log n)$ is referred to

A.A measure of the desired maximal complexity of data mining algorithms

B.A database containing volatile data used for the daily operation of an organization

C.Relational database management system

D.None of these

31. Perceptron is

- A.**General class of approaches to a problem.
- B.**Performing several computations simultaneously
- C.**Structures in a database those are statistically relevant
- D.**Simple forerunner of modern neural networks, without hidden layers

32. Prolog is

- A.**A programming language based on logic
- B.**A computer where each processor has its own operating system, its own memory, and its own hard disk
- C.**Describes the structure of the contents of a database
- D.**None of these

33. Shallow knowledge

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be, retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

34. Quantitative attributes are

- A.**A reference to the speed of an algorithm, which is quadratically dependent on the size of

the data

B.Attributes of a database table that can take only numerical values

C.Tools designed to query a database

D.None of these

35. Subject orientation

A.The science of collecting, organizing, and applying numerical facts

B.Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.None of these

36. Vector

A.It do not need the control of the human operator during their execution

B.An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.The validation of a theory on the basis of a finite number of examples

D.None of these

37. Transparency

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

38. Core of soft Computing is

- A.**Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.**Fuzzy Networks and Artificial Intelligence
- C.**Artificial Intelligence and Neural Science
- D.**Neural Science and Genetic Science

39. Who initiated the idea of Soft Computing

- A.**Charles Darwin
- B.**Lofti A Zadeh
- C.**Rechenberg
- D.**Mc_Culloch

40. Fuzzy Computing

- A.**mimics human behaviour
- B.**doesn't deal with 2 valued logic
- C.**deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.**All of the above

41. Neural Computing

- A.**mimics human brain
- B.**information processing paradigm
- C.**Both (a) and (b)
- D.**None of the above

42. Genetic Algorithm are a part of

- A.**Evolutionary Computing
- B.**inspired by Darwin's theory about evolution - "survival of the fittest"
- C.**are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D.**All of the above

43. What are the 2 types of learning

- A.**Improvised and unimprovised
- B.**supervised and unsupervised
- C.**Layered and unlayered
- D.**None of the above

44. Supervised Learning is

- A.**learning with the help of examples
- B.**learning without teacher
- C.**learning with the help of teacher
- D.**learning with computers as supervisor

45. Unsupervised learning is

- A.**learning without computers
- B.**problem based learning

C.learning from environment

D.learning from teachers

46. Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

47. In supervised learning

A.classes are not predefined

B.classes are predefined

C.classes are not required

D. classification is not done

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Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

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	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intution, Inference, Rank Ordering B.Fuzzy Algorithm, Neural network, Genetic Algorithm C.Core, Support , Boundary D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core B.Support C.Boundary D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

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	<p>B.normal fuzzy set C.convex fuzzy set D.concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A.1 B.0 C.infinite D.Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A.normal fuzzy set B.subnormal fuzzy set. C.convex fuzzy set D.concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesn't deal with 2 valued logic</p>	D

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	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	<p>Defuzzification is done to obtain</p> <ul style="list-style-type: none"> a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above 	a
13.	<p>“The train is running fast”. Here ‘fast’ can be represented by</p> <ul style="list-style-type: none"> a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned 	a
14.	<p>Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$</p> <p>Then the crisp value of Young using MoM method is</p> <ul style="list-style-type: none"> a) 25 b) 20 c) 35 d) 50 	a
15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area 	c

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	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)^{\text{complement}} \neq \text{---} (A \lambda)^{\text{complement}}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

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	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

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	d) None of the above	
26.	<p>Fuzzy logic is a form of</p> <ul style="list-style-type: none"> a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic 	<p>Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.</p>
27.	<p>Traditional set theory is also known as Crisp Set theory.</p> <ul style="list-style-type: none"> a) True b) False 	<p>Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set.</p> <p>3. The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>
28.	<p>The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>	<p>Answer: a Explanation: Refer the</p>

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	<p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	definition of Fuzzy set and Crisp set.
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p> <p>a) Fuzzy Set b) Crisp Set</p>	<p>Answer: a Explanation: Fuzzy logic deals with linguistic variables.</p>
31.	<p>The values of the set membership is represented by</p> <p>a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c</p>	<p>Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.</p>
32.	What is meant by probability density function?	d

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	<p>a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables</p>	
33.	<p>Which of the following is used for probability theory sentences?</p> <p>a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned</p>	<p>Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.</p>
34.	<p>Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.</p> <p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy</p>

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		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <ul style="list-style-type: none"> a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned 	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <ul style="list-style-type: none"> a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned 	<p>Answer: c</p> <p>Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

SCOA UNIT 2 MCQs

This sheet is for 1 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions	Cannot Distinguish	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguous	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neuro	Fuzzy network and	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard bertrand	mc culloch	lofti zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behavior	deals with imprecise	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computation	conventional computation	non conventional computation	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behavior	information processing	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search representation	Blind search usually	Blind search cannot	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can be found	a solution found is	a solution that is the best	a solution that requires	C
17	When is a complete enumeration of solution used?		When a solution that is found	When there is enough time	When the modeler has time	When there are an infinite number of solutions	B
18	All of the following are true about heuristics EXCEPT		heuristics are used widely	heuristics are used often	heuristics are used sometimes	heuristics are rules of thumb	C
19	Which approach is most suited to structured problem with little uncertainty		Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based is	A
21	What does the 0 membership value means in the set		the object is fully included	the object is not included	the object is partially included	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a
23	The process of fuzzy inference system involves		membership function	fuzzy logic operations	if-then rules	all the above	d
24	What does a fuzzifier do		converts crisp input to	converts crisp output to	converts fuzzy input to	converts fuzzy output to	a
25	Which of the following is not defuzzifier method		centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy inference method		mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have		multiple parts of antecedent	only single part of antecedent	multiple parts of antecedent	only single part of antecedent	c
28	The α cut of a fuzzy set A is a crisp set defined by :-		$\{x \cup a(x) > \alpha\}$	$\{x \cup a(x) = \alpha\}$	$\{x \cup a(x) < \alpha\}$	$\{x \cup a(x) \leq \alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1 / x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?		$\{0/a, 0.7/b, 0.8/c, 0.2/d, 0/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.3/d, 0/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of A and B?		$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B?		$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.2/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 0/e\}$	a
34	What denotes the support(A) in a fuzzy set?		$\{x \cup a(x) > 0\}$	$\{x \cup a(x) < 0\}$	$\{x \cup a(x) = 0\}$	$\{x \cup a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?		$\{x \cup a(x) > 0\}$	$\{x \cup a(x) = 1\}$	$\{x \cup a(x) > 0.5\}$	$\{x \cup a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Evaluation	defuzzification->rule evaluation	rule evaluation->fuzzification	rule evaluation->defuzzification	a
38	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
39	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based is	A
40	All of the following are suitable problems for genetic algorithm EXCEPT		pattern recognition	simulation of biological systems	simple optimization	dynamic process control	C
41	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a

42	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
43	mutation is applied on __candidates.		one	two	more than two	noneof these	a
44	recombination is applied on __candidates.		one	two	more than two	noneof these	b
45	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	noneof these	a
46	Survival is __ approach.		deterministic	non deterministic	semi deterministic	noneof these	a
47	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
48	Tabu search is an example of ?		heuristic	Evolutionary algo	ACO	PSO	a
49	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
50	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?		line representation	String representat	Circular representat	all of these	b
52	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by		Fredrik	Fogel	Frank	Flin	b
54	Evolution Strategies is developed with		selection	mutation	a population of size	all of these	d
55	Evolution Strategies typically uses		real-valued vector re	vector representa	time based represen	none of these	a
56	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is		Parent population siz	Survival populatio	both a and b	none of these	c
59	What are different types of crossover		discrete and interme	discrete and conti	continuous and inte	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and te		TRUE	FALSE			B
61	_____cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solutuon	none of these	C
62	Discrete events and agent-based models are usually used for _____.		middle or low level o	high level of abstr	very high level of ab	none of these	A
63	_____doesnot usually allow decision makers to see how a solution to a _____en		Simulation ,Complex	Simulation,Easy p	Genetics,Complex p	Genetics,Easy problem	A
64	EC stands for?		Evolutionary Comput	Evolutionary com	Electronic computa	noneof these	a
65	GA stands for		genetic algorithm	genetic assuranc	genese alforithm	noneof these	a
66	LCS stands for		learning classes syste	learning classifier	learned class system	noneof these	b
67	GBML stands for		Genese based Machi	Genes based mob	Genetic bsed machi	noneof these	c
68	EV is dominantly used for solving ____.		optimization proble	NP problem	simple problems	noneof these	a
69	EV is considered as?		adaptive	complex	both a and b	noneof these	c
70	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?		line representation	String representa	Circular representat	all of these	b
72	Parameters that affect GA		initial population	selection process	fitness function	all of these	d
73	Fitness function should be		maximum	minimum	intermediate	noneof these	b
74	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
75	Tabu search is an example of ?		heuristic	Evolutionary algo	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
77	mutation is applied on __candidates.		one	two	more than two	noneof these	a
78	recombination is applied on __candidates.		one	two	more than two	noneof these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offsprings	grand child	c
80	____ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection methods	both a and b	noneof these	c
82	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	noneof these	a

83	Survival is _____ approach.		deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment		d
90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned		d
91	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned		c
92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned		c
93	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities		b
94	Given $U = \{1, 2, 3, 4, 5, 6, 7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3)\}: (5, 0), (6, (1, 2, 1), (3, 0.3)$	$\{(3, 0.3), (6, 0.2)\}$		c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification \rightarrow Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Fuzzification \rightarrow Rule Evaluation \rightarrow Defuzzification

96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to		{(0.5,12), (0.6,13), (1,14)}	{(0.5,12), (0.6,13), (1,14)}	{(0.3,12), (0.5,13), (1,14)}	{(0.3,12), (0.5,13), (1,14)}	d
98	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		{0, 1, 2, 3, 4, 5, 6, 7, 8}	{1, 2, 3, 4, 5, 6, 7, 8}	{2, 3, 4, 5, 6, 7, 8, 9}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified	unconditional unqualified	conditional qualified	unconditional qualified	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise answer	ANN gives accurate answer	In each, no precise answer	Fuzzy gives exact result	C
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	---- defines logic function of two propositions		prepositions	Linguistic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a

109	IF x is A and y is B then z=c (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b

116	In Evolutionary programming, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
119	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

123	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125 (1+1) ES			offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126 (1+λ) ES			λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127 Termination condition for EA			mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
130 (1+1) ES			Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
131	Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

This sheet is for 3 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
1	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
2	What is defuzzification		conversion of fuzzy set	conversion of crisp set	conversion of fuzzy set	conversion of crisp set to crisp log	a
3	What type of model is required for hard computing		mathematical	biological	chemical	probabilistic	a
4	Which of the following is/are basic component neuron		dendrites	axons	nucleus	all of the above	d
5	Which of the following computing technique has the ability of learning and adoption		neural network	evolutionary	hard	probabilistic	a
6	The truth value of the fuzzy set is		either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
7	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
8	7 which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Eval	defuzzification->rule eval	rule evaluation->fuzzif	rule evaluation->defuzzification->	a
9	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
10	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based isolation area	A
11	All of the following are suitable problem for genetic algorithm EXCEPT		pattern recognition	simulation of biological	simple optimization w	dynamic process control	C
12	In which stage of the simulation methodology do you determine the variable and gather data		Defining the problem	Constructing the sim	testing and validating	designing the experiment	B
13	In which stage of the simulation methodology do you determine how long to run the simulation		Defining the problem	Constructing the sim	testing and validating	designing the experiment	D
14	In which stage of the simulation methodology do you determine the system boundaries and environment?		Defining the problem	Constructing the sim	testing and validating	designing the experiment	B
15	What BEST describes a simulation model with a limited number of variables, each with the finite number of values		system dynamics simul	discrete event simul	continuous distribution	Monte Carlo simulation	B
16	The advantage of visual interactive simulation include all of the following EXCEPT		Improvement in training	reduced need for the	The ability to see how	improved presentation of simulat	B
17	What can system dynamics modelling be used for ?		qualitative method for	simulation models th	micro-level simulation	studying system behaviour at an	A
18	In agent-based modelling, agents are		the human workers or	communication links	Autonomous rule-base	the hardware platform used to co	C
19	Agent based modelling is best for all the following types of problem features EXCEPT		complex interactions	low uncertainty	Many inter-related fac	irregular data	B
20	What is the final stage of an agent based modeling(ABM) methodology?		Identifying the agents	Determining agent-re	Validating agent behav	determining the suitability of ABM	C
21	Which of the following is the advantage of simulation?		It can incorporate signif	It always result in opt	Simulation software re	It solves problem in one pass with	A
22	The truth value of the fuzzy set is		either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
23	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
24	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Eval	defuzzification->rule eval	rule evaluation->fuzzif	rule evaluation->defuzzification->	a
25	EV is dominantly used for solving		optimization problems	NP problem	simple problems	none of these	a
26	EV is considered as?		adaptive	complex	both a and b	none of these	c
27	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
28	Identify the drawbacks of clustering algorithms? 1) can generate empty clusters 2) can terminate at local minima		1,2,3	1,2	3	2,3	b
29	generation of empty cluster problem in clustering can be overcome by?		ACO based clustering	PSO based clusterin	kmeans	knode	b
30	where does PSO based clustering terminates?		global optimum	local optimum	global maximum	local minimum	a
31	Each particle in PSO modifies its position according to ? 1) its velocity 2) its weight 3) its best and pbest		2,3	1,2	1,2,3	only 1	c
32	Applications of ACO are ? 1) shortest path 2) assignment problem 3) set problem		2,3	1,2	1,2,3	1,2,3	c
33	Evaporation of pheromones is ?		directly proportional	inversely proportiona	constant	none	a
34	Metaheuristics does not include ?		evolutionary algorithm	tabu searching	simulated annealing	none	d
35	Metaheuristics are ? 1) non deterministic 2) non approximate 3) not problem specific		1,2,3	1,2	1,3	2,3	c
36	In search techniques, as single point based contradicts population based similarity deterministic contradicts		Stochastic	simplex based	complex based	none	a
37	In swarm systems organisations are		centralized	decentralized	controlled by third pa	none	b
38	Identify the working sequence of kmean clustering ? 1) redefine cluster centroids 2) initialize the k centroids		1,3,2	3,2,1	2,3,1	2,1,3	c
39	Every particle in the system takes experience from previous particle ?		PSO	ACO	clustering	none	a
40	swarm intelligence includes ? 1) bee colony algorithm 2) ant colony algorithm 3) PSO 4) immune system alg		1,2	1,2,3	2,3,4	all of these	d
41	pheromone quantity in ACO is proportional to path selection.		directly	inversely	there is no connection	none	a
42	Recombination involves candidates while mutation requires candidates, and the result is called .		1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
43	Identify the correct sequence for evolutionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3)Create offspring 4)Replace some parents		1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
44	Problems for which there is no efficient method to solve such problems exactly are called?		complex	hard	strong	none	b
45	EV is considered as ? 1)complex 2) adaptive		1	2	1,2	none	c
46	EV system was proposed for exploring a fitness space and can form .		multipieaked,clusters	single peaked,clusters	multipieaked,hard prob	single peaked,hard problems	a
47	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recom		1,2	1,2,3	2,3	1,3	b
48	Parameters that affect GA are ? 1)initial population 2)fitness function 3)ability to generate offspring		1,3	1,2	1,2,3	only 1	b
49	48) Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and	{ t = 0; initialize population P(t); evaluate P(t); until (done){ t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
50	Identify the algorithm ?procedure EA						
51	Genetic algorithm are heuristic methods that do not guarantee an optimal solution to a problem		TRUE	FALSE			A
52	A "what-if" model is most typically used for the most structured problems		TRUE	FALSE			B
53	cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solution	none of these	C
54	Discrete events and agent-based models are usually used for		middle or low level of abstract	high level of abstract	very high level of abstract	none of these	A
55	does not usually allow decision makers to see how a solution to a evolves over time nor can it		Simulation, Complex pr	Simulation,Easy prob	Genetics,Complex prob	Genetics,Easy problem	A
56	is a simulation method that let decision maker see what the model is doing and how it interact.		VIS	VIM	SIV	HIV	A
57	systems,especially those developed for the military and video-game industry		VIS	VIM	SIV	HIV	B
58	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and		Simulation	Optimization	human intuition	genetic algorithm	A
59	Which of the following is the advantage of simulation?		It can incorporate signif	It always result in opt	Simulation software re	It solves problem in one pass with	A
60	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurs		continuous distribution	time dependent simu	system dynamics simul	discrete event simulation	B
61	The defining length of a schema is useful to calculate _ of the schema for _		Survival probability,cross	crossovers,survival pr	crossovers,length	length,crossover	A
62	Recombination involves candidates while mutation requires candidates, and the result is called .		1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
63	Identify the correct sequence for evolutionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3)Create offspring 4)Replace some parents		1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
64	Problems for which there is no efficient method to solve such problems exactly are called?		complex	hard	strong	none	b
65	EV is considered as ? 1)complex 2) adaptive		1	2	1,2	none	c
66	EV system was proposed for exploring a fitness space and can form .		multipieaked,clusters	single peaked,clusters	multipieaked,hard prob	single peaked,hard problems	a
67	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recom		1,2	1,2,3	2,3	1,3	b
68	Parameters that affect GA are ? 1)initial population 2)fitness function 3)ability to generate offspring		1,3	1,2	1,2,3	only 1	b
	focuses attention on high fitness individuals, thus exploiting the available fitness information.		clustering	offspring production	replace	selection	d

69	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done){ t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }		ACO	PSO	EA	Kmean	c
70	Evolution strategies uses ? 1)selection 2)recombination 3)real valued vector	1,2,3	2,3	1,3	only 2		a
71	which of the following statements are true regarding ES ? 1)Survival is deterministic 2)first allows the N best children	only 1	1,2	only 2	1,2,3		d
72	Evolutionary Algorithms includes ? 1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	3,4	2,3,4		c
73	Heuristics include ?1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	1,2			d
74	Which of the following statements are true ? 1)mutation is applied to two selected candidates, the so-called parents, and results in one or two new candidates, the children 2) recombination is applied to one candidate and results in one new candidate.	only 1	only 2	both	none of these		d
75	The ___ is performed by selecting two sub trees by chance from the parents and exchange them to create the descendants.		GP crossover	GP Mutation	GP clustering	GP Recombination	a
76	The ___ is performed by selecting a sub tree of the descendant by chance and to exchange the sub tree with another	GP crossover	GP Mutation	GP clustering	GP Recombination		b
77	are able to learn simple "if (condition) then (action)" style rules by learning from feedback	ES	EA	LCS	Heuristics		c
78	Island model is related with ?	Distributed Evolutionary	LCS	swarm intelligence	ACO		a
79	payoffs can be easily translated to a ___ function for an EA.	survival	reduction	comination	fitness		d
80	Identify the correct statements with respect to genetic algorithms? 1)A fitness function should maximized. 2)a replacement procedure. 3)A string representation of chromosomes.		1,2	2,3	1,2,3	1,3	b
81	There are also other operators, more linguistic in nature, called that can be applied to fuzzy set theory.	Hedges	Lingual Variable	Fuzz Variable	None of the mentioned		a
82	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
83	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only		a
84	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
85	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-if Analysis	Supervised Learning	b
86	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
87	For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
88	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c
89	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
90	The values of the set membership is represented by		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
91	Given U = {1,2,3,4,5,6,7} A = {(3, 0.7), (5, 1), (6, 0.8)} then A will be: (where ~ → complement)		((4, 0.7), (2, 1), (1, 0.8))	((4, 0.3): (5, 0), (6, 0.2))	((1, 1), (2, 1), (3, 0.3), (4, (3, 0.3), (6, 0.2)))		c
92	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification → Rule eva	Fuzzification → Rule eva	Fuzzification → Rule eva	Fuzzification → Rule eva	Fuzzification → Rule eva
93	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)(x)$ will be						
94	Compute the value of adding the following two fuzzy integers: A = {(0.3,1), (0.6,2), (1,3), (0.7,4), (0,2,5)} B = {(0.5,11), (1,12), (0,5,13)} Where fuzzy addition is defined as $\mu_A+B(z) = \max_{x,y} \min(\mu_A(x), \mu_B(y))$ Then, f(A+B) is equal to		((0.9, 0.5, 0.6, 0.8, 0.8))	((0.6, 0.2, 0.1, 0.7, 0.5))	((0.1, 0.5, 0.4, 0.2, 0.2))	((0.1, 0.5, 0.4, 0.2, 0.3))	c
95	A U (B ∩ C) =		(A ∩ B) ∩ (A ∩ C)	(A ∪ B) ∩ C	(A ∩ B) ∩ (A ∩ C)	B ∩ A ∪ C	b
96	Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the cut corresponding to $\alpha = 0.5$ will be		(0, 1, 2, 3, 4, 5, 6, 7, 8, 9)	(1, 2, 3, 4, 5, 6, 7, 8, 9)	(2, 3, 4, 5, 6, 7, 8, 9, 10)	None of the above	c
97	The fuzzy proposition "If X is E then Y is F" is a		conditional unqualified	unconditional unquali	conditional qualified p	unconditional qualified propo	a
98	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that A ⊑ B and B ⊑ C and A ⊑ C 3. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
99	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy = Prediction	Fuzzy = Forecasting	Probability = Forecasti	None of these	b
100	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise and accura	ANN gives accurate re	In each, no precise mat	Fuzzy gives exact result but ANN c	c
101	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b

102	---- defines logic function of two prepositions		prepositions	Linguistic hedges	truth tables	inference rules	c
103	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
104	Multiple conjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
105	Multiple disjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
106	IF x is A and y is B then z=c (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
107	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set	convex fuzzy set	concave fuzzy set	b
108	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
109	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Mamfred-type and Sugeno-type	Mamdani-type and Sugeno-type	Mihni-type and Sugjani-type	c
110	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
111	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ): selection based on the children only ($\mu+\lambda$): selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
112	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ): selection based on the children only ($\mu+\lambda$): selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
113	In Evolutionary programming, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination to produce offspring. It uses various recombination operators such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
114	In Evolutionary strategy, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
115	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
116	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
117	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
118	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
119	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu\lambda$): Select survivors among offspring only	b
120	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
121	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
122	(1+1) ES		offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring becomes parent by default	offspring never becomes parent	none of the mentioned	a
123	(1+λ) ES		λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
124	Termination condition for EA		maximally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
125	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
126	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming does not use crossover operators	d
127	(1+1) ES		Operates on population size of two	operates on population size of one	operates on population size of zero	operates on population size of λ	a
128	Which of these emphasize development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
129	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
130	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

This sheet is for 3 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
1	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
2	What is defuzzification		conversion of fuzzy set	conversion of crisp set	conversion of fuzzy set	conversion of crisp set to crisp log	a
3	What type of model is required for hard computing		mathematical	biological	chemical	probabilistic	a
4	Which of the following is/are basic component neuron		dendrites	axons	nucleus	all of the above	d
5	Which of the following computing technique has the ability of learning and adoption		neural network	evolutionary	hard	probabilistic	a
6	The truth value of the fuzzy set is		either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
7	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
8	7 which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Eval	defuzzification->rule eval	rule evaluation->fuzzif	rule evaluation->defuzzification->	a
9	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
10	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based isolation area	A
11	All of the following are suitable problem for genetic algorithm EXCEPT		pattern recognition	simulation of biological	simple optimization w	dynamic process control	C
12	In which stage of the simulation methodology do you determine the variable and gather data		Defining the problem	Constructing the sim	testing and validating	designing the experiment	B
13	In which stage of the simulation methodology do you determine how long to run the simulation		Defining the problem	Constructing the sim	testing and validating	designing the experiment	D
14	In which stage of the simulation methodology do you determine the system boundaries and environment?		Defining the problem	Constructing the sim	testing and validating	designing the experiment	B
15	What BEST describes a simulation model with a limited number of variables, each with the finite number of values		system dynamics simul	discrete event simul	continuous distribution	Monte Carlo simulation	B
16	The advantage of visual interactive simulation include all of the following EXCEPT		Improvement in training	reduced need for the	The ability to see how	improved presentation of simulat	B
17	What can system dynamics modelling be used for ?		qualitative method for	simulation models th	micro-level simulation	studying system behaviour at an	A
18	In agent-based modelling, agents are		the human workers or	communication links	Autonomous rule-base	the hardware platform used to co	C
19	Agent based modelling is best for all the following types of problem features EXCEPT		complex interactions	low uncertainty	Many inter-related fac	irregular data	B
20	What is the final stage of an agent based modeling(ABM) methodology?		Identifying the agents	Determining agent-re	Validating agent behav	determining the suitability of ABM	C
21	Which of the following is the advantage of simulation?		It can incorporate signif	It always result in opt	Simulation software re	It solves problem in one pass with	A
22	The truth value of the fuzzy set is		either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
23	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
24	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Eval	defuzzification->rule eval	rule evaluation->fuzzif	rule evaluation->defuzzification->	a
25	EV is dominantly used for solving		optimization problems	NP problem	simple problems	none of these	a
26	EV is considered as?		adaptive	complex	both a and b	none of these	c
27	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
28	Identify the drawbacks of clustering algorithms? 1) can generate empty clusters 2) can terminate at local minima		1,2,3	1,2	3	2,3	b
29	generation of empty cluster problem in clustering can be overcome by?		ACO based clustering	PSO based clusterin	kmeans	knode	b
30	where does PSO based clustering terminates?		global optimum	local optimum	global maximum	local minimum	a
31	Each particle in PSO modifies its position according to ? 1) its velocity 2) its weight 3) its gbest and pbest		2,3	1,2	1,2,3	only 1	c
32	Applications of ACO are ? 1) shortest path 2) assignment problem 3) set problem		2,3	1,2	1,2,3	1,2,3	c
33	Evaporation of pheromones is ?		directly proportional	inversely proportiona	constant	none	a
34	Metaheuristics does not include ?		evolutionary algorithm	tabu searching	simulated annealing	none	d
35	Metaheuristics are ? 1) non deterministic 2) non approximate 3) not problem specific		1,2,3	1,2	1,3	2,3	c
36	In search techniques, as single point based contradicts population based similarity deterministic contradicts		Stochastic	simplex based	complex based	none	a
37	In swarm systems organisations are		centralized	decentralized	controlled by third pa	none	b
38	Identify the working sequence of kmean clustering ? 1) redefine cluster centroids 2) initialize the k centroids		1,3,2	3,2,1	2,3,1	2,1,3	c
39	Every particle in the system takes experience from previous particle ?		PSO	ACO	clustering	none	a
40	swarm intelligence includes ? 1) bee colony algorithm 2) ant colony algorithm 3) PSO 4) immune system alg		1,2	1,2,3	2,3,4	all of these	d
41	pheromone quantity in ACO is proportional to path selection.		directly	inversely	there is no connection	none	a
42	Recombination involves candidates while mutation requires candidates, and the result is called .		1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
43	Identify the correct sequence for evolutionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3)Create offspring 4)Replace some parents		1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
44	Problems for which there is no efficient method to solve such problems exactly are called?		complex	hard	strong	none	b
45	EV is considered as ? 1)complex 2) adaptive		1	2	1,2	none	c
46	EV system was proposed for exploring a fitness space and can form .		multipieaked,clusters	single peaked,clusters	multipieaked,hard prob	single peaked,hard problems	a
47	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recom		1,2	1,2,3	2,3	1,3	b
48	Parameters that affect GA are ? 1)initial population 2)fitness function 3)ability to generate offspring		1,3	1,2	1,2,3	only 1	b
49	48) Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and	{ t = 0; initialize population P(t); evaluate P(t); until (done){ t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
50	Identify the algorithm ?procedure EA						
51	Genetic algorithm are heuristic methods that do not guarantee an optimal solution to a problem		TRUE	FALSE			A
52	A "what-if" model is most typically used for the most structured problems		TRUE	FALSE			B
53	cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solution	none of these	C
54	Discrete events and agent-based models are usually used for		middle or low level of abstract	high level of abstract	very high level of abstract	none of these	A
55	does not usually allow decision makers to see how a solution to a evolves over time nor can it		Simulation, Complex pr	Simulation,Easy prob	Genetics,Complex prob	Genetics,Easy problem	A
56	is a simulation method that let decision maker see what the model is doing and how it interact.		VIS	VIM	SIV	HIV	A
57	systems,especially those developed for the military and video-game industry		VIS	VIM	SIV	HIV	B
58	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and		Simulation	Optimization	human intuition	genetic algorithm	A
59	Which of the following is the advantage of simulation?		It can incorporate signif	It always result in opt	Simulation software re	It solves problem in one pass with	A
60	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurs		continuous distribution	time dependent simu	system dynamics simul	discrete event simulation	B
61	The defining length of a schema is useful to calculate _ of the schema for _.		Survival probability,cross	crossovers,survival pr	crossovers,length	length,crossover	A
62	Recombination involves candidates while mutation requires candidates, and the result is called .		1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
63	Identify the correct sequence for evolutionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3)Create offspring 4)Replace some parents		1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
64	Problems for which there is no efficient method to solve such problems exactly are called?		complex	hard	strong	none	b
65	EV is considered as ? 1)complex 2) adaptive		1	2	1,2	none	c
66	EV system was proposed for exploring a fitness space and can form .		multipieaked,clusters	single peaked,clusters	multipieaked,hard prob	single peaked,hard problems	a
67	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recom		1,2	1,2,3	2,3	1,3	b
68	Parameters that affect GA are ? 1)initial population 2)fitness function 3)ability to generate offspring		1,3	1,2	1,2,3	only 1	b
	68) Which of the following is the advantage of simulation?		clustering	offspring production	replace	selection	d

69	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done){ t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }		ACO	PSO	EA	Kmean	c
70	Evolution strategies uses ? 1)selection 2)recombination 3)real valued vector	1,2,3	2,3	1,3	only 2		a
71	which of the following statements are true regarding ES ? 1)Survival is deterministic 2)first allows the N best children	only 1	1,2	only 2	1,2,3		d
72	Evolutionary Algorithms includes ? 1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	3,4	2,3,4		c
73	Heuristics include ?1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	1,2			d
74	Which of the following statements are true ? 1)mutation is applied to two selected candidates, the so-called parents, and results in one or two new candidates, the children 2) recombination is applied to one candidate and results in one new candidate.	only 1	only 2	both	none of these		d
75	The ___ is performed by selecting two sub trees by chance from the parents and exchange them to create the descendants.		GP crossover	GP Mutation	GP clustering	GP Recombination	a
76	The ___ is performed by selecting a sub tree of the descendant by chance and to exchange the sub tree with another	GP crossover	GP Mutation	GP clustering	GP Recombination		b
77	are able to learn simple "if (condition) then (action)" style rules by learning from feedback	ES	EA	LCS	Heuristics		c
78	Island model is related with ?	Distributed Evolutionary	LCS	swarm intelligence	ACO		a
79	payoffs can be easily translated to a ___ function for an EA.	survival	reduction	comination	fitness		d
80	Identify the correct statements with respect to genetic algorithms? 1)A fitness function should maximized. 2)a replacement procedure. 3)A string representation of chromosomes.		1,2	2,3	1,2,3	1,3	b
81	There are also other operators, more linguistic in nature, called that can be applied to fuzzy set theory.	Hedges	Lingual Variable	Fuzz Variable	None of the mentioned		a
82	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set		a
83	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only		a
84	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
85	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-if Analysis	Supervised Learning	b
86	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
87	For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
88	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c
89	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
90	The values of the set membership is represented by		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
91	Given U = {1,2,3,4,5,6,7} A = {(3, 0.7), (5, 1), (6, 0.8)} then A will be: (where ~ → complement)		((4, 0.7), (2, 1), (1, 0.8))	((4, 0.3): (5, 0), (6, 0.2))	((1, 1), (2, 1), (3, 0.3), (4, (3, 0.3), (6, 0.2)))		c
92	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Rule evaluation → Defuzzification	Rule evaluation → Fuzzification → Defuzzification	Defuzzification → Fuzzification	
93	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)(x)$ will be						
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95	A U (B ∩ C) =		(A ∩ B) ∩ (A ∩ C)	(A ∪ B) ∩ C	(A ∩ B) ∩ (A ∩ C)	B ∩ A ∪ C	b
96	Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the cut corresponding to $\alpha = 0.5$ will be		(0, 1, 2, 3, 4, 5, 6, 7, 8, 9)	(1, 2, 3, 4, 5, 6, 7, 8, 9)	(2, 3, 4, 5, 6, 7, 8, 9, 10)	None of the above	c
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122	(1+1) ES		offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring becomes parent by default	offspring never becomes parent	none of the mentioned	a
123	(1+λ) ES		λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
124	Termination condition for EA		maximally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
125	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
126	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming does not use crossover operators	d
127	(1+1) ES		Operates on population size of two	operates on population size of one	operates on population size of zero	operates on population size of λ	a
128	Which of these emphasize development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
129	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
130	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

This sheet is for 2 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	Who can deal with noisy input information		soft computing	hard computing	both a and b	none of the above	a
2	Ability to learn how to do task based on the data is done by		self organization	adaptive learning	fault tolerance	robustness	b
3	Which of the following is not a technique of soft computing		neural network	genetic algorithm	evolutionary algorithm	conventional algorithm	d
4	Fuzzy logic system is based on what type of rule		if-then	else-if	while	do-while	a
5	What is the function of dendrites in biological neural network		send signals to neurons	receive signals from	sum of incoming signal	transmit signals	b
6	Expert system		combines different types	is a approach to design	an information base	none of the above	c
7	Three main basic feature involved in characterizing member function are		intuition, inference, rank	fuzzy algorithm, neural	center of sums, median	core, support, boundary	d
8	What is the function of cell body in biological neural network		multiplying the incoming	sums the outgoing	multiples the outgoing	sums the outgoing sign	b
9	What is perceptron		a single layer feed forward	a double layer association	a neural network that	auto associative neural	a
10	Which of the following computing is trial and error problem solver algorithm		hard computing	neural network	evolutionary computation	fuzzy logic	c
11	What are advantages of neural network		ability to learn by example	fault tolerant	both a and b	none of the above	c
12	Which of the following does not belong to the process of involuntary computing		selection	mutation	recombination	deletion	d
13	The value of crisp set can be		either 0 or 1	near to 0 or 1	between 0 and 1	between 0.5 and 0.7	a
14	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by		fuzzy set	crisp set	probabilistic set	none of the above	a
15	The value of set membership can be represented by		discrete set	degree of truth	probabilities	both b and c	b
16	Semiconductor layout & aircraft design are the application type of which domain?		Control	Design	Robotics	ML	B
17	Trajectory planning is the application type of which domain?		Control	Design	Robotics	ML	C
18	Filter design is the application type of which domain?		Control	Signal Processing	Robotics	ML	B
19	Pokers & Checkers are the application type of which domain?		Control	Game Playing	Robotics	ML	B
20	Manufacturing & resource allocation are the application type of which domain?		Scheduling	Design	Robotics	ML	A
21	What is a crossover point in a fuzzy set?	$\{x u(x)<0\}$	$\{x u(x)=1\}$	$\{x u(x)=0.5\}$	$\{x u(x)>0\}$		c
22	If A and B are two fuzzy sets with membership function: $u(A)=(0,2,0.5,0.6,1.0,0.9)$, $u(B)=(0,1,0.5,0.2,0.5,0.7,0.9)$		$(0,2,0.5,0.6,1.0,0.9)$	$(0,2,0.3,0.8,0.1,0.5)$	$(0,5,0,1,0.6,1.0,0.8)$	$(0,1,0.5,0.2,0.1,0.8)$	d
23	$A=(0.1/1+0.2/2+0.3/3)$, $B=(0.6/1+0.5/2+0.4/3+0.5/4)$. Find the set difference		$(0.1/1+0.2/2+0.3/3)$	$(0.3/1+0.2/2+0.2/3)$	$(0.1/1+0.3/2+0.2/3)$	$(0.3/1+0.2/2+0.5/3)$	a
24	With the help of which formula we can find the algebraic sum of two fuzzy sets A,B?	$\{u(A)x^+, B(x)\}, \{A(x)^-, B(x)\}$	$\{u(A)x^+, B(x)\}, \{A(x)^-, B(x)\}$	$\{u(A)x^+, B(x)\}, \{A(x)^-, B(x)\}$	$\{u(A)x^+, B(x)\}, \{A(x)^-, B(x)\}$	$\{u(A)x^+, B(x)\}, \{A(x)^-, B(x)\}$	a
25	With the help of which formula we can find the algebraic product of two fuzzy sets A,B?	$\{u(A)x^+u(B)x^+\}$	$\{u(A)x^+u(B)x^+\}$	$\{u(A)x^+u(B)x^+\}$	$\{u(A)x^+u(B)x^+\}$	$\{u(A)x^+u(B)x^+\}$	d
26	Which one of the following is the associative property for a crisp set	$AU(BUC)=(AU)UC$	$AU(BUC)=(AU)UC$	$BU(AUC)=CU(BUA)$	$BU(AUC)=CU(BUA)$	$CU(AU)=B(AUC)$	all the above
27	Knowledge base is a combination of		rule base and data base	rule base and time base	time base and probabilities	model base and data base	a
28	Fuzzy logic system is based on what type of rule		if-then	else-if	while	do-while	a
29	What is the function of dendrites in biological neural network		send signals to neurons	receive signals from	sum of incoming signal	transmit signals	b
30	Discrete events and agent-based models are usually used for		middle or low level of abstraction	high level of abstraction	very high level of abstraction	none of these	A
31	_____ does not usually allow decision makers to see how a solution to a _____ involves over time		Simulation ,Complex pr	Simulation,Easy prob	Genetics,Complex prod	Genetics,Easy problem	A
32	_____ is a simulation method that let decision maker see what the model is doing and how it interact.	VIS	VIM	SIV	HIV	HIV	A
33	_____ systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	HIV	B
34	Which approach is most suited to complex problem with significant uncertainty, a need for experimental	Simulation	Optimization	human intuition	genetic algorithm	genetic algorithm	A
35	Which of the following is the advantage of simulation?		It can incorporate sign	It always result in opt	Simulation software re	It solves problem in on	A
36	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurs?		continuous distribution	time dependent simu	System dynamics simu	discrete event simulati	B
37	The defining length of a schema is useful to calculate _____ of the schema for _____.	Survival probability,crossover	crossovers,survival pr	crossovers,length	length,crossover	length,crossover	A
38	Semiconductor layout & aircraft design are the application type of which domain?	Control	Design	Robotics	ML	B	B
39	Trajectory planning is the application type of which domain?	Control	Design	Robotics	ML	C	C
40	Filter design is the application type of which domain?	Control	Signal Processing	Robotics	ML	B	B
41	categories of EA are/	Genetic Algorithm	genetic programming	learning Classifier Syst	all of these	all of these	d
42	Phases in which the LCS individuals are evaluated are		performance phase	reinforcement phase	both a and b	none of these	c
43	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	none of these	a
44	Genetic algorithm is a subset of _____.		evolutionary algorithm	dynamic algorithm	both a&b	None of these	A
45	NP hard problems are also called as _____.		discrete optimization	combinatorial optimizat	evolutionary optimizat	None of these	B
46	Genetic algorithm is first introduce by _____	Charles Darwin	John Holland	Gregor Johan Mendel	None of these	None of these	B
47	replicates the most successful solutions found in a population at a rate proportional to related	Selection	Recombination	Mutation	None of these	None of these	A
48	decomposes two distinct solutions and then randomly mixes their parts to form novel solution	Selection	Recombination	Mutation	None of these	None of these	B
49	randomly perturbs a candidate solution.	Selection	Recombination	Mutation	None of these	None of these	C
50	A _____ is a template consisting of a string composed of three symbol.	Wild symbol	Schema	Layout	None of these	None of these	B
51	{0,1,#} is the symbol alphabet,where # is a special _____ symbol.	Wild card	Schema	Layout	None of these	None of these	A
52	Metaheuristics are ?) non deterministic 2) non approximate 3) not problem specific	1,2,3	1,2	1,3	2,3	2,3	c
53	In search techniques, as single point based contradicts population based similiy deterministic contr	Stochastic	simplex based	complex based	none	none	a
54	In swarm systems organisations are		centralized	decentralized	controlled by third pa	none	b
55	Identify the working sequence of kmean clustering ? 1) redefine cluster centroids 2) initialize the k c	1,3,2	3,2,1	2,3,1	2,1,3	2,1,3	c
56	Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	none	a
57	swarm intelligence includes ? 1) bee colony algorithm 2) ant colony algorithm 3) PSO 4)immune sys	1,2	1,2,3	2,3,4	all of these	all of these	d
58	pheromone quantity in ACO is _____ proportional to path selection.	directly	inversely	there is no connection	none	none	a
59	The ants prefer the smaller drop of honey over the more abundant, but less nutritious, sugar. This is the	kruskal algorithm	Travelling salesmen	Knapsack problem	NP hard problem	NP hard problem	c
60	In kmeans clustering each cluster is associated with	centroids	edge	common point	none of them	none of them	a
61	What is EC2?		computer based proble	Systems that uses cor	both a and b	none of these	c
62	Recombination is applied to	2 selected candidated	1 selected candidat	3 selected candidat	none of these	none	a
63	In EA mutation is applied to	2 candidate	1 candidate	3 candidate	none of these	none of these	b
64	EV is used for		solving optimization pr	finding solutions	both a and b	none of these	a
65	EV is considered as	complex	simple	complex and adaptive	all of these	all of these	c
66	GA stands for	Genetic Algorithm	genetic programming	genetic assurance	none of these	none of these	a
67	Features of GA		A string representation	A fitness function be	A cross-over method	all of these	d
68	what are the parameters that affect GA are/is		selection process	initial populatio	both a and b	none of these	c
69	Evolutionary programming was developed by	Fredrik	Fogel	Frank	Flin	b	b
70	Evolution Strategies is developed with	selection	mutation	a population of size or	all of these	all of these	d
71	Evolution Strategies typically uses	real-valued vector repr	vector representatio	time based representa	none of these	none of these	a
72	in ES survival is	Indeterministic	deterministic	both a and b	none of these	none of these	d
73	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d	d
74	Elements of ES are/is	Parent population size	Survival population si	both a and b	none of these	none of these	c
75	What are different types of crossover	discrete and intermediate	discrete and continu	continuous and interme	none of these	none of these	a
76	GP individual stores computer program	TRUE	FALSE				a
77	GP selection is	Deterministic selection	Tournament selector	nondeterministic selec	none of these	none of these	b
78	EP mutation is	Data specific	Data type specific	non specific	none of these	none of these	b
79	categories of EA are/is	Genetic Algorithm	genetic programming	learning Classifier Syst	all of these	all of these	d
80	Phases in which the LCS individuals are evaluated are		performance phase	reinforcement phase	both a and b	none of these	c
81	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	none of these	a
82	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, either 0 or 1	Either 0 or 1, either 0 or 1	either 0 or 1	a
83	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by	Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	Fuzzy & Crisp Set	a	a
84	Fuzzy logic is usually represented as	IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	None of the mentioned	b
85	Three main basic features involved in characterizing membership function are	Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural Network, Genetic Algorithm	Core, Support, Boundary	Weighted Average, center of Sums, Median	Weighted Average, center of Sums, Median	c
86	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	concave fuzzy set	b
87	Why can't we design a perfect neural network?	full operation is still not known of biological neurons	number of neuron is itself not precisely known	number of interconnection is very large & is very complex	In each, no precise mathematical model	Fuzzy logic gives accurate result but ANN doesn't	d
88	Both Fuzzy logic and ANN are soft computing techniques because		Both gives precise and accurate results	result but fuzzy logic doesn't	activation of activity level of neuron	Fuzzy logic gives accurate result but ANN doesn't	c
89	Internal state of neuron is called _____, is the function of the inputs the neurons receive	Weight		Bias	None of these	None of these	b
90	Each connection link in ANN is associated with _____ which has information about the input signal.	neurons	weights	bias	activation function	activation function	b
91	In artificial Neural Network interconnected processing elements are called	nodes or neurons	weights	axons	Soma	Soma	a
92	The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to	infinite		1	0	0.5	d

93	The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing		Convex Fuzzy Set	Non convex fuzzy set	Normal Fuzzy set	Sub normal fuzzy set	b
94	The cell body of neuron can be analogous to what mathematical operation?	summing	differentiator	integrator	none of the mentioned	a	
95	Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial	Conventional Artificial	Both (a) and (b)	None of the above	c	
96	is/are the way/s to represent uncertainty.	Fuzzy Logic	Probability	Entropy	All of the mentioned	d	
97	Given two fuzzy sets A and B A={(x1,0.5),(x2,0.1),(x3,0.4)} and B={(x1,0.2),(x2,0.3),(x3,0.5)} then union of 2 sets A U B is	(({x1,0.5),(x2,0.1),(x3,0.4)})	(({x1,0.5),(x2,0.3),(x3,0.5)})	(({x1,0.2),(x2,0.3),(x3,0.5)})	(({x1,0.2),(x2,0.1),(x3,0.4)})	b	
98	If A and B are two fuzzy sets with membership functions: $\mu_A(x) = [0.2, 0.5, 0.6, 0.1, 0.9]$ $\mu_B(x) = [0.1, 0.5, 0.2, 0.7, 0.8]$ then the value of $\mu_A \cap \mu_B$ will be	[0.2, 0.5, 0.6, 0.7, 0.9]	[0.2, 0.5, 0.2, 0.1, 0.8]	[0.1, 0.5, 0.6, 0.1, 0.8]	[0.1, 0.5, 0.2, 0.1, 0.8]	d	
99	For k>1, which of the following concept can be used to generate other linguistic hedge?	Concentration and dilatation	Dilation	Concentration	None of the mentioned	c	
100	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A U B is	{1.0, 0.45, 0.75}	{1.0, 0.20, 0.75}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	a	
101	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A ∩ B is	{1.0, 0.45, 0.75}	{0.2, 0.20, 0.50}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	b	
102	Mamdani-style inference involves which steps	Fuzzification of the input variables & Rule evaluation	Aggregation of the rule output & Defuzzification	Both a and b	either a or b	c	
103	A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$	Core	Support	Cross-over	α - cut	c	
104	Which statement is true?	Mamdani approach characterised by its low interpretability and low accuracy	Takagi and Sugeno's approach characterised by high accuracy but at the cost of high interpretability	Takagi and Sugeno's approach follows precise fuzzy modelling and obtains high accuracy but at the cost of low interpretability	Mamdani approach characterised by its low interpretability and high accuracy	c	
105	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$	$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) < 1$	c	
106	Which can be used as an input to fuzzy controller?	A fuzzy set	A crisp set	Both fuzzy set and Crisp set	None of these	b	
107	What are the types of fuzzy logic sets?	Type-1 fuzzy set	Type-2 fuzzy set	Both a and b	None of these	c	
108	How is fuzzy logic different from conventional control methods	IF and THEN approach	FOR approach	WHILE approach	DO approach	a	
109	The height $h(A)$ of a fuzzy set A is defined as $h(A)=\text{support } A(x)$, where A belongs to A. Then fuzzy set is called normal when	$h(A)=0$	$h(A)<0$	$h(A)=1$	$h(A)>1$	c	
110	If A and B are sets and $A \cup B = A \cap B$ then	$A=B$	$A=0$	$B=0$	None of these	A	
111	If x is A then y is B else y is C. The output of the given fuzzy rule is	A fuzzy set	A crisp set	a fuzzy relation	a membership function	c	
112	What Is The First Step Of Fuzzy Logic Toolbox?	Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator(AND or OR) in the antecedent	Aggregation of the consequents across the rule	a	
113	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	The input is a value greater than one and the output is a value less than the input	The input and output have both the same values	The input has two or more values and the output has a single truth value	d	
114	What Is The Input And Output Of Step 3 - Apply Implication Method?	Input is a fuzzy set but the output is a whole value	Input is a fuzzy set but the output is a whole value	Input and Output have the same value	Input is a smaller value than the output value	b	
115	What Is The Purpose Of Aggregation?	To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	a	
116	Linguistic variable is	a variable whose values are words or sentences	any numerical value only	any binary value only	variable which contains TRUE or FALSE values only	a	
117	Identification of Input, Output and state variables is performed in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	Identification of variables	d	
118	Assigning linguistic label to each subset is done in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	fuzzy subset configuration	d	
119	Disjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	a	
120	Conjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	b	
121	Categorial reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy quantifiers are related to inference rules	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	a	
122	Syllogistic reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	c	
123	Qualitative reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	b	
124	Dispositional reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	d	
125	Mamdani systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	d	
126	Sugeno systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	b	
127	In the generational model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	a	
128	In the steady-state model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	b	
129	In the generational model of EA	each individual survives exactly for two generation	each individual survives exactly for one generation	cannot predict	each individual survives as many generations as want	b	

130	In the steady-state model of EA		One offspring is generated per generation	two offsprings are generated per generation	cannot decide	more than two offsprings are generated per generation	a
131	Which of the following algorithm is most efficient for discontinuous and noisy problems?		Evolutionary algorithm	Classical optimization algorithm	Genetic algorithm	none	a
132	Each iteration of EA is referred to as		Generation	Iteration	population	None	a
133	Which of the following are evolutionary operators?		Selection	Crossover	Mutation	All of the above	d
134	In the $(\mu/\rho,\lambda)$ method of ES, parents are		selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	a
135	In the $(\mu/\rho+\lambda)$ method of ES, parents are		selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	b
136	Fitness scaling is desirable to ensure		Population diversity	selection pressure	that better solutions are selected only	relatively inferior solutions are not ignored	
137	Which mutation operator is used in ES as reproduction operator?		one point	Gaussian mutation	two point	adaptive	b
138	Fitness proportionate selection methods are		Roulette wheel selection	Stochastic universal sampling	tournament selection	All the mentioned	d
139	In which selection method of survival selection there is no notion of fitness?		fitness based selection	elitism	Agebased selection	All the mentioned	c
140	In which selection strategy every individual has the same probability to be selected?		Roulette wheel selection	Uniform selection	tournament selection	Rank selection	b
141	High selection pressure is desirable, when we need		diversity not found in each generation	there is no improvement in successive GA iteration	faster termination of GA	fitness values are not uniformly distributed	c
142	Tournament selection scheme is more preferable when		when fitness values are uniformly distributed	population are with very diversified fitness values	when fitness values are not necessarily uniformly distributed	under all the above situations	b
143	Which of the following is not a characteristic of evolutionary algorithm?		Conceptual simplicity	Parallelism	Broad applicability	Artificial selection	d
144	What is the correct order of steps in evolutionary algorithm?		Select parents-recombine-mutate-evaluate	Select parents-recombine-evaluate-mutate-	Select parents-mutate-evaluate -recombine-evaluate	Select parents-mutate-evaluate -recombine-evaluate	a
145	Which of the following schemes are selection schemes in Evolutionary computation?		Hall of fame	Rank based selection	tournament selection	All of the above	d
146	To encode chromosomes which encoding schemes are used		binary encoding	finite state machine	real value encoding	All of the above	d

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e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	Who can deal with noisy input information		soft computing	hard computing	both a and b	none of the above	a
2	Ability to learn how to do task based on the data is done by		self organization	adaptive learning	fault tolerance	robustness	b
3	Which of the following is not a technique of soft computing		neural network	genetic algorithm	evolutionary algorithm	conventional algorithm	d
4	Fuzzy logic system is based on what type of rule		if-then	else-if	while	do-while	a
5	What is the function of dendrites in biological neural network		send signals to neurons	receive signals from	sum of incoming signal	transmit signals	b
6	Expert system		combines different types	is a approach to design	an information base	none of the above	c
7	Three main basic feature involved in characterizing member function are		intuition, inference, rank	fuzzy algorithm, neural	center of sums, median	core, support, boundary	d
8	What is the function of cell body in biological neural network		multiplying the incoming	sums the outgoing	multiples the outgoing	sums the outgoing sign	b
9	What is perceptron		a single layer feed forward	a double layer association	a neural network that	auto associative neural	a
10	Which of the following computing is trial and error problem solver algorithm		hard computing	neural network	evolutionary computing	fuzzy logic	c
11	What are advantages of neural network		ability to learn by example	fault tolerant	both a and b	none of the above	c
12	Which of the following does not belong to the process of involuntary computing		selection	mutation	recombination	deletion	d
13	The value of crisp set can be		either 0 or 1	near to 0 or 1	between 0 and 1	between 0.5 and 0.7	a
14	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by		fuzzy set	crisp set	probabilistic set	none of the above	a
15	The value of set membership can be represented by		discrete set	degree of truth	probabilities	both b and c	b
16	Semiconductor layout & aircraft design are the application type of which domain?		Control	Design	Robotics	ML	B
17	Trajectory planning is the application type of which domain?		Control	Design	Robotics	ML	C
18	Filter design is the application type of which domain?		Control	Signal Processing	Robotics	ML	B
19	Pokers & Checkers are the application type of which domain?		Control	Game Playing	Robotics	ML	B
20	Manufacturing & resource allocation are the application type of which domain?		Scheduling	Design	Robotics	ML	A
21	What is a crossover point in a fuzzy set?	$\{x u(x)<0\}$	$\{x u(x)=1\}$	$\{x u(x)=0.5\}$	$\{x u(x)>0\}$		c
22	If A and B are two fuzzy sets with membership function: $u(A)=(0,2,0.5,0.6,1.0,0.9)$, $u(B)=(0,1,0.5,0.2,0.5,0.7,0.9)$		$(0,2,0.5,0.6,1.0,0.9)$	$(0,2,0.3,0.8,0.1,0.5)$	$(0,5,0,1,0.6,1.0,0.8)$	$(0,1,0.5,0.2,0.1,0.8)$	d
23	$A=(0.1/1+0.2/2+0.3/3)$, $B=(0.6/1+0.5/2+0.4/3+0.5/4)$. Find the set difference		$(0.1/1+0.2/2+0.3/3)$	$(0.3/1+0.2/2+0.2/3)$	$(0.1/1+0.3/2+0.2/3)$	$(0.3/1+0.2/2+0.5/3)$	a
24	With the help of which formula we can find the algebraic sum of two fuzzy sets A,B?	$\{u(A)x^+, B(x)\}, \{A(x)^-, B(x)\}$	$\{u(A)x^+, B(x)\}, \{A(x)^-, B(x)\}$	$\{u(A)x^+, B(x)\}, \{A(x)^-, B(x)\}$	$\{u(A)x^+, B(x)\}, \{A(x)^-, B(x)\}$	$\{u(A)x^+, B(x)\}, \{A(x)^-, B(x)\}$	a
25	With the help of which formula we can find the algebraic product of two fuzzy sets A,B?	$\{u(A)x^+u(B)x^+\}$	$\{u(A)x^+u(B)x^+\}$	$\{u(A)x^+u(B)x^+\}$	$\{u(A)x^+u(B)x^+\}$	$\{u(A)x^+u(B)x^+\}$	d
26	Which one of the following is the associative property for a crisp set	$AU(BUC)=(AU)UC$	$AU(BUC)=(AU)UC$	$BU(AUC)=CU(BUA)$	$BU(AUC)=CU(BUA)$	$CU(AU)=B(AUC)$	all the above
27	Knowledge base is a combination of		rule base and data base	rule base and time base	time base and probabilities	model base and data base	a
28	Fuzzy logic system is based on what type of rule		if-then	else-if	while	do-while	a
29	What is the function of dendrites in biological neural network		send signals to neurons	receive signals from	sum of incoming signal	transmit signals	b
30	Discrete events and agent-based models are usually used for		middle or low level of abstraction	high level of abstraction	very high level of abstraction	none of these	A
31	_____ does not usually allow decision makers to see how a solution to a _____ involves over time		Simulation ,Complex pr	Simulation,Easy prob	Genetics,Complex prod	Genetics,Easy problem	A
32	_____ is a simulation method that let decision maker see what the model is doing and how it interact.	VIS	VIM	SIV	HIV	HIV	A
33	_____ systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	HIV	B
34	Which approach is most suited to complex problem with significant uncertainty, a need for experimental	Simulation	Optimization	human intuition	genetic algorithm	genetic algorithm	A
35	Which of the following is the advantage of simulation?		It can incorporate sign	It always result in opt	Simulation software re	It solves problem in on	A
36	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurs?		continuous distribution	time dependent simu	System dynamics simu	discrete event simulati	B
37	The defining length of a schema is useful to calculate _____ of the schema for _____.	Survival probability,crossover	crossovers,survival pr	crossovers,length	length,crossover	length,crossover	A
38	Semiconductor layout & aircraft design are the application type of which domain?	Control	Design	Robotics	ML	B	B
39	Trajectory planning is the application type of which domain?	Control	Design	Robotics	ML	C	C
40	Filter design is the application type of which domain?	Control	Signal Processing	Robotics	ML	B	B
41	categories of EA are/	Genetic Algorithm	genetic programming	learning Classifier Syst	all of these	all of these	d
42	Phases in which the LCS individuals are evaluated are	performance phase	reinforcement phase	both a and b	none of these	c	c
43	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	a	a
44	Genetic algorithm is a subset of _____.	evolutionary algorithm	dynamic algorithm	both a&b	None of these	A	A
45	NP hard problems are also called as _____.	discrete optimization	combinatorial optimizat	evolutionary optimizat	None of these	B	B
46	Genetic algorithm is first introduce by _____	Charles Darwin	John Holland	Gregor Johan Mendel	None of these	B	B
47	replicates the most successful solutions found in a population at a rate proportional to related	Selection	Recombination	Mutation	None of these	A	A
48	decomposes two distinct solutions and then randomly mixes their parts to form novel solution	Selection	Recombination	Mutation	None of these	B	B
49	randomly perturbs a candidate solution.	Selection	Recombination	Mutation	None of these	C	C
50	A _____ is a template consisting of a string composed of three symbol.	Wild symbol	Schema	Layout	None of these	B	B
51	{0,1,#} is the symbol alphabet,where # is a special _____ symbol.	Wild card	Schema	Layout	None of these	A	A
52	Metaheuristics are ?) non deterministic 2)non approximate 3)not problem specific	1,2,3	1,2	1,3	2,3	c	c
53	In search techniques, as single point based contradicts population based similarly deterministic contr	Stochastic	simplex based	complex based	none	a	a
54	In swarm systems organisations are	centralized	decentralized	controlled by third pa	none	b	b
55	Identify the working sequence of kmean clustering ? 1) redefine cluster centroids 2)initialize the k c	1,3,2	3,2,1	2,3,1	2,1,3	c	c
56	Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	a	a
57	swarm intelligence includes ? 1)beec colony algorithm 2)ant colony algorithm 3) PSO 4)immune sys	1,2	1,2,3	2,3,4	all of these	d	d
58	pheromone quantity in ACO is _____ proportional to path selection.	directly	inversely	there is no connection	none	a	a
59	The ants prefer the smaller drop of honey over the more abundant, but less nutritious, sugar. This is the	kruskal algorithm	Travelling salesmen	Knapsack problem	NP hard problem	c	c
60	In kmeans clustering each cluster is associated with	centroids	edge	common point	none of them	a	a
61	What is EC2?	computer based proble	Systems that uses cor	both a and b	none of these	c	c
62	Recombination is applied to	2 selected candidated	1 selected candidate	3 selected candidate	none of these	a	a
63	In EA mutation is applied to	2 candidate	1 candidate	3 candidate	none of these	b	b
64	EV is used for	solving optimization pr	finding solutions	both a and b	none of these	a	a
65	EV is considered as	complex	simple	complex and adaptive	all of these	c	c
66	GA stands for	Genetic Algorithm	genetic programming	genetic assurance	none of these	a	a
67	Features of GA	A string representation	A fitness function be	A cross-over method	all of these	d	d
68	what are the parameters that affect GA are/is	selection process	initial populatio	both a and b	none of these	c	c
69	Evolutionary programming was developed by	Fredrik	Fogel	Frank	Flin	b	b
70	Evolution Strategies is developed with	selection	mutation	a population of size or	all of these	d	d
71	Evolution Strategies typically uses	real-valued vector repr	vector representatio	time based representa	none of these	a	a
72	in ES survival is	Indeterministic	deterministic	both a and b	none of these	d	d
73	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d	d
74	Elements of ES are/is	Parent population size	Survival population si	both a and b	none of these	c	c
75	What are different types of crossover	discrete and intermediate	discrete and continu	continuous and interme	none of these	a	a
76	GP individual stores computer program	TRUE	FALSE			a	a
77	GP selection is	Deterministic selection	Tournament selector	nondeterministic selec	none of these	b	b
78	EP mutation is	Data specific	Data type specific	non specific	none of these	b	b
79	categories of EA are/is	Genetic Algorithm	genetic programming	learning Classifier Syst	all of these	d	d
80	Phases in which the LCS individuals are evaluated are	performance phase	reinforcement phase	both a and b	none of these	c	c
81	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	a	a
82	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, either 0 or 1	Between 0 & 1, either 0 or 1	a	a
83	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____	Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	Fuzzy & Crisp Set	a	a
84	Fuzzy logic is usually represented as _____	IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	b	b
85	Three main basic features involved in characterizing membership function are	Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural Network, Genetic Algorithm	Core, Support, Boundary	Weighted Average, center of Sums, Median	c	c
86	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b	b
87	Why can't we design a perfect neural network?	full operation is still not known of biological neurons	number of neuron is itself not precisely known	number of interconnection is very large & is very complex	In each, no precise mathematical model	Fuzzy logic gives accurate result but ANN doesn't	d
88	Both Fuzzy logic and ANN are soft computing techniques because		Both gives precise and accurate results	result but fuzzy logic doesn't	activation or activity level of neuron	Fuzzy logic gives accurate result but ANN doesn't	c
89	Internal state of neuron is called _____, is the function of the inputs the neurons receive	Weight	Bias	Bias	None of these	b	b
90	Each connection link in ANN is associated with _____ which has information about the input signal.	neurons	weights	bias	activation function	b	b
91	In artificial Neural Network interconnected processing elements are called	nodes or neurons	weights	axons	Soma	a	a
92	The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to	infinite	1	0	0.5	d	d

93	The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing		Convex Fuzzy Set	Non convex fuzzy set	Normal Fuzzy set	Sub normal fuzzy set	b
94	The cell body of neuron can be analogous to what mathematical operation?	summing	differentiator	integrator	none of the mentioned	a	
95	Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial	Conventional Artificial	Both (a) and (b)	None of the above	c	
96	is/are the way/s to represent uncertainty.	Fuzzy Logic	Probability	Entropy	All of the mentioned	d	
97	Given two fuzzy sets A and B A={(x1,0.5),(x2,0.1),(x3,0.4)} and B={(x1,0.2),(x2,0.3),(x3,0.5)} then union of 2 sets A U B is	(({x1,0.5),(x2,0.1),(x3,0.4)})	(({x1,0.5),(x2,0.3),(x3,0.5)})	(({x1,0.2),(x2,0.3),(x3,0.5)})	(({x1,0.2),(x2,0.1),(x3,0.4)})	b	
98	If A and B are two fuzzy sets with membership functions: $\mu_A(x) = [0.2, 0.5, 0.6, 0.1, 0.9]$ $\mu_B(x) = [0.1, 0.5, 0.2, 0.7, 0.8]$ then the value of $\mu_A \cap \mu_B$ will be	[0.2, 0.5, 0.6, 0.7, 0.9]	[0.2, 0.5, 0.2, 0.1, 0.8]	[0.1, 0.5, 0.6, 0.1, 0.8]	[0.1, 0.5, 0.2, 0.1, 0.8]	d	
99	For k>1, which of the following concept can be used to generate other linguistic hedge?	Concentration and dilatation	Dilation	Concentration	None of the mentioned	c	
100	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A U B is	{1.0, 0.45, 0.75}	{1.0, 0.20, 0.75}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	a	
101	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A ∩ B is	{1.0, 0.45, 0.75}	{0.2, 0.20, 0.50}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	b	
102	Mamdani-style inference involves which steps	Fuzzification of the input variables & Rule evaluation	Aggregation of the rule output & Defuzzification	Both a and b	either a or b	c	
103	A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$	Core	Support	Cross-over	α - cut	c	
104	Which statement is true?	Mamdani approach characterised by its low interpretability and low accuracy	Takagi and Sugeno's approach characterised by high accuracy but at the cost of high interpretability	Takagi and Sugeno's approach follows precise fuzzy modelling and obtains high accuracy but at the cost of low interpretability	Mamdani approach characterised by its low interpretability and high accuracy	c	
105	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$	$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) < 1$	c	
106	Which can be used as an input to fuzzy controller?	A fuzzy set	A crisp set	Both fuzzy set and Crisp set	None of these	b	
107	What are the types of fuzzy logic sets?	Type-1 fuzzy set	Type-2 fuzzy set	Both a and b	None of these	c	
108	How is fuzzy logic different from conventional control methods	IF and THEN approach	FOR approach	WHILE approach	DO approach	a	
109	The height $h(A)$ of a fuzzy set A is defined as $h(A)=\text{support } A(x)$, where A belongs to A. Then fuzzy set is called normal when	$h(A)=0$	$h(A)<0$	$h(A)=1$	$h(A)>1$	c	
110	If A and B are sets and $A \cup B = A \cap B$ then	$A=B$	$A=0$	$B=0$	None of these	A	
111	If x is A then y is B else y is C. The output of the given fuzzy rule is	A fuzzy set	a crisp set	a fuzzy relation	a membership function	c	
112	What Is The First Step Of Fuzzy Logic Toolbox?	Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator(AND or OR) in the antecedent	Aggregation of the consequents across the rule	a	
113	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	The input is a value greater than one and the output is a value less than the input	The input and output have both the same values	The input has two or more values and the output has a single truth value	d	
114	What Is The Input And Output Of Step 3 - Apply Implication Method?	Input is a fuzzy set but the output is a whole value	Input is a fuzzy set but the output is a whole value	Input and Output have the same value	Input is a smaller value than the output value	b	
115	What Is The Purpose Of Aggregation?	To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	a	
116	Linguistic variable is	a variable whose values are words or sentences	any numerical value only	any binary value only	variable which contains TRUE or FALSE values only	a	
117	Identification of Input, Output and state variables is performed in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	Identification of variables	d	
118	Assigning linguistic label to each subset is done in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	fuzzy subset configuration	d	
119	Disjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	a	
120	Conjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	b	
121	Categorial reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy quantifiers are related to inference rules	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	a	
122	Syllogistic reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	c	
123	Qualitative reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	b	
124	Dispositional reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	d	
125	Mamdani systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	d	
126	Sugeno systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	b	
127	In the generational model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	a	
128	In the steady-state model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	b	
129	In the generational model of EA	each individual survives exactly for two generation	each individual survives exactly for one generation	cannot predict	each individual survives as many generations as want	b	

130	In the steady-state model of EA		One offspring is generated per generation	two offsprings are generated per generation	cannot decide	more than two offsprings are generated per generation	a
131	Which of the following algorithm is most efficient for discontinuous and noisy problems?		Evolutionary algorithm	Classical optimization algorithm	Genetic algorithm	none	a
132	Each iteration of EA is referred to as		Generation	Iteration	population	None	a
133	Which of the following are evolutionary operators?		Selection	Crossover	Mutation	All of the above	d
134	In the $(\mu/\rho,\lambda)$ method of ES, parents are		selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	a
135	In the $(\mu/\rho+\lambda)$ method of ES, parents are		selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	b
136	Fitness scaling is desirable to ensure		Population diversity	selection pressure	that better solutions are selected only	relatively inferior solutions are not ignored	
137	Which mutation operator is used in ES as reproduction operator?		one point	Gaussian mutation	two point	adaptive	b
138	Fitness proportionate selection methods are		Roulette wheel selection	Stochastic universal sampling	tournament selection	All the mentioned	d
139	In which selection method of survival selection there is no notion of fitness?		fitness based selection	elitism	Agebased selection	All the mentioned	c
140	In which selection strategy every individual has the same probability to be selected?		Roulette wheel selection	Uniform selection	tournament selection	Rank selection	b
141	High selection pressure is desirable, when we need		diversity not found in each generation	there is no improvement in successive GA iteration	faster termination of GA	fitness values are not uniformly distributed	c
142	Tournament selection scheme is more preferable when		when fitness values are uniformly distributed	population are with very diversified fitness values	when fitness values are not necessarily uniformly distributed	under all the above situations	b
143	Which of the following is not a characteristic of evolutionary algorithm?		Conceptual simplicity	Parallelism	Broad applicability	Artificial selection	d
144	What is the correct order of steps in evolutionary algorithm?		Select parents-recombine-mutate-evaluate	Select parents-recombine-evaluate-mutate-	Select parents-mutate-evaluate -recombine-evaluate	Select parents-mutate-evaluate -recombine-evaluate	a
145	Which of the following schemes are selection schemes in Evolutionary computation?		Hall of fame	Rank based selection	tournament selection	All of the above	d
146	To encode chromosomes which encoding schemes are used		binary encoding	finite state machine	real value encoding	All of the above	d

This sheet is for 1 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions	Cannot Distinguish	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguous	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neuro fuzzy	Fuzzy network and	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard bertrand	mc culloch	lofti zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behavior	deals with imprecise information	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computation	conventional computation	non conventional computation	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behavior	information processing	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search representation	Blind search usual	Blind search cannot	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can be found	a solution found	a solution that is the best	a solution that requires	C
17	When is a complete enumeration of solution used?		When a solution is found	When there is no solution	When the modeler	When there are an infinite number of solutions	B
18	All of the following are true about heuristics EXCEPT		heuristics are used widely	heuristics are used well	heuristics are used often	heuristics are rules of thumb	C
19	Which approach is most suited to structured problem with little uncertainty		Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belong to the family of method in the		artificial intelligence	optimization area	complete enumeration	Non computer based is	A
21	What does the 0 membership value means in the set		the object is fully inside	the object is not inside	the object is partially inside	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a
23	The process of fuzzy interference system involves		membership function	fuzzy logic operation	if-then rules	all the above	d
24	What does a fuzzifier do		converts crisp input to	converts crisp output	converts fuzzy input to	converts fuzzy output to	a
25	Which of the following is not defuzzifier method		centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method		mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have		multiple part of antecedent	only single part of antecedent	multiple part of antecedent	only single part of antecedent	c
28	The α cut of a fuzzy set A is a crisp set defined by :-		$\{x \mu_A(x) > \alpha\}$	$\{x \mu_A(x) = \alpha\}$	$\{x \mu_A(x) < \alpha\}$	$\{x \mu_A(x) \leq \alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1/x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the common support of A and B?		$\{0/a, 0.7/b, 0.8/c, 0.2/d, 0/e\}$	$\{0/a, 0.9/b, 0.7/c, 0/d, 0/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0/d, 0/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the universal set of A and B?		$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B?		$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.2/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.2/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 0/e\}$	a
34	What denotes the support(A) in a fuzzy set?		$\{x \mu_A(x) > 0\}$	$\{x \mu_A(x) < 0\}$	$\{x \mu_A(x) = 0\}$	$\{x \mu_A(x) \leq 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?		$\{x \mu_A(x) > 0\}$	$\{x \mu_A(x) = 1\}$	$\{x \mu_A(x) > 0.5\}$	$\{x \mu_A(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Evaluation	defuzzification->rule evaluation	rule evaluation->fuzzification	rule evaluation->defuzzification	a
38	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
39	Genetic algorithm belong to the family of method in the		artificial intelligence	optimization area	complete enumeration	Non computer based is	A
40	All of the following are suitable problem for genetic algorithm EXCEPT		pattern recognition	simulation of biological systems	simple optimization	dynamic process control	C
41	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
43	mutation is applied on ____ candidates.		one	two	more than two	none of these	a
44	recombination is applied on ____ candidates.		one	two	more than two	none of these	b
45	LCS belongs to ____ based methods?		rule based learning	genetic learning	both a and b	none of these	a
46	Survival is ____ approach.		deterministic	non deterministic	semi deterministic	none of these	a
47	Evolutionary algorithms are a ____ based approach		heuristic	metaheuristic	both a and b	none of these	a
48	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?		line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by		Frederick J. Fogel	Franklin G. Lin	Flin	b	b
54	Evolution Strategies is developed with		selection	mutation	a population of size	all of these	d
55	Evolution Strategies typically uses		real-valued vector representation	vector representation	time based representation	none of these	a
56	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is		Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover		discrete and intermediate	discrete and continuous	continuous and intermediate	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested	TRUE	FALSE				B
61	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solution	none of these		C
62	Discrete events and agent-based models are usually used for _____.	middle or low level	high level of abstraction	very high level of abstraction	none of these		A
63	_____ does not usually allow decision makers to see how a solution to a problem	environment	Simulation ,Complex	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
64	EC stands for?	Evolutionary Computation	Evolutionary computation	Electronic computation	none of these		a
65	GA stands for	genetic algorithm	genetic assurance	genetic algorithm	none of these		a
66	LCS stands for	learning classes system	learning classifier	learned class system	none of these		b
67	GBML stands for	Genetic based Machine Learning	Genes based model	Genetic based machine	none of these		c
68	EV is dominantly used for solving _____.	optimization problem	NP problem	simple problems	none of these		a
69	EV is considered as?	adaptive	complex	both a and b	none of these		c
70	Idea of genetic algorithm came from	machines	Birds	ACO	genetics		d
71	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these		b
72	Parameters that affect GA	initial population	selection process	fitness function	all of these		d
73	Fitness function should be	maximum	minimum	intermediate	none of these		b
74	Evolutionary algorithms are a ____ based approach	heuristic	metaheuristic	both a and b	none of these		a
75	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO		a

76	Genetic algorithms are example of mutation is applied on _____ candidates.	heuristic	Evolutionary algo	ACO	PSO	b
77		one	two	more than two	none of these	a
78	recombination is applied on _____ candidates.	one	two	more than two	none of these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?	sub parents	parents	offsprings	grand child	c
80	_____ decides who becomes parents and how many children the parents have.	parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?	Parent Selection methods	Survival Selection methods	both a and b	none of these	c
82	LCS belongs to _____ based methods?	rule based learning	genetic learning	both a and b	none of these	a
83	Survival is _____ approach.	deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.	Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?	associative nature of networks	nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is	Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned	c
92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where \sim → complement)					
95	then $\{(4, 0.7), (2, 1), (1, 0.8)\}$ then $\{(4, 0.3), (5, 0), (6, 1), (2, 1), (3, 0.3)\}$ then $\{(3, 0.3), (6, 0.2)\}$					c
96	What are the following sequence of steps taken in designing a fuzzy logic machine ? If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be					
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3, 1), (0.6, 2), (1, 3), (0.7, 4), (0.2, 5)\}$ $B = \{(0.5, 11), (1, 12), (0.5, 13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to	{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.6}	{0.1, 0.5, 0.4, 0.2, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
98	$A \cup (B \cap C) =$	$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cap C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be	{0, 1, 2, 3, 4, 5, 6, 7, 8}	{1, 2, 3, 4, 5, 6, 7, 8, 9}	{2, 3, 4, 5, 6, 7, 8, 9}	None of the above	c
100	The fuzzy proposition "If X is E then Y is F" is a	conditional unqualified	unconditional and conditional qualified	conditional qualified	unconditional qualified	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A, B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous	1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy ≈ Prediction	Fuzzy ≈ Forecasting	Probability ≈ Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise answer	ANN gives accurate	In each, no precise	Fuzzy gives exact result	c
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b

105	---- defines logic function of two prepositions		prepositions	Linguistic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then z=c (c is constant), is		rule in first order FIS	rule in zero order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sugani-type	c
113	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling Controller		All of the above	d
114	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
119	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

123	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125 (1+1) ES			offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126 (1+λ) ES			λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127 Termination condition for EA			mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128 Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none		a
129 Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators		d
130 (1+1) ES		Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ		a
131 Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned		a
132 EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned		c
133 Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection		d

This sheet is for 1 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions	Cannot Distinguish	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguous	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neuro fuzzy	Fuzzy network and	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard bertrand	mc culloch	lofti zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behavior	deals with imprecise information	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computation	conventional computation	non conventional computation	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behavior	information processing	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search representation	Blind search usual	Blind search cannot	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can be found	a solution found	a solution that is the best	a solution that requires	C
17	When is a complete enumeration of solution used?		When a solution is found	When there is no solution	When the modeler	When there are an infinite number of solutions	B
18	All of the following are true about heuristics EXCEPT		heuristics are used widely	heuristics are used well	heuristics are used often	heuristics are rules of thumb	C
19	Which approach is most suited to structured problem with little uncertainty		Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belong to the family of method in the		artificial intelligence	optimization area	complete enumeration	Non computer based is	A
21	What does the 0 membership value means in the set		the object is fully inside	the object is not inside	the object is partially inside	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a
23	The process of fuzzy interference system involves		membership function	fuzzy logic operation	if-then rules	all the above	d
24	What does a fuzzifier do		converts crisp input to	converts crisp output	converts fuzzy input to	converts fuzzy output to	a
25	Which of the following is not defuzzifier method		centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method		mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have		multiple part of antecedent	only single part of antecedent	multiple part of antecedent	only single part of antecedent	c
28	The α cut of a fuzzy set A is a crisp set defined by :-		$\{x \mu_A(x) > \alpha\}$	$\{x \mu_A(x) = \alpha\}$	$\{x \mu_A(x) < \alpha\}$	$\{x \mu_A(x) \leq \alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1/x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the common support of A and B?		$\{0/a, 0.7/b, 0.8/c, 0.2/d, 0/e\}$	$\{0/a, 0.9/b, 0.7/c, 0/d, 0/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0/d, 0/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the universal set of A and B?		$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B?		$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.2/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.2/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 0/e\}$	a
34	What denotes the support(A) in a fuzzy set?		$\{x \mu_A(x) > 0\}$	$\{x \mu_A(x) < 0\}$	$\{x \mu_A(x) = 0\}$	$\{x \mu_A(x) \leq 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?		$\{x \mu_A(x) > 0\}$	$\{x \mu_A(x) = 1\}$	$\{x \mu_A(x) > 0.5\}$	$\{x \mu_A(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Evaluation	defuzzification->rule evaluation	rule evaluation->fuzzification	rule evaluation->defuzzification	a
38	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
39	Genetic algorithm belong to the family of method in the		artificial intelligence	optimization area	complete enumeration	Non computer based is	A
40	All of the following are suitable problem for genetic algorithm EXCEPT		pattern recognition	simulation of biological systems	simple optimization	dynamic process control	C
41	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
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52	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by		Frederick J. Fogel	Franklin G. Lin	Flin	b	b
54	Evolution Strategies is developed with		Selection	mutation	a population of size	all of these	d
55	Evolution Strategies typically uses		real-valued vector representation	vector representation	time based representation	none of these	a
56	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is		Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover		discrete and intermediate	discrete and continuous	continuous and intermediate	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested	TRUE	FALSE				B
61	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solution	none of these		C
62	Discrete events and agent-based models are usually used for _____.	middle or low level	high level of abstraction	very high level of abstraction	none of these		A
63	_____ does not usually allow decision makers to see how a solution to a problem	environment	Simulation ,Complex	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
64	EC stands for?	Evolutionary Computation	Evolutionary computation	Electronic computation	none of these		a
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72	Parameters that affect GA	initial population	selection process	fitness function	all of these		d
73	Fitness function should be	maximum	minimum	intermediate	none of these		b
74	Evolutionary algorithms are a ____ based approach	heuristic	metaheuristic	both a and b	none of these		a
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76	Genetic algorithms are example of mutation is applied on _____ candidates.	heuristic	Evolutionary algo	ACO	PSO	b
77		one	two	more than two	none of these	a
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79	Applying recombination and mutation leads to a set of new candidates, called as ?	sub parents	parents	offsprings	grand child	c
80	_____ decides who becomes parents and how many children the parents have.	parent combination	Parent selection	Parent mutation	Parent replace	b
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84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.	Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?	associative nature of networks	nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is	Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d
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92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where \sim → complement)					
95	then $\{(4, 0.7), (2, 1), (1, 0.8)\}$ then $\{(4, 0.3), (5, 0), (6, 1), (2, 1), (3, 0.3)\}$ then $\{(3, 0.3), (6, 0.2)\}$					c
96	What are the following sequence of steps taken in designing a fuzzy logic machine ? If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be					
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3, 1), (0.6, 2), (1, 3), (0.7, 4), (0.2, 5)\}$ $B = \{(0.5, 11), (1, 12), (0.5, 13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to	{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.6}	{0.1, 0.5, 0.4, 0.2, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
98	$A \cup (B \cap C) =$	$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cap C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be	{0, 1, 2, 3, 4, 5, 6, 7, 8}	{1, 2, 3, 4, 5, 6, 7, 8, 9}	{2, 3, 4, 5, 6, 7, 8, 9}	None of the above	c
100	The fuzzy proposition "If X is E then Y is F" is a	conditional unqualified	unconditional and conditional qualified	conditional qualified	unconditional qualified	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A, B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous	1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy ≈ Prediction	Fuzzy ≈ Forecasting	Probability ≈ Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise answer	ANN gives accurate	In each, no precise	Fuzzy gives exact result	c
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b

105	---- defines logic function of two prepositions		prepositions	Linguistic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then z=c (c is constant), is		rule in first order FIS	rule in zero order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sugani-type	c
113	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling Controller		All of the above	d
114	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
119	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

123	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125 (1+1) ES			offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126 (1+λ) ES			λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127 Termination condition for EA			mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128 Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none		a
129 Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators		d
130 (1+1) ES		Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ		a
131 Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned		a
132 EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned		c
133 Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection		d

SCOA Unit I MCQ

- 1. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.**
A.True
B.False
- 2. The membership functions are generally represented in**
A.Tabular Form
B.Graphical Form
C.Mathematical Form
D.Logical Form
- 3. Membership function can be thought of as a technique to solve empirical problems on the basis of**
A.knowledge
B.examples
C.learning
D.experience
- 4. Three main basic features involved in characterizing membership function are**
A.Intuition, Inference, Rank Ordering
B.Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.sub normal fuzzy sets

B.normal fuzzy set

C.convex fuzzy set

D.concave fuzzy set

7. In a Fuzzy set a prototypical element has a value

A.1

B.0

C.infinite

D.Not defined

- 8. A fuzzy set wherein no membership function has its value equal to 1 is called**
- A.**normal fuzzy set
B.Subnormal fuzzy set.
C.convex fuzzy set
D.concave fuzzy set
- 9. A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe**
- A.**convex fuzzy set
B.concave fuzzy set
C.Non concave Fuzzy set
D.Non Convex Fuzzy set
- 10. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.**
- A.**Convex Fuzzy Set
B.Non convex fuzzy set
C.Normal Fuzzy set
D.Sub normal fuzzy set
- 11. The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to**

A.infinite

B.1

C.0

D.0.5

12. Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

B.False

14. Artificial neural network used for

A.Pattern Recognition

B.Classification

C.Clustering

D.All of these

15. A Neural Network can answer

- A.**For Loop questions
- B.**what-if questions
- C.**IF-The-Else Analysis Questions
- D.**None of these

16. Ability to learn how to do tasks based on the data given for training or initial experience

- A.**Self Organization
- B.**Adaptive Learning
- C.**Fault tolerance
- D.**Robustness

17. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

- A.**Adaptive Learning
- B.**Self Organization
- C.**What-If Analysis
- D.**Supervised Learning

18. In artificial Neural Network interconnected processing elements are called

- A.**nodes or neurons

B.weights

C.axons

D.Soma

19. Each connection link in ANN is associated with _____ which has information about the input signal.

A.neurons

B.weights

C.bias

D.activation function

20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.True

B.False

21. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.Weight

B.activation or activity level of neuron

C.Bias

D.None of these

22. Neuron can send _____ signal at a time.

- A.**multiple
- B.**one
- C.**none
- D.**any number of

23. Artificial intelligence is

- A.**It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations
- B.**Computational procedure that takes some value as input and produces some value as output.
- C.**Science of making machines performs tasks that would require intelligence when performed by humans
- D.**None of these

24. Expert systems

- A.**Combining different types of method or information
- B.**Approach to the design of learning algorithms that is structured along the lines of the theory of evolution
- C.**an information base filled with the knowledge of an expert formulated in terms

of if-then rules

D.None of these

25. Falsification is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

26. Evolutionary computation is

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.

C.Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.

D.None of these

27. Extendible architecture is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

28. Massively parallel machine is

A.A programming language based on logic

B.A computer where each processor has its own operating system, its own memory, and its own hard disk

C.Describes the structure of the contents of a database.

D.None of these

29. Search space

A.The large set of candidate solutions possible for a problem

B.The information stored in a database that can be, retrieved with a single query.

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

30. $n(\log n)$ is referred to

A.A measure of the desired maximal complexity of data mining algorithms

B.A database containing volatile data used for the daily operation of an organization

C.Relational database management system

D.None of these

31. Perceptron is

- A.**General class of approaches to a problem.
- B.**Performing several computations simultaneously
- C.**Structures in a database those are statistically relevant
- D.**Simple forerunner of modern neural networks, without hidden layers

32. Prolog is

- A.**A programming language based on logic
- B.**A computer where each processor has its own operating system, its own memory, and its own hard disk
- C.**Describes the structure of the contents of a database
- D.**None of these

33. Shallow knowledge

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be, retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

34. Quantitative attributes are

- A.**A reference to the speed of an algorithm, which is quadratically dependent on the size of

the data

B.Attributes of a database table that can take only numerical values

C.Tools designed to query a database

D.None of these

35. Subject orientation

A.The science of collecting, organizing, and applying numerical facts

B.Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.None of these

36. Vector

A.It do not need the control of the human operator during their execution

B.An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.The validation of a theory on the basis of a finite number of examples

D.None of these

37. Transparency

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

38. Core of soft Computing is

- A.**Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.**Fuzzy Networks and Artificial Intelligence
- C.**Artificial Intelligence and Neural Science
- D.**Neural Science and Genetic Science

39. Who initiated the idea of Soft Computing

- A.**Charles Darwin
- B.**Lofti A Zadeh
- C.**Rechenberg
- D.**Mc_Culloch

40. Fuzzy Computing

- A.**mimics human behaviour
- B.**doesn't deal with 2 valued logic
- C.**deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.**All of the above

41. Neural Computing

- A.**mimics human brain
- B.**information processing paradigm
- C.**Both (a) and (b)
- D.**None of the above

42. Genetic Algorithm are a part of

- A.**Evolutionary Computing
- B.**inspired by Darwin's theory about evolution - "survival of the fittest"
- C.**are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D.**All of the above

43. What are the 2 types of learning

- A.**Improvised and unimprovised
- B.**supervised and unsupervised
- C.**Layered and unlayered
- D.**None of the above

44. Supervised Learning is

- A.**learning with the help of examples
- B.**learning without teacher
- C.**learning with the help of teacher
- D.**learning with computers as supervisor

45. Unsupervised learning is

- A.**learning without computers
- B.**problem based learning

C.learning from environment

D.learning from teachers

46. Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

47. In supervised learning

A.classes are not predefined

B.classes are predefined

C.classes are not required

D. classification is not done

SCOA UNIT 2 MCQs

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

SCOA UNIT 2 MCQs

	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intution, Inference, Rank Ordering B.Fuzzy Algorithm, Neural network, Genetic Algorithm C.Core, Support , Boundary D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core B.Support C.Boundary D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

SCOA UNIT 2 MCQs

	<p>B.normal fuzzy set C.convex fuzzy set D.concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A.1 B.0 C.infinite D.Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A.normal fuzzy set B.subnormal fuzzy set. C.convex fuzzy set D.concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesn't deal with 2 valued logic</p>	D

SCOA UNIT 2 MCQs

	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	<p>Defuzzification is done to obtain</p> <ul style="list-style-type: none"> a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above 	a
13.	<p>“The train is running fast”. Here ‘fast’ can be represented by</p> <ul style="list-style-type: none"> a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned 	a
14.	<p>Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$</p> <p>Then the crisp value of Young using MoM method is</p> <ul style="list-style-type: none"> a) 25 b) 20 c) 35 d) 50 	a
15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area 	c

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	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)^{\text{complement}} \neq \text{---} (A \lambda)^{\text{complement}}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

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	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

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	d) None of the above	
26.	<p>Fuzzy logic is a form of</p> <ul style="list-style-type: none"> a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic 	<p>Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.</p>
27.	<p>Traditional set theory is also known as Crisp Set theory.</p> <ul style="list-style-type: none"> a) True b) False 	<p>Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set.</p> <p>3. The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>
28.	<p>The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>	<p>Answer: a Explanation: Refer the</p>

SCOA UNIT 2 MCQs

	<p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	definition of Fuzzy set and Crisp set.
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p> <p>a) Fuzzy Set b) Crisp Set</p>	<p>Answer: a Explanation: Fuzzy logic deals with linguistic variables.</p>
31.	<p>The values of the set membership is represented by</p> <p>a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c</p>	<p>Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.</p>
32.	What is meant by probability density function?	d

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	<p>a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables</p>	
33.	<p>Which of the following is used for probability theory sentences?</p> <p>a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned</p>	<p>Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.</p>
34.	<p>Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.</p> <p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy</p>

SCOA UNIT 2 MCQs

		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <ul style="list-style-type: none"> a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned 	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <ul style="list-style-type: none"> a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned 	<p>Answer: c</p> <p>Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

SCOA UNIT 2 MCQs

This sheet is for 1 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions	Cannot Distinguish	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguous	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neuro	Fuzzy network and	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard bertrand	mc culloch	lofti zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behavior	deals with imprecise	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computation	conventional computation	non conventional computation	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behavior	information processing	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search representation	Blind search usually	Blind search cannot	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can be found	a solution found is	a solution that is the best	a solution that requires	C
17	When is a complete enumeration of solution used?		When a solution that is found	When there is enough time	When the modeler has time	When there are an infinite number of solutions	B
18	All of the following are true about heuristics EXCEPT		heuristics are used widely	heuristics are used well	heuristics are used often	heuristics are rules of thumb	C
19	Which approach is most suited to structured problem with little uncertainty		Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based is	A
21	What does the 0 membership value means in the set		the object is fully included	the object is not included	the object is partially included	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a
23	The process of fuzzy inference system involves		membership function	fuzzy logic operations	if-then rules	all the above	d
24	What does a fuzzifier do		converts crisp input to	converts crisp output to	converts fuzzy input to	converts fuzzy output to	a
25	Which of the following is not defuzzifier method		centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy inference method		mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have		multiple parts of antecedent	only single part of antecedent	multiple parts of antecedent	only single part of antecedent	c
28	The α cut of a fuzzy set A is a crisp set defined by :-		$\{x \cup_a(x) > \alpha\}$	$\{x \cup_a(x) = \alpha\}$	$\{x \cup_a(x) < \alpha\}$	$\{x \cup_a(x) \leq \alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1 / x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?		$\{0/a, 0.7/b, 0.8/c, 0.2/d, 0/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.3/d, 0/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of A and B?		$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B?		$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.2/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 0/e\}$	a
34	What denotes the support(A) in a fuzzy set?		$\{x \cup_a(x) > 0\}$	$\{x \cup_a(x) < 0\}$	$\{x \cup_a(x) = 0\}$	$\{x \cup_a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?		$\{x \cup_a(x) > 0\}$	$\{x \cup_a(x) = 1\}$	$\{x \cup_a(x) >= 0.5\}$	$\{x \cup_a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Evaluation	defuzzification->rule evaluation	rule evaluation->fuzzification	rule evaluation->defuzzification	a
38	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
39	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based is	A
40	All of the following are suitable problems for genetic algorithm EXCEPT		pattern recognition	simulation of biological systems	simple optimization	dynamic process control	C
41	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a

42	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
43	mutation is applied on __candidates.		one	two	more than two	noneof these	a
44	recombination is applied on __candidates.		one	two	more than two	noneof these	b
45	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	noneof these	a
46	Survival is __ approach.		deterministic	non deterministic	semi deterministic	noneof these	a
47	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
48	Tabu search is an example of ?		heuristic	Evolutionary algo	ACO	PSO	a
49	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
50	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?		line representation	String representat	Circular representat	all of these	b
52	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by		Fredrik	Fogel	Frank	Flin	b
54	Evolution Strategies is developed with		selection	mutation	a population of size	all of these	d
55	Evolution Strategies typically uses		real-valued vector re	vector representa	time based represen	none of these	a
56	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is		Parent population siz	Survival populatio	both a and b	none of these	c
59	What are different types of crossover		discrete and interme	discrete and conti	continuous and inte	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and te		TRUE	FALSE			B
61	_____cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solutuon	none of these	C
62	Discrete events and agent-based models are usually used for _____.		middle or low level o	high level of abstr	very high level of ab	none of these	A
63	_____doesnot usually allow decision makers to see how a solution to a _____en		Simulation ,Complex	Simulation,Easy p	Genetics,Complex p	Genetics,Easy problem	A
64	EC stands for?		Evolutionary Comput	Evolutionary com	Electronic computa	noneof these	a
65	GA stands for		genetic algorithm	genetic assuranc	genese alforithm	noneof these	a
66	LCS stands for		learning classes syste	learning classifier	learned class system	noneof these	b
67	GBML stands for		Genese based Machi	Genes based mob	Genetic bsed machi	noneof these	c
68	EV is dominantly used for solving ____.		optimization proble	NP problem	simple problems	noneof these	a
69	EV is considered as?		adaptive	complex	both a and b	noneof these	c
70	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?		line representation	String representa	Circular representat	all of these	b
72	Parameters that affect GA		initial population	selection process	fitness function	all of these	d
73	Fitness function should be		maximum	minimum	intermediate	noneof these	b
74	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
75	Tabu search is an example of ?		heuristic	Evolutionary algo	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
77	mutation is applied on __candidates.		one	two	more than two	noneof these	a
78	recombination is applied on __candidates.		one	two	more than two	noneof these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offsprings	grand child	c
80	____ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection methods	both a and b	noneof these	c
82	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	noneof these	a

83	Survival is _____ approach.		deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment		d
90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned		d
91	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned		c
92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned		c
93	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities		b
94	Given $U = \{1, 2, 3, 4, 5, 6, 7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3)\}: (5, 0), (6, (1, 2, 1), (3, 0.3)$	$\{(3, 0.3), (6, 0.2)\}$		c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification \rightarrow Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Defuzzification \rightarrow Fuzzification	

96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to		{(0.5,12), (0.6,13), (1,14)}	{(0.5,12), (0.6,13), (1,14)}	{(0.3,12), (0.5,13), (1,14)}	{(0.3,12), (0.5,13), (1,14)}	d
98	$A \cup (B \cup C) =$	$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b	
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		{0, 1, 2, 3, 4, 5, 6, 7, 8}	{1, 2, 3, 4, 5, 6, 7, 8}	{2, 3, 4, 5, 6, 7, 8, 9}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a	conditional unqualified	unconditional unqualified	conditional qualified	unconditional qualified	a	
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous	1 only	2 and 3	1,2 and 3	None of these	b	
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b	
103	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise answer	ANN gives accurate answer	In each, no precise answer	Fuzzy gives exact result	C	
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b	
105	---- defines logic function of two propositions	prepositions	Linguistic hedges	truth tables	inference rules	c	
106	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b	
107	Multiple conjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a	
108	Multiple disjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a	

109	IF x is A and y is B then z=c (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b

116	In Evolutionary programming, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
119	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

123	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125 (1+1) ES			offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126 (1+λ) ES			λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127 Termination condition for EA			mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
130 (1+1) ES			Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
131	Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

Quest ion No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical</p>	B

	Form D. Logical Form	
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning D.experience</p>	D
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intuition, Inference,</p>	C

	<p>Rank Ordering</p> <p>B.Fuzzy Algorithm, Neural network, Genetic Algorithm</p> <p>C.Core, Support , Boundary</p> <p>D.Weighted Average, center of Sums, Median</p>	
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core</p> <p>B.Support</p>	A

	<p>C.Boundary D.Fuzzy</p>	
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets B.normal fuzzy set C.convex fuzzy set D.concave fuzzy set</p>	B
7.	<p>In a Fuzzy set a prototypical element has a</p>	A

	value A. 1 B. 0 C. infinite D. Not defined	
8.	A fuzzy set wherein no membership function has its value equal to 1 is called A. normal fuzzy set B. subnormal fuzzy set. C. convex fuzzy set D. concave fuzzy set	B

9.	<p>A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A convex fuzzy set B.concave fuzzy set C Non concave</p>	A
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	<ul style="list-style-type: none"><input type="radio"/> Fuzzy set<input checked="" type="radio"/> D Non Convex<input type="radio"/> Fuzzy set	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set</p> <p>B.Non convex fuzzy set</p> <p>C.Normal Fuzzy set</p> <p>D.Sub normal</p>	B

	fuzzy set	
11.	<p>Fuzzy Computing</p> <p>A. doesn't deal with 2 valued logic</p> <p>B. mimics human behaviour</p> <p>C. deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D. All of the above</p>	D
12.	Defuzzification is done to obtain a) Crisp output	a

	b) The best rule to follow c) Precise fuzzy value d) None of the above	
13.	“The train is running fast”. Here ‘fast’ can be represented by a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned	a
14.	Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$ Then the crisp value of Young using MoM method is a) 25 b) 20	a

	c) 35 d) 50	
15.	f the fuzzy set has two sub regions, then the centre of gravity of the sub region — can be used to calculate the defuzzified value. a) with the median of all the area b) with the mean of all the area c) with the largest area d) with the smallest area	c
16.	Which of the following is not a centroid method? a) Centre of gravity method	d

	<p>(CoG)</p> <p>b) Centre of sum method (CoS)</p> <p>c) Centre of area method (CoA)</p> <p>d) Centre of Mass (CoM)</p>	
17.	<p>What are the following sequence of steps taken in designing a fuzzy logic machine?</p> <p>(a) Fuzzification->Rule evaluation->Defuzzification</p> <p>(b) Rule evaluation->Fuzzification->Defuzzification</p> <p>(c) Fuzzy Sets->Defuzzification->Rule evaluation</p> <p>(d) Defuzzification->Rule evaluation->Fuzzification</p>	a

18.	If A is a fuzzy set, then (A^λ) complement \neq _____($A\lambda$)complement (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set A = {1, 2, 3, 4, 5} a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is c then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A$	b

	$\times C)$ c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d

22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm'	C

	<p>represents:</p> <ul style="list-style-type: none">a) Smallest likely valueb) Most probable valuec) Largest possible valued) None of the above	
25.	<p>Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis?</p> <ul style="list-style-type: none">a) Vector normalizationb) Linear normalizationc) Both A and Bd) None of the above	b
26.	Fuzzy logic is a form of	Answer: c

	<ul style="list-style-type: none"> a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic 	<p>Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.</p>
27.	<p>Traditional set theory is also known as Crisp Set theory.</p> <ul style="list-style-type: none"> a) True b) False 	<p>Answer: a</p> <p>Explanation:</p> <p>Traditional set theory set membership is</p>

	<p>fixed or exact either the member is in the set or not. There is only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set.</p> <p>3. The truth</p>
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		<p>values of traditional set theory is _____</p> <p>and that of fuzzy set is _____</p> <p>_____</p>
28.	<p>The truth values of traditional set theory is _____ and that of fuzzy set is _____</p> <p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	<p>Answer: a</p> <p>Explanation: Refer the definition of Fuzzy set and Crisp set.</p>

29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c</p> <p>Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____.</p> <p>a) Fuzzy Set b) Crisp Set</p>	<p>Answer: a</p> <p>Explanation: Fuzzy logic deals with linguistic variables.</p>

SCOA UNIT 2 MCQs

31.	<p>The values of the set membership is represented by</p> <ul style="list-style-type: none">a) Discrete Setb) Degree of truthc) Probabilitiesd) Both b & c	<p>Answer: b</p> <p>Explanation: Both Probabilities and degree of truth ranges between 0 – 1.</p>
32.	<p>What is meant by probability density function?</p> <ul style="list-style-type: none">a) Probability distributionsb) Continuous variablec) Discrete variabled) Probability distributions for Continuous variables	d

33.	<p>Which of the following is used for probability theory sentences?</p> <ul style="list-style-type: none">a) Conditional logicb) Logicc) Extension of propositional logicd) None of the mentioned	<p>Answer: c</p> <p>Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.</p>
34.	<p>Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.</p>	<p>Answer: a, b, c</p> <p>Explanation: The AND,</p>

	a) AND b) OR c) NOT d) EX-OR	OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum ,, maximum , and complement;
35.	Fuzzy logic is usually represented as a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b	Answer: b Explanation: Fuzzy set theory defines fuzzy

	d) None of the mentioned	operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy
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		associative matrices. Rules are usually expressed in the form: IF variable IS property THEN action
36.	<p>is/are the way/s to represent uncertainty.</p> <p>a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned</p>	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty involved</p>

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		in data. Represented by $H(\text{data})$.
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <p>a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned</p>	<p>Answer: c</p> <p>Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>
S.r No	Question	Image

SCOA UNIT 2 MCQs

e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/ c/d			
1	Who can deal with noisy input information		soft computing	hard computing	both a and b	none of the above	a			
2	Ability to learn how to do task based on the data is done by		self organization	adaptive learning	fault tolerance	robustness	b			
3	Which of the following is not a technique of soft computing		neural network	genetic algorithm	evolutionary algorithm	conventional algorithm	d			
4	Fuzzy logic system is based on what type of rule		if-then	else-if	while	do-while	a			
5	What is the function of dendrites in biological neural network		send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b			
6	Expert system		combines different types of method and information	is a approach to design of learning algorithms	is an information base filled with knowledge of an expert formulated in terms of if-then rules	none of the above	c			
7	Three main basic feature involved in characterizing member function are		intuition,inference ,rank ordering	fuzzy algorithm,neural network,genetic algorithm	center of sums,median,core	core,support,boundary	d			
8	What is the function of cell body in biological neural network		multiplies the incoming signals	sums the incoming signals	multiple the outgoing signals	sums the outgoing signals	b			
9	What is perceptron		a single layer feed forward neural network	a double layer associative neural network	a neural network that contains feedback	auto associative neural network	a			

SCOA UNIT 2 MCQs

10	Which of the following computing is trial and error problem solver algorithm		hard computing	neural network	evolutionary computing	fuzzy logic	c			
11	What are advantages of neural network		ability to learn by example	fault tolerant	both a and b	none of the above	c			
12	Which of the following does not belong to the process of involuntary computing		selection	mutation	recombination	deletion	d			
13	The Value of crisp set can be		either 0 or 1	near to 0 or 1	between 0 and 1	between 0.5 and 0.7	a			
14	The room temrature is hot. Here the hot(use of lingustic variable is used) can be represented by		fuzzy set	crisp set	probabilistic set	none of the above	a			
15	The value of set membership can be represented by		discrete set	degree of truth	probabilities	both b and c	b			
16	Semiconductor layout & aircraft design are the application type of which domain?		Control	Design	Robotics	ML	B			
17	Trajectory planning is the application type of which domain?		Control	Design	Robotics	ML	C			
18	Filter design is the application type of which domain?		Control	Signal Processing	Robotics	ML	B			
19	Pokers & Checkers are the application type of which of domain?		Control	Game Playing	Robotics	ML	B			

SCOA UNIT 2 MCQs

20	Manufacturing & resource allocation are the application type of which domain?		Scheduling	Design	Robotics	ML	A			
21	What is a crossover point in a fuzzy set?		$\{x u_a(x) < 0\}$	$\{x u_a(x) = 1\}$	$\{x u_a(x) = 0.5\}$	$\{x U_a(x) > 0\}$	c			
22	If A and B are two fuzzy sets with membership function: $u_a(x)=\{0.2, 0.5, 0.6, 0.1, 0.9\}$ $u_b(x)=\{0.1, 0.5, 0.2, 0.7, 0.8\}$ THEN what will be the intersection of A and B		$\{0.2, 0.5, 0.6, 0.7, 0.9\}$	$\{0.2, 0.3, 0.8, 0.1, 0.5\}$	$\{0.5, 0.1, 0.6, 0.1, 0.8\}$	$\{0.1, 0.5, 0.2, 0.1, 0.8\}$	d			
23	$A=\{0.1/1+0.2/2+0.3/3\}$ $B=\{0.6/1+0.5/2+0.4/3+0.5/4\}$ Find the set difference		$\{0.1/1+0.2/2+0.3/3\}$	$\{0.3/1+0.2/2+0.2/3\}$	$\{0.1/1+0.3/2+0.2/3\}$	$\{0.1/1+0.2/2+0.5/3\}$	a			
24	With the help of which formula can we find the algebraic sum of two fuzzy sets A,B?		$\{u_A(x)+_uB(x)\}-\{u_A(x)*_uB(x)\}$	$\{u_A(x)-_uB(x)\}-\{u_A(x)*_uB(x)\}$	$\{u_A(x)/_uB(x)\}-\{u_A(x)+_uB(x)\}$	$\{u_A(x)+_uB(x)\}+\{u_A(x)*_uB(x)\}$	a			
25	With the help of which formula can we find the algebraic product of two fuzzy sets A,B?		$\{u_A(x)/u_B(x)\}$	$\{u_A(x)*u_B(x)\}*\{u_A(x)-u_B(x)\}$	$\{u_A(x)*u_B(x)+\{u_A(x)+u_B(x)\}\}$	$\{u_A(x)*u_B(x)\}$	d			
26	Which one of the following is the associative property for a crisp set		$AU(BUC)=(AUB)UC$	$BU(AUC)=CU(BUA)$	$AU(CUA)=B(AUC)$	all the above	a			
27	Knowledge base is a combination of		rule base and data base	rule base and time base	time base and probability base	model base and data base	a			

SCOA UNIT 2 MCQs

28	Fuzzy logic system is based on what type of rule		if-then	else-if	while	do-while	a			
29	What is the function of dendrites in biological neural network		send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b			
30	Discrete events and agent-based models are usually used for _____.		middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A			
31	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.		Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A			
32	_____ is a simulation method that let decision maker see what the model is doing and how it interact.		VIS	VIM	SIV	HIV	A			
33	_____ systems,especially those developed for the military and video-game industry		VIS	VIM	SIV	HIV	B			
34	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?		Simulation	Optimization	human intuition	genetic algorithm	A			
35	Which of the following is		It can incorporate	It always result in	Simulation	It solves problem	A			

SCOA UNIT 2 MCQs

	the advantage of simulation?		significant real-life complexity	optimal solution	software requires special skills	in one pass with no iteration.				
36	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred		continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B			
37	The defining length of a schema is useful to calculate _____ of the schema for _____.		Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A			
38	Semiconductor layout & aircraft design are the application type of which domain?		Control	Design	Robotics	ML	B			
39	Trajectory planning is the application type of which domain?		Control	Design	Robotics	ML	C			
40	Filter design is the application type of which domain?		Control	Signal Processing	Robotics	ML	B			
41	categories of EA are/is		Genetic Algorithm	genetic programming	learning Classifier Systems	all of these	d			
42	Phases in which the LCS individuals are evaluated are		performance phase	reinforcement phase	both a and b	none of these	c			
43	MA sometimes called as		Hybrid EA	Integrated EA	both a and b	none of these	a			
44	Genetic algorithm is a subset of _____.		evolutionary algorithm	dynamcic algorithm	both a&b	None of these	A			
45	NP hard problems are also called as _____.		dicrete optimization	combinatorial optimization	evolutionary optimization	None of these	B			
46	Genetic algorithm is first		Charles Darwin	John Holland	Gregor Johan	None of these	B			

SCOA UNIT 2 MCQs

	introduce by _____.				Mendel					
47	_____ replicates the most successful solutions found in a population at a rate proportional to relative quality.		Selection	Recombination	Mutation	None of these	A			
48	_____ decomposes two distinct solutions and then randomly mixes their parts to form novel solutions.		Selection	Recombination	Mutation	None of these	B			
49	_____ randomly perturbs a candidate solution.		Selection	Recombination	Mutation	None of these	C			
50	A _____ is a template consisting of a string composed of three symbol.		Wild symbol	Schema	Layout	None of these	B			
51	{0,1,#} is the symbol alphabet ,where # is a special _____ symbol.		Wild card	Schema	Layout	None of these	A			
52	Metaheuristics are ?1)non deterministic 2)non approximate 3)not problem specific		1,2,3	1,2	1,3	2,3	c			
53	In search techniques, as single point based contradicts population based similary deterministic contradicts _____?		Stochastic	simplex based	complex based	none	a			

SCOA UNIT 2 MCQs

54	In swarm systems organisations are		centralized	decentralized	controlled by third party	none	b			
55	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids		1,3,2	3,2,1	2,3,1	2,1,3	c			
56	Every particle in the system takes experience from previous particle ?		PSO	ACO	clustering	none	a			
57	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms		1,2	1,2,3	2,3,4	all of these	d			
58	pheromone quantity in ACO is _____ proportional to path selection.		directly	inversely	there is no connection	none	a			
59	The ants prefer the smaller drop of honey over the more abundant, but less nutritious, sugar. This is the example of?		kruskal algorithm	Travelling salesman	Knapsack problem	NP hard problem	c			
60	In kmeans clustering each cluster is associated with		centroid	edge	common point	none of them	a			
61	What is EC?		computer based	Systems that uses	both a and b	none of these	c			

SCOA UNIT 2 MCQs

			problem solving systems	computational models of evolutionary process						
62	Recombination is applied to		2 selected candidated	1 selected candidate	3 selected candidate	none of these	a			
63	In EA mutation is applied to		2 candidate	1 candidate	3 candidate	none of these	b			
64	EV is used for		solving optimization problems	finding solutions	both a and b	none of these	a			
65	EV is considered as		complex	simple	complex and adaptive	all of these	c			
66	GA stands for		Genetic Algorithm	genetic programing	genetic assurance	none of these	a			
67	Features of GA		A string representation of chromosomes.	A fitness function be to minimized.	A cross-over method and a mutation method.	all of these	d			
68	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c			
69	Evolutionary programming was developed by		Fredrik	Fodgel	Frank	Flin	b			
70	Evolution Strategies is developed with		selection	mutation	a population of size one	all of these	d			
71	Evolution Strategies typically uses		real-valued vector representations	vector representation	time based representation	none of these	a			
72	in ES survival is		indeterministic	deterministic	both a and b	none of these	d			
73	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d			
74	Elements of ES are/is		Parent population size	Survival population size	both a and b	none of these	c			
75	What are different types		discrete and	discrete and	continuous and	none of these	a			

SCOA UNIT 2 MCQs

	of crossover		intermedium	continuous	intermedium					
76	GP individual stores computer program		TRUE	FALSE			a			
77	GP selection is		Deterministic selection	Tournament selection	nondeterministic selection	none of these	b			
78	EP mutation is		Data specific	Data type specific	non specific	none of these	b			
79	categories of EA are/is		Genetic Algorithm	genetic programing	learning Classifier Systems	all of these	d			
80	Phases in which the LCS individuals are evaluated are		performance phase	reinforcement phase	both a and b	none of these	c			
81	MA sometimes called as		Hybrid EA	Integrated EA	both a and b	none of these	a			
82	The truth values of traditional set theory is _____ and that of fuzzy set is _____		Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	a			
83	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____		Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	Fuzzy & Crisp Set	a			
84	Fuzzy logic is usually represented as _____		IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	b			
85	Three main basic features involved in characterizing membership function are		Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	Core, Support , Boundary	Weighted Average, center of Sums, Median	c			

SCOA UNIT 2 MCQs

86	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b				
87	Why can't we design a perfect neural network?		full operation is still not known of biological neurons	number of neuron is itself not precisely known	number of interconnection is very large & is very complex	all of the mentioned	d				
88	Both Fuzzy logic and ANN are soft computing techniques because		Both gives precise and accurate results	ANN gives accurate result but fuzzy logic does not	In each, no precise mathematical model of the problem is required	Fuzzy logic gives accurate result but ANN does not	c				
89	Internal state of neuron is called _____, is the function of the inputs the neurons receives		Weight	activation or activity level of neuron	Bias	None of these	b				
90	Each connection link in ANN is associated with _____ which has information about the input signal.		neurons	weights	bias	activation function	b				
91	In artificial Neural Network interconnected processing elements are called		nodes or neurons	weights	axons	Soma	a				

SCOA UNIT 2 MCQs

92	The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to		infinite	1	0	0.5	d				
93	The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing		Convex Fuzzy Set	Non convex fuzzy set	Normal Fuzzy set	Sub normal fuzzy set	b				
94	The cell body of neuron can be analogous to what mathematical operation?		summing	differentiator	integrator	none of the mentioned	a				
95	Conventional Artificial Intelligence is different from soft computing in the sense		Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data	Both (a) and (b)	None of the above	c				
96	_____ is/are the way/s to represent uncertainty.		Fuzzy Logic	Probability	Entropy	All of the mentioned	d				
97	Given two fuzzy sets A and B A={\{(x1,0.5),(x2,0.1),(x3,0.4)\}} and B={\{(x1,0.2),(x2,0.3),(x3,0.1)\}}		\{(x1,0.5),(x2,0.1),(x3,0.4)\}	\{(x1,0.5),(x2,0.3),(x3,0.5)\}	\{(x1,0.2),(x2,0.3),(x3,0.5)\}	\{(x1,0.2),(x2,0.1),(x3,0.4)\}	b				

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	5}) then union of 2 sets A U B is									
98	If A and B are two fuzzy sets with membership functions: $\mu_a(x)$ $=\{0.2, 0.5, 0.6, 0.1, 0.9\}$ $\mu_b(x) =$ $\{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_a \cap \mu_b$ will be		{0.2,0.5,0.6,0.7,0.9} }	{0.2, 0.5, 0.2, 0.1,0.8}	{0.1, 0.5, 0.6, 0.1,0.8}	{0.1, 0.5, 0.2, 0.1,0.8}	d			
99	For k>1, which of the following concept can be used to generate other linguistic hedge?		Concentration and dilation	Dilation	Concentration	None of the mentioned	c			
100	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A U B is		{1.0, 0.45, 0.75}	{1,0.2,0.75}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	a			
101	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A ∩ B is		{1.0, 0.45, 0.75}	{0.2, 0.20, 0.50}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	b			
102	Mamdani-style inference involves which steps		Fuzzification of the input variables & Rule evaluation	Aggregation of the rule output & Defuzzification	Both a and b	either a or b	c			
103	A _____ point of a		Core	Support	Cross-over	α - cut	c			

SCOA UNIT 2 MCQs

	fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$									
104	Which statement is true?		Mamdani approach characterised by its low interpredictability and low accuracy	Takagi and Sugeno's approach characterised by high accuracy but at the cost of high interpretability	Takagi and Sugeno's approach follows precise fuzzy modelling and obtains high accuracy but at the cost of low interpretability	Mamdani approach characterised by its low interpretability and high accuracy	c			
105	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$		$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) > 1$	c			
106	Which can be used as an input to fuzzy controller?		A fuzzy set	a crisp set	Both fuzzy set and Crisp set	None of these	b			
107	What are the types of fuzzy logic sets?		Type-1 fuzzy set	Type-2 fuzzy set	Both a and b	None of these	c			
108	How is fuzzy logic different from conventional control methods		IF and THEN approach	FOR approach	WHILE approach	DO approach	a			
109	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \text{support } A(x)$, where A belongs to A. Then fuzzy set is called normal when		$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) > 1$	c			
110	If A and B are sets and $A \cup B = A \cap B$ then		$A = B$	$A = 0$	$B = 0$	None of these	A			

SCOA UNIT 2 MCQs

111	If x is A then y is B else y is C. The output of the given fuzzy rule is		A fuzzy set	a crisp set	a fuzzy relation	a membership function	c			
112	What Is The First Step Of Fuzzy Logic Toolbox?		Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator(AND or OR) in the antecedent	Aggregation of the consequents across the rule	a			
113	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?		What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	The input is a value greater than one and the output is a value less than the input	The input and output have both the same values	The input has two or more values and the output has a single truth value	d			
114	What Is The Input And Output Of Step 3 - Apply Implication Method?		Input is a fuzzy set but the output is a whole value	Input is a fuzzy set but the output is a whole value	Input and Output have the same value	Input is a smaller value than the output value	b			
115	What Is The Purpose Of Aggregation?		To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	a			
116	Linguistic variable is		a variable whose values are words or sentences	any numerical value only	any binary value only	variable which contains TRUE or FALSE values only	a			
117	Identification of Input, Output and state variables is performed in which step of FLC?		Fuzzy configuration	Defuzzification	combining fuzzy outputs	Identification of variables	d			
118	Assigning linguistic label to each subset is done in		Fuzzy configuration	Defuzzification	combining fuzzy outputs	fuzzy subset configuration	d			

SCOA UNIT 2 MCQs

	which step of FLC?									
119	Disjunctive system of rules is used for system		that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	a			
120	Conjunctive system of rules is used for system		that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	b			
121	Categorial reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	a			
122	Syllogistic reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	c			
123	Qualitative reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	b			
124	Dispositional reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	d			

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125	Mamdani systems are		MISO systems	MIMO systems	Only MISO systems	both a and b	d			
126	Sugeno systems are		MISO systems	MIMO systems	Only MISO systems	both a and b	b			
127	In the generational model of EA		entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	a			
128	In the steady-state model of EA		entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	b			
129	In the generational model of EA		each individual survives exactly for two generation	each individual survives exactly for one generation	cannot predict	each individual survives as many generations as want	b			
130	In the steady-state model of EA		One offspring is generated per generation	two offsprings are generated per generation	cannot decide	more than two offsprings are generated per generation	a			
131	Which of the following algorithm is most efficient for discontinuous and noisy problems?		Evolutionary algorithm	Classical optimization algorithm	Genetic algorithm	none	a			
132	Each iteration of EA is referred to as		Generation	Iteration	population	None	a			
133	Which of the following are evolutionary operators?		Selection	Crossover	Mutation	All of the above	d			
134	In the $(\mu/\rho, \lambda)$ method of ES, parents are		selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	a			

SCOA UNIT 2 MCQs

135	In the $(\mu/\rho+\lambda)$ method of ES, parents are		selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	b				
136	Fitness scaling is desirable to ensure		Population diversity	selection pressure	that better solutions are selected only	relatively inferior solutions are not ignored	a				
137	Which mutation operator is used in ES as reproduction operator?		one point	Gaussian mutation	two point	adaptive	b				
138	Fitness proportionate selection methods are		Roulette wheel selection	Stochastic universal sampling	tournament selection	All the mentioned	d				
139	In which selection method of survival selection there is no notion of fitness?		fitness based selection	elitism	Agebased selection	All the mentioned	c				
140	In which selection strategy every individual has the same probability to be selected?		Roulette wheel selection	Uniform selection	tournament selection	Rank selection	b				
141	High selection pressure is desirable, when we need		diversity not found in each generation	there is no improvement in successive GA iteration	faster termination of GA	fitness values are not uniformly distributed	c				
142	Tournament selection scheme is more preferable when		when fitness values are uniformly distributed	population are with very diversified fitness values	when fitness values are not necessarily uniformly distributed	under all the above situations	b				
143	Which of the following is not a characteristic of evolutionary algorithm?		Conceptual simplicity	Parallelism	Broad applicability	Artificial selection	d				

SCOA UNIT 2 MCQs

144	What is the correct order of steps in evolutionary algorithm?		Select parents-recombine-mutate-evaluate	Select parents-recombine-evaluate-mutate-	Select parents-mutate - recombine-evaluate	Select parents-evaluate - recombine-mutate	a				
145	Which of the following schemes are selection schemes in Evolutionary computation?		Hall of fame	Rank based selection	tournament selection	All of the above	d				
146	To encode chromosomes which encoding schemes are used		binary encoding	finite state machine encoding	real value encoding	All of the above	d				
This sheet is for 1 Mark questions											
S.r No	Question	Image	a	b	c	d	Correct Answer				
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d				
1	When we say that the boundary is crisp		Distinguish two regions clearly	Cannot Distinguish two regions clearly	Collection of ordered pairs	None of these	a				
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a				
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c				
4	Control actions while computing should be		Ambiguous	Unambiguos	Inaccurate	None of these	b				
5	Core of soft computing is		Fuzzy computing,neural computing,Genetic algorithm	Fuzzy network and artificial intelligence	Neural Science	Genetic Science	a				
6	Hard computing		Sequential	Parallel	approximate	both a and b	a				

SCOA UNIT 2 MCQs

	performs what type of computation						
7	Who initiated idea of soft computing		charles darwin	richard berger	mc culloch	lofti a zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems, algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behaviour	deals with imprecise, probabilistic	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computing	conventional computing	non conventional computing	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behaviour	information processing paradigm	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search represents a guided approach while optimization is unguided	Blind search usually does not conclude in one step like some optimization methods.	Blind search cannot result in optimal solution whereas optimization method do	none of these	B
16	In modeling, an optimal solution is understood to be		a solution that can only be determined by an exhaustive enumeration testing of	a solution found in the least possible time and using the least possible computing resources	a solution that is the best based on criteria defined in the design phase	a solution that requires an algorithm for the determination	C

SCOA UNIT 2 MCQs

			alternatives				
17	When is a complete enumeration of solution used?		When a solution that is "good enough" is fine and good heuristics are available	When there is enough time and computational power available	When the modeler requires a guided approach to problem solving	When there are an infinite number of solution to be searched	B
18	All of the following are true about heuristics EXCEPT		heuristics are used when the modeler requires a guided approach to problem solving	heuristics are used when a solution that is "good enough" is sought	heuristics are used when there is abundant time and computational power	heuristics are rules of good judgement	C
19	Which approach is most suited to structured problem with little uncertainty		Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belongs to the family of methods in the		artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
21	What does the 0 membership value means in the set		the object is fully inside the set	the object is not in the set	the object is partially present in the set	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a
23	The process of fuzzy interference system involves		membership functions	fuzzy logic operators	if-then rules	all the above	d
24	What does a fuzzifier do		converts crisp input to linguistic variables	converts crisp output to linguistic variables	converts fuzzy input to linguistic variables	converts fuzzy output to linguistic variables	a

SCOA UNIT 2 MCQs

25	Which of the following is not defuzzifier method		centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method		mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have		multiple part of antecedent,only single part of consequent	only single part of antecedent,multiple part of consequent	multiple part of antecedent,multiple part of consequent	only single part of antecedent,only single part of consequent	c
28	The α cut of a fuzzy set A is a crisp set defined by :-		$\{x u_a(x) > \alpha\}$	$\{x u_a(x) \geq \alpha\}$	$\{x u_a(x) < \alpha\}$	$\{x u_a(x) \leq \alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1 / x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?		$\{0/a, 0.7/b, 0.8/c, 0.2/d, 1/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.2/d, 1/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.7/d, 1/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 1/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of AUB?		$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0.2/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.5/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.8/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B ?		$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 1/e\}$	a

SCOA UNIT 2 MCQs

34	What denotes the support(A) in a fuzzy set?		$\{x \cup a(x) > 0\}$	$\{x \cup a(x) < 0\}$	$\{x \cup a(x) \leq 0\}$	$\{x \cup a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?		$\{x \cup a(x) > 0\}$	$\{x \cup a(x) = 1\}$	$\{x \cup a(x) \geq 0.5\}$	$\{x \cup a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designning a fuzy logic machine		fuzzification->Rule Evaluation->Defuzzification	deffuzification->rule evaluation->fuzzification	rule evaluation->fuzzification->deffuzification	rule evaluation->defuzzification->fuzzification	a
38	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
39	Genetic algorithm belong to the family of method in the		artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
40	All of the follwing are suitable problem for genetic algorithm EXCEPT		pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
41	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
43	mutation is applied on <u> </u> candidates.		one	two	more than two	noneof these	a
44	recombination is applied on <u> </u> candidates.		one	two	more than two	noneof these	b
45	LCS belongs to <u> </u> based methods?		rule based learning	genetic learning	both a and b	noneof these	a
46	Survival is <u> </u> approach.		deterministic	non deterministic	semi deterministic	noneof these	a
47	Evolutionary algorithms are a <u> </u> based		heuristic	metaheuristic	both a and b	noneof these	a

SCOA UNIT 2 MCQs

	approach						
48	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?		line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by		Fredrik	Fodgel	Frank	Flin	b
54	Evolution Strategies is developed with		selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses		real-valued vector representations	vector representation	time based representation	none of these	a
56	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is		Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover		discrete and intermedium	discrete and continuous	continuous and intemedium	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested.		TRUE	FALSE			B
61	_____ cannot easily be transferred from one		optimal solution	analytical solution	simulation solutuon	none of these	C

SCOA UNIT 2 MCQs

	problem domain to another						
62	Discrete events and agent-based models are usually used for _____.		middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
63	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.		Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
64	EC stands for?		Evolutionary Computations	Evolutionary computer	Electronic computations	none of these	a
65	GA stands for		genetic algorithm	genetic assurance	genetic algorithim	none of these	a
66	LCS stands for		learning classes system	learning classifier systems	learned class system	none of these	b
67	GBML stands for		Genes based Machine learning	Genes based mobile learning	Genetic bsed machine learning	none of these	c
68	EV is dominantly used for solving _____.		optimization problems	NP problem	simple problems	none of these	a
69	EV is considered as?		adaptive	complex	both a and b	none of these	c
70	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?		line representation	String representation	Circular representation	all of these	b
72	Parameters that affect GA		initial population	selection process	fitness function	all of these	d
73	Fitness function should be		maximum	minimum	intermediate	none of these	b
74	Evolutionary algorithms		heuristic	metaheuristic	both a and b	none of these	a

SCOA UNIT 2 MCQs

	are a ___ based approach						
75	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
77	mutation is applied on ___ candidates.		one	two	more than two	none of these	a
78	recombination is applied on ___ candidates.		one	two	more than two	none of these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offsprings	grand child	c
80	___ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection methods	both a and b	none of these	c
82	LCS belongs to ___ based methods?		rule based learning	genetic learning	both a and b	none of these	a
83	Survival is ___ approach.		deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called ___ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a

SCOA UNIT 2 MCQs

85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b

SCOA UNIT 2 MCQs

89	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
90	For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c
92	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3.): (5, 0), (6, 0.2) \}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a

SCOA UNIT 2 MCQs

96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.5}	{0.1, 0.5, 0.4, 0.2, 0.2}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x,y} \min(\mu_A(x), \mu_B(y))$ Then, $f(A+B)$ is equal to		$\{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)\}$	$\{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)\}$	$\{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	$\{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	d
98	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut		{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c

SCOA UNIT 2 MCQs

	corresponding to $\alpha = 0.5$ will be						
100	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c

SCOA UNIT 2 MCQs

104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	----- defines logic function of two prepositions		prepositions	Linguistic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ----- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ----- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ----- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then $z=c$ (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b

SCOA UNIT 2 MCQs

111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a

SCOA UNIT 2 MCQs

115	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a

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119	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

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123	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125	(1+1) ES		offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126	(1+λ) ES		λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127	Termination condition for EA		maximally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a

SCOA UNIT 2 MCQs

129	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming does not use crossover operators	d
130	(1+1) ES		Operates on population size of two	operates on population size of one	operates on population size of zero	operates on population size of λ	a
131	Which of these emphasize development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d
This sheet is for 3 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	What is defuzzification		conversion of fuzzy set to crisp set	conversion of crisp set to fuzzy set	conversion of fuzzy set to fuzzy logic	conversion of crisp set to crisp logic	a

SCOA UNIT 2 MCQs

2	What type of model is required for hard computing		mathematical	biological	chemical	probabilistic	a
3	Which of the following is/are basic component neuron		dendrites	axon	nucleus	all of the above	d
4	Which of the following computing technique has the ability of learning and adoption		neural network	evolutionary	hard	probabilistic	a
5	The truth value of the fuzzy set is		either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
6	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
7	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Evaluation->Defuzzification	defuzzification->rule evaluation->fuzzification	rule evaluation->fuzzification->defuzzification	rule evaluation->defuzzification->fuzzification	a
8	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
9	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
10	All of the following are suitable problem for genetic algorithm EXCEPT		pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
11	In which stage of the simulation methodology do you determine the variable and gather data		Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
12	In which stage of the simulation methodology		Defining the problem	Constructing the simulation model	testing and validating the	designing the experiment	D

SCOA UNIT 2 MCQs

	do you determine how long to run the simulation				model		
13	In which stage of the simulation methodology do you determine the system boundaries and environment?		Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
14	What BEST describes a simulation model with a limited number of variables ,each with the finite number of values?		system dynamics simulation	discrete event simulation	continuous distribution simulation	Monte carlo simulation	B
15	The advantage of visual interactive simulation include all of the following EXCEPT		Improvement in training using the simulation	reduced need for the decision maker involvement	The ability to see how a simulation works	improved presentation of simulation results	B
16	What can system dynamics modelling be used for ?		qualitative method for analyzing a system	simulation models that test each subsystem in isolation	micro-level simulation models that examine individual values	studying system behaviour at an instant in time	A
17	In agent-based modelling ,agents are		the human workers or agents who use the system	communication links between simulation	Autonomous rule-based decision making units	the hardware platform used to conduct the simulation	C
18	Agent based modelling is best for all the following types of problem features EXCEPT		complex interactions	low uncertainty	Many inter-related factors	irregular data	B
19	What is the final stage of an agent based modelling(ABM) methodology?		Identifying the agents and determining their behaviour	Determining agent-related data	Validating agent behaviour against reality	determining the suitability of ABM	C

SCOA UNIT 2 MCQs

20	Which of the following is the advantage of simulation?		It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skills	It solves problem in one pass with no iteration.	A
21	The truth value of the fuzzy set is		either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
22	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
23	which of the following is a sequence of steps taken in designning a fuzy logic machine		fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation->fuzzification->deffuzification	rule evaluation->defuzzification->fuzzification	a
24	EV is dominantly used for solving ____.		optimization problems	NP problem	simple problems	noneof these	a
25	EV is considered as?		adaptive	complex	both a and b	noneof these	c
26	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
27	Identify the drawbacks of clustering algorithms? 1) can geneerate empty clusters 2) can terminate at local minimum 3)can handle noisy data		1,2,3	1,2	3	2,3	b
28	generation of empty cluster problem in clustering can be overcome by?		ACO based clustering	PSO based clustering	kmeans	kmode	b
29	where does PSO based clustering terminates?		global optimum	local optimum	global maximum	local minimum	a
30	Each particle in PSO modifies its position		2,3	1,2	1,2,3	only 1	c

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	according to ? 1)its velocity 2)its weight 3) its gbest and pbest						
31	Applications of ACO are ? 1)shortest path 2)assignment problem 3)set problem		2,3	1,2	1,2,3		c
32	Evaporation of pharomones is ?		directly proportional to path length	inversly proportional to path length	constant	none	a
33	Metaheuristics doesnot include ?		evolutinary algorithms	tabu searching	simulated annealing	none	d
34	Metaheuristics are ?1)non deterministic 2)non approximate 3)not problem specific		1,2,3	1,2	1,3	2,3	c
35	In search techniques, as single point based contradicts population based similary deterministic contradicts ____?		Stochastic	simplex based	complex based	none	a
36	In swarm systems organisations are		centalized	decentralized	controlled by third party	none	b
37	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids		1,3,2	3,2,1	2,3,1	2,1,3	c
38	Every particle in the		PSO	ACO	clustering	none	a

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	system takes experience from previous particle ?						
39	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms		1,2	1,2,3	2,3,4	all of these	d
40	pheromone quantity in ACO is _____ proportional to path selection.		directly	inversely	there is no connection	none	a
41	Recombination involves _____ candidates while mutation requires _____ candidates, and the result is called _____.		1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
42	Identify the correct sequence for evolutionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3>Create offspring 4)replace some parents		1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
43	Problems for which there is no efficient method to solve such problems exactly are called?		complex	hard	strong	none	b
44	EV is considered as ? 1)complex 2) adaptive		1	2	1,2	none	c

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45	EV system was proposed for exploring a___ fitness space and can form___.		multipeaked,clusters	single peaked,clusters	multipeaked,hard problems	single peaked,hard problems	a
46	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recombination operator		1,2	1,2,3	2,3	1,3	b
47	Parameters that affect GA are ? 1)intial population 2)fitness function 3)ability to generate offspring		1,3	1,2	1,2,3	only 1	b
48	___focuses attention on high fitness individuals, thus exploiting the available fitness information.		clustering	offspring production	replace	selection	d

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49	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }		ACO	PSO	EA	Kmean	c
50	Genetic algorithm are heuristic methods that do not guarantee an optimal solution to a problem		TRUE	FALSE			A
51	A "What-if" model is most typically used for the most structured problems		TRUE	FALSE			B
52	_____ cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solutuon	none of these	C
53	Discrete events and agent-based models are usually used for _____.		middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A

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54	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.		Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
55	_____ is a simulation method that let decision maker see what the model is doing and how it interact.		VIS	VIM	SIV	HIV	A
56	_____ systems,especially those developed for the military and video-game industry		VIS	VIM	SIV	HIV	B
57	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?		Simulation	Optimization	human intuition	genetic algorithm	A
58	Which of the following is the advantage of simulation?		It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skills	It solves problem in one pass with no iteration.	A
59	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred		continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B
60	The defining length of a schema is useful to calculate _____ of the		Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A

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	schema for _____. 61 Recombination involves ___ candidates while mutation requires ___ candidates, and the result is called ____.		1,2,offspring 62 Identify the correct sequence for evolutionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3>Create offspring 4)replace some parents	2,1,offspring 63 Problems for which there is no efficient method to solve such problems exactly are called?	1,2,parent 64 EV is considered as ? 1)complex 2) adaptive	2,1,parent 65 EV system was proposed for exploring a ___ fitness space and can form _____. 66 Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3) recombination operator	a 67 Parameters that affect GA are ? 1) initial population 2) fitness

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	function 3)ability to generate offspring						
68	___ focuses attention on high fitness individuals, thus exploiting the available fitness information.		clustering	offspring production	replace	selection	d
69	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }		ACO	PSO	EA	Kmean	c
70	Evolution strategies uses ? 1)selection 2)recombination 3)real valued vector		1,2,3	2,3	1,3	only 2	a
71	which of the following statements are true regarding ES ? 1)Survival is deterministic 2)first allows the N best children to survive, and		only 1	1,2	only 2	1,2,3	d

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	replaces the parents with these children. 3)allows the N best children and parents to survive.						
72	Evolutionary Algorithms includes ? 1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms		1,2,3,4	2,3	3,4	2,3,4	c
73	Heuristics include ?1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms		1,2,3,4	2,3	1,2		d
74	Which of the following statements are true ? 1)mutation is applied to two selected candidates, the so-called parents, and results in one or two new candidates, the children 2) recombination is applied to one candidate and results in one new candidate.		only 1	only 2	both	none of these	d
75	The ___ is performed by selecting two sub trees by chance from the parents and exchange them to create the descendants.		GP crossover	GP Mutation	GP clustering	GP Recombination	a
76	The___ is performed by selecting a sub tree of the descendant by		GP crossover	GP Mutation	GP clustering	GP Recombination	b

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	chance and to exchange the sub tree with an arbitrary generated new sub tree.						
77	___ are able to learn simple “if {condition} then {action}” style rules ²³ by learning from feedback		ES	EA	LCS	Heuristics	c
78	Island model is related with ?		Distributed Evolutionary Algorithms	LCS	swarm intelligence	ACO	a
79	payoffs can be easily translated to a ___ function for an EA.		survival	reduction	comination	fitness	d
80	Identify the correct statements with respect to genetic algorithms? 1)A fitness function should maximized. 2)A replacement procedure. 3)A string representation of chromosomes.		1,2	2,3	1,2,3	1,3	b
81	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a

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82	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
83	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
84	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
85	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b

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86	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
87	For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
88	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c
89	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
90	The values of the set membership is represented by		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
91	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3.): (5, 0), (6, 0.2) \}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
92	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification \rightarrow Rule evaluation \rightarrow Defuzzification	Fuzzification \rightarrow Defuzzification \rightarrow Rule evaluation	Rule evaluation \rightarrow Fuzzification \rightarrow Defuzzification	Rule evaluation \rightarrow Defuzzification \rightarrow Fuzzification	a

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93	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		$\{0.9, 0.5, 0.6, 0.8, 0.8\}$	$\{0.6, 0.2, 0.1, 0.7, 0.5\}$	$\{0.1, 0.5, 0.4, 0.2, 0.2\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	c
94	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_x y = z (\min(\mu_A(x), \mu_B(x)))$ Then, $f(A+B)$ is equal to		$\{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)\}$	$\{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)\}$	$\{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	$\{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	d
95	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
96	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut		$\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$	$\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$	$\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$	None of the above	c

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	corresponding to $\alpha = 0.5$ will be						
97	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
98	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
99	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
100	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	C

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101	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
102	---- defines logic function of two prepositions		prepositions	Linguistic hedges	truth tables	inference rules	c
103	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
104	Multiple conjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
105	Multiple disjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
106	IF x is A and y is B then $z=c$ (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
107	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b

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108	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
109	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
110	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
111	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
112	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b

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113	In Evolutionary programming, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
114	In Evolutionary strategy, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
115	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
116	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
117	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c

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118	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
119	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b
120	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
121	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
122	(1+1) ES		offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a

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123	(1+λ) ES		λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
124	Termination condition for EA		maximally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
125	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
126	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming does not use crossover operators	d
127	(1+1) ES		Operates on population size of two	operates on population size of one	operates on population size of zero	operates on population size of λ	a
128	Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
129	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
130	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d
Question No		Question				Answer Key	

38.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
39.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
40.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning D.experience</p>	D

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41.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intuition, Inference, Rank Ordering B.Fuzzy Algorithm, Neural network, Genetic Algorithm C.Core, Support , Boundary D.Weighted Average, center of Sums, Median</p>	C
42.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core B.Support C.Boundary D.Fuzzy</p>	A
43.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets B.normal fuzzy set</p>	B

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	<p><u>C.</u>convex fuzzy set</p> <p><u>D.</u>concave fuzzy set</p>	
44.	<p>In a Fuzzy set a prototypical element has a value</p> <p><u>A.</u>1</p> <p><u>B.</u>0</p> <p><u>C.</u>infinite</p> <p><u>D.</u>Not defined</p>	A
45.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p><u>A.</u>normal fuzzy set</p> <p><u>B.</u>subnormal fuzzy set.</p> <p><u>C.</u>convex fuzzy set</p> <p><u>D.</u>concave fuzzy set</p>	B
46.	<p>A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing</p>	A

	<p>than strictly monotonically decreasing with increasing values for elements in the universe</p> <p><u>A.</u>convex fuzzy set <u>B.</u>concave fuzzy set <u>C.</u>Non concave Fuzzy set <u>D.</u>Non Convex Fuzzy set</p>	
47.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p><u>A.</u>Convex Fuzzy Set <u>B.</u>Non convex fuzzy set <u>C.</u>Normal Fuzzy set <u>D.</u>Sub normal fuzzy set</p>	B
48.	<p>Fuzzy Computing</p> <p><u>A.</u>doesnt deal with 2 valued logic <u>B.</u>mimics human behaviour</p>	D

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	<p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
49.	<p>Defuzzification is done to obtain</p> <ul style="list-style-type: none"> e) Crisp output f) The best rule to follow g) Precise fuzzy value h) None of the above 	a
50.	<p>“The train is running fast”. Here ‘fast’ can be represented by</p> <ul style="list-style-type: none"> e) Fuzzy Set f) Crisp Set g) Fuzzy and Crisp Set h) None of the mentioned 	a
51.	<p>Suppose, a fuzzy set Young is defined as follows: $\text{Young} = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$</p> <p>Then the crisp value of Young using MoM method is</p> <ul style="list-style-type: none"> e) 25 f) 20 g) 35 h) 50 	a
52.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> e) with the median of all the area f) with the mean of all the area g) with the largest area 	c

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	h) with the smallest area	
53.	Which of the following is not a centroid method? e) Centre of gravity method (CoG) f) Centre of sum method (CoS) g) Centre of area method (CoA) h) Centre of Mass (CoM)	d
54.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
55.	If A is a fuzzy set, then $(A \lambda)$ complement \neq $(A\lambda)$ complement (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
56.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ e) 2 f) 5 g) 4 h) 1	B
57.	If x is A then y is B else y is c then the relation R is equivalent to e) $(A \times B) + (B \times C)$ f) $A \times B \cup (A \times C)$ g) $(A \times B) \rightarrow (B \times C)$ h) $(A \times C) \cup (B \times C)$	b

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58.	What are the applications of Fuzzy Inference Systems? e) Wireless services, heat control and printers f) Restrict power usage, telephone lines and sort data g) Simulink, boiler and CD recording h) Automatic control, decision analysis and data classification	d
59.	Fuzzy logic is a form of : e) Two valued logic f) Crisp set logic g) Many valued logic h) Binary set logic	c
60.	The main objective of fuzzy AHP is: e) To increase the ambiguity of human judgement f) Eliminate the ambiguous and vagueness of the human judgement g) Control human biasness h) B and C	d
61.	In triangular fuzzy number (l, m, u), what does 'm' represents: e) Smallest likely value f) Most probable value g) Largest possible value h) None of the above	C
62.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? e) Vector normalization f) Linear normalization g) Both A and B h) None of the above	b
63.	Fuzzy logic is a form of	Answer: c

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	<p>a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic</p>	<p>Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.</p>
64.	<p>Traditional set theory is also known as Crisp Set theory.</p> <p>a) True b) False</p>	<p>Answer: a</p> <p>Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set.</p> <p>3. The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>
65.	<p>The truth values of traditional set theory is _____ and that of fuzzy set is _____</p> <p>a) Either 0 or 1, between 0 & 1</p>	<p>Answer: a</p> <p>Explanation: Refer the definition of Fuzzy set and Crisp set.</p>

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	b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1	
66.	How many types of random variables are available? a) 1 b) 2 c) 3 d) 4	Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.
67.	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____. a) Fuzzy Set b) Crisp Set	Answer: a Explanation: Fuzzy logic deals with linguistic variables.
68.	The values of the set membership is represented by a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c	Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.
69.	What is meant by probability density function? a) Probability distributions	d

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	<p>b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables</p>	
70.	<p>Which of the following is used for probability theory sentences?</p> <p>a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned</p>	<p>Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.</p>
71.	<p>Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.</p> <p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
72.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy operator may not be known. For this reason, fuzzy logic</p>

SCOA UNIT 2 MCQs

		<p>usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
73.	<p>_____ is/are the way/s to represent uncertainty.</p> <p>a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned</p>	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
74.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <p>a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned</p>	<p>Answer: c</p> <p>Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

SCOA UNIT 2 MCQs

1: Core of soft Computing is

- A.Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.Fuzzy Networks and Artificial Intelligence
- C.Artificial Intelligence and Neural Science
- D.Neural Science and Genetic Science

Answer A

2: Who initiated the idea of Soft Computing

- A.Charles Darwin
- B.Lofti A Zadeh
- C.Rechenberg
- D.Mc_Culloch

Answer B

3: Fuzzy Computing

- A.mimics human behavior
- B.doesnt deal with 2 valued logic
- C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.All of the above

Answer D

:

Neural Computing

- A.mimics human brain
- B.information processing paradigm
- C.Both (a) and (b)
- D.None of the above

Answer C

5: Genetic Algorithm are a part of

- A.Evolutionary Computing

B.inspired by Darwin's theory about evolution - "survival of the fittest"

C.are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics

D.All of the above

Answer D

6: What are the 2 types of learning

A.Improvised and unimprovised

B.supervised and unsupervised

C.Layered and unlabeled

D.None of the above

Answer B

7: Supervised Learning is

A.learning with the help of examples

B.learning without teacher

C.learning with the help of teacher

D.learning with computers as supervisor

Answer C

8: Unsupervised learning is

A.learning without computers

B.problem based learning

C.learning from environment

D.learning from teachers

Answer C

9 Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

D.None of the above

Answer C

10: In supervised learning

A.classes are not predefined

- B.**classes are predefined
- C.**classes are not required
- D.**classification is not done

Answer B

11 Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.

- A.**True
- B.**False

Answer A

12: The membership functions are generally represented in

- A.**Tabular Form
- B.**Graphical Form
- C.**Mathematical Form
- D.**Logical Form

Answer B

13: Membership function can be thought of as a technique to solve empirical problems on the basis of

- A.**knowledge
- B.**examples
- C.**learning
- D.**experience

Answer D

14: Three main basic features involved in characterizing membership function are

- A.**Intuition, Inference, Rank Ordering
- B.**Fuzzy Algorithm, Neural network, Genetic Algorithm
- C.**Core, Support , Boundary
- D.**Weighted Average, center of Sums, Median

Answer C

15: The region of universe that is characterized by complete membership in the set is called

- A.**Core

- B.**Support
- C.**Boundary
- D.**Fuzzy

Answer A

16: A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

- A.**sub normal fuzzy sets
- B.**normal fuzzy set
- C.**convex fuzzy set
- D.**concave fuzzy set

Answer B

17: In a Fuzzy set a prototypical element has a value

- A.**1
- B.**0
- C.**infinite
- D.**Not defined

Answer A

18: A fuzzy set wherein no membership function has its value equal to 1 is called

- A.**normal fuzzy set
- B.**subnormal fuzzy set.
- C.**convex fuzzy set
- D.**concave fuzzy set

Answer B

19: A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe

- A.**convex fuzzy set
- B.**concave fuzzy set
- C.**Non concave Fuzzy set
- D.**Non Convex Fuzzy set

Answer A

20: The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.

A.Convex Fuzzy Set

B.Non convex fuzzy set

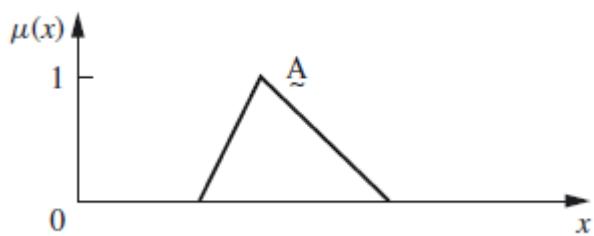
C.Normal Fuzzy set

D.Sub normal fuzzy set

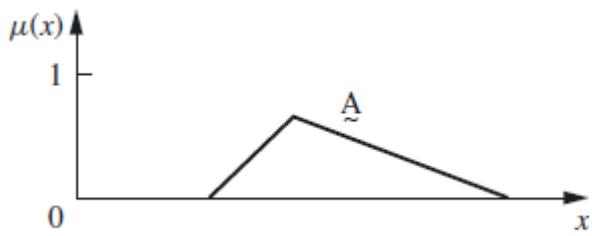
Answer B

21: Match the Column

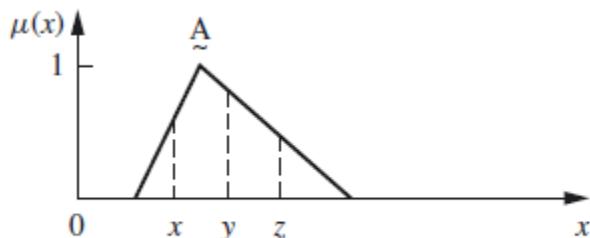
List I



(a)

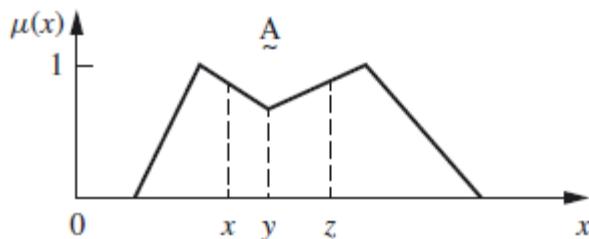


(b)



(c)

List II



(d)

1 Subnormal Fuzzy Set

2 Normal Fuzzy Set

3 Non Convex Normal Fuzzy Set

4 Convex Normal Fuzzy Set

A.a b c d

2 1 4 3

B.a b c d

1 2 3 4

C.a b c d

4 3 2 1

D.a b c d

3 2 1 4

Answer A

22: The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to

A. infinite

B. 1

C. 0

D. 0.5

Answer D

23:
Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

Answer D

1. What is the form of Fuzzy logic?

- a) Two-valued logic
- b) Crisp set logic
- c) Many-valued logic
- d) Binary set logic

Answer: c

24. Traditional set theory is also known as Crisp Set theory.

- a) True

- b) False

Answer a

25. The truth values of traditional set theory is _____ and that of fuzzy set is _____

- a) Either 0 or 1, between 0 & 1
- b) Between 0 & 1, either 0 or 1
- c) Between 0 & 1, between 0 & 1
- d) Either 0 or 1, either 0 or 1

Answer a

26. Fuzzy logic is extension of Crisp set with an extension of handling the concept of Partial Truth.

- a) True

- b) False

Answer a

27. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by

- a) Fuzzy Set
- b) Crisp Set
- c) Fuzzy & Crisp Set
- d) None of the mentioned

Answer a

28. The values of the set membership is represented by _____

- a) Discrete Set
- b) Degree of truth
- c) Probabilities
- d) Both Degree of truth & Probabilities

Answer b

29. Japanese were the first to utilize fuzzy logic practically on high-speed trains in Sendai.

- a) True
- b) False

Answer a

30. Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.

- a) AND
- b) OR
- c) NOT
- d) All of the mentioned

Answer d

31. There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.

- a) Hedges
- b) Lingual Variable

c) Fuzz Variable

d) None of the mentioned

Answer a

32. Fuzzy logic is usually represented as _____

a) IF-THEN-ELSE rules

b) IF-THEN rules

c) Both IF-THEN-ELSE rules & IF-THEN rules

d) None of the mentioned

Answer b

33. Like relational databases there does exists fuzzy relational databases.

a) True

b) False

Answer a

34. _____ is/are the way/s to represent uncertainty.

a) Fuzzy Logic

b) Probability

c) Entropy

d) All of the mentioned

Answer d

35. _____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.

a) Fuzzy Relational DB

b) Ecorithms

- c) Fuzzy Set
- d) None of the mentioned

Answer c

36. Fuzzy logic is :

- a) Used to respond to questions in a humanlike way
- b) A new programming language used to program animation
- c) The result of fuzzy thinking
- d) A term that indicates logical values greater than one

Answer a

37. A robot is a _____

- a) Computer-controlled machine that mimics the motor activities of living things
- b) Machine that thinks like a human
- c) Machine that replaces a human by performing complex mental processing tasks
- d) Type of virtual reality device that takes the place of humans in adventures

Answer a

38 Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction

$\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be

- a. $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- b. $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- c. $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- d. None of the above

Answer c

39. If A and B are two fuzzy sets with membership functions:

$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$ and $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$

- b. {0.2, 0.5, 0.2, 0.1, 0.8}
- c. {0.1, 0.5, 0.6, 0.1, 0.8}
- d. {0.1, 0.5, 0.2, 0.1, 0.8}

Answer d

40. The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$

- a. $h(A) = 0$
- b. $h(A) < 0$
- c. $h(A) = 1$
- d. $h(A) < 1$

Answer c

41. A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$

- a. Core
- b. Support
- c. Cross-over
- d. α - cut

Answer c

42. Suppose the function y and a fuzzy integer number around -4 for x are given as $y = (x-3)^2 + 2$.

Around $-4 = \{(2, 0.3), (3, 0.6), (4, 1), (5, 0.6), (6, 0.3)\}$ respectively. Then $f(\text{Around } -4)$ is given by:

- a. $\{(2, 0.6), (3, 0.3), (6, 1), (11, 0.3)\}$
- b. $\{(2, 0.6), (3, 1), (6, 1), (11, 0.3)\}$
- c. $\{(2, 0.6), (3, 1), (6, 0.6), (11, 0.3)\}$
- d. $\{(2, 0.6), (3, 0.3), (6, 0.6), (11, 0.3)\}$

Answer c

43. Given $U = \{1, 2, 3, 4, 5, 6, 7\}$ and $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)

- a. $\{(4, 0.7), (2, 1), (1, 0.8)\}$

- b. $\{(4, 0.3), (5, 0), (6, 0.2)\}$
- c. $\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$
- d. $\{(3, 0.3), (6, 0.2)\}$

Answer c

44. Consider a fuzzy set Old as defined below

$\text{Old} = \{(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)\}$ Then the alpha-cut for $\alpha = 0.4$ for the set Old will be

- a. $\{(40, 0.4)\}$
- b. $\{50, 60, 70, 80\}$
- c. $\{(20, 0.1), (30, 0.2)\}$
- d. $\{(20, 0), (30, 0), (40, 1), (50, 1), (60, 1), (70, 1), (80, 1)\}$

Answer d

45. Let R and S be two fuzzy relations defined as follows. Then, the resulting relation, T, which relates elements of universe x to the elements of universe z using max-min composition is given by:

$$R = \begin{array}{c} \begin{matrix} y_1 & y_2 \\ \hline x_1 & 0.6 & 0.4 \\ x_2 & 0.7 & 0.3 \end{matrix} \end{array} \text{ and } S = \begin{array}{c} \begin{matrix} z_1 & z_2 & z_3 \\ \hline y_1 & 0.8 & 0.5 & 0.1 \\ y_2 & 0.0 & 0.6 & 0.4 \end{matrix} \end{array}$$

(1)	$T = \begin{bmatrix} z_1 & z_2 & z_3 \\ x_1 & \begin{bmatrix} 0.4 & 0.6 & 0.4 \\ 0.7 & 0.7 & 0.7 \end{bmatrix} \\ x_2 \end{bmatrix}$
(2)	$T = \begin{bmatrix} z_1 & z_2 & z_3 \\ x_1 & \begin{bmatrix} 0.4 & 0.6 & 0.4 \\ 0.8 & 0.5 & 0.4 \end{bmatrix} \\ x_2 \end{bmatrix}$
(3)	$T = \begin{bmatrix} z_1 & z_2 & z_3 \\ x_1 & \begin{bmatrix} 0.6 & 0.5 & 0.4 \\ 0.7 & 0.5 & 0.3 \end{bmatrix} \\ x_2 \end{bmatrix}$
(4)	$T = \begin{bmatrix} z_1 & z_2 & z_3 \\ x_1 & \begin{bmatrix} 0.6 & 0.5 & 0.5 \\ 0.7 & 0.7 & 0.7 \end{bmatrix} \\ x_2 \end{bmatrix}$

a.(1)

b.(2)

c.(3)

d.(4)

Answer c

46. What are the following sequence of steps taken in designing a fuzzy logic machine ?

a.Fuzzification → Rule evaluation → Defuzzification

b.Fuzzification → Defuzzification → Rule evaluation

c.Rule evaluation → Fuzzification → Defuzzification

d. Rule evaluation → Defuzzification → Fuzzification

Answer a

47. Let R and S be two fuzzy relations defined as follows. Then, the resulting relation, T, which relates elements of universe of X to elements of universe of Z using max-product composition is given by

$$R = \begin{bmatrix} y_1 & y_2 \\ x_1 & \begin{bmatrix} 0.6 & 0.4 \\ 0.7 & 0.3 \end{bmatrix} \\ x_2 \end{bmatrix} \text{ and } S = \begin{bmatrix} z_1 & z_2 & z_3 \\ y_1 & \begin{bmatrix} 0.8 & 0.5 & 0.1 \\ 0.0 & 0.6 & 0.4 \end{bmatrix} \\ y_2 \end{bmatrix}$$

	z ₁	z ₂	z ₃
(A)	$T = \frac{x_1}{x_2} \begin{bmatrix} 0.68 & 0.89 & 0.39 \\ 0.76 & 0.72 & 0.32 \end{bmatrix}$		
	z ₁	z ₂	z ₃
(B)	$T = \frac{x_1}{x_2} \begin{bmatrix} 0.68 & 0.89 & 0.39 \\ 0.72 & 0.76 & 0.32 \end{bmatrix}$		
	z ₁	z ₂	z ₃
(C)	$T = \frac{x_1}{x_2} \begin{bmatrix} 0.63 & 0.42 & 0.25 \\ 0.72 & 0.48 & 0.20 \end{bmatrix}$		
	z ₁	z ₂	z ₃
(D)	$T = \frac{x_1}{x_2} \begin{bmatrix} 0.05 & 0.35 & 0.14 \\ 0.04 & 0.28 & 0.16 \end{bmatrix}$		

- a. A
- b. B
- c. C
- d. D

Answer d

48. Let R and S be two fuzzy relations defined as follows.

Then, the resulting relation, T, which relates elements of universe x to elements of universe z using max-min composition is given by

$$R = \frac{x_1}{x_2} \begin{bmatrix} y_1 & y_2 \\ 0.6 & 0.4 \\ 0.7 & 0.3 \end{bmatrix} \text{ and } S = \frac{y_1}{y_2} \begin{bmatrix} z_1 & z_2 & z_3 \\ 0.8 & 0.5 & 0.1 \\ 0.0 & 0.6 & 0.4 \end{bmatrix}$$

$(A) \quad T = \frac{x_1}{x_2} \begin{bmatrix} z_1 & z_2 & z_3 \\ .5 & .7 & .5 \\ .8 & .8 & .8 \end{bmatrix}$	$(C) \quad T = \frac{x_1}{x_2} \begin{bmatrix} z_1 & z_2 & z_3 \\ .5 & .7 & .5 \\ .9 & .6 & .5 \end{bmatrix}$
$(B) \quad T = \frac{x_1}{x_2} \begin{bmatrix} z_1 & z_2 & z_3 \\ 0.7 & 0.6 & 0.5 \\ 0.8 & 0.6 & 0.4 \end{bmatrix}$	$(D) \quad T = \frac{x_1}{x_2} \begin{bmatrix} z_1 & z_2 & z_3 \\ 0.7 & 0.6 & 0.5 \\ 0.8 & 0.8 & 0.8 \end{bmatrix}$

- a. A
- b. B
- c. C
- d. D

Answer c

49. Compute the value of adding the following two fuzzy integers:

$$A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$$

$$B = \{(0.5,11), (1,12), (0.5,13)\}$$

Where fuzzy addition is defined as

$$\mu_{A+B}(z) = \max_{x,y} \min(\mu_A(x), \mu_B(y))$$

Then, $f(A+B)$ is equal to

- a. $\{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)\}$
- b. $\{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)\}$
- c. $\{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$
- d. $\{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$

Answer d

50. A perceptron has input weights $W_1 = -3.9$ and $W_2 = 1.1$ with threshold value $T = 0.3$. What output does it give for the input $x_1 = 1.3$ and $x_2 = 2.2$?

- a. -2.65
- b. -2.30
- c. 0
- d. 1

Answer c

51. Let A and B be two fuzzy integers defined as:

$$A = \{(1, 0.3), (2, 0.6), (3, 1), (4, 0.7), (5, 0.2)\}$$

$$B = \{(10, 0.5), (11, 1), (12, 0.5)\}$$

$$\mu_{A+B}(z) = \underset{x + y = z}{\oplus} (\mu_A(x) \otimes \mu_B(y))$$

$f(A+B)$ is _____ . [Note : $\oplus \equiv \max$
 $\otimes \equiv \min$]

Using fuzzy arithmetic operation given by

- a. $\{(11, 0.8), (13, 1), (15, 1)\}$
- b. $\{(11, 0.3), (12, 0.5), (13, 1), (14, 1), (15, 1), (16, 0.5), (17, 0.2)\}$
- c. $\{(11, 0.3), (12, 0.5), (13, 0.6), (14, 1), (15, 1), (16, 0.5), (17, 0.2)\}$
- d. $\{(11, 0.3), (12, 0.5), (13, 0.6), (14, 1), (15, 0.7), (16, 0.5), (17, 0.2)\}$

Answer d

52.

Let A be the set of comfortable houses given as follows. Then the set of comfortable and affordable houses is

$$A = \left\{ \frac{x_1}{0.8}, \frac{x_2}{0.9}, \frac{x_3}{0.1}, \frac{x_4}{0.7} \right\}$$

and B be the set of affordable houses

$$B = \left\{ \frac{x_1}{0.9}, \frac{x_2}{0.8}, \frac{x_3}{0.6}, \frac{x_4}{0.2} \right\}$$

- (A) $\left\{ \frac{x_1}{0.8}, \frac{x_2}{0.8}, \frac{x_3}{0.1}, \frac{x_4}{0.2} \right\}$
- (B) $\left\{ \frac{x_1}{0.9}, \frac{x_2}{0.9}, \frac{x_3}{0.6}, \frac{x_4}{0.7} \right\}$
- (C) $\left\{ \frac{x_1}{0.8}, \frac{x_2}{0.8}, \frac{x_3}{0.6}, \frac{x_4}{0.7} \right\}$
- (D) $\left\{ \frac{x_1}{0.7}, \frac{x_2}{0.7}, \frac{x_3}{0.7}, \frac{x_4}{0.9} \right\}$

- a. A
- b. B
- c. C
- d. D

Answer a

53. Support of a fuzzy set given below, within a universal set X is given as

$$A = \left\{ \frac{x_1}{0.2}, \frac{x_2}{0.15}, \frac{x_3}{0.9}, \frac{x_4}{0.95}, \frac{x_5}{0.15} \right\}$$

- (A) $\left\{ \frac{x_1}{0.15}, \frac{x_2}{0.15}, \frac{x_3}{0.15}, \frac{x_4}{0.15}, \frac{x_5}{0.15} \right\}$
- (B) $\left\{ \frac{x_1}{0.95}, \frac{x_2}{0.95}, \frac{x_3}{0.95}, \frac{x_4}{0.95}, \frac{x_5}{0.95} \right\}$
- (C) $\{x_3, x_4\}$
- (D) $\{x_1, x_2, x_3, x_4, x_5\}$

- a. A
- b. B

- c. C
- d. D

Answer d

54. In a single perceptron, the updatation rule of weight vector is given by

- a. $w(n + 1) = w(n) + \eta[d(n) - y(n)]$
- b. $w(n + 1) = w(n) - \eta[d(n) - y(n)]$
- c. $w(n + 1) = w(n) + \eta[d(n) - y(n)] * x(n)$
- d. $w(n + 1) = w(n) - \eta[d(n) - y(n)] * x(n)$

Answer c

55. A fuzzy set A on R is iff $A(\lambda x_1 + (1 - \lambda)x_2) \geq \min [A(x_1), A(x_2)]$ for all $x_1, x_2 \in R$ and all $\lambda \in [0, 1]$, where min denotes the minimum operator.

- a. Support
- b. α -cut
- c. Convex
- d. Concave

Answer c

56. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

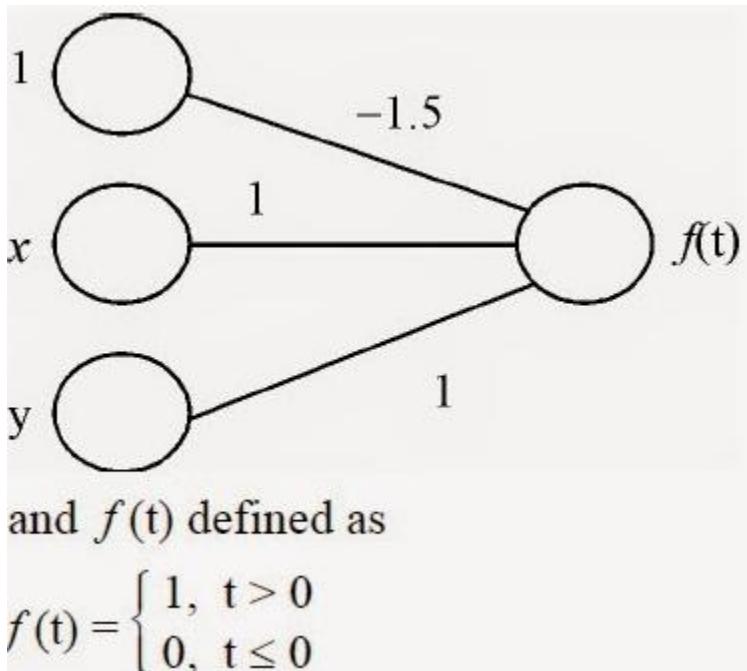
$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cup B)'(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.1, 0.5, 0.4, 0.2, 0.2\}$
- d. $\{0.1, 0.5, 0.4, 0.2, 0.3\}$

Answer c

57. Consider a single perception with weights as given in the following figure. The perception can solve



- a.OR problem
- b.AND problem
- c.XOR problem
- d.All of the above

Answer b

58 Which of the following is not true regarding the principles of fuzzy logic ?

- A Fuzzy logic is a concept of 'certain degree'.
- B Fuzzy logic follows the principle of Aristotle and Buddha.
- C Fuzzy logic is a concept of 'certain degree'.
- D. Boolean logic is a subset of fuzzy logic.

Answer B

59 What are the following sequence of steps taken in designing a fuzzy logic machine?

Fuzzification->Rule evaluation->Defuzzification

Rule evaluation->Fuzzification->Defuzzification

Fuzzy Sets->Defuzzification->Rule evaluation

Defuzzification->Rule evaluation->Fuzzification

Answer A

60. Generalizations of ordinary fuzzy sets which involve fuzzy sets defined within a universal set whose elements are ordinary fuzzy sets constitute a -----fuzzy set.

- a) Level 1 b) Level 2 3) Level 3 4) Level 4

Answer b

61. Let $h(A)$ denote the height of a fuzzy set A. A is called a normal fuzzy set if

- a) $h(A)=0$ b) $h(A)=1$ c) $h(A)<1$ d) $h(A)>1$

Answer b

62. Let A be a fuzzy set. Then 1-cut of A is usually called

- a) Support of A b) height of A c) Core of A d) cut of A

Answer c

63. The cut of the complement of a fuzzy set A is always same as the complement of the

- a) Strong cut of A b) strong cut of c) Strong (-) cut of A d) Strong (1-) cut of A c

Answer c

64. The boundary condition satisfied by the standard fuzzy complement is

- a) $c(0)=1$ and $c(1)=1$ b) $c(0)=0$ and $c(1)=1$ c) $c(0)=0$ and $c(1)=0$ d) $c(0)=1$ and $c(1)=0$

Answer d

65. Involutive property of the standard fuzzy complement c , for each $a \in [,]$ is ----

- a) $c(c(a))=c(a)$ b) $c(c(a))=1$ c) $c(c(a))=0$ d) $c(c(a))=a$

Answer d

66. Each fuzzy complement has at most -----equilibrium.

a) 1 b) 2 c) 3 d) None of these

Answer a

66. Yager Class of fuzzy complement is defined as

a) $() = (-)$ b) $() = (-)$ c) $() = (-)$ d) None

Answer c

67. Equilibrium of a fuzzy complement c is a solution of the equation

a) $c(a)-a=1$ b) $c(a)-a=2$ c) $c(a)=2a$ d) $c(a)-a=0$

Answer d

68. For $a \in [,]$, the boundary condition for the t-norm function i is

a) $i(a,1)=0$ b) $i(a,0)=a$ c) $i(a,1)=a$ d) $i(a,0)=1$

Answer c

69. For standard fuzzy intersection, which of the following hold?

a) $i(a,b)=\min(a,b)$ b) $i(a,b)=ab$ c) $i(a,b)=a-b$ d) None

Answer a

70. Example of an idempotent t-norm is

a) Algebraic Product b) Bounded Difference c) Drastic intersection d) Standard intersection

Answer d

71. The most adequate choice for an upper bound for the drastic intersection is

a) $i(a,b)$ b) $\min(a,b)$ c) a d) All the three options given.

Answer a

72. Equilibrium value for the standard fuzzy complement is -----

a) 0 b) 0.5 c) 1 d) 0.4

Answer b

73. The set Q of rational numbers is

a) Countably finite b) Countably infinite c) Uncountably infinite d) None.

Answer b

74. A continuous super idempotent t- conorm is called ----

- a) Strictly Archimedean b) Archimedean c) t-norm d) None.

Answer b

75. Back propagation is a learning technique that adjusts weights in the neural network by propagating weight changes.

- a .Forward from source to sink
- b. Backward from sink to source
- c. Forward from source to hidden nodes
- d. Backward from sink to hidden nodes

Answer b

76. Identify the following activation function :

$$\phi(V) = Z + \frac{1}{1 + \exp(-x * V + Y)},$$

Z, X, Y are parameters

- a.Step function
- b.Ramp function
- c.Sigmoid function
- d.Gaussian function

Answer c

77. An artificial neuron receives n inputs $x_1, x_2, x_3, \dots, x_n$ with weights w_1, w_2, \dots, w_n attached to the input links. The weighted sum _____ is computed to be passed on to a non-linear filter Φ called activation function to release the output.

- a. $\sum w_i$
- b. $\sum x_i$
- c. $\sum w_i + \sum x_i$
- d. $\sum w_i * x_i$

Answer d

78. A neuron with 3 inputs has the weight vector $[0.2 \ -0.1 \ 0.1]^T$ and a bias $\theta = 0$. If the input vector is $X = [0.2 \ 0.4 \ 0.2]^T$ then the total input to the neuron is:

- a.0.20

b.1.0

c.0.02

d.-1.0

Answer c

79 Which of the following neural networks uses supervised learning?

- (A) Multilayer perceptron
 - (B) Self organizing feature map
 - (C) Hopfield network
- a.(A) only
- b.(B) only
- c.(A) and (B) only
- d.(A) and (C) only

Answer a

80 What Is Fuzzy Inference Systems?

- A. The process of formulating the mapping from a given input to an output using fuzzy logic
- B. Changing the output value to match the input value to give it an equal balance
- C. Having a larger output than the input
- D. Having a smaller output than the input

Answer A

81 What Are The Two Types Of Fuzzy Inference Systems?

- A.Model-Type and System-Type
- B.Momfred-Type and Semigi-Type
- C.Mamdani-Type and Sugeno-Type
- D.Mihni-Type and Sujgani-Type

Answer C

82 .Where Has Fuzzy Inference Systems Been Implemented?

- A.Wireless services, heat control and printers

- B.Restrict power usage, telephone lines and sort data
- C. Simulink, boiler and CD recording
- D. Automatic control, decision analysis and data classification

Answer D

83. What Is Another Name For Fuzzy Inference Systems?

- A. Fuzzy Expert System
- B. Fuzzy Modelling
- C. Fuzzy Logic Controller
- D. All of the above

Answer D

84. Mamdani's Fuzzy Inference Method Was Designed To Attempt What?

- A. Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.
- B. Control a television and remote combination by synthesising a set of linguistic control rules obtained from experienced human operations.
- C. Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.
- D. Control a air craft and feul level combination by synthesising a set of linguistic control rules obtained from experienced human operations.

Answer C

85. What Is The First Step Of Fuzzy Logic Toolbox?

- A. Fuzzification of the input variables
- B. Defuzzification
- C. Application of the fuzzy operator (AND or OR) in the antecedent
- D. Aggregation of the consequents across the rules

Answer A

867. What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?

- A. The input is a single truth value and the output has two or more values
- B. The input is a value greater than one and the output is a value less than the input
- C. The input and output have both the same values
- D. The input has two or more values and the output has a single truth value

Answer D

87. What Is The Equation For Probabilistic?

- A. Prob σ r(a,b) = a-b + ab
- B. Prob σ r(a,b) = ab + ab
- C. Prob σ r(a,b) = a+b - ab
- D. Prob σ r(a,b) = a/b x ab

Answer C

88. What Is The Input And Output Of Step 3 - Apply Implication Method?

- A. Input is a fuzzy set but the output is a whole value
- B. Input is a whole value but the output can be a fuzzy set
- C. Input and output have the same value
- D. Input is a smaller value than the output value

Answer B

89 . What Is The Purpose Of Aggregation?

- A. To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs
- B. To gather all the possible inputs and use the average to gain an output
- C. To gather all the different fuzzy set outputs and average them out to get a single value
- D. To subtract all the output fuzzy set values from the input values

Answer A

S

Unit No.	Sr. No.	Question		Option 1	Option 2	Option 3	Option 4	Answer
1	1	Core of soft Computing is-		Fuzzy Computing, Neural Computing, Genetic Algorithms	Fuzzy Networks and Artificial Intelligence	Artificial Intelligence and Neural Science	Neural Science and Genetic Science	1
	2	Who initiated the idea of Soft Computing		Charles Darwin	Lofti A Zadeh	Rechenberg	Mc_Culloch	2
	3	In supervised learning		classes are not predefined	classes are predefined	classes are not required	classification is not done	2
	4	Artificial neural network used for		Pattern Recognition	Classification	Clustering	All of these	4
	5	A Neural Network can answer		For Loop questions	what-if questions	IF-The-Else Analysis Questions	None of these	2
	6	Hard computing produce		precise solutions	fuzzy solution	approximate solution	None of these	1
	7	Hard computing is strictly		Parallel	sequential	Both	None of these	2
	8	Principle component of soft computing is		Neural Network	Fuzzy Logic	Genetic Algorithms	All of the mentioned	4
	9	Which is supervised learning		clustering	regression	association	dimensionality reduction	2
	10	In supervised learning, training set of data includes		Input	Output	Both input and output	None	3
2	11	The truth values of traditional set theory is _____ and that of fuzzy set is _____		Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	1
	12	Fuzzy – Genetic Hybrid system is a		Fuzzy logic in parallel with the Genetic algorithm	Fuzzy logic controlled Genetic algorithm	Genetic algorithm controlled Fuzzy logic	None of the above	2
	13	Which of the following is not a hybrid system?		Embedded hybrid system	Sequential hybrid system	Auxiliary hybrid system	Parallel hybrid system	4
	14	Command to start matlab fuzzy toolbox is		fis	fuzzy	fuzzybox	fuzzytool	2
	15	In terms of computing we have		antecedent	consequent	mapping function	All of the mentioned	4
	16	Fuzzy logic is a form of		Two valued logic	Many valued logic	Crisp set logic	Binary set logic	2
	17	Traditional set theory is also known as Crisp set theory.		True	False			1
3	18	In a Fuzzy set a prototypical element has a value		1	0	Infinite	Not Defined	1
	19	Which of the following is a type of Membership function?		Triangular	Trapezoidal	Sigmoid	All of the above	4
	20	Which of the following is not a type of Membership function?		S-shape	Bell shape	Truncated Gaussian	None of these	4
	21	What is the independent variable of fuzzy output?		Maturity	Membership	Generic Element	None of these	1
	22	Fuzzy Implication is also known as		Fuzzy logic	Fuzzy IF-THEN rule	Fuzzy expert system	None of these	2
	23	Ways to compute fuzzy rule A-> B is		A coupled with B	A entails B	Both	None of these	3
	24	System is used for both MISO and MIMO		Mamdani	Sugeno	Takagi	None of these	1

	25	Which is not the diffuzzification method		Centre of gravity method	Centre of sum method	Centre of perimeter method	Centre of area method	3
	26	Which of this is not a fuzzy controller		Domestic Shower Controller	Water purifier controller	Train brake power controller	Angular JS Controller	4
4	27	In Evolutionary algorithm _____ operator is prime operator		selection	mutation	recombination	initialization	2
	28	In evolutionary algorithm selection is _____		deterministic	probabilistic	both	None of these	1
	29	Evolutionary Algorithm deals with self adaptation		Yes	No			1
	30	Problem domain of Evolutionary Algorithm is		discrete optimization	continuous optimization	combinatorial optimization	None of these	2
	31	Evolutionary Algorithm solves _____ problem		NP-complete	NP-hard	P	None of these	2
	32	Category of EP based on scaling function		Non adaptive	Non Dynamic	Non self-adaptive	Adaptive	1
	33	Evolutionary algorithm differs from genetic algorithm as it does not have		Crossover	mutation	Selection	Reproduction	1
	34	Evolutionary algorithms classified as		Evolutionary Programming	Evolutionary Strategies	Genetic Algorithms	All of the mentioned	4
	35	compared to Traditional approach EA takes _____ CPU time		Large	Small	Equal	None of these	1
	36	Genetic Algorithm is superset of Evolutionary Algorithm		True	False			2
5	37	Optimization in GA is		Metaheuristic	Stochastic	Discrete	Continuous	3
	38	In GA individual memory is there		Yes	No			2
	39	In GA individual operator is		Crossover point	Mutation	pbest	gbest	2
	40	In _____ each individual survives for exactly one generation		Generation Model	Steady state Model	Population Model	Tournament Model	1
	41	Which GA operation is computationally most expensive?		Initial population creation	Selection of sub-population for mating	Reproduction to produce next generation	Convergence testing	3
	42	Which of these are adaptive heuristic search algorithms		evolutionary algorithms	genetic algorithms	Binary search	None of these	2
	43	In Genetic algorithm string operate with		Real values	binary number	Decimal Number	None of these	2
	44	Parallel GA		Generational	Steady state	Distributed	None of these	3
	45	Examples of stopping criteria in GA can be		Generation limit	No change in fitness	Elapsed time	All of the mentioned	4
	46	Category of GBML systems		Pittsburg Approach	Divide n conquer approach	Michi Approach	None of these	1
	47	PGA is		Parallel Genetic Algorithm	Proportional Genetic Algorithm	Perceptron based Genetic Algorithm	None of these	1
	48	Swarm intelligence (SI) introduced by		Gerardo Beni and Jing Wang	Gerardo Beni and James Gosling	George M and Jing Wang	None of these	1
	49	The application of swarm principles to robots is called		swarm robotics	swarm behaviour	robotics	None of these	1
	50	Methods of Swarm intelligence is		Particle swarm optimization	Ant colony optimization	Both	None of these	3
	51	PSO stands for		Particle Swarm Optimization	Particle Selection Optimization	Portion Swarm Optimization	Portion Selection Optimization	1
	52	ACO stands for		Analytical Colony Optimization	Ant Colony Optimization	Ant Coding optimization	None of these	2

6	53	Each particle of swarm maintains record of		pbest	gbest	Both pbest, gbest	None of these	3
	54	pbest is		personal best	personal based	proper based	proper best	1
	55	gbest is		global best	general best	global based	general based	1
	56	Particle has		fitness value	velocity	pbest	All of the mentioned	4
	57	In each iteration every particle in swarm we update		velocity	gbest	Both velocity ,gbest	None of these	3
	58	In PSO important thing is		Communication	Learning	Both	None of these	3
	59	PSO topology		Star	Ring	Adaptive random	All of the mentioned	4
	60	"The train is running fast". Here 'fast' can be represented by		Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	None of these	1
	61	_____ is/are the way/s to represent uncertainty.		Fuzzy Logic	Probability	Entropy	All of the mentioned	4

Unit No.	Sr. No.	Question		Option 1	Option 2	Option 3	Option 4	Answer
1	1	In artificial Neural Network interconnected processing elements are called		nodes or neurons	weights	axons	Soma	1
	2	Neuron can send _____ signal at a time.		Multiple	One	Two	Three	2
	3	Example of hard computing		Robot movement	Hand written character recognition	money allocation	searching problem	4
	4	For the same size of training data as input, the fastest learning technique is		Supervised training with gradient descent error correction	Supervised training with stochastic method	Unsupervised training without error calculation	Unsupervised training with Hebbian method.	1
	5	In case of layer calculation, the maximum time involved in		Input layer computation.	Hidden layer computation.	Output layer computation.	Equal effort in each layer.	4
	6	Any soft-computing methodology is characterized with		precise solutions	control actions are unambiguous and accurate	Control action is formally defined	algorithm which can easily adapt with the change of dynamic environment	4
2	7	An equivalence between Fuzzy vs. Probability to that of Prediction vs. Forecasting is		Fuzzy=Prediction	Fuzzy= Forecasting	Probability=Forecasting	None of these	2
	8	Which of the following cannot be stated using fuzzy logic?		Color of an apple	Height of a person	Date of birth of a student	Speed of a car	3
	9	Where is the minimum criterion used ?		When there is an AND operation	When there is an OR operation	In De-Morgan's theorem	None of these	1
3	10	How is Fuzzy Logic different from conventional control methods?		IF and THEN Approach	FOR Approach	WHILE Approach	DO Approach	1
	11	The membership functions are generally represented in		Tabular Form	Graphical Form	Mathematical Form	Logical Form	2
	12	Three main basic features involved in characterizing membership function are		Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	Core, Support , Boundary	Weighted Average, center of Sums, Median	3
	13	Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.		True	False			1
	14	Membership function can be thought of as a technique to solve empirical problems on the basis of		knowledge	examples	learning	experience	4
	15	The region of universe that is characterized by complete membership in the set is called		Core	Support	Boundary	Fuzzy	1
	16	A fuzzy set whose membership function has no members whose membership value is 1		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	1
	17	If if x is A then y is B else y is C . The output of the given fuzzy rule is		a fuzzy set	a crisp set	a fuzzy relation	a membership function	3
	18	If if x is A then y is B else y is C . Then relation is equivalent to		$(A \times B) + (B \times C)$	$(A \times B) \cup (A^- \times C)$	$(A \times B) \rightarrow (B \times C)$	$(A \times C) \cup (B \times C)$	2
	19	Fuzzy logic is usually represented as		IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	2
	20	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____		Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	None of these	1

	21	Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.		AND	OR	NOT	All of the mentioned	4
3	22	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzzy Variable	None of the mentioned	1
	23	In Lamda-cut method the value of λ can be		Greater than 10	Between 1 and 10	Between 0 and 1	Any value	3
	24	If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.		with the median of all the area	with the mean of all the area	with the largest area	with the smallest area	3
	25	Which of the following is not a centroid method?		Centre of gravity method (CoG)	Centre of sum method (CoS)	Centre of area method (CoA)	Centre of Mass (CoM)	4
	26	Let A be a fuzzy set. Then 1-cut of A is usually called		support	height	core	alpha-cut	3
	27	If Z is a set of elements with a generic element z, i.e. Z = {z}, then this set is called _____		Universe set	Universe of discourse	Derived set	None of these	2
	28	A fuzzy convexity is set whose membership values are strictly monolithically		increasing	decreasing	increasing and then decreasing	All of the mentioned	4
	29	Fuzzy logic is :		Used to respond to questions in a humanlike way	A new programming language used to program animation	The result of fuzzy thinking	A term that indicates logical values greater than one	1
	30	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-Type and Semigi-Type	Mamdani-Type and Sugeno-Type	Mihni-Type and Sujgani-Type	3
	31	Where Has Fuzzy Inference Systems Been Implemented?		Wireless services, heat control and printers	Wireless services, heat control and printers	Simulink, boiler and CD recording	Automatic control, decision analysis and data classification	4
4	32	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert System	Fuzzy Modelling	Fuzzy Logic Controller	All of the mentioned	4
	33	An expert system differs from a database program in that only an expert system:		contains declarative knowledge	contains procedural knowledge	features the retrieval of stored information	expects users to draw their own conclusions	2
	34	Motivation for EA is		Mathematical based properties	Natural selection	Gradient properties	None of these	2
	35	Genetic algorithms are heuristic methods that do not guarantee an optimal solution to a problem.		TRUE	FALSE			1
	36	How many genes will be used in a chromosome of each individual if the number of cities is 10?		5	10	100	4	2
	37	Is it advisable to apply genetic algorithm for all kinds of optimization problem		Yes	No			2
	38	Roulette wheel selection scheme is preferable when		Fitness values are uniformly distributed	Fitness values are non-uniformly distributed	Needs low selection pressure	Needs high population diversity	1
	39	What GA encoding scheme suffers from Hamming cliff problem?		Binary coded GA	Real coded GA	Order GA	Tree coded GA	1
	40	Which selection strategy is susceptible to a high selection pressure and low population diversity?		Roulette-wheel selection.	Rank based selection.	Tournament selection.	All of the mentioned	1
	41	Which of the following is not a mutation operation in real coded GA?		Flipping	Random mutation.	Polynomial mutation.	All are mutation operation in real coded GA	1
5	42	Tournament Selection has		Low population diversity and moderate selection pressure	High population diversity and Moderate selection pressure	Moderate population diversity and high selection pressure	High population diversity and low selection pressure	3
	43	If selection pressure is HIGH, which one is FALSE		The search focuses only on good individuals (in terms of fitness) at the moment	It loses the population diversity.	Lower rate of convergence.	Leads to pre-mature convergence of the solution to a sub-optimal solution.	3
	44	Which of the following is a fitness scaling approach?		Linear scaling	Sigma scaling	Power law scaling	All of the mentioned	4
	45	In genetic algorithm, the mutation is a genetic operator used to maintain-		Genetic Diversity	Linear scaling	Sigma scaling	None of these	1
	46	Important aspect of GA		Definition of objective function	Implementation of genetic representation	Implementation of genetic operators	All of the mentioned	4
	47	Which of the following are stochastic algorithms (i.e., algorithms which for the same input can produce different output)?		Genetic Algorithms	Particle Swarm Optimization	Ant Colony Optimization	All of the mentioned	4
	48	Swarm intelligence (SI) is		collective behavior of decentralized, self-organized systems, natural or artificial	fuzzy logic system	crisp logic concept	None of these	1
	49	In PSO partical move towards global optimum step by step that is known as -		progress	loops	iteration	None of these	3
	50	In each iteration every particle in swarm gets_____ chance to move towards global optimum		1	2	3	Many	1

Unit No.	Sr. No.	Question		Option 1	Option 2	Option 3	Option 4	Answer
1	1	Conventional Artificial Intelligence is different from soft computing in the sense		Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data	Both (a) and (b)	None of the above	3
	2	ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems		TRUE	FALSE			1
2	3	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise and accurate results.	Artificial neural network gives accurate result, but fuzzy logic does not.	In each, no precise mathematical model of the problem is required	Fuzzy gives exact result but artificial neural network does not.	3
	4	Both fuzzy logic and artificial neural network are soft computing techniques because,		Both gives precise and accurate results.	Artificial neural network gives accurate result but fuzzy logic does not.	In each, no precise mathematical model of the problem is required.	Fuzzy gives exact result but artificial neural network does not.	3
	5	In which of the following, one technology calls the other technology as subroutine to process or manipulate information needed		Embedded hybrid system	Sequential hybrid system	Auxiliary hybrid system	Parallel hybrid system	3
	6	Why are linearly separable problems of interest to neural network researchers?		Because they are the only class of problems that a network can solve successfully	Because they are the only mathematical functions that are continuous	Because they are the only mathematical functions you can draw	Because they are the only class of problems a perceptron can solve successfully	2
	7	Fuzzy logic is usually represented as-		IF-THEN-ELSE rules	IF-THEN rules	Both a & b	None of the mentioned	2
3	8	A fuzzy set A is closed if:		$\lim_{x \rightarrow -\infty} \mu_A(x) = 1$ and $\lim_{x \rightarrow +\infty} \mu_A(x) = 1$	$\lim_{x \rightarrow -\infty} \mu_A(x) = 0$ $\lim_{x \rightarrow +\infty} \mu_A(x) = 0$	$\lim_{x \rightarrow -\infty} \mu_A(x) = 0$ and $\lim_{x \rightarrow +\infty} \mu_A(x) = 1$	$\lim_{x \rightarrow -\infty} \mu_A(x) = \lim_{x \rightarrow +\infty} \mu_A(x) = 1$	2
	9	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$ where x belongs to A. Then the fuzzy set A is called normal when		$h(A)=0$	$h(A)<0$	$h(A)=1$	$h(A)>1$	3
	10	For $k>1$, which of the following concept can be used to generate other linguistic hedge		Concentration and Dilation	Dilation	Concentration	None of the above	3
	11	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	2
	12	What are the applications of Fuzzy Inference Systems?		Wireless services, heat control and printers	Restrict power usage, telephone lines and sort data	Simulink, boiler and CD recording	Automatic control, decision analysis and data classification	4
	13	Which of the following is not true regarding the principles of fuzzy logic ?		Fuzzy logic follows the principle of Aristotle and Buddha	Japan is currently the most active users of fuzzy logic	Fuzzy logic is a concept of 'certain degree'	Boolean logic is a subset of fuzzy logic	1
	14	Suppose, a fuzzy set Young is defined as follows Young = $(10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$ Then the crisp value of Young using MoM method is		20	25	30	35	2
4	15	What Is Fuzzy Inference Systems?		The process of formulating the mapping from a given input to an output using fuzzy logic	The process of formulating the mapping from a given input to an output using fuzzy logic	Having a larger output than the input	Having a smaller output than the input	1
	16	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a television and remote combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and feul level combination by synthesising a set of linguistic control rules obtained from experienced human operations	3
	17	$R=(AXB)U(\bar{A}XY)$ is		Zadeh's Max Product rule for If x is A then y is B else y is C	Zadeh's Max Min rule for If x is A then y is B	Zadeh's Max Product rule for If x is A then y is B else y is C	Zadeh's Max Min rule for If x is A then y is B	4
	18	Sequence of steps in EA		initialization-> selection->mutation->crossover->termination	initialization-> selection->crossover->termination	initialization-> selection->crossover->mutation->termination	None of these	3
	19	How many genes will be in the alphabet of the algorithm?		$n^{*(n-1)/2}$	$n^{*(n+1)/2}$	$n^{*(n-2)/2}$	$n^{*(n+2)/2}$	1

	20	Which of the following is not true for Genetic algorithms?		It is a probabilistic search algorithm	It is guaranteed to give global optimum solutions	If an optimization problem has more than one solution, then it will return all the solutions	It is an iterative process suitable for parallel programming	2
	21	Which one of the following is not necessarily be considered as GA parameters?		the population size.	the obtainable accuracy	the mutation probability	the average fitness score	4
	22	Which of the following optimization problem(s) can be better solved with Order GA?		0-1 Knapsack problem	Travelling salesman problem	Job shop scheduling problem	Optimal binary search tree construction problem	2
5	23	If crossover between chromosomes in search space does not produce significantly different offspring, what does it imply? (if offspring consist of one half of each parent) (i) The crossover operation is not successful. (ii) Solution is about to be reached. (iii) Diversity is so poor that the parents involved in the crossover operation are similar. (iv) The search space of the problem is not ideal for GAs to operate		ii, iii & iv only	ii, iii only	i, iii & iv only	All of the mentioned	2
	24	In Rank-based selection scheme, which of the following is not correct		The % area to be occupied by an individual , is given by average of sumation of elements	Two or more individuals with the same fitness values should have the same rank.	Individuals are arranged in a descending order of their fitness values.	The proportionate based selection scheme is followed based on the assigned rank.	3
	25	Real Coded GA flow is-		Random mutation-Polynomial mutation	Polynomial mutation-Random mutation	Flipping-Random mutation- Polynomial mutation	None	1
	26	Breeding in GA flow is-		Create a mating pool-Select a pair-Reproduce	Select a pair-Create a mating pool-Reproduce	Reproduce-Create a mating pool- Select a pair	None	1
	27	Binary Coded GA flow is-		Flipping-Interchanging-Reversing	Reversing- Flipping-Interchanging-	Interchanging-Reversing Flipping	None	1
	28	Which of the following comparison is true?		In the event of restricted accessto information, GAs win out in that they require much	Under any circumstances, GAs always outperform other algorithms.	The qualities of solutions offered by GAs for any problems are always better than	GAs could be applied to any problem, whereas certain algorithms are applicable to	1
	29	Premature convergence of PSO is		Once PSO traps in global optimum, it is difficult to jump out of global optimum	Once PSO traps in local optimum, it is difficult to jump out of local optimum	Once PSO traps in local optimum, it is difficult to jump out of global optimum	Once PSO traps in global optimum, it is difficult to jump out of local optimum	2
6	30	Takagi-Sugeno approach to FLC design is computationally more expensive compared to Mamdani approach because		Mamdani approach considers a less number of rules in fuzzy rule base	Searching a rule in Mamdani approach is simple and hence less time consuming	Takagi-Sugeno approach consider a large number of rules in fuzzy rule base	Computation of each rule in Takagi-Sugeno approach is more time consuming	4

SCOA Unit I MCQ

- 1. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.**
A.True
B.False
- 2. The membership functions are generally represented in**
A.Tabular Form
B.Graphical Form
C.Mathematical Form
D.Logical Form
- 3. Membership function can be thought of as a technique to solve empirical problems on the basis of**
A.knowledge
B.examples
C.learning
D.experience
- 4. Three main basic features involved in characterizing membership function are**
A.Intuition, Inference, Rank Ordering
B.Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core , Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.sub normal fuzzy sets

B.normal fuzzy set

C.convex fuzzy set

D.concave fuzzy set

7. In a Fuzzy set a prototypical element has a value

A.1

B.0

C.infinite

D.Not defined

- 8. A fuzzy set wherein no membership function has its value equal to 1 is called**
- A.**normal fuzzy set
B.Subnormal fuzzy set.
C.convex fuzzy set
D.concave fuzzy set
- 9. A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe**
- A.**convex fuzzy set
B.concave fuzzy set
C.Non concave Fuzzy set
D.Non Convex Fuzzy set
- 10. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.**
- A.**Convex Fuzzy Set
B.Non convex fuzzy set
C.Normal Fuzzy set
D.Sub normal fuzzy set
- 11. The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to**

A.infinite

B.1

C.0

D.0.5

12. Fuzzy Computing

A.doesn't deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

B.False

14. Artificial neural network used for

A.Pattern Recognition

B.Classification

C.Clustering

D.All of these

15. A Neural Network can answer

A.For Loop questions

B.what-if questions

C.IF-The-Else Analysis Questions

D.None of these

16. Ability to learn how to do tasks based on the data given for training or initial experience

A.Self Organization

B.Adaptive Learning

C.Fault tolerance

D.Robustness

17. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

A.Adaptive Learning

B.Self Organization

C.What-If Analysis

D.Supervised Learning

18. In artificial Neural Network interconnected processing elements are called

A.nodes or neurons

B.weights

C.axons

D.Soma

19. Each connection link in ANN is associated with _____ which has information about the input signal.

A.neurons

B.weights

C.bias

D.activation function

20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.True

B.False

21. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.Weight

B.activation or activity level of neuron

C.Bias

D.None of these

22. Neuron can send _____ signal at a time.

- A.**multiple
- B.**one
- C.**none
- D.**any number of

23. Artificial intelligence is

- A.**It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations
- B.**Computational procedure that takes some value as input and produces some value as output.
- C.**Science of making machines performs tasks that would require intelligence when performed by humans
- D.**None of these

24. Expert systems

- A.**Combining different types of method or information
- B.**Approach to the design of learning algorithms that is structured along the lines of the theory of evolution
- C.**an information base filled with the knowledge of an expert formulated in terms

of if-then rules

- D.**None of these

25. Falsification is

- A.**Modular design of a software application that facilitates the integration of new modules
- B.**Showing a universal law or rule to be invalid by providing a counter example
- C.**A set of attributes in a database table that refers to data in another table
- D.**None of these

26. Evolutionary computation is

- A.**Combining different types of method or information
- B.**Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.
- C.**Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.
- D.**None of these

27. Extendible architecture is

- A.**Modular design of a software application that facilitates the integration of new modules
- B.**Showing a universal law or rule to be invalid by providing a counter example
- C.**A set of attributes in a database table that refers to data in another table

D.None of these

28. Massively parallel machine is

A.A programming language based on logic

B.A computer where each processor has its own operating system, its own memory, and its own hard disk

C.Describes the structure of the contents of a database.

D.None of these

29. Search space

A.The large set of candidate solutions possible for a problem

B.The information stored in a database that can be, retrieved with a single query.

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

30. $n(\log n)$ is referred to

A.A measure of the desired maximal complexity of data mining algorithms

B.A database containing volatile data used for the daily operation of an organization

C.Relational database management system

D.None of these

31. Perceptron is

- A.**General class of approaches to a problem.
- B.**Performing several computations simultaneously
- C.**Structures in a database those are statistically relevant
- D.**Simple forerunner of modern neural networks, without hidden layers

32. Prolog is

- A.**A programming language based on logic
- B.**A computer where each processor has its own operating system, its own memory, and its own hard disk
- C.**Describes the structure of the contents of a database
- D.**None of these

33. Shallow knowledge

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be, retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

34. Quantitative attributes are

- A.**A reference to the speed of an algorithm, which is quadratically dependent on the size of

the data

B.Attributes of a database table that can take only numerical values

C.Tools designed to query a database

D.None of these

35. Subject orientation

A.The science of collecting, organizing, and applying numerical facts

B.Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.None of these

36. Vector

A.It do not need the control of the human operator during their execution

B.An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.The validation of a theory on the basis of a finite number of examples

D.None of these

37. Transparency

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

38. Core of soft Computing is

- A.**Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.**Fuzzy Networks and Artificial Intelligence
- C.**Artificial Intelligence and Neural Science
- D.**Neural Science and Genetic Science

39. Who initiated the idea of Soft Computing

- A.**Charles Darwin
- B.**Lofti A Zadeh
- C.**Rechenberg
- D.**Mc_Culloch

40. Fuzzy Computing

- A.**mimics human behaviour
- B.**doesnt deal with 2 valued logic
- C.**deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.**All of the above

41. Neural Computing

- A.**mimics human brain
- B.**information processing paradigm
- C.**Both (a) and (b)
- D.**None of the above

42. Genetic Algorithm are a part of

- A.**Evolutionary Computing
- B.**inspired by Darwin's theory about evolution - "survival of the fittest"
- C.**are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D.**All of the above

43. What are the 2 types of learning

- A.**Improvised and unimprovised
- B.**supervised and unsupervised
- C.**Layered and unlayered
- D.**None of the above

44. Supervised Learning is

- A.**learning with the help of examples
- B.**learning without teacher
- C.**learning with the help of teacher
- D.**learning with computers as supervisor

45. Unsupervised learning is

- A.**learning without computers
- B.**problem based learning

C.learning from environment

D.learning from teachers

46. Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

47. In supervised learning

A.classes are not predefined

B. classes are predefined

C.classes are not required

D. classification is not done

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

	D .experience	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intuition, Inference, Rank Ordering B.Fuzzy Algorithm, Neural network, Genetic Algorithm C.Core, Support , Boundary D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core B.Support C.Boundary D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

	B. normal fuzzy set C. convex fuzzy set D. concave fuzzy set	
7.	In a Fuzzy set a prototypical element has a value A. 1 B. 0 C. infinite D. Not defined	A
8.	A fuzzy set wherein no membership function has its value equal to 1 is called A. normal fuzzy set B. subnormal fuzzy set. C. convex fuzzy set D. concave fuzzy set	B
9.	A fuzzy set has a membership function whose membership values	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesnt deal with 2 valued logic</p>	D

	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	Defuzzification is done to obtain a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above	a
13.	“The train is running fast”. Here ‘fast’ can be represented by a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned	a
14.	Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$ Then the crisp value of Young using MoM method is a) 25 b) 20 c) 35 d) 50	a
15.	f the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value. a) with the median of all the area	c

	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)\text{complement} \neq (A\lambda)\text{complement}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is c then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

	d) None of the above	
26.	Fuzzy logic is a form of a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic	Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.
27.	Traditional set theory is also known as Crisp Set theory. a) True b) False	Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set. 3. The truth values of traditional set theory is _____ and that of fuzzy set is _____
28.	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Answer: a Explanation: Refer the

	a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1	definition of Fuzzy set and Crisp set.
29.	How many types of random variables are available? a) 1 b) 2 c) 3 d) 4	Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.
30.	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____. a) Fuzzy Set b) Crisp Set	Answer: a Explanation: Fuzzy logic deals with linguistic variables.
31.	The values of the set membership is represented by a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c	Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.
32.	What is meant by probability density function?	d

	a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables	
33.	Which of the following is used for probability theory sentences? a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned	Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.
34.	Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following. a) AND b) OR c) NOT d) EX-OR	Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;
35.	Fuzzy logic is usually represented as a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned	Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy

		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices. Rules are usually expressed in the form: IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <p>a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned</p>	<p>Answer: d Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <p>a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned</p>	<p>Answer: c Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

This sheet is for 1 Mark questions

S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions clearly	Cannot Distinguish two regions clearly	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambigous	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neural computing,Genetic algorithm	Fuzzy network and artificial intelligence	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard bertrand	mc culloch	lofti a zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behaviour	deals with imprecise,probabilistic	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computing	conventional computing	non conventional computing	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behaviour	information processing paradigm	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search represent a guided approach while optimization is unguided	Blind search usually does not conclude in one step like some optimization methods.	Blind search cannot result in optimal solution whereas optimization method do	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can only be determined by an exhaustive enumeration testing of alternatives	a solution found in the least possible time and using the least possible computing resources	a solution that is the best based on criteria defined in the design phase	a solution that requires an algorithm for the determination	C
17	When is a complete enumeration of solution used?		When a solution that is "good enough" is fine and good heuristics are available	When there is enough time and computational power available	When the modeler requires a guided approach to problem solving	When there are an infinite number of solution to be searched	B
18	All of the following are true about heuristics EXCEPT		heuristics are used when the modeler requires a guided approach to problem solving	heuristics are used when a solution that is "good enough" is sought	heuristics are used when there is abundant time and computational power	heuristics are rules of good judgement	C
19	Which approach is most suited to structured problem with little uncertainty		simulation	human intuition	optimization	genetic algorithm	C
20	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
21	What does the 0 membership value mean in the set		the object is fully inside the set	the object is not in the set	the object is partially present in the set	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a
23	The process of fuzzy inference system involves		membership functions	fuzzy logic operators	if-then rules	all the above	d
24	What does a fuzzifier do		converts crisp input to linguistic variables	converts crisp output to linguistic variables	converts fuzzy input to linguistic variables	converts fuzzy output to linguistic variables	a
25	Which of the following is not defuzzifier method		centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy inference method		mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have		multiple part of antecedent,only single part of consequent	only single part of antecedent,multiple part of consequent	multiple part of antecedent,multiple part of consequent	only single part of antecedent,only single part of consequent	c
28	The α cut of a fuzzy set A is a crisp set defined by :-		$\{x \cup a(x) > \alpha\}$	$\{x \cup a(x) > \alpha\}$	$\{x \cup a(x) < \alpha\}$	$\{x \cup a(x) \leq \alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1 / x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?		$\{0/a, 0.7/b, 0.8/c, 0.2/d, 1/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.2/d, 1/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.7/d, 1/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 1/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of AUB?		$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0.2/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.5/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.8/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B ?		$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 1/e\}$	a
34	What denotes the support(A) in a fuzzy set?		$\{x \cup a(x) > 0\}$	$\{x \cup a(x) < 0\}$	$\{x \cup a(x) \leq 0\}$	$\{x \cup a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?		$\{x \cup a(x) > 0\}$	$\{x \cup a(x) = 1\}$	$\{x \cup a(x) \geq 0.5\}$	$\{x \cup a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c

37	which of the following is a sequence of steps taken in designning a fuzy logic machine		fuzzification->Rule Evaluation->Defuzzification	defuzzification->rule evaluation->fuzzification	rule evaluation->fuzzification->defuzzification	rule evaluation->defuzzification->fuzzification	a
38	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
39	Genetic algorithm belong to the family of method in the		artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
40	All of the follwing are suitable problem for genetic algorithm EXCEPT		pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
41	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
43	mutation is applied on __ candidates.		one	two	more than two	noneof these	a
44	recombination is applied on __ candidates.		one	two	more than two	noneof these	b
45	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	noneof these	a
46	Survival is __ approach.		deterministic	non deterministic	semi deterministic	noneof these	a
47	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
48	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?		line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by		Fredrik	Fogel	Frank	Flin	b
54	Evolution Strategies is developed with		selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses		real-valued vector representations	vector representation	time based representation	none of these	a
56	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is		Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover		discrete and intermedium	discrete and continuous	continuous and intemedium	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested.		TRUE	FALSE			B
61	_____ cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solution	none of these	C
62	Discrete events and agent-based models are usually used for _____.		middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
63	_____ doesnot usually allow decision makers to see how a solution to a _____ envolves over time nor can decision makers interact with it.		Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
64	EC stands for?		Evolutionary Computatons	Evolutionary computer	Electronic computations	noneof these	a
65	GA stands for		genetic algorithm	genetic assurance	genese alorithm	noneof these	a
66	LCS stands for		learning classes system	learning classifier systems	learned class system	noneof these	b
67	GBML stands for		Genese based Machine learning	Genes based mobile learning	Genetic bsed machine learning	noneof these	c
68	EV is dominantly used for solving ____.		optimization problems	NP problem	simple problems	noneof these	a
69	EV is considered as?		adaptive	complex	both a and b	none of these	c
70	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?		line representation	String representation	Circular representation	all of these	b
72	Parameters that affect GA		initial population	selection process	fitness function	all of these	d
73	Fitness function should be		maximum	minimum	intermediate	noneof these	b
74	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
75	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
77	mutation is applied on __ candidates.		one	two	more than two	none of these	a
78	recombination is applied on __ candidates.		one	two	more than two	none of these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offsprings	grand child	c
80	____ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection methods	both a and b	none of these	c
82	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	none of these	a
83	Survival is __ approach.		deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic	d
90	For what purpose feedforward neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c
92	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given U = {1,2,3,4,5,6,7} A = {(3, 0.7), (5, 1), (6, 0.8)} then A will be: (where ~ → complement)		{(4, 0.7), (2,1), (1,0.8)}	{(4, 0.3), (5, 0), (6, 0.2)}	{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)}	{(3, 0.3), (6,0.2)}	c

95	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.5}	{0.1, 0.5, 0.4, 0.2, 0.2}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: A = {(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)} B = {(0.5,11), (1,12), (0.5,13)} Where fuzzy addition is defined as $\mu_{A+B}(z) = \max(x+y=z \min(\mu_A(x), \mu_B(y)))$ Then, f(A+B) is equal to		{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)}	{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)}	{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	d
98	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A, B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy ≈ Prediction	Fuzzy ≈ Forecasting	Probability ≈ Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	---- defines logic function of two prepositions		prepositions	Linguistic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then z=c (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semig-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
119	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

123	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125	(1+1) ES		offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126	(1+λ) ES		λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127	Termination condition for EA		mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming does not use crossover operators	d
130	(1+1) ES		Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
131	Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

This sheet is for 2 Mark questions

S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	Who can deal with noisy input information		soft computing	hard computing	both a and b	none of the above	a
2	Ability to learn how to do task based on the data is done by		self organization	adaptive learning	fault tolerance	robustness	b
3	Which of the following is not a technique of soft computing		neural network	genetic algorithm	evolutionary algorithm	conventional algorithm	d
4	Fuzzy logic system is based on what type of rule		if-then	else-if	while	do-while	a
5	What is the function of dendrites in biological neural network		send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b
6	Expert system		combines different types of method and information	is a approach to design of learning algorithms	is an information base filled with knowledge of an expert formulated in terms of if-then rules	none of the above	c
7	Three main basic feature involved in characterizing member function are		fuzzy algorithm,neural intuition,inference,rank ordering	fuzzy algorithm,neural network,genetic algorithm	center of sums,median,core	core,support,boundary	d
8	What is the function of cell body in biological neural network		multiplies the incoming signals	sums the incoming signals	multiples the outgoing signals	sums the outgoing signals	b
9	What is perceptron		a single layer feed forward neural network	a double layer associative neural network	a neural network that contains feedback	auto associative neural network	a
10	Which of the follwing computing is trial and error problem solver algorithm		hard computing	neural network	evolutionary computing	fuzzy logic	c
11	What are advantages of neural network		ability to learn by example	fault tolerant	both a and b	none of the above	c
12	Which of the following does not belong to the process of involuntary computing		selection	mutation	recombination	deletion	d
13	The Value of crisp set can be		either 0 or 1	near to 0 or 1	between 0 and 1	between 0.5 and 0.7	a
14	The room temprature is hot. Here the hot(use of linguistic variable is used) can be represented by		fuzzy set	crisp set	probabilistic set	none of the above	a
15	The value of set membership can be represented by		discrete set	degree of truth	probabilities	both b and c	b
16	Semiconductor layout & aircraft design are the application type of which domain?		Control	Design	Robotics	ML	B
17	Trajectory planning is the application type of which domain?		Control	Design	Robotics	ML	C
18	Filter design is the application type of which domain?		Control	Signal Processing	Robotics	ML	B
19	Pokers & Checkers are the application type of which of domain?		Control	Game Playing	Robotics	ML	B
20	Manufacturing & resource allocation are the application type of which domain?		Scheduling	Design	Robotics	ML	A
21	What is a crossover point in a fuzzy set?		{x \cup a(x)<0}	{x \cup a(x)=1}	{x \cup a(x)=0.5}	{x \cup a(x)>0}	c
22	If A and B are two fuzzy sets with membership function: $\cup a(X)=\{0.2,0.5,0.6,0.1,0.9\}$ $\cup b(X)=\{0.1,0.5,0.2,0.7,0.8\}$ THEN what will be the intersection of A and B		{0.2,0.5,0.6,0.7,0.9}	{0.2,0.3,0.8,0.1,0.5}	{0.5,0.1,0.6,0.1,0.8}	{0.1,0.5,0.2,0.1,0.8}	d
23	$A=\{0.1/1+0.2/2+0.3/3\}$ $B=\{0.6/1+0.5/2+0.4/3+0.5/4\}$ Find the set difference		{0.1/1+0.2/2+0.3/3}	{0.3/1+0.2/2+0.2/3}	{0.1/1+0.3/2+0.2/3}	{0.1/1+0.2/2+0.5/3}	a
24	With the help of which formula can we find the algebraic sum of two fuzzy sets A,B?		$\{\cup A(x)+\cup B(x)\}-\{\cup A(x)^*\cup B(x)\}$	$\{\cup A(x)-\cup B(x)\}-\{\cup A(x)^*\cup B(x)\}$	$\{\cup A(x)/\cup B(x)\}-\{\cup A(x)^*\cup B(x)\}$	$\{\cup A(x)+\cup B(x)\}$	a
25	With the help of which formula can we find the algebraic product of two fuzzy sets A,B?		$\{\cup A(x)/\cup B(x)\}$	$\{\cup A(x)^*\cup B(x)\}*(\cup A(x)-\cup B(x))$	$\{\cup A(x)*\cup B(x)\}+(\cup A(x)+\cup B(x))$	$\{\cup A(x)^*\cup B(x)\}$	d
26	Which one of the following is the associative property for a crisp set		$AU(BUC)=(AUB)UC$	$BU(AUC)=CU(BUA)$	$AU(CUA)=B(AUC)$	all the above	a
27	Knowledge base is a combination of		rule base and data base	rule base and time base	time base and probability base	model base and data base	a
28	Fuzzy logic system is based on what type of rule		if-then	else-if	while	do-while	a
29	What is the function of dendrites in biological neural network		send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b
30	Discrete events and agent-based models are usually used for _____.		middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
31	_____ doesnot usually allow decision makers to see how a solution to a _____ envolves over time nor can decision makers interact with it.		Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
32	_____ is a simulation method that let decision maker see what the model is doing and how it interact.		VIS	VIM	SIV	HIV	A
33	_____ systems,especially those developed for the military and video-game industry		VIS	VIM	SIV	HIV	B
34	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?		Simulation	Optimization	human intuition	genetic algorithm	A
35	Which of the following is the advantage of simulation?		It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skils	It solves problem in one pass with no iteration.	A
36	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred		continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B

37	The defining length of a schema is useful to calculate _____ of the schema for _____.		Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A
38	Semiconductor layout & aircraft design are the application type of which domain?		Control	Design	Robotics	ML	B
39	Trajectory planning is the application type of which domain?		Control	Design	Robotics	ML	C
40	Filter design is the application type of which domain?		Control	Signal Processing	Robotics	ML	B
41	categories of EA are/is		Genetic Algorithm	genetic programing	Systems	all of these	d
42	Phases in which the LCS individuals are evaluated are		performance phase	reinforcement phase	both a and b	none of these	c
43	MA sometimes called as		Hybrid EA	Integrated EA	both a and b	none of these	a
44	Genetic algorithm is a subset of _____.		evolutionary algorithm	dynamcic algorithm	both a&b	None of these	A
45	NP hard problems are also called as _____.		dcrete optimization	combinatorial optimization	evolutionary optimization	None of these	B
46	Genetic algorithm is first introduce by _____.	Charles Darwin	John Holland	Gregor Johan Mendel	None of these		B
47	_____ replicates the most successful solutions found in a population at a rate proportional to relative quality.		Selection	Recombination	Mutation	None of these	A
48	_____ decomposes two distinct solutions and then randomly mixes their parts to form novel solutions.		Selection	Recombination	Mutation	None of these	B
49	_____ randomly perturbs a candidate solution.		Selection	Recombination	Mutation	None of these	C
50	A _____ is a template consisting of a string composed of three symbol.		Wild symbol	Schema	Layout	None of these	B
51	{0,1,#} is the symbol alphabet ,where # is a special symbol.		Wild card	Schema	Layout	None of these	A
52	Metaheuristics are ?1)non deterministic 2)non approximate 3)not problem specific		1,2,3	1,2	1,3	2,3	c
53	In search techniques, as single point based contradicts population based similary deterministic contradicts _____?		Stochastic	simplex based	complex based	none	a
54	In swarm systems organisations are		centalized	decentralized	controlled by third party	none	b
55	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids		1,3,2	3,2,1	2,3,1	2,1,3	c
56	Every particle in the system takes experience from previous particle ?		PSO	ACO	clustering	none	a
57	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms		1,2	1,2,3	2,3,4	all of these	d
58	pheromone quantity in ACO is _____ proportional to path selection.		directly	inversly	there is no connection	none	a
59	The ants prefer the smaller drop of honey over the more abundant, but less nutritious, sugar. This is the example of?		Kruskal algorithm	Travelling salesman	Knapsack problem	NP hard problem	c
60	In kmeans clustering each cluster is associated with		centroid	edge	common point	none of them	a
61	What is EC?		computer based problem solving systems	Systems that uses computational models of evolutionary process	both a and b	none of these	c
62	Recombination is applied to		2 selected candidated	1 selected candidate	3 selected candidate	none of these	a
63	In EA mutation is applied to		2 candidate	1 candidate	3 candidate	none of these	b
64	EV is used for		solving optimization problems	finding solutions	both a and b	none of these	a
65	EV is considered as		complex	simple	complex and adaptive	al of these	c
66	GA stands for		Genetic Algorithm	genetic programing	genetic assurance	none of these	a
67	Features of GA		A string representation of chromosomes.	A fitness function be to minimized.	A cross-over method and a mutation method.	all of these	d
68	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
69	Evolutionary programming was developed by		Fredrik	Fodgel	Frank	Flin	b
70	Evolution Strategies is developed with		selection	mutation	a population of size one	all of these	d
71	Evolution Strategies typically uses		real-valued vector representations	vector representation	time based representation	none of these	a
72	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
73	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d
74	Elements of ES are/is		Parent population size	Survival population size	both a and b	none of these	c
75	What are different types of crossover		discrete and intermedium	discrete and continuous	continuous and intemedium	none of these	a
76	GP individual stores computer program		TRUE	FALSE			a
77	GP selection is		Deterministic selection	Tournament selection	nondeterministic selection	none of these	b
78	EP mutation is		Data specific	Data type specific	non specific	none of these	b
79	categories of EA are/is		Genetic Algorithm	genetic programing	learning Classifier	all of these	d
80	Phases in which the LCS individuals are evaluated are		performance phase	reinforcement phase	both a and b	none of these	c
81	MA sometimes called as		Hybrid EA	Integrated EA	both a and b	none of these	a
82	The truth values of traditional set theory is . and that of fuzzy set is _____		Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	a
83	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____		Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	Fuzzy & Crisp Set	a
84	Fuzzy logic is usually represented as _____		IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	b
85	Three main basic features involved in characterizing membership function are		Intution, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	Core, Support , Boundary	Weighted Average, center of Sums, Median	c
86	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
87	Why can't we design a perfect neural network?		full operation is still not known of biological neurons	number of neuron is itself not precisely known	number of interconnection is very large & is very complex	all of the mentioned	d
88	Both Fuzzy logic and ANN are soft computing techniques because		Both gives precise and accurate results	ANN gives accurate result but fuzzy logic doesnot	In each, no precise mathematical model of the problem is required	Fuzzy logic gives accurate result but ANN doesnot	c
89	Internal state of neuron is called _____, is the function of the inputs the neurons receives		Weight	activation or activity level of neuron	Bias	None of these	b
90	Each connection link in ANN is associated with _____ which has information about the input signal.		neurons	weights	bias	activation function	b
91	In artificial Neural Network interconnected processing elements are called		nodes or neurons	weights	axons	Soma	a

92	The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to		infinite	1	0	0.5	d
93	The membership values of the membership function are not strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing		Convex Fuzzy Set	Non convex fuzzy set	Normal Fuzzy set	Sub normal fuzzy set	b
94	The cell body of neuron can be analogous to what mathematical operation?		summing	differentiator	integrator	none of the mentioned	a
95	Conventional Artificial Intelligence is different from soft computing in the sense		Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols whereas soft computing is based on empirical data	Both (a) and (b)	None of the above	c
96	_____ is/are the way/s to represent uncertainty.		Fuzzy Logic	Probability	Entropy	All of the mentioned	d
97	Given two fuzzy sets A and B A={(x1,0.5),(x2,0.1),(x3,0.4)} and B={(x1,0.2),(x2,0.3),(x3,0.5)} then union of 2 sets A U B is		{(x1,0.5),(x2,0.1),(x3,0.4)}	{(x1,0.5),(x2,0.3),(x3,0.5)}	{(x1,0.2),(x2,0.3),(x3,0.5)}	{(x1,0.2),(x2,0.1),(x3,0.4)}	b
98	If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$ $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be		{0.2, 0.5, 0.6, 0.7, 0.9}	{0.2, 0.5, 0.2, 0.1, 0.8}	{0.1, 0.5, 0.6, 0.1, 0.8}	{0.1, 0.5, 0.2, 0.1, 0.8}	d
99	For $k > 1$, which of the following concept can be used to generate other linguistic hedge?		Concentration and dilation	Dilation	Concentration	None of the mentioned	c
100	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A U B is		{1.0, 0.45, 0.75}	{1.0, 0.2, 0.75}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	a
101	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A ∩ B is		{1.0, 0.45, 0.75}	{0.2, 0.20, 0.50}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	b
102	Mamdani-style inference involves which steps		Fuzzification of the input variables & Rule evaluation	Aggregation of the rule output & Defuzzification	Both a and b	either a or b	c
103	A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$		Core	Support	Cross-over	α - cut	c
104	Which statement is true?		Mamdani approach characterised by its low interpretability and low accuracy	Takagi and Sugeno's approach characterised by high accuracy but at the cost of high interpretability	Takagi and Sugeno's approach follows precise fuzzy modelling and obtains high accuracy but at the cost of low interpretability	Mamdani approach characterised by its low interpretability and high accuracy	c
105	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup \mu_A(x)$		$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) < 1$	c
106	Which can be used as an input to fuzzy controller?		A fuzzy set	a crisp set	Both fuzzy set and Crisp set	None of these	b
107	What are the types of fuzzy logic sets?		Type-1 fuzzy set	Type-2 fuzzy set	Both a and b	None of these	c
108	How is fuzzy logic different from conventional control methods		IF and THEN approach	FOR approach	WHILE approach	DO approach	a
109	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \text{support } A(x)$, where A belongs to A. Then fuzzy set is called normal when		$h(A)=0$	$h(A)<0$	$h(A)=1$	$h(A)>1$	c
110	If A and B are sets and $A \cup B = A \cap B$ then		$A=B$	$A=0$	$B=0$	None of these	A
111	If x is A then y is B else y is C. The output of the given fuzzy rule is		A fuzzy set	a crisp set	a fuzzy relation	a membership function	c
112	What Is The First Step Of Fuzzy Logic Toolbox?		Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator(AND or OR) in the antecedent	Aggregation of the consequents across the rule	a
113	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?		What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	The input is a value greater than one and the output is a value less than the input	The input and output have both the same values	The input has two or more values and the output has a single truth value	d
114	What Is The Input And Output Of Step 3 - Apply Implication Method?		Input is a fuzzy set but the output is a whole value	Input is a fuzzy set but the output is a whole value	Input and Output have the same value	Input is a smaller value than the output value	b
115	What Is The Purpose Of Aggregation?		To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	a
116	Linguistic variable is		a variable whose values are words or sentences	any numerical value only	any binary value only	variable which contains TRUE or FALSE values	a
117	Identification of Input, Output and state variables is performed in which step of FLC?		Fuzzy configuration	Defuzzification	combining fuzzy outputs	Identification of variables	d
118	Assigning linguistic label to each subset is done in which step of FLC?		Fuzzy configuration	Defuzzification	combining fuzzy outputs	fuzzy subset configuration	d
119	Disjunctive system of rules is used for system		that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	a
120	Conjunctive system of rules is used for system		that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	b
121	Categorical reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	a
122	Syllogistic reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	c
123	Qualitative reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	b
124	Dispositional reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	d
125	Mamdani systems are		MISO systems	MIMO systems	Only MISO systems	both a and b	d

126	Sugeno systems are		MISO systems	MIMO systems	Only MISO systems	both a and b	b
127	In the generational model of EA		entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	a
128	In the steady-state model of EA		entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	b
129	In the generational model of EA		each individual survives exactly for two generation	each individual survives exactly for one generation	cannot predict	each individual survives as many generations as want	b
130	In the steady-state model of EA		One offspring is generated per generation	two offsprings are generated per generation	cannot decide	more than two offsprings are generated per generation	a
131	Which of the following algorithm is most efficient for discontinuous and noisy problems?		Evolutionary algorithm	Classical optimization algorithm	Genetic algorithm	none	a
132	Each iteration of EA is referred to as		Generation	Iteration	population	None	a
133	Which of the following are evolutionary operators?		Selection	Crossover	Mutation	All of the above	d
134	In the $(\mu/\rho, \lambda)$ method of ES, parents are		selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	a
135	In the $(\mu/\rho+\lambda)$ method of ES, parents are		selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	b
136	Fitness scaling is desirable to ensure		Population diversity	selection pressure	that better solutions are selected only	relatively inferior solutions are not ignored	a
137	Which mutation operator is used in ES as reproduction operator?		one point	Gaussian mutation	two point	adaptive	b
138	Fitness proportionate selection methods are		Roulette wheel selection	Stochastic universal sampling	tournament selection	All the mentioned	d
139	In which selection method of survival selection there is no notion of fitness?		fitness based selection	elitism	Agebased selection	All the mentioned	c
140	In which selection strategy every individual has the same probability to be selected?		Roulette wheel selection	Uniform selection	tournament selection	Rank selection	b
141	High selection pressure is desirable, when we need		diversity not found in each generation	there is no improvement in successive GA iteration	faster termination of GA	fitness values are not uniformly distributed	c
142	Tournament selection scheme is more preferable when		when fitness values are uniformly distributed	population are with very diversified fitness values	when fitness values are not necessarily uniformly distributed	under all the above situations	b
143	Which of the following is not a characteristic of evolutionary algorithm?		Conceptual simplicity	Parallelism	Broad applicability	Artificial selection	d
144	What is the correct order of steps in evolutionary algorithm?		Select parents-recombine-mutate-evaluate	Select parents-recombine-evaluate-mutate-	Select parents-mutate -recombine-evaluate	Select parents-evaluate -recombine-mutate	a
145	Which of the following schemes are selection schemes in Evolutionary computation?		Hall of fame	Rank based selection	tournament selection	All of the above	d
146	To encode chromosomes which encoding schemes are used		binary encoding	finite state machine encoding	real value encoding	All of the above	d

This sheet is for 3 Mark questions

S.r No	Question	Image	a	b	c	d	Correct Answer
	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	What is defuzzification		conversion of fuzzy set to crisp set	conversion of crisp set to fuzzy set	conversion of fuzzy set to fuzzy logic	conversion of crisp set to crisp logic	a
2	What type of model is required for hard computing		mathematical	biological	chemical	probabilistic	a
3	Which of the following is/are basic component neuron		dendrites	axon	nucleus	all of the above	d
4	Which of the following computing technique has the ability of learning and adoption		neural network	evolutionary	hard	probabilistic	a
5	The truth value of the fuzzy set is		either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
6	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
7	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Evaluation->Defuzzification	defuzzification->rule evaluation->fuzzification	rule evaluation->fuzzification->defuzzification	rule evaluation->defuzzification->fuzzification	a
8	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
9	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
10	All of the following are suitable problem for genetic algorithm EXCEPT		pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
11	In which stage of the simulation methodology do you determine the variable and gather data		Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
12	In which stage of the simulation methodology do you determine how long to run the simulation		Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	D
13	In which stage of the simulation methodology do you determine the system boundaries and environment?		Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
14	What BEST describes a simulation model with a limited number of variables, each with the finite number of values?		system dynamics simulation	discrete event simulation	continuous distribution simulation	Monte carlo simulation	B
15	The advantage of visual interactive simulation include all of the following EXCEPT		Improvement in training using the simulation	reduced need for the decision maker involvement	The ability to see how a simulation works	improved presentation of simulation results	B
16	What can system dynamics modelling be used for?		qualitative method for analyzing a system	simulation models that test each subsystem in isolation	micro-level simulation models that examine individual values	studying system behaviour at an instant in time	A
17	In agent-based modelling, agents are		the human workers or agents who use the system	communication links between simulation	Autonomous rule-based decision making units	the hardware platform used to conduct the simulation	C
18	Agent based modelling is best for all the following types of problem features EXCEPT		complex interactions	low uncertainty	Many inter-related factors	irregular data	B
19	What is the final stage of an agent based modelling (ABM) methodology?		Identifying the agents and determining their behaviour	Determining agent-related data	Validating agent behaviour against reality	determining the suitability of ABM	C
20	Which of the following is the advantage of simulation?		It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skills	It solves problem in one pass with no iteration.	A
21	The truth value of the fuzzy set is		either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
22	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
23	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Evaluation->Defuzzification	defuzzification->rule evaluation->fuzzification	rule evaluation->fuzzification->defuzzification	rule evaluation->defuzzification->fuzzification	a
24	EV is dominantly used for solving ____.		optimization problems	NP problem	simple problems	none of these	a
25	EV is considered as?		adaptive	complex	both a and b	none of these	c
26	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
27	Identify the drawbacks of clustering algorithms? 1) can generate empty clusters 2) can terminate at local minimum 3) can handle noisy data		1,2,3	1,2	3	2,3	b
28	generation of empty cluster problem in clustering can be overcome by?		ACO based clustering	PSO based clustering	kmeans	kmode	b

29	where does PSO based clustering terminates?		global optimum	local optimum	global maximum	local minimum	a
30	Each particle in PSO modifies its position according to ? 1)its velocity 2)its weight 3) its gbest and pbest		2,3	1,2	1,2,3	only 1	c
31	Applications of ACO are ? 1)shortest path 2)assignment problem 3)set problem		2,3	1,2	1,2,3		c
32	Evaporation of pharomones is ?		directly proportional to path length	inversly proportional to path length	constant	none	a
33	Metaheuristics doesnt include ?		evolutinary algorithms	tabu searching	simulated annealing	none	d
34	Metaheuristics are ?1)non deterministic 2)non approximate 3)not problem specific		1,2,3	1,2	1,3	2,3	c
35	In search techniques, as single point based contradicts population based similary deterministic contradicts ___?		Stochastic	simplex based	complex based	none	a
36	In swarm systems organisations are		centalized	decentralized	controlled by third party	none	b
37	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids		1,3,2	3,2,1	2,3,1	2,1,3	c
38	Every particle in the system takes experience from previous particle ?		PSO	ACO	clustering	none	a
39	swarm intelligence includes ?1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms		1,2	1,2,3	2,3,4	all of these	d
40	pheromone quantity in ACO is ___ proportional to path selection.		directly	inversly	there is no connection	none	a
41	Recombination involves ___ candidates while mutation requires ___ candidates, and the result is called ___.		1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
42	Identify the correct sequence for evlutionary algorithms ? 1>Select genitors from parent population 2)Evaluate newborn offspring 3)Create offpsring 4)replace some parents		1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
43	Problems for which there is no efficient method to solve such problems exactly are called?		complex	hard	strong	none	b
44	EV is considered as ? 1)complex 2) adaptive		1	2	1,2	none	c
45	EV system was proposed for exploring a___ fitness space and can form___.		multipeaked,clusters	single peaked,clusters	multipeaked,hard problems	single peaked,hard problems	a
46	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recombination operator		1,2	1,2,3	2,3	1,3	b
47	Parameters that affect GA are ? 1)intial population 2)fitness function 3)ability to generate offspring		1,3	1,2	1,2,3	only 1	b
48	___ focuses attention on high fitness individuals, thus exploiting the available fitness information.		clustering	offspring production	replace	selection	d
49	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }		ACO	PSO	EA	Kmean	c
50	Genetic algorithm are heuristic methods that do not guarantee an optimal solution to a problem		TRUE	FALSE			A
51	A "What-if" model is most typically used for the most structured problems		TRUE	FALSE			B
52	___ cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solutuon	none of these	C
53	Discrete events and agent-based models are usually used for _____.		middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
54	___doesnot usually allow decision makers to see how a solution to a _____ envolves over time nor can decision makers interact with it.		Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
55	___ is a simulation method that let decision maker see what the model is doing and how it interact.		VIS	VIM	SIV	HIV	A
56	___systems,especially those developed for the military and video-game industry		VIS	VIM	SIV	HIV	B
57	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?		Simulation	Optimization	human intuition	genetic algorithm	A
58	Which of the following is the advantage of simulation?		It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skils	It solves problem in one pass with no iteration.	A
59	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred		continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B
60	The defining length of a schema is useful to calculate ___ of the schema for _____.		Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A
61	Recombination involves ___ candidates while mutation requires___ candidates, and the result is called___.		1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
62	Identify the correct sequence for evlutionary algorithms ? 1>Select genitors from parent population 2)Evaluate newborn offspring 3)Create offpsring 4)replace some parents		1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b

63	Problems for which there is no efficient method to solve such problems exactly are called?		complex	hard	strong	none	b
64	EV is considered as ? 1)complex 2) adaptive		1	2	1,2	none	c
65	EV system was proposed for exploring a___ fitness space and can form__.		multipaked,clusters	single peaked,clusters	multipaked,hard problems	single peaked,hard problems	a
66	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3) recombination operator		1,2	1,2,3	2,3	1,3	b
67	Parameters that affect GA are ? 1) initial population 2) fitness function 3) ability to generate offspring		1,3	1,2	1,2,3	only 1	b
68	___ focuses attention on high fitness individuals, thus exploiting the available fitness information.		clustering	offspring production	replace	selection	d
69	Identify the algorithm ? procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }		ACO	PSO	EA	Kmean	c
70	Evolution strategies uses ? 1) selection 2) recombination 3) real valued vector		1,2,3	2,3	1,3	only 2	a
71	which of the following statements are true regarding ES ? 1) Survival is deterministic 2) first allows the N best children to survive, and replaces the parents with these children. 3) allows the N best children and parents to survive.		only 1	1,2	only 2	1,2,3	d
72	Evolutionary Algorithms includes ? 1) tabu search 2) simulated annealing 3) ES 4) genetic algorithms		1,2,3,4	2,3	3,4	2,3,4	c
73	Heuristics include ? 1) tabu search 2) simulated annealing 3) ES 4) genetic algorithms		1,2,3,4	2,3	1,2		d
74	Which of the following statements are true ? 1) mutation is applied to two selected candidates, the so-called parents, and results in one or two new candidates, the children 2) recombination is applied to one candidate and results in one new candidate.		only 1	only 2	both	none of these	d
75	The ___ is performed by selecting two sub trees by chance from the parents and exchange them to create the descendants.		GP crossover	GP Mutation	GP clustering	GP Recombination	a
76	The___ is performed by selecting a sub tree of the descendant by chance and to exchange the sub tree with an arbitrary generated new sub tree.		GP crossover	GP Mutation	GP clustering	GP Recombination	b
77	___ are able to learn simple "if {condition} then {action}" style rules 23 by learning from feedback		ES	EA	LCS	Heuristics	c
78	Island model is related with ?		Distributed Evolutionary Algorithms	LCS	swarm intelligence	ACO	a
79	payoffs can be easily translated to a ___ function for an EA.		survival	reduction	comination	fitness	d
80	Identify the correct statements with respect to genetic algorithms? 1) A fitness function should be maximized. 2) A replacement procedure. 3) A string representation of chromosomes.		1,2	2,3	1,2,3	1,3	b
81	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
82	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
83	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
84	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
85	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-if Analysis	Supervised Learning	b
86	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic	d
87	For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
88	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c
89	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
90	The values of the set membership is represented by		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b

91	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3): (5, 0), (6, 0.2)\}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
92	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification \rightarrow Rule evaluation \rightarrow Defuzzification	Fuzzification \rightarrow Defuzzification \rightarrow Rule evaluation	Rule evaluation \rightarrow Fuzzification \rightarrow Defuzzification	Rule evaluation \rightarrow Defuzzification \rightarrow Fuzzification	a
93	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		$\{0.9, 0.5, 0.6, 0.8, 0.8\}$	$\{0.6, 0.2, 0.1, 0.7, 0.5\}$	$\{0.1, 0.5, 0.4, 0.2, 0.2\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	c
94	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x,y} z = \min(\mu_A(x), \mu_B(y))$ Then, $f(A+B)$ is equal to		$\{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)\}$	$\{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)\}$	$\{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	$\{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	d
95	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
96	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		$\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$	$\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$	$\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$	None of the above	c
97	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
98	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A, B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
99	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
100	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c
101	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
102	---- defines logic funtion of two prepositions		prepositions	Lingustic hedges	truth tables	inference rules	c
103	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
104	Multiple conjuctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
105	Multiple disjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
106	IF x is A and y is B then $z=c$ (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
107	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
108	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
109	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semig-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
110	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
111	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ) - selection based on the children only $(\mu+\lambda)$ - selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
112	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ) - selection based on the children only $(\mu+\lambda)$ - selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
113	In Evolutionary programming, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
114	In Evolutionary strategy, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
115	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
116	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b

117	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
118	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
119	Evolutionary Strategies (ES)		(μ,λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b
120	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
121	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
122	(1+1) ES		offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
123	(1+ λ) ES		λ mutants can be generated from one parent	one mutant is generated	2 λ mutants can be generated	no mutants are generated	a
124	Termination condition for EA		maximally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
125	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
126	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming does not use crossover operators	d
127	(1+1) ES		Operates on population size of two	operates on population size of one	operates on population size of zero	operates on population size of λ	a
128	Which of these emphasize development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
129	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
130	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

This sheet is for 1 Mark questions

S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions clearly	regions clearly	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguos	Inaccurate	None of these	b
5	Core of soft computing is		computing,Genetic algorithm	artificial intelligence	Neural Science	Genetic Science	a
6	computation		Sequential	Parallel	approxiamate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	rich and berg	mc culloch	lofti a zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behaviour	imprecise,probabilistic	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computing	conventional computing	computing	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behaviour	paradigm	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search represent a guided approach while optimization is unguided	Blind search usually does not conclude in one step like some optimization methods.	Blind search cannot result in optimal solution whereas optimization method do	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can only be determined by an exhaustive enumeration testing of alternatives	a solution found in the least possible time and using the least possible computing resources	a solution that is the best based on criteria defined in the design phase	a solution that requires an algorithm for the determination	C
17	When is a complete enumeration of solution used?		When a solution that is "good enough" is fine and good heuristics are available	When there is enough time and computational power available	When the modeler requires a guided approach to problem solving	When there are an infinite number of solution to be searched	B
18	All of the following are true about heuristics EXCEPT		heuristics are used when the modeler requires a guided approach to problem solving	heuristics are used when a solution that is "good enough" is sought	heuristics are used when there is abundant time and computational power	heuristics are rules of good judgement	C
19	Which approach is most suited to structured problem with little uncertainty		Simuation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belong to the family of method in the		artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
21	What does the 0 membership value means in the set		the object is fully inside the set	the object is not in the set	the object is partially present in the set	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a
23	The process of fuzzy interference system involes		membership functions	fuzzy logic operators	if-then rules	all the above	d
24	What does a fuzzifier do		coverts crisp input to linguistic variables	coverts crisp ouput to linguistic variables	coverts fuzzy input to linguistic variables	coverts fuzzy output to linguistic variables	a
25	Which of the following is not defuzzifier method		centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method		mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have		multiple part of antecedent,only single part of consequent	only single part of antecedent,multiple part of consequent	multiple part of antecedent,multiple part of consequent	only single part of antecedent,only single part of consequent	c
28	The α cut of a fuzzy set A is a crisp set defined by :-		$\{x \cup a(x) > \alpha\}$	$\{x \cup a(x) = \alpha\}$	$\{x \cup a(x) < \alpha\}$	$\{x \cup a(x) \leq \alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1 / x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?		$\{0/a, 0.7/b, 0.8/c, 0.2/d, 1/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.2/d, 1/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.7/d, 1/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 1/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of AUB?		$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0.2/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.5/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.8/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B ?		$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 1/e\}$	a
34	What denotes the support(A) in a fuzzy set?		$\{x \cup a(x) > 0\}$	$\{x \cup a(x) < 0\}$	$\{x \cup a(x) \leq 0\}$	$\{x \cup a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?		$\{x \cup a(x) > 0\}$	$\{x \cup a(x) = 1\}$	$\{x \cup a(x) \geq 0.5\}$	$\{x \cup a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designning a fuzy logic machine		fuzzification->Rule Evaluation->Defuzzification	defuzzification->rule evaluation->fuzzification	rule evaluation->fuzzification->defuzzification	rule evaluation->defuzzification->fuzzification	a
38	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
39	Genetic algorithm belong to the family of method in the		artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
40	All of the following are suitable problem for genetic algorithm EXCEPT		pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
41	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
43	mutation is applied on ____ candidates.		one	two	more than two	noneof these	a
44	recombination is applied on ____ candidates.		one	two	more than two	noneof these	b
45	LCS belongs to ____ based methods?		rule based learning	genetic learning	both a and b	noneof these	a
46	Survival is ____ approach.		deterministic	non deterministic	semi deterministic	noneof these	a
47	Evolutionary algorithms are a ____ based approach		heuristic	metaheuristic	both a and b	noneof these	a
48	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?		line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by		Fredrik	Fodgel	Frank	Flin	b
54	Evolution Strategies is developed with		selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses		real-valued vector representations	vector representation	time based representation	none of these	a
56	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is		Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover		discrete and intermedium	discrete and continuous	continuous and intermedium	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested.		TRUE	FALSE			B
61	cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solutuon	none of these	C
62	Discrete events and agent-based models are usually used for _____.		middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A

63	_____ does not usually allow decision makers to see how a solution to a _____ evolves over time nor can decision makers interact with it.		Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
64	EC stands for?		Evolutionary Computatons	Evolutionary computer	Electronic computations	noneof these	a
65	GA stands for		genetic algorithm	genetic assurance	genese alforithm	noneof these	a
66	LCS stands for		learning classes system	learning classifier systems	learned class system	noneof these	b
67	GBML stands for		Genese based Machine learning	Genes based mobile learning	Genetic bsed machine learning	noneof these	c
68	EV is dominantly used for solving ____.		optimization problems	NP problem	simple problems	noneof these	a
69	EV is considered as?		adaptive	complex	both a and b	noneof these	c
70	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?		line representation	String representation	Circular representation	all of these	b
72	Parameters that affect GA		initial population	selection process	fitness function	all of these	d
73	Fitness function should be		maximum	minimum	intermediate	noneof these	b
74	Evolutionary algorithms are a ___ based approach		heuristic	metaheuristic	both a and b	noneof these	a
75	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
77	mutation is applied on ___ candidates.		one	two	more than two	noneof these	a
78	recombination is applied on ___ candidates.		one	two	more than two	noneof these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offsprings	grand child	c
80	___ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection methods	both a and b	noneof these	c
82	LCS belongs to ___ based methods?		rule based learning	genetic learning	both a and b	noneof these	a
83	Survival is ___ approach.		deterministic	non deterministic	semi deterministic	noneof these	a
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
90	For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c
92	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where \sim → complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3), (5, 0), (6, 0.2)\}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		$\{0.9, 0.5, 0.6, 0.8, 0.8\}$	$\{0.6, 0.2, 0.1, 0.7, 0.5\}$	$\{0.1, 0.5, 0.4, 0.2, 0.2\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x,y} z = \min(\mu_A(x), \mu_B(y))$ Then, $f(A+B)$ is equal to		$\{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)\}$	$\{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)\}$	$\{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	$\{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	d
98	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		$\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$	$\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$	$\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy ≈ Prediction	Fuzzy ≈ Forecasting	Probability ≈ Forecasting	None of these	b

103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	---- defines logic function of two prepositions		prepositions	Linguistic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then $z=c$ (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semig-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
119	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu-\lambda$): Select survivors among offspring only	($\mu-\lambda$): Select survivors among offspring only	b
123	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125	(1+1) ES		offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126	(1+ λ) ES		λ mutants can be generated from one parent	one mutant is generated	2 λ mutants can be generated	no mutants are generated	a
127	Termination condition for EA		mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
130	(1+1) ES		Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
131	Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

This sheet is for 2 Mark questions

S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	Who can deal with noisy input information		soft computing	hard computing	both a and b	none of the above	a
2	Ability to learn how to do task based on the data is done by		self organization	adaptive learning	fault tolerance	robustness	b
3	Which of the following is not a technique of soft computing		neural network	genetic algorithm	evolutionary algorithm	conventional algorithm	d
4	Fuzzy logic system is based on what type of rule		if-then	else-if	while	do-while	a

5	What is the function of dendrites in biological neural network		send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b
6	Expert system		combines different types of method and information	is a approach to design of learning algorithms	is an information base filled with knowledge of an expert formulated in terms of if-then rules	none of the above	c
7	Three main basic feature involved in characterizing member function are		fuzzy algorithm,neural intuition,inference,rank ordering	network,genetic algorithm	center of sums,median,core	core,support,boundary	d
8	What is the function of cell body in biological neural network		multiples the incoming signals	sums the incoming signals	multiples the outgoing signals	sums the outgoing signals	b
9	What is perceptron		a single layer feed forward neural network	a double layer associative neural network	a neural network that contains feedback	auto associative neural network	a
10	Which of the following computing is trial and error problem solver algorithm		hard computing	neural network	evolutionary computing	fuzzy logic	c
11	What are advantages of neural network		ability to learn by example	fault tolerant	both a and b	none of the above	c
12	Which of the following does not belong to the process of involuntary computing		selection	mutation	recombination	deletion	d
13	The Value of crisp set can be		either 0 or 1	near to 0 or 1	between 0 and 1	between 0.5 and 0.7	a
14	The room temperature is hot. Here the hot(use of linguistic variable is used) can be represented by		fuzzy set	crisp set	probabilistic set	none of the above	a
15	The value of set membership can be represented by		discrete set	degree of truth	probabilities	both b and c	b
16	Semiconductor layout & aircraft design are the application type of which domain?		Control	Design	Robotics	ML	B
17	Trajectory planning is the application type of which domain?		Control	Design	Robotics	ML	C
18	Filter design is the application type of which domain?		Control	Signal Processing	Robotics	ML	B
19	Pokers & Checkers are the application type of which of domain?		Control	Game Playing	Robotics	ML	B
20	Manufacturing & resource allocation are the application type of which domain?		Scheduling	Design	Robotics	ML	A
21	What is a crossover point in a fuzzy set?		$\{x \cup a(x) < 0\}$	$\{x \cup a(x) = 1\}$	$\{x \cup a(x) = 0.5\}$	$\{x \cup a(x) > 0\}$	c
22	If A and B are two fuzzy sets with membership function: $\cup a(X)=\{0.2,0.5,0.6,0.1,0.9\}$ $\cup b(X)=\{0.1,0.5,0.2,0.7,0.8\}$ THEN what will be the intersection of A and B		$\{0.2,0.5,0.6,0.7,0.9\}$	$\{0.2,0.3,0.8,0.1,0.5\}$	$\{0.5,0.1,0.6,0.1,0.8\}$	$\{0.1,0.5,0.2,0.1,0.8\}$	d
23	$A=\{0.1/1+0.2/2+0.3/3\}$ $B=\{0.6/1+0.5/2+0.4/3+0.5/4\}$ Find the set difference		$\{0.1/1+0.2/2+0.3/3\}$	$\{0.3/1+0.2/2+0.2/3\}$	$\{0.1/1+0.3/2+0.2/3\}$	$\{0.1/1+0.2/2+0.5/3\}$	a
24	With the help of which formula can we find the algebraic sum of two fuzzy sets A,B?		$(\cup A(x)+\cup B(x))-\{\cup A(x)^*\cup B(x)\}$	$(\cup A(x)-\cup B(x))-\{\cup A(x)^*\cup B(x)\}$	$(\cup A(x)/\cup B(x))-\{\cup A(x)+\cup B(x)\}$	$(\cup A(x)+\cup B(x))+(\cup A(x)^*\cup B(x))$	a
25	With the help of which formula can we find the algebraic product of two fuzzy sets A,B?		$(\cup A(x)/\cup B(x))$	$(\cup A(x)^*\cup B(x))^*(\cup A(x)-\cup B(x))$	$(\cup A(x)*\cup B(x))+(A(x)+B(x))$	$(\cup A(x)^*\cup B(x))$	d
26	Which one of the following is the associative property for a crisp set		$AU(BUC)=(AUB)UC$	$BU(AUC)=CU(BUA)$	$AU(CUA)=B(AUC)$	all the above	a
27	Knowledge base is a combination of		rule base and data base	rule base and time base	time base and probability base	model base and data base	a
28	Fuzzy logic system is based on what type of rule		if-then	else-if	while	do-while	a
29	What is the function of dendrites in biological neural network		send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b
30	Discrete events and agent-based models are usually used for _____.		middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
31	_____ does not usually allow decision makers to see how a solution to a _____ evolves over time nor can decision makers interact with it.		Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
32	_____ is a simulation method that let decision maker see what the model is doing and how it interact.		VIS	VIM	SIV	HIV	A
33	_____ systems,especially those developed for the military and video-game industry		VIS	VIM	SIV	HIV	B
34	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?		Simulation	Optimization	human intution	genetic algorithm	A
35	Which of the following is the advantage of simulation?		It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skils	It solves problem in one pass with no iteration.	A
36	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred		continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B
37	The defining length of a schema is useful to calculate _____ of the schema for _____.		Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A
38	Semiconductor layout & aircraft design are the application type of which domain?		Control	Design	Robotics	ML	B
39	Trajectory planning is the application type of which domain?		Control	Design	Robotics	ML	C
40	Filter design is the application type of which domain?		Control	Signal Processing	Robotics	ML	B
41	categories of EA are/is		Genetic Algorithm	genetic programing	learning Classifier Systems	all of these	d
42	Phases in which the LCS individuals are evaluated are		performance phase	reinforcement phase	both a and b	none of these	c
43	MA sometimes called as		Hybrid EA	Integrated EA	both a and b	none of these	a
44	Genetic algorithm is a subset of _____.		evolutionary algorithm	dynamcic algorithm	both a&b	None of these	A
45	NP hard problems are also called as _____.		dicrete optimization	combinatorial optimization	evolutionary optimization	None of these	B
46	Genetic algorithm is first introduce by _____.		Charles Darwin	John Holland	Gregor Johan Mendel	None of these	B
47	_____ replicates the most successful solutions found in a population at a rate proportional to relative quality.		Selection	Recombination	Mutation	None of these	A
48	_____ decomposes two distinct solutions and then randomly mixes their parts to form novel solutions.		Selection	Recombination	Mutation	None of these	B
49	_____ randomly perturbs a candidate solution.		Selection	Recombination	Mutation	None of these	C
50	A _____ is a template consisting of a string composed of three symbol.		Wild symbol	Schema	Layout	None of these	B
51	$\{0,1,\#\}$ is the symbol alphabet ,where # is a special symbol.		Wild card	Schema	Layout	None of these	A
52	Metaheuristics are ?1)non deterministic 2)non approximate 3)not problem specific		1,2,3	1,2	1,3	2,3	c
53	In search techniques, as single point based contradicts population based similary deterministic contradicts _____?		Stochastic	simplex based	complex based	none	a

54	In swarm systems organisations are		centralized	decentralized	controlled by third party	none	b
55	Identify the working sequence of kmean clustering ? 1) redefine cluster centeroids 2) initialize the k centroids 3) make clusters near centroids		1,3,2	3,2,1	2,3,1	2,1,3	c
56	Every particle in the system takes experience from previous particle ?		PSO	ACO	clustering	none	a
57	swarm intelligence includes ? 1) bee colony algorithm 2) ant colony algorithm 3) PSO 4) immune system algorithms		1,2	1,2,3	2,3,4	all of these	d
58	pheromone quantity in ACO is ___ proportional to path selection.		directly	inversely	there is no connection	none	a
59	The ants prefer the smaller drop of honey over the more abundant, but less nutritious, sugar. This is the example of?		kruskal algorithm	Travelling salesman	Knapsack problem	NP hard problem	c
60	In kmeans clustering each cluster is associated with		centroid	edge	common point	none of them	a
61	What is EC?		computer based problem solving systems	Systems that uses computational models of evolutionary process	both a and b	none of these	c
62	Recombination is applied to		2 selected candidated	1 selected candidate	3 selected candidate	none of these	a
63	In EA mutation is applied to		2 candidate	1 candidate	3 candidate	none of these	b
64	EV is used for		solving optimization problems	finding solutions	both a and b	none of these	a
65	EV is considered as		complex	simple	complex and adaptive	all of these	c
66	GA stands for		Genetic Algorithm	genetic programing	genetic assurance	none of these	a
67	Features of GA		A string representation of chromosomes.	A fitness function be to minimized.	A cross-over method and a mutation method.	all of these	d
68	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
69	Evolutionary programming was developed by		Fredrik	Fogel	Frank	Flin	b
70	Evolution Strategies is developed with		selection	mutation	a population of size one	all of these	d
71	Evolution Strategies typically uses		real-valued vector representations	vector representation	time based representation	none of these	a
72	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
73	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d
74	Elements of ES are/is		Parent population size	Survival population size	both a and b	none of these	c
75	What are different types of crossover		discrete and intermedium	discrete and continuous	continuous and intermedium	none of these	a
76	GP individual stores computer program		TRUE	FALSE			a
77	GP selection is		Deterministic selection	Tournament selection	nondeterministic selection	none of these	b
78	EP mutation is		Data specific	Data type specific	non specific	none of these	b
79	categories of EA are/is		Genetic Algorithm	genetic programing	learning Classifier Systems	all of these	d
80	Phases in which the LCS individuals are evaluated are		performance phase	reinforcement phase	both a and b	none of these	c
81	MA sometimes called as		Hybrid EA	Integrated EA	both a and b	none of these	a
82	The truth values of traditional set theory is and that of fuzzy set is		Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	a
83	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by		Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	Fuzzy & Crisp Set	a
84	Fuzzy logic is usually represented as		IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF THEN rules	None of the mentioned	b
85	Three main basic features involved in characterizing membership function are		Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	Core, Support , Boundary	Weighted Average, center of Sums, Median	c
86	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
87	Why can't we design a perfect neural network?		full operation is still not known of biological neurons	number of neuron is itself not precisely known	number of interconnection is very large & is very complex	all of the mentioned	d
88	Both Fuzzy logic and ANN are soft computing techniques because		Both gives precise and accurate results	ANN gives accurate result but fuzzy logic doesn't	In each, no precise mathematical model of the problem is required	Fuzzy logic gives accurate result but ANN doesn't	c
89	Internal state of neuron is called _____, is the function of the inputs the neurons receives		Weight	activation or activity level of neuron	Bias	None of these	b
90	Each connection link in ANN is associated with _____ which has information about the input signal.		neurons	weights	bias	activation function	b
91	In artificial Neural Network interconnected processing elements are called		nodes or neurons	weights	axons	Soma	a
92	The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to		infinite	1	0	0.5	d
93	The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing		Convex Fuzzy Set	Non convex fuzzy set	Normal Fuzzy set	Sub normal fuzzy set	b
94	The cell body of neuron can be analogous to what mathematical operation?		summing	differentiator	integrator	none of the mentioned	a
95	Conventional Artificial Intelligence is different from soft computing in the sense		Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data	Both (a) and (b)	None of the above	c
96	_____ is/are the way/s to represent uncertainty.		Fuzzy Logic	Probability	Entropy	All of the mentioned	d
97	Given two fuzzy sets A and B A={(x1,0.5),(x2,0.1),(x3,0.4)} and B={(x1,0.2),(x2,0.3),(x3,0.5)} then union of 2 sets A U B is		{}{(x1,0.5),(x2,0.1),(x3,0.4)}	{}{(x1,0.5),(x2,0.3),(x3,0.5)}	{}{(x1,0.2),(x2,0.3),(x3,0.5)}	{}{(x1,0.2),(x2,0.1),(x3,0.4)}	b
98	If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$ $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be		{0.2,0.5,0.6,0.7,0.9}	{0.2, 0.5, 0.2, 0.1, 0.8}	{0.1, 0.5, 0.6, 0.1, 0.8}	{0.1, 0.5, 0.2, 0.1, 0.8}	d
99	For $k>1$, which of the following concept can be used to generate other linguistic hedge?		Concentration and dilation	Dilation	Concentration	None of the mentioned	c

100	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A ∪ B is		{1.0, 0.45, 0.75}	{1, 0.2, 0.75}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	a
101	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A ∩ B is		{1.0, 0.45, 0.75}	{0.2, 0.20, 0.50}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	b
102	Mamdani-style inference involves which steps		Fuzzification of the input variables & Rule evaluation	Aggregation of the rule output & Defuzzification	Both a and b	either a or b	c
103	A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$		Core	Support	Cross-over	α - cut	c
104	Which statement is true?		Mamdani approach characterised by its low interpredictability and low accuracy	Takagi and Sugeno's approach characterised by high accuracy but at the cost of high interpretability	Takagi and Sugeno's approach follows precise fuzzy modelling and obtains high accuracy but at the cost of low interpretability	Mamdani approach characterised by its low interpredictability and high accuracy	c
105	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$		$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) < 1$	c
106	Which can be used as an input to fuzzy controller?		A fuzzy set	a crisp set	Both fuzzy set and Crisp set	None of these	b
107	What are the types of fuzzy logic sets?		Type-1 fuzzy set	Type-2 fuzzy set	Both a and b	None of these	c
108	How is fuzzy logic different from conventional control methods		IF and THEN approach	FOR approach	WHILE approach	DO approach	a
109	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \text{support } A(x)$, where A belongs to A. Then fuzzy set is called normal when		$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) > 1$	c
110	If A and B are sets and $A \cup B = A \cap B$ then		$A=B$	$A=0$	$B=0$	None of these	A
111	If x is A then y is B else y is C. The output of the given fuzzy rule is		A fuzzy set	a crisp set	a fuzzy relation	a membership function	c
112	What Is The First Step Of Fuzzy Logic Toolbox?		Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator(AND or OR) in the antecedent	Aggregation of the consequents across the rule	a
113	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?		What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	The input is a value greater than one and the output is a value less than the input	The input and output have both the same values	The input has two or more values and the output has a single truth value	d
114	What Is The Input And Output Of Step 3 - Apply Implication Method?		Input is a fuzzy set but the output is a whole value	Input is a fuzzy set but the output is a whole value	Input and Output have the same value	Input is a smaller value than the output value	b
115	What Is The Purpose Of Aggregation?		To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	a
116	Linguistic variable is		a variable whose values are words or sentences	any numerical value only	any binary value only	variable which contains TRUE or FALSE values only	a
117	Identification of Input, Output and state variables is performed in which step of FLC?		Fuzzy configuration	Defuzzification	combining fuzzy outputs	Identification of variables	d
118	Assigning linguistic label to each subset is done in which step of FLC?		Fuzzy configuration	Defuzzification	combining fuzzy outputs	fuzzy subset configuration	d
119	Disjunctive system of rules is used for system		that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	a
120	Conjunctive system of rules is used for system		that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	b
121	Categorial reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	a
122	Syllogistic reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	c
123	Qualitative reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	b
124	Dispositional reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	d
125	Mamdani systems are		MISO systems	MIMO systems	Only MISO systems	both a and b	d
126	Sugeno systems are		MISO systems	MIMO systems	Only MISO systems	both a and b	b
127	In the generational model of EA		entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	a
128	In the steady-state model of EA		entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	b
129	In the generational model of EA		each individual survives exactly for two generation	each individual survives exactly for one generation	cannot predict	each individual survives as many generations as want	b
130	In the steady-state model of EA		One offspring is generated per generation	two offsprings are generated per generation	cannot decide	more than two offsprings are generated per generation	a
131	Which of the following algorithm is most efficient for discontinuous and noisy problems?		Evolutionary algorithm	Classical optimization algorithm	Genetic algorithm	none	a
132	Each iteration of EA is referred to as		Generation	Iteration	population	None	a
133	Which of the following are evolutionary operators?		Selection	Crossover	Mutation	All of the above	d
134	In the $(\mu/\rho, \lambda)$ method of ES, parents are		selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	a
135	In the $(\mu/\rho + \lambda)$ method of ES, parents are		selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	b
136	Fitness scaling is desirable to ensure		Population diversity	selection pressure	that better solutions are selected only	relatively inferior solutions are not ignored	a
137	Which mutation operator is used in ES as reproduction operator?		one point	Gaussian mutation	two point	adaptive	b
138	Fitness proportionate selection methods are		Roulette wheel selection	Stochastic universal sampling	tournament selection	All the mentioned	d
139	In which selection method of survival selection there is no notion of fitness?		fitness based selection	elitism	Agebased selection	All the mentioned	c
140	In which selection strategy every individual has the same probability to be selected?		Roulette wheel selection	Uniform selection	tournament selection	Rank selection	b
141	High selection pressure is desirable, when we need		diversity not found in each generation	there is no improvement in successive GA iteration	faster termination of GA	fitness values are not uniformly distributed	c

142	Tournament selection scheme is more preferable when		when fitness values are uniformly distributed	population are with very diversified fitness values	when fitness values are not necessarily uniformly distributed	under all the above situations	b
143	Which of the following is not a characteristic of evolutionary algorithm?		Conceptual simplicity	Parallelism	Broad applicability	Artificial selection	d
144	What is the correct order of steps in evolutionary algorithm?		Select parents-recombine-mutate-evaluate	Select parents-recombine-evaluate-mutate-	Select parents-mutate -recombine-evaluate	Select parents-evaluate -recombine-mutate	a
145	Which of the following schemes are selection schemes in Evolutionary computation?		Hall of fame	Rank based selection	tournament selection	All of the above	d
146	To encode chromosomes which encoding schemes are used		binary encoding	finite state machine encoding	real value encoding	All of the above	d

This sheet is for 3 Mark questions

S.r No	Question	Image	a	b	c	d	Correct Answer
1	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
2	What is defuzzification		conversion of fuzzy set to crisp set	conversion of crisp set to fuzzy set	conversion of fuzzy set to fuzzy logic	conversion of crisp set to crisp logic	a
3	What type of model is required for hard computing		mathematical	biological	chemical	probabilistic	a
4	Which of the following is basic component neuron		dendrites	axon	nucleus	all of the above	d
5	Which of the following computing technique has the ability of learning and adoption		neural network	evolutionary	hard	probabilistic	a
6	The truth value of the fuzzy set is		either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
7	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
8	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Evaluation->Defuzzification	defuzzification->rule evaluation->fuzzification	rule evaluation->fuzzification->defuzzification	rule evaluation->defuzzification->fuzzification	a
9	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
10	Genetic algorithm belongs to the family of methods in the		artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
11	All the following are suitable problems for genetic algorithm EXCEPT		pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
12	In which stage of the simulation methodology do you determine the variable and gather data		Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
13	In which stage of the simulation methodology do you determine how long to run the simulation		Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	D
14	In which stage of the simulation methodology do you determine the system boundaries and environment?		Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
15	What BEST describes a simulation model with a limited number of variables, each with the finite number of values?		system dynamics simulation	discrete event simulation	continuous distribution simulation	Monte Carlo simulation	B
16	The advantage of visual interactive simulation include all of the following EXCEPT		Improvement in training using the simulation	reduced need for the decision maker involvement	The ability to see how a simulation works	improved presentation of simulation results	B
17	What can system dynamics modelling be used for?		qualitative method for analyzing a system	simulation models that test each subsystem in isolation	micro-level simulation models that examine individual values	studying system behaviour at an instant in time	A
18	In agent-based modelling, agents are		the human workers or agents who use the system	communication links between simulation	Autonomous rule-based decision making units	the hardware platform used to conduct the simulation	C
19	Agent-based modelling is best for all the following types of problem features EXCEPT		complex interactions	low uncertainty	Many inter-related factors	irregular data	B
20	What is the final stage of an agent-based modelling (ABM) methodology?		Identifying the agents and determining their behaviour	Determining agent-related data	Validating agent behaviour against reality	determining the suitability of ABM	C
21	Which of the following is the advantage of simulation?		It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skills	It solves problem in one pass with no iteration.	A
22	The truth value of the fuzzy set is		either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
23	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
24	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Evaluation->Defuzzification	defuzzification->rule evaluation->fuzzification	rule evaluation->fuzzification->defuzzification	rule evaluation->defuzzification->fuzzification	a
25	EV is dominantly used for solving ____.		optimization problems	NP problem	simple problems	none of these	a
26	EV is considered as?		adaptive	complex	both a and b	none of these	c
27	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
28	Identify the drawbacks of clustering algorithms? 1) can generate empty clusters 2) can terminate at local minimum 3) can handle noisy data		1,2,3	1,2	3	2,3	b
29	generation of empty cluster problem in clustering can be overcome by?		ACO based clustering	PSO based clustering	kmeans	kmode	b
30	where does PSO based clustering terminates?		global optimum	local optimum	global maximum	local minimum	a
31	Each particle in PSO modifies its position according to ? 1) its velocity 2) its weight 3) its gbest and pbest		2,3	1,2	1,2,3	only 1	c
32	Applications of ACO are ? 1) shortest path 2) assignment problem 3) set problem		2,3	1,2	1,2,3		c
33	Evaporation of pheromones is ?		directly proportional to path length	inversely proportional to path length	constant	none	a
34	Metaheuristics does not include ?		evolutionary algorithms	tabu searching	simulated annealing	none	d
35	Metaheuristics are ? 1) non deterministic 2) non approximate 3) not problem specific		1,2,3	1,2	1,3	2,3	c
36	In search techniques, as single point based contradicts population based similarity		Stochastic	simplex based	complex based	none	a
37	deterministic contradicts ____?		centrized	decentralized	controlled by third party	none	b
38	Identify the working sequence of kmean clustering ? 1) redefine cluster centroids 2) initialize the k centroids 3) make clusters near centroids		1,3,2	3,2,1	2,3,1	2,1,3	c
39	Every particle in the system takes experience from previous particle ?		PSO	ACO	clustering	none	a
40	swarm intelligence includes ? 1) bee colony algorithm 2) ant colony algorithm 3) PSO 4) immune system algorithms		1,2	1,2,3	2,3,4	all of these	d
41	pheromone quantity in ACO is ___ proportional to path selection.		directly	inversely	there is no connection	none	a
42	Recombination involves ___ candidates while mutation requires ___ candidates, and the result is called ____.		1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a

42	Identify the correct sequence for evolutionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3)Create offspring 4)replace some parents		1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
43	Problems for which there is no efficient method to solve such problems exactly are called?		complex	hard	strong	none	b
44	EV is considered as ? 1)complex 2)adaptive		1	2	1,2	none	c
45	EV system was proposed for exploring a____ fitness space and can form____.		multipeaked,clusters	single peaked,clusters	multipeaked,hard problems	single peaked,hard problems	a
46	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3) recombination operator		1,2	1,2,3	2,3	1,3	b
47	Parameters that affect GA are ? 1) initial population 2) fitness function 3) ability to generate offspring		1,3	1,2	1,2,3	only 1	b
48	___ focuses attention on high fitness individuals, thus exploiting the available fitness information.		clustering	offspring production	replace	selection	d
49	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }		ACO	PSO	EA	Kmean	c
50	Genetic algorithm are heuristic methods that do not guarantee an optimal solution to a problem		TRUE	FALSE			A
51	A "What-if" model is most typically used for the most structured problems		TRUE	FALSE			B
52	___ cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solution	none of these	C
53	Discrete events and agent-based models are usually used for ____.		middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
54	___ does not usually allow decision makers to see how a solution to a _____ evolves over time nor can decision makers interact with it.		Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
55	___ is a simulation method that let decision maker see what the model is doing and how it interact.		VIS	VIM	SIV	HIV	A
56	___ systems,especially those developed for the military and video-game industry		VIS	VIM	SIV	HIV	B
57	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?		Simulation	Optimization	human intuition	genetic algorithm	A
58	Which of the following is the advantage of simulation?		It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skills	It solves problem in one pass with no iteration.	A
59	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred		continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B
60	The defining length of a schema is useful to calculate ___ of the schema for ____.		Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A
61	Recombination involves ___ candidates while mutation requires ___ candidates, and the result is called ___.		1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
62	Identify the correct sequence for evolutionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3)Create offspring 4)replace some parents		1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
63	Problems for which there is no efficient method to solve such problems exactly are called?		complex	hard	strong	none	b
64	EV is considered as ? 1)complex 2)adaptive		1	2	1,2	none	c
65	EV system was proposed for exploring a____ fitness space and can form____.		multipeaked,clusters	single peaked,clusters	multipeaked,hard problems	single peaked,hard problems	a
66	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3) recombination operator		1,2	1,2,3	2,3	1,3	b
67	Parameters that affect GA are ? 1) initial population 2) fitness function 3) ability to generate offspring		1,3	1,2	1,2,3	only 1	b
68	___ focuses attention on high fitness individuals, thus exploiting the available fitness information.		clustering	offspring production	replace	selection	d
69	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }		ACO	PSO	EA	Kmean	c
70	Evolution strategies uses ? 1)selection 2)recombination 3)real valued vector		1,2,3	2,3	1,3	only 2	a
71	which of the following statements are true regarding ES ? 1)Survival is deterministic 2)first allows the N best children to survive, and replaces the parents with these children. 3)allows the N best children and parents to survive.		only 1	1,2	only 2	1,2,3	d
72	Evolutionary Algorithms includes ? 1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms		1,2,3,4	2,3	3,4	2,3,4	c
73	Heuristics include ?1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms		1,2,3,4	2,3	1,2		d

74	Which of the following statements are true ? 1)mutation is applied to two selected candidates, the so-called parents, and results in one or two new candidates, the children 2) recombination is applied to one candidate and results in one new candidate.		only 1	only 2	both	none of these	d
75	The ___ is performed by selecting two sub trees by chance from the parents and exchange them to create the descendants.		GP crossover	GP Mutation	GP clustering	GP Recombination	a
76	The ___ is performed by selecting a sub tree of the descendant by chance and to exchange the sub tree with an arbitrary generated new sub tree.		GP crossover	GP Mutation	GP clustering	GP Recombination	b
77	___ are able to learn simple "if {condition} then {action}" style rules23 by learning from feedback		ES	EA	LCS	Heuristics	c
78	Island model is related with ?		Distributed Evolutionary Algorithms	LCS	swarm intelligence	ACO	a
79	payoffs can be easily translated to a ___ function for an EA.		survival	reduction	comination	fitness	d
80	Identify the correct statements with respect to genetic algorithms? 1)A fitness function should maximized. 2)A replacement procedure. 3)A string representation of chromosomes.		1,2	2,3	1,2,3	1,3	b
81	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
82	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
83	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
84	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
85	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
86	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
87	For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
88	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c
89	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
90	The values of the set membership is represented by		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
91	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3): (5, 0), (6, 0.2) \}$ $\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$		$\{(3, 0.3), (6, 0.2)\}$	c
92	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification \rightarrow Rule evaluation \rightarrow Defuzzification	Fuzzification \rightarrow Defuzzification \rightarrow Rule evaluation	Rule evaluation \rightarrow Fuzzification \rightarrow Defuzzification	Rule evaluation \rightarrow Defuzzification \rightarrow Fuzzification	a
93	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		$\{0.9, 0.5, 0.6, 0.8, 0.8\}$	$\{0.6, 0.2, 0.1, 0.7, 0.5\}$	$\{0.1, 0.5, 0.4, 0.2, 0.2\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	c
94	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max(x+y=z \min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to		$\{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.2,16), (1,17), (0.1,18)\}$	$\{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)\}$	$\{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	$\{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	d
95	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
96	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		$\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$	$\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$	$\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$	None of the above	c
97	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
98	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
99	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
100	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c
101	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
102	----- defines logic funtion of two prepositions		prepositions	Linguistic hedges	truth tables	inference rules	c

103	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
104	Multiple conjunctives antecedents is method of ----- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
105	Multiple disjunctives antecedents is method of ----- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
106	IF x is A and y is B then z=c (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
107	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
108	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
109	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semig-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
110	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
111	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
112	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
113	In Evolutionary programming, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
114	In Evolutionary strategy, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
115	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
116	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
117	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
118	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
119	Evolutionary Strategies (ES)		(μ,λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b
120	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
121	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
122	(1+1) ES		offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
123	(1+λ) ES		λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
124	Termination condition for EA		mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
125	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
126	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
127	(1+1) ES		Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
128	Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
129	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
130	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

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Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

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	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intution, Inference, Rank Ordering B.Fuzzy Algorithm, Neural network, Genetic Algorithm C.Core, Support , Boundary D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core B.Support C.Boundary D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

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	<p>B.normal fuzzy set C.convex fuzzy set D.concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A.1 B.0 C.infinite D.Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A.normal fuzzy set B.subnormal fuzzy set. C.convex fuzzy set D.concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesn't deal with 2 valued logic</p>	D

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	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	<p>Defuzzification is done to obtain</p> <ul style="list-style-type: none"> a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above 	a
13.	<p>“The train is running fast”. Here ‘fast’ can be represented by</p> <ul style="list-style-type: none"> a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned 	a
14.	<p>Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$</p> <p>Then the crisp value of Young using MoM method is</p> <ul style="list-style-type: none"> a) 25 b) 20 c) 35 d) 50 	a
15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area 	c

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	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)\text{complement} \neq \text{---} (A\lambda)\text{complement}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

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	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

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	d) None of the above	
26.	Fuzzy logic is a form of a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic	Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.
27.	Traditional set theory is also known as Crisp Set theory. a) True b) False	Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set. 3. The truth values of traditional set theory is _____ and that of fuzzy set is _____
28.	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Answer: a Explanation: Refer the

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	<p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	definition of Fuzzy set and Crisp set.
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p> <p>a) Fuzzy Set b) Crisp Set</p>	<p>Answer: a Explanation: Fuzzy logic deals with linguistic variables.</p>
31.	<p>The values of the set membership is represented by</p> <p>a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c</p>	<p>Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.</p>
32.	What is meant by probability density function?	d

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	<p>a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables</p>	
33.	<p>Which of the following is used for probability theory sentences?</p> <p>a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned</p>	<p>Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.</p>
34.	<p>Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.</p> <p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy</p>

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		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <ul style="list-style-type: none"> a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned 	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <ul style="list-style-type: none"> a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned 	<p>Answer: c</p> <p>Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

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Soft Computing & Optimization Algorithms [Multiple Choice Question] **UNIT No-03****Name of Content: Fuzzy Systems- Fuzzy Controller**

01	Fuzzy logic is :	
	Option A	Used to respond to questions in a human like way
	Option B	A new programming language used to program animation
	Option C	The result of fuzzy thinking
	Option D	A term that indicates logical values greater than one
	Correct Answer	A
02	What are the following sequence of steps taken in designing a fuzzy logic machine?	
	Option A	Rule evaluation->Fuzzification->Defuzzification
	Option B	Fuzzification->Rule evaluation->Defuzzification
	Option C	Fuzzy Sets->Defuzzification->Rule evaluation
	Option D	Defuzzification->Rule evaluation->Fuzzification
	Correct Answer	B
03	Fuzzy logic is a form of	
	Option A	Two-valued logic
	Option B	Crisp set logic
	Option C	Many-valued logic
	Option D	Binary set logic
	Correct Answer	C
04	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$	
	Option A	$h(A) = 0$
	Option B	$h(A) < 0$
	Option C	$h(A)=1$
	Option D	$h(A)<1$
	Correct Answer	C
05	Assumptions in Fuzzy Logic Control (FLC) Design	
	Option A	Existence of a knowledge body
	Option B	Range of precision
	Option C	The plant is observable and controllable
	Option D	All of the above
	Correct Answer	D

Name of Content: Fuzzy Rule Base & Approximate Reasoning

01	Fuzzy logic uses	
	Option A	Global variables
	Option B	Linguistic variables
	Option C	Local variables
	Option D	Approximate variables
	Correct Answer	B
02	_____ as an operator acts on fuzzy set representing meaning of its operand	
	Option A	Defuzzification
	Option B	Truth table
	Option C	Linguistic hedges
	Option D	Propositions
	Correct Answer	C
03	The major components of the FLC	
	Option A	Fuzzifier & Defuzzifier
	Option B	Fuzzy Rule Base & Knowledge Base
	Option C	Inference Engine
	Option D	All of the above
	Correct Answer	D
04	Which of the following not an Advantages of Fuzzy Logic Control	
	Option A	Cheaper
	Option B	Robust
	Option C	Reliability
	Option D	Expensive
	Correct Answer	D
05	Examples of Fuzzy quantifiers are words like	
	Option A	Most
	Option B	Many
	Option C	Few
	Option D	All of the above
	Correct Answer	D
06	Fuzzy truth qualification claims the degree of truth of fuzzy proposition	
	Option A	True
	Option B	False
	Correct Answer	A

07	Propositions in fuzzy logic involves	
	Option A	Fuzzy predicate
	Option B	Fuzzy Quantifier
	Option C	Fuzzy Qualifier
	Option D	All of the above
	Correct Answer	D
08	Formation of Rules: I: Assignment statement; II: Conditional statement; III: Unconditional statement	
	Option A	Only I
	Option B	Only I & II
	Option C	Only I, II & III
	Option D	Only II & III
	Correct Answer	C
09	Methods used for decomposition of rules	
	Option A	Multiple conjunctive antecedents
	Option B	Multiple disjunctive antecedents
	Option C	Conditional statement
	Option D	All of the above
	Correct Answer	D
10	Multiple conjunctive antecedents based on	
	Option A	Fuzzy union operation
	Option B	Fuzzy intersection operation
	Option C	Fuzzy condition operation
	Option D	Fuzzy difference operation
	Correct Answer	B
11	Two methods of Aggregation of fuzzy rules	
	Option A	Conjunctive system of rules
	Option B	Disjunctive system of rules
	Option C	Both a & b
	Option D	Neither a nor b
	Correct Answer	C
12	In disjunctive system of rules, output determined by performing fuzzy union of all individual rule consequents	
	Option A	True
	Option B	False
	Correct Answer	A

Name of Content: Fuzzy Reasoning and Fuzzy Inference system

01	In this form of reasoning, the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	
	Option A	Qualitative Reasoning
	Option B	Categorial Reasoning
	Option C	Syllogistic Reasoning
	Option D	Dispositional Reasoning
	Correct Answer	B
02	A Fuzzy syllogism can be expressed as $x=s_1$ A's are B's & $y=s_2$ C's are D's	
	Option A	$z=s_2$ C's are D's
	Option B	$z=s_2$ A's are B's
	Option C	$z=s_2$ C's are D's
	Option D	$z=s_3$ E's are F's
	Correct Answer	D
03	The Conjunction rule is	
	Option A	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \cap \sim B$
	Option B	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A - \sim B$
	Option C	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \ast \sim B$
	Option D	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \cap \sim B$
	Correct Answer	D
04	The negative rule of inference is	
	Option A	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } \sim A$
	Option B	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } A$
	Option C	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } A$
	Option D	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow x \text{ is } A$
	Correct Answer	A
05	In this mode of reasoning, the antecedents & consequents have fuzzy linguistic variables	
	Option A	Qualitative Reasoning
	Option B	Categorial Reasoning
	Option C	Syllogistic Reasoning
	Option D	Dispositional Reasoning
	Correct Answer	A

07	How many types are available in machine learning?	
	Option A	1
	Option B	2
	Option C	3
	Option D	4
	Correct Answer	C
08	How the decision tree reaches its decision?	
	Option A	Single test
	Option B	Two test
	Option C	Sequence of test
	Option D	No test
	Correct Answer	C
09	What Is Fuzzy Inference Systems?	
	Option A	The process of formulating the mapping from a given input to an output using fuzzy logic
	Option B	Changing the output value to match the input value to give it an equal balance
	Option C	Having a larger output than the input
	Option D	Having a smaller output than the input
	Correct Answer	A
10	Where Has Fuzzy Inference Systems Been Implemented?	
	Option A	Wireless services, heat control and printers
	Option B	Restrict power usage, telephone lines and sort data
	Option C	Simulink, boiler and CD recording
	Option D	Automatic control, decision analysis and data classification
	Correct Answer	D
11	What Is Another Name For Fuzzy Inference Systems?	
	Option A	Fuzzy Expert System
	Option B	Fuzzy Modelling
	Option C	Fuzzy Logic Controller
	Option D	All of the above
	Correct Answer	D
12	The Equation For Probabilistic: Prob(a,b) = a+b - ab	
	Option A	True
	Option B	False
	Correct Answer	A

Soft Computing & Optimization Algorithms [Multiple Choice Question] **UNIT No-04**

Name of Content: Basic Evolutionary Processes, EV: A Simple Evolutionary System

- 01 The tendency of population to remain in genetic equilibrium may be disturbed by
Option A Random mating
Option B Lack of migration
Option C Lack of mutations
Option D Lack of random mating

Correct Answer **D**

- 02 One of the important consequences of geographical isolation is:
Option A Random creation of new species
Option B No change in the isolated fauna
Option C Preventing Speciation
Option D Speciation through reproductive isolation

Correct Answer **D**

- 03 What is meant by the term Darwin fitness?
Option A The ability to survive and reproduce
Option B High aggressiveness
Option C Healthy appearance
Option D Physical strength

Correct Answer **A**

- 04 Diversification in plant life appeared:
Option A Due to abrupt mutations
Option B Suddenly on earth
Option C By seed dispersal
Option D Due to long periods of evolutionary changes

Correct Answer **D**

- 05 Chemical reactions could have converted simple organic compounds into _____ for the origin of life
Option A Micromolecules
Option B Nitrogen, oxygen and other gases
Option C Cells
Option D Macromolecules

Correct Answer **D**

- 06 Which one of the following sequences was proposed by Darwin and Wallace for organic evolution?
- Option A Overproduction, variations, constancy of population size, natural selection
- Option B Variations, constancy of population size, overproduction, natural selection
- Option C Overproduction, constancy of population size, variations, natural selection
- Option D Variations, natural selection, overproduction, constancy of population size
- Correct Answer** **C**
- 07 _____ is a subset of evolutionary computation,[1] a generic population-based meta-heuristic optimization algorithm
- Option A Genetic Algorithm
- Option B Evolutionary algorithm (EA)
- Option C Simulated Annealing
- Option D Artificial Intelligence
- Correct Answer** **B**
- 08 An EA uses mechanisms inspired by biological evolution, such as
- Option A mutation
- Option B recombination
- Option C selection
- Option D All of the above
- Correct Answer** **D**
- 09 Genetic Algorithms are
- Option A a class of algorithms that try and build solutions by introducing evolution and selection of the best in a population of candidate solutions
- Option B Methods, based on the theory of natural selection and evolutionary biology, for solving optimization problems.
- Option C A heuristic search method used in artificial intelligence and computing.
- Option D All of the above
- Correct Answer** **D**
- 10 Objects forming possible solutions within the original problem context are referred to as
- Option A Phenotypes
- Option B Genotypes
- Option C Genes
- Option D Chromosomes
- Correct Answer** **A**

Name of Content: Canonical Evolutionary Algorithms

- 01 In Evolutionary algorithm, An individual consist of
Option A Genotype and phenotypes
Option B Parent selection and crossover
Option C Genotype and a fitness function
Option D Mutation and recombination
- Correct Answer C**
- 02 Evolutionary Strategies were developed in the sixties by
Option A John Holland
Option B Rechenberg and Schwefe
Option C Allen and Karjalainen
Option D Ryan and Collins
- Correct Answer B**
- 03 EA heuristic follows
Option A Initialization
Option B Evaluation
Option C Mutation and selection
Option D All of the above
- Correct Answer D**
- 04 Selection is based on
Option A Ranking of the individual fitness
Option B Recombination of parents
Option C Mutation of parameter
Option D None of the above
- Correct Answer A**
- 05 The Simple evolution strategy operates on population of size two:
Option A The current point (parent)
Option B Result of its mutation (one offspring)
Option C Both a and b
Option D None of the above
- Correct Answer C**
- 06 Depending on search space & objective function, recombination & mutation of strategy parameter may or may not occur in specific algorithm
Option A True
Option B False
- Correct Answer A**

Name of Content: A Unified view of Simple EAs

01 EA consist of following elements

- | | |
|----------|---------------------------|
| Option A | Parent Population size |
| Option B | Survival selection method |
| Option C | Parent selection method |
| Option D | All of the above |

Correct Answer **D**

02 _____ which of the following method determines to be kept in the next generation

- | | |
|----------|--------------------|
| Option A | Parent selection |
| Option B | Mutation |
| Option C | Recombination |
| Option D | Survival selection |

Correct Answer **D**

03 Roulette wheel selection scheme is preferable when

- | | |
|----------|--|
| Option A | Fitness values are uniformly distributed |
| Option B | Fitness values are non-uniformly distributed |
| Option C | Needs low selection pressure |
| Option D | Needs high population diversity |

Correct Answer **A**

04 A genetic operator used in genetic algorithms for selecting potentially useful solutions for recombination.

- | | |
|----------|---------------------------------|
| Option A | Fitness proportionate selection |
| Option B | Roulette wheel selection |
| Option C | Rank selection method |
| Option D | Stochastic universal sampling |

Correct Answer **A & B**

05 _____ is a method of selecting an individual from a population of individuals in a genetic algorithm.

- | | |
|----------|-------------------------------|
| Option A | Roulette wheel selection |
| Option B | Rank selection method |
| Option C | Tournament selection |
| Option D | Stochastic Universal Sampling |

Correct Answer **C**

06 As selection pressure increases, fitter solutions are more likely to survive

- | | |
|----------|-------|
| Option A | True |
| Option B | False |

Correct Answer **A**

- 07 What are normally the two best measurement units for an evolutionary algorithm?
- Option A Number of evaluations
Option B Number of generations
Option C Elapsed & CPU time
Option D Both a & b
- Correct Answer D**
- 08 What is most important to be concerned with in the evolution of repetitive problems?
- Option A Do multiple runs until a good solution is found
Option B Execute one run until the solution is good enough
Option C Get a reasonably good solution every time
Option D Get a very good result just once
- Correct Answer C**
- 09 Evolutionary Strategies (ES)
- Option A (μ, λ) : Select survivors among parents and offspring
Option B $(\mu + \lambda)$: Select survivors among parents and offspring
Option C $(\mu - \lambda)$: Select survivors among offspring only
Option D $(\mu : \lambda)$: Select survivors among offspring only
- Correct Answer B**
- 10 Rank based selection
- Option A Use relative rather than absolute fitness
Option B Use absolute rather than relative fitness
Option C Results in less control of the selection pressure than fitness-proportionate selection
Option D Ranking can be either linear or non-linear
- Correct Answer A & D**

Who initiated the idea of Soft Computing		Charles Darwin	Lofti Zadeh	Rechenberg	Mc_Culloch	B
What are the two types of learning		Improvised and Unimprovised	Supervised and Unsupervised	Layered and Unlayered	None of the above	B
A Neural Network can answer		For Loop questions	what-if questions	IF-THEN-ELSE Analysis questions	None of the above	B
Artificial Neural Network used for		Pattern Recognition	Classification	Clustering	All of these	D
In artificial Neural Network Interconnected Processing elements are called		Nodes or Neurons	Weights	Axons	Soma	A
Neural Computing is		mimics human brain	information processing paradigm	Both (a) and (b)	None of the above	C
Fuzzy logic is :		Used to respond to questions in a humanlike way	A new programming language used to program animation	The result of fuzzy thinking	A term that indicates logical values greater than one	A
What Is The First Step Of Fuzzy Logic Toolbox?		Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator (AND or OR) in the antecedent	Aggregation of the consequents across the rules	A
Core of Soft Computing is		Fuzzy Computing, Neural Computing, Genetic Algorithms	Fuzzy Network and Artificial Intelligence	Artificial Intelligence and neural network	Neural Science and Genetic Science	A
Fuzzy Computing		Mimics human behaviour	doesnt deal with 2 valued logic	Deals with information which is vague, imprecise, uncertain, inexact, or probabilistic	All of the above	D
Core of soft Computing is		Fuzzy Computing, Neural Computing, Genetic Algorithms	Fuzzy Networks and Artificial Intelligence	Artificial Intelligence and Neural Science	Neural Science and Genetic Science	A
Unsupervised learning is		learning without computers	problem based learning	learning from environment	learning from teachers	C
Conventional Artificial Intelligence is different from soft computing in the sense		Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data	Both (a) and (b)	None of the above	C
The membership functions are generally represented in		Tabular Form	Graphical Form	Mathematical Form	Logical Form	B
Three main basic features involved in characterizing membership function are		Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	Core, Support, Boundary	Weighted Average, center of Sums, Median	C
A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	B
Connections across the layers in standard topologies & among the units within a layer can be organised		in feedforward manner	in feedback manner	both feedforward & feedback	either feedforward & feedback	D
Internal state of neuron is called _____, is the function of the inputs the neurons receives		Weight	activation or activity level of neuron	Bias	None of these	D
Genetic Algorithm are a part of		Evolutionary Computing	inspired by Darwin's theory about evolution - "survival of the fittest"	are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics	All of the above	D
Fuzzy Computing		mimics human behaviour	doesnt deal with 2 valued logic	deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic	All of the above	D
For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	D
Which of the following is true for neural networks? (i) The training time depends on the size of the network. (ii) Neural networks can be simulated on a conventional computer. (iii) Artificial neurons are identical in operation to biological ones.		All of the mentioned	(ii) is true	(i) and (ii) are true	None of the mentioned	C
There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	A
If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)(x)$ will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.5}	{0.1, 0.5, 0.4, 0.2, 0.2}	{0.1, 0.5, 0.4, 0.2, 0.3}	C
Internal state of neuron is called _____, is the function of the inputs the neurons receives		Weight	activation or activity level of neuron	Bias	None of these	B
Membership function can be thought of as a technique to solve empirical problems on the basis of		knowledge	examples	learning	experience	D
Fuzzy Computing		doesnt deal with 2 valued logic	mimics human behaviour	deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic	All of the above	D
Evolutionary computation is		Combining different types of method or information	Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.	Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.	None of these	B

Unit II

What is the form of Fuzzy Logic		Two valued logics	Crisp Set Logic	Many-Valued logic	Binary set logic	C
There are also other operators. More linguistic in nature, called _____ that can be applied to Fuzzy set theory		Hedges	Lingual Variables	Fuzz Variables	None of the mentioned	A
Membership functions can be thought of as a technique to solve empirical problem on the basis of		Knowledge	Examples	Learning	Experience	D
The membership functions are generally represented in		Tabular Form	Graphical Form	Mathematical Form	Logical form	B
The value of set membership is represented by		Discrete set	Degree of truth	Probabilities	Both degree of truth & Probabilities	B
Fuzzy set theory defines Fuzzy operators. Choose the fuzzy operation from the following_		AND	OR	NOT	All of the mentioned	D
_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate. And simply solution logic.		Fuzzy relation DB	Ecorithms	Fuzzy Set	None of the mentioned	C
Fuzzy logic is usually represented as_____		IF-THEN-ELSE-rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	B
The truth value of traditional set theory is _____ and that of Fuzzy set is _____		Either 0 or 1, between 0 & 1	Between 0 & 1. either 0 or 1	Between 0 & 1. Between 0 & 1	Either 0 or 1. Either 0 or 1	A
A robot is a _____		Computer-controlled machine that mimics the motor activities of living things	Machine that thinks like a human	Machine that replaces a human by performing complex mental processing tasks	Type of virtual reality device that takes the place of humans in adventures	A
The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup_{x \in A} h(x)$ where x belongs to A. Then the fuzzy set A is called normal when		$h(A)=0$	$h(A)<0$	$h(A)=1$	$h(A)<1$	C
Fuzzy logic is a form of		Two-valued logic	Crisp set logic	Many-valued logic	Binary set logic	C
Consider a fuzzy set old as defined below old={\{(20,0),(30,0.2),(40,0.4),(50,0.6),(60,0.8),(70,1),(80,1)\}}. Then the alpha-cut for alpha=0.4 for the set old will be		\{(40,0.3)\}	\{50,60,70,80\}	\{(20,0.1),(30,0.2)\}	\{(20,0),(30,0),(40,1),(50,1),(60,1),(70,1),(80,1)\}	D
If A and B are two fuzzy sets with membership functions ?A(x) = {0.6, 0.5, 0.1, 0.7, 0.8} ?B(x) = {0.9, 0.2, 0.6, 0.8, 0.5} Then the value of ? Complement A?B(x) will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.5}	{0.1, 0.5, 0.4, 0.2, 0.2}	{0.1,0.5,0.4,0.2,0.3}	C
_____ is/are the way/s to represent uncertainty.		Fuzzy Logic	Probability	Entropy	All of the mentioned	D
The truth values of traditional set theory is _____ and that of fuzzy set is _____		Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	A
Fuzzy logic is usually represented as		IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	B
If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$, $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be		\{0.2,0.5,0.6,0.7,0.9\}	\{0.2, 0.5, 0.2, 0.1, 0.8\}	\{0.1, 0.5, 0.6, 0.1, 0.8\}	\{0.1, 0.5, 0.2, 0.1, 0.8\}	D
A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$		Core	Support	Cross-over	α - cut	C
What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	A
Which of the following is not true regarding the principles of fuzzy logic		Fuzzy Logic is a concept of Certain Degree	Boolean logic is a subset of Fuzzy logic	Japan is the most active member of Fuzzy member	Fuzzy logic follow the principle of Aristostle,	D
Which of the following is a type of Membership function?		Triangular	Trapezoidal	Sigma	All of the mentioned	D
Using IF-THEN rule to create the output of fuzzy system is called		Inference	Implication	Both the mentioned	None of the mentioned	C
Which of the following is not a principle step in fuzzy technique		Fuzzify input	Apply implication method	Defuzzify final output	None of the mentioned	D
Which is the set, whose membership only can be true or false, in bi-values Boolean logic		Boolean set	Crisp set	Null set	None of the mentioned	B
Defuzzification methods are		Lambda-cut-method	maxima method	centroid method	All of the mentioned	D
What Is Fuzzy Inference Systems		process of formulating the mapping from given input to output using fuzzy logic	changing output value to match input value to give it at equal balance	having higher output than input	having lower output than input	A
What Is Another Name For Fuzzy Inference Systems		Fuzzy expert system	fuzzy modeling	Fuzzy logic controller	All of the mentioned	D
Who initiate the idea of soft computing		charles darwin	zadeh	culloch	Rechenberg	B
The region of universe that is characterized by complete membership in the set is called		Core	Support	Boundary	Fuzzy	A

Unit III

In a Fuzzy Set a prototypical element has a value		1	0	Infinite	Not defined	A																		
What is Fuzzy Inference Systems?		The process of formulating the mapping from a given input to an output using fuzzy logic	Changing the output value to match the input value to give it an equal balance	Having a larger output than the input	Having a smaller output than the input	A																		
What Are The Two Types Of Fuzzy Inference Systems		Model-Type and System-Type	Momfred-Type and Semigi-Type	Mamdani-Type and Sugeno-Type). Mihni-Type and Sujgani-Type	C																		
Where Has Fuzzy Inference Systems Been Implemented?		Wireless services, heat control and printers	Restrict power usage, telephone lines and sort data	Simulink, boiler and CD recording	Automatic control, decision analysis and data classification	D																		
What attempt was Mamdanis Fuzzy Inference Method Was Designed for?		Control any two combinations of any two products by synthesizing a set of linguistic control rules obtained from experienced human operations.	Control a television and remote combination by synthesizing a set of linguistic control rules obtained from experienced human operations	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	C																		
Two fuzzy sets P and Q are defined on X as follows: <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>$\mu(X)$</th> <th>X1</th> <th>X2</th> <th>X3</th> <th>X4</th> <th>X5</th> </tr> <tr> <td>P</td> <td>0.1</td> <td>0.2</td> <td>0.7</td> <td>0.5</td> <td>0.4</td> </tr> <tr> <td>Q</td> <td>0.9</td> <td>0.6</td> <td>0.3</td> <td>0.2</td> <td>0.8</td> </tr> </table> Then, according to λ -cut method, $(P \cap Q)_{0.4} = ?$	$\mu(X)$	X1	X2	X3	X4	X5	P	0.1	0.2	0.7	0.5	0.4	Q	0.9	0.6	0.3	0.2	0.8		{X1,X2,X3,X4}	{X1,X2,X3,X4,X5}	{X5}	{X1,X2,X5}	C
$\mu(X)$	X1	X2	X3	X4	X5																			
P	0.1	0.2	0.7	0.5	0.4																			
Q	0.9	0.6	0.3	0.2	0.8																			
The Truth Value of R: "if mango is sweet then cost is high " Given P: mango is sweet with $\mu(P) = 0.3$ and Cost		$\mu(R) = 0.3$	$\mu(R) = 0.5$	$\mu(R) = 0.7$	$\mu(R) = 0.0$	C																		
What is another name of Fuzzy inference system?		Fuzzy Controller System	Fuzzy expert System	Fuzzy Modeling	All of the above	D																		
Expert system is		Combining different types of method or information	Approach to design of learning algorithms that	An information base filled with the knowledge of an expert formulated in terms of if then else rules	None of these	C																		
What is Fuzzy Inference System		The process of formulating the mapping form a given input to an output using Fuzzy logic	Changing the output value to match the input value to give it an equal balance	Having a larger output than the input	Having a smaller output than the input	A																		
What Is The Purpose Of Aggregation?		To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	C																		
What attempt was Mamdanis Fuzzy Inference Method Was Designed for?		Control any two combinations of any two products by synthesizing a set of linguistic control rules obtained from experienced human operations.	Control a television and remote combination by synthesizing a set of linguistic control rules obtained from experienced human operations	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	C																		
The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by		Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	None of the mentioned	A																		
Fuzzy Computing		doesnt deal with 2 valued logic	mimics human behavior	deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or	All of the above	D																		
Sugeno approach to FLC design is Computationally more expensive compare to Mamdani approach because		Mamdani approach considers a less number of rules in fuzzy rule base	Searching a rule in mamdani approach is simple and hence less time consuming	Sugeno approach consider a large number of rules in fuzzy rule base	Computation of each rule in sugeno approach is more time consuming.	D																		
Fuzzy logic is		Used to respond to questions in a humanlike way	A new programming language used to program animation	The result of fuzzy thinking	A term that indicates logical values greater than one	A																		
A robot is a _____		Computer-controlled machine that mimics the motor activities of living things	Machine that thinks like a human	Machine that replaces a human by performing complex mental processing tasks	Type of virtual reality device that takes the place of humans in adventures	A																		
What is Fuzzy Inference Systems?		The process of formulating the mapping from a given input to an output using fuzzy logic	Changing the output value to match the input value to give it an equal balance	Having a larger output than the input	Having a smaller output than the input	A																		
What Are The Two Types Of Fuzzy Inference Systems		Model-Type and System-Type	Momfred-Type and Semigi-Type	Mamdani-Type and Sugeno-Type). Mihni-Type and Sujgani-Type	C																		
Where Has Fuzzy Inference Systems Been Implemented?		Wireless services, heat control and printers	Restrict power usage, telephone lines and sort data	Simulink, boiler and CD recording	Automatic control, decision analysis and data classification	D																		
What attempt was Mamdanis Fuzzy Inference Method Was Designed for?		Control any two combinations of any two products by synthesizing a set of linguistic control rules obtained from experienced human operations.	Control a television and remote combination by synthesizing a set of linguistic control rules obtained from experienced human operations	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	C																		
What Is The First Step Of Fuzzy Logic Toolbox?		Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator (AND or OR) in the antecedent	Aggregation of the consequents across the rules	A																		

What Is The Input And Output Of Step 3 - Apply Implication Method?		Input is a fuzzy set but the output is a whole value	Input is a whole value but the output can be a fuzzy set	Input and output have the same value	Input is a smaller value than the output value	B
The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____		Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	None of the mentioned	A
Fuzzy Computing		doesn't deal with 2 valued logic	mimics human behavior	deals with information which is vague, imprecise, uncertain,	All of the above	D
Sugeno approach to FLC design is Computationally more expensive compare to Mamdani approach because		Mamdani approach considers a less number of rules in fuzzy rule base	Searching a rule in mamdani approach is simple and hence less time consuming	Sugeno approach consider a large number of rules in fuzzy rule base	Computation of each rule in sugeno approach is more time consuming.	D
The Truth Value of R: "if mango is sweet then cost is high " Given P: mango is sweet with $\mu(P)=0.3$ and Cost is high with		$\mu(R) = 0.3$	$\mu(R) = 0.5$	$\mu(R) = 0.7$	$\mu(R) = 0.0$	C
Fuzzy logic is a form of		Two values logic	Crisp Set logic	Many valued logic	Binary Set logic	C
How is the Fuzzy logic different than Conventional Control Method		IF and THEN approach	For Approach	While Approach	Do approach	A
In the following some statements are given i) Fuzzy set is crisp set but reverse is not true ii) if A, B, C are the three sets defined over universe of discourse say X such that A<= B and B<=C then A<=C iii) Membership function defines the fuzziness in fuzzy set irrespective of elements in the set, which are discrete or continuous Choose the correct statements given above		I only	ii only	Both ii, iii	All i, ii, iii	C
What Is The Purpose Of Aggregation?		To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	C
What is another name of Fuzzy inference system?		Fuzzy Controller System	Fuzzy expert System	Fuzzy Modeling	All of the above	D
Unit IV						
Who is Evolutionary computation?		Combining different types of method or information	Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.	Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.		B
What is Perceptron?		General class of approaches to a problem.	Performing several computations simultaneously	Structures in a database those are statistically relevant	Simple forerunner of modern neural networks, without hidden layers	D
Which one of the following is the smallest biological unit capable of evolving over time?		A cell	A species	A population	An individual Organism	C
Charles Darwin discussed all of the following except		Individual within species exhibit variability in form and function	Gene mutations are the sources of variation for evolution	Natural selection removes organisms that are poorly adapted to their environment	Organisms produce more offspring than can survive	B
What is Initiating Force of evolution?		Variation	Natural Selection	Competition	Adaptation	A
Which of the following are the main components of Evolutionary Computing?		Initial population	Fitness function	Mutation	All of Above	D
How the characteristics of individual is represented?		Chromosome	Gray code	Initial Population	None	A
Which is the main concept of Evolutionary computation?		Survival of fittest	Survival of weakest	Phenotype	None	A
Which of the following schemes are selection schemes in Evolutionary Computing?		Half of fame	Rank based selection	Tournament selection	All of above	D
Which of the following Algorithm is most efficient for discontinuous and noisy problem?		Evolutionary Algorithm	Classical optimization problem'	Genetic Algorithm	None	A
Each iteration of EA is referred to as		Generation	Iteration	Population	None	A
Which Selection strategy is called ordinary based selection		Roulette wheel selection	Canonical selection	Tournament Selection	Rank based Selection	D
When will be Roulette wheel selection preferable?		fitness values are uniformly distributed	fitness values are non-uniformly distributed	Needs low selection pressure	needs high population diversity	A
How can be 0-1 Knapsack problem defined?		Minimum Optimization problem	maximum Optimization Problem	0-1 Knapsack problem is not an optimization problem	None	B
Darwin was the first scientist to propose the concept of evolution.		TRUE	FALSE			B
What molecular evidence do we have that all of life is related?		All life on earth has the same set of mutation in its genes	All life on earth has DNA	All life on earth has same number of DNA pairs	All life on earth stores its genetic material inside the nucleic acid of its cell	B
When will be Tournament Selection scheme is more preferable?		fitness values are uniformly distributed	population are with very diversified fitness values	fitness values are non-uniformly distributed	under all the above situations	B

What is desirable to ensure in Fitness Scaling?		Population diversity	Selection pressure	That better solution in a population selected only	Relatively inferior solutions are not ignored	A
Damage and errors in DNA cause		Mutation	DNA repair	Translation	Transcription	A
Mark the INCORRECT statement about Mutation		Mutation is predestined	Major source of evaluation	Usually deleterious and recessive	It is a reversible process	A
Evolutionary algorithm: Variation operators		Is a selection operator	Act on population level	Act on individual level	Are crossover and mutation	B
Evolutionary algorithm: Recombination		Also known as crossover	Combines elements of two or more genotypes	Also known as mutation	Also known as representation	A
Evolutionary algorithm: Initialization		Individuals are normally generated randomly	Is concerned with generating candidate solutions	Mutation of candidates is normally also taking place during the initialization	Heuristics for generating candidates can be applied	C
The force that initiates evolution is _____		Variation	Mutation	Extinction	Adaptation	A
Extendible architecture is		Modular design of a software application that facilitates the integration of new modules	showing a universal law or rule to be invalid by providing a counter example	A set of attributes in a database tables that refers to data in another table	None of these	A
Evolutionary Strategies (ES)		(μ,λ) : Select survivors among parents and offspring	$(\mu+\lambda)$: Select survivors among parents and offspring	$(\mu-\lambda)$: Select survivors among offspring only	$(\mu:\lambda)$: Select survivors among offspring only	B
According to Schema theory which of the following are functions of Schemas		They can be activated to increase information processing efficiency	They are used to organise our knowledge	They help to decrease bias in information processing	They assist recall	A
Evolutionary algorithm: Survivor selection		Is often stochastic	Also known as replacement	Can be fitness based	Can be age based	A

Unit V

Genetic Algorithm are a part of	Evolutionary Computing	inspired by Darwin's theory about evolution - "survival of the fittest"	are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics	All of the above	D
The red and gamma genes are removed in which type of phages?	Substitution phage	Replacement and substitution phages both	Replacement phage	Substitution is preferred over replacement phage	C
Which of the following techniques does not come under the umbrella of Soft Computing	Genetic Algorithm alone	Genetic fuzzy system	Genetic neural system	Genetic neuro-fuzzy system	A
Which GA operation is computationally most expensive?	Initial population creation	Selection of sub-population for mating	Reproduction to produce next generation	Convergence testing	D
Which of the following optimization problem(s) can be better solved with Order GA?	0-1 Knapsack problem	Travelling salesman problem	Job shop scheduling problem	Optimal binary search tree construction problem	B
Which GA operation is computationally most expensive?	Initial population creation	Selection of sub-population for mating	Reproduction to produce next generation	Convergence testing	C
An optimization problem is stated as follows: maximize $f(x, y) = +$ where $x, y \in x_2 2 125 y^2 R+$. The above optimization problem comes under the category of	Unconstrained optimization problem	Linear optimization problem	Integer value optimization problem	Real value optimization problem	A
What GA encoding scheme suffers from Hamming cliff problem?	Binary coded GA	Real coded GA	Order GA	Tree coded GA	A
Which GA operation is computationally most expensive?	Initial population creation	Selection of sub-population for mating	Reproduction to produce next generation	Convergence testing	C
Roulette wheel selection scheme is preferable when	Fitness values are uniformly distributed	Fitness values are non-uniformly distributed	Needs low selection pressure	Needs high population diversity	A
The Fitness Function in Genetic Algorithms is	method to measure how fit a candidate solution is in solving the problem.	the objective function for the optimization problem being solved	a substitute to approximate the survival abilities of individuals in nature.	a least squares approximation for a polynomial.	A
The basic idea behind Genetic Algorithms is to work with a population	of problem solvers that interact with each other through signs.	of candidate solutions to try and create better candidates by mixing genes	of candidate solutions in which each candidate is heuristically refined. h.	of problem solvers each of which does an independent heuristic search	B
The Fitness Function in Genetic Algorithms is	method to measure how fit a candidate solution is in solving the problem	the objective function for the optimization problem being solved	a substitute to approximate the survival abilities of individuals in nature.	a least squares approximation for a polynomial.	D
Which chemical is released by ants to keep track of their path?	Deoxyribonucleic acid (DNA)	Pheromone	H ₂ O	Citric acid	B
A genetic algorithm (GA) for optimization is most likely to succeed given	a small population of fit and similar individuals	a large population of fit and similar individuals	a small diverse population of fit individuals.	a large diverse population of fit individuals.	D
What is Genes:	Genes are basic instruction for building a GA	Genes are basic Algorithms for building a GA	Genes are basic Programs for building a GA	Genes are basic software for building a GA	A
What are Different Selection Strategies	Roulette Wheel	Rank	Both A & B	Uniform	C
What are the steps involved in General GA:	Initialization → Evaluation → Generation	Evaluation → Generation → Initialization	Initialization → Generation → Evaluation	Evaluation → Initialization → Generation	A
What is Quantum GA:	It deals with Constraint GA	It deals with Sequential GA	It deals with Parallel GA	It deals with Quantum GA	D

Step involved in iteration process in Simple GA		Reproduction → Selection → Evolution → Replacement	Selection → Evolution → Replacement → Reproduction	Selection → Reproduction → Evolution → Replacement	Evolution → Replacement → Reproduction → Selection	C
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Unit VI

In particle swarm Optimization, which of the following is a control parameter?		Position of the particle	Velocity of the paarticle	Maximum Number of Iteration	Accelerated Coefficient(C1 & C2)	D
In Particle Swarm Optimization, a number of particles are considered, these particles are:-		Initially dispersed, with every iteration they coverage	Initiallt converged with every iteratin	Initially dispersed , with every iteration they dispersed	Initiallt converge with every iteration they remain converged	A
During optimization, Particle Swarm Optimization (PSO) caries out		local search only	global search only	both local and global searches simultaneously	neither local nor global search	C
In comparison with a Genetic Algorithm, Particle Swarm Optimization (PSO) is expected to be		more efficient and computationally faster	less efficient but computationally faster	more efficient but computationally slower	less efficient and computationally slower	D
On principle, particle swarm optimization (PSO) solves		maximization problem	minimization problem	neither minimization nor maximization problem	problem having saddle point	A
The concept of Boltzmann-probability distribution is used in Simulated Annealing to ensure that		the probability of selecting bad solutions is more initially but it decreases as the iteration proceeds	the probability of selecting bad solutions is less initially but it increases as the iteration proceeds	the algorithm becomes computationally faster	the algorithm becomes easier to understand	A
The basic idea behind Ant Colony Optimization algorithms is to work with a population		of problem solvers that interact with each other through signs	of candidate solutions to try and create better candidates by mixing genes	of candidate solutions in which each candidate is heuristically refined.	of problem solvers each of which does an independent heuristic search	A
An ant in Ant Colony Optimization algorithm for TSP produces a tour by		a deterministic greedy constructive method.	a stochastic greedy constructive metho	a deterministic perturbation of the previous tour	a stochastic perturbation of the previous tour.	B
What is the relation between the pheromone deposited by an ant on an edge and the cost of the tour generated by that ant in the ACO algorithm?		The pheromone deposited on each edge is directly proportional to the cost of the tour.	The pheromone deposited on each edge is inversely proportional to the cost of the tour	The pheromone deposited on each edge is constant	The pheromone deposited on each edge depends upon the length of that edge.	D
A genetic algorithm (GA) for optimization is most likely to succeed given		a small population of fit and similar individuals.	a large population of fit and similar individuals.	a small diverse population of fit individuals.	a large diverse population of fit individuals.	D

Sample MCQs - Soft Computing and optimization algorithms

Unit I

Who initiated the idea of Soft Computing	Charles Darwin	Lofti Zadeh	Rechenberg	Mc_Culloch	B
What are the two types of learning	Improvised and Unimprovised	Supervised and Unsupervised	Layered and Unlayered	None of the above	B
A Neural Network can answer	For Loop questions	what-if questions	IF-THEN-ELSE Analysis questions	None of the above	B
Artificial Neural Network used for	Pattern Recognition	Classification	Clustering	All of these	D
In artificial Neural Network Interconnected Processing elements are called	Nodes or Neurons	Weights	Axons	Soma	A
Neural Computing is	mimics hyman brain	information processing paradigm	Both (a) and (b)	None of the above	C
Fuzzy logic is :	Used to respond to questions in a humanlike way	A new programming language used to program animation	The result of fuzzy thinking	A term that indicates logical values greater than one	A
What Is The First Step Of Fuzzy Logic Toolbox?	Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator (AND or OR) in the antecedent	Aggregation of the consequents across the rules	A
Core of Soft Computing is	Fuzzy Computing, Neural Computing, Genetic Algorithms	Fuzzy Network and Artificial Intelligence	Artificial Intelligence and neural network	Neural Science and Genetic Science	A

Fuzzy Computing	Mimics human behaviour	deals not deal with 2 valued logic	Deals with information which is vague, imprecise, uncertain, inexact, or probabilistic	All of the above	D
Core of soft Computing is	Fuzzy Computing, Neural Computing, Genetic Algorithms	Fuzzy Networks and Artificial Intelligence	Artificial Intelligence and Neural Science	Neural Science and Genetic Science	A
Unsupervised learning is	learning without computers	problem based learning	learning from environment	learning from teachers	C
Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial Intelligence deals with predicate logic whereas soft computing deals with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols whereas soft computing is based on empirical data	Both (a) and (b)	None of the above	C
The membership functions are generally represented in	Tabular Form	Graphical Form	Mathematical Form	Logical Form	B
Three main basic features involved in characterizing membership function are	Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	Core, Support, Boundary	Weighted Average, center of Sums, Median	C
A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	B

Connections across the layers in standard topologies & among the units within a layer can be organised	in feedforward manner	in feedback manner	both feedforward & feedback	either feedforward & feedback	D
Internal state of neuron is called _____, is the function of the inputs the neurons receives	Weight	activation or activity level of neuron	Bias	None of these	D
Genetic Algorithm are a part of	Evolutionary Computing	inspired by Darwin's theory about evolution - "survival of the fittest"	are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics	All of the above	D
Fuzzy Computing	mimics human behaviour	doesn't deal with 2 valued logic	deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or nonprobabilistic	All of the above	D
For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	D
Which of the following is true for neural networks? (i) The training time depends on the size of the network. (ii) Neural networks can be simulated on a conventional computer. (iii) Artificial neurons are identical in operation to	All of the mentioned	(ii) is true	(i) and (ii) are true	None of the mentioned	C
There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory	Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	A

If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu_{(A \cup B)}(x)$ will be	{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.5}	{0.1, 0.5, 0.4, 0.2, 0.2}	{0.1, 0.5, 0.4, 0.2, 0.3}	C
Internal state of neuron is called _____, is the function of the inputs the neurons receives	Weight	activation or activity level of neuron	Bias	None of these	B
Membership function can be thought of as a technique to solve empirical problems on the basis of	knowledge	examples	learning	experience	D
Fuzzy Computing	doesn't deal with 2 valued logic	mimics human behaviour	deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic	All of the above	D
Evolutionary computation is	Combining different types of method or information	Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.	Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules	None of these	B

Unit II

What is the form of Fuzzy Logic	Two valued logic	Crisp Set Logic	Many-Valued logic	Binary set logic	C
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There are also other operators. More linguistic in nature, called _____ that can be applied to Fuzzy set theory	Hedges	Lingual Variables	Fuzz Variables	None of the mentioned	A
Membership functions can be thought of as a technique to solve empirical problem on the basis of	Knowledge	Examples	Learning	Experience	D
The membership functions are generally represented in	Tabular Form	Graphical Form	Mathematical Form	Logical form	B
The value of set membership is represented by	Discrete set	Degree of truth	Probabilities	Both degree of truth & Probabilities	B
Fuzzy set theory defines Fuzzy operators. Choose the fuzzy operation from the following_	AND	OR	NOT	All of the mentioned	D
_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate. And simply solution logic.	Fuzzy relation DB	Ecorithms	Fuzzy Set	None of the mentioned	C
Fuzzy logic is usually represented as _____	IF-THEN-ELSE-rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	B

The truth value ofs of traditional set theory is _____ and that of Fuzzy set is _____	Either 0 or 1, between 0 & 1	Between 0 & 1. either 0 or 1	Between 0 & 1. Between 0 & 1	Either 0 or 1. Either 0 or 1	A
A robot is a _____	Computer-controlled machine that mimics the motor activities of living things	Machine that thinks like a human	Machine that replaces a human by performing complex mental processing tasks	Type of virtual reality device that takes the place of humans in adventures	A
The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$ where x belongs to A. Then the fuzzy set A is called normal when	$h(A)=0$	$h(A)<0$	$h(A)=1$	$h(A)<1$	C
Fuzzy logic is a form of	Two-valued logic	Crisp set logic	Many-valued logic	Binary set logic	C
Consider a fuzzy set old as defined below $old = \{(20,0),(30,0.2),(40,0.4), (50,0.6),(60,0.8),(70,1), (80,1)\}$. Then the alpha-cut for $\alpha=0.4$ for the set old will be	$\{(40,0.3)\}$	$\{50,60,70,80\}$	$\{(20,0.1),(30,0.2)\}$	$\{(20,0),(30,0), (40,1),(50,1), (60,1),(70,1), (80,1)\}$	D
If A and B are two fuzzy sets with membership functions $?A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $?B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of ?Complement $A?B(x)$ will be	$\{0.9, 0.5, 0.6, 0.8, 0.8\}$	$\{0.6, 0.2, 0.1, 0.7, 0.5\}$	$\{0.1, 0.5, 0.4, 0.2, 0.2\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	C
_____ is/are the way/s to represent uncertainty.	Fuzzy Logic	Probability	Entropy	All of the mentioned	D

The truth values of traditional set theory is _____ and that of fuzzy set is _____	Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	A
Fuzzy logic is usually represented as	IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	B
If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.2, 0.5, 0.6, 0.7, 0.9\}$, $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be	{0.2, 0.5, 0.6, 0.7, 0.9}	{0.2, 0.5, 0.2, 0.1, 0.8}	{0.1, 0.5, 0.6, 0.1, 0.8}	{0.1, 0.5, 0.2, 0.1, 0.8}	D
A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$	Core	Support	Cross-over	α - cut	C
What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	A
Which of the following is not true regarding the principles of fuzzy logic	Fuzzy Logic is a concept of Certain Degree	Boolean logic is a subset of Fuzzy logic	Japan is the most active member of Fuzzy member	Fuzzy logic follow the principle of Aristostle,	D
Which of the following is a type of Membership function?	Triangular	Trapezoidal	Sigma	All of the mentioned	D
Using IF-THEN rule to create the output of fuzzy system is called	Inference	Implication	Both the mentioned	None of the mentioned	C
Which of the following is not a principle step in fuzzy technique	Fuzzify input	Apply implication method	Defuzzify final output	None of the mentioned	D

Which is the set, whose membership only can be true or false, in bi-values Boolean logic	Boolean set	Crisp set	Null set	None of the mentioned	B
Defuzzification methods are	Lambda-cut-method	maxima method	centroid method	All of the mentioned	D
What Is Fuzzy Inference Systems	process of formulating the mapping from given input to output using fuzzy logic	changing output value to match input value to give it at equal balance	having higher output than input	having lower output than input	A
What Is Another Name For Fuzzy Inference Systems	Fuzzy expert system	fuzzy modeling	Fuzzy logic controller	All of the mentioned	D
Who initiate the idea of soft computing	charles darwin	zadeh	culloch	Rechenberg	B
The region of universe that is characterized by complete membership in the set is called	Core	Support	Boundary	Fuzzy	A

Unit III

In a Fuzzy Set a prototypical element has a value	1	0	Infinite	Not defined	A
What is Fuzzy Inference Systems?	The process of formulating the mapping from a given input to an output using fuzzy logic	Changing the output value to match the input value to give it an equal balance	Having a larger output than the input	Having a smaller output than the input	A
What Are The Two Types Of Fuzzy Inference Systems	Model-Type and System-Type	Momfred-Type and Semigi-Type	Mamdani-Type and Sugeno-Type). Mihni-Type and Sujgani-Type	C

Where Has Fuzzy Inference Systems Been Implemented?	Wireless services, heat control and printers	Restrict power usage, telephone lines and sort data	Simulink, boiler and CD recording	Automatic control, decision analysis and data classification	D																		
What attempt was Mamdanis Fuzzy Inference Method Was Designed for?	Control any two combinations of any two products by synthesizing a set of linguistic control rules obtained from experienced human operations	Control a television and remote combination by synthesizing a set of linguistic control rules obtained from experienced human operations	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations	C																		
	{X1,X2,X3,X4} Two fuzzy sets P and Q are defined on X as follows: <table border="1"><tr><td>$\mu(X)$</td><td>X1</td><td>X2</td><td>X3</td><td>X4</td><td>X5</td></tr><tr><td>P</td><td>0.1</td><td>0.2</td><td>0.7</td><td>0.5</td><td>0.4</td></tr><tr><td>Q</td><td>0.9</td><td>0.6</td><td>0.3</td><td>0.2</td><td>0.8</td></tr></table> Then, according to λ -cut method, $(P \cap Q)_{0.4} = ?$	$\mu(X)$	X1	X2	X3	X4	X5	P	0.1	0.2	0.7	0.5	0.4	Q	0.9	0.6	0.3	0.2	0.8	{X1,X2,X3,X4,X5}	{X5}	{X1,X2,X5}	C
$\mu(X)$	X1	X2	X3	X4	X5																		
P	0.1	0.2	0.7	0.5	0.4																		
Q	0.9	0.6	0.3	0.2	0.8																		
The Truth Value of R: "if mango is sweet then cost is high " Given P: mango is sweet with $\mu(P) = 0.3$ and Cost is high with $\mu(Q) = 0.7$ then	$\mu(R) = 0.3$	$\mu(R) = 0.5$	$\mu(R) = 0.7$	$\mu(R) = 0.0$	C																		
What is another name of Fuzzy inference system?	Fuzzy Controller System	Fuzzy expert System	Fuzzy Modeling	All of the above	D																		
Expert system is	Combining different types of method or information	Approach to design of learning algorithms that	An information base filled with the knowledge of an expert formulated in terms of if then else rules	None of these	C																		
What is Fuzzy Inference System	The process of formulating the mapping form a given input to an output using Fuzzy logic	Changing the output value to match the input value to give it an equal balance	Having a larger output than the input	Having a smaller output than the input	A																		

What Is The Purpose Of Aggregation?	To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	C
What attempt was Mamdanis Fuzzy Inference Method Was Designed for?	Control any two combinations of any two products by synthesizing a set of linguistic control rules obtained from experienced human	Control a television and remote combination by synthesizing a set of linguistic control rules obtained from experienced human operations	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human	C
The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____	Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	None of the mentioned	A
Fuzzy Computing	doesnt deal with 2 valued logic	mimics human behavior	deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic	All of the above	D
Sugeno approach to FLC design is Computationally more expensive compare to Mamdani approach because	Mamdani approach considers a less number of rules in fuzzy rule base	Searching a rule in mamdani approach is simple and hence less time consuming	Sugeno approach consider a large number of rules in fuzzy rule base	Computation of each rule in sugeno approach is more time consuming.	D
Fuzzy logic is	Used to respond to questions in a humanlike way	A new programming language used to program animation	The result of fuzzy thinking	A term that indicates logical values greater than one	A

A robot is a _____	Computer-controlled machine that mimics the motor activities of living things	Machine that thinks like a human	Machine that replaces a human by performing complex mental processing tasks	Type of virtual reality device that takes the place of humans in adventures	A
What is Fuzzy Inference Systems?	The process of formulating the mapping from a given input to an output using fuzzy logic	Changing the output value to match the input value to give it an equal balance	Having a larger output than the input	Having a smaller output than the input	A
What Are The Two Types Of Fuzzy Inference Systems	Model-Type and System-Type	Momfred-Type and Semigi-Type	Mamdani-Type and Sugeno-Type). Mihni-Type and Sujgani-Type	C
Where Has Fuzzy Inference Systems Been Implemented?	Wireless services, heat control and printers	Restrict power usage, telephone lines and sort data	Simulink, boiler and CD recording	Automatic control, decision analysis and data classification	D
What attempt was Mamdanis Fuzzy Inference Method Was Designed for?	Control any two combinations of any two products by synthesizing a set of linguistic control rules obtained from experienced human operations	Control a television and remote combination by synthesizing a set of linguistic control rules obtained from experienced human operations	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations	C
What Is The First Step Of Fuzzy Logic Toolbox?	Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator (AND or OR) in the antecedent	Aggregation of the consequents across the rules	A
What Is The Input And Output Of Step 3 - Apply Implication Method?	Input is a fuzzy set but the output is a whole value	Input is a whole value but the output can be a fuzzy set	Input and output have the same value	Input is a smaller value than the output value	B
The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____	Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	None of the mentioned	A

Fuzzy Computing	doesn't deal with 2 valued logic	mimics human behavior	deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic	All of the above	D
Sugeno approach to FLC design is Computationally more expensive compare to Mamdani approach because	Mamdani approach considers a less number of rules in fuzzy rule base	Searching a rule in mamdani approach is simple and hence less time consuming	Sugeno approach consider a large number of rules in fuzzy rule base	Computation of each rule in sugeno approach is more time consuming.	D
The Truth Value of R: "if mango is sweet then cost is high " Given P: mango is sweet with $\mu(P) = 0.3$ and Cost is high with $\mu(Q) = 0.7$ then	$\mu(R) = 0.3$	$\mu(R) = 0.5$	$\mu(R) = 0.7$	$\mu(R) = 0.0$	C
Fuzzy logic is a form of	Two values logic	Crisp Set logic	Many valued logic	Binary Set logic	C
How is the Fuzzy logic different than Conventional Control Method	IF and THEN approach	For Approach	While Approach	Do approach	A
In the following some statements are given i) Fuzzy set is crisp set but reverse is not true ii) if A, B, C are the three sets defined over universe of discourse say X such that A \leq B and n - c than A < C	I only	ii only	Both ii, iii	All I, ii, iii	C
What Is The Purpose Of Aggregation?	To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	C
What is another name of Fuzzy inference system?	Fuzzy Controller System	Fuzzy expert System	Fuzzy Modeling	All of the above	D
Unit IV					

What is Evolutionary computation?	Combining different types of method or information	Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.	Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules		B
What is Perceptron?	General class of approaches to a problem.	Performing several computations simultaneously	Structures in a database those are statistically relevant	Simple forerunner of modern neural networks, without hidden layers	D
Which one of the following is the smallest biological unit capable of evolving over time?	A cell	A species	A population	An individual Organism	C
Charles Darwin discussed all of the following except	Individual within species exhibit variability in form and function	Gene mutations are the sources of variation for evolution	Natural selection removes organisms that are poorly adapted to their environment	Organisms produce more offspring than can survive	B
What is Initiating Force of evolution?	Variation	Natural Selection	Competition	Adaptation	A
Which of the following are the main components of Evolutionary Computing?	Initial population	Fitness function	Mutation	All of Above	D
How the characteristics of individual is represented?	Chromosome	Gray code	Initial Population	None	A
Which is the main concept of Evolutionary computation?	Survival of fittest	Survival of weakest	Phenotype	None	A
Which of the following schemes are selection schemes in Evolutionary Computing?	Half of fame	Rank based selection	Tournament selection	All of above	D
Which of the following Algorithm is most efficient for discontinuous and noisy problem?	Evolutionary Algorithm	'Classical optimization problem'	Genetic Algorithm	None	A

Each iteration of EA is referred to as	Generation	Iteration	Population	None	A
Which Selection strategy is called ordinary based selection	Roulette wheel selection	Canonical selection	Tournament Selection	Rank based Selection	D
when will be Roulette wheel selection preferable?	fitness values are uniformly distributed	fitness values are non-uniformly distributed	Needs low selection pressure	needs high population diversity	A
How can be 0-1 Knapsack problem defined?	Minimum Optimization problem	maximum Optimization Problem	0-1 Knapsack problem is not an optimization problem	None	B
Darwin was the first scientist to propose the concept of evolution.	TRUE	FALSE			B
What molecular evidence do we have that all of life is related?	All life on earth has the same set of mutation in its genes	All life on earth has DNA	All life on earth has same number of DNA pairs	All life on earth stores its genetic material inside the nucle of its cell	B
When will be Tournament Selection scheme is more preferable?	fitness values are uniformly distributed	population are with very diversified fitness values	fitness values are non-uniformly distributed	under all the above situations	B
What is desirable to ensure in Fitness Scaling?	Population diversity	Selection pressure	That better solution in a population selected only	Relatively inferior solutions are not ignored	A
Damage and errors in DNA cause	Mutation	DNA repair	Translation	Transcription	A
Mark the INCORRECT statement about Mutation	Mutation is predestined	Major source of evaluation	Usually deleterious and recessive	It is a reversible process	A
Evolutionary algorithm: Variation operators	Is a selection operator	Act on population level	Act on individual level	Are crossover and mutation	B

Evolutionary algorithm: Recombination	Also known as crossover	Combines elements of two or more genotypes	Also known as mutation	Also known as representation	A
Evolutionary algorithm: Initialization	Individuals are normally generated randomly	Is concerned with generating individuals	Mutation of candidates is normally also taking place during the initialization	Heuristics for generating candidates can be applied	C
The force that initiates variation	Variation	Mutation	Extinction	Adaptation	A
Extendible architecture is	Modular design of a software application that facilitates the integration of new modules	showing a universal law or rule to be invalid by providing a counter example	A set of attributes in a database tables that refers to data in another table	None of these	A
Evolutionary Strategies (ES)	(μ,λ) : Select survivors among parents and offspring	$(\mu+\lambda)$: Select survivors among parents and offspring	$(\mu-\lambda)$: Select survivors among offspring only	$(\mu:\lambda)$: Select survivors among offspring only	B
According to Schema theory which of the following are functions of Schemas	They can be activated to increase information processing efficiency	They are used to organise our knowledge	They help to decrease bias in information processing	They assist recall	A
Evolutionary algorithm: Survivor selection	Is often stochastic	Also known as replacement	Can be fitness based	Can be age based	A

Unit V

Genetic Algorithm are a part of	Evolutionary Com	inspired by Darwin's theory about evolution - "survival of the fittest"	are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics	All of the above	D
The red and gamma genes are removed in which type of phages?	Substitution phage	Replacement and substitution phages both	Replacement phage	Substitution is preferred over replacement phage	C
Which of the following techniques does not come under the umbrella of Soft Computing	Genetic Algorithm a	Genetic fuzzy system	Genetic neural syste	Genetic neuro-fuzzy system	A
Which GA operation is computationally most expensive?	Initial population cr	Selection of sub-population for mating	Reproduction to produce next generation	Convergence test	D
Which of the following optimization problem(s) can be better solved with Order GA?	0-1 Knapsack proble	Travelling salesman	Job shop scheduling problem	Optimal binary search tree construction problem	B
Which GA operation is computationally most expensive?	Initial population cr	Selection of sub-population for mating	Reproduction to produce next generation	Convergence test	C

An optimization problem is stated as follows: maximize $f(x, y) = +$ where $x, y \in x^2 + 125y^2 \in R^+$. The above optimization problem comes under the category of	Unconstrained optimization problem	Linear optimization	Integer value optimization problem	Real value optimization problem	A
What GA encoding scheme suffers from Hamming cliff problem?	Binary coded GA	Real coded GA	Order GA	Tree coded GA	A
Which GA operation is computationally most expensive?	Initial population creation	Selection of sub-population for mating	Reproduction to produce next generation	Convergence testing	C
Roulette wheel selection scheme is preferable when	Fitness values are uniformly distributed	Fitness values are non-uniformly distributed	Needs low selection pressure	Needs high population diversity	A
The Fitness Function in Genetic Algorithms is	method to measure how fit a candidate solution is in solving the problem.	the objective function for the optimization problem being solved	a substitute to approximate the survival abilities of individuals in nature.	a least squares approximation for a polynomial.	A
The basic idea behind Genetic Algorithms is to work with a population	of problem solvers that interact with each other through signs.	of candidate solutions to try and create better candidates by mixing genes	of candidate solutions in which each candidate is heuristically refined. h.	of problem solvers each of which does an independent heuristic search	B
The Fitness Function in Genetic Algorithms is	method to measure how fit a candidate solution is in solving the problem	the objective function for the optimization problem being solved	a substitute to approximate the survival abilities of individuals in nature.	a least squares approximation for a polynomial.	D

Which chemical is released by ants to keep track of their path?	Deoxyribonucleic acid	Pheromone	H ₂ O	Citric acid	B
A genetic algorithm (GA) for optimization is most likely to succeed given	a small population of fit and similar individuals	a large population of fit and similar individuals	a small diverse population of fit individuals.	a large diverse population of fit individuals.	D
What is Genes:	Genes are basic information	Genes are basic Algorithms for building a GA	Genes are basic Programs for building a GA	Genes are basic	A
What are Different Selection Strategies	Roulette Wheel	Rank	Both A & B	Uniform	C
What are the steps involved in General GA:	Initialization → Evaluation → Generation	Evaluation → Generation → Initialization	Initialization → Generation → Initialization	Evaluation → Initialization → Generation	A
What is Quantum GA:	It deals with Constraints	It deals with Sequences		It deals with Quantum bits	D
Step involved in iteration process in Simple GA	Reproduction → Selection	Selection → Evolution → Replacement → Reproduction	Selection → Reproduction	Evolution → Reproduction	C

Unit VI

In particle swarm Optimization, which of the following is a control parameter?	Position of the particle	Velocity of the paarticle	Maximum Number of Iteration	Accelerated Coefficient(C1 & C2)	D
In Particle Swarm Optimization, a number of particles are considered, these particles are:-	Initially dispersed, with every iteration they coverage	Initially converged with every iteration	Initially dispersed , with every iteration they dispersed	Initially converge with every iteration they remain converged	A

During optimization, Particle Swarm Optimization (PSO) carries out	local search only	global search only	both local and global searches simultaneously	neither local nor global search	C
In comparison with a Genetic Algorithm, Particle Swarm Optimization (PSO) is expected to be	more efficient and computationally faster	less efficient but computationally faster	more efficient but computationally slower	less efficient and computationally slower	D
On principle, particle swarm optimization (PSO) solves	maximization problem	minimization problem	neither minimization nor maximization problem	problem having saddle point	A
The concept of Boltzmann-probability distribution is used in Simulated Annealing to ensure that	the probability of selecting bad solutions is more initially but it decreases as the iteration proceeds	the probability of selecting bad solutions is less initially but it increases as the iteration proceeds	the algorithm becomes computationally faster	the algorithm becomes easier to understand	A
The basic idea behind Ant Colony Optimization algorithms is to work with a population	of problem solvers that interact with each other through signs	of candidate solutions to try and create better candidates by mixing genes	of candidate solutions in which each candidate is heuristically refined.	of problem solvers each of which does an independent heuristic search	A
An ant in Ant Colony Optimization algorithm for TSP produces a tour by	a deterministic greedy constructive method.	a stochastic greedy constructive method	a deterministic perturbation of the previous tour	a stochastic perturbation of the previous tour.	B
What is the relation between the pheromone deposited by an ant on an edge and the cost of the tour generated by that ant in the ACO	The pheromone deposited on each edge is directly proportional to the cost of the tour.	The pheromone deposited on each edge is inversely proportional to the cost of the tour	The pheromone deposited on each edge is constant	The pheromone deposited on each edge depends upon the length of that edge.	D

A genetic algorithm (GA) for optimization is most likely to succeed given	a small population of fit and similar individuals.	a large population of fit and similar individuals.	a small diverse population of fit individuals.	a large diverse population of fit individuals.	D
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This sheet is for 1 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions clearly	Cannot Distinguish two regions clearly	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguos	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neural computing,Genetic algorithm	Fuzzy network and artificial intelligence	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard bertrand	mc culloch	lofti a zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behaviour	deals with imprecise,probabilistic	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computing	conventional computing	non conventional computing	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behaviour	information processing paradigm	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search represents a guided approach while optimization is unguided	Blind search usually does not conclude in one step like some optimization methods.	Blind search cannot result in optimal solution whereas some optimization methods do	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can only be determined by an exhaustive enumeration testing of alternatives	a solution found in the least possible time and using the least possible computing resources	a solution that is the best based on criteria defined in the design phase	a solution that requires an algorithm for the determination	C
17	When is a complete enumeration of solution used?		When a solution that is "good enough" is fine and good heuristics are available	When there is enough time and computational power available	When the modeler requires a guided approach to problem solving	When there are an infinite number of solutions to be searched	B
18	All of the following are true about heuristics EXCEPT		heuristics are used when the modeler requires a guided approach to problem solving	heuristics are used when a solution that is "good enough" is sought	heuristics are used when there is abundant time and computational power	heuristics are rules of good judgement	C
19	Which approach is most suited to structured problem with little uncertainty		Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
21	What does the 0 membership value mean in the set		the object is fully inside the set	the object is not in the set	the object is partially present in the set	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a

23	The process of fuzzy interference system involves	membership functions	fuzzy logic operators	if-then rules	all the above	d
24	What does a fuzzifier do	converts crisp input to linguistic variables	converts crisp output to linguistic variables	converts fuzzy input to linguistic variables	converts fuzzy output to linguistic variables	a
25	Which of the following is not defuzzifier method	centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method	mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have	multiple part of antecedent, only single part of consequent	only single part of antecedent, multiple part of consequent	multiple part of antecedent, multiple part of consequent	only single part of antecedent, only single part of consequent	c
28	The a cut of a fuzzy set A is a crisp set defined by :-	$\{x u_A(x) > a\}$	$\{x u_A(x) \geq a\}$	$\{x u_A(x) < a\}$	$\{x u_A(x) \leq a\}$	b
29	The bandwidth(A) in a fuzzy set is given by	$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1/x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?	$\{0/a, 0.7/b, 0.8/c, 0.2/d, 1/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.2/d, 1/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.7/d, 1/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 1/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of AUB?	$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0.2/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.5/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.8/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B ?	$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 1/e\}$	a

34	What denotes the support(A) in a fuzzy set?	$\{x u_A(x) > 0\}$	$\{x u_A(x) < 0\}$	$\{x u_A(x) \leq 0\}$	$\{x u_A(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?	$\{x u_A(x) > 0\}$	$\{x u_A(x) = 1\}$	$\{x u_A(x) \geq 0.5\}$	$\{x u_A(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designing a fuzzy logic machine	fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation>fuzzification>defuzzification	rule evaluation->defuzzification->fuzzification	a
38	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
39	Genetic algorithm belongs to the family of methods in the	artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
40	All of the following are suitable problems for genetic algorithms EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
41	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are examples of	heuristic	Evolutionary algorithm	ACO	PSO	b
43	mutation is applied on candidates.	one	two	more than two	none of these	a
44	recombination is applied on candidates.	one	two	more than two	none of these	b
45	LCS belongs to ___ based methods?	rule based learning	genetic learning	both a and b	none of these	a
46	Survival is ___ approach.	deterministic	non deterministic	semi deterministic	none of these	a

47	Evolutionary algorithms are a _____ based approach	heuristic	metaheuristic	both a and b	none of these	a
48	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by	Fredrik	Fogel	Frank	Flin	b
54	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
56	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover	discrete and intermediate	discrete and continuous	continuous and intermediate	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested.		1			B
61	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solution	none of these	c
62	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
63	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.	Simulation, Complex problem	Simulation, Easy problem	Genetics, Complex problem	Genetics, Easy problem	A
64	EC stands for?	Evolutionary Computations	Evolutionary computer	Electronic computations	none of these	a
65	GA stands for	genetic algorithm	genetic assurance	genetic algorithm	none of these	a
66	LCS stands for	learning classes system	learning classifier systems	learned class system	none of these	b
67	GBML stands for	Genetic based Machine learning	Genetic based mobile learning	Genetic based machine learning	none of these	c
68	EV is dominantly used for solving _____.	optimization problems	NP problem	simple problems	none of these	a
69	EV is considered as?	adaptive	complex	both a and b	none of these	c
70	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
72	Parameters that affect GA	initial population	selection process	fitness function	all of these	d

73	Fitness function should be		maximum	minimum	intermediate	none of these	b
74	Evolutionary algorithms are a ___ based approach		heuristic	metaheuristic	both a and b	none of these	a
75	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
77	mutation is applied on ___ candidates.		one	two	more than two	none of these	a
78	recombination is applied on ___ candidates.		one	two	more than two	none of these	b

79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offsprings	grand child	c
80	___ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection methods	both a and b	none of these	c
82	LCS belongs to ___ based methods?		rule based learning	genetic learning	both a and b	none of these	a
83	Survival is ___ approach.		deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called ___ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
90	For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c

92	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by _____		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3.): (5, 0), (6, 0.2) \}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.5}	{0.1, 0.5, 0.4, 0.2, 0.2}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3, 1), (0.6, 2), (1, 3), (0.7, 4), (0.2, 5)\}$ $B = \{(0.5, 11), (1, 12), (0.5, 13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max(x+y=z, \min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to		$\{(0.5, 12), (0.6, 13), (1, 14), (0.7, 15), (0.7, 16), (1, 17), (1, 18)\}$	$\{(0.5, 12), (0.6, 13), (1, 14), (1, 15), (1, 16), (1, 17), (1, 18)\}$	$\{(0.3, 12), (0.5, 13), (0.5, 14), (1, 15), (0.7, 16), (0.5, 17), (0.2, 18)\}$	$\{(0.3, 12), (0.5, 13), (0.6, 14), (1, 15), (0.7, 16), (0.5, 17), (0.2, 18)\}$	d

98	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy ≈ Prediction	Fuzzy ≈ Forecasting	Probability ≈ Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c

104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	----- defines logic funtion of two prepositions	prepositions	Lingustic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ---gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ---- - in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ---- - in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then $z=c$ (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigitype	Mamdani-type and Sugeno-type	Mihni-type and Sujganitype	c
113	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is	doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is	doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size changes dynamically	size=1	a
119	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size changes dynamically	size=1	b
120	Step size in self-adaptive EP	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size changes dynamically	size=1	c

121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)	(μ,λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

123	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126	(1+λ) ES	λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127	Termination condition for EA	maximally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming does not use crossover operators	d
130	(1+1) ES	Operates on population size of two	operates on population size of one	operates on population size of zero	operates on population size of λ	a
131	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

SCOA Unit I MCQ

- 1. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.**
A.True
B.False

- 2. The membership functions are generally represented in**
A.Tabular Form
B.Graphical Form
C.Mathematical Form
D.Logical Form

- 3. Membership function can be thought of as a technique to solve empirical problems on the basis of**
A.knowledge
B.examples
C.learning
D.experience

- 4. Three main basic features involved in characterizing membership function are**
A.Intuition, Inference, Rank Ordering
B.Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.sub normal fuzzy sets

B.normal fuzzy set

C.convex fuzzy set

D.concave fuzzy set

7. In a Fuzzy set a prototypical element has a value

A.1

B.0

C.infinite

D.Not defined

8. A fuzzy set wherein no membership function has its value equal to 1 is called

A.normal fuzzy set

B.Subnormal fuzzy set.

C.convex fuzzy set

D.concave fuzzy set

9. A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe

A.convex fuzzy set

B.concave fuzzy set

C.Non concave Fuzzy set

D.Non Convex Fuzzy set

10. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.

A.Convex Fuzzy Set

B.Non convex fuzzy set

C.Normal Fuzzy set

D.Sub normal fuzzy set

11. The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to

A.infinite

B.1

C.0

D.0.5

12. Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

B.False

14. Artificial neural network used for

A.Pattern Recognition

B.Classification

C.Clustering

D.All of these

15. A Neural Network can answer

- A.**For Loop questions
- B.**what-if questions
- C.**IF-The-Else Analysis Questions
- D.**None of these

16. Ability to learn how to do tasks based on the data given for training or initial experience

- A.**Self Organization
- B.**Adaptive Learning
- C.**Fault tolerance
- D.**Robustness

17. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

- A.**Adaptive Learning
- B.**Self Organization
- C.**What-If Analysis
- D.**Supervised Learning

18. In artificial Neural Network interconnected processing elements are called

- A.**nodes or neurons

B.weights

C.axons

D.Soma

19. Each connection link in ANN is associated with _____ which has information about the input signal.

A.neurons

B.weights

C.bias

D.activation function

20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.True

B.False

21. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.Weight

B.activation or activity level of neuron

C.Bias

D.None of these

22. Neuron can send _____ signal at a time.

- A.**multiple
- B.**one
- C.**none
- D.**any number of

23. Artificial intelligence is

- A.**It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations
- B.**Computational procedure that takes some value as input and produces some value as output.
- C.**Science of making machines performs tasks that would require intelligence when performed by humans
- D.**None of these

24. Expert systems

- A.**Combining different types of method or information
- B.**Approach to the design of learning algorithms that is structured along the lines of the theory of evolution
- C.**an information base filled with the knowledge of an expert formulated in terms

of if-then rules

D.None of these

25. Falsification is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

26. Evolutionary computation is

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.

C.Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.

D.None of these

27. Extendible architecture is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

28. Massively parallel machine is

A.A programming language based on logic

B.A computer where each processor has its own operating system, its own memory, and its own hard disk

C.Describes the structure of the contents of a database.

D.None of these

29. Search space

A.The large set of candidate solutions possible for a problem

B.The information stored in a database that can be, retrieved with a single query.

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

30. $n(\log n)$ is referred to

A.A measure of the desired maximal complexity of data mining algorithms

B.A database containing volatile data used for the daily operation of an organization

C.Relational database management system

D.None of these

31. Perceptron is

- A.**General class of approaches to a problem.
- B.**Performing several computations simultaneously
- C.**Structures in a database those are statistically relevant
- D.**Simple forerunner of modern neural networks, without hidden layers

32. Prolog is

- A.**A programming language based on logic
- B.**A computer where each processor has its own operating system, its own memory, and its own hard disk
- C.**Describes the structure of the contents of a database
- D.**None of these

33. Shallow knowledge

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be, retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

34. Quantitative attributes are

- A.**A reference to the speed of an algorithm, which is quadratically dependent on the size of

the data

B.Attributes of a database table that can take only numerical values

C.Tools designed to query a database

D.None of these

35. Subject orientation

A.The science of collecting, organizing, and applying numerical facts

B.Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.None of these

36. Vector

A.It do not need the control of the human operator during their execution

B.An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.The validation of a theory on the basis of a finite number of examples

D.None of these

37. Transparency

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

38. Core of soft Computing is

- A.**Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.**Fuzzy Networks and Artificial Intelligence
- C.**Artificial Intelligence and Neural Science
- D.**Neural Science and Genetic Science

39. Who initiated the idea of Soft Computing

- A.**Charles Darwin
- B.**Lofti A Zadeh
- C.**Rechenberg
- D.**Mc_Culloch

40. Fuzzy Computing

- A.**mimics human behaviour
- B.**doesn't deal with 2 valued logic
- C.**deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.**All of the above

41. Neural Computing

- A.**mimics human brain
- B.**information processing paradigm
- C.**Both (a) and (b)
- D.**None of the above

42. Genetic Algorithm are a part of

- A.**Evolutionary Computing
- B.**inspired by Darwin's theory about evolution - "survival of the fittest"
- C.**are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D.**All of the above

43. What are the 2 types of learning

- A.**Improvised and unimprovised
- B.**supervised and unsupervised
- C.**Layered and unlayered
- D.**None of the above

44. Supervised Learning is

- A.**learning with the help of examples
- B.**learning without teacher
- C.**learning with the help of teacher
- D.**learning with computers as supervisor

45. Unsupervised learning is

- A.**learning without computers
- B.**problem based learning

C.learning from environment

D.learning from teachers

46. Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

47. In supervised learning

A.classes are not predefined

B.classes are predefined

C.classes are not required

D. classification is not done

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

	<u>D.</u> experience	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p><u>A.</u>Intuition, Inference, Rank Ordering <u>B.</u>Fuzzy Algorithm, Neural network, Genetic Algorithm <u>C.</u>Core, Support , Boundary <u>D.</u>Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p><u>A.</u>Core <u>B.</u>Support <u>C.</u>Boundary <u>D.</u>Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p><u>A.</u>sub normal fuzzy sets</p>	B

	<u>B.</u> normal fuzzy set <u>C.</u> convex fuzzy set <u>D.</u> concave fuzzy set	
7.	In a Fuzzy set a prototypical element has a value <u>A.</u> 1 <u>B.</u> 0 <u>C.</u> infinite <u>D.</u> Not defined	A
8.	A fuzzy set wherein no membership function has its value equal to 1 is called <u>A.</u> normal fuzzy set <u>B.</u> subnormal fuzzy set. <u>C.</u> convex fuzzy set <u>D.</u> concave fuzzy set	B
9.	A fuzzy set has a membership function whose membership values	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesnt deal with 2 valued logic</p>	D

	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	Defuzzification is done to obtain a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above	a
13.	“The train is running fast”. Here ‘fast’ can be represented by a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned	a
14.	Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$ Then the crisp value of Young using MoM method is a) 25 b) 20 c) 35 d) 50	a
15.	f the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value. a) with the median of all the area	c

	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)\text{complement} \neq (A\lambda)\text{complement}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is c then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

	d) None of the above	
26.	Fuzzy logic is a form of a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic	Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.
27.	Traditional set theory is also known as Crisp Set theory. a) True b) False	Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set. 3. The truth values of traditional set theory is _____ and that of fuzzy set is _____
28.	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Answer: a Explanation: Refer the

	a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1	definition of Fuzzy set and Crisp set.
29.	How many types of random variables are available? a) 1 b) 2 c) 3 d) 4	Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.
30.	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____. a) Fuzzy Set b) Crisp Set	Answer: a Explanation: Fuzzy logic deals with linguistic variables.
31.	The values of the set membership is represented by a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c	Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.
32.	What is meant by probability density function?	d

	a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables	
33.	Which of the following is used for probability theory sentences? a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned	Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.
34.	Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following. a) AND b) OR c) NOT d) EX-OR	Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;
35.	Fuzzy logic is usually represented as a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned	Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy

		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices. Rules are usually expressed in the form: IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <p>a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned</p>	<p>Answer: d Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <p>a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned</p>	<p>Answer: c Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

SCOA UNIT 2 MCQs

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

SCOA UNIT 2 MCQs

	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intuition, Inference, Rank Ordering</p> <p>B.Fuzzy Algorithm, Neural network, Genetic Algorithm</p> <p>C.Core, Support , Boundary</p> <p>D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core</p> <p>B.Support</p> <p>C.Boundary</p> <p>D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

SCOA UNIT 2 MCQs

	<p>B. normal fuzzy set C. convex fuzzy set D. concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A. 1 B. 0 C. infinite D. Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A. normal fuzzy set B. subnormal fuzzy set. C. convex fuzzy set D. concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

SCOA UNIT 2 MCQs

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesnt deal with 2 valued logic</p>	D

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	<p>B. mimics human behaviour</p> <p>C. deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D. All of the above</p>	
12.	Defuzzification is done to obtain a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above	a
13.	“The train is running fast”. Here ‘fast’ can be represented by a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned	a
14.	Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$ Then the crisp value of Young using MoM method is a) 25 b) 20 c) 35 d) 50	a

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15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area b) with the mean of all the area c) with the largest area d) with the smallest area 	c
16.	<p>Which of the following is not a centroid method?</p> <ul style="list-style-type: none"> a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM) 	d
17.	<p>What are the following sequence of steps taken in designing a fuzzy logic machine?</p> <ul style="list-style-type: none"> (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification 	a
18.	<p>If A is a fuzzy set, then $(A \lambda)$complement \neq $(A\lambda)$complement</p> <ul style="list-style-type: none"> (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ 	a
19.	<p>The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$</p> <ul style="list-style-type: none"> a) 2 	B

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	b) 5 c) 4 d) 1	
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$ c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	b
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d

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24.	<p>In triangular fuzzy number (l, m, u), what does 'm' represents:</p> <ul style="list-style-type: none"> a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above 	C
25.	<p>Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis?</p> <ul style="list-style-type: none"> a) Vector normalization b) Linear normalization c) Both A and B d) None of the above 	b
26.	<p>Fuzzy logic is a form of</p> <ul style="list-style-type: none"> a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic 	<p>Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.</p>
27.	<p>Traditional set theory is also known as Crisp Set theory.</p> <ul style="list-style-type: none"> a) True b) False 	<p>Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There is only two crisp values true or false. In case of fuzzy logic there are</p>

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		<p>many values. With weight say x the member is in the set.</p> <p>3. The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>
28.	<p>The truth values of traditional set theory is _____ and that of fuzzy set is _____</p> <p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	<p>Answer: a Explanation: Refer the definition of Fuzzy set and Crisp set.</p>
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p>	<p>Answer: a</p>

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	a) Fuzzy Set b) Crisp Set	Explanation: Fuzzy logic deals with linguistic variables.
31.	The values of the set membership is represented by a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c	Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.
32.	What is meant by probability density function? a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables	d
33.	Which of the following is used for probability theory sentences? a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned	Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.
34.	Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.	Answer: a, b, c

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	<p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b</p> <p>Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <p>a) Fuzzy Logic</p>	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty</p>

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	b) Probability c) Entropy d) All of the mentioned	involved in data. Represented by $H(\text{data})$.
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <p>a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned</p>	Answer: c Explanation: Local structure is usually associated with linear rather than exponential growth in complexity

Soft Computing & Optimization Algorithms [Multiple Choice Question] **UNIT No-03****Name of Content: Fuzzy Systems- Fuzzy Controller**

01	Fuzzy logic is :	
	Option A	Used to respond to questions in a human like way
	Option B	A new programming language used to program animation
	Option C	The result of fuzzy thinking
	Option D	A term that indicates logical values greater than one
	Correct Answer	A
02	What are the following sequence of steps taken in designing a fuzzy logic machine?	
	Option A	Rule evaluation->Fuzzification->Defuzzification
	Option B	Fuzzification->Rule evaluation->Defuzzification
	Option C	Fuzzy Sets->Defuzzification->Rule evaluation
	Option D	Defuzzification->Rule evaluation->Fuzzification
	Correct Answer	B
03	Fuzzy logic is a form of	
	Option A	Two-valued logic
	Option B	Crisp set logic
	Option C	Many-valued logic
	Option D	Binary set logic
	Correct Answer	C
04	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$	
	Option A	$h(A) = 0$
	Option B	$h(A) < 0$
	Option C	$h(A)=1$
	Option D	$h(A)<1$
	Correct Answer	C
05	Assumptions in Fuzzy Logic Control (FLC) Design	
	Option A	Existence of a knowledge body
	Option B	Range of precision
	Option C	The plant is observable and controllable
	Option D	All of the above
	Correct Answer	D

Name of Content: Fuzzy Rule Base & Approximate Reasoning

01	Fuzzy logic uses	
	Option A	Global variables
	Option B	Linguistic variables
	Option C	Local variables
	Option D	Approximate variables
	Correct Answer	B
02	_____ as an operator acts on fuzzy set representing meaning of its operand	
	Option A	Defuzzification
	Option B	Truth table
	Option C	Linguistic hedges
	Option D	Propositions
	Correct Answer	C
03	The major components of the FLC	
	Option A	Fuzzifier & Defuzzifier
	Option B	Fuzzy Rule Base & Knowledge Base
	Option C	Inference Engine
	Option D	All of the above
	Correct Answer	D
04	Which of the following not an Advantages of Fuzzy Logic Control	
	Option A	Cheaper
	Option B	Robust
	Option C	Reliability
	Option D	Expensive
	Correct Answer	D
05	Examples of Fuzzy quantifiers are words like	
	Option A	Most
	Option B	Many
	Option C	Few
	Option D	All of the above
	Correct Answer	D
06	Fuzzy truth qualification claims the degree of truth of fuzzy proposition	
	Option A	True
	Option B	False
	Correct Answer	A

07	Propositions in fuzzy logic involves	
	Option A	Fuzzy predicate
	Option B	Fuzzy Quantifier
	Option C	Fuzzy Qualifier
	Option D	All of the above
	Correct Answer	D
08	Formation of Rules: I: Assignment statement; II: Conditional statement; III: Unconditional statement	
	Option A	Only I
	Option B	Only I & II
	Option C	Only I, II & III
	Option D	Only II & III
	Correct Answer	C
09	Methods used for decomposition of rules	
	Option A	Multiple conjunctive antecedents
	Option B	Multiple disjunctive antecedents
	Option C	Conditional statement
	Option D	All of the above
	Correct Answer	D
10	Multiple conjunctive antecedents based on	
	Option A	Fuzzy union operation
	Option B	Fuzzy intersection operation
	Option C	Fuzzy condition operation
	Option D	Fuzzy difference operation
	Correct Answer	B
11	Two methods of Aggregation of fuzzy rules	
	Option A	Conjunctive system of rules
	Option B	Disjunctive system of rules
	Option C	Both a & b
	Option D	Neither a nor b
	Correct Answer	C
12	In disjunctive system of rules, output determined by performing fuzzy union of all individual rule consequents	
	Option A	True
	Option B	False
	Correct Answer	A

Name of Content: Fuzzy Reasoning and Fuzzy Inference system

01	In this form of reasoning, the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	
	Option A	Qualitative Reasoning
	Option B	Categorial Reasoning
	Option C	Syllogistic Reasoning
	Option D	Dispositional Reasoning
	Correct Answer	B
02	A Fuzzy syllogism can be expressed as $x=s_1$ A's are B's & $y=s_2$ C's are D's	
	Option A	$z=s_2$ C's are D's
	Option B	$z=s_2$ A's are B's
	Option C	$z=s_2$ C's are D's
	Option D	$z=s_3$ E's are F's
	Correct Answer	D
03	The Conjunction rule is	
	Option A	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \cap \sim B$
	Option B	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A - \sim B$
	Option C	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \ast \sim B$
	Option D	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \cap \sim B$
	Correct Answer	D
04	The negative rule of inference is	
	Option A	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } \sim A$
	Option B	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } A$
	Option C	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } A$
	Option D	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow x \text{ is } A$
	Correct Answer	A
05	In this mode of reasoning, the antecedents & consequents have fuzzy linguistic variables	
	Option A	Qualitative Reasoning
	Option B	Categorial Reasoning
	Option C	Syllogistic Reasoning
	Option D	Dispositional Reasoning
	Correct Answer	A

07	How many types are available in machine learning?	
	Option A	1
	Option B	2
	Option C	3
	Option D	4
	Correct Answer	C
08	How the decision tree reaches its decision?	
	Option A	Single test
	Option B	Two test
	Option C	Sequence of test
	Option D	No test
	Correct Answer	C
09	What Is Fuzzy Inference Systems?	
	Option A	The process of formulating the mapping from a given input to an output using fuzzy logic
	Option B	Changing the output value to match the input value to give it an equal balance
	Option C	Having a larger output than the input
	Option D	Having a smaller output than the input
	Correct Answer	A
10	Where Has Fuzzy Inference Systems Been Implemented?	
	Option A	Wireless services, heat control and printers
	Option B	Restrict power usage, telephone lines and sort data
	Option C	Simulink, boiler and CD recording
	Option D	Automatic control, decision analysis and data classification
	Correct Answer	D
11	What Is Another Name For Fuzzy Inference Systems?	
	Option A	Fuzzy Expert System
	Option B	Fuzzy Modelling
	Option C	Fuzzy Logic Controller
	Option D	All of the above
	Correct Answer	D
12	The Equation For Probabilistic: Prob(a,b) = a+b - ab	
	Option A	True
	Option B	False
	Correct Answer	A

Soft Computing & Optimization Algorithms [Multiple Choice Question] **UNIT No-04**

Name of Content: Basic Evolutionary Processes, EV: A Simple Evolutionary System

- 01 The tendency of population to remain in genetic equilibrium may be disturbed by
Option A Random mating
Option B Lack of migration
Option C Lack of mutations
Option D Lack of random mating

Correct Answer **D**

- 02 One of the important consequences of geographical isolation is:
Option A Random creation of new species
Option B No change in the isolated fauna
Option C Preventing Speciation
Option D Speciation through reproductive isolation

Correct Answer **D**

- 03 What is meant by the term Darwin fitness?
Option A The ability to survive and reproduce
Option B High aggressiveness
Option C Healthy appearance
Option D Physical strength

Correct Answer **A**

- 04 Diversification in plant life appeared:
Option A Due to abrupt mutations
Option B Suddenly on earth
Option C By seed dispersal
Option D Due to long periods of evolutionary changes

Correct Answer **D**

- 05 Chemical reactions could have converted simple organic compounds into _____ for the origin of life
Option A Micromolecules
Option B Nitrogen, oxygen and other gases
Option C Cells
Option D Macromolecules

Correct Answer **D**

- 06 Which one of the following sequences was proposed by Darwin and Wallace for organic evolution?
- Option A Overproduction, variations, constancy of population size, natural selection
- Option B Variations, constancy of population size, overproduction, natural selection
- Option C Overproduction, constancy of population size, variations, natural selection
- Option D Variations, natural selection, overproduction, constancy of population size
- Correct Answer** **C**
- 07 _____ is a subset of evolutionary computation,[1] a generic population-based meta-heuristic optimization algorithm
- Option A Genetic Algorithm
- Option B Evolutionary algorithm (EA)
- Option C Simulated Annealing
- Option D Artificial Intelligence
- Correct Answer** **B**
- 08 An EA uses mechanisms inspired by biological evolution, such as
- Option A mutation
- Option B recombination
- Option C selection
- Option D All of the above
- Correct Answer** **D**
- 09 Genetic Algorithms are
- Option A a class of algorithms that try and build solutions by introducing evolution and selection of the best in a population of candidate solutions
- Option B Methods, based on the theory of natural selection and evolutionary biology, for solving optimization problems.
- Option C A heuristic search method used in artificial intelligence and computing.
- Option D All of the above
- Correct Answer** **D**
- 10 Objects forming possible solutions within the original problem context are referred to as
- Option A Phenotypes
- Option B Genotypes
- Option C Genes
- Option D Chromosomes
- Correct Answer** **A**

Name of Content: Canonical Evolutionary Algorithms

- 01 In Evolutionary algorithm, An individual consist of
Option A Genotype and phenotypes
Option B Parent selection and crossover
Option C Genotype and a fitness function
Option D Mutation and recombination
- Correct Answer C**
- 02 Evolutionary Strategies were developed in the sixties by
Option A John Holland
Option B Rechenberg and Schwefe
Option C Allen and Karjalainen
Option D Ryan and Collins
- Correct Answer B**
- 03 EA heuristic follows
Option A Initialization
Option B Evaluation
Option C Mutation and selection
Option D All of the above
- Correct Answer D**
- 04 Selection is based on
Option A Ranking of the individual fitness
Option B Recombination of parents
Option C Mutation of parameter
Option D None of the above
- Correct Answer A**
- 05 The Simple evolution strategy operates on population of size two:
Option A The current point (parent)
Option B Result of its mutation (one offspring)
Option C Both a and b
Option D None of the above
- Correct Answer C**
- 06 Depending on search space & objective function, recombination & mutation of strategy parameter may or may not occur in specific algorithm
Option A True
Option B False
- Correct Answer A**

Name of Content: A Unified view of Simple EAs

01 EA consist of following elements

- | | |
|----------|---------------------------|
| Option A | Parent Population size |
| Option B | Survival selection method |
| Option C | Parent selection method |
| Option D | All of the above |

Correct Answer **D**

02 _____ which of the following method determines to be kept in the next generation

- | | |
|----------|--------------------|
| Option A | Parent selection |
| Option B | Mutation |
| Option C | Recombination |
| Option D | Survival selection |

Correct Answer **D**

03 Roulette wheel selection scheme is preferable when

- | | |
|----------|--|
| Option A | Fitness values are uniformly distributed |
| Option B | Fitness values are non-uniformly distributed |
| Option C | Needs low selection pressure |
| Option D | Needs high population diversity |

Correct Answer **A**

04 A genetic operator used in genetic algorithms for selecting potentially useful solutions for recombination.

- | | |
|----------|---------------------------------|
| Option A | Fitness proportionate selection |
| Option B | Roulette wheel selection |
| Option C | Rank selection method |
| Option D | Stochastic universal sampling |

Correct Answer **A & B**

05 _____ is a method of selecting an individual from a population of individuals in a genetic algorithm.

- | | |
|----------|-------------------------------|
| Option A | Roulette wheel selection |
| Option B | Rank selection method |
| Option C | Tournament selection |
| Option D | Stochastic Universal Sampling |

Correct Answer **C**

06 As selection pressure increases, fitter solutions are more likely to survive

- | | |
|----------|-------|
| Option A | True |
| Option B | False |

Correct Answer **A**

- 07 What are normally the two best measurement units for an evolutionary algorithm?
- Option A Number of evaluations
Option B Number of generations
Option C Elapsed & CPU time
Option D Both a & b
- Correct Answer D**
- 08 What is most important to be concerned with in the evolution of repetitive problems?
- Option A Do multiple runs until a good solution is found
Option B Execute one run until the solution is good enough
Option C Get a reasonably good solution every time
Option D Get a very good result just once
- Correct Answer C**
- 09 Evolutionary Strategies (ES)
- Option A (μ, λ) : Select survivors among parents and offspring
Option B $(\mu + \lambda)$: Select survivors among parents and offspring
Option C $(\mu - \lambda)$: Select survivors among offspring only
Option D $(\mu : \lambda)$: Select survivors among offspring only
- Correct Answer B**
- 10 Rank based selection
- Option A Use relative rather than absolute fitness
Option B Use absolute rather than relative fitness
Option C Results in less control of the selection pressure than fitness-proportionate selection
Option D Ranking can be either linear or non-linear
- Correct Answer A & D**

Subject: Soft computing Optimization Algorithm
MCQs Unit- I

1. Neural Computing
 - A. mimics human brain
 - B. information processing paradigm
 - C. Both (a) and (b)
 - D. None of the above

Ans: C

Explanation: NN is used for data processing modelled on human brain

2. Genetic Algorithm are a part of

- A. Evolutionary Computing
- B. inspired by Darwin's theory about evolution - "survival of the fittest"
- C. are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D. All of the above

Ans: D

Explanation: It is part of EA

3. What are the 2 types of learning

- A. Improvised and unimprovised
- B. supervised and unsupervised
- C. Layered and unlayered
- D. None of the above

Ans: B

Explanation: Supervised and unsupervised are two types

4. Supervised Learning is
 - A. learning with the help of examples
 - B. learning without teacher
 - C. learning with the help of teacher
 - D. learning with computers as supervisor

Ans: C

Explanation: Training data is present

5. Unsupervised learning is

- A. learning without computers
- B. problem based learning
- C. learning from environment
- D. learning from teachers

Ans: C

Explanation: without training data

6. Conventional AI is different from soft computing in the sense

- A. Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic
- B. Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data
- C. Both (a) and (b)
- D. None of the above

Ans: C

Explanation: Soft computing covers fuzzy, supervised NN algorithms

7. In Supervised learning:

- A. classes are not predefined
- B. classes are predefined
- C. classes are not required
- D. classification is not done

Ans: B

Explanation: Training data is present

8. A 4-input neuron has weights 1, 2, 3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. The output will be:

- a) 238
- b) 76
- c) 119
- d) 123

Ans: a

Explanation: The output is found by multiplying the weights with their respective inputs, summing the results and multiplying with the transfer function. Therefore:

$$\text{Output} = 2 * (1*4 + 2*10 + 3*5 + 4*20) = 238$$

9. ANN is composed of large number of highly interconnected processing elements (neurons) working in unison to solve problems.

A. True

B. False

Ans: A

Explanation: As per architecture it is true

10. Artificial neural network used for

A. Pattern Recognition

B. Classification

C. Clustering

D. All of these

Ans: D

11. A Neural Network can answer

A. For Loop questions

B. what-if questions

C. IF-The-Else Analysis Questions

D. None of these

Ans: B

Explanation: Generally used for prediction and classification

12. Ability to learn how to do tasks based on the data given for training or initial experience

A. Self Organization

B. Adaptive Learning

C. Fault tolerance

D. Robustness

Ans: B

Explanation: Adaption allows learn from self experiences

13. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

A. Adaptive Learning

B. Self Organization

C. What-If Analysis

D. Supervised Learnning

Ans: B

Explanation: SOM is unsupervised NN

14. In artificial Neural Network interconnected processing elements are called

- A. nodes or neurons
- B. weights
- C. axons
- D. Soma

Ans: A

Explanation: As per the definition

15. Each connection link in ANN is associated with _____ which has information about the input signal.

- A. Neurons
- B. Weights
- C. Bias
- D. activation function

Ans: B

Explanation: As per the definition

16. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

- A. True
- B. False

Ans: A

17. Internal state of neuron is called _____, is the function of the inputs the neurons receives

- A. Weight
- B. activation or activity level of neuron
- C. Bias
- D. None of these

Ans: B

Explanation: As per the definition

18. Neuron can send _____ signal at a time.

- A. multiple

- B. one
- C. none
- D. any number

Ans: B

Explanation: can receive multiple signals but send only one signal (single output)

19. What is perceptron?

- a) a single layer feed-forward neural network with pre-processing
- b) an auto-associative neural network
- c) a double layer auto-associative neural network
- d) a neural network that contains feedback

Ans: a

Explanation:

20. The perceptron is a single layer feed-forward neural network. It is not an auto-associative network because it has no feedback and is not a multiple layer neural network because the pre-processing stage is not made of neuron

21. Why is the XOR problem exceptionally interesting to neural network researchers?

- a) Because it can be expressed in a way that allows you to use a neural network
- b) Because it is complex binary operation that cannot be solved using neural networks
- c) Because it can be solved by a single layer perceptron
- d) Because it is the simplest linearly inseparable problem that exists.

Ans:d

Explanation: it is the simplest non linearly problem

22. What is back propagation?

- a) It is another name given to the curvy function in the perceptron
- b) It is the transmission of error back through the network to adjust the inputs
- c) It is the transmission of error back through the network to allow weights to be adjusted so that the network can learn
- d) None of the mentioned

Answer: c

Explanation: Back propagation is the transmission of error back through the network to allow weights to be adjusted so that the network can learn.

23. Neural Networks are complex _____ with many parameters.

- a) Linear Functions
- b) Nonlinear Functions

- c) Discrete Functions
- d) Exponential Functions

Answer: a

Explanation: Neural networks are complex linear functions with many parameters.

24. A perceptron adds up all the weighted inputs it receives, and if it exceeds a certain value, it outputs a 1, otherwise it just outputs a 0.

- a) True
- b) False
- c) Sometimes – it can also output intermediate values as well
- d) Can't say

Answer: a

Explanation: Yes the perceptron works like that.

25. The network that involves backward links from output to the input and hidden layers is called _____

- a) Self organizing maps
- b) Perceptrons
- c) Recurrent neural network
- d) Multi layered perceptron

Answer: c

Explanation: RNN (Recurrent neural network) topology involves backward links from output to the input and hidden layers.

26. Which of the following is an application of NN (Neural Network)?

- a) Sales forecasting
- b) Data validation
- c) Risk management
- d) All of the mentioned

Answer: d

Explanation: All mentioned options are applications of Neural Network.

27 Artificial neural networks

- A Are trained by adjusting the network size
- B Are trained by adjusting weights
- C The weights are either all positive or all negative
- D The learning rate controls the amount of weight change

Ans: B , D

28 Why use Multi Layer Perceptron instead of a single layer perceptron?

- A Faster learning

- B Easier programming
- C Can solve more complex problems
- D Can learn multiple decision boundaries

Ans: c,D

29. The activation function in a multilayer perceptron
- A Does thresholding to 0 or 1
 - B Is used to compute the output value of a node
 - C Is used for initialization of the network
 - D Makes it possible to train non-linear decision boundaries

And: B,D

30 Which of the following neural networks uses supervised learning?

- (A) Multilayer perceptron
- (B) Self organizing feature map
- (C) Hopfield network
- (D) M_P neuron

Ans: A

Explanation: Training is not possible for MP neuron

31. Identify the following activation function : $\phi(V) = Z + (1 / (1 + \exp(-x * V + Y)))$, Z, X, Y are parameters
- a. Step function
 - b. Ramp function
 - c. Sigmoid function
 - d. Gaussian function

Ans: C

Explanation: it is sigmoid function

- 32 . An artificial neuron receives n inputs $x_1, x_2, x_3, \dots, x_n$ with weights w_1, w_2, \dots, w_n attached to the input links. The weighted sum _____ is computed to be passed on to a non-linear filter Φ called activation function to release the output.
- a. $\sum w_i$
 - b. $\sum x_i$
 - c. $\sum w_i + \sum x_i$
 - d. $\sum w_i * x_i$

Ans: d

Explanation: It is net input calculated as $\sum w_i * x_i$

33. Which of the following can be used for clustering of data ?

- a. Single layer perception
- b. Multilayer perception
- c. Self organizing map
- d. Radial basis function

Ans: C

Explanation: SOM is unsupervised NN based on grouping of elements based on similarity

34. Perceptron learning, Delta learning and LMS learning are learning methods which falls under the category of

- a. Error correction learning - learning with a teacher
- b. Reinforcement learning - learning with a critic
- c. Hebbian learning
- d. Competitive learning - learning without a teacher

Ans: a

Explanation: It is one of the supervised learning algorithm.

35 Which of the following model has ability to learn?

- a) pitts model
- b) rosenblatt perceptron model
- c) both rosenblatt and pitts model
- d) neither rosenblatt nor pitts

Answer: b

Explanation: Weights are fixed in pitts model but adjustable in rosenblatt.

36 When both inputs are 1, what will be the output of the pitts model nand gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: a

Explanation: Check the truth table of simply a nand gate.

37 When both inputs are 1, what will be the output of the pitts model AND gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: b

Explanation: Check the truth table of simply a And gate.

38. When both inputs are 1, what will be the output of the pitts model OR gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: b

Explanation: Check the truth table of simply a OR gate.

39. When both inputs are 1, what will be the output of the pitts model XOR gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: a

Explanation: Check the truth table of simply a XOR gate.

40. Does McCulloch-pitts model have ability of learning?

- a) yes
- b) no

Answer: b

Explanation: Weights are fixed.

41. What is an activation value?

- a) weighted sum of inputs
- b) threshold value
- c) main input to neuron
- d) none of the mentioned

Answer: a

Explanation: It is definition of activation value

42. Positive sign of weight indicates?

- a) excitatory input
- b) inhibitory input
- c) can be either excitatory or inhibitory as such
- d) none of the mentioned

Answer: a

Explanation: Sign convention of neuron.

43. Negative sign of weight indicates?

- a) excitatory input
- b) inhibitory input
- c) excitatory output
- d) inhibitory output

Answer: b

Explanation: Sign convention of neuron.

44. The amount of output of one unit received by another unit depends on what?

- a) output unit
- b) input unit
- c) activation value
- d) weight

Answer: d

Explanation: Activation is sum of weighted sum of inputs, which gives desired output..hence output depends on weights.

45. The process of adjusting the weight is known as?

- a) activation
- b) synchronisation
- c) learning
- d) none of the mentioned

Answer: c

Explanation: Basic definition of learning in neural nets .

46. The procedure to incrementally update each of weights in neural is referred to as?

- a) synchronisation
- b) learning law
- c) learning algorithm
- d) both learning algorithm & law

Answer: d

Explanation: Basic definition of learning law in neural.

47. In what ways can output be determined from activation value?

- a) deterministically
- b) stochastically
- c) both deterministically & stochastically
- d) none of the mentioned

Answer: c

Explanation: This is the most important trait of input processing & output determination in neural networks.

48. How can output be updated in neural network?

- a) synchronously
- b) asynchronously

- c) both synchronously & asynchronously
- d) none of the mentioned

Answer: c

Explanation: Output can be updated at same time or at different time in the networks.

49. What is asynchronous update in neural netwks?

- a) output units are updated sequentially
- b) output units are updated in parallel fashion
- c) can be either sequentially or in parallel fashion
- d) none of the mentioned

Answer: a

Explanation: Output are updated at different time in the networks.

50. Who developed the first learning machine in which connection strengths could be adapted automatically?

- a) McCulloch-pitts
- b) Marvin Minsky
- c) Hopfield
- d) none of the mentioned

Answer: b

Explanation: In 1954 Marvin Minsky developed the first learning machine in which connection strengths could be adapted automatically & efficiebtly.

51. Who proposed the first perceptron model in 1958?

- a) McCulloch-pitts
- b) Marvin Minsky
- c) Hopfield
- d) Rosenblatt

Answer: d

Explanation: Rosenblatt proposed the first perceptron model in 1958 .

52. What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?

- a) associative nature of networks
- b) distributive nature of networks
- c) both associative & distributive
- d) none of the mentioned

Answer: c

Explanation: General characteristics of ANNs.

53. What was the name of the first model which can perform wieghted sum of inputs?

- a) McCulloch-pitts neuron model
- b) Marvin Minsky neuron model

- c) Hopfield model of neuron
- d) none of the mentioned

Answer: a

Explanation: McCulloch-pitts neuron model can perform weighted sum of inputs followed by threshold logic operation.

54. The cell body of neuron can be analogous to what mathematical operation?

- a) summing
- b) differentiator
- c) integrator
- d) none of the mentioned

Answer: a

Explanation: Because adding of potential(due to neural fluid) at different parts of neuron is the reason of its firing.

55. What is the critical threshold voltage value at which neuron get fired?

- a) 30mv
- b) 20mv
- c) 25mv
- d) 10mv

Answer: d

Explanation: This critical is founded by series of experiments conducted by neural scientist.

60 . Does there is any effect on particular neuron which got repeatedly fired ?

- a) yes
- b) no

Answer: a

Explanation: The strength of neuron to fire in future increases.

61. What is name of above mechanism?

- a) hebb rule learning
- b) error correction learning
- c) memory based learning
- d) none of the mentioned

View Answer

Answer: a

Explanation: It follows from basic definition of hebb rule learning.

62. What is hebb's rule of learning

- a) the system learns from its past mistakes
- b) the system recalls previous reference inputs & respective ideal outputs
- c) the strength of neural connection get modified accordingly

d) none of the mentioned

Answer:c

Explanation: The strength of neuron to fire in future increases, if it is fired repeatedly.

63. Who invented perceptron neural networks?

a) McCulloch-pitts

b) Widrow

c) Minsky & papert

d) Rosenblatt

Answer: d

Explanation: The perceptron is one of the earliest neural networks. Invented at the Cornell Aeronautical Laboratory in 1957 by Frank Rosenblatt, the Perceptron was an attempt to understand human memory, learning, and cognitive processes.

64. What is delta (error) in perceptron model of neuron?

a) error due to environmental condition

b) difference between desired & target output

c) can be both due to difference in target output or environmental condition

d) none of the mentioned

Answer: a

Explanation: All other parameters are assumed to be null while calculating the error in perceptron model & only difference between desired & target output is taken into account.

65. In neural how can connections between different layers be achieved?

a) interlayer

b) intralayer

c) both interlayer and intralayer

d) either interlayer or intralayer

Answer: c

Explanation: Connections between layers can be made to one unit to another and within the units of a layer.

66. Connections across the layers in standard topologies & among the units within a layer can be organised?

a) in feedforward manner

b) in feedback manner

c) both feedforward & feedback

d) either feedforward & feedback

Answer: d

Explanation: Connections across the layers in standard topologies can be in feedforward manner or in feedback manner but not both.

67. State whether Hebb's law is supervised learning or of unsupervised type?

a) supervised

b) unsupervised

c) either supervised or unsupervised

d) can be both supervised & unsupervised

Answer: b

Explanation: No desired output is required for its implementation.

68. Following approach has deterministic and well written rules:

- a. Soft Computing
- b. hard computing

Ans: b

Explanation: Hard computing is based on deterministic fixed algorithms

69. Uncertainty can be handled in ---

- a. Soft Computing
- b. hard computing

Ans:

Explanation: Fuzzy a type of soft computing is more suitable to handle uncertainty

70. Different soft computing approaches can be combined to improve efficiency:

- a. True
- b. False

Ans: a

Explanation: there are different hybrid approaches available.

Subject: Soft computing Optimization Algorithm

MCQs Unit- II and III (Fuzzy Logic)

1. The membership functions are generally represented in

- a. Tabular Form
- b. Graphical Form
- c. Mathematical Form
- d. Logical Form

Ans: b

Explanation: Membership functions are presented in the form of plots

2. Three main basic features involved in characterizing membership function are

- a. Intuition, Inference, Rank Ordering
- b. Fuzzy Algorithm, Neural network, Genetic Algorithm
- c. Core, Support , Boundary
- d. Weighted Average, center of Sums, Median

Ans: C

Explanation: As per the diagram of MF

3 A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

- a. sub normal fuzzy sets
- b. normal fuzzy set
- c. convex fuzzy set
- d. concave fuzzy set

Ans: b

Explanation: As per the definition

4 A fuzzy set wherein no membership function has its value equal to 1 is called

- a. normal fuzzy set
- b. subnormal fuzzy set.
- c. convex fuzzy set
- d. concave fuzzy set

Ans: b

Explanation: As per the definition

5. Who initiated the idea of Soft Computing

- a. Charles Darwin
- b. Lofti A Zadeh
- c. Mc_Culloch
- d. Rechenberg

Ans: b

6. Core of soft Computing is.....

- a. Fuzzy Computing, Neural Computing, Genetic Algorithms
- b. Fuzzy Networks and Artificial Intelligence
- c. Artificial Intelligence and Neural Science
- d. Neural Science and Genetic Science

Ans: a

Explanation: As per the definition

7. Fuzzy logic is usually represented as

- a. IF-THEN-ELSE rules
- b. IF-THEN rules
- c. Both IF-THEN-ELSE rules & IF-THEN rules
- d. None of the mentioned

Ans: b

Explanation: Rules are usually expressed in the form: IF variable IS property THEN action

8. Which of the following is not true regarding the principles of fuzzy logic?

- a. Fuzzy logic follows the principle of Aristotle and Buddha
- b. Fuzzy logic is a concept of 'certain degree'
- c. Japan is currently the most active users of fuzzy logic
- d. Boolean logic is a subset of fuzzy logic

Ans: b

Explanation: Fuzzy deals with uncertainty

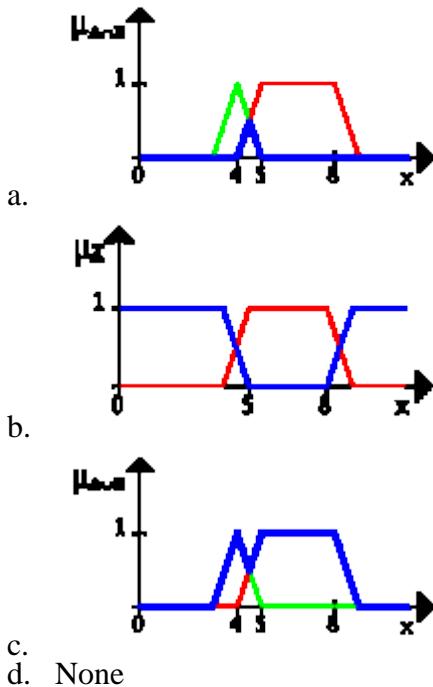
9. what are the following sequence of steps taken in designing a fuzzy logic machine?

- a. Fuzzification -> Rule Evaluation --> Defuzzification
- b. Rule Evaluation -->Fuzzification ->Defuzzification
- c. Defuzzification-->Rule Evaluation -->Fuzzification
- d. Fuzzy Sets-->Defuzzification-->Rule Evaluation

Ans: a

Explanation: fuzzification, rule evaluation and defuzzification are the general steps

10. Given these fuzzy graphs for member functions A and B.Which of the following graphs yields the result of the operation A OR B.



Ans: C

11. What Is Fuzzy Inference Systems?

- a. The process of formulating the mapping from a given input to an output using fuzzy logic
- b. Changing the output value to match the input value to give it an equal balance
- c. Having a larger output than the input
- d. Having a smaller output than the input

Ans: a

12. What Is another Name For Fuzzy Inference Systems?

- a. Fuzzy Expert System
- b. Fuzzy Modelling
- c. Fuzzy Logic Controller
- d. All the Options

Ans: a

13. _____ is/are the way/s to represent uncertainty.

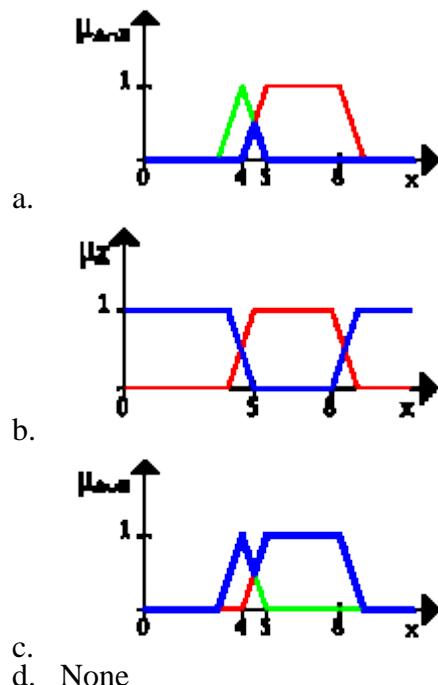
- a. Fuzzy Logic
- b. Probabilty

- c. Entropy
- d. All of the mentioned

Ans: d

Explanation: Entropy is amount of uncertainty involved in data.

14. Given these fuzzy graphs for member functions A and B. Which of the following graphs yields the result of the operation A AND B.



Ans: a

15. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.

- A. True
- B. False

Ans: A

16. Fuzzy Computing

- A. mimics human behaviour
- B. doesn't deal with 2 valued logic
- C. deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D. All of the above

Ans: D

Explanation: Fuzzy deals with imprecise, uncertain, ambiguous, inexact, or probabilistic can represent linguistic variables and partial membership in more than two sets

17 The region of universe that is characterized by complete membership in the set is called

A. Core

B. Support

C. Boundary

D. Fuzzy

Ans: A

Explanation: As per the definition

18 Three main basic features involved in characterizing membership function are

A. Intuition, Inference, Rank Ordering

B. Fuzzy Algorithm, Neural network, Genetic Algorithm

C. Core, Support , Boundary

D. Weighted Average, center of Sums, Median

Ans: C

Explanation: As per the definition

19 Membership function can be thought of as a technique to solve empirical problems on the basis of

A. knowledge

B. examples

C. learning

D. experience

Ans: D

Explanation: It depends on individual's perception

20 In a Fuzzy set a prototypical element has a value

A. 1

B. 0

C. infinite

D. Not defined

Ans: A

Explanation: As per the definition

21 A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe

- A. convex fuzzy set
- B. concave fuzzy set
- C. Non concave Fuzzy set
- D. Non Convex Fuzzy set

Ans: A

Explanation: As per the definition

22. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.

- A. Convex Fuzzy Set
- B. Non convex fuzzy set
- C. Normal Fuzzy set
- D. Sub normal fuzzy set

Ans: B

Explanation: As per the definition

23 The process of converting crisp input to fuzzy output is called as.....

- A. Fuzzification
- B. Defuzzification

Ans: A

Explanation: As per the definition

24 The process of converting fuzzy input to crisp output is called as.....

- A. Fuzzification
- B. Defuzzification

Ans: B

Explanation: As per the definition

25. Traditional set theory is called as....

- a. Fuzzy sets
- b. Crisp sets

Explanation: As per the definition

26. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **Intersection** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: A

27. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **Union** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: B

28. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **complement for A** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: C

29. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **complement for B** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: d

30 In propositional logic $P \Leftrightarrow Q$ is equivalent to (Where \sim denotes NOT):

- a. $\sim(P \vee Q) \wedge \sim(Q \vee P)$
- b. $(\sim P \vee Q) \wedge (\sim Q \vee P)$
- c. $(P \vee Q) \wedge (Q \vee P)$
- d. $\sim(P \vee Q) \rightarrow \sim(Q \vee P)$

Ans:B

31. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy **fuzzy min-max composition** is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: b

32. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy **fuzzy max-min composition** is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: a

33. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy **fuzzy max-product composition** is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: c

34. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **A Union B**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: a

35. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **A Intersect B**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: b

36. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **complement of A**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: c

37. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **complement of B**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: d

38. Following are defuzzification techniques

- a. Max-membership principle
- b. Centroid method
- c. Weighted average method.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques

39. Following are defuzzification techniques

- a. Lamdda cut method
- b. Centroid method
- c. Center of sums.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques

40. Following are defuzzification techniques

- a. Mean-max membership
- b. Center of large area
- c. First of maxima, last of maxima.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques

41. fuzzy approximate reasoning methods are

- a. categorical reasoning;
- b. qualitative reasoning;
- c. syllogistic reasoning;
- d. All of above

Ans: d

Explanation: All above are techniques of approximation

42. fuzzy approximate reasoning methods are

- a. categorical reasoning;
- b. qualitative reasoning;
- c. dispositional reasoning.
- d. All of above

Ans: d

Explanation: All above are techniques of approximation

43. Following are types of fuzzy Inference system

- a. Fuzzy controller
- b. Fuzzy expert system
- c. Mamdani FIS
- d. none of above

Ans: C

Explanation: Mamdani and Sugeno are types of FIS

44. Following are types of fuzzy Inference system

- a. Fuzzy controller
- b. Fuzzy expert system
- c. Sugeno FIS
- d. none of above

Ans: C

Explanation: Mamdani and Sugeno are types of FIS

45. Fuzzy propositions like short, Tall, Quick are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fu:zzy qualifiers

Ans: a

Explanation: Fuzzy predicates are tall, short , quick

46. Fuzzy propositions like moderately, rather, slightly are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy qualifiers

Ans:b

Explanation: As per the definition

47. Fuzzy propositions like most, several, many, & frequently are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fu:zzy qualifiers

Ans: C

Explanation: As per the definition

48. Fuzzy propositions that shows truth value or probability value are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy qualifiers

Ans: d

Explanation: As per the definition

49. Fuzzy propositions like rail, short, Tall, Quick are comes under

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy possibility qualification:

Ans: A

Explanation: As per the definition

50. In which type of FIS (fuzzy inference System) , output membership function is linear or constant

- a. Sugeno FIS
- b. Mamdani FIS

Ans: a

51. For describing fuzzy variables, modifiers like very, highly, slightly, moderately, plus, minus, fairly are called

- a. Linguistic variables
- b. Linguistic hedges

Ans: b

Explanation: As per the definition

52. For fuzzy variable Height, values like tall, small are called as

- a. Linguistic variables
- b. Linguistic hedges

Ans: a

Explanation: As per the definition

53. The values of the set membership is represented by _____

- a) Discrete Set
- b) Degree of truth
- c) Probabilities
- d) Both Degree of truth & Probabilities

Answer: b

Explanation: Both Probabilities and degree of truth ranges between 0 – 1.

54. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____

- a) Fuzzy Set
- b) Crisp Set
- c) Fuzzy & Crisp Set
- d) None of the mentioned

Answer: a

Explanation: Fuzzy logic deals with linguistic variables.

55. The truth values of traditional set theory is _____ and that of fuzzy set is _____

- a) Either 0 or 1, between 0 & 1
- b) Between 0 & 1, either 0 or 1
- c) Between 0 & 1, between 0 & 1
- d) Either 0 or 1, either 0 or 1

Answer: a

Explanation: Refer the definition of Fuzzy set and Crisp set.

56. Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.

- a) AND
- b) OR
- c) NOT
- d) All of the mentioned

Answer: d

Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;

57. Like relational databases there does exists fuzzy relational databases.

- a) True
- b) False

Answer: a

Explanation: Once fuzzy relations are defined, it is possible to develop fuzzy relational databases. The first fuzzy relational database, FRDB, appeared in Maria Zemankova dissertation.

58 What is the form of Fuzzy logic?

- a) Two-valued logic
- b) Crisp set logic
- c) Many-valued logic
- d) Binary set logic

Answer: c

Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.

59. What Is The Purpose Of Aggregation?

- A. To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs
- B. To gather all the possible inputs and use the average to gain an output
- C. To gather all the different fuzzy set outputs and averages them out to get a single value
- D. To subtract all the output fuzzy set values from the input values

Ans: A

Explanation: Aggregate operation combines them into single fuzzy set. (it is not a average)

60. What Are The Two Types Of Fuzzy Inference Systems?

- A. Model-Type and System-Type
- B. Momfred-Type and Semigi-Type
- C. Mamdani-Type and Sugeno-Type
- D. Mihni-Type and Sujgani-Type

Ans: C

Explanation: Mamdani and Sugeno are types of FIS

61. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be

- a. $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- b. $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- c. $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- d. None of the above

Answer:c

Explanation: e.g $0/2 < 0.5$ hence $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$

62. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 2$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {4, 5, 6, 7, 8, 9, 10}
- d. None of the above

Answer: d

Explanation: no membership value above 2

63. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / x$ Then the α cut corresponding to $\alpha = 1$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {4, 5, 6, 7, 8, 9, 10}
- d. None of the above

Answer: b

Explanation: all the values equal or above to α are considered in α cut

64. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x$ Then the α cut corresponding to $\alpha = 5$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {5, 6, 7, 8, 9, 10}
- d. None of the above

Answer:C

Answer: all the values equal or above to α are considered in α cut

65. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x$ Then the α cut corresponding to $\alpha = 8$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {9, 10}
- c. {8, 9, 10}
- d. None of the above

Answer:C

Explanation: all the values equal or above to α are considered in α cut

66 . Consider a fuzzy set old as defined below

Old = {(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)}

Then the alpha-cut for alpha = 0.4 for the set old will be

- a.** $\{(40, 0.4)\}$
- b.** $\{50, 60, 70, 80\}$
- c.** $\{(20, 0.1), (30, 0.2)\}$
- d.** $\{(20, 0), (30, 0), (40, 1), (50, 1), (60, 1), (70, 1), (80, 1)\}$

Ans: d

Explanation: all the values equal or above to α are considered in α cut

68 . Consider a fuzzy set old as defined below

$$\text{Old} = \{(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)\}$$

Then the alpha-cut for alpha = 1 for the set old will be

- a.** $\{(40, 0.4)\}$
- b.** $\{70, 80\}$
- c.** $\{(20, 0.1), (30, 0.2)\}$
- d.** $\{(20, 0), (30, 0), (40, 0), (50, 0), (60, 0), (70, 1), (80, 1)\}$

Ans: d

Explanation: all the values equal or above to α are considered in α cut

69. The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$

- a.** $h(A) = 0$
- b.** $h(A) < 0$
- c.** $h(A) = 1$
- d.** $h(A) < 1$

Ans: c

Explanation: Support of MF =1

70. A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$

- a.** Core
- b.** Support
- c.** Cross-over
- d.** α - cut

Ans: c

Explanation: Cross-over point =0.5

71. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.1, 0.5, 0.6, 0.1, 0.8\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: d

Explanation: intersection is minimum value of MF

72. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cup \mu_B$ will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.1, 0.5, 0.6, 0.1, 0.8\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: a

Explanation: Union is maximum value of MF

73. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of complement($\sim \mu_A$) will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.8, 0.5, 0.4, 0.9, 0.1\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: c

Explanation: complement is 1-mf

74. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of complement($\sim \mu_B$) will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.9, 0.5, 0.8, 0.3, 0.2\}$
- c. $\{0.8, 0.5, 0.4, 0.9, 0.1\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: b

Explanation: complement is 1-mf

75. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value of $A \cup B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: a

Explanation: Maximum of mf

76. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value of $A \cap B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: minimum of mf

77. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim A$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans:c

Explanation: 1- mf

78. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans:d

Explanation: 1- mf

78. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $A \cap \sim B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) min of mf

79. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $A \cup \sim B$ will be

- a. $\{0.5, 0.6, 0.8, 0.2\}$
- b. $\{0.1, 0.3, 0.1, 0\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: a

Explanation: i) 1- mf ii) max of mf

80. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim A \cup \sim B$ will be

- a. $\{0.5, 0.6, 0.8, 0.2\}$
- b. $\{0.9, 0.6, 0.5, 0.8\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) max of mf

81. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim A \cup B$ will be

- a. $\{0.5, 0.6, 0.8, 0.2\}$
- b. $\{0.9, 0.7, 0.5, 1\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) max of mf

82. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cap B)$ will be

- a. $\{0.5, 0.4, 0.1, 0.8\}$
- b. $\{0.9, 0.7, 0.5, 1\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: a

Explanation: i) 1- mf ii) min of mf

83. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cap \sim B)$ will be

- a. $\{0.5, 0.4, 0.1, 0.8\}$
- b. $\{0.9, 0.7, 0.8, 0.8\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) min of mf

84. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cap B)$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.5, 0.6, 0.5, 0\}$
- d. $\{0.9, 0.7, 0.9, 0.8\}$

Ans: d

Explanation: i) min of mf ii) 1- mf

85. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cup B)$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.5, 0.6, 0.5, 0\}$
- d. $\{0.9, 0.7, 0.9, 0.8\}$

Ans: b

Explanation: i) max of mf ii) 1- mf

86. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cup B)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.1, 0.5, 0.4, 0.2, 0.2\}$
- d. $\{0.1, 0.5, 0.4, 0.2, 0.3\}$

Ans: a

Explanation: Union is maximum of MF

87. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cap B)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.1, 0.5, 0.4, 0.2, 0.2\}$
- d. $\{0.1, 0.5, 0.4, 0.2, 0.3\}$

Ans: b

Explanation: Intersection is minimum of MF

88. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim \mu(A)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.4, 0.5, 0.9, 0.3, 0.2\}$
- d. $\{0.1, 0.8, 0.4, 0.2, 0.5\}$

Ans: c

Explanation: Complement is 1- of MF

89. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim \mu(B)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.4, 0.5, 0.9, 0.3, 0.2\}$

- d.** {0.1, 0.8, 0.4, 0.2, 0.5}

Ans: d

Explanation: Complement is 1- of MF

90. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim\mu(A \cup B)(x)$ will be

- a.** {0.9, 0.5, 0.6, 0.8, 0.8}
- b.** {0.6, 0.2, 0.1, 0.7, 0.5}
- c.** {0.4, 0.5, 0.9, 0.3, 0.2}
- d.** {0.1, 0.5, 0.4, 0.2, 0.2}

Ans: d

Explanation: Max of MF then 1- of MF

91. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cup \sim B)(x)$ will be

- a.** {0.9, 0.5, 0.6, 0.8, 0.8}
- b.** {0.6, 0.2, 0.1, 0.7, 0.5}
- c.** {0.6, 0.8, 0.4, 0.7, 0.8}
- d.** {0.1, 0.8, 0.4, 0.2, 0.5}

Ans: c

Explanation: Max of MF , 1- of MF

92. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(\sim A \cup B)(x)$ will be

- a.** {0.9, 0.5, 0.6, 0.8, 0.8}
- b.** {0.6, 0.2, 0.1, 0.7, 0.5}
- c.** {0.4, 0.5, 0.9, 0.3, 0.2}
- d.** {0.9, 0.5, 0.9, 0.8, 0.5}

Ans: d

Explanation: Max of MF , 1- of MF

93. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____

- a) Fuzzy Set
- b) Crisp Set
- c) Fuzzy & Crisp Set
- d) None of the mentioned

Answer: a

Explanation: Fuzzy logic deals with linguistic variables.

94. The values of the set membership is represented by _____

- a) Discrete Set
- b) Degree of truth
- c) Probabilities
- d) Both Degree of truth & Probabilities

Answer: b

Explanation: Both Probabilities and degree of truth ranges between 0 – 1.

95. Japanese were the first to utilize fuzzy logic practically on high-speed trains in Sendai.

- a) True
- b) False

Answer: a

Explanation: None.

96 Compute the value of adding the following two fuzzy integers:

$$A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$$

$$B = \{(0.5,11), (1,12), (0.5,13)\}$$

Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(y)))$

Then, $f(A+B)$ is equal to

- a. $\{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)\}$
- b. $\{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)\}$
- c. $\{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$
- d. $\{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$

Ans: d

Explanation: As per the formula

97. Let R and S be two fuzzy relations defined as follows. Then, the resulting relation, T, which relates elements of universe of X to elements of universe of Z using max-product composition is given by

$$R = \begin{matrix} & y_1 & y_2 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.7 & 0.5 \\ 0.8 & 0.4 \end{matrix} \right] \end{matrix}$$

and $S = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} y_1 \\ y_2 \end{matrix} & \left[\begin{matrix} 0.9 & 0.6 & 0.2 \\ 0.1 & 0.7 & 0.5 \end{matrix} \right] \\ z_1 & z_2 & z_3 \end{matrix}$

(A) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.68 & 0.89 & 0.39 \\ 0.76 & 0.72 & 0.32 \end{matrix} \right] \end{matrix}$

(B) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.68 & 0.89 & 0.39 \\ 0.72 & 0.76 & 0.32 \end{matrix} \right] \end{matrix}$

(C) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.63 & 0.42 & 0.25 \\ 0.72 & 0.48 & 0.20 \end{matrix} \right] \end{matrix}$

(D) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.05 & 0.35 & 0.14 \\ 0.04 & 0.28 & 0.16 \end{matrix} \right] \end{matrix}$

Ans: D

Explanation: As per the formula

98. Consider above example and compute Max_min composition, Min_max composition

Ans: []

Explanation: As per the formula i) max (min(u(R),u(s)), ii) min(max(u(R),u(s))

99. Let A be the set of comfortable houses given as follows. Then the set of comfortable and affordable houses is

$$A = \left\{ \frac{x_1}{0.8}, \frac{x_2}{0.9}, \frac{x_3}{0.1}, \frac{x_4}{0.7} \right\}$$

and B be the set of affordable houses

$$B = \left\{ \frac{x_1}{0.9}, \frac{x_2}{0.8}, \frac{x_3}{0.6}, \frac{x_4}{0.2} \right\}$$

(A) $\left\{ \frac{x_1}{0.8}, \frac{x_2}{0.8}, \frac{x_3}{0.1}, \frac{x_4}{0.2} \right\}$

(B) $\left\{ \frac{x_1}{0.9}, \frac{x_2}{0.9}, \frac{x_3}{0.6}, \frac{x_4}{0.7} \right\}$

(C) $\left\{ \frac{x_1}{0.8}, \frac{x_2}{0.8}, \frac{x_3}{0.6}, \frac{x_4}{0.7} \right\}$

(D) $\left\{ \frac{x_1}{0.7}, \frac{x_2}{0.7}, \frac{x_3}{0.7}, \frac{x_4}{0.9} \right\}$

Ans: B

Explanation: AND is Minimum of MF

100. Fuzzy membership function with only one member with value one is called..

- a. Singleton
- b. Core
- c. Boundary
- d. Support

Ans: a:

Explanation: As per the definition

101. Let $h(A)$ denote the height of a fuzzy set A. A is called a normal fuzzy set if

- a) $h(A)=0$
- b) $h(A)=1$
- c) $h(A)<1$
- d) $h(A)>1$

Ans: b

Explanation: As per the definition

102. Let A be a fuzzy set. Then 1-cut of A is usually called

- a)Support of A
- b) height of A
- c) Core of A
- d)cut of A5.

Ans: C

Explanation: core of MF has values 1

103. The boundary condition satisfied by the standard fuzzy complement is

- a) $c(0)=1$ and $c(1)=1$
- b) $c(0)=0$ and $c(1)=1$
- c) $c(0)=0$ and $c(1)=0$
- d) $c(0)=1$ and $c(1)=0$.

Ans: D

Explanation: Boundary is between 0 to 1 its complement is 1 to 0

104. Each fuzzy complement has atmost-----equilibrium.

- a)1
- b)2
- c) 3
- d) None of these

Ans: A

Explanation: MF is between 0 to 1

Subject: Soft computing Optimization Algorithm

Unit-4 Evolutionary Computing

1. Which of the following is not a discrete optimization problem?

- A Travelling salesman problem
- B Robot control
- C Chess playing program
- D Prediction of stock prices

Ans: B

Explanation: Robot control is controller system

2. Which of the following are discrete optimization problems?

- A Travelling salesman problem
- B Prediction of stock prices
- C Chess playing program
- D All of above

Ans: D

Explanation: All are applications of GA or EA

3. Exploration search is

- A Concerned with improving the current best solution by local search
- B Concerned with global search
- C Often resulting in getting stuck in local optima
- D None of above

Ans: B

Explanation: Exploitation means using already exist solutions and make refinement to it so it's fitness will improve

4. Evolutionary algorithm: Initialization

- A Individuals are normally generated randomly
- B Is concerned with generating candidate solutions
- C Heuristics for generating candidates can be applied
- D All of above

Ans: D

Explanation: All above are true

5. Evolutionary algorithm: Variation operators

- A Is a selection operator
- B Act on population level
- C Act on individual level
- D Are crossover and mutation

Ans: B, D

Explanation: variation operations are crossover and mutation

6. Evolutionary algorithm: Recombination

- A Also known as crossover
- B Combines elements of two or more genotypes
- C Also known as mutation
- D Also known as representation

Ans: A, B

Explanation: Recombination is also known as crossover

7. Evolutionary algorithm: Survivor selection

- A Is often stochastic
- B Also known as replacement
- C Can be fitness based
- D Can be age based

Ans: B,C,D

Explanation: Survivor selection can be based on fitness value, age

8. Evolutionary algorithm: Termination condition

- A Several termination criteria can be combined
- B Determines when to compute the fitness for a population
- C Should be avoided to get faster evolution
- D None of above

Ans: A

Explanation: Termination conditions like max iteration, time out, no change in fitness can be combined

9. Evolutionary algorithm: Termination condition

- A None of above
- B Determines when to compute the fitness for a population
- C Is checked in every generation
- D Should be avoided to get faster evolution

Ans: C

Explanation: checked after every iteration to end the search

10 Tree representation (choose multiple)

- A Is used in Genetic Programming
- B Mutation results in replacing a randomly chosen subtree by a randomly generated tree
- C Not suited for representing computer programs
- D Is used in Genetic Algorithms

Ans: A,B

Explanation: Suitable for GP to generate computer programs

11 Rank based selection

- A Results in less control of the selection pressure than fitness-proportionate selection
- B Use absolute rather than relative fitness
- C Ranking can be either linear or non-linear
- D None of above

Ans: C

Explanation: Chromosomes are ranked based on fitness value

12 Simple Genetic Algorithm (GA) (choose multiple)

- A Children compete with parents in survival selection
- B Both crossover and mutation are applied in each generation
- C The whole population is replaced with the resulting offspring
- D All of above

Ans: B,C

Explanation: Whole population get replaced with new child

13 Evolutionary Strategies (ES)

- A (μ , λ): Select survivors among parents and offspring
- B ($\mu+\lambda$): Select survivors among parents and offspring
- C ($\mu-\lambda$): Select survivors among offspring only
- D ($\mu:\lambda$): Select survivors among offspring only

Ans: B

Explanation: The form of $(\mu + \lambda)$ -ES models in which μ specified the size of the parent population and λ specified the size of the offspring population

14 What is most important to be concerned with in the evolution of repetitive problems?

- A Do multiple runs until a good solution is found
- B Execute one run until the solution is good enough
- C Get a reasonably good solution every time
- D Get a very good result just once

Ans: C

Explanation: Iterative process looking for good solutions in every iterations

15. What are normally the two best measurement units for an evolutionary algorithm?

- A Number of Generations
- B Elapsed time
- C CPU time
- D Population size

Ans: A, B

Explanation: CPU time is hardware dependent and number of population specifies size of search area.

16. What are normally the two best measurement units for an evolutionary algorithm?

- A Number of evaluations
- B Elapsed time
- C CPU time
- D Number of generations

Ans: B, D

Explanation: CPU time is hardware dependent and number of evaluations is not important

17 Tree representation (choose multiple)

- A Is used in Genetic Programming
- B Mutation results in replacing a randomly chosen subtree by a randomly generated tree
- C Suited for representing computer programs
- D All of above

Ans: D

Explanation: Suitable for GP to generate computer programs

18 Simple Genetic Algorithm (GA)

- A Fitness get evaluated at the end of every iteration
- B Both crossover and mutation are applied in each generation
- C The whole population is replaced with the resulting offspring
- D All of above

Ans: D

Explanation: Recombination-evaluation- replacement are steps of GA

19. In Evolutionary Strategy , individuals are represented as

- a. real value
- b. Binary
- c. tree
- d. Octal

Ans. A

Explanation: The focus of the evolution strategy (ES) paradigm was on real-valued function optimization. Hence, individuals were naturally represented as vectors of real numbers.

20. In early EA or ES, parent selection is based on

- a. Roulette Wheel
- b. Order of fitness
- c. Probabilistic normal distribution
- d. All of above

Ans: c

Explanation: parent selection is based on Probabilistic normal distribution

21. In EP, population is the combination of parent and child

- a. True
- b. False

Ans: a

Explanation: The evolutionary programming (EP) paradigm concentrated on models involving a fixed-size population of N parents, each of which produced a single offspring. The next generation of N parents was determined by combining both parents and children into a single population of size $2N$, rank ordering them by fitness and allowing only the top N to survive.

22. In GA, population is the combination of Parent and child

- a. True
- b. False

Ans: b

Explanation: parent gets replaced by child

23. In EA, the new offspring is forced to compete immediately for survival against an existing member of the population

- a. True
- b. False

Ans: a

Explanation: If the objective fitness of the child is greater than the selected member, the child survives and the old member dies off. Otherwise, the child dies without ever residing in the population.

24 In EA, the entire parent population dies off each generation and the offspring only compete with each other for survival

- a. non-overlapping models
- b. overlapping models

Ans: a

Explanation: As per definition

25 In EA, offspring compete with each other and parents for survival

- a. non-overlapping models
- b. overlapping models

Ans: b

Explanation: As per definition

26. In EA, premature convergence takes place due to

- a. Survival selection pressure
- b. Selection method

- c. Complexity of problems
- d. too much exploitation

Ans: d

Explanation: For problems that exhibit highly multi-modal (rugged) fitness landscapes or landscapes that change over time, too much exploitation generally results in premature convergence to suboptimal peaks in the space.

27. In EA, offspring compete with parent or other offspring is called...

- a. Survival Selection
- b. Tournament Selection
- c. Competition
- d. None of above

Ans: a

Explanation: As per the definition

28. In EV, $(\mu+\lambda)$ model is supported by

- a. Evolutionary Strategy
- b. Evolutionary Programming
- c. Evolutionary Algorithms
- d. All of Above

Ans: a

Explanation: The form of $(\mu + \lambda)$ -ES models in which μ specified the size of the parent population and λ specified the size of the offspring population

29. In EC, following are the selection methods

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. All are above

Ans: d

Explanation: These are non-overlapping generation modules

30. In EC, following are the selection methods

- a. Rank-Proportional Selection
- b. Tournament Selection
- c. Fitness-Proportional Selection
- d. All of above

Ans: d

Explanation: These are non-overlapping generation modules

31. In EC, genotype is selected based on maximum fitness value is called

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection

- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: b

Explanation: As per the definition

32. In EC, only the k most fit individuals are selected from a pool of individuals of size $r > k$ is ..

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: c

Explanation: As per the definition

33. In EC, selection based on sorting the members of a selection pool by fitness is ...

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: d

Explanation: As per the definition

34. In EC selection, picking q individuals from the selection pool using a uniform probability distribution with replacement and designating the winner of that tournament as the one with the best fitness is

- a. Rank-Proportional Selection
- b. Tournament Selection
- c. Fitness-Proportional Selection
- d. Fitness_biased

Ans: b

Explanation: As per the definition

35. The difference between rank proportional and tournament selection is that genotypes are sorted in order to fitness value in rank proportional

- a. True
- b. False

Ans: a

Explanation: A potential computational disadvantage to truncation and linear ranking selection methods is that they require the selection pool to be sorted by fitness.

36. The difference between truncation and tournament selection is that genotypes are sorted in order to fitness value in truncation proportional

- a. True
- b. False

Ans: a

Explanation: A potential computational disadvantage to truncation and linear ranking selection methods is that they require the selection pool to be sorted by fitness.

37. In EA, recombination operation on p1: AB|CD and p2: ab|cd produces

- a. ABab
- b. ABcd
- c. ABCD
- d. abCD

Ans: b

Explanation: Recombination operation in EA is crossover here at point 2

38. In EA, recombination operation on p1: ABC|DEF and p2: abc|def produces

- a. ABCabc
- b. ABCdef
- c. ABCDef
- d. abcDEF

Ans: b

Explanation: Recombination operation in EA is crossover here at point 3

Note: In evolutionary algorithms two parents produce single child, whereas in GA two parents produce 2 children.

39. In EA, recombination operation on p1: AB|CD|EF and p2: ab|cd|ef produces

- a. ABcdEF
- b. abCDEF
- c. ABCDef
- d. abcDEF

Ans: a

Explanation: Recombination operation in EA is crossover here at point 2 and 4

40. In EA, recombination operation on p1: A|BCDE|F and p2: a|bcde|f produces

- a. ABcdEF
- b. abCDEF
- c. AbcdeF
- d. abcDEF

Ans: c

Explanation: Recombination operation in EA is crossover here at point 2 and 4

41. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 1122 produces

- a. ABcd
- b. abCD

c. ABCD

d. abcd

Ans: a

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

42. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 2211 produces

a. ABcd

b. abCD

c. ABCD

d. abcd

Ans: b

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

43. In EA, recombination operation on p1: ABCDEF and p2: abcdef with flip sequence 221122 produces

a. ABcdcd

b. abCDef

c. ABCDef

d. abcdEF

Ans: b

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

44. In EA, recombination operation on p1: ABCDEF and p2: abcdef with flip sequence 112211 produces

a. ABcdEF

b. abCDef

c. ABCDef

d. abcdEF

Ans: a

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

45. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 1212 produces

a. ABcd

b. abCD

c. AbCd

d. abcd

Ans: c

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

46. In EA , parent selection and survival selection is same

- a. True
- b. False

Ans: b

Explanation: Offspring compute with parent or other offspring for survival is called survival selection

47. In Evolutionary Algorithm, the whole population is replaced with the resulting offspring

- a. True
- b. False

Ans: b

Explanation: population is combination of parents and offspring

48 Simple Evolutionary Algorithm (EA) (choose multiple)

- A Children compete with parents in survival selection
- B Both crossover and mutation are applied in each generation
- C The whole population is replaced with the resulting offspring
- D All of above

Ans: A, B

Explanation: population is combination of parents and offspring hence survival selection occurs

49. In EA, ----asexual operation is

- a. representation
- b. Recombination
- c. Mutation
- d. none of above

Ans: c

Explanation: Mutation is performed on single parent only

50. In EA, ----sexual operation is

- a. representation
- b. Recombination
- c. Mutation
- d. none of above

Ans: b

Explanation: Recombination (crossover) is performed on two parents

Unit-5 Genetic Algorithms

1 Genetic Algorithms: Variable length encoding is possible in

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans: A

Explanation: Variable size encoding is possible in Messy GA

2 Genetic Algorithms: parameters can be changes runtime

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans : B

Explanation: parameters can be changes runtime in adaptive GA

3. Genetic Programming: representation is

- A. binary encoding
- B: Tree encoding
- C: Hex encoding
- D: Real value encoding

Ans: B

Explanation: Tree encoding is used to represent computer programs in GP

4. Generation of Computer programs is possible in

- A: Genetic Algorithms
- B. Genetic Programming
- C. Evolutionary Algorithms
- D. Evolutionary Strategy

Ans: B

Explanation: Computer programs can be output in GP

5. Probability of sub string get propagated in next generation is derived by

- A. Schema theorem
- B. Holland Classifiers
- C. Roulette wheel
- D. fitness evaluation

Ans: A

Explanation: Schema theorem is used to compute Probability of sub string get propagated in next generation

6. Following are the evaluation parameters for schema theorem (Choose multiple answers)

- A. Schema order
- B. Schema length
- C. representation technique
- D. None of above

Ans: A, B

Explanation: order and length are used

7. Schema theorem defines, there is high probability for sub strings to propagate in next generation if

- A. high order and short length
- B. High order and long length
- C. Low order and short length
- D. Low order and long length

Ans: C

Explanation: As per the theorem

8. Genetic algorithm: Mutation operators

- A. Is a selection operator
- B. Act on population level
- C. Act on individual level
- D. Is an encoding technique

Ans: C

Explanation: mutation act on one parent at a time

9. Genetic algorithm: Selection operators

- A Is a mutation operator
- B Act on population level
- C Act on individual level
- D Is an encoding technique

Ans: B

Explanation: Selection is based on whole population

10. Genetic algorithm: Crossover operators

- A Is a mutation operator
- B Act on population level
- C Act two individual level
- D Is an encoding technique

Ans: c

Explanation: Crossover combines two parents to produce two childs

11. Genetic Algorithms: chromosomes are represented using:

- A binary
- B Octal
- C Real value
- D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string are way to represent chromosomes

12. Genetic Algorithms: Diversification is carried out due to

- A Selection
- B Mutation
- C Crossover
- D Fitness evaluation

Ans: B

Explanation: As per definition

13. Genetic algorithms: chromosomes are selected randomly in

- A. Roulette Wheel
- B. Tournament
- C. Rank Selection
- D. Random selection

Ans: D

Explanation: Random Selection selects chromosomes randomly

14. Genetic algorithms: chromosomes selected based on selective pressure by holding a tournament competition

- A. Roulette Wheel
- B. Tournament
- C. Rank Selection
- D. Random selection

Ans: B

Explanation: As per definition

15. Genetic algorithms: chromosomes are selected based on highest fitness value

- A. Roulette Wheel
- B. Tournament
- C. Rank Selection
- D. Random selection

Ans: C

Explanation: As per definition

16. Rank based selection

- A Use relative rather than absolute fitness
- B Use absolute rather than relative fitness
- C Results in less control of the selection pressure than fitness-proportionate selection
- D None of above

Ans: A

Explanation: As per definition

17. The process of taking two parent solutions and producing from them a child is called

- A. Selection
- B. Crossover
- C. Mutation
- D. Reproduction

Ans: B

Explanation: As per definition

18. The two mating chromosomes are cut once at corresponding points and the sections after the cuts exchanged.

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: A

Explanation: As per definition

19. The process of taking single parent solutions and producing a child is called

- A. Selection
- B. Crossover
- C. Mutation
- D. Reproduction

Ans: C

Explanation: As per definition

20. The two mating chromosomes are cut more than one at corresponding points and the sections after the cuts exchanged.

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: B

Explanation: As per definition

21. The two mating chromosomes are crossover with the help of mask

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: C

Explanation: As per definition

22. The three mating chromosomes are crossovered in

- A. Three parent crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: A

Explanation: As per definition

23. Probability of how often crossover will be performed can be mentioned in

- A. Three parent crossover
- B. Double point crossover
- C. Crossover probability
- D. Uniform crossover

Ans: A

Explanation: As per definition

24. A mutation chromosome generated by changing bit 0 to 1 and 1 to 0 is

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: B

Explanation: As per definition

25. A mutation chromosome generated by selecting random position and the bits next to that position are reversed

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: D

Explanation: As per definition

26. A mutation chromosome generated by exchanging bits at randomly selected positions is

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: A

Explanation: As per definition

27. How often parts of chromosome will be mutated is

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: C

Explanation: As per definition

28. Stopping criteria for Genetic Algorithms is

- A. No change in fitness
- B. Maximum generation
- C. Elapsed time
- D. All of above

Ans: D

Explanation: All are stopping criteria for GA

29. In this type of GA, the GA does the global optimization while local refinement is done by the conventional method

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans: d

Explanation: Hybrid allows combination of traditional approaches with GA

30. In this type of GA, task of a basic GA is distributed on different processors

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans: C

Explanation: Parallel GA allows parallel execution on different processor

31. Genetic algorithms are used if

- A. The search space is large, complex
- B. No mathematical analysis is available
- C. Traditional search methods fail
- D. All of above

Ans: D

Explanation: All are applications of GA

32. Application of Genetic Algorithm

- A. Optimization
- B. Machine and robotic learning

C. Economic Model

D. All of above

Ans: D

Explanation: All are applications of GA

33. Architecture-altering operation is special operation present in

- A. Genetic Algorithm
- B. Genetic Programming
- C. Evolutionary Algorithms
- D. Evolutionary Computing

Ans: B

Explanation: It is found in GP

34. Basic steps of GA

- A. selection- fitness evaluation- recombination
- B. recombination - selection- fitness evaluation
- C. Fitness evaluation- Selection-recombination
- D. Selection- recombination-fitness evaluation

Ans: D

Explanation: It is the general flow of GA

35. In GA , 10100011 is ----- chromosome representation

- a. Binary
- b. Octal
- c. Real value
- d. Hexadecimal

Ans: a

Explanation: it is binary encoding representation

36. In GA , 9CEF is ----- chromosome representation

- a. Binary
- b. Octal
- c. Real value
- d. Hexadecimal

Ans: d

Explanation: it is hexadecimal encoding representation

37. In GA , 2348 is ----- chromosome representation

- a. Binary
- b. Octal
- c. tree encoding
- d. Hexadecimal

Ans: b

Explanation: it is Octal encoding representation

38. In GA , 1 2 4 8 is ----- chromosome representation

- a. Binary
- b. Octal
- c. Permutation encoding
- d. Hexadecimal

Ans: c

Explanation: it is permutation or real valued encoding representation

39. In GA , 1.25 2.45 4.45 8.67 is ----- chromosome representation

- a. Binary
- b. Octal
- c. Value encoding
- d. Hexadecimal

Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

40. In GA , ABCD, DEFG is ----- chromosome representation

- a. Binary
- b. Octal
- c. Value encoding
- d. Hexadecimal

Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

41. In GA {right}, {back}, {white}is ----- chromosome representation

- a. Binary
- b. Octal
- c. Value encoding
- d. Hexadecimal

Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

42. In GA , {right}, {back}, {white} is one of chromosome representation

- a. True
- b. false

Ans: a

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

43. In GA , abcd, efgt is one of chromosome representation

- a. True
- b. false

Ans: a

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

44. In GA, p1: 1010, P2:1100 are parents chromosome, in single point , crossover point 2 (lsb) produces:

- a. c1: 1000 c2: 1110
- b. c1: 1010 c2:1110
- c. c1: 1000 c2:1111
- d. c1:1100 c2:1010

Ans: a

Explanation: interchange string after cross over point

45. In GA, p1: 1010, P2:1100 are parents chromosome, in single point, crossover point 3 (lsb) produces:

- a. c1: 1000 c2: 1110
- b. c1: 1010 c2:1110
- c. c1: 1000 c2:1111
- d. c1:1100 c2:1010

Ans: d

Explanation: interchange string after cross over point

46. In GA, p1: 101 00 000, P2:110 01 111 are parents chromosome, in two point, crossover point 3 ,5 (lsb) produces:

- a. c1: 100 00 111 c2: 111 00 111
- b. c1: 101 01 000 c2: 110 00 111
- c. c1: 100 01 000 c2: 110 01 111
- d. c1:110 00 000 c2:101 01 111

Ans: b

Explanation: interchange string between cross over point

47. In GA, p1: 101 00 000, P2:110 01 111 are parents chromosome, in two point, crossover point 2 ,7 (lsb) produces:

- a. c1: 1 000011 1 c2: 1 110011 1
- b. c1: 1 01 0000 1 c2: 1 10 01 11 0
- c. c1: 1 000100 0 c2: 1 100111 1
- d. c1:1 100000 0 c2:1 010111 1

Ans: b

Explanation: interchange string between cross over point

48. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 1010 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1111 c2: 0000
- c. c1: 0000 c2: 1010
- d. c1:1010 c2:1111

Ans: a

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

49. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 0101 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1010 c2: 0101
- c. c1: 0000 c2: 1010
- d. c1:1010 c2:1111

Ans: b

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

50. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 0001 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1010 c2: 0101
- c. c1: 0001 c2: 1110
- d. c1:1010 c2:1111

Ans: c

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

51. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 1212 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH

d. c1: EFAB

Ans: a

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

52. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 2121 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH
- d. c1: EFAB

Ans: b

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

53. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 1122 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH
- d. c1: EFAB

Ans: c

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

54. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 2211 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH
- d. c1: EFAB

Ans: d

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

55. In GA, p1: 4 1| 1 3| 6 5 , P2: 2 3|1 4| 5 6 are parents chromosome, in *order* crossover produces:

- a. c1: 4 1| 3 1| 6 5 c2: 2 3| 4 1| 5 6
- b. c1: 4 1| 1 3| 6 5 c2: 2 3| 4 1| 5 6
- c. c1: 4 1| 3 1| 6 5 c2: 2 3| 1 4| 5 6
- d. c1: 4 1| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: a

Explanation: child 1 inherits its left and right section from parent 1, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

56. In GA, p1: 4 1| 5 3| 6 5 , P2: 2 3|1 6| 5 6 are parents chromosome, in *order* crossover produces:

- a. c1: 4 1| 3 5| 6 5 c2: 2 3| 1 6| 5 6
- b. c1: 4 1| 1 3| 6 5 c2: 2 3| 4 1| 5 6
- c. c1: 4 1| 3 1| 6 5 c2: 2 3| 1 4| 5 6
- d. c1: 4 1| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: a

Explanation: child 1 inherits its left and right section from parent 1, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

57. In GA, p1: 4 6| 5 3| 1 5, P2: 2 3|1 6| 5 6 are parents chromosome, in *order* crossover produces:

- a. c1: 4 6| 5 3| 1 5 c2: 2 3| 6 1| 5 6
- b. c1: 4 6| 1 3| 6 5 c2: 2 3| 6 1| 5 6
- c. c1: 4 6| 3 5| 1 5 c2: 2 3| 1 6| 5 6
- d. c1: 4 6| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: c

Explanation: child 1 inherits its left and right section from parent 1, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

58. In GA, p1:0011 are parent chromosome, in *flipping mutation* chromosome 1001 produces:

- a. 1001
- b. 1000
- c. 1010
- d. 0011

Ans: c

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

59. In GA, p1:0011 are parent chromosome, in *flipping mutation* chromosome 0110 produces:

- a. 1001
- b. 1000
- c. 1010
- d. 0101

Ans: d

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

60. In GA, p1:1111 are parent chromosome, in *flipping mutation* chromosome 1001 produces:

- a. 1001
- b. 0110
- c. 1010
- d. 0011

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

61. In GA, p1:1111 are parent chromosome, in *flipping mutation* chromosome 1011 produces:

- a. 1001
- b. 1011
- c. 1010
- d. 0011

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

62. In GA, p1:1111 0000 are parent chromosome, in *flipping mutation* chromosome 0000 1111 produces:

- a. 1111 0000
- b. 1111 1111
- c. 0000 1111
- d. 0000 0000

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

63. In GA, p1:1111 0000 are parent chromosome, in *flipping mutation* chromosome 1111 0000 produces:

- a. 1111 0000
- b. 1111 1111
- c. 0000 1111
- d. 0000 0000

Ans: d

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

64. In GA, p1:11110000 are parent chromosome, in interchanging mutation at position 1 and 8 (lsb) produces:

- a. 01110001
- b. 1111 1111

c. 0000 1111

d. 0000 0000

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

65. In GA, p1:11110000 are parent chromosome, in interchanging mutation at position 2 and 7 (lsb) produces:

a. 10110010

b. 1111 1111

c. 0000 1111

d. 0000 0000

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

66. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 1 and 4 (lsb) produces:

a. 1001

b. 0110

c. 1010

d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

67. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 2 and 3 (lsb) produces:

a. 1001

b. 0110

c. 1010

d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

68. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 1 and 3 (lsb) produces:

a. 1001

b. 0110

c. 1100

d. 0101

Ans: c

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

69. In GA, p1:1101 are parent chromosome, in interchanging mutation at position 3 and 4 (lsb) produces:

- a. 1101
- b. 0110
- c. 1100
- d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

70. In GA, p1:1101 are parent chromosome, in interchanging mutation at position 3 and 2 (lsb) produces:

- a. 1101
- b. 0110
- c. 1010
- d. 0101

Ans: c

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

71. In GA, p1:11 01 are parent chromosome, in reversing mutation at position 2 (lsb) produces:

- a. 1001
- b. 0110
- c. 1010
- d. 1101

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

72. In GA, p1:1 101 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 1 001
- b. 0 110
- c. 1 110
- d. 1 101

Ans: c

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

72. In GA, p1:1 100 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 1 001
- b. 0 110
- c. 1 110
- d. 1 010

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

73. In GA, p1:110011 are parent chromosome, in reversing mutation at position 4 (lsb) produces:

- a. 11 0011
- b. 11 1001
- c. 11 1100
- d. 11 0100

Ans: b

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

74. In GA, p1:110011 are parent chromosome, in reversing mutation at position 2 (lsb) produces:

- a. 11 0011
- b. 11 1001
- c. 11 1100
- d. 11 0011

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

75. In GA, p1:110011 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 110 101
- b. 111 001
- c. 111 100
- d. 110 011

Ans: a

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

76. In schema theorem, 111**0, order of schema is...

- a. 2
- b. 3
- c. 1

d. None of above

Ans: a

Explanation: Order is number of * (don't care, i.e. 0 or 1)

77. In schema theorem, $1^*1^{**}0$, order of schema is...

a. 2

b. 1

c. 3

d. 6

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

78. In schema theorem, $1^{***}0$, order of schema is...

a. 2

b. 1

c. 3

d. 4

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

79. In schema theorem, $10^*0^*1^*$, order of schema is...

a. 2

b. 1

c. 3

d. 7

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

80. In schema theorem, 10^*0^* , order of schema is...

a. 2

b. 1

c. 3

d. 5

Ans: a

Explanation: Order is number of * (don't care, i.e. 0 or 1)

81. In schema theorem, 10^*0^* , length of schema is...

a. 2

b. 1

c. 3

d. 5

Ans: a

Explanation: length is number of elements in between first non *to last *

82. In schema theorem, 10^{**} , length of schema is...

- a. 2
- b. 1
- c. 0
- d. 5

Ans: c

Explanation: length is number of elements in between first non *to last *

83. In schema theorem, 100^{**} , length of schema is...

- a. 2
- b. 5
- c. 0
- d. 1

Ans: d

Explanation: length is number of elements in between first non *to last *

84. In schema theorem, $100^{**}0$, length of schema is...

- a. 4
- b. 5
- c. 0
- d. 1

Ans: a

Explanation: length is number of elements in between first non *to last *

85. In schema theorem, $1*00^{**}0$, length of schema is...

- a. 4
- b. 5
- c. 0
- d. 1

Ans: b

Explanation: length is number of elements in between first non *to last *

86. In schema theorem, $1*00^{**}$, length of schema is...

- a. 4
- b. 5
- c. 0
- d. 2

Ans: d

Explanation: length is number of elements in between first non *to last *

87. In schema theorem, 1^{***} , length of schema is...

- a. 4
- b. 5

c. 0

d. 2

Ans: c

Explanation: length is number of elements in between first non *to last *

88. In schema theorem, 1^{***} , length and order of schema is...

a. 4,1

b. 1,3

c. 0,3

d. 3,1

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of *

89. In schema theorem, $1^{***}1$, length and order of schema is...

a. 3,5

b. 1,3

c. 0,3

d. 3,3

Ans: d

Explanation: length is number of elements in between first non *to last * and order is no. of *

90. In schema theorem, 1^*1^*1 , length and order of schema is...

a. 3,2

b. 1,3

c. 0,3

d. 3,3

Ans: a

Explanation: length is number of elements in between first non *to last * and order is no. of *

91. In schema theorem, 10^*00^* , length and order of schema is...

a. 6,2

b. 6,4

c. 3,2

d. 2,3

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of *

92. In schema theorem, 10^*0^* , length and order of schema is...

a. 6,2

b. 6,4

c. 3,2

d. 2,2

Ans: d

Explanation: length is number of elements in between first non *to last * and order is no. of *

93. In schema theorem, 00^{**} , length and order of schema is...

a. 4,2

b. 2,4

c. 0,2

d. 2,2

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of *

94. Genetic Algorithms: chromosomes are represented using:

A binary

B Octal

C Hexadecimal

D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string are way to represent chromosomes

95. Genetic Algorithms: chromosomes are represented using:

A binary

B Tree

C Hexadecimal

D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string, tree are way to represent chromosomes

96. In GA: compute fitness of 00110011, where fitness function is number of ones

a. 2

b. 8

c. 4

d. 0

Ans: c

Explanation: Fitness is computed as number of ones

96. In GA: compute fitness of 0011, where fitness function is number of ones

a. 2

b. 8

c. 4

d. 0

Ans: a

Explanation: Fitness is computed as number of ones

97. In GA: compute fitness of 0011, where fitness function is number of ones, what would be the best solution

a. 2, 15

b. 8, 15

c. 4, 8

d. 0, 8

Ans: a

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

98. In GA: For fitness function is number of ones, what would be the best solution for 4 bit string

a. 8

b. 15

c. 4

d. 2

Ans: b

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

99. In GA: For fitness function is number of ones, what would be the global minimum solution for 5 bit string

a. 11111

b. 10000

c. 00000

d. 00101

Ans: c

Explanation: Fitness is computed as number of ones, hence 00000 will produce best solution

100. In GA: For fitness function equal to number of ones, what would be the best solution for 4 bit string

a. 0000

b. 1111

c. 1010

d. 1110

Ans: b

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

Unit-6 Swarm Intelligence

1. Swarm intelligence

- A Global behaviour appears as a result of centralized control
- B In Particle Swarm Optimization, velocity and position of particles are updated
- C The probability of choosing a new edge in ant colony optimization is proportional with the pheromone level of the edge
- D All of above

Ans: D

Explanation: All are types of swarm intelligence

2. Biologically inspired computation is appropriate for

- A Optimization
- B Modelling
- C Simulation
- D. All of above

Ans: D

Explanation: Biological processes are simulated, modelled to solve optimization problems

3. In PSO, at every iteration particle changes

- A. only position
- B. Only Velocity
- C. Position and Velocity both
- D. None of above

Ans: C

Explanation: At every iterations position and velocity is updating

4. In PSO particles position is depend upon

- A. Inertial
- B. Individual best position
- C. Global best position
- D. All of above

Ans: D

Explanation: Factors affecting position are inertia, global and local positions

5. ACO is used in

- A. Graph coloring problem
- B. Travelling Sales Man
- C. Network routing
- D. All of above

Ans: D

Explanation: All above are application of ACO

6. In ACO, pheromone level is directly proportional to the distance

A. True

B: False

Ans: B

Explanation: Minimum distance higher the pheromone level

7. In ACO, pheromone level is inversely proportional to the distance

A. True

B: False

Ans: A

Explanation: Minimum distance higher the pheromone level

8. Gradient descent is optimization technique used to find

A. Local maximum

B. Local Minimum

C. Both A and B

D. None of above

Ans B

Explanation: it optimizes problem of minimization

9. Gradient ascent is optimization technique used to find

A. Local maximum

B. Local Minimum

C. Both A and B

D. None of above

Ans A

Explanation: it optimizes problem of maximization

10. In ACO, pheromone amount get decreases with some fraction, called as

A. Evaporation rate

B. Decade rate

C. Pheromone trail

D. None of above

Ans: A

Explanation: As per the definition

11. Social behaviour of animals is observed and implemented artificially is called

A. Artificial neural network

B. Genetic Programming

C. Swarm Intelligence

D. Evolutionary computing

Ans: C

Explanation: As per the definition

12. In ACO, selection probability of next node by ant is

- A. proportional to pheromone level present on connection link
- B. inversely proportional to pheromone level present on connection link
- C. proportional to evaporation rate
- D. None of above

Ans: A

Explanation: probability is higher if pheromone is higher

13. In PSO, next position p is computed as

- A. $p=p+1$
- B. $p=p+velocity$

Ans: B

Explanation: As per the formula

14. Evaporation value is

- a. 0
- b. 1
- c. Between 0 to 1
- d. none of above

Ans: c

Explanation: Rate is in between 0 to 1

15. $T_{ij}(t + n) = p \cdot T_{ij}(t) + \Delta T$ is the formula for updating

- a. pheromone level
- b. evaporation rate

Ans: a

Explanation: p stands for evaporation rate

16. $T_{ij}(t + n) = p \cdot T_{ij}(t) + \Delta T$ in this formula p is set to

- a. 0
- b. 1
- c. $0 < p < 1$
- d. any value

Ans: c

Explanation: p stands for evaporation rate, set between 0 to 1

17. In TSP for an ant to decide which city to visit next is calculated based on

- a. greedy approach
- b. Genetic Algorithms
- c. ACO
- d. All are above

Ans: d

Explanation: TSP is non-deterministic problem can be solved by any of above technique.

18. In TSP for an ant to decide which city to visit next is calculated based on

- a. Transition probability
- b. Simple probability

Ans: a

Explanation: Values are normalized all over the values (i.e adjacent cities are considered)

19. In ACO based TSP transition probability is

- a. Combination of heuristic rules and pheromone level
- b. based on pheromone level only
- c. based on heuristic rules only
- d. none of above

Ans: a

Explanation: As per the formula, it is Combination of heuristic rules and pheromone level

20. In TSP, track of non-visited cities can be maintained by

- a. heuristic rules
- b. transition probability
- c. evaporation rate
- d. Pheromone updation rate

Ans: a

Explanation: Rules can be used to maintain list of visited and non-visited cities.

21. PSO is inspired from

- a. Birds behaviour searching for the food
- b. Ants searching for food
- c. Bees searching for the food
- d. All of above

Ans: a

Explanation: PSO is based on the behaviour of flock of birds or school of fish

22. ACO is inspired from

- a. Birds behaviour searching for the food

- b. Ants searching for food
- c. Bees searching for the food
- d. All of above

Ans: b

Explanation: ACO is based on the behaviour of ant colonies

23. In swarm intelligence control is decentralized.....

- a. True
- b. false

Ans: a

Explanation: Not having single point control

24. In PSO , number of particles present in search space are..

- a. 1
- b. 0
- c. any number
- d. none of above

Ans: c

Explanation: Depends on problem statement e.g. 20,30,100 etc

25. In PSO, if numbers of particles are less, algorithm will converge slowly

- a. true
- b. false

Ans. A

Explanation: If large number result will come faster

26. In swarm intelligence control is centralized.....

- a. True
- b. false

Ans: b

Explanation: Not having single point control

27. Compared with GA, all the particles tend to converge to the best solution quickly ...

- a. True
- b. false

Ans: a

Explanation: In PSO, only gBest (or lBest) gives out the information to others. It is a one - way information sharing mechanism. The evolution only looks for the best solution.

28. Particles update themselves with...

- a. evaporation rate
- b. Internal velocity
- c. fitness value
- d. All of above

Ans; b

Explanation: At every iteration position is updated by adding velocity

29. For optimizing function $f(x)=2x+2y$, how many minimum particles will be required

- a. 1
- b. 2
- c. infinite
- d. zero

Ans: b

Explanation: one for x and other for y

30. For optimizing function $f(x)=2x+2y+2z$, how many minimum particles will be required

- a. 1
- b. 2
- c. infinite
- d. 3

Ans: d

Explanation: one for x , one for y and other for z

31. For optimizing function $f(x)=2x+2y+2z$, which function is used for fitness evaluation

- a. $f(x)=1$
- b. $f(x)=0$
- c. $f(x)=2x+2y+2z$,
- d. $f(x)=\max[0,1]$

Ans: c

Explanation: In this case objective function is fitness function

32. For optimizing function $f(x)=2x$, which function is used for fitness evaluation

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=2x$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case objective function is fitness function

33. For optimizing function $f(x)=2$, how many minimum particles will be required

- a. 1
- b. 2
- c. infinite
- d. zero

Ans: d

Explanation: This function will not able to optimize because of constant value

34 For TSP, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{Min_distance}(i,j)$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the minimum distance or Euclidean distance

35 For TSP, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{Sqrt_root } (i^2-j^2)$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the minimum distance or Euclidean distance

36 In classification problem, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{error rate evaluation}$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the error rate or accuracy measure

37 In classification problem, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{Accuracy measure}$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the error rate or accuracy measure

38 In classification problem, function used for fitness evaluation is

- a. $f(x)= \text{Accuracy measure}$
- b. $f(x)= \text{error rate evaluation}$
- c. neither a nor b
- d. both a and b

Ans: d

Explanation: In this case fitness function will be the error rate or accuracy measure

39 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1,2 what would be the fitness value for each particle

- a. 0,1,2
- b. 1,2,1

- c. 1,1,1
- d. 2,1,1

Ans: b

Explanation: Put each value in the function separately

40 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1 what would be the fitness value for each particle

- a. 0,1,2
- b. 1,2,1
- c. 1,1,1
- d. -2,1,2

Ans: d

Explanation: Put each value in the function separately

41 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1 , which particle produce best solution

- a. P1
- b. P2
- c. P3
- d. All of above

Ans: c

Explanation: P3=1 produces 2 value (i.e. maximum solution)

42 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1 ,2 which particle produces optimal solution

- a. P1
- b. P2
- c. P3
- d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

43 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1 ,2 Optimal solution has value...

- a. 1
- b. 2
- c. 0
- d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

44. $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1, Optimal solution has value...

- a. 1
- b. 2
- c. 0
- d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

45. In PSO , $V=V+c_1r_1(ib-p) + c_2r_2(gb-p)$ where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

- a. $c_1r_2(ib-p)$
- b. $c_1r_1(ib-p)$
- c. $c_1r_1(ib-gb)$
- d. $c_1r_1(gb-ib)$

Ans: b

Explanation: $c_1r_1(ib-p)$ gives individual best

46. In PSO, $V=V+c_1r_1(ib-p) + c_2r_2(gb-p)$ where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

- a. $c_1r_2(gb-p)$
- b. $c_2r_2(gb-p)$
- c. $c_2r_2(ib-gb)$
- d. $c_2r_2(gb-ib)$

Ans: b

Explanation: $c_2r_2(gb-p)$ gives global best

47. In ACO, if B and C are adjacent node to A with pheromone level 2,3 respectively then, then ant starting with A will select node with transition probability ---

- a. B
- b. C

Ans: b

Explanation: transition probability without heuristic rule is calculated as for $c=3/2+3$,
 $b=2/2+3$

48. In ACO, if B and C are adjacent node to A with pheromone level 2,3 respectively then,
then ant starting with A will select node with transition probability ---

- a. 2/3
- b. 3/2
- c. 2/5
- d. 3/5

Ans: d

Explanation: transition probability without heuristic rule is calculated as for $c=3/2+3$,
 $b=2/2+3$

49. A real-valued function f defined on a domain X has
a global (or absolute) point at x^* if $f(x^*) \geq f(x)$ for all x in X .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: d

Explanation: Global X with maximum function value

50. A real-valued function f defined on a domain X has
a global (or absolute) point at x^* if $f(x^*) \leq f(x)$ for all x in X .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: c

Explanation: Global X with minimum function value

51. A real-valued function f defined on a domain X has a
local (or absolute) point at x^* if $f(x^*) \leq f(x)$ for all x in X within distance of x^* .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: a

Explanation: local X with minimum function value

52. A real-valued function f defined on a domain X has a local (or absolute) point at x^* if $f(x^*) \geq f(x)$ for all x in X within distance of x^* .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: b

Explanation: local X with maximum function value

This sheet is for 1 Mark questions

S.r No	Question	a	b	c	d	Correct Answer
e.g	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp	Distinguish two regions clearly	Cannot Distinguish two regions clearly	Collection of ordered pairs	None of these	a
2	In computing the output is called as	Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of	two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be	Ambiguous	Unambiguos	Inaccurate	None of these	b
5	Core of soft computing is	Fuzzy computing,neural computing,Genetic algorithm	Fuzzy network and artificial intelligence	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation	Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing	charles darwin	rich and berg	mc culloch	lofti a zadeh	d
8	Soft computing is based on	fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be	non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing	mimics human behaviour	deals with imprecise, probabilistic	exact information	both a and b	d
11	Hard computing is also called as	evolutionary computing	conventional computing	non conventional computing	probabilistic computing	b

12	Which computing produces accurate results	soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing	mimics human behaviour	information processing paradigm	both a and b	none of the above	c
14	Artificial neural network is used for	pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization	Blind search represent a guided approach while optimization is unguided	Blind search usually does not conclude in one step like some optimization methods.	Blind search cannot result in optimal solution whereas optimization method do	none of these	B
16	In modeling, an optimal solution is understood to be	a solution that can only be determined by an exhaustive enumeration testing of alternatives	a solution found in the least possible time and using the least possible computing resources	a solution that is the best based on criteria defined in the design phase	a solution that requires an algorithm for the determination	c
17	When is a complete enumeration of solution used?	When a solution that is "good enough" is fine and good heuristics are available	When there is enough time and computational power available	When the modeler requires a guided approach to problem solving	When there are an infinite number of solution to be searched	B
18	All of the following are true about heuristics EXCEPT	heuristics are used when the modeler requires a guided approach to problem solving	heuristics are used when a solution that is "good enough" is sought	heuristics are used when there is abundant time and computational power	heuristics are rules of good judgement	C

19	Which approach is most suited to structured problem with little uncertainty	Simuation	human intuition	Optimization	genetic algorithm	c
20	Genetic algorithm belong to the family of method in the	artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
21	What does the 0 membership value means in the set	the object is fully inside the set	the object is not in the set	the object is partially present in the set	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	a
23	The process of fuzzy interference system involes	membership functions	fuzzy logic operators	if-then rules	all the above	d
24	What does a fuzzifier do	coverts crisp input to linguistic variables	coverts crisp ouput to linguistic variables	coverts fuzzy input to linguistic variables	coverts fuzzy output to linguistic variables	a
25	Which of the following is not defuzzifier method	centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method	mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have	multiple part of antecedent,only single part of consequent	only single part of antecedent,multiple part of consequent	multiple part of antecedent,multiple part of consequent	only single part of antecedent,only single part of consequent	c
28	The a cut of a fuzzy set A is a crisp set defined by :-	$\{x U_a(x) > a\}$	$\{x U_a(x) \geq a\}$	$\{x U_a(x) < a\}$	$\{x U_a(x) \leq a\}$	b

29	The bandwidth(A) in a fuzzy set is given by	$(A)= x_1*x_2 $	$(A)= x_1+x_2 $	$(A)= x_1-x_2 $	$(A)= x_1/x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	b
31	A={1/a,0.3/b,0.2/c,0.8/d,0/e} B={0.6/a,0.9/b,0.1/c,0.3/d,0.2/e} What will be the complement of A?	{0/a,0.7/b,0.8/c,0.2/d,1/e}	{0/a,0.9/b,0.7/c,0.2/d,1/e}	{0.8/a,0.7/b,0.8/c,0.7/d,1/e}	{0/a,0.7/b,0.8/c,0.9/d,1/e}	a
32	A={1/a,0.3/b,0.2/c,0.8/d,0/e} B={0.6/a,0.9/b,0.1/c,0.3/d,0.2/e} What will be the union of AUB?	{1/a,0.9/b,0.1/c,0.5/d,0.2/e}	{0.8/a,0.9/b,0.2/c,0.5/d,0.2/e}	{1/a,0.9/b,0.2/c,0.8/d,0.2/e}	{1/a,0.9/b,0.2/c,0.8/d,0.8/e}	c
33	A={1/a,0.3/b,0.2/c,0.8/d,0/e} B={0.6/a,0.9/b,0.1/c,0.3/d,0.2/e} What will be the intersection of A and B ?	{0.6/a,0.3/b,0.1/c,0.3/d,0/e}	{0.6/a,0.8/b,0.1/c,0.3/d,0/e}	{0.6/a,0.3/b,0.1/c,0.5/d,0/e}	{0.6/a,0.3/b,0.2/c,0.3/d,1/e}	a
34	What denotes the support(A) in a fuzzy set?	$\{x U_a(x) > 0\}$	$\{x U_a(x) < 0\}$	$\{x U_a(x) \leq 0\}$	$\{x U_a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?	$\{x U_a(x) > 0\}$	$\{x U_a(x) = 1\}$	$\{x U_a(x) \geq 0.5\}$	$\{x U_a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c

37	which of the following is a sequence of steps taken in designning a fuzy logic machine	fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation->fuzzification->deffuzification	rule evaluation->defuzzification->fuzzification	a
38	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
39	Genetic algorithm belong to the family of method in the	artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
40	All of the follwing are suitable problem for genetic algorithm EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	c
41	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
43	mutation is applied on __ candidates.	one	two	more than two	noneof these	a
44	recombination is applied on __ candidates.	one	two	more than two	noneof these	b
45	LCS belongs to __ based methods?	rule based learning	genetic learning	both a and b	noneof these	a
46	Survival is __ approach.	deterministic	non deterministic	semi deterministic	noneof these	a
47	Evolutionary algorithms are a __ based approach	heuristic	metaheuristic	both a and b	noneof these	a
48	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d

51	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developef by	Fredrik	Fodgel	Frank	Flin	b
54	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
56	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm	Termination	selection	Recombinatio	Initialization	d
58	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover	discrete and intermedium	discrete and continuous	continuous and intemedium	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested.	TRUE	FALSE			B
61	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solutuon	none of these	c

62	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
63	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
64	EC stands for?	Evolutionary Computations	Evolutionary computer	Electronic computations	none of these	a
65	GA stands for	genetic algorithm	genetic assurance	genetic algorithm	none of these	a
66	LCS stands for	learning classes system	learning classifier systems	learned class system	none of these	b
67	GBML stands for	Genes based Machine learning	Genes based mobile learning	Genetic based machine learning	none of these	c
68	EV is dominantly used for solving ____.	optimization problems	NP problem	simple problems	none of these	a
69	EV is considered as?	adaptive	complex	both a and b	none of these	c
70	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
72	Parameters that affect GA	initial population	selection process	fitness function	all of these	d
73	Fitness function should be	maximum	minimum	intermediate	none of these	b
74	Evolutionary algorithms are a ___ based approach	heuristic	metaheuristic	both a and b	none of these	a

75	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
76	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
77	mutation is applied on __ candidates.	one	two	more than two	none of these	a
78	recombination is applied on __ candidates.	one	two	more than two	none of these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?	sub parents	parents	offspring	grand child	c
80	___ decides who becomes parents and how many children the parents have.	parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?	Parent Selection methods	Survival Selection methods	both a and b	none of these	c
82	LCS belongs to ___ based methods?	rule based learning	genetic learning	both a and b	none of these	a
83	Survival is ___ approach.	deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.	Hedges	Linguistic Variable	Fuzz Variable	None of the mentioned	a

85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?	associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is	Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d

90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned	c
92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where \sim → complement)	$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3), (5, 0), (6, 0.2)\}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be	$\{0.9, 0.5, 0.6, 0.8, 0.8\}$	$\{0.6, 0.2, 0.1, 0.7, 0.5\}$	$\{0.1, 0.5, 0.4, 0.2, 0.2\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	c

	Compute the value of adding the following two fuzzy integers: A = {(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)} B = {(0.5,11), (1,12), (0.5,13)} Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x,y} \min(\mu_A(x), \mu_B(y))$ Then, f(A+B) is equal to					
97	A = {(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)} B = {(0.5,11), (1,12), (0.5,13)} Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x,y} \min(\mu_A(x), \mu_B(y))$ Then, f(A+B) is equal to	{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)}	{(0.5,12), (0.6,13), (1,14), (0.7,15), (1,16), (1,17), (1,18)}	{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	d
98	A U (B U C) =	(A ∩ B) ∩ (A ∩ C)	(A ∪ B) ∪ C	(A ∪ B) ∩ (A ∪ C)	B ∩ A ∪ C	b
99	Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be	{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a	conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a

101	<p>Choose the correct statement</p> <p>1. A fuzzy set is a crisp set but the reverse is not true</p> <p>2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$</p> <p>3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous</p>	1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	----- defines logic function of two propositions	prepositions	Linguistic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ----- gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b

107	Multiple conjunctives antecedents is method of ----- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ----- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then z=c (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d

114	In Evolutionary programming, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)-selection based on the children only ($\mu+\lambda$)-selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)-selection based on the children only ($\mu+\lambda$)-selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a

119	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)	(μ,λ) : Select survivors among parents and offspring	$(\mu+\lambda)$: Select survivors among parents and offspring	$(\mu-\lambda)$: Select survivors among offspring only	$(\mu:\lambda)$: Select survivors among offspring only	b
123	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a

125	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126	(1+λ) ES	λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127	Termination condition for EA	mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
130	(1+1) ES	Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
131	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

This sheet is for 2 Mark questions						
S.r No	Question	a	b	c	d	Correct Answer
e.g	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	Who can deal with noisy input information	soft computing	hard computing	both a and b	none of the above	a
2	Ability to learn how to do task based on the data is done by	self organization	adaptive learning	fault tolerance	robustness	b
3	Which of the following is not a technique of soft computing	neural network	genetic algorithm	evolutionary algorithm	conventional algorithm	d
4	Fuzzy logic system is based on what type of rule	if-then	else-if	while	do-while	a
5	What is the function of dendrites in biological neural network	send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b
6	Expert system	combines different types of method and information	is a approach to design of learning algorithms	is an information base filled with knowledge of an expert formulated in terms of if-then rules	none of the above	c
7	Three main basic feature involved in characterizing member function are	intuition,inference,rank ordering	fuzzy algorithm,neural network,genetic algorithm	center of sums,median,core	core,support,boundary	d
8	What is the function of cell body in biological neural network	multiplies the incoming signals	sums the incoming signals	multiplies the outgoing signals	sums the outgoing signals	b

9	What is perceptron	a single layer feed forward neural network	a double layer associative neural network	a neural network that contains feedback	auto associative neural network	a
10	Which of the following computing is trial and error problem solver algorithm	hard computing	neural network	evolutionary computing	fuzzy logic	c
11	What are advantages of neural network	ability to learn by example	fault tolerant	both a and b	none of the above	c
12	Which of the following does not belong to the process of involuntary computing	selection	mutation	recombination	deletion	d
13	The Value of crisp set can be	either 0 or 1	near to 0 or 1	between 0 and 1	between 0.5 and 0.7	a
14	The room temrature is hot. Here the hot(use of lingustic variable is used) can be represented by	fuzzy set	crisp set	probabilistic set	none of the above	a
15	The value of set membership can be represented by	discrete set	degree of truth	probabilities	both b and c	b
16	Semiconductor layout & aircraft design are the application type of which domain?	Control	Design	Robotics	ML	B
17	Trajectory planning is the application type of which domain?	Control	Design	Robotics	ML	c
18	Filter design is the application type of which domain?	Control	Signal Processing	Robotics	ML	B
19	Pokers & Checkers are the application type of which of domain?	Control	Game Playing	Robotics	ML	B

20	Manufacturing & resource allocation are the application type of which domain?	Scheduling	Design	Robotics	ML	A
21	What is a crossover point in a fuzzy set?	$\{x u_a(x) < 0\}$	$\{x u_a(x) = 1\}$	$\{x u_a(x) = 0.5\}$	$\{x u_a(x) > 0\}$	c
22	If A and B are two fuzzy sets with membership function: $u_a(x)=\{0.2,0.5,0.6,0.1,0.9\}$ $u_b(x)=\{0.1,0.5,0.2,0.7,0.8\}$ THEN what will be the intersection of A and B	$\{0.2,0.5,0.6,0.7,0.9\}$	$\{0.2,0.3,0.8,0.1,0.5\}$	$\{0.5,0.1,0.6,0.1,0.8\}$	$\{0.1,0.5,0.2,0.1,0.8\}$	d
23	$A=\{0.1/1+0.2/2+0.3/3\}$ $B=\{0.6/1+0.5/2+0.4/3+0.5/4\}$ Find the set difference	$\{0.1/1+0.2/2+0.3/3\}$	$\{0.3/1+0.2/2+0.2/3\}$	$\{0.1/1+0.3/2+0.2/3\}$	$\{0.1/1+0.2/2+0.5/3\}$	a
24	With the help of which formula can we find the algebraic sum of two fuzzy sets A,B?	$\{u_A(x)+u_B(x)\}$ - $\{u_A(x)*u_B(x)\}$	$\{u_A(x)-u_B(x)\}$ - $\{u_A(x)*u_B(x)\}$	$\{u_A(x)/u_B(x)\}$ - $\{u_A(x)+u_B(x)\}$	$\{u_A(x)+u_B(x)\}+\{u_A(x)*u_B(x)\}$	a
25	With the help of which formula can we find the algebraic product of two fuzzy sets A,B?	$\{u_A(x)/u_B(x)\}$	$\{u_A(x)*u_B(x)\}$ * $\{u_A(x)-u_B(x)\}$	$\{u_A(x)*u_B(x)+\{u_A(x)+u_B(x)\}\}$	$\{u_A(x)*u_B(x)\}$	d
26	Which one of the following is the associative property for a crisp set	$AU(BUC)=(AU)BUC$	$BU(AUC)=CU(BUA)$	$AU(CUA)=B(AUC)$	all the above	a
27	Knowledge base is a combination of	rule base and data base	rule base and time base	time base and probability base	model base and data base	a
28	Fuzzy logic system is based on what type of rule	if-then	else-if	while	do-while	a
29	What is the function of dendrites in biological neural network	send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b
30	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A

31	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
32	_____ is a simulation method that let decision maker see what the model is doing and how it interact.	VIS	VIM	SIV	HIV	A
33	_____ systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	B
34	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?	Simulation	Optimization	human intuition	genetic algorithm	A
35	Which of the following is the advantage of simulation?	It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skills	It solves problem in one pass with no iteration.	A
36	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred	continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B
37	The defining length of a schema is useful to calculate _____ of the schema for _____.	Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A
38	Semiconductor layout & aircraft design are the application type of which domain?	Control	Design	Robotics	ML	B
39	Trajectory planning is the application type of which domain?	Control	Design	Robotics	ML	C
40	Filter design is the application type of which domain?	Control	Signal Processing	Robotics	ML	B

41	categories of EA are/is	Genetic Algorithm	genetic programing	learning Classifier Systems	all of these	d
42	Phases in which the LCS individuals are evaluated are	performance phase	reinforcement phase	both a and b	none of these	c
43	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	a
44	Genetic algorithm is a subset of _____.	evolutionary algorithm	dynamcic algorithm	both a&b	None of these	A
45	NP hard problems are also called as _____.	dcrete optimization	combinatori al optimization	evolutionary optimization	None of these	B
46	Genetic algorithm is first introduce by _____.	Charles Darwin	John Holland	Gregor Johan Mendel	None of these	B
47	_____ replicates the most successful solutions found in a population at a rate proportional to relative quality.	Selection	Recombinati on	Mutation	None of these	A
48	_____ decomposes two distinct solutions and then randomly mixes their parts to form novel solutions.	Selection	Recombinati on	Mutation	None of these	B
49	_____ randomly perturbs a candidate solution.	Selection	Recombinati on	Mutation	None of these	C
50	A _____ is a template consisting of a string composed of three symbol.	Wild symbol	Schema	Layout	None of these	B
51	{0,1,#} is the symbol alphabet ,where # is a special symbol.	Wild card	Schema	Layout	None of these	A
52	Metaheuristics are ?1)non deterministic 2)non approximate 3)not problem specific	1,2,3	1,2	1,3	2,3	c
53	In search techniques, as single point based contradicts population based similary deterministic contradicts ____?	Stochastic	simplex based	complex based	none	a

54	In swarm systems organisations are	centralized	decentralized	controlled by third party	none	b
55	Identify the working sequence of kmean clustering ? 1) redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids	1,3,2	3,2,1	2,3,1	2,1,3	c
56	Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	a
57	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms	1,2	1,2,3	2,3,4	all of these	d
58	pheromone quantity in ACO is ___ proportional to path selection.	directly	inversly	there is no connection	none	a
59	The ants prefer the smaller drop of honey over the more abundant, but less nutritious, sugar. This is the example of?	kruskal algorithm	Travelling salesman	Knapsack problem	NP hard problem	c
60	In kmeans clustering each cluster is associated with	centroid	edge	common point	none of them	a
61	What is EC?	computer based problem solving systems	Systems that uses computational models of evolutionary process	both a and b	none of these	c
62	Recombination is applied to	2 selected candidated	1 selected candidate	3 selected candidate	none of these	a
63	In EA mutation is applied to	2 candidate	1 candidate	3 candidate	none of these	b

64	EV is used for	solving optimization problems	finding solutions	both a and b	none of these	a
65	EV is considered as	complex	simple	complex and adaptive	all of these	c
66	GA stands for	Genetic Algorithm	genetic programing	genetic assurance	none of these	a
67	Features of GA	A string representation of chromosomes.	A fitness function being minimized.	A cross-over method and a mutation method.	all of these	d
68	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
69	Evolutionary programming was developed by	Fredrik	Fodgel	Frank	Flin	b
70	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
71	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
72	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
73	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d
74	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
75	What are different types of crossover	discrete and intermedium	discrete and continuous	continuous and intermedium	none of these	a
76	GP individual stores computer program	TRUE	FALSE			a

77	GP selection is	Deterministic selection	Tournament selection	nondeterministic selection	none of these	b
78	EP mutation is	Data specific	Data type specific	non specific	none of these	b
79	categories of EA are/is	Genetic Algorithm	genetic programing	learning Classifier Systems	all of these	d
80	Phases in which the LCS individuals are evaluated are	performance phase	reinforcement phase	both a and b	none of these	c
81	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	a
82	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	a
83	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____	Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	Fuzzy & Crisp Set	a
84	Fuzzy logic is usually represented as _____	IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	b
85	Three main basic features involved in characterizing membership function are	Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	Core, Support , Boundary	Weighted Average, center of Sums, Median	c
86	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b

87	Why can't we design a perfect neural network?	full operation is still not known of biological neurons	number of neuron is itself not precisely known	number of interconnection is very large & is very complex	all of the mentioned	d
88	Both Fuzzy logic and ANN are soft computing techniques because	Both gives precise and accurate results	ANN gives accurate result but fuzzy logic does not	In each, no precise mathematical model of the problem is required	Fuzzy logic gives accurate result but ANN does not	c
89	Internal state of neuron is called _____, is the function of the inputs the neurons receives	Weight	activation or activity level of neuron	Bias	None of these	b
90	Each connection link in ANN is associated with _____ which has information about the input signal.	neurons	weights	bias	activation function	b
91	In artificial Neural Network interconnected processing elements are called	nodes or neurons	weights	axons	Soma	a
92	The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to	infinite	1	0	0.5	d
93	The membership values of the membership function are not strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing	Convex Fuzzy Set	Non convex fuzzy set	Normal Fuzzy set	Sub normal fuzzy set	b
94	The cell body of neuron can be analogous to what mathamatical operation?	summing	differentiator	integrator	none of the mentioned	a

95	Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial Intelligence deal with predicate logic whereas soft computing deal with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols whereas soft computing is based on empirical data	Both (a) and (b)	None of the above	c
96	_____ is/are the way/s to represent uncertainty.	Fuzzy Logic	Probability	Entropy	All of the mentioned	d
97	Given two fuzzy sets A and B A={\{(x1,0.5),(x2,0.1),(x3,0.4)\}} and B={\{(x1,0.2),(x2,0.3),(x3,0.5)\}} then union of 2 sets A U B is	{(x1,0.5),(x2,0.1),(x3,0.4)}	{(x1,0.5),(x2,0.3),(x3,0.5)}	{(x1,0.2),(x2,0.3),(x3,0.5)}	{(x1,0.2),(x2,0.1),(x3,0.4)}	b
98	If A and B are two fuzzy sets with membership functions: $\mu_a(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$ $\mu_b(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_a \cap \mu_b$ will be	{0.2, 0.5, 0.6, 0.7, 0.9}	{0.2, 0.5, 0.2, 0.1, 0.8}	{0.1, 0.5, 0.6, 0.1, 0.8}	{0.1, 0.5, 0.2, 0.1, 0.8}	d
99	For $k > 1$, which of the following concept can be used to generate other linguistic hedge?	Concentration and dilation	Dilation	Concentration	None of the mentioned	c
100	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A U B is	{1.0, 0.45, 0.75}	{1, 0.2, 0.75}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	a
101	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A ∩ B is	{1.0, 0.45, 0.75}	{0.2, 0.20, 0.50}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	b

102	Mamdani-style inference involves which steps	Fuzzification of the input variables & Rule evaluation	Aggregation of the rule output & Defuzzification	Both a and b	either a or b	c
103	A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$	Core	Support	Cross-over	α - cut	c
104	Which statement is true?	Mamdani approach characterised by its low interpretability and low accuracy	Takagi and Sugeno's approach characterised by high accuracy but at the cost of high interpretability	Takagi and Sugeno's approach follows precise fuzzy modelling and obtains high accuracy but at the cost of low interpretability	Mamdani approach characterised by its low interpretability and high accuracy	c
105	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$	$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) < 1$	c
106	Which can be used as an input to fuzzy controller?	A fuzzy set	a crisp set	Both fuzzy set and Crisp set	None of these	b
107	What are the types of fuzzy logic sets?	Type-1 fuzzy set	Type-2 fuzzy set	Both a and b	None of these	c
108	How is fuzzy logic different from conventional control methods	IF and THEN approach	FOR approach	WHILE approach	DO approach	a
109	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \text{support } A(x)$, where A belongs to A. Then fuzzy set is called normal when	$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) > 1$	c
110	If A and B are sets and $A \cup B = A \cap B$ then	$A = B$	$A = 0$	$B = 0$	None of these	A

111	If x is A then y is B else y is C. The output of the given fuzzy rule is	A fuzzy set	a crisp set	a fuzzy relation	a membership function	c
112	What Is The First Step Of Fuzzy Logic Toolbox?	Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator(AND or OR) in the antecedent	Aggregation of the consequents across the rule	a
113	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	The input is a value greater than one and the output is a value less than the input	The input and output have both the same values	The input has two or more values and the output has a single truth value	d
114	What Is The Input And Output Of Step 3 - Apply Implication Method?	Input is a fuzzy set but the output is a whole value	Input is a fuzzy set but the output is a whole value	Input and Output have the same value	Input is a smaller value than the output value	b
115	What Is The Purpose Of Aggregation?	To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	a
116	Linguistic variable is	a variable whose values are words or sentences	any numerical value only	any binary value only	variable which contains TRUE or FALSE values only	a
117	Identification of Input, Output and state variables is performed in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	Identification of variables	d

118	Assigning linguistic label to each subset is done in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	fuzzy subset configuration	d
119	Disjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	a
120	Conjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	b
121	Categorial reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	a
122	Syllogistic reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	c
123	Qualitative reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	b

124	Dispositional reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	d
125	Mamdani systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	d
126	Sugeno systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	b
127	In the generational model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	a
128	In the steady-state model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	b
129	In the generational model of EA	each individual survives exactly for two generation	each individual survives exactly for one generation	cannot predict	each individual survives as many generations as want	b
130	In the steady-state model of EA	One offspring is generated per generation	two offsprings are generated per generation	cannot decide	more than two offsprings are generated per generation	a
131	Which of the following algorithm is most efficient for discontinuous and noisy problems?	Evolutionary algorithm	Classical optimization algorithm	Genetic algorithm	none	a

132	Each iteration of EA is referred to as	Generation	Iteration	population	None	a
133	Which of the following are evolutionary operators?	Selection	Crossover	Mutation	All of the above	d
134	In the $(\mu/\rho, \lambda)$ method of ES, parents are	selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	a
135	In the $(\mu/\rho+\lambda)$ method of ES, parents are	selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	b
136	Fitness scaling is desirable to ensure	Population diversity	selection pressure	that better solutions are selected only	relatively inferior solutions are not ignored	a
137	Which mutation operator is used in ES as reproduction operator?	one point	Gaussian mutation	two point	adaptive	b
138	Fitness proportionate selection methods are	Roulette wheel selection	Stochastic universal sampling	tournament selection	All the mentioned	d
139	In which selection method of survival selection there is no notion of fitness?	fitness based selection	elitism	Agebased selection	All the mentioned	c
140	In which selection strategy every individual has the same probability to be selected?	Roulette wheel selection	Uniform selection	tournament selection	Rank selection	b
141	High selection pressure is desirable, when we need	diversity not found in each generation	there is no improvement in successive GA iteration	faster termination of GA	fitness values are not uniformly distributed	c

142	Tournament selection scheme is more preferable when	when fitness values are uniformly distributed	population are with very diversified fitness values	when fitness values are not necessarily uniformly distributed	under all the above situations	b
143	Which of the following is not a characteristic of evolutionary algorithm?	Conceptual simplicity	Parallelism	Broad applicability	Artificial selection	d
144	What is the correct order of steps in evolutionary algorithm?	Select parents-recombine-mutate-evaluate	Select parents-recombine-evaluate-mutate-	Select parents-mutate - recombine-evaluate	Select parents-evaluate - recombine-mutate	a
145	Which of the following schemes are selection schemes in Evolutionary computation?	Hall of fame	Rank based selection	tournament selection	All of the above	d
146	To encode chromosomes which encoding schemes are used	binary encoding	finite state machine encoding	real value encoding	All of the above	d

This sheet is for 3 Mark questions						Correct Answer
S.r No	Question	a	b	c	d	
	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	What is defuzzification	conversion of fuzzy set to crisp set	conversion of crisp set to fuzzy set	conversion of fuzzy set to fuzzy logic	conversion of crisp set to crisp logic	a
2	What type of model is required for hard computing	mathematical	biological	chemical	probabilistic	a
3	Which of the following is/are basic component neuron	dendrites	axon	nucleus	all of the above	d
4	Which of the following computing technique has the ability of learning and adoption	neural network	evolutionary	hard	probabilistic	a
5	The truth value of the fuzzy set is	either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
6	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
7	which of the following is a sequence of steps taken in designing a fuzzy logic machine	fuzzification->Rule Evaluation->Defuzzification	defuzzification->rule evaluation->fuzzification	rule evaluation->fuzzification->defuzzification	rule evaluation->defuzzification->fuzzification	a
8	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
9	Genetic algorithm belongs to the family of method in the	artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A

10	All of the following are suitable problem for genetic algorithm EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
11	In which stage of the simulation methodology do you determine the variable and gather data	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
12	In which stage of the simulation methodology do you determine how long to run the simulation	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	D
13	In which stage of the simulation methodology do you determine the system boundaries and environment?	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
14	What BEST describes a simulation model with a limited number of variables, each with the finite number of values?	system dynamics simulation	discrete event simulation	continuous distribution simulation	Monte Carlo simulation	B
15	The advantage of visual interactive simulation include all of the following EXCEPT	Improvement in training using the simulation	reduced need for the decision maker involvement	The ability to see how a simulation works	improved presentation of simulation results	B
16	What can system dynamics modelling be used for?	qualitative method for analyzing a system	simulation models that test each subsystem in isolation	micro-level simulation models that examine individual values	studying system behaviour at an instant in time	A

17	In agent-based modelling ,agents are	the human workers or agents who use the system	communication links between simulation	Autonomous rule-based decision making units	the hardware platform used to conduct the simulation	C
18	Agent based modelling is best for all the following types of problem features EXCEPT	complex interactions	low uncertainty	Many inter-related factors	irregular data	B
19	What is the final stage of an agent based modelling(ABM) methodology?	Identifying the agents and determining their behaviour	Determining agent-related data	Validating agent behaviour against reality	determining the suitability of ABM	C
20	Which of the following is the advantage of simulation?	It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skills	It solves problem in one pass with no iteration.	A
21	The truth value of the fuzzy set is	either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
22	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
23	which of the following is a sequence of steps taken in designning a fuzy logic machine	fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation->fuzzification->deffuzification	rule evaluation->defuzzification->fuzzification	a
24	EV is dominantly used for solving ____.	optimization problems	NP problem	simple problems	noneof these	a

25	EV is considered as?	adaptive	complex	both a and b	none of these	c
26	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
27	Identify the drawbacks of clustering algorithms? 1) can generate empty clusters 2) can terminate at local minimum 3) can handle noisy data	1,2,3	1,2	3	2,3	b
28	generation of empty cluster problem in clustering can be overcome by?	ACO based clustering	PSO based clustering	kmeans	kmode	b
29	where does PSO based clustering terminates?	global optimum	local optimum	global maximum	local minimum	a
30	Each particle in PSO modifies its position according to ? 1) its velocity 2) its weight 3) its gbest and pbest	2,3	1,2	1,2,3	only 1	c
31	Applications of ACO are ? 1) shortest path 2) assignment problem 3) set problem	2,3	1,2	1,2,3		c
32	Evaporation of pheromones is ?	directly proportional to path length	inversely proportional to path length	constant	none	a
33	Metaheuristics does not include ?	evolutionary algorithms	tabu searching	simulated annealing	none	d
34	Metaheuristics are ? 1) non deterministic 2) non approximate 3) not problem specific	1,2,3	1,2	1,3	2,3	c

35	In search techniques, as single point based contradicts population based similary deterministic contradicts ___?	Stochastic	simplex based	complex based	none	a
36	In swarm systems organisations are	centralized	decentralized	controlled by third party	none	b
37	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids	1,3,2	3,2,1	2,3,1	2,1,3	c
38	Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	a
39	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms	1,2	1,2,3	2,3,4	all of these	d
40	pheromone quantity in ACO is ___ proportional to path selection.	directly	inversly	there is no connection	none	a
41	Recombination involves ___ candidates while mutation requires___ candidates, and the result is called___.	1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
42	Identify the correct sequence for evolitionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3)Create offspring 4)replace some parents	1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
43	Problems for which there is no efficient method to solve such problems exactly are called?	complex	hard	strong	none	b

44	EV is considered as ? 1)complex 2)adaptive	1	2	1,2	none	c
45	EV system was proposed for exploring a___ fitness space and can form___.	multipaked,clusters	single peaked,clusters	multipaked,hard problems	single peaked,hard problems	a
46	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recombination operator	1,2	1,2,3	2,3	1,3	b
47	Parameters that affect GA are ? 1)intial population 2)fitness function 3)ability to generate offspring	1,3	1,2	1,2,3	only 1	b
48	___focuses attention on high fitness individuals, thus exploiting the available fitness information.	clustering	offspring production	replace	selection	d
49	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
50	Genetic algorithm are heuristic methods that do not guarantee an optimal solution to a problem	TRUE	FALSE			A

51	A "What-if" model is most typically used for the most structured problems	TRUE	FALSE			B
52	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solutuon	none of these	C
53	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
54	_____ doesnot usually allow decision makers to see how a solution to a _____ evolves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
55	_____ is a simulation method that let decision maker see what the model is doing and how it interact.	VIS	VIM	SIV	HIV	A
56	_____ systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	B
57	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?	Simulation	Optimization	human intution	genetic algorithm	A
58	Which of the following is the advantage of simulation?	It can incorporate significant real life complexity	It always result in optimal solution	Simulation software requires special skils	It solves problem in one pass with no iteration.	A
59	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred	continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B

60	The defining length of a schema is useful to calculate ____ of the schema for _____.	Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A
61	Recombination involves ___ candidates while mutation requires ___ candidates, and the result is called _____.	1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
62	Identify the correct sequence for evolutionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3>Create offspring 4)replace some parents	1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
63	Problems for which there is no efficient method to solve such problems exactly are called?	complex	hard	strong	none	b
64	EV is considered as ? 1)complex 2) adaptive	1	2	1,2	none	c
65	EV system was proposed for exploring a ___ fitness space and can form ___.	multipaked,clusters	single peaked,clusters	multipaked,hard problems	single peaked,hard problems	a
66	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recombination operator	1,2	1,2,3	2,3	1,3	b
67	Parameters that affect GA are ? 1)intial population 2)fitness function 3)ability to generate offspring	1,3	1,2	1,2,3	only 1	b

68	___ focuses attention on high fitness individuals, thus exploiting the available fitness information.	clustering	offspring production	replace	selection	d
69	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
70	Evolution strategies uses ? 1)selection 2)recombination 3)real valued vector	1,2,3	2,3	1,3	only 2	a
71	which of the following statements are true regarding ES ? 1)Survival is deterministic 2)first allows the N best children to survive, and replaces the parents with these children. 3)allows the N best children and parents to survive.	only 1	1,2	only 2	1,2,3	d
72	Evolutionary Algorithms includes ? 1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	3,4	2,3,4	c
73	Heuristics include ?1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	1,2		d

74	Which of the following statements are true ? 1)mutation is applied to two selected candidates, the so-called parents, and results in one or two new candidates, the children 2) recombination is applied to one candidate and results in one new candidate.	only 1	only 2	both	none of these	d
75	The ___ is performed by selecting two sub trees by chance from the parents and exchange them to create the descendants.	GP crossover	GP Mutation	GP clustering	GP Recombination	a
76	The___ is performed by selecting a sub tree of the descendant by chance and to exchange the sub tree with an arbitrary generated new sub tree.	GP crossover	GP Mutation	GP clustering	GP Recombination	b
77	___ are able to learn simple “if {condition} then {action}” style rules23 by learning from feedback	ES	EA	LCS	Heuristics	c
78	Island model is related with ?	Distributed Evolutionary Algorithms	LCS	swarm intelligence	ACO	a
79	payoffs can be easily translated to a ___ function for an EA.	survival	reduction	comination	fitness	d
80	Identify the correct statements with respect to genetic algorithms? 1)A fitness function should maximized. 2)A replacement procedure. 3)A string representation of chromosomes.	1,2	2,3	1,2,3	1,3	b

81	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.	Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
82	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
83	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
84	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?	associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
85	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is	Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
86	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d

87	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d
88	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned	c
89	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
90	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
91	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)	$\{(4, 0.7), (2,1), (1,0.8)\}$	$\{(4, 0.3.): (5, 0), (6. 0.2) \}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6,0.2), (7, 1)\}$	$\{(3, 0.3), (6.0.2)\}$	c
92	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
93	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be	$\{0.9, 0.5, 0.6, 0.8, 0.8\}$	$\{0.6, 0.2, 0.1, 0.7, 0.5\}$	$\{0.1, 0.5, 0.4, 0.2, 0.2\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	c

	Compute the value of adding the following two fuzzy integers: A = {(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)} B = {(0.5,11), (1,12), (0.5,13)} Where fuzzy addition is defined as $\mu_{A+B}(z) = \max(x+y=z \cap (\mu_A(x), \mu_B(y)))$ Then, f(A+B) is equal to	{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)}	{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)}	{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	d
95	A U (B U C) =	$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
96	Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be	{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
97	The fuzzy proposition "IF X is E then Y is F" is a	conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
98	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A, B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous	1 only	2 and 3	1,2 and 3	None of these	b
99	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b

100	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c
101	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
102	---- defines logic function of two prepositions	prepositions	Linguistic hedges	truth tables	inference rules	c
103	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
104	Multiple conjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
105	Multiple disjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
106	IF x is A and y is B then $z=c$ (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
107	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b

108	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a aircraft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
109	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
110	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
111	In Evolutionary programming, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ) -selection based on the children only $(\mu+\lambda)$ -selection based on both the set of parent and children	Children replace the parent	All the mentioned	a

112	In Evolutionary strategy, survival selection is	Probabilistic selection $(\mu+\mu)$ selection	(μ, λ) -selection based on the children only $(\mu+\lambda)$ -selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
113	In Evolutionary programming, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
114	In Evolutionary strategy, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
115	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
116	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b

117	Step size in self-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
118	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
119	Evolutionary Strategies (ES)	(μ,λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b
120	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
121	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a

122	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
123	(1+λ) ES	λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
124	Termination condition for EA	mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
125	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
126	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
127	(1+1) ES	Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
128	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
129	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c

130	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d
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1: Core of soft Computing is

- A.Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.Fuzzy Networks and Artificial Intelligence
- C.Artificial Intelligence and Neural Science
- D.Neural Science and Genetic Science

Answer A

2: Who initiated the idea of Soft Computing

- A.Charles Darwin
- B.Lofti A Zadeh
- C.Rechenberg
- D.Mc_Culloch

Answer B

3: Fuzzy Computing

- A.mimics human behavior
- B.doesnt deal with 2 valued logic
- C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.All of the above

Answer D

:

Neural Computing

- A.mimics human brain
- B.information processing paradigm
- C.Both (a) and (b)
- D.None of the above

Answer C

5: Genetic Algorithm are a part of

- A.Evolutionary Computing

B.inspired by Darwin's theory about evolution - "survival of the fittest"

C.are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics

D.All of the above

Answer D

6: What are the 2 types of learning

A.Improvised and unimprovised

B.supervised and unsupervised

C.Layered and unlabeled

D.None of the above

Answer B

7: Supervised Learning is

A.learning with the help of examples

B.learning without teacher

C.learning with the help of teacher

D.learning with computers as supervisor

Answer C

8: Unsupervised learning is

A.learning without computers

B.problem based learning

C.learning from environment

D.learning from teachers

Answer C

9 Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

D.None of the above

Answer C

10: In supervised learning

A.classes are not predefined

- B.**classes are predefined
- C.**classes are not required
- D.**classification is not done

Answer B

11 Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.

- A.**True
- B.**False

Answer A

12: The membership functions are generally represented in

- A.**Tabular Form
- B.**Graphical Form
- C.**Mathematical Form
- D.**Logical Form

Answer B

13: Membership function can be thought of as a technique to solve empirical problems on the basis of

- A.**knowledge
- B.**examples
- C.**learning
- D.**experience

Answer D

14: Three main basic features involved in characterizing membership function are

- A.**Intuition, Inference, Rank Ordering
- B.**Fuzzy Algorithm, Neural network, Genetic Algorithm
- C.**Core, Support , Boundary
- D.**Weighted Average, center of Sums, Median

Answer C

15: The region of universe that is characterized by complete membership in the set is called

- A.**Core

- B.**Support
- C.**Boundary
- D.**Fuzzy

Answer A

16: A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

- A.**sub normal fuzzy sets
- B.**normal fuzzy set
- C.**convex fuzzy set
- D.**concave fuzzy set

Answer B

17: In a Fuzzy set a prototypical element has a value

- A.**1
- B.**0
- C.**infinite
- D.**Not defined

Answer A

18: A fuzzy set wherein no membership function has its value equal to 1 is called

- A.**normal fuzzy set
- B.**subnormal fuzzy set.
- C.**convex fuzzy set
- D.**concave fuzzy set

Answer B

19: A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe

- A.**convex fuzzy set
- B.**concave fuzzy set
- C.**Non concave Fuzzy set
- D.**Non Convex Fuzzy set

Answer A

20: The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.

A.Convex Fuzzy Set

B.Non convex fuzzy set

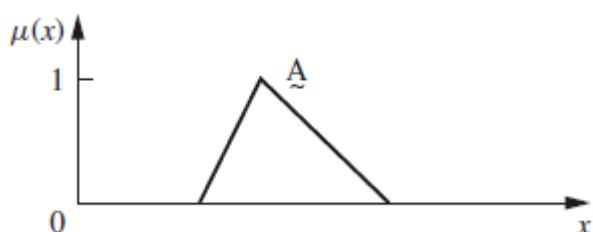
C.Normal Fuzzy set

D.Sub normal fuzzy set

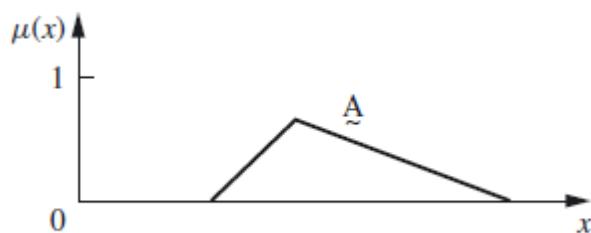
Answer B

21: Match the Column

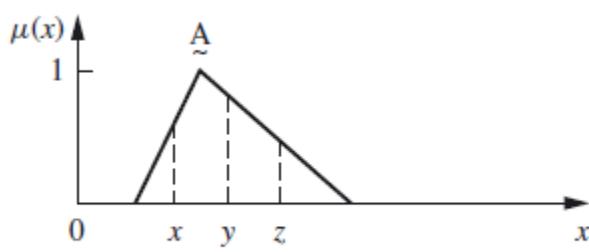
List I



(a)

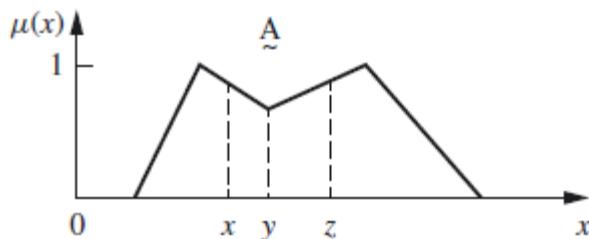


(b)



(c)

List II



(d)

1 Subnormal Fuzzy Set

2 Normal Fuzzy Set

3 Non Convex Normal Fuzzy Set

4 Convex Normal Fuzzy Set

A.a b c d

2 1 4 3

B.a b c d

1 2 3 4

C.a b c d

4 3 2 1

D.a b c d

3 2 1 4

Answer A

22: The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to

A. infinite

B. 1

C. 0

D. 0.5

Answer D

23:
Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

Answer D

1. What is the form of Fuzzy logic?

- a) Two-valued logic
- b) Crisp set logic
- c) Many-valued logic
- d) Binary set logic

Answer: c

24. Traditional set theory is also known as Crisp Set theory.

- a) True

- b) False

Answer a

25. The truth values of traditional set theory is _____ and that of fuzzy set is _____

- a) Either 0 or 1, between 0 & 1
- b) Between 0 & 1, either 0 or 1
- c) Between 0 & 1, between 0 & 1
- d) Either 0 or 1, either 0 or 1

Answer a

26. Fuzzy logic is extension of Crisp set with an extension of handling the concept of Partial Truth.

- a) True

- b) False

Answer a

27. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by

- a) Fuzzy Set
- b) Crisp Set
- c) Fuzzy & Crisp Set
- d) None of the mentioned

Answer a

28. The values of the set membership is represented by _____

- a) Discrete Set
- b) Degree of truth
- c) Probabilities
- d) Both Degree of truth & Probabilities

Answer b

29. Japanese were the first to utilize fuzzy logic practically on high-speed trains in Sendai.

- a) True
- b) False

Answer a

30. Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.

- a) AND
- b) OR
- c) NOT
- d) All of the mentioned

Answer d

31. There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.

- a) Hedges
- b) Lingual Variable

c) Fuzz Variable

d) None of the mentioned

Answer a

32. Fuzzy logic is usually represented as _____

a) IF-THEN-ELSE rules

b) IF-THEN rules

c) Both IF-THEN-ELSE rules & IF-THEN rules

d) None of the mentioned

Answer b

33. Like relational databases there does exists fuzzy relational databases.

a) True

b) False

Answer a

34. _____ is/are the way/s to represent uncertainty.

a) Fuzzy Logic

b) Probability

c) Entropy

d) All of the mentioned

Answer d

35. _____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.

a) Fuzzy Relational DB

b) Ecorithms

- c) Fuzzy Set
- d) None of the mentioned

Answer c

36. Fuzzy logic is :

- a) Used to respond to questions in a humanlike way
- b) A new programming language used to program animation
- c) The result of fuzzy thinking
- d) A term that indicates logical values greater than one

Answer a

37. A robot is a _____

- a) Computer-controlled machine that mimics the motor activities of living things
- b) Machine that thinks like a human
- c) Machine that replaces a human by performing complex mental processing tasks
- d) Type of virtual reality device that takes the place of humans in adventures

Answer a

38 Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction

$\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be

- a. $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- b. $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- c. $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- d. None of the above

Answer c

39. If A and B are two fuzzy sets with membership functions:

$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$ and $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$

- b. {0.2, 0.5, 0.2, 0.1, 0.8}
- c. {0.1, 0.5, 0.6, 0.1, 0.8}
- d. {0.1, 0.5, 0.2, 0.1, 0.8}

Answer d

40. The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$

- a. $h(A) = 0$
- b. $h(A) < 0$
- c. $h(A) = 1$
- d. $h(A) < 1$

Answer c

41. A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$

- a. Core
- b. Support
- c. Cross-over
- d. α - cut

Answer c

42. Suppose the function y and a fuzzy integer number around -4 for x are given as $y = (x-3)^2 + 2$.

Around $-4 = \{(2, 0.3), (3, 0.6), (4, 1), (5, 0.6), (6, 0.3)\}$ respectively. Then $f(\text{Around } -4)$ is given by:

- a. $\{(2, 0.6), (3, 0.3), (6, 1), (11, 0.3)\}$
- b. $\{(2, 0.6), (3, 1), (6, 1), (11, 0.3)\}$
- c. $\{(2, 0.6), (3, 1), (6, 0.6), (11, 0.3)\}$
- d. $\{(2, 0.6), (3, 0.3), (6, 0.6), (11, 0.3)\}$

Answer c

43. Given $U = \{1, 2, 3, 4, 5, 6, 7\}$ and $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)

- a. $\{(4, 0.7), (2, 1), (1, 0.8)\}$

b. $\{(4, 0.3)\}: (5, 0), (6, 0.2) \}$

c. $\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$

d. $\{(3, 0.3), (6, 0.2)\}$

Answer c

44. Consider a fuzzy set Old as defined below

Old = $\{(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)\}$ Then the alpha-cut for alpha = 0.4 for the set Old will be

a. $\{(40, 0.4)\}$

b. $\{50, 60, 70, 80\}$

c. $\{(20, 0.1), (30, 0.2)\}$

d. $\{(20, 0), (30, 0), (40, 1), (50, 1), (60, 1), (70, 1), (80, 1)\}$

Answer d

45. Let R and S be two fuzzy relations defined as follows. Then, the resulting relation, T, which relates elements of universe x to the elements of universe z using max-min composition is given by:

$$R = \begin{bmatrix} y_1 & y_2 \\ x_1 & 0.6 & 0.4 \\ x_2 & 0.7 & 0.3 \end{bmatrix} \text{ and } S = \begin{bmatrix} z_1 & z_2 & z_3 \\ y_1 & 0.8 & 0.5 & 0.1 \\ y_2 & 0.0 & 0.6 & 0.4 \end{bmatrix}$$

(1)	$T = \begin{bmatrix} z_1 & z_2 & z_3 \\ x_1 & \begin{bmatrix} 0.4 & 0.6 & 0.4 \\ 0.7 & 0.7 & 0.7 \end{bmatrix} \\ x_2 \end{bmatrix}$
(2)	$T = \begin{bmatrix} z_1 & z_2 & z_3 \\ x_1 & \begin{bmatrix} 0.4 & 0.6 & 0.4 \\ 0.8 & 0.5 & 0.4 \end{bmatrix} \\ x_2 \end{bmatrix}$
(3)	$T = \begin{bmatrix} z_1 & z_2 & z_3 \\ x_1 & \begin{bmatrix} 0.6 & 0.5 & 0.4 \\ 0.7 & 0.5 & 0.3 \end{bmatrix} \\ x_2 \end{bmatrix}$
(4)	$T = \begin{bmatrix} z_1 & z_2 & z_3 \\ x_1 & \begin{bmatrix} 0.6 & 0.5 & 0.5 \\ 0.7 & 0.7 & 0.7 \end{bmatrix} \\ x_2 \end{bmatrix}$

a.(1)

b.(2)

c.(3)

d.(4)

Answer c

46. What are the following sequence of steps taken in designing a fuzzy logic machine ?

- a.Fuzzification → Rule evaluation → Defuzzification
- b.Fuzzification → Defuzzification → Rule evaluation
- c.Rule evaluation → Fuzzification → Defuzzification
- d. Rule evaluation → Defuzzification → Fuzzification

Answer a

47. Let R and S be two fuzzy relations defined as follows. Then, the resulting relation, T, which relates elements of universe of X to elements of universe of Z using max-product composition is given by

$$R = \begin{bmatrix} y_1 & y_2 \\ x_1 & \begin{bmatrix} 0.6 & 0.4 \\ 0.7 & 0.3 \end{bmatrix} \\ x_2 \end{bmatrix} \text{ and } S = \begin{bmatrix} z_1 & z_2 & z_3 \\ y_1 & \begin{bmatrix} 0.8 & 0.5 & 0.1 \\ 0.0 & 0.6 & 0.4 \end{bmatrix} \\ y_2 \end{bmatrix}$$

	z ₁	z ₂	z ₃
(A)	$T = \frac{x_1}{x_2} \begin{bmatrix} 0.68 & 0.89 & 0.39 \\ 0.76 & 0.72 & 0.32 \end{bmatrix}$		
	z ₁	z ₂	z ₃
(B)	$T = \frac{x_1}{x_2} \begin{bmatrix} 0.68 & 0.89 & 0.39 \\ 0.72 & 0.76 & 0.32 \end{bmatrix}$		
	z ₁	z ₂	z ₃
(C)	$T = \frac{x_1}{x_2} \begin{bmatrix} 0.63 & 0.42 & 0.25 \\ 0.72 & 0.48 & 0.20 \end{bmatrix}$		
	z ₁	z ₂	z ₃
(D)	$T = \frac{x_1}{x_2} \begin{bmatrix} 0.05 & 0.35 & 0.14 \\ 0.04 & 0.28 & 0.16 \end{bmatrix}$		

- a. A
- b. B
- c. C
- d. D

Answer d

48. Let R and S be two fuzzy relations defined as follows.

Then, the resulting relation, T, which relates elements of universe x to elements of universe z using max-min composition is given by

$$R = \frac{x_1}{x_2} \begin{bmatrix} y_1 & y_2 \\ 0.6 & 0.4 \\ 0.7 & 0.3 \end{bmatrix} \text{ and } S = \frac{y_1}{y_2} \begin{bmatrix} z_1 & z_2 & z_3 \\ 0.8 & 0.5 & 0.1 \\ 0.0 & 0.6 & 0.4 \end{bmatrix}$$

$(A) \quad T = \frac{x_1}{x_2} \begin{bmatrix} z_1 & z_2 & z_3 \\ .5 & .7 & .5 \\ .8 & .8 & .8 \end{bmatrix}$	$(C) \quad T = \frac{x_1}{x_2} \begin{bmatrix} z_1 & z_2 & z_3 \\ .5 & .7 & .5 \\ .9 & .6 & .5 \end{bmatrix}$
$(B) \quad T = \frac{x_1}{x_2} \begin{bmatrix} z_1 & z_2 & z_3 \\ 0.7 & 0.6 & 0.5 \\ 0.8 & 0.6 & 0.4 \end{bmatrix}$	$(D) \quad T = \frac{x_1}{x_2} \begin{bmatrix} z_1 & z_2 & z_3 \\ 0.7 & 0.6 & 0.5 \\ 0.8 & 0.8 & 0.8 \end{bmatrix}$

- a. A
- b. B
- c. C
- d. D

Answer c

49. Compute the value of adding the following two fuzzy integers:

$$A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$$

$$B = \{(0.5,11), (1,12), (0.5,13)\}$$

Where fuzzy addition is defined as

$$\mu_{A+B}(z) = \max_{x,y} \min(\mu_A(x), \mu_B(y))$$

Then, $f(A+B)$ is equal to

- a. $\{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)\}$
- b. $\{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)\}$
- c. $\{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$
- d. $\{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$

Answer d

50. A perceptron has input weights $W_1 = -3.9$ and $W_2 = 1.1$ with threshold value $T = 0.3$. What output does it give for the input $x_1 = 1.3$ and $x_2 = 2.2$?

- a. -2.65
- b. -2.30
- c. 0
- d. 1

Answer c

51. Let A and B be two fuzzy integers defined as:

$$A = \{(1, 0.3), (2, 0.6), (3, 1), (4, 0.7), (5, 0.2)\}$$

$$B = \{(10, 0.5), (11, 1), (12, 0.5)\}$$

$$\mu_{A+B}(z) = \underset{x + y = z}{\oplus} (\mu_A(x) \otimes \mu_B(y))$$

$f(A+B)$ is _____ . [Note : $\oplus \equiv \max$
 $\otimes \equiv \min$]

Using fuzzy arithmetic operation given by

- a. $\{(11, 0.8), (13, 1), (15, 1)\}$
- b. $\{(11, 0.3), (12, 0.5), (13, 1), (14, 1), (15, 1), (16, 0.5), (17, 0.2)\}$
- c. $\{(11, 0.3), (12, 0.5), (13, 0.6), (14, 1), (15, 1), (16, 0.5), (17, 0.2)\}$
- d. $\{(11, 0.3), (12, 0.5), (13, 0.6), (14, 1), (15, 0.7), (16, 0.5), (17, 0.2)\}$

Answer d

52.

Let A be the set of comfortable houses given as follows. Then the set of comfortable and affordable houses is

$$A = \left\{ \frac{x_1}{0.8}, \frac{x_2}{0.9}, \frac{x_3}{0.1}, \frac{x_4}{0.7} \right\}$$

and B be the set of affordable houses

$$B = \left\{ \frac{x_1}{0.9}, \frac{x_2}{0.8}, \frac{x_3}{0.6}, \frac{x_4}{0.2} \right\}$$

- (A) $\left\{ \frac{x_1}{0.8}, \frac{x_2}{0.8}, \frac{x_3}{0.1}, \frac{x_4}{0.2} \right\}$
- (B) $\left\{ \frac{x_1}{0.9}, \frac{x_2}{0.9}, \frac{x_3}{0.6}, \frac{x_4}{0.7} \right\}$
- (C) $\left\{ \frac{x_1}{0.8}, \frac{x_2}{0.8}, \frac{x_3}{0.6}, \frac{x_4}{0.7} \right\}$
- (D) $\left\{ \frac{x_1}{0.7}, \frac{x_2}{0.7}, \frac{x_3}{0.7}, \frac{x_4}{0.9} \right\}$

- a. A
- b. B
- c. C
- d. D

Answer a

53. Support of a fuzzy set given below, within a universal set X is given as

$$A = \left\{ \frac{x_1}{0.2}, \frac{x_2}{0.15}, \frac{x_3}{0.9}, \frac{x_4}{0.95}, \frac{x_5}{0.15} \right\}$$

- (A) $\left\{ \frac{x_1}{0.15}, \frac{x_2}{0.15}, \frac{x_3}{0.15}, \frac{x_4}{0.15}, \frac{x_5}{0.15} \right\}$
- (B) $\left\{ \frac{x_1}{0.95}, \frac{x_2}{0.95}, \frac{x_3}{0.95}, \frac{x_4}{0.95}, \frac{x_5}{0.95} \right\}$
- (C) $\{x_3, x_4\}$
- (D) $\{x_1, x_2, x_3, x_4, x_5\}$

- a. A
- b. B

- c. C
- d. D

Answer d

54. In a single perceptron, the updatation rule of weight vector is given by

- a. $w(n + 1) = w(n) + \eta[d(n) - y(n)]$
- b. $w(n + 1) = w(n) - \eta[d(n) - y(n)]$
- c. $w(n + 1) = w(n) + \eta[d(n) - y(n)] * x(n)$
- d. $w(n + 1) = w(n) - \eta[d(n) - y(n)] * x(n)$

Answer c

55. A fuzzy set A on R is iff $A(\lambda x_1 + (1 - \lambda)x_2) \geq \min [A(x_1), A(x_2)]$ for all $x_1, x_2 \in R$ and all $\lambda \in [0, 1]$, where min denotes the minimum operator.

- a. Support
- b. α -cut
- c. Convex
- d. Concave

Answer c

56. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

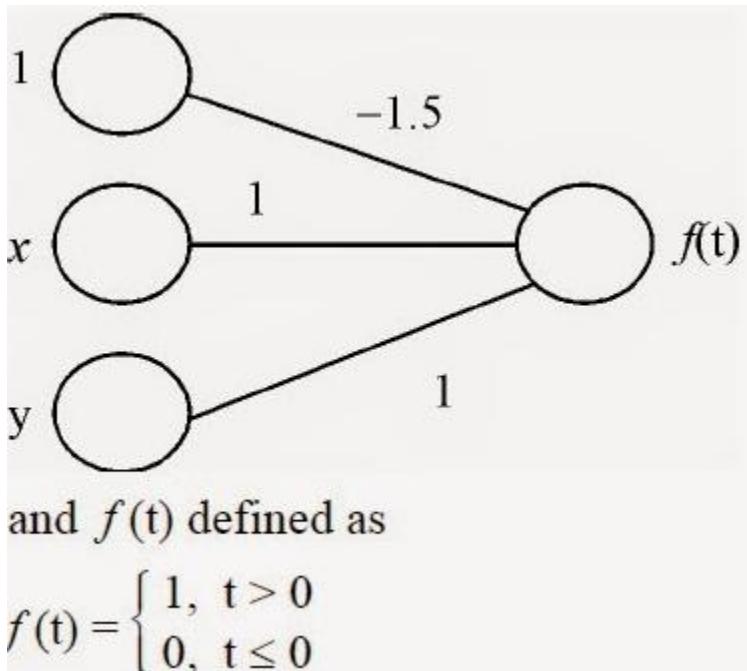
$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cup B)'(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.1, 0.5, 0.4, 0.2, 0.2\}$
- d. $\{0.1, 0.5, 0.4, 0.2, 0.3\}$

Answer c

57. Consider a single perception with weights as given in the following figure. The perception can solve



- a.OR problem
- b.AND problem
- c.XOR problem
- d.All of the above

Answer b

58 Which of the following is not true regarding the principles of fuzzy logic ?

- A Fuzzy logic is a concept of 'certain degree'.
- B Fuzzy logic follows the principle of Aristotle and Buddha.
- C Fuzzy logic is a concept of 'certain degree'.
- D. Boolean logic is a subset of fuzzy logic.

Answer B

59 What are the following sequence of steps taken in designing a fuzzy logic machine?

Fuzzification->Rule evaluation->Defuzzification

Rule evaluation->Fuzzification->Defuzzification

Fuzzy Sets->Defuzzification->Rule evaluation

Defuzzification->Rule evaluation->Fuzzification

Answer A

60. Generalizations of ordinary fuzzy sets which involve fuzzy sets defined within a universal set whose elements are ordinary fuzzy sets constitute a -----fuzzy set.

- a) Level 1 b) Level 2 3) Level 3 4) Level 4

Answer b

61. Let $h(A)$ denote the height of a fuzzy set A. A is called a normal fuzzy set if

- a) $h(A)=0$ b) $h(A)=1$ c) $h(A)<1$ d) $h(A)>1$

Answer b

62. Let A be a fuzzy set. Then 1-cut of A is usually called

- a) Support of A b) height of A c) Core of A d) cut of A

Answer c

63. The cut of the complement of a fuzzy set A is always same as the complement of the

- a) Strong cut of A b) strong cut of c) Strong (-) cut of A d) Strong (1-) cut of A c

Answer c

64. The boundary condition satisfied by the standard fuzzy complement is

- a) $c(0)=1$ and $c(1)=1$ b) $c(0)=0$ and $c(1)=1$ c) $c(0)=0$ and $c(1)=0$ d) $c(0)=1$ and $c(1)=0$

Answer d

65. Involutive property of the standard fuzzy complement c , for each $a \in [,]$ is ----

- a) $c(c(a))=c(a)$ b) $c(c(a))= 1$ c) $c(c(a))=0$ d) $c(c(a))=a$

Answer d

66. Each fuzzy complement has at most -----equilibrium.

a) 1 b) 2 c) 3 d) None of these

Answer a

66. Yager Class of fuzzy complement is defined as

a) $() = (-)$ b) $() = (-)$ c) $() = (-)$ d) None

Answer c

67. Equilibrium of a fuzzy complement c is a solution of the equation

a) $c(a)-a=1$ b) $c(a)-a=2$ c) $c(a)=2a$ d) $c(a)-a=0$

Answer d

68. For $a \in [,]$, the boundary condition for the t-norm function i is

a) $i(a,1)=0$ b) $i(a,0)=a$ c) $i(a,1)=a$ d) $i(a,0)=1$

Answer c

69. For standard fuzzy intersection, which of the following hold?

a) $i(a,b)=\min(a,b)$ b) $i(a,b)=ab$ c) $i(a,b)=a-b$ d) None

Answer a

70. Example of an idempotent t-norm is

a) Algebraic Product b) Bounded Difference c) Drastic intersection d) Standard intersection

Answer d

71. The most adequate choice for an upper bound for the drastic intersection is

a) $i(a,b)$ b) $\min(a,b)$ c) a d) All the three options given.

Answer a

72. Equilibrium value for the standard fuzzy complement is -----

a) 0 b) 0.5 c) 1 d) 0.4

Answer b

73. The set Q of rational numbers is

a) Countably finite b) Countably infinite c) Uncountably infinite d) None.

Answer b

74. A continuous super idempotent t- conorm is called ----

- a) Strictly Archimedean b) Archimedean c) t-norm d) None.

Answer b

75. Back propagation is a learning technique that adjusts weights in the neural network by propagating weight changes.

- a .Forward from source to sink
- b. Backward from sink to source
- c. Forward from source to hidden nodes
- d. Backward from sink to hidden nodes

Answer b

76. Identify the following activation function :

$$\phi(V) = Z + \frac{1}{1 + \exp(-x * V + Y)},$$

Z, X, Y are parameters

- a.Step function
- b.Ramp function
- c.Sigmoid function
- d.Gaussian function

Answer c

77. An artificial neuron receives n inputs $x_1, x_2, x_3, \dots, x_n$ with weights w_1, w_2, \dots, w_n attached to the input links. The weighted sum _____ is computed to be passed on to a non-linear filter Φ called activation function to release the output.

- a. $\sum w_i$
- b. $\sum x_i$
- c. $\sum w_i + \sum x_i$
- d. $\sum w_i * x_i$

Answer d

78. A neuron with 3 inputs has the weight vector $[0.2 \ -0.1 \ 0.1]^T$ and a bias $\theta = 0$. If the input vector is $X = [0.2 \ 0.4 \ 0.2]^T$ then the total input to the neuron is:

- a.0.20

b.1.0

c.0.02

d.-1.0

Answer c

79 Which of the following neural networks uses supervised learning?

- (A) Multilayer perceptron
 - (B) Self organizing feature map
 - (C) Hopfield network
- a.(A) only
- b.(B) only
- c.(A) and (B) only
- d.(A) and (C) only

Answer a

80 What Is Fuzzy Inference Systems?

- A. The process of formulating the mapping from a given input to an output using fuzzy logic
- B. Changing the output value to match the input value to give it an equal balance
- C. Having a larger output than the input
- D. Having a smaller output than the input

Answer A

81 What Are The Two Types Of Fuzzy Inference Systems?

- A.Model-Type and System-Type
- B.Momfred-Type and Semigi-Type
- C.Mamdani-Type and Sugeno-Type
- D.Mihni-Type and Sujgani-Type

Answer C

82 .Where Has Fuzzy Inference Systems Been Implemented?

- A.Wireless services, heat control and printers

- B.Restrict power usage, telephone lines and sort data
- C. Simulink, boiler and CD recording
- D. Automatic control, decision analysis and data classification

Answer D

83. What Is Another Name For Fuzzy Inference Systems?

- A. Fuzzy Expert System
- B. Fuzzy Modelling
- C. Fuzzy Logic Controller
- D. All of the above

Answer D

84. Mamdani's Fuzzy Inference Method Was Designed To Attempt What?

- A. Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.
- B. Control a television and remote combination by synthesising a set of linguistic control rules obtained from experienced human operations.
- C. Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.
- D. Control a air craft and feul level combination by synthesising a set of linguistic control rules obtained from experienced human operations.

Answer C

85. What Is The First Step Of Fuzzy Logic Toolbox?

- A. Fuzzification of the input variables
- B. Defuzzification
- C. Application of the fuzzy operator (AND or OR) in the antecedent
- D. Aggregation of the consequents across the rules

Answer A

867. What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?

- A. The input is a single truth value and the output has two or more values
- B. The input is a value greater than one and the output is a value less than the input
- C. The input and output have both the same values
- D. The input has two or more values and the output has a single truth value

Answer D

87. What Is The Equation For Probabilistic?

- A. Prob \ominus (a,b) = a-b + ab
- B. Prob \ominus (a,b) = ab + ab
- C. Prob \ominus (a,b) = a+b - ab
- D. Prob \ominus (a,b) = a/b x ab

Answer C

88. What Is The Input And Output Of Step 3 - Apply Implication Method?

- A. Input is a fuzzy set but the output is a whole value
- B. Input is a whole value but the output can be a fuzzy set
- C. Input and output have the same value
- D. Input is a smaller value than the output value

Answer B

89 . What Is The Purpose Of Aggregation?

- A. To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs
- B. To gather all the possible inputs and use the average to gain an output
- C. To gather all the different fuzzy set outputs and average them out to get a single value
- D. To subtract all the output fuzzy set values from the input values

Answer A

S

Option A (μ,λ): Select survivors among parents and offspring

Option B ($\mu+\lambda$): Select survivors among parents and offspring

Option C ($\mu-\lambda$): Select survivors among offspring only

Option D ($\mu:\lambda$): Select survivors among offspring only

Correct Answer B

10 Rank based selection

Option A Use relative rather than absolute fitness

Option B Use absolute rather than relative fitness

Option C Results in less control of the selection pressure than

fitness-proportionate selection

Option D Ranking can be either linear or non-linear

Correct Answer A & D

Sr. No .	Question	Option 1	Option 2	Option 3	Option 4	Answer
1	Core of soft Computing is-	Fuzzy Computing, Neural Computing, Genetic Algorithms	Fuzzy Networks and Artificial Intelligence	Artificial Intelligence and Neural Science	Neural Science and Genetic Science	1
2	Who initiated the idea of Soft Computing	Charles Darwin	Lofti A Zadeh	Rechenberg	Mc_Culloch	2
3	In supervised learning	classes are not predefined	classes are predefined	classes are not required	classification is not done	2
4	Artificial neural network used for	Pattern Recognition	Classification	Clustering	All of these	4

5	A Neural Network can answer	For Loop questions	what-if questions	IF-The-Else Analysis Questions	None of these	2
6	Hard computing produce	precise solutions	fuzzy solution	approximate solution	None of these	1
7	Hard computing is strictly	Parallel	sequential	Both	None of these	2
8	Principle component of soft computing is	Neural Network	Fuzzy Loguc	Genetic Algorithms	All of the mentioned	4
9	Which is supervised learning	clustering	regression	association	dimensionality reduction	2
10	In supervised learning, training set of data includes	Input	Output	Both input and output	None	3
11	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	1
12	Fuzzy – Genetic Hybrid system is a	Fuzzy logic in parallel with the Genetic algorithm	Fuzzy logic controlled Genetic algorithm	Genetic algorithm controlled Fuzzy logic	None of the above	2
13	Which of the following is not a hybrid system?	Embedded hybrid system	Sequential hybrid system	Auxiliary hybrid system	Parallel hybrid system	4

14	Command to start matlab fuzzy toolbox is	fis	fuzzy	fuzzybox	fuzzytool	2
15	In terms of computing we have	antecedent	consequent	mapping function	All of the mentioned	4
16	Fuzzy logic is a form of	Two valued logic	Many valued logic	Crisp set logic	Binary set logic	2
17	Traditional set theory is also known as Crisp set theory.	True	False			1
18	In a Fuzzy set a prototypical element has a value	1	0	Infinite	Not Defined	1
19	Which of the following is a type of Membership function?	Triangular	Trapezoidal	Sigmoid	All of the above	4
20	Which of the following is not a type of Membership function?	S-shape	Bell shape	Truncated Gaussian	None of these	4
21	What is the independent variable of fuzzy output?	Maturity	Membership	Generic Element	None of these	1
22	Fuzzy Implication is also known as	Fuzzy logic	Fuzzy IF-THEN rule	Fuzzy expert system	None of these	2
23	Ways to compute fuzzy rule A-> B is	A coupled with B	A entails B	Both	None of these	3

24	System is used for both MISO and MIMO	Mamdani	Sugeno	Takagi	None of these	1
25	Which is not the defuzzification method	Centre of gravity method	Centre of sum method	Centre of perimeter method	Centre of area method	3
26	Which of this is not a fuzzy controller	Domestic Shower Controller	Water purifier controller	Train brake power controller	Angular JS Controller	4
27	In Evolutionary algorithm _____ operator is prime operator	selection	mutation	recombination	initialization	2
28	In evolutionary algorithm selection is _____	deterministic	probabilistic	both	None of these	1
29	Evolutionary Algorithm deals with self adaptation	Yes	No			1
30	Problem domain of Evolutionary Algorithm is	discrete optimization	continuous optimization	combinatorial optimization	None of these	2
31	Evolutionary Algorithm solves _____ problem	NP-complete	NP-hard	P	None of these	2
32	Category of EP based on scaling function	Non adaptive	Non Dynamic	Non self-adaptive	Adaptive	1

33	Evolutionary algorithm differs from genetic algorithm as it does not have	Crossover	mutation	Selection	Reproduction	1
34	Evolutionary algorithms classified as	Evolutionary Programming	Evolutionary Strategies	Genetic Algorithms	All of the mentioned	4
35	compared to Traditional approach EA takes _____ CPU time	Large	Small	Equal	None of these	1
36	Genetic Algorithm is superset of Evolutionary Algorithm	True	False			2
37	Optimization in GA is	Metaheuristic	Stochastic	Discrete	Continuous	3
38	In GA individual memory is there	Yes	No			2
39	In GA individual operator is	Crossover point	Mutation	pbest	gbest	2
40	In _____ each individual survives for exactly one generation	Generation Model	Steady state Model	Population Model	Tournament Model	1
41	Which GA operation is computationally most expensive?	Initial population creation	Selection of sub-population for mating	Reproduction to produce next generation	Convergence testing	3

42	Which of these are adaptive heuristic search algorithms	evolutionary algorithms	genetic algorithms	Binary search	None of these	2
43	In Genetic algorithm string operate with	Real values	binary number	Decimal Number	None of these	2
44	Parallel GA	Generational	Steady state	Distributed	None of these	3
45	Examples of stopping criteria in GA can be	Generation limit	No change in fitness	Elapsed time	All of the mentioned	4
46	Category of GBML systems	Pittsburg Approach	Divide n conquer approach	Michi Approach	None of these	1
47	PGA is	Parallel Genetic Algorithm	Proportional Genetic Algorithm	Perceptron based Genetic Algorithm	None of these	1
48	Swarm intelligence (SI) introduced by	Gerardo Beni and Jing Wang	Gerardo Beni and James Gosling	George M and Jing Wang	None of these	1
49	The application of swarm principles to robots is called	swarm robotics	swarm behaviour	robotics	None of these	1
50	Methods of Swarm intelligence is	Particle swarm optimization	Ant colony optimization	Both	None of these	3

51	PSO stands for	Particle Swarm Optimization	Particle Selection Optimization	Portion Swarm Optimization	Portion Selection Optimization	1
52	ACO stands for	Analytical Colony Optimization	Ant Colony Optimization	Ant Coding optimization	None of these	2
53	Each particle of swarm maintains record of	pbest	gbest	Both pbest, gbest	None of these	3
54	pbest is	personal best	personal based	proper based	proper best	1
55	gbest is	global best	general best	global based	general based	1
56	Particle has	fitness value	velocity	pbest	All of the mentioned	4
57	In each iteration every particle in swarm we update	velocity	gbest	Both velocity ,gbest	None of these	3
58	In PSO important thing is	Communication	Learning	Both	None of these	3
59	PSO topology	Star	Ring	Adaptive random	All of the mentioned	4
60	“The train is running fast”. Here ‘fast’ can be represented by	Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	None of these	1

61	<u> </u> is/are the way/s to represent uncertainty.	Fuzzy Logic	Probabilty	Entropy	All of the mentioned	4
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89	Internal state of neuron is called _____, is the function of the inputs the neurons receives		Weight	activation or activity level of neuron	Bias	None of these	b
90	Each connection link in ANN is associated with _____ which has information about the input signal.		neurons	weights	bias	activation function	b
91	In artificial Neural Network interconnected processing elements are called		nodes or neurons	weights	axons	Soma	a
92	The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to		infinite	1	0	0.5	d
93	The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing		Convex Fuzzy Set	Non convex fuzzy set	Normal Fuzzy set	Sub normal fuzzy set	b
94	The cell body of neuron can be analogous to what mathematical operation?		summing	differentiator	integrator	none of the mentioned	a
95	Conventional Artificial Intelligence is different from soft computing in the sense		Conventional Artificial	Conventional Artificial	Both (a) and (b)	None of the above	c
96	_____ is/are the way/s to represent uncertainty.		Fuzzy Logic	Probability	Entropy	All of the mentioned	d
97	Given two fuzzy sets A and B A={(x1,0.5),(x2,0.1),(x3,0.4)} and B={(x1,0.2),(x2,0.3),(x3,0.5)} then union of 2 sets A U B is		{(x1,0.5),(x2,0.1),(x3,0.4)}	{(x1,0.5),(x2,0.3),(x3,0.5)}	{(x1,0.2),(x2,0.3),(x3,0.5)}	{(x1,0.2),(x2,0.1),(x3,0.4)}	b
98	If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$ $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be		(0.2,0.5,0.6,0.7,0.9)	(0.2, 0.5, 0.2, 0.1, 0.8)	{0.1, 0.5, 0.6, 0.1, 0.8}	{0.1, 0.5, 0.2, 0.1, 0.8}	d
99	For k>1, which of the following concept can be used to generate other linguistic hedge?		Concentration and dilation	Dilation	Concentration	None of the mentioned	c
100	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A U B is		{1.0, 0.45, 0.75}	{1.0, 0.2, 0.75}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	a
101	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A ∩ B is		{1.0, 0.45, 0.75}	{0.2, 0.20, 0.50}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	b
102	Mamdani-style inference involves which steps		Fuzzification of the input variables & Rule evaluation	Aggregation of the rule output & Defuzzification	Both a and b	either a or b	c
103	A _____ point of a fuzzy set A is a point x X at which $\mu_A(x) = 0.5$		Core	Support	Cross-over	α - cut	c
104	Which statement is true?		Mamdani approach characterised by its low interpretability and low accuracy	Takagi and Sugeno's approach characterised by high accuracy but at the cost of high interpretability	Takagi and Sugeno's approach follows precise fuzzy modelling and obtains high accuracy but at the cost of high interpretability	Mamdani approach characterised by its low interpretability and high accuracy	c
105	The height h(A) of a fuzzy set A is defined as $h(A) = \sup A(x)$		$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) < 1$	c
106	Which can be used as an input to fuzzy controller?		A fuzzy set	a crisp set	Both fuzzy set and Crisp set	None of these	b
107	What are the types of fuzzy logic sets?		Type-1 fuzzy set	Type-2 fuzzy set	Both a and b	None of these	c
108	How is fuzzy logic different from conventional control methods		IF and THEN approach	FOR approach	WHILE approach	DO approach	a
109	The height h(A) of a fuzzy set A is defined as $h(A)=\text{support } A(x)$, where A belongs to A. Then fuzzy set is called normal when		$h(A)>0$	$h(A)<0$	$h(A)=1$	$h(A)>1$	c
110	If A and B are sets and A U B=A B then		$A=B$	$A=0$	$B=0$	None of these	A
111	If x is A then y is B else y is C. The output of the given fuzzy rule is		A fuzzy set	a crisp set	a fuzzy relation	a membership function	c
112	What Is The First Step Of Fuzzy Logic Toolbox?		Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator(AND or OR) in the antecedent	Aggregation of the consequents across the rule	a
113	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?		What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	The input is a value greater than one and the output is a value less than the input	The input and output have both the same values	The input has two or more values and the output has a single truth value	d
114	What Is The Input And Output Of Step 3 - Apply Implication Method?		Input is a fuzzy set but the output is a whole value	Input is a fuzzy set but the output is a whole value	Input and Output have the same value	Input is a smaller value than the output value	b
115	What Is The Purpose Of Aggregation?		To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	a
116	Linguistic variable is		a variable whose values are words or sentences	any numerical value only	any binary value only	variable which contains TRUE or FALSE values only	a
117	Identification of Input, Output and state variables is performed in which step of FLC?		Fuzzy configuration	Defuzzification	combining fuzzy outputs	Identification of variables	d
118	Assigning linguistic label to each subset is done in which step of FLC?		Fuzzy configuration	Defuzzification	combining fuzzy outputs	fuzzy subset configuration	d
119	Disjunctive system of rules is used for system		that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	a
120	Conjunctive system of rules is used for system		that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	b
121	Categorial reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	a
122	Syllogistic reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	c
123	Qualitative reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	b
124	Dispositional reasoning form of fuzzy reasoning		the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	d

125	Mamdani systems are		MISO systems	MIMO systems	Only MISO systems	both a and b	d
126	Sugeno systems are		MISO systems	MIMO systems	Only MISO systems	both a and b	b
127	In the generational model of EA		entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	a
128	In the steady-state model of EA		entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	b
129	In the generational model of EA		each individual survives exactly for two generation	each individual survives exactly for one generation	cannot predict	each individual survives as many generations as want	b
130	In the steady-state model of EA		One offspring is generated per generation	two offsprings are generated per generation	cannot decide	more than two offsprings are generated per generation	a
131	Which of the following algorithm is most efficient for discontinuous and noisy problems?		Evolutionary algorithm	Classical optimization algorithm	Genetic algorithm	none	a
132	Each iteration of EA is referred to as		Generation	Iteration	population	None	a
133	Which of the following are evolutionary operators?		Selection	Crossover	Mutation	All of the above	d
134	In the $(\mu/\rho,\lambda)$ method of ES, parents are		selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	a
135	In the $(\mu/\rho+\lambda)$ method of ES, parents are		selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	b
136	Fitness scaling is desirable to ensure		Population diversity	selection pressure	that better solutions are selected only	relatively inferior solutions are not ignored	a
137	Which mutation operator is used in ES as reproduction operator?		one point	Gaussian mutation	two point	adaptive	b
138	Fitness proportionate selection methods are		Roulette wheel selection	Stochastic universal sampling	tournament selection	All the mentioned	d
139	In which selection method of survival selection there is no notion of fitness?		fitness based selection	elitism	Agebased selection	All the mentioned	c
140	In which selection strategy every individual has the same probability to be selected?		Roulette wheel selection	Uniform selection	tournament selection	Rank selection	b
141	High selection pressure is desirable, when we need		diversity not found in each generation	there is no improvement in successive GA iteration	faster termination of GA	fitness values are not uniformly distributed	c
142	Tournament selection scheme is more preferable when		when fitness values are uniformly distributed	population are with very diversified fitness values	when fitness values are not necessarily uniformly distributed	under all the above situations	b
143	Which of the following is not a characteristic of evolutionary algorithm?		Conceptual simplicity	Parallelism	Broad applicability	Artificial selection	d
144	What is the correct order of steps in evolutionary algorithm?		Select parents-recombine-mutate-evaluate	Select parents-recombine-evaluate-mutate-	Select parents-mutate-evaluate -recombine-evaluate-mutate		a
145	Which of the following schemes are selection schemes in Evolutionary computation?		Hall of fame	Rank based selection	tournament selection	All of the above	d
146	To encode chromosomes which encoding schemes are used		binary encoding	finite state machine	real value encoding	All of the above	d
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp	Distinguish two regions	Cannot Distinguish two	Collection of ordered pairs	None of these		a
2	In computing the output is called as	Consequent	Outfeed	Antecedents	Premise		a
3	Fuzzy logic is a form of	two valued logic	crisp set logic	many value logic	binary set logic		c
4	Control actions while computing should be	Ambiguous	Unambigous	Inaccurate	None of these		b
5	Core of soft computing is	Fuzzy computing,neura	Fuzzy network and a	Neural Science	Genetic Science		a
6	Hard computing performs what type of computation	Sequential	Parallel	approximate	both a and b		a
7	Who initiated idea of soft computing	charles darwin	rich and berg	mc culloch	lofti a zadeh		d
8	Soft computing is based on	fuzzy logic	neural science	crisp software	binary logic		a
9	In soft computing the problems,algorithms can be	non adaptive	adaptive	static	all of the above		b
10	Fuzzy Computing	mimics human behavio	deals with imprecise,p	exact information	both a and b		d
11	Hard computing is also called as	evolutionary computin	conventional comput	non conventional com	probabilistic computing		b
12	Which computing produces accurate results	soft computing	hard computing	both a and b	none of the above		b
13	Neural network computing	mimics human behavio	information processi	both a and b	none of the above		c
14	Artificial neural network is used for	pattern recognition	classification	clustering	all of the above		d
15	How does blind search differ from optimization	Blind search represent	Blind search usually do	Blind search cannot re	none of these		b
16	In modeling,an optimal solution is understood to be	a solution that can only	a solution found in th	a solution that is the best	a solution that requires		c
17	When is a complete enumeration of solution used?	When a solution that is	When there is enough	When the modeler req	When there are an infi		b
18	All the following are true about heuristics EXCEPT	heuristics are used whe	heuristics are used wh	heuristics are used wh	heuristics are rules of g		c
19	Which approach is most suited to structured problem with little uncertainty	Simulation	human intuition	Optimization	genetic algorithm		c
20	Genetic algorithm belong to the family of method in the	artificial intelligence are	optimization area	complete enumeration	Non computer based is		a
21	What does the 0 membership value means in the set	the object is fully inside	the object is not in th	the object is partially p	none of the above		b
22	The union of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to		a
23	The process of fuzzy interference system involes	membership functions	fuzzy logic operators	if-then rules	all the above		d
24	What does a fuzzifier do	converts crisp input to if	converts crisp output to	converts fuzzy input to l	converts fuzzy output to		a
25	Which of the following is not defuzzifier method	centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle		d
26	Which of the following is/are type of fuzzy interference method	mamdani	sugeno	rivest	only a and b		d
27	A Fuzzy rule can have	multiple part of antece	only single part of ant	multiple part of antece	only single part of ante		c
28	The α cut of a fuzzy set A is a crisp set defined by :-	$(x U_a(x)>a)$	$(x U_a(x)>=a)$	$(x U_a(x)<a)$	$(x U_a(x)\leq a)$		b
29	The bandwidth(A) in a fuzzy set is given by	$(A)= x_1*x_2 $	$(A)= x_1+x_2 $	$(A)= x_1-x_2 $	$(A)= x_1/x_2 $		c
30	The intersection of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to		b
31	$A=(1/a,0.3/b,0.2/c,0.8/d,e)$ $B=(0.6/a,0.9/b,0.1/c,0.3/d,0.2/e)$ What will be the complement of A?	$(0/a,0.7/b,0.8/c,0.2/d,e)$	$(0/a,0.9/b,0.7/c,0.2/d,e)$	$(0.8/a,0.7/b,0.8/c,0.7/d,e)$	$(0/a,0.7/b,0.8/c,0.9/d,e)$		a
32	$A=(1/a,0.3/b,0.2/c,0.8/d,e)$ $B=(0.6/a,0.9/b,0.1/c,0.3/d,0.2/e)$ What will be the union of AUB?	$(1/a,0.9/b,0.1/c,0.5/d,e)$	$(0.8/a,0.9/b,0.2/c,0.5/d,e)$	$(1/a,0.9/b,0.2/c,0.8/d,e)$	$(1/a,0.9/b,0.2/c,0.8/d,e)$		c
33	$A=(1/a,0.3/b,0.2/c,0.8/d,e)$ $B=(0.6/a,0.9/b,0.1/c,0.3/d,0.2/e)$ What will be the intersection of A and B?	$(0.6/a,0.3/b,0.1/c,0.3/d,e)$	$(0.6/a,0.8/b,0.1/c,0.3/d,e)$	$(0.6/a,0.3/b,0.1/c,0.5/d,e)$	$(0.6/a,0.3/b,0.2/c,0.3/d,e)$		a
34	What denotes the support(A) in a fuzzy set?	$ x U_a(x)>0$	$ x U_a(x)<0$	$ x U_a(x) <0$	$ x U_a(x) >0.5$		a
35	What denotes the core(A) in a fuzzy set?	$ x U_a(x)>0$	$ x U_a(x) =1$	$ x U_a(x) >0.5$	$ x U_a(x) >0.8$		b
36	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above		c
37	which of the following is a sequence of steps taken in designning a fuzy logic machine	fuzzification->Rule Eval	defuzzification->rule eval	rule evaluation->fuzzif	rule evaluation->defuzz		a
38	can a crisp set be a fuzzy set?	no	yes	depends	all of the above		b
39	Genetic algorithm belong to the family of method in the	artificial intelligence are	optimization area	complete enumeration	Non computer based is		a
40	All the follwing are suitable problem for genetic algorithm EXCEPT	pattern recognition	simulation of biologic	simple optimization wi	dynamic process contr		c
41	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO		a
42	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO		b
43	mutation is applied on _____ candidates.	one	two	more than two	none of these		a
44	recombination is applied on _____ candidates.	one	two	more than two	none of these		b
45	LCS belongs to _____ based methods?	rule based learning	genetic learning	both a and b	none of these		a
46	Survival is _____ approach.	deterministic	non deterministic	semi deterministic	none of these		a
47	Evolutionary algorithms are a _____ based approach	heuristic	metaheuristic	both a and b	none of these		a
48	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO		a
49	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO		b
50	Idea of genetic algorithm came from	machines	Birds	ACO	genetics		d

51	Chromosomes are actually ?		line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by	Fredrik	Fogel	Frank	Flin	b	
54	Evolution Strategies is developed with		selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses		real-valued vector representation	vector representation	time based representation	none of these	a
56	in ES survival is	indeterministic	deterministic	both a and b	none of these	d	
57	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d	
58	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c	
59	What are different types of crossover	discrete and intermediate	discrete and continuous	continuous and intermediate	none of these	a	
60	Determining the duration of the simulation occurs before the model is validated and tested.	TRUE	FALSE			B	
61	cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solution	none of these	C	
62	Discrete events and agent-based models are usually used for	middle or low level of abstraction	high level of abstraction	very high level of abstraction	none of these	A	
63	I does not usually allow decision makers to see how a solution to a problem evolves over time	Simulation , Complex problem	Simulation, Easy problem	Genetics, Complex problem	Genetics, Easy problem	A	
64	EC stands for?	Evolutionary Computation	Evolutionary computation	Electronic computation	none of these	a	
65	GA stands for	genetic algorithm	genetic assurance	genetic algorithm	none of these	a	
66	LCS stands for	learning classes system	learning classifier system	learned class system	none of these	b	
67	GBML stands for	Genes based Machine	Genes based mobile	Genetic based machine	none of these	c	
68	EV is dominantly used for solving _____.	optimization problems	NP problem	simple problems	none of these	a	
69	EV is considered as?	adaptive	complex	both a and b	none of these	c	
70	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d	
71	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b	
72	Parameters that affect GA	initial population	selection process	fitness function	all of these	d	
73	Fitness function should be	maximum	minimum	intermediate	none of these	b	
74	Evolutionary algorithms are a _____ based approach	heuristic	metaheuristic	both a and b	none of these	a	
75	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a	
76	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b	
77	mutation is applied on _____ candidates.	one	two	more than two	none of these	a	
78	recombination is applied on _____ candidates.	one	two	more than two	none of these	b	
79	Applying recombination and mutation leads to a set of new candidates, called as ?	sub parents	parents	offspring	grand child	c	
80	_____ decides who becomes parents and how many children the parents have.	parent combination	Parent selection	Parent mutation	Parent replace	b	
81	Basic elements of EA are ?	Parent Selection methods	Survival Selection methods	both a and b	none of these	c	
82	LCS belongs to _____ based methods?	rule based learning	genetic learning	both a and b	none of these	a	
83	Survival is _____ approach.	deterministic	non deterministic	semi deterministic	none of these	a	
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.	Hedges	Linguistic Variable	Fuzzy Variable	None of the mentioned	a	
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a	
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a	
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?	associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c	
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is	Adaptive Learning	Self Organization	What-if Analysis	Supervised Learning	b	
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d	
90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d	
91	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned	c	
92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c	
93	The values of the set membership is represented by	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b	
94	Given $U = \{1, 2, 3, 4, 5, 6, 7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where \sim → complement)						
95	If A and B are two fuzzy sets with membership functions						
96	$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu_{(A \cup B)}(x)$ will be						
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3, 1), (0.6, 2), (1, 3), (0.7, 4), (0.2, 5)\}$ $B = \{(0.5, 11), (1, 12), (0.5, 13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(y)))$ Then, μ_{A+B} is equal to						
98	$A \cup (B \cup C) =$	$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cap C$	$(A \cup B) \cap (A \cap C)$	$B \cap A \cap C$	b	
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be						
100	The fuzzy proposition "If X is E then Y is F" is a	conditional unqualified	unconditional unqualified	conditional qualified	unconditional qualified	a	
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A, B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous	1 only	2 and 3	1, 2 and 3	None of these	b	
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy ≈ Prediction	Fuzzy ≈ Forecasting	Probability ≈ Forecasting	None of these	b	
103	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and accurate result	ANN gives accurate result	In each, no precise result	Fuzzy gives exact result	c	
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b	
105	--- defines logic function of two prepositions	prepositions	Linguistic hedges	truth tables	inference rules	c	
106	In fuzzy propositions, --- gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b	

107	Multiple conjunctives antecedents is method of ----- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ----- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
109	If x is A and y is B then z=c (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semig-type	Mamdani-type and Sugeno-type	Mihni-type and Sugani-type	c
113	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)-selection based on the children only ($\mu+\lambda$)-selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)-selection based on the children only ($\mu+\lambda$)-selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
119	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu\lambda$): Select survivors among offspring only	b
123	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125	(1+1) ES		offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126	(1+λ) ES		λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127	Termination condition for EA		mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesn't use crossover operators	d
130	(1+1) ES		Operates on population size of two	operates on population size of one	operates on population size of zero	operates on population size of λ	a
131	Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d
Sr.No	Question	Image	a	b	c	d	Correct Answer
	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	What is defuzzification		conversion of fuzzy set	conversion of crisp set	conversion of fuzzy set	conversion of crisp set	a
2	What type of model is required for hard computing		mathematical	biological	chemical	probabilistic	a
3	Which of the following is/are basic component neuron		dendrites	axon	nucleus	all of the above	d
4	Which of the following computing technique has the ability of learning and adoption		neural network	evolutionary	hard	probabilistic	a
5	The truth value of the fuzzy set is		either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
6	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
7	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Eval	defuzzification->rule eval	rule evaluation->fuzzifi	rule evaluation->defuzz	a
8	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
9	Genetic algorithm belong to the family of method in the		artificial intelligence are	optimization area	complete enumeration	Non computer based is	A

10	All of the following are suitable problem for genetic algorithm EXCEPT	pattern recognition	simulation of biological systems	simple optimization with continuous distribution	dynamic process control	C
11	In which stage of the simulation methodology do you determine the variable and gather data	Defining the problem	Constructing the simulation	testing and validating	designing the experiment	B
12	In which stage of the simulation methodology do you determine how long to run the simulation	Defining the problem	Constructing the simulation	testing and validating	designing the experiment	D
13	In which stage of the simulation methodology do you determine the system boundaries and environment?	Defining the problem	Constructing the simulation	testing and validating	designing the experiment	B
14	What BEST describes a simulation model with a limited number of variables, each with the finite number of values?	System dynamics simulation	discrete event simulation	continuous distribution	Monte carlo simulation	B
15	The advantage of visual interactive simulation include all of the following EXCEPT	Improvement & training	reduced need for the qualitative method for simulation models that involve the human workers or communication links	The ability to see how complex interactions affect the system	improved presentation	B
16	What can system dynamics modelling be used for ?	Qualitative method for simulation models that involve the human workers or communication links	micro-level simulation	studying system behaviour	A	
17	In agent-based modelling, agents are	the human workers or communication links	Autonomous rule-based	the hardware platform	C	
18	Agent based modelling is best for all the following types of problem features EXCEPT	complex interactions	low uncertainty	Many inter-related factors	irregular data	B
19	What is the final stage of an agent based modelling(ABM) methodology?	Identifying the agents	Determining agent-relation	Validating agent behaviour	determining the suitability	C
20	Which of the following is the advantage of simulation?	It can incorporate signals	It always result in optimum	Simulation software required	It solves problem in one go	A
21	The truth value of the fuzzy set is	either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
22	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
23	which of the following is a sequence of steps taken in designing a fuzzy logic machine	fuzzification->Rule Evaluation	deffuzzification->rule evaluation	rule evaluation->fuzzification	rule evaluation->defuzzification	a
24	EV is dominantly used for solving	optimization problems	NP problem	simple problems	none of these	a
25	EV is considered as?	adaptive	complex	both a and b	none of these	c
26	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
27	Identify the drawbacks of clustering algorithms? 1) can generate empty clusters 2) can terminate at a local optimum	1,2,3	1,2	3	2,3	b
28	generation of empty cluster problem in clustering can be overcome by?	ACO based clustering	PSO based clustering	kmeans	kmode	b
29	where does PSO based clustering terminates?	global optimum	local optimum	global maximum	local minimum	a
30	Each particle in PSO modifies its position according to ? 1)its velocity 2)its weight 3)its gbest and pbest	2,3	1,2	1,2,3	only 1	c
31	Applications of ACO are ? 1)shortest path 2)assignment problem 3)set problem	2,3	1,2	1,2,3		c
32	Evaporation of pheromones is ?	directly proportional to	inversely proportional to	constant	none	a
33	Metaheuristics doesn't include ?	evolutionary algorithms	tabu searching	simulated annealing	none	d
34	Metaheuristics are ? 1)non deterministic 2)non approximate 3)not problem specific	1,2,3	1,2	1,3	2,3	c
35	In search techniques, as single point based contradicts population based similary deterministic concept	Stochastic	simplex based	complex based	none	a
36	In swarm systems organisations are	centralized	decentralized	controlled by third party	none	b
37	Identify the working sequence of kmean clustering ? 1) redefine cluster centeroids 2)initialize the k means	1,3,2	3,2,1	2,3,1	2,1,3	c
38	Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	a
39	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system	1,2	1,2,3	2,3,4	all of these	d
40	pheromone quantity in ACO is proportional to path selection.	directly	inversely	there is no connection	none	a
41	Recombination involves candidates while mutation requires candidates, and the result is called	1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
42	Identify the correct sequence for evolutionary algorithms ? 1>Select genitors from parent population 2)Evaluate newborn offspring 3>Create offspring 4)replace some parents	1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
43	Problems for which there is no efficient method to solve such problems exactly are called?	complex	hard	strong	none	b
44	EV is considered as ? 1)complex 2)adaptive	1	2	1,2	none	c
45	EV system was proposed for exploring a fitness space and can form	multipieaked,clusters	single peaked,clusters	multipieaked,hard prob	single peaked,hard prob	a
46	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation	1,2	1,2,3	2,3	1,3	b
47	Parameters that affect GA are ? 1)initial population 2)fitness function 3)ability to generate offspring	1,3	1,2	1,2,3	only 1	b
48	—focuses attention on high fitness individuals, thus exploiting the available fitness information.	clustering	offspring production	replace	selection	d
49	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
50	Genetic algorithm are heuristic methods that do not guarantee an optimal solution to a problem	TRUE	FALSE			A
51	A "What-if" model is most typically used for the most structured problems	TRUE	FALSE			B
52	cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solution	none of these	C
53	Discrete events and agent-based models are usually used for	middle or low level of abstraction	high level of abstraction	very high level of abstraction	none of these	A
54	does not usually allow decision makers to see how a solution to a problem evolves over time	Simulation, Complex problem	Simulation,Easy prob	Genetics,Complex problem	Genetics,Easy problem	A
55	is a simulation method that let decision maker see what the model is doing and how it interacts with the real world	VIS	VIM	SIV	HIV	A
56	systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	B
57	Which approach is most suited to complex problem with significant uncertainty, a need for experiments and simulations	Simulation	Optimization	human intuition	genetic algorithm	A
58	Which of the following is the advantage of simulation?	It can incorporate signals	It always result in optimum	Simulation software required	It solves problem in one go	A
59	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurs?	continuous distribution	time dependent simulation	system dynamics simulation	discrete event simulation	B
60	The defining length of a schema is useful to calculate of the schema for	Survival probability,crossover	crossovers,survival probability	crossovers,length	length,crossover	A
61	Recombination involves candidates while mutation requires candidates, and the result is called	1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
62	Identify the correct sequence for evolutional algorithms ? 1>Select genitors from parent population 2)Evaluate newborn offspring 3>Create offspring 4)replace some parents	1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
63	Problems for which there is no efficient method to solve such problems exactly are called?	complex	hard	strong	none	b
64	EV is considered as ? 1)complex 2)adaptive	1	2	1,2	none	c
65	EV system was proposed for exploring a fitness space and can form	multipieaked,clusters	single peaked,clusters	multipieaked,hard prob	single peaked,hard prob	a
66	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation	1,2	1,2,3	2,3	1,3	b
67	Parameters that affect GA are ? 1)initial population 2)fitness function 3)ability to generate offspring	1,3	1,2	1,2,3	only 1	b
68	—focuses attention on high fitness individuals, thus exploiting the available fitness information.	clustering	offspring production	replace	selection	d
69	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
70	Evolution strategies uses ? 1)selection 2)recombination 3)real valued vector	1,2,3	2,3	1,3	only 2	a
71	which of the following statements are true regarding ES ? 1)survival is deterministic 2)first allows the N best individuals to survive	only 1	1,2	only 2	1,2,3	d
72	Evolutionary Algorithms includes ? 1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	3,4	2,3,4	c
73	Heuristics include ? 1)tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	1,2		d
74	Which of the following statements are true ? 1)mutation is applied to two selected candidates, the so-called parents, and results in one or two new candidates, the children 2) recombination is applied to one candidate and results in one new candidate.	only 1	only 2	both	none of these	d
75	The — is performed by selecting two sub trees by chance from the parents and exchange them to create the descendants.	GP crossover	GP Mutation	GP clustering	GP Recombination	a
76	The — is performed by selecting a sub tree of the descendant by chance and to exchange the sub tree with another	GP crossover	GP Mutation	GP clustering	GP Recombination	b
77	are able to learn simple "if (condition) then (action)" style rules 23 by learning from feedback	ES	EA	LCS	Heuristics	c
78	Island model is related with ?	Distributed Evolutionary	LCS	swarm intelligence	ACO	a

79	payoffs can be easily translated to a _____ function for an EA.		survival	reduction	comination	fitness	d
80	Identify the correct statements with respect to genetic algorithms? 1)A fitness function should maximized. 2)A replacement procedure. 3)A string representation of chromosomes.		1,2	2,3	1,2,3	1,3	b
81	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
82	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
83	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
84	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
85	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
86	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
87	For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
88	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c
89	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
90	The values of the set membership is represented by		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
91	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)						c
92	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification \rightarrow Rule ev	Fuzzification \rightarrow Defuz	Rule evaluation \rightarrow Fuzz	Rule evaluation \rightarrow Defuz	a
93	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cap B)'(x)$ will be			(0.9, 0.5, 0.6, 0.8, 0.8)	(0.6, 0.2, 0.1, 0.7, 0.5)	(0.1, 0.5, 0.4, 0.2, 0.2)	(0.1, 0.5, 0.4, 0.2, 0.3) c
94	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x,y} z (\min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to			(0.5,12), (0.6,13), (1,14)	(0.5,12), (0.6,13), (1,14)	(0.3,12), (0.5,13), (0.5,14)	(0.3,12), (0.5,13), (0.6,14) d
95	$A \cup (B \cap C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cap B) \cap C$	$(A \cap B) \cap (A \cap C)$	$B \cap A \cap C$	b
96	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be			(0, 1, 2, 3, 4, 5, 6, 7, 8, 9)	(1, 2, 3, 4, 5, 6, 7, 8, 9)	(2, 3, 4, 5, 6, 7, 8, 9, 10)	None of the above c
97	The fuzzy proposition "If X is E then Y is F" is a		conditional unqualified	unconditional unqual	conditional qualified p	unconditional qualified q	a
98	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A, B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
99	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
100	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise and accurate result	ANN gives accurate result	In each, no precise result	Fuzzy gives exact result	c
101	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
102	---- defines logic funtion of two prepositions		prepositions	Linguistic hedges	truth tables	inference rules	c
103	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
104	Multiple conjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
105	Multiple disjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
106	If x is A and y is B then $z=c$ (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
107	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set	convex fuzzy set	concave fuzzy set	b
108	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
109	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sugani-type	c
110	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
111	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)-selection based on the children only ($\mu+\lambda$)-selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
112	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)-selection based on the children only ($\mu+\lambda$)-selection based on both the set of parent and children	Children replace the parent	All the mentioned	b

113	In Evolutionary programming, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
114	In Evolutionary strategy, recombination is		does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
115	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
116	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
117	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
118	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
119	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	(μ,λ): Select survivors among offspring only	b
120	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
121	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
122	(1+1) ES		offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
123	(1+ λ) ES		λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
124	Termination condition for EA		maximally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
125	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
126	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming does not use crossover operators	d
127	(1+1) ES		Operates on population size of two	operates on population size of one	operates on population size of zero	operates on population size of λ	a
128	Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
129	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
130	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

	Name of subject: SCOA					
	Unit No: 1 Introduction					
Sr. No.	Question	Option A	Option B	Option C	Option D	Ans
1	Core of soft Computing is	Fuzzy Computing, Neural Computing, Genetic Algorithms	Fuzzy Networks and Artificial Intelligence	Artificial Intelligence and Neural Science	Neural Science and Genetic Science	A
2	Who initiated the idea of Soft Computing	Charles Darwin	Lofti A Zadeh	Rechenberg	Mc_Culloch	B
3	Fuzzy Computing	mimics human behaviour	doesn't deal with 2 valued logic	deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic	All of the above	D
4	Neural Computing	mimics human brain	information processing paradigm	Both (a) and (b)	None of the above	C
5	Genetic Algorithm are a part of	Evolutionary Computing	inspired by Darwin's theory about evolution - "survival of the fittest"	are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics	All of the above	D
6	What are the 2 types of learning	Improvised and unimprovised	supervised and unsupervised	Layered and unlayered	None of the above	B
7	Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols whereas soft computing is based on empirical data	Both (a) and (b)	None of the above	C

8	Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.	TRUE	FALSE	Can't say	None of the above	A
9	The membership functions are generally represented in	Tabular Form	Graphical Form	Mathematical Form	Logical Form	B
10	Membership function can be thought of as a technique to solve empirical problems on the basis of	knowledge	examples	learning	experience	D
11	Three main basic features involved in characterizing membership function are	Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	Core, Support , Boundary	Weighted Average, center of Sums, Median	C
12	The region of universe that is characterized by complete membership in the set is called	Core	Support	Boundary	Fuzzy	A
13	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy sets	convex fuzzy set	concave fuzzy set	B
14	In a Fuzzy set a prototypical element has a value	1	0	Infinity	Not Defined	A
15	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy sets	concave fuzzy set	sub normal fuzzy sets	convex fuzzy set	C
16	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	non-concave fuzzy set	non-convex fuzzy set	A

17	The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.	convex fuzzy set	concave fuzzy set	non-concave fuzzy set	non-convex fuzzy set	D
18	The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to	infinite	1	0	0.5	D
19	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	None of the above	D
20	Presence of false minima will have what effect on probability of error in recall?	directly	inversely	no effect	directly or inversely	A
21	How is effect false minima reduced	deterministic update of weights	stochastic update of weights	deterministic update of weights or stochastic update of weights	None of the above	B
22	Is Boltzman law practical for implementation?	Yes	No	Can't say	None of the above	B
23	For practical implementation what type of approximation is used on boltzman law?	max field approximation	min field approximation	hop field approximation	None of the above	D
24	What happens when we use mean field approximation with boltzman learning?	it slows down	it get speeded up	nothing happens	either speeds up or speeds down	B
25	Approximately how much times the boltzman learning get speeded up using mean field approximation	05 to 10	10 to 30	30 to 50	50 to 70	B
26	False minima can be reduced by deterministic updates?	Yes	No	None of this	Both A and B	B
27	In boltzman learning which algorithm can be used to arrive at equilibrium?	Mean field	Hop field	Hebb field	None of the above	D
28	Boltzman learning is a	Fast process	Slow process	Steady process	None of the above	B

29	How are input layer units connected to second layer in competitive learning networks	Feedforward manner	Feedback manner	Feedforward and feedback	Feedforward or feedback	A
30	Which layer has feedback weights in competitive neural networks	Input	Second	Both (a) and (b)	None of the above	B
31	What consist of competitive learning neural networks	Feedforward manner	Feedback manner	either Feedforward or feedback	Combination of Feedforward and feedback	D
32	What conditions are must for competitive network to perform pattern clustering?	non linear output layers	connection to neighbours is excitatory and to the farther units inhibitory	on centre off surround connections	none of the mentioned fulfils the whole criteria	D
33	What conditions are must for competitive network to perform feature mapping?	non linear output layers	connection to neighbours is excitatory and to the farther units inhibitory	on centre off surround connections	none of the mentioned fulfils the whole criteria	D
34	If a competitive network can perform feature mapping then what is that network can be called	self excitatory	self inhibitory	self organization	None of the above	C
35	How is weight vector adjusted in basic competitive learning	such that it moves towards the input vector	such that it moves away from input vector	such that it moves towards the output vector	such that it moves away from output vector	A

Name of subject: SCOA	
Unit No: 3 Fuzzy System	

Sr. No.	Question	Option A	Option B	Option C	Option D	Ans
1						
2	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-Type and Semigi-Type	Mamdani-Type and Sugeno-Type	Mihni-Type and Sujgani-Type	C
3	Where Has Fuzzy Inference Systems Been Implemented?	Wireless services, heat control and printers	Restrict power usage, telephone lines and sort data	Simulink, boiler and CD recording	Automatic control, decision analysis and data classification	D
4	<u>What Is Another Name For Fuzzy Inference Systems?</u>	Fuzzy Expert System	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	D
5	<u>Mamdani's Fuzzy Inference Method Was Designed To Attempt What?</u>	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a television and remote combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and feul level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	C
6	<u>What Is The First Step Of Fuzzy Logic Toolbox?</u>	Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator (AND or OR) in the antecedent	Aggregation of the consequents across the rules	A
7	<u>What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?</u>	The input is a single truth value and the output has two or more values	The input is a value greater than one and the output is a value less than the input	The input and output have both the same values	The input has two or more values and the output has a single truth value	D
8	What Is The Equation For Probabilistic?	$\text{Probor}(a,b) = a \cdot b + ab$	$\text{Probor}(a,b) = ab + ab$	$\text{Probor}(a,b) = a+b - ab$	$\text{Probor}(a,b) = a/b \times ab$	C
9	<u>What Is The Input And Output Of Step 3 - Apply Implication Method?</u>	Input is a fuzzy set but the output is a whole value	Input is a whole value but the output can be a fuzzy set	Input and output have the same value	Input is a smaller value than the output value	B

10	What Is The Purpose Of Aggregation?	To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	A
11	What is correct about Expert systems?	Solve problems too difficult for human experts	Are based on DO WHILE rules	Work in very limited domains	Share characteristics with mainframe computing	C
12	Virtually all expert systems deal with problems of ?	policy development	classification	logic and control	high complexity	B
13	Which module stores IF-THEN rules provided by experts?	Fuzzification Module	Knowledge Base	Inference Engine	Defuzzification Module	B
14	Which module transforms the Fuzzy set obtained by the Inference Engine into a crisp value?	Fuzzification Module	Knowledge Base	Inference Engine	Defuzzification Module	D
15	Which module transforms the system inputs, which are crisp numbers, into fuzzy sets?	Fuzzification Module	Knowledge Base	Inference Engine	Defuzzification Module	A
16	What are the models of fuzzy approximate reasoning?	Categorial reasoning and Qualitative reasoning	Syllogative reasoning	Dispositional reasoning	All of the above	D
17	In Fuzzy logic what is allowed to be Fuzzy Preposition?	Antecedents	Consequents	Both A and B	None of the Above	C
18	In which fuzzy approximate reasoning model antecedents with fuzzy quantifiers are related to inference rules?	Categorial reasoning	Qualitative reasoning	Syllogative reasoning	Dispositional reasoning	C
19	Fuzzy Computing____?	mimics human behaviour	doesnt deal with 2 valued logic	deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic	All of the above	D

		Tabular Form	Graphical Form	Mathematical Form	Logical Form	
20	The membership functions are generally represented in _____?					B
21	The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to ?	Infinite	0	0.5	1	C
22	Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.	AND	OR	NOT	All of the above	D
23	There are operators, more linguistic in nature , called _____ that can be applied to fuzzy set theory.	Hedges	Lingual Variable	Fuzzy Variable	None of the Mentioned	A
24	What is the reason that logic function has rapidly become one of the most successful technology for developing sophisticated control systems?	Fuzzy logic applies the concept of 'certain degree' which is similar to the way human beings think.	Instead of just being either true or false, fuzzy logic can be true partially and also false partially at the same time.This is similar to the human mind.	Fuzzy logic can uses exact points representing to what degree an event occurs and with fuzzy rules it generates precise outcomes.	All of the above	D
25	What is correct sequence of steps taken in designing a Fuzzy logic machine?	Fuzzification-> Rule Evaluation-> Defuzzification	Rule Evaluation->Fuzzification->Defuzzification	Fuzzification->Defuzzification->Rule Evaluation	None of the Mentioned	A
26	What is the principle of Adaptive System?	FIFO	DIRO	RIDO	LIFO	B
27	Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.	TRUE	FALSE	Can't say	None of the above	A

28	In a Fuzzy set a prototypical element has a value?	0	1	Infinite	Not defined	A
29	How many main parts are there in Fuzzy Logic Systems Architecture?	3	4	5	6	B
30	The truth values of traditional set theory is _____ and that of fuzzy set is	Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Between 0 & 1, between 0 & 1	A
31	In Relational databases exists fuzzy relational databases.	TRUE	FALSE	Can't say	None of the above	A
32	What is Fuzzification?	Conversion of crisp input to fuzzy set	Control input into a single crisp value	None of this	Both A and B	A
33	What is Defuzzification?	Control input into a single crisp value	Conversion of crisp input to fuzzy set	None of this	Both A and B	A
34	What are various methods of decomposition of rules?	Conditional statement	Nested If-Then	Both A and B	None of this	C
35	What are methods of Fuzzy Inference System?	Mamdani FIS	Sugeno FIS	Both A and B	None of this	C
36	What are different models of fuzzy reasoning?	Categorial, Qualitative, Syllogistic, Dispositional	Categorial, Qualitative, Disjunctive	Categorial, Qualitative,Negative	None of this	A
37	How many steps for computing Mamdani FIS?	3	4	6	8	B
38	Membership function can be thought of as a technique to solve empirical problems on the basis of	knowledge	Example	Learning	Experience	D
39	The region of universe that is characterized by complete membership in the set is called	Core	Support	Boundary	Fuzzy	A
41	A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$	Core	Support	Cross over	alpha cut	C

42	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	A
43	The room tem&erature is hot. here the hot (use of linguistic variable is used)is represented by	Fuzzy set	Crisp set	Can't say	None of the above	A
44	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	Convex fuzzy set	Non Concave fuzzy set	Non Convex fuzzy set	Concave fuzzy set	A
45	A fuzzy set wherein no membership function has its value equal to 1 is called	Normal fuzzy set	Subnormal fuzzy set	Convex fuzzy set	Concave fuzzy set	B
46	What are the aggregation rule/s?	Conjuctive rules	Disjunctive rules	Both A and B	None of this	C
47	The rule base module contain.....?	Conjuctive rules	Disjunctive rules	If-Then Rules	None of this	C

Name of subject: SCOA
Unit No: 4 Evolutionary Computing

Sr. No.	Question	Option A	Option B	Option C	Option D	Ans
1	Genetic Algorithm are a part of	Evolutionary Computing	Inspired by Darwin's theory about evolution - "survival of the fittest"	Are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics	All of the above	D
2	concept of variational inheritance	Offspring closely resembles their parents	Offsprings are identical	Offspring closely resembles their parents but are not identical	Both (A) and (B)	C
3	One way to describe an individual in Evolutionary system is	Fixed length vector of L feature	Fixed length Array of L feature	Fixed length List of L feature	A or B	A
4	To specify a geno/phenospace, we need to define	Low of motion	Low of gravity	Both A and B	None of th above	A
5	Randomly selecting a candidate for deletion from the current population using a uniform probability and keeping either candidate or the offspring depending on	One has lower fitness	One has higher fitness	Can't say	None of the above	B
6	Randomly selecting a candidate for deletion from the current population using a uniform probability and keeping	candidate	offspring	Either candidate or offspring	candidate and offspring	C
7	The fitness of the individual is computed using	Objective Fitness	Nothing	Can't say	None of the above	A
8	Offspring is priduced by	Mutating a parent	crossover	selection	All of the above	A
9	How many gene in every individual is muted ?	Zero	One	Two	Three	B

10	If there are L genes, each gene has an independent probability of _____ of being selected to undergo a mutation.	L	2L	1/L	1+L	C
11	In Evolutionary system return the individual with	With highest global objective	With lowest global objective fitness	With highest local objective fitness	With lowest local objective fitness	A
12	Who produce the an Evolutionary System?	Darwin	Swell Wright	Can't say	None of the above	B
13	Evolutionary system is used for	To solve Optimization problem	To solve complex computer based problem	Both A and B	None of the above	A
14	Evolutionary system viewed as a tool for achieving a goal of	Machine Learning	Artificial Intelligence	Data Mining	Data Analytics	B
15	Evolutionary process is capable of dealing with	Uncertain Environment	Changing Environment	Both A and B	none of th above	C
16	To implement a simple EA, many design decision need to take	Population Management issues	Mechanism for Selecting Parent	Producing offspring	All of the above	D
17	In Evolutionary programming, both the parents and children are combined into the population of size 2N to produce next generation offspring of size	2N	N	N-1	N+1	B
18	Types of reproduction are	Sexual reproduction	Asexual reproduction	Both A and B	None of the above	C
19	Sexual reproduction involves	Two parents combining to form offspring via recombination operator such as crossover	Two parents combining to form offspring via recombination operator such as mutation	Single parent with mutation operator	Single parent with crossover operator	A
20	Asexual reproduction involves	Two parents combining to form offspring via recombination operator such as crossover	Two parents combining to form offspring via recombination operator such as mutation	Single parent with mutation operator	Single parent with crossover operator	C

UN

IT

-

3

1.

Fuzziness means

a)Vagueness

b)Clear c)Precise d)Certainty

2.

are pictorial representations to denote a set

a)Flow chart

b)Venn diagram

c)DFD d)ER diagrams

3.

The number of elements in a set is called its

a)modality b)placticity

c)Cardinality

d)elasticity

4.A set with a single element is called

a)Single set

b)Singleton set

c)1 set d)none

5.A

of a set A is the set of all possible subsets that are derivable from A including null set

a)Power set

b)Impower set c

)Rational set

d)Irrational set

6.

The member ship function of fuzzy set not always be described by

a)continuous

b)Discrete

c)crisp d)specific

7.

Fuzzy relation is a fuzzy set defined on the Cartesian product of

--

a)single set

b)crisp set

c)union set d)intersection set

8.

Raising a fuzzy set to its second power is called

a)concentration

b)intersection c)conjunction d)disjunction

9.Taking a square root of fuzzy

set is called

a)Dilemma

b)

Dual c)dialama d)none

10.Fuzzy relation associates

to a varying degree of membership.

a)records

b)tuples

c)felds d)none

11.In case of =

> operator, the proposition occurring before the “=>” symbol is called

a. antecedent

b.consequent c.conjunction d.disjunction

12. A truth table comprises rows known as

a. interpretations

b.contradiction c.conjunction d.disjunction

13.A formula which has all its interpretations recording true is known as a

a.

disjunction b.conjunction

c.tautology

d.antecedent

14.In propositional logic,

widely used for inferring facts.

a.pones b.modus

c.modus ponens

d.pons

15.

represent objects that do not change values

a.constants

b.variables c.predicates d.subject

16.

are representative of associations between objects that are constants or variables and

acquire truth values.

- a.Subject
- b.Predicate**
- c.Quantifier d.Functions

17.

truth values are
multivalued.

- a.crisp logic b.boolean logic

c.fuzzy logic

- d.none

18.Fuzzy logic propositions are also quantified by

- a.fuzzy b.fuzzy qualifiers

c.fuzzy quantifiers

- d.none

19.Fuzzy inferenc

e also referred to as

a.approximate reasoning

- b.reasoning c.fixed reasoning d.none

20.

Conversion of a fuzzy set to single crisp value is called

a.fuzzification

- b.defuzzification c.fuzzy logic

- d.fuzzy rule

21.

obtains centre
of area occupied by the fuzzy set

- a.center

b.center of gravity

- c.center of area d.center point

22.The

is the arithmetic average of mean values of all inte
rvals

- a.mean

b.mean of maxima

- c.maximum d.mean interval

23.The

are obtained by computing the minimum of the membership functions of the
antecedents.

a.rule base

- b.rule strengths c.rules d.none

24.

Relative quantifiers are defined as

----- a.0 to 10

b.0 to 1

c.0 d.1

25.Fuzzy cruise controller has

inputs

a.2

b.3 c.1 d.0

PART

-

A

1.Hybrid systems is combination of neural networks, fuzzy logic and

a.Genetic Algorithm

b.Genetic Programming c.Genetic d.none

2.In

, one technology calls the other as a subroutine to process or manipulate information needed by it.

a.Auxiliary hybrid systems

b

.Embedded hybrid systems

c.sequential hybrid systems d.none

3.

hyrbid systems make use of technologies in a pipeline fashion.

a.auxialiry hybrid systems b.embedded hybrid systems

c.sequential hybrid systems

d.none

4.

hyrbid systems the technologies participating are integerated in such a manner that they appear interwined.

a.auxialiry hybrid systems

b.embedded hybrid systems

c.sequential hybrid systems

d.none

5.

deals with uncertainty problems with its own merits and demerits

a.neuro

-

fuzzy

b.neuro

-

genetic c.fuzzy

-

genetic d.none

6.Neural network can learn various tasks from

a.training

b.t

esting c.learning d.none

7.

exhibit non

-
linear functions to any desired degree of accuracy

a.neuro

-

fuzzy b.neuro

-

genetic

c.fuzzy

-

genetic

d.none

8.

use to determine the weights of a
multilayer feedforward network with
backpropagation learning

a.neuro

-

fuzzy

b.neuro

-

genetic

c.fuzzy

-

genetic d.none

9.

fuzzy input vectors to crisp outputs

a.Fuzzy

-

backpropagation

b.neuro

-

fuzzy c

.neuro

-

genetic d

.fuzzy

-

genetic

10.

is a neuro

-

fuzzy hybrid in which the host is a recurrent network with a kind of competitive learning.

a.Fuzzy ARTMAP

b.Fuzzy art

c.ARTMAP
d.none

11.FAM Stands for

a.

Fuzzy Associative Memory

b.Fuzzy association memory

c.Fuzzy Assist Memory

d.none

12.

maps fuzzy sets and can encode fuzzy rules.

a.FAM

b.Fuzzy

c.ART d.none

13.Fuzzy truck backer

-

upper system is application of

a

.FAM b.Fuzzy ART c.ART d.none

14.

applicable on fuzzy optimization problems

a.Fuzzy

-

genetic

b.neuro

-

fuzzy c.fuzzy

- logic d.fuzzy

- backpropagation

15.

learning have reported
difficulties in learning the topology of the networks whose
weights they optimize

a.Gradient descent learning

b.descent learning c.Gradient learning d.none

16.

Applying neuronal learning capabilities to fuzzy systems is knowns as

a.NN driven fuzzy reasoning

b.fuzzy driven nn reasoning

c.neural network reasoning

d.none

17.

can be applicable to mathematical relationship

a. neuro

-

fuzzy

b.fuzzy

-

neuro c.neuro

-

network d.none

18.

is a multilayer feedforward network architecture with gradient learning.

a.backpropagation

b.forward propagation c.Propagation d.none

19. Recurrent network architectures adopting

a.hebbian learning

b.supe

rvised learning c.unsupervised learning d.reinforced learning

20.

set have no crisp boundaries

a.fuzzy

b.boolean c.crisp set d.none

21.GA

-

NN also known as

a.GANN

b.NNGA c.GA d.none

22.lma

ge recognition under noisy is application of

a.Fuzzy

b.Fuzzy art

c.art d.none

23.Genetic algorithm

uses to determine

optimization **a.fitness function**

b.fit function

c.strength function

d.none

24.

proposed neu

ro

-

fuzzy system

a.lee and lie

b.kosko c.gradient d.lee

25.Knowledge

-

based evaluation and earthquake damage evaluation is application of

a.fuzzy

-

backpropagation

b.neuro

-

fuzzy c.fuzzy d.none

Subject: Soft computing Optimization Algorithm

Unit-4 Evolutionary Computing

1. Which of the following is not a discrete optimization problem?

- A Travelling salesman problem
- B Robot control
- C Chess playing program
- D Prediction of stock prices

Ans: B

Explanation: Robot control is controller system

2. Which of the following are discrete optimization problems?

- A Travelling salesman problem
- B Prediction of stock prices
- C Chess playing program
- D All of above

Ans: D

Explanation: All are applications of GA or EA

3. Exploration search is

- A Concerned with improving the current best solution by local search
- B Concerned with global search
- C Often resulting in getting stuck in local optima
- D None of above

Ans: B

Explanation: Exploitation means using already exist solutions and make refinement to it so it's fitness will improve

4. Evolutionary algorithm: Initialization

- A Individuals are normally generated randomly
- B Is concerned with generating candidate solutions
- C Heuristics for generating candidates can be applied
- D All of above

Ans: D

Explanation: All above are true

5. Evolutionary algorithm: Variation operators

- A Is a selection operator
- B Act on population level
- C Act on individual level
- D Are crossover and mutation

Ans: B, D

Explanation: variation operations are crossover and mutation

6. Evolutionary algorithm: Recombination

- A Also known as crossover

B Combines elements of two or more genotypes

C Also known as mutation

D Also known as representation

Ans: A, B

Explanation: Recombination is also known as crossover

7. Evolutionary algorithm: Survivor selection

A Is often stochastic

B Also known as replacement

C Can be fitness based

D Can be age based

Ans: B,C,D

Explanation: Survivor selection can be based on fitness value, age

8. Evolutionary algorithm: Termination condition

A Several termination criteria can be combined

B Determines when to compute the fitness for a population

C Should be avoided to get faster evolution

D None of above

Ans: A

Explanation: Termination conditions like max iteration, time out, no change in fitness can be combined

9. Evolutionary algorithm: Termination condition

A None of above

B Determines when to compute the fitness for a population

C Is checked in every generation

D Should be avoided to get faster evolution

Ans: C

Explanation: checked after every iteration to end the search

10 Tree representation (choose multiple)

A Is used in Genetic Programming

B Mutation results in replacing a randomly chosen subtree by a randomly generated tree

C Not suited for representing computer programs

D Is used in Genetic Algorithms

Ans: A,B

Explanation: Suitable for GP to generate computer programs

11 Rank based selection

A Results in less control of the selection pressure than fitness-proportionate selection

B Use absolute rather than relative fitness

C Ranking can be either linear or non-linear

D None of above

Ans: C

Explanation: Chromosomes are ranked based on fitness value

12 Simple Genetic Algorithm (GA) (choose multiple)

A Children compete with parents in survival selection

B Both crossover and mutation are applied in each generation

C The whole population is replaced with the resulting offspring

D All of above

Ans: B,C

Explanation: Whole population get replaced with new child

13 Evolutionary Strategies (ES)

A (μ , λ): Select survivors among parents and offspring

B ($\mu+\lambda$): Select survivors among parents and offspring

C ($\mu-\lambda$): Select survivors among offspring only

D ($\mu:\lambda$): Select survivors among offspring only

Ans: B

Explanation: The form of $(\mu + \lambda)$ -ES models in which μ specified the size of the parent population and λ specified the size of the offspring population

14 What is most important to be concerned with in the evolution of repetitive problems?

A Do multiple runs until a good solution is found

B Execute one run until the solution is good enough

C Get a reasonably good solution every time

D Get a very good result just once

Ans: C

Explanation: Iterative process looking for good solutions in every iterations

15. What are normally the two best measurement units for an evolutionary algorithm?

A Number of Generations

B Elapsed time

C CPU time

D Population size

Ans: A, B

Explanation: CPU time is hardware dependent and number of population specifies size of search area.

16. What are normally the two best measurement units for an evolutionary algorithm?

A Number of evaluations

B Elapsed time

C CPU time

D Number of generations

Ans: B, D

Explanation: CPU time is hardware dependent and number of evaluations is not important

17 Tree representation (choose multiple)

A Is used in Genetic Programming

B Mutation results in replacing a randomly chosen subtree by a randomly generated tree

C Suited for representing computer programs

D All of above

Ans: D

Explanation: Suitable for GP to generate computer programs

18 Simple Genetic Algorithm (GA)

A Fitness get evaluated at the end of every iteration

B Both crossover and mutation are applied in each generation

C The whole population is replaced with the resulting offspring

D All of above

Ans: D

Explanation: Recombination-evaluation- replacement are steps of GA

19. In Evolutionary Strategy , individuals are represented as

- a. real value
- b. Binary
- c. tree
- d. Octal

Ans. A

Explanation: The focus of the evolution strategy (ES) paradigm was on real-valued function optimization. Hence, individuals were naturally represented as vectors of real numbers.

20. In early EA or ES, parent selection is based on

- a. Roulette Wheel
- b. Order of fitness
- c. Probabilistic normal distribution
- d. All of above

Ans: c

Explanation: parent selection is based on Probabilistic normal distribution

21. In EP, population is the combination of parent and child

- a. True
- b. False

Ans: a

Explanation: The evolutionary programming (EP) paradigm concentrated on models involving a fixed-size population of N parents, each of which produced a single offspring.

The next generation of N parents was determined by combining both parents and children into a single population of size $2N$, rank ordering them by fitness and allowing only the top N to survive.

22. In GA, population is the combination of Parent and child

- a. True
- b. False

Ans: b

Explanation: parent gets replaced by child

23. In EA, the new offspring is forced to compete immediately for survival against an existing member of the population

- a. True
- b. False

Ans: a

Explanation: If the objective fitness of the child is greater than the selected member, the child survives and the old member dies off. Otherwise, the child dies without ever residing in the population.

24 In EA, the entire parent population dies off each generation and the offspring only compete with each other for survival

- a. non-overlapping models
- b. overlapping models

Ans: a

Explanation: As per definition

25 In EA, offspring compete with each other and parents for survival

- a. non-overlapping models
- b. overlapping models

Ans: b

Explanation: As per definition

26. In EA, premature convergence takes place due to

- a. Survival selection pressure
- b. Selection method
- c. Complexity of problems
- d. too much exploitation

Ans: d

Explanation: For problems that exhibit highly multi-modal (rugged) fitness landscapes or landscapes that change over time, too much exploitation generally results in premature convergence to suboptimal peaks in the space.

27. In EA, offspring compete with parent or other offspring is called...

- a. Survival Selection
- b. Tournament Selection
- c. Competition
- d. None of above

Ans: a

Explanation: As per the definition

28. In EV, $(\mu+\lambda)$ model is supported by

- a. Evolutionary Strategy
- b. Evolutionary Programming
- c. Evolutionary Algorithms
- d. All of Above

Ans: a

Explanation: The form of $(\mu + \lambda)$ -ES models in which μ specified the size of the parent population and λ specified the size of the offspring population

29. In EC, following are the selection methods

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. All are above

Ans: d

Explanation: These are non-overlapping generation modules

30. In EC, following are the selection methods

- a. Rank-Proportional Selection
- b. Tournament Selection
- c. Fitness-Proportional Selection
- d. All of above

Ans: d

Explanation: These are non-overlapping generation modules

31. In EC, genotype is selected based on maximum fitness value is called

- a. Uniform (Neutral) Selection

- b. Fitness-Biased Selection
- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: b

Explanation: As per the definition

32. In EC, only the k most fit individuals are selected from a pool of individuals of size $r > k$ is ..

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: c

Explanation: As per the definition

33. In EC, selection based on sorting the members of a selection pool by fitness is ...

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: d

Explanation: As per the definition

34. In EC selection, picking q individuals from the selection pool using a uniform probability distribution with replacement and designating the winner of that tournament as the one with the best fitness is

- a. Rank-Proportional Selection
- b. Tournament Selection
- c. Fitness-Proportional Selection
- d. Fitness_biased

Ans: b

Explanation: As per the definition

35. The difference between rank proportional and tournament selection is that genotypes are sorted in order to fitness value in rank proportional

- a. True
- b. False

Ans: a

Explanation: A potential computational disadvantage to truncation and linear ranking selection methods is that they require the selection pool to be sorted by fitness.

36. The difference between truncation and tournament selection is that genotypes are sorted in order to fitness value in truncation proportional

- a. True
- b. False

Ans: a

Explanation: A potential computational disadvantage to truncation and linear ranking selection methods is that they require the selection pool to be sorted by fitness.

37. In EA, recombination operation on p1: AB|CD and p2: ab|cd produces

- a. ABab

- b. ABcd
- c. ABCD
- d. abCD

Ans: b

Explanation: Recombination operation in EA is crossover here at point 2

38. In EA, recombination operation on p1: ABC|DEF and p2: abc|def produces

- a. ABCabc
- b. ABCdef
- c. ABCDef
- d. abcDEF

Ans: b

Explanation: Recombination operation in EA is crossover here at point 3

Note: In evolutionary algorithms two parents produces single child, whereas in GA two parent produces 2 children.

39. In EA, recombination operation on p1: AB|CD|EF and p2: ab|cd|ef produces

- a. ABcdEF
- b. abCDEF
- c. ABCDef
- d. abcDEF

Ans: a

Explanation: Recombination operation in EA is crossover here at point 2 and 4

40. In EA, recombination operation on p1: A|BCDE|F and p2: a|bcde|f produces

- a. ABcdEF
- b. abCDEF
- c. AbcdeF
- d. abcDEF

Ans: c

Explanation: Recombination operation in EA is crossover here at point 2 and 4

41. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 1122 produces

- a. ABcd
- b. abCD
- c. ABCD
- d. abcd

Ans: a

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

42. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 2211 produces

- a. ABcd
- b. abCD
- c. ABCD
- d. abcd

Ans: b

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select

parent 1 and two for parent 2

43. In EA, recombination operation on p1: ABCDEF and p2: abcdef with flip sequence 221122 produces

- a. ABcdcd
- b. abCDef
- c. ABCDef
- d. abcdEF

Ans: b

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

44. In EA, recombination operation on p1: ABCDEF and p2: abcdef with flip sequence 112211 produces

- a. ABcdEF
- b. abCDef
- c. ABCDef
- d. abcdEF

Ans: a

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

45. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 1212 produces

- a. ABcd
- b. abCD
- c. AbCd
- d. abcd

Ans: c

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

46. In EA , parent selection and survival selection is same

- a. True
- b. False

Ans: b

Explanation: Offspring compute with parent or other offspring for survival is called survival selection

47. In Evolutionary Algorithm, the whole population is replaced with the resulting offspring

- a. True
- b. False

Ans: b

Explanation: population is combination of parents and offspring

48 Simple Evolutionary Algorithm (EA) (choose multiple)

A Children compete with parents in survival selection

B Both crossover and mutation are applied in each generation

C The whole population is replaced with the resulting offspring

D All of above

Ans: A, B

Explanation: population is combination of parents and offspring hence survival selection occurs

49. In EA, ----asexual operation is

- a. representation
- b. Recombination
- c. Mutation
- d. none of above

Ans: c

Explanation: Mutation is performed on single parent only

50. In EA, ----sexual operation is

- a. representation
- b. Recombination
- c. Mutation
- d. none of above

Ans: b

Explanation: Recombination (crossover) is performed on two parents

This sheet is for 1 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions clearly	Cannot Distinguish two regions clearly	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguos	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neural computing,Genetic algorithm	Fuzzy network and artificial intelligence	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard bertrand	mc culloch	lofti a zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behaviour	deals with imprecise,probabilistic	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computing	conventional computing	non conventional computing	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behaviour	information processing paradigm	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search represents a guided approach while optimization is unguided	Blind search usually does not conclude in one step like some optimization methods.	Blind search cannot result in optimal solution whereas some optimization methods do	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can only be determined by an exhaustive enumeration testing of alternatives	a solution found in the least possible time and using the least possible computing resources	a solution that is the best based on criteria defined in the design phase	a solution that requires an algorithm for the determination	C
17	When is a complete enumeration of solution used?		When a solution that is "good enough" is fine and good heuristics are available	When there is enough time and computational power available	When the modeler requires a guided approach to problem solving	When there are an infinite number of solutions to be searched	B
18	All of the following are true about heuristics EXCEPT		heuristics are used when the modeler requires a guided approach to problem solving	heuristics are used when a solution that is "good enough" is sought	heuristics are used when there is abundant time and computational power	heuristics are rules of good judgement	C
19	Which approach is most suited to structured problem with little uncertainty		Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
21	What does the 0 membership value mean in the set		the object is fully inside the set	the object is not in the set	the object is partially present in the set	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a

23	The process of fuzzy interference system involves	membership functions	fuzzy logic operators	if-then rules	all the above	d
24	What does a fuzzifier do	converts crisp input to linguistic variables	converts crisp output to linguistic variables	converts fuzzy input to linguistic variables	converts fuzzy output to linguistic variables	a
25	Which of the following is not defuzzifier method	centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method	mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have	multiple part of antecedent, only single part of consequent	only single part of antecedent, multiple part of consequent	multiple part of antecedent, multiple part of consequent	only single part of antecedent, only single part of consequent	c
28	The a cut of a fuzzy set A is a crisp set defined by :-	$\{x u_A(x) > a\}$	$\{x u_A(x) \geq a\}$	$\{x u_A(x) < a\}$	$\{x u_A(x) \leq a\}$	b
29	The bandwidth(A) in a fuzzy set is given by	$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1/x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ B = $\{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?	$\{0/a, 0.7/b, 0.8/c, 0.2/d, 1/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.2/d, 1/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.7/d, 1/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 1/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ B = $\{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of AUB?	$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0.2/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.5/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.8/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ B = $\{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B ?	$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 1/e\}$	a

34	What denotes the support(A) in a fuzzy set?	$\{x u_A(x) > 0\}$	$\{x u_A(x) < 0\}$	$\{x u_A(x) \leq 0\}$	$\{x u_A(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?	$\{x u_A(x) > 0\}$	$\{x u_A(x) = 1\}$	$\{x u_A(x) \geq 0.5\}$	$\{x u_A(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designing a fuzzy logic machine	fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation>fuzzification>defuzzification	rule evaluation->defuzzification->fuzzification	a
38	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
39	Genetic algorithm belongs to the family of methods in the	artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
40	All of the following are suitable problems for genetic algorithm EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
41	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
43	mutation is applied on candidates.	one	two	more than two	none of these	a
44	recombination is applied on candidates.	one	two	more than two	none of these	b
45	LCS belongs to ___ based methods?	rule based learning	genetic learning	both a and b	none of these	a
46	Survival is ___ approach.	deterministic	non deterministic	semi deterministic	none of these	a

47	Evolutionary algorithms are a _____ based approach	heuristic	metaheuristic	both a and b	none of these	a
48	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by	Fredrik	Fogel	Frank	Flin	b
54	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
56	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover	discrete and intermediate	discrete and continuous	continuous and intermediate	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested.		1			B
61	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solution	none of these	c
62	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
63	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.	Simulation, Complex problem	Simulation, Easy problem	Genetics, Complex problem	Genetics, Easy problem	A
64	EC stands for?	Evolutionary Computations	Evolutionary computer	Electronic computations	none of these	a
65	GA stands for	genetic algorithm	genetic assurance	genetic algorithm	none of these	a
66	LCS stands for	learning classes system	learning classifier systems	learned class system	none of these	b
67	GBML stands for	Genetic based Machine learning	Genetic based mobile learning	Genetic based machine learning	none of these	c
68	EV is dominantly used for solving _____.	optimization problems	NP problem	simple problems	none of these	a
69	EV is considered as?	adaptive	complex	both a and b	none of these	c
70	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
72	Parameters that affect GA	initial population	selection process	fitness function	all of these	d

73	Fitness function should be		maximum	minimum	intermediate	none of these	b
74	Evolutionary algorithms are a ___ based approach		heuristic	metaheuristic	both a and b	none of these	a
75	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
77	mutation is applied on ___ candidates.		one	two	more than two	none of these	a
78	recombination is applied on ___ candidates.		one	two	more than two	none of these	b

79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offsprings	grand child	c
80	___ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection methods	both a and b	none of these	c
82	LCS belongs to ___ based methods?		rule based learning	genetic learning	both a and b	none of these	a
83	Survival is ___ approach.		deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called ___ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
90	For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c

92	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by _____		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3.): (5, 0), (6, 0.2) \}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.5}	{0.1, 0.5, 0.4, 0.2, 0.2}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3, 1), (0.6, 2), (1, 3), (0.7, 4), (0.2, 5)\}$ $B = \{(0.5, 11), (1, 12), (0.5, 13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max(x+y=z, \min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to		$\{(0.5, 12), (0.6, 13), (1, 14), (0.7, 15), (0.7, 16), (1, 17), (1, 18)\}$	$\{(0.5, 12), (0.6, 13), (1, 14), (1, 15), (1, 16), (1, 17), (1, 18)\}$	$\{(0.3, 12), (0.5, 13), (0.5, 14), (1, 15), (0.7, 16), (0.5, 17), (0.2, 18)\}$	$\{(0.3, 12), (0.5, 13), (0.6, 14), (1, 15), (0.7, 16), (0.5, 17), (0.2, 18)\}$	d

98	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy ≈ Prediction	Fuzzy ≈ Forecasting	Probability ≈ Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c

104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	----- defines logic funtion of two prepositions	prepositions	Lingustic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ---gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ---- - in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ---- - in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then $z=c$ (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigitype	Mamdani-type and Sugeno-type	Mihni-type and Sujganitype	c
113	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is	doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is	doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size changes dynamically	size=1	a
119	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size changes dynamically	size=1	b
120	Step size in self-adaptive EP	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size changes dynamically	size=1	c

121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)	(μ,λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

123	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126	(1+λ) ES	λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127	Termination condition for EA	maximally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming does not use crossover operators	d
130	(1+1) ES	Operates on population size of two	operates on population size of one	operates on population size of zero	operates on population size of λ	a
131	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

SCOA Unit I MCQ

- 1. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.**
A.True
B.False

- 2. The membership functions are generally represented in**
A.Tabular Form
B.Graphical Form
C.Mathematical Form
D.Logical Form

- 3. Membership function can be thought of as a technique to solve empirical problems on the basis of**
A.knowledge
B.examples
C.learning
D.experience

- 4. Three main basic features involved in characterizing membership function are**
A.Intuition, Inference, Rank Ordering
B.Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.sub normal fuzzy sets

B.normal fuzzy set

C.convex fuzzy set

D.concave fuzzy set

7. In a Fuzzy set a prototypical element has a value

A.1

B.0

C.infinite

D.Not defined

8. A fuzzy set wherein no membership function has its value equal to 1 is called

A.normal fuzzy set

B.Subnormal fuzzy set.

C.convex fuzzy set

D.concave fuzzy set

9. A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe

A.convex fuzzy set

B.concave fuzzy set

C.Non concave Fuzzy set

D.Non Convex Fuzzy set

10. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.

A.Convex Fuzzy Set

B.Non convex fuzzy set

C.Normal Fuzzy set

D.Sub normal fuzzy set

11. The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to

A.infinite

B.1

C.0

D.0.5

12. Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

B.False

14. Artificial neural network used for

A.Pattern Recognition

B.Classification

C.Clustering

D.All of these

15. A Neural Network can answer

- A.**For Loop questions
- B.**what-if questions
- C.**IF-The-Else Analysis Questions
- D.**None of these

16. Ability to learn how to do tasks based on the data given for training or initial experience

- A.**Self Organization
- B.**Adaptive Learning
- C.**Fault tolerance
- D.**Robustness

17. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

- A.**Adaptive Learning
- B.**Self Organization
- C.**What-If Analysis
- D.**Supervised Learning

18. In artificial Neural Network interconnected processing elements are called

- A.**nodes or neurons

B.weights

C.axons

D.Soma

19. Each connection link in ANN is associated with _____ which has information about the input signal.

A.neurons

B.weights

C.bias

D.activation function

20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.True

B.False

21. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.Weight

B.activation or activity level of neuron

C.Bias

D.None of these

22. Neuron can send _____ signal at a time.

- A.**multiple
- B.**one
- C.**none
- D.**any number of

23. Artificial intelligence is

- A.**It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations
- B.**Computational procedure that takes some value as input and produces some value as output.
- C.**Science of making machines performs tasks that would require intelligence when performed by humans
- D.**None of these

24. Expert systems

- A.**Combining different types of method or information
- B.**Approach to the design of learning algorithms that is structured along the lines of the theory of evolution
- C.**an information base filled with the knowledge of an expert formulated in terms

of if-then rules

D.None of these

25. Falsification is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

26. Evolutionary computation is

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.

C.Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.

D.None of these

27. Extendible architecture is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

28. Massively parallel machine is

A.A programming language based on logic

B.A computer where each processor has its own operating system, its own memory, and its own hard disk

C.Describes the structure of the contents of a database.

D.None of these

29. Search space

A.The large set of candidate solutions possible for a problem

B.The information stored in a database that can be, retrieved with a single query.

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

30. $n(\log n)$ is referred to

A.A measure of the desired maximal complexity of data mining algorithms

B.A database containing volatile data used for the daily operation of an organization

C.Relational database management system

D.None of these

31. Perceptron is

- A.**General class of approaches to a problem.
- B.**Performing several computations simultaneously
- C.**Structures in a database those are statistically relevant
- D.**Simple forerunner of modern neural networks, without hidden layers

32. Prolog is

- A.**A programming language based on logic
- B.**A computer where each processor has its own operating system, its own memory, and its own hard disk
- C.**Describes the structure of the contents of a database
- D.**None of these

33. Shallow knowledge

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be, retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

34. Quantitative attributes are

- A.**A reference to the speed of an algorithm, which is quadratically dependent on the size of

the data

B.Attributes of a database table that can take only numerical values

C.Tools designed to query a database

D.None of these

35. Subject orientation

A.The science of collecting, organizing, and applying numerical facts

B.Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.None of these

36. Vector

A.It do not need the control of the human operator during their execution

B.An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.The validation of a theory on the basis of a finite number of examples

D.None of these

37. Transparency

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

38. Core of soft Computing is

- A.**Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.**Fuzzy Networks and Artificial Intelligence
- C.**Artificial Intelligence and Neural Science
- D.**Neural Science and Genetic Science

39. Who initiated the idea of Soft Computing

- A.**Charles Darwin
- B.**Lofti A Zadeh
- C.**Rechenberg
- D.**Mc_Culloch

40. Fuzzy Computing

- A.**mimics human behaviour
- B.**doesn't deal with 2 valued logic
- C.**deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.**All of the above

41. Neural Computing

- A.**mimics human brain
- B.**information processing paradigm
- C.**Both (a) and (b)
- D.**None of the above

42. Genetic Algorithm are a part of

- A.**Evolutionary Computing
- B.**inspired by Darwin's theory about evolution - "survival of the fittest"
- C.**are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D.**All of the above

43. What are the 2 types of learning

- A.**Improvised and unimprovised
- B.**supervised and unsupervised
- C.**Layered and unlayered
- D.**None of the above

44. Supervised Learning is

- A.**learning with the help of examples
- B.**learning without teacher
- C.**learning with the help of teacher
- D.**learning with computers as supervisor

45. Unsupervised learning is

- A.**learning without computers
- B.**problem based learning

C.learning from environment

D.learning from teachers

46. Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

47. In supervised learning

A.classes are not predefined

B.classes are predefined

C.classes are not required

D. classification is not done

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

	<u>D.</u> experience	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p><u>A.</u>Intuition, Inference, Rank Ordering <u>B.</u>Fuzzy Algorithm, Neural network, Genetic Algorithm <u>C.</u>Core, Support , Boundary <u>D.</u>Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p><u>A.</u>Core <u>B.</u>Support <u>C.</u>Boundary <u>D.</u>Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p><u>A.</u>sub normal fuzzy sets</p>	B

	<u>B.</u> normal fuzzy set <u>C.</u> convex fuzzy set <u>D.</u> concave fuzzy set	
7.	In a Fuzzy set a prototypical element has a value <u>A.</u> 1 <u>B.</u> 0 <u>C.</u> infinite <u>D.</u> Not defined	A
8.	A fuzzy set wherein no membership function has its value equal to 1 is called <u>A.</u> normal fuzzy set <u>B.</u> subnormal fuzzy set. <u>C.</u> convex fuzzy set <u>D.</u> concave fuzzy set	B
9.	A fuzzy set has a membership function whose membership values	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesnt deal with 2 valued logic</p>	D

	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	Defuzzification is done to obtain a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above	a
13.	“The train is running fast”. Here ‘fast’ can be represented by a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned	a
14.	Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$ Then the crisp value of Young using MoM method is a) 25 b) 20 c) 35 d) 50	a
15.	f the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value. a) with the median of all the area	c

	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)\text{complement} \neq \text{---}(A\lambda)\text{complement}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is c then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

	d) None of the above	
26.	Fuzzy logic is a form of a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic	Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.
27.	Traditional set theory is also known as Crisp Set theory. a) True b) False	Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set. 3. The truth values of traditional set theory is _____ and that of fuzzy set is _____
28.	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Answer: a Explanation: Refer the

	a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1	definition of Fuzzy set and Crisp set.
29.	How many types of random variables are available? a) 1 b) 2 c) 3 d) 4	Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.
30.	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____. a) Fuzzy Set b) Crisp Set	Answer: a Explanation: Fuzzy logic deals with linguistic variables.
31.	The values of the set membership is represented by a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c	Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.
32.	What is meant by probability density function?	d

	a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables	
33.	Which of the following is used for probability theory sentences? a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned	Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.
34.	Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following. a) AND b) OR c) NOT d) EX-OR	Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;
35.	Fuzzy logic is usually represented as a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned	Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy

		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices. Rules are usually expressed in the form: IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <p>a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned</p>	<p>Answer: d Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <p>a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned</p>	<p>Answer: c Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

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Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

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	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intuition, Inference, Rank Ordering</p> <p>B.Fuzzy Algorithm, Neural network, Genetic Algorithm</p> <p>C.Core, Support , Boundary</p> <p>D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core</p> <p>B.Support</p> <p>C.Boundary</p> <p>D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

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	<p>B. normal fuzzy set C. convex fuzzy set D. concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A. 1 B. 0 C. infinite D. Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A. normal fuzzy set B. subnormal fuzzy set. C. convex fuzzy set D. concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

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	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesnt deal with 2 valued logic</p>	D

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	<p>B. mimics human behaviour</p> <p>C. deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D. All of the above</p>	
12.	Defuzzification is done to obtain a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above	a
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15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area b) with the mean of all the area c) with the largest area d) with the smallest area 	c
16.	<p>Which of the following is not a centroid method?</p> <ul style="list-style-type: none"> a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM) 	d
17.	<p>What are the following sequence of steps taken in designing a fuzzy logic machine?</p> <ul style="list-style-type: none"> (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification 	a
18.	<p>If A is a fuzzy set, then $(A \lambda)$complement \neq $(A\lambda)$complement</p> <ul style="list-style-type: none"> (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ 	a
19.	<p>The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$</p> <ul style="list-style-type: none"> a) 2 	B

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	b) 5 c) 4 d) 1	
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$ c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	b
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26.	<p>Fuzzy logic is a form of</p> <ul style="list-style-type: none"> a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic 	<p>Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.</p>
27.	<p>Traditional set theory is also known as Crisp Set theory.</p> <ul style="list-style-type: none"> a) True b) False 	<p>Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There is only two crisp values true or false. In case of fuzzy logic there are</p>

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		<p>many values. With weight say x the member is in the set.</p> <p>3. The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>
28.	<p>The truth values of traditional set theory is _____ and that of fuzzy set is _____</p> <p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	<p>Answer: a Explanation: Refer the definition of Fuzzy set and Crisp set.</p>
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p>	<p>Answer: a</p>

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	a) Fuzzy Set b) Crisp Set	Explanation: Fuzzy logic deals with linguistic variables.
31.	The values of the set membership is represented by a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c	Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.
32.	What is meant by probability density function? a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables	d
33.	Which of the following is used for probability theory sentences? a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned	Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.
34.	Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.	Answer: a, b, c

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	<p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b</p> <p>Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <p>a) Fuzzy Logic</p>	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty</p>

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	b) Probability c) Entropy d) All of the mentioned	involved in data. Represented by $H(\text{data})$.
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <p>a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned</p>	Answer: c Explanation: Local structure is usually associated with linear rather than exponential growth in complexity

Soft Computing & Optimization Algorithms [Multiple Choice Question] **UNIT No-03****Name of Content: Fuzzy Systems- Fuzzy Controller**

01	Fuzzy logic is :	
	Option A	Used to respond to questions in a human like way
	Option B	A new programming language used to program animation
	Option C	The result of fuzzy thinking
	Option D	A term that indicates logical values greater than one
	Correct Answer	A
02	What are the following sequence of steps taken in designing a fuzzy logic machine?	
	Option A	Rule evaluation->Fuzzification->Defuzzification
	Option B	Fuzzification->Rule evaluation->Defuzzification
	Option C	Fuzzy Sets->Defuzzification->Rule evaluation
	Option D	Defuzzification->Rule evaluation->Fuzzification
	Correct Answer	B
03	Fuzzy logic is a form of	
	Option A	Two-valued logic
	Option B	Crisp set logic
	Option C	Many-valued logic
	Option D	Binary set logic
	Correct Answer	C
04	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$	
	Option A	$h(A) = 0$
	Option B	$h(A) < 0$
	Option C	$h(A)=1$
	Option D	$h(A)<1$
	Correct Answer	C
05	Assumptions in Fuzzy Logic Control (FLC) Design	
	Option A	Existence of a knowledge body
	Option B	Range of precision
	Option C	The plant is observable and controllable
	Option D	All of the above
	Correct Answer	D

Name of Content: Fuzzy Rule Base & Approximate Reasoning

01	Fuzzy logic uses	
	Option A	Global variables
	Option B	Linguistic variables
	Option C	Local variables
	Option D	Approximate variables
	Correct Answer	B
02	_____ as an operator acts on fuzzy set representing meaning of its operand	
	Option A	Defuzzification
	Option B	Truth table
	Option C	Linguistic hedges
	Option D	Propositions
	Correct Answer	C
03	The major components of the FLC	
	Option A	Fuzzifier & Defuzzifier
	Option B	Fuzzy Rule Base & Knowledge Base
	Option C	Inference Engine
	Option D	All of the above
	Correct Answer	D
04	Which of the following not an Advantages of Fuzzy Logic Control	
	Option A	Cheaper
	Option B	Robust
	Option C	Reliability
	Option D	Expensive
	Correct Answer	D
05	Examples of Fuzzy quantifiers are words like	
	Option A	Most
	Option B	Many
	Option C	Few
	Option D	All of the above
	Correct Answer	D
06	Fuzzy truth qualification claims the degree of truth of fuzzy proposition	
	Option A	True
	Option B	False
	Correct Answer	A

07	Propositions in fuzzy logic involves	
	Option A	Fuzzy predicate
	Option B	Fuzzy Quantifier
	Option C	Fuzzy Qualifier
	Option D	All of the above
	Correct Answer	D
08	Formation of Rules: I: Assignment statement; II: Conditional statement; III: Unconditional statement	
	Option A	Only I
	Option B	Only I & II
	Option C	Only I, II & III
	Option D	Only II & III
	Correct Answer	C
09	Methods used for decomposition of rules	
	Option A	Multiple conjunctive antecedents
	Option B	Multiple disjunctive antecedents
	Option C	Conditional statement
	Option D	All of the above
	Correct Answer	D
10	Multiple conjunctive antecedents based on	
	Option A	Fuzzy union operation
	Option B	Fuzzy intersection operation
	Option C	Fuzzy condition operation
	Option D	Fuzzy difference operation
	Correct Answer	B
11	Two methods of Aggregation of fuzzy rules	
	Option A	Conjunctive system of rules
	Option B	Disjunctive system of rules
	Option C	Both a & b
	Option D	Neither a nor b
	Correct Answer	C
12	In disjunctive system of rules, output determined by performing fuzzy union of all individual rule consequents	
	Option A	True
	Option B	False
	Correct Answer	A

Name of Content: Fuzzy Reasoning and Fuzzy Inference system

01	In this form of reasoning, the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	
	Option A	Qualitative Reasoning
	Option B	Categorial Reasoning
	Option C	Syllogistic Reasoning
	Option D	Dispositional Reasoning
	Correct Answer	B
02	A Fuzzy syllogism can be expressed as $x=s_1$ A's are B's & $y=s_2$ C's are D's	
	Option A	$z=s_2$ C's are D's
	Option B	$z=s_2$ A's are B's
	Option C	$z=s_2$ C's are D's
	Option D	$z=s_3$ E's are F's
	Correct Answer	D
03	The Conjunction rule is	
	Option A	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \cap \sim B$
	Option B	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A - \sim B$
	Option C	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \ast \sim B$
	Option D	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \cap \sim B$
	Correct Answer	D
04	The negative rule of inference is	
	Option A	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } \sim A$
	Option B	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } A$
	Option C	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } A$
	Option D	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow x \text{ is } A$
	Correct Answer	A
05	In this mode of reasoning, the antecedents & consequents have fuzzy linguistic variables	
	Option A	Qualitative Reasoning
	Option B	Categorial Reasoning
	Option C	Syllogistic Reasoning
	Option D	Dispositional Reasoning
	Correct Answer	A

07	How many types are available in machine learning?	
	Option A	1
	Option B	2
	Option C	3
	Option D	4
	Correct Answer	C
08	How the decision tree reaches its decision?	
	Option A	Single test
	Option B	Two test
	Option C	Sequence of test
	Option D	No test
	Correct Answer	C
09	What Is Fuzzy Inference Systems?	
	Option A	The process of formulating the mapping from a given input to an output using fuzzy logic
	Option B	Changing the output value to match the input value to give it an equal balance
	Option C	Having a larger output than the input
	Option D	Having a smaller output than the input
	Correct Answer	A
10	Where Has Fuzzy Inference Systems Been Implemented?	
	Option A	Wireless services, heat control and printers
	Option B	Restrict power usage, telephone lines and sort data
	Option C	Simulink, boiler and CD recording
	Option D	Automatic control, decision analysis and data classification
	Correct Answer	D
11	What Is Another Name For Fuzzy Inference Systems?	
	Option A	Fuzzy Expert System
	Option B	Fuzzy Modelling
	Option C	Fuzzy Logic Controller
	Option D	All of the above
	Correct Answer	D
12	The Equation For Probabilistic: Prob(a,b) = a+b - ab	
	Option A	True
	Option B	False
	Correct Answer	A

Soft Computing & Optimization Algorithms [Multiple Choice Question] **UNIT No-04**

Name of Content: Basic Evolutionary Processes, EV: A Simple Evolutionary System

- 01 The tendency of population to remain in genetic equilibrium may be disturbed by
Option A Random mating
Option B Lack of migration
Option C Lack of mutations
Option D Lack of random mating

Correct Answer **D**

- 02 One of the important consequences of geographical isolation is:
Option A Random creation of new species
Option B No change in the isolated fauna
Option C Preventing Speciation
Option D Speciation through reproductive isolation

Correct Answer **D**

- 03 What is meant by the term Darwin fitness?
Option A The ability to survive and reproduce
Option B High aggressiveness
Option C Healthy appearance
Option D Physical strength

Correct Answer **A**

- 04 Diversification in plant life appeared:
Option A Due to abrupt mutations
Option B Suddenly on earth
Option C By seed dispersal
Option D Due to long periods of evolutionary changes

Correct Answer **D**

- 05 Chemical reactions could have converted simple organic compounds into _____ for the origin of life
Option A Micromolecules
Option B Nitrogen, oxygen and other gases
Option C Cells
Option D Macromolecules

Correct Answer **D**

- 06 Which one of the following sequences was proposed by Darwin and Wallace for organic evolution?
- Option A Overproduction, variations, constancy of population size, natural selection
- Option B Variations, constancy of population size, overproduction, natural selection
- Option C Overproduction, constancy of population size, variations, natural selection
- Option D Variations, natural selection, overproduction, constancy of population size
- Correct Answer** **C**
- 07 _____ is a subset of evolutionary computation,[1] a generic population-based meta-heuristic optimization algorithm
- Option A Genetic Algorithm
- Option B Evolutionary algorithm (EA)
- Option C Simulated Annealing
- Option D Artificial Intelligence
- Correct Answer** **B**
- 08 An EA uses mechanisms inspired by biological evolution, such as
- Option A mutation
- Option B recombination
- Option C selection
- Option D All of the above
- Correct Answer** **D**
- 09 Genetic Algorithms are
- Option A a class of algorithms that try and build solutions by introducing evolution and selection of the best in a population of candidate solutions
- Option B Methods, based on the theory of natural selection and evolutionary biology, for solving optimization problems.
- Option C A heuristic search method used in artificial intelligence and computing.
- Option D All of the above
- Correct Answer** **D**
- 10 Objects forming possible solutions within the original problem context are referred to as
- Option A Phenotypes
- Option B Genotypes
- Option C Genes
- Option D Chromosomes
- Correct Answer** **A**

Name of Content: Canonical Evolutionary Algorithms

- 01 In Evolutionary algorithm, An individual consist of
Option A Genotype and phenotypes
Option B Parent selection and crossover
Option C Genotype and a fitness function
Option D Mutation and recombination
- Correct Answer C**
- 02 Evolutionary Strategies were developed in the sixties by
Option A John Holland
Option B Rechenberg and Schwefe
Option C Allen and Karjalainen
Option D Ryan and Collins
- Correct Answer B**
- 03 EA heuristic follows
Option A Initialization
Option B Evaluation
Option C Mutation and selection
Option D All of the above
- Correct Answer D**
- 04 Selection is based on
Option A Ranking of the individual fitness
Option B Recombination of parents
Option C Mutation of parameter
Option D None of the above
- Correct Answer A**
- 05 The Simple evolution strategy operates on population of size two:
Option A The current point (parent)
Option B Result of its mutation (one offspring)
Option C Both a and b
Option D None of the above
- Correct Answer C**
- 06 Depending on search space & objective function, recombination & mutation of strategy parameter may or may not occur in specific algorithm
Option A True
Option B False
- Correct Answer A**

Name of Content: A Unified view of Simple EAs

01 EA consist of following elements

- | | |
|----------|---------------------------|
| Option A | Parent Population size |
| Option B | Survival selection method |
| Option C | Parent selection method |
| Option D | All of the above |

Correct Answer **D**

02 _____ which of the following method determines to be kept in the next generation

- | | |
|----------|--------------------|
| Option A | Parent selection |
| Option B | Mutation |
| Option C | Recombination |
| Option D | Survival selection |

Correct Answer **D**

03 Roulette wheel selection scheme is preferable when

- | | |
|----------|--|
| Option A | Fitness values are uniformly distributed |
| Option B | Fitness values are non-uniformly distributed |
| Option C | Needs low selection pressure |
| Option D | Needs high population diversity |

Correct Answer **A**

04 A genetic operator used in genetic algorithms for selecting potentially useful solutions for recombination.

- | | |
|----------|---------------------------------|
| Option A | Fitness proportionate selection |
| Option B | Roulette wheel selection |
| Option C | Rank selection method |
| Option D | Stochastic universal sampling |

Correct Answer **A & B**

05 _____ is a method of selecting an individual from a population of individuals in a genetic algorithm.

- | | |
|----------|-------------------------------|
| Option A | Roulette wheel selection |
| Option B | Rank selection method |
| Option C | Tournament selection |
| Option D | Stochastic Universal Sampling |

Correct Answer **C**

06 As selection pressure increases, fitter solutions are more likely to survive

- | | |
|----------|-------|
| Option A | True |
| Option B | False |

Correct Answer **A**

- 07 What are normally the two best measurement units for an evolutionary algorithm?
- Option A Number of evaluations
Option B Number of generations
Option C Elapsed & CPU time
Option D Both a & b
- Correct Answer D**
- 08 What is most important to be concerned with in the evolution of repetitive problems?
- Option A Do multiple runs until a good solution is found
Option B Execute one run until the solution is good enough
Option C Get a reasonably good solution every time
Option D Get a very good result just once
- Correct Answer C**
- 09 Evolutionary Strategies (ES)
- Option A (μ, λ) : Select survivors among parents and offspring
Option B $(\mu + \lambda)$: Select survivors among parents and offspring
Option C $(\mu - \lambda)$: Select survivors among offspring only
Option D $(\mu : \lambda)$: Select survivors among offspring only
- Correct Answer B**
- 10 Rank based selection
- Option A Use relative rather than absolute fitness
Option B Use absolute rather than relative fitness
Option C Results in less control of the selection pressure than fitness-proportionate selection
Option D Ranking can be either linear or non-linear
- Correct Answer A & D**

Subject: Soft computing Optimization Algorithm
MCQs Unit- I

1. Neural Computing
 - A. mimics human brain
 - B. information processing paradigm
 - C. Both (a) and (b)
 - D. None of the above

Ans: C

Explanation: NN is used for data processing modelled on human brain

2. Genetic Algorithm are a part of

- A. Evolutionary Computing
- B. inspired by Darwin's theory about evolution - "survival of the fittest"
- C. are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D. All of the above

Ans: D

Explanation: It is part of EA

3. What are the 2 types of learning

- A. Improvised and unimprovised
- B. supervised and unsupervised
- C. Layered and unlayered
- D. None of the above

Ans: B

Explanation: Supervised and unsupervised are two types

4. Supervised Learning is
 - A. learning with the help of examples
 - B. learning without teacher
 - C. learning with the help of teacher
 - D. learning with computers as supervisor

Ans: C

Explanation: Training data is present

5. Unsupervised learning is

- A. learning without computers
- B. problem based learning
- C. learning from environment
- D. learning from teachers

Ans: C

Explanation: without training data

6. Conventional AI is different from soft computing in the sense

- A. Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic
- B. Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data
- C. Both (a) and (b)
- D. None of the above

Ans: C

Explanation: Soft computing covers fuzzy, supervised NN algorithms

7. In Supervised learning:

- A. classes are not predefined
- B. classes are predefined
- C. classes are not required
- D. classification is not done

Ans: B

Explanation: Training data is present

8. A 4-input neuron has weights 1, 2, 3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. The output will be:

- a) 238
- b) 76
- c) 119
- d) 123

Ans: a

Explanation: The output is found by multiplying the weights with their respective inputs, summing the results and multiplying with the transfer function. Therefore:

$$\text{Output} = 2 * (1*4 + 2*10 + 3*5 + 4*20) = 238$$

9. ANN is composed of large number of highly interconnected processing elements (neurons) working in unison to solve problems.

A. True

B. False

Ans: A

Explanation: As per architecture it is true

10. Artificial neural network used for

A. Pattern Recognition

B. Classification

C. Clustering

D. All of these

Ans: D

11. A Neural Network can answer

A. For Loop questions

B. what-if questions

C. IF-The-Else Analysis Questions

D. None of these

Ans: B

Explanation: Generally used for prediction and classification

12. Ability to learn how to do tasks based on the data given for training or initial experience

A. Self Organization

B. Adaptive Learning

C. Fault tolerance

D. Robustness

Ans: B

Explanation: Adaption allows learn from self experiences

13. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

A. Adaptive Learning

B. Self Organization

C. What-If Analysis

D. Supervised Learnning

Ans: B

Explanation: SOM is unsupervised NN

14. In artificial Neural Network interconnected processing elements are called

- A. nodes or neurons
- B. weights
- C. axons
- D. Soma

Ans: A

Explanation: As per the definition

15. Each connection link in ANN is associated with _____ which has information about the input signal.

- A. Neurons
- B. Weights
- C. Bias
- D. activation function

Ans: B

Explanation: As per the definition

16. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

- A. True
- B. False

Ans: A

17. Internal state of neuron is called _____, is the function of the inputs the neurons receives

- A. Weight
- B. activation or activity level of neuron
- C. Bias
- D. None of these

Ans: B

Explanation: As per the definition

18. Neuron can send _____ signal at a time.

- A. multiple

- B. one
- C. none
- D. any number

Ans: B

Explanation: can receive multiple signals but send only one signal (single output)

19. What is perceptron?

- a) a single layer feed-forward neural network with pre-processing
- b) an auto-associative neural network
- c) a double layer auto-associative neural network
- d) a neural network that contains feedback

Ans: a

Explanation:

20. The perceptron is a single layer feed-forward neural network. It is not an auto-associative network because it has no feedback and is not a multiple layer neural network because the pre-processing stage is not made of neuron

21. Why is the XOR problem exceptionally interesting to neural network researchers?

- a) Because it can be expressed in a way that allows you to use a neural network
- b) Because it is complex binary operation that cannot be solved using neural networks
- c) Because it can be solved by a single layer perceptron
- d) Because it is the simplest linearly inseparable problem that exists.

Ans:d

Explanation: it is the simplest non linearly problem

22. What is back propagation?

- a) It is another name given to the curvy function in the perceptron
- b) It is the transmission of error back through the network to adjust the inputs
- c) It is the transmission of error back through the network to allow weights to be adjusted so that the network can learn
- d) None of the mentioned

Answer: c

Explanation: Back propagation is the transmission of error back through the network to allow weights to be adjusted so that the network can learn.

23. Neural Networks are complex _____ with many parameters.

- a) Linear Functions
- b) Nonlinear Functions

- c) Discrete Functions
- d) Exponential Functions

Answer: a

Explanation: Neural networks are complex linear functions with many parameters.

24. A perceptron adds up all the weighted inputs it receives, and if it exceeds a certain value, it outputs a 1, otherwise it just outputs a 0.

- a) True
- b) False
- c) Sometimes – it can also output intermediate values as well
- d) Can't say

Answer: a

Explanation: Yes the perceptron works like that.

25. The network that involves backward links from output to the input and hidden layers is called _____

- a) Self organizing maps
- b) Perceptrons
- c) Recurrent neural network
- d) Multi layered perceptron

Answer: c

Explanation: RNN (Recurrent neural network) topology involves backward links from output to the input and hidden layers.

26. Which of the following is an application of NN (Neural Network)?

- a) Sales forecasting
- b) Data validation
- c) Risk management
- d) All of the mentioned

Answer: d

Explanation: All mentioned options are applications of Neural Network.

27 Artificial neural networks

- A Are trained by adjusting the network size
- B Are trained by adjusting weights
- C The weights are either all positive or all negative
- D The learning rate controls the amount of weight change

Ans: B , D

28 Why use Multi Layer Perceptron instead of a single layer perceptron?

- A Faster learning

- B Easier programming
- C Can solve more complex problems
- D Can learn multiple decision boundaries

Ans: c,D

29. The activation function in a multilayer perceptron
- A Does thresholding to 0 or 1
 - B Is used to compute the output value of a node
 - C Is used for initialization of the network
 - D Makes it possible to train non-linear decision boundaries

And: B,D

30 Which of the following neural networks uses supervised learning?

- (A) Multilayer perceptron
- (B) Self organizing feature map
- (C) Hopfield network
- (D) M_P neuron

Ans: A

Explanation: Training is not possible for MP neuron

31. Identify the following activation function : $\phi(V) = Z + (1 / (1 + \exp(-x * V + Y)))$, Z, X, Y are parameters
- a. Step function
 - b. Ramp function
 - c. Sigmoid function
 - d. Gaussian function

Ans: C

Explanation: it is sigmoid function

- 32 . An artificial neuron receives n inputs $x_1, x_2, x_3, \dots, x_n$ with weights w_1, w_2, \dots, w_n attached to the input links. The weighted sum _____ is computed to be passed on to a non-linear filter Φ called activation function to release the output.
- a. $\sum w_i$
 - b. $\sum x_i$
 - c. $\sum w_i + \sum x_i$
 - d. $\sum w_i * x_i$

Ans: d

Explanation: It is net input calculated as $\sum w_i * x_i$

33. Which of the following can be used for clustering of data ?

- a. Single layer perception
- b. Multilayer perception
- c. Self organizing map
- d. Radial basis function

Ans: C

Explanation: SOM is unsupervised NN based on grouping of elements based on similarity

34. Perceptron learning, Delta learning and LMS learning are learning methods which falls under the category of

- a. Error correction learning - learning with a teacher
- b. Reinforcement learning - learning with a critic
- c. Hebbian learning
- d. Competitive learning - learning without a teacher

Ans: a

Explanation: It is one of the supervised learning algorithm.

35 Which of the following model has ability to learn?

- a) pitts model
- b) rosenblatt perceptron model
- c) both rosenblatt and pitts model
- d) neither rosenblatt nor pitts

Answer: b

Explanation: Weights are fixed in pitts model but adjustable in rosenblatt.

36 When both inputs are 1, what will be the output of the pitts model nand gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: a

Explanation: Check the truth table of simply a nand gate.

37 When both inputs are 1, what will be the output of the pitts model AND gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: b

Explanation: Check the truth table of simply a And gate.

38. When both inputs are 1, what will be the output of the pitts model OR gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: b

Explanation: Check the truth table of simply a OR gate.

39. When both inputs are 1, what will be the output of the pitts model XOR gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: a

Explanation: Check the truth table of simply a XOR gate.

40. Does McCulloch-pitts model have ability of learning?

- a) yes
- b) no

Answer: b

Explanation: Weights are fixed.

41. What is an activation value?

- a) weighted sum of inputs
- b) threshold value
- c) main input to neuron
- d) none of the mentioned

Answer: a

Explanation: It is definition of activation value

42. Positive sign of weight indicates?

- a) excitatory input
- b) inhibitory input
- c) can be either excitatory or inhibitory as such
- d) none of the mentioned

Answer: a

Explanation: Sign convention of neuron.

43. Negative sign of weight indicates?

- a) excitatory input
- b) inhibitory input
- c) excitatory output
- d) inhibitory output

Answer: b

Explanation: Sign convention of neuron.

44. The amount of output of one unit received by another unit depends on what?

- a) output unit
- b) input unit
- c) activation value
- d) weight

Answer: d

Explanation: Activation is sum of weighted sum of inputs, which gives desired output..hence output depends on weights.

45. The process of adjusting the weight is known as?

- a) activation
- b) synchronisation
- c) learning
- d) none of the mentioned

Answer: c

Explanation: Basic definition of learning in neural nets .

46. The procedure to incrementally update each of weights in neural is referred to as?

- a) synchronisation
- b) learning law
- c) learning algorithm
- d) both learning algorithm & law

Answer: d

Explanation: Basic definition of learning law in neural.

47. In what ways can output be determined from activation value?

- a) deterministically
- b) stochastically
- c) both deterministically & stochastically
- d) none of the mentioned

Answer: c

Explanation: This is the most important trait of input processing & output determination in neural networks.

48. How can output be updated in neural network?

- a) synchronously
- b) asynchronously

- c) both synchronously & asynchronously
- d) none of the mentioned

Answer: c

Explanation: Output can be updated at same time or at different time in the networks.

49. What is asynchronous update in neural netwks?

- a) output units are updated sequentially
- b) output units are updated in parallel fashion
- c) can be either sequentially or in parallel fashion
- d) none of the mentioned

Answer: a

Explanation: Output are updated at different time in the networks.

50. Who developed the first learning machine in which connection strengths could be adapted automatically?

- a) McCulloch-pitts
- b) Marvin Minsky
- c) Hopfield
- d) none of the mentioned

Answer: b

Explanation: In 1954 Marvin Minsky developed the first learning machine in which connection strengths could be adapted automatically & efficiebtly.

51. Who proposed the first perceptron model in 1958?

- a) McCulloch-pitts
- b) Marvin Minsky
- c) Hopfield
- d) Rosenblatt

Answer: d

Explanation: Rosenblatt proposed the first perceptron model in 1958 .

52. What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?

- a) associative nature of networks
- b) distributive nature of networks
- c) both associative & distributive
- d) none of the mentioned

Answer: c

Explanation: General characteristics of ANNs.

53. What was the name of the first model which can perform wieghted sum of inputs?

- a) McCulloch-pitts neuron model
- b) Marvin Minsky neuron model

- c) Hopfield model of neuron
- d) none of the mentioned

Answer: a

Explanation: McCulloch-pitts neuron model can perform weighted sum of inputs followed by threshold logic operation.

54. The cell body of neuron can be analogous to what mathematical operation?

- a) summing
- b) differentiator
- c) integrator
- d) none of the mentioned

Answer: a

Explanation: Because adding of potential(due to neural fluid) at different parts of neuron is the reason of its firing.

55. What is the critical threshold voltage value at which neuron get fired?

- a) 30mv
- b) 20mv
- c) 25mv
- d) 10mv

Answer: d

Explanation: This critical is founded by series of experiments conducted by neural scientist.

60 . Does there is any effect on particular neuron which got repeatedly fired ?

- a) yes
- b) no

Answer: a

Explanation: The strength of neuron to fire in future increases.

61. What is name of above mechanism?

- a) hebb rule learning
- b) error correction learning
- c) memory based learning
- d) none of the mentioned

View Answer

Answer: a

Explanation: It follows from basic definition of hebb rule learning.

62. What is hebb's rule of learning

- a) the system learns from its past mistakes
- b) the system recalls previous reference inputs & respective ideal outputs
- c) the strength of neural connection get modified accordingly

d) none of the mentioned

Answer:c

Explanation: The strength of neuron to fire in future increases, if it is fired repeatedly.

63. Who invented perceptron neural networks?

a) McCulloch-pitts

b) Widrow

c) Minsky & papert

d) Rosenblatt

Answer: d

Explanation: The perceptron is one of the earliest neural networks. Invented at the Cornell Aeronautical Laboratory in 1957 by Frank Rosenblatt, the Perceptron was an attempt to understand human memory, learning, and cognitive processes.

64. What is delta (error) in perceptron model of neuron?

a) error due to environmental condition

b) difference between desired & target output

c) can be both due to difference in target output or environmental condition

d) none of the mentioned

Answer: a

Explanation: All other parameters are assumed to be null while calculating the error in perceptron model & only difference between desired & target output is taken into account.

65. In neural how can connections between different layers be achieved?

a) interlayer

b) intralayer

c) both interlayer and intralayer

d) either interlayer or intralayer

Answer: c

Explanation: Connections between layers can be made to one unit to another and within the units of a layer.

66. Connections across the layers in standard topologies & among the units within a layer can be organised?

a) in feedforward manner

b) in feedback manner

c) both feedforward & feedback

d) either feedforward & feedback

Answer: d

Explanation: Connections across the layers in standard topologies can be in feedforward manner or in feedback manner but not both.

67. State whether Hebb's law is supervised learning or of unsupervised type?

a) supervised

b) unsupervised

c) either supervised or unsupervised

d) can be both supervised & unsupervised

Answer: b

Explanation: No desired output is required for its implementation.

68. Following approach has deterministic and well written rules:

- a. Soft Computing
- b. hard computing

Ans: b

Explanation: Hard computing is based on deterministic fixed algorithms

69. Uncertainty can be handled in ---

- a. Soft Computing
- b. hard computing

Ans:

Explanation: Fuzzy a type of soft computing is more suitable to handle uncertainty

70. Different soft computing approaches can be combined to improve efficiency:

- a. True
- b. False

Ans: a

Explanation: there are different hybrid approaches available.

Subject: Soft computing Optimization Algorithm

MCQs Unit- II and III (Fuzzy Logic)

1. The membership functions are generally represented in

- a. Tabular Form
- b. Graphical Form
- c. Mathematical Form
- d. Logical Form

Ans: b

Explanation: Membership functions are presented in the form of plots

2. Three main basic features involved in characterizing membership function are

- a. Intuition, Inference, Rank Ordering
- b. Fuzzy Algorithm, Neural network, Genetic Algorithm
- c. Core, Support , Boundary
- d. Weighted Average, center of Sums, Median

Ans: C

Explanation: As per the diagram of MF

3 A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

- a. sub normal fuzzy sets
- b. normal fuzzy set
- c. convex fuzzy set
- d. concave fuzzy set

Ans: b

Explanation: As per the definition

4 A fuzzy set wherein no membership function has its value equal to 1 is called

- a. normal fuzzy set
- b. subnormal fuzzy set.
- c. convex fuzzy set
- d. concave fuzzy set

Ans: b

Explanation: As per the definition

5. Who initiated the idea of Soft Computing

- a. Charles Darwin
- b. Lofti A Zadeh
- c. Mc_Culloch
- d. Rechenberg

Ans: b

6. Core of soft Computing is.....

- a. Fuzzy Computing, Neural Computing, Genetic Algorithms
- b. Fuzzy Networks and Artificial Intelligence
- c. Artificial Intelligence and Neural Science
- d. Neural Science and Genetic Science

Ans: a

Explanation: As per the definition

7. Fuzzy logic is usually represented as

- a. IF-THEN-ELSE rules
- b. IF-THEN rules
- c. Both IF-THEN-ELSE rules & IF-THEN rules
- d. None of the mentioned

Ans: b

Explanation: Rules are usually expressed in the form: IF variable IS property THEN action

8. Which of the following is not true regarding the principles of fuzzy logic?

- a. Fuzzy logic follows the principle of Aristotle and Buddha
- b. Fuzzy logic is a concept of 'certain degree'
- c. Japan is currently the most active users of fuzzy logic
- d. Boolean logic is a subset of fuzzy logic

Ans: b

Explanation: Fuzzy deals with uncertainty

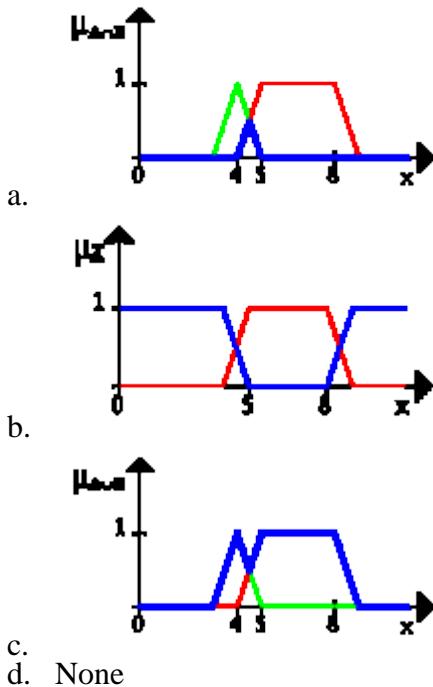
9. what are the following sequence of steps taken in designing a fuzzy logic machine?

- a. Fuzzification -> Rule Evaluation --> Defuzzification
- b. Rule Evaluation -->Fuzzification ->Defuzzification
- c. Defuzzification-->Rule Evaluation -->Fuzzification
- d. Fuzzy Sets-->Defuzzification-->Rule Evaluation

Ans: a

Explanation: fuzzification, rule evaluation and defuzzification are the general steps

10. Given these fuzzy graphs for member functions A and B.Which of the following graphs yields the result of the operation A OR B.



Ans: C

11. What Is Fuzzy Inference Systems?

- a. The process of formulating the mapping from a given input to an output using fuzzy logic
- b. Changing the output value to match the input value to give it an equal balance
- c. Having a larger output than the input
- d. Having a smaller output than the input

Ans: a

12. What Is another Name For Fuzzy Inference Systems?

- a. Fuzzy Expert System
- b. Fuzzy Modelling
- c. Fuzzy Logic Controller
- d. All the Options

Ans: a

13. _____ is/are the way/s to represent uncertainty.

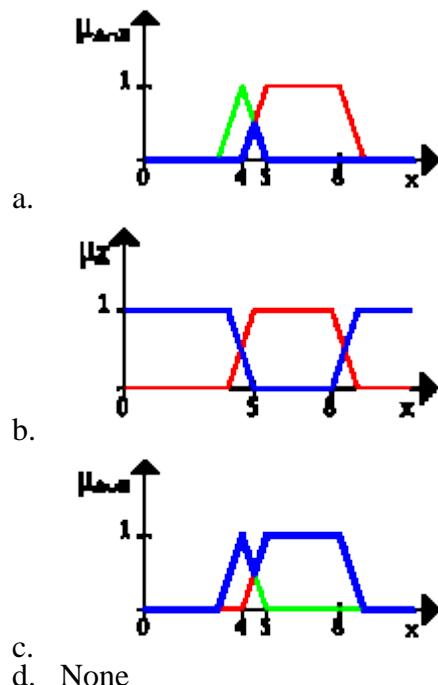
- a. Fuzzy Logic
- b. Probabilty

- c. Entropy
- d. All of the mentioned

Ans: d

Explanation: Entropy is amount of uncertainty involved in data.

14. Given these fuzzy graphs for member functions A and B. Which of the following graphs yields the result of the operation A AND B.



Ans: a

15. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.

- A. True
- B. False

Ans: A

16. Fuzzy Computing

- A. mimics human behaviour
- B. doesn't deal with 2 valued logic
- C. deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D. All of the above

Ans: D

Explanation: Fuzzy deals with imprecise, uncertain, ambiguous, inexact, or probabilistic can represent linguistic variables and partial membership in more than two sets

17 The region of universe that is characterized by complete membership in the set is called

A. Core

B. Support

C. Boundary

D. Fuzzy

Ans: A

Explanation: As per the definition

18 Three main basic features involved in characterizing membership function are

A. Intuition, Inference, Rank Ordering

B. Fuzzy Algorithm, Neural network, Genetic Algorithm

C. Core, Support , Boundary

D. Weighted Average, center of Sums, Median

Ans: C

Explanation: As per the definition

19 Membership function can be thought of as a technique to solve empirical problems on the basis of

A. knowledge

B. examples

C. learning

D. experience

Ans: D

Explanation: It depends on individual's perception

20 In a Fuzzy set a prototypical element has a value

A. 1

B. 0

C. infinite

D. Not defined

Ans: A

Explanation: As per the definition

21 A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe

- A. convex fuzzy set
- B. concave fuzzy set
- C. Non concave Fuzzy set
- D. Non Convex Fuzzy set

Ans: A

Explanation: As per the definition

22. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.

- A. Convex Fuzzy Set
- B. Non convex fuzzy set
- C. Normal Fuzzy set
- D. Sub normal fuzzy set

Ans: B

Explanation: As per the definition

23 The process of converting crisp input to fuzzy output is called as.....

- A. Fuzzification
- B. Defuzzification

Ans: A

Explanation: As per the definition

24 The process of converting fuzzy input to crisp output is called as.....

- A. Fuzzification
- B. Defuzzification

Ans: B

Explanation: As per the definition

25. Traditional set theory is called as....

- a. Fuzzy sets
- b. Crisp sets

Explanation: As per the definition

26. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **Intersection** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: A

27. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **Union** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: B

28. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **complement for A** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: C

29. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **complement for B** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: d

30 In propositional logic $P \Leftrightarrow Q$ is equivalent to (Where \sim denotes NOT):

- a. $\sim(P \vee Q) \wedge \sim(Q \vee P)$
- b. $(\sim P \vee Q) \wedge (\sim Q \vee P)$
- c. $(P \vee Q) \wedge (Q \vee P)$
- d. $\sim(P \vee Q) \rightarrow \sim(Q \vee P)$

Ans:B

31. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy **fuzzy min-max composition** is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: b

32. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy **fuzzy max-min composition** is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: a

33. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy **fuzzy max-product composition** is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: c

34. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **A Union B**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: a

35. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **A Intersect B**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: b

36. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **complement of A**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: c

37. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **complement of B**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: d

38. Following are defuzzification techniques

- a. Max-membership principle
- b. Centroid method
- c. Weighted average method.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques

39. Following are defuzzification techniques

- a. Lamdda cut method
- b. Centroid method
- c. Center of sums.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques

40. Following are defuzzification techniques

- a. Mean-max membership
- b. Center of large area
- c. First of maxima, last of maxima.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques

41. fuzzy approximate reasoning methods are

- a. categorical reasoning;
- b. qualitative reasoning;
- c. syllogistic reasoning;
- d. All of above

Ans: d

Explanation: All above are techniques of approximation

42. fuzzy approximate reasoning methods are

- a. categorical reasoning;
- b. qualitative reasoning;
- c. dispositional reasoning.
- d. All of above

Ans: d

Explanation: All above are techniques of approximation

43. Following are types of fuzzy Inference system

- a. Fuzzy controller
- b. Fuzzy expert system
- c. Mamdani FIS
- d. none of above

Ans: C

Explanation: Mamdani and Sugeno are types of FIS

44. Following are types of fuzzy Inference system

- a. Fuzzy controller
- b. Fuzzy expert system
- c. Sugeno FIS
- d. none of above

Ans: C

Explanation: Mamdani and Sugeno are types of FIS

45. Fuzzy propositions like short, Tall, Quick are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fu:zzy qualifiers

Ans: a

Explanation: Fuzzy predicates are tall, short , quick

46. Fuzzy propositions like moderately, rather, slightly are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy qualifiers

Ans:b

Explanation: As per the definition

47. Fuzzy propositions like most, several, many, & frequently are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fu:zzy qualifiers

Ans: C

Explanation: As per the definition

48. Fuzzy propositions that shows truth value or probability value are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy qualifiers

Ans: d

Explanation: As per the definition

49. Fuzzy propositions like rail, short, Tall, Quick are comes under

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy possibility qualification:

Ans: A

Explanation: As per the definition

50. In which type of FIS (fuzzy inference System) , output membership function is linear or constant

- a. Sugeno FIS
- b. Mamdani FIS

Ans: a

51. For describing fuzzy variables, modifiers like very, highly, slightly, moderately, plus, minus, fairly are called

- a. Linguistic variables
- b. Linguistic hedges

Ans: b

Explanation: As per the definition

52. For fuzzy variable Height, values like tall, small are called as

- a. Linguistic variables
- b. Linguistic hedges

Ans: a

Explanation: As per the definition

53. The values of the set membership is represented by _____

- a) Discrete Set
- b) Degree of truth
- c) Probabilities
- d) Both Degree of truth & Probabilities

Answer: b

Explanation: Both Probabilities and degree of truth ranges between 0 – 1.

54. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____

- a) Fuzzy Set
- b) Crisp Set
- c) Fuzzy & Crisp Set
- d) None of the mentioned

Answer: a

Explanation: Fuzzy logic deals with linguistic variables.

55. The truth values of traditional set theory is _____ and that of fuzzy set is _____

- a) Either 0 or 1, between 0 & 1
- b) Between 0 & 1, either 0 or 1
- c) Between 0 & 1, between 0 & 1
- d) Either 0 or 1, either 0 or 1

Answer: a

Explanation: Refer the definition of Fuzzy set and Crisp set.

56. Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.

- a) AND
- b) OR
- c) NOT
- d) All of the mentioned

Answer: d

Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;

57. Like relational databases there does exists fuzzy relational databases.

- a) True
- b) False

Answer: a

Explanation: Once fuzzy relations are defined, it is possible to develop fuzzy relational databases. The first fuzzy relational database, FRDB, appeared in Maria Zemankova dissertation.

58 What is the form of Fuzzy logic?

- a) Two-valued logic
- b) Crisp set logic
- c) Many-valued logic
- d) Binary set logic

Answer: c

Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.

59. What Is The Purpose Of Aggregation?

- A. To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs
- B. To gather all the possible inputs and use the average to gain an output
- C. To gather all the different fuzzy set outputs and averages them out to get a single value
- D. To subtract all the output fuzzy set values from the input values

Ans: A

Explanation: Aggregate operation combines them into single fuzzy set. (it is not a average)

60. What Are The Two Types Of Fuzzy Inference Systems?

- A. Model-Type and System-Type
- B. Momfred-Type and Semigi-Type
- C. Mamdani-Type and Sugeno-Type
- D. Mihni-Type and Sujgani-Type

Ans: C

Explanation: Mamdani and Sugeno are types of FIS

61. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be

- a. $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- b. $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- c. $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- d. None of the above

Answer:c

Explanation: e.g $0/2 < 0.5$ hence $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$

62. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 2$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {4, 5, 6, 7, 8, 9, 10}
- d. None of the above

Answer: d

Explanation: no membership value above 2

63. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / x$ Then the α cut corresponding to $\alpha = 1$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {4, 5, 6, 7, 8, 9, 10}
- d. None of the above

Answer: b

Explanation: all the values equal or above to α are considered in α cut

64. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x$ Then the α cut corresponding to $\alpha = 5$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {5, 6, 7, 8, 9, 10}
- d. None of the above

Answer:C

Answer: all the values equal or above to α are considered in α cut

65. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x$ Then the α cut corresponding to $\alpha = 8$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {9, 10}
- c. {8, 9, 10}
- d. None of the above

Answer:C

Explanation: all the values equal or above to α are considered in α cut

66 . Consider a fuzzy set old as defined below

Old = {(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)}

Then the alpha-cut for alpha = 0.4 for the set old will be

- a.** $\{(40, 0.4)\}$
- b.** $\{50, 60, 70, 80\}$
- c.** $\{(20, 0.1), (30, 0.2)\}$
- d.** $\{(20, 0), (30, 0), (40, 1), (50, 1), (60, 1), (70, 1), (80, 1)\}$

Ans: d

Explanation: all the values equal or above to α are considered in α cut

68 . Consider a fuzzy set old as defined below

$$\text{Old} = \{(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)\}$$

Then the alpha-cut for alpha = 1 for the set old will be

- a.** $\{(40, 0.4)\}$
- b.** $\{70, 80\}$
- c.** $\{(20, 0.1), (30, 0.2)\}$
- d.** $\{(20, 0), (30, 0), (40, 0), (50, 0), (60, 0), (70, 1), (80, 1)\}$

Ans: d

Explanation: all the values equal or above to α are considered in α cut

69. The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$

- a.** $h(A) = 0$
- b.** $h(A) < 0$
- c.** $h(A) = 1$
- d.** $h(A) < 1$

Ans: c

Explanation: Support of MF =1

70. A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$

- a.** Core
- b.** Support
- c.** Cross-over
- d.** α - cut

Ans: c

Explanation: Cross-over point =0.5

71. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.1, 0.5, 0.6, 0.1, 0.8\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: d

Explanation: intersection is minimum value of MF

72. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cup \mu_B$ will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.1, 0.5, 0.6, 0.1, 0.8\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: a

Explanation: Union is maximum value of MF

73. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of complement($\sim \mu_A$) will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.8, 0.5, 0.4, 0.9, 0.1\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: c

Explanation: complement is 1-mf

74. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of complement($\sim \mu_B$) will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.9, 0.5, 0.8, 0.3, 0.2\}$
- c. $\{0.8, 0.5, 0.4, 0.9, 0.1\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: b

Explanation: complement is 1-mf

75. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value of $A \cup B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: a

Explanation: Maximum of mf

76. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value of $A \cap B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: minimum of mf

77. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim A$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans:c

Explanation: 1- mf

78. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans:d

Explanation: 1- mf

78. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $A \cap \sim B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) min of mf

79. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $A \cup \sim B$ will be

- a. $\{0.5, 0.6, 0.8, 0.2\}$
- b. $\{0.1, 0.3, 0.1, 0\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: a

Explanation: i) 1- mf ii) max of mf

80. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim A \cup \sim B$ will be

- a. $\{0.5, 0.6, 0.8, 0.2\}$
- b. $\{0.9, 0.6, 0.5, 0.8\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) max of mf

81. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim A \cup B$ will be

- a. $\{0.5, 0.6, 0.8, 0.2\}$
- b. $\{0.9, 0.7, 0.5, 1\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) max of mf

82. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cap B)$ will be

- a. $\{0.5, 0.4, 0.1, 0.8\}$
- b. $\{0.9, 0.7, 0.5, 1\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: a

Explanation: i) 1- mf ii) min of mf

83. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cap \sim B)$ will be

- a. $\{0.5, 0.4, 0.1, 0.8\}$
- b. $\{0.9, 0.7, 0.8, 0.8\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) min of mf

84. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cap B)$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.5, 0.6, 0.5, 0\}$
- d. $\{0.9, 0.7, 0.9, 0.8\}$

Ans: d

Explanation: i) min of mf ii) 1- mf

85. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cup B)$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.5, 0.6, 0.5, 0\}$
- d. $\{0.9, 0.7, 0.9, 0.8\}$

Ans: b

Explanation: i) max of mf ii) 1- mf

86. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cup B)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.1, 0.5, 0.4, 0.2, 0.2\}$
- d. $\{0.1, 0.5, 0.4, 0.2, 0.3\}$

Ans: a

Explanation: Union is maximum of MF

87. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cap B)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.1, 0.5, 0.4, 0.2, 0.2\}$
- d. $\{0.1, 0.5, 0.4, 0.2, 0.3\}$

Ans: b

Explanation: Intersection is minimum of MF

88. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim \mu(A)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.4, 0.5, 0.9, 0.3, 0.2\}$
- d. $\{0.1, 0.8, 0.4, 0.2, 0.5\}$

Ans: c

Explanation: Complement is 1- of MF

89. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim \mu(B)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.4, 0.5, 0.9, 0.3, 0.2\}$

- d.** {0.1, 0.8, 0.4, 0.2, 0.5}

Ans: d

Explanation: Complement is 1- of MF

90. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim\mu(A \cup B)(x)$ will be

- a.** {0.9, 0.5, 0.6, 0.8, 0.8}
- b.** {0.6, 0.2, 0.1, 0.7, 0.5}
- c.** {0.4, 0.5, 0.9, 0.3, 0.2}
- d.** {0.1, 0.5, 0.4, 0.2, 0.2}

Ans: d

Explanation: Max of MF then 1- of MF

91. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cup \sim B)(x)$ will be

- a.** {0.9, 0.5, 0.6, 0.8, 0.8}
- b.** {0.6, 0.2, 0.1, 0.7, 0.5}
- c.** {0.6, 0.8, 0.4, 0.7, 0.8}
- d.** {0.1, 0.8, 0.4, 0.2, 0.5}

Ans: c

Explanation: Max of MF , 1- of MF

92. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(\sim A \cup B)(x)$ will be

- a.** {0.9, 0.5, 0.6, 0.8, 0.8}
- b.** {0.6, 0.2, 0.1, 0.7, 0.5}
- c.** {0.4, 0.5, 0.9, 0.3, 0.2}
- d.** {0.9, 0.5, 0.9, 0.8, 0.5}

Ans: d

Explanation: Max of MF , 1- of MF

93. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____

- a) Fuzzy Set
- b) Crisp Set
- c) Fuzzy & Crisp Set
- d) None of the mentioned

Answer: a

Explanation: Fuzzy logic deals with linguistic variables.

94. The values of the set membership is represented by _____

- a) Discrete Set
- b) Degree of truth
- c) Probabilities
- d) Both Degree of truth & Probabilities

Answer: b

Explanation: Both Probabilities and degree of truth ranges between 0 – 1.

95. Japanese were the first to utilize fuzzy logic practically on high-speed trains in Sendai.

- a) True
- b) False

Answer: a

Explanation: None.

96 Compute the value of adding the following two fuzzy integers:

$$A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$$

$$B = \{(0.5,11), (1,12), (0.5,13)\}$$

Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(y)))$

Then, $f(A+B)$ is equal to

- a. $\{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)\}$
- b. $\{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)\}$
- c. $\{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$
- d. $\{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$

Ans: d

Explanation: As per the formula

97. Let R and S be two fuzzy relations defined as follows. Then, the resulting relation, T, which relates elements of universe of X to elements of universe of Z using max-product composition is given by

$$R = \begin{matrix} & y_1 & y_2 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.7 & 0.5 \\ 0.8 & 0.4 \end{matrix} \right] \end{matrix}$$

and $S = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} y_1 \\ y_2 \end{matrix} & \left[\begin{matrix} 0.9 & 0.6 & 0.2 \\ 0.1 & 0.7 & 0.5 \end{matrix} \right] \\ z_1 & z_2 & z_3 \end{matrix}$

(A) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.68 & 0.89 & 0.39 \\ 0.76 & 0.72 & 0.32 \end{matrix} \right] \end{matrix}$

(B) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.68 & 0.89 & 0.39 \\ 0.72 & 0.76 & 0.32 \end{matrix} \right] \end{matrix}$

(C) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.63 & 0.42 & 0.25 \\ 0.72 & 0.48 & 0.20 \end{matrix} \right] \end{matrix}$

(D) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.05 & 0.35 & 0.14 \\ 0.04 & 0.28 & 0.16 \end{matrix} \right] \end{matrix}$

Ans: D

Explanation: As per the formula

98. Consider above example and compute Max_min composition, Min_max composition

Ans: []

Explanation: As per the formula i) max (min(u(R),u(s)), ii) min(max(u(R),u(s))

99. Let A be the set of comfortable houses given as follows. Then the set of comfortable and affordable houses is

$$A = \left\{ \frac{x_1}{0.8}, \frac{x_2}{0.9}, \frac{x_3}{0.1}, \frac{x_4}{0.7} \right\}$$

and B be the set of affordable houses

$$B = \left\{ \frac{x_1}{0.9}, \frac{x_2}{0.8}, \frac{x_3}{0.6}, \frac{x_4}{0.2} \right\}$$

(A) $\left\{ \frac{x_1}{0.8}, \frac{x_2}{0.8}, \frac{x_3}{0.1}, \frac{x_4}{0.2} \right\}$

(B) $\left\{ \frac{x_1}{0.9}, \frac{x_2}{0.9}, \frac{x_3}{0.6}, \frac{x_4}{0.7} \right\}$

(C) $\left\{ \frac{x_1}{0.8}, \frac{x_2}{0.8}, \frac{x_3}{0.6}, \frac{x_4}{0.7} \right\}$

(D) $\left\{ \frac{x_1}{0.7}, \frac{x_2}{0.7}, \frac{x_3}{0.7}, \frac{x_4}{0.9} \right\}$

Ans: B

Explanation: AND is Minimum of MF

100. Fuzzy membership function with only one member with value one is called..

- a. Singleton
- b. Core
- c. Boundary
- d. Support

Ans: a:

Explanation: As per the definition

101. Let $h(A)$ denote the height of a fuzzy set A. A is called a normal fuzzy set if

- a) $h(A)=0$
- b) $h(A)=1$
- c) $h(A)<1$
- d) $h(A)>1$

Ans: b

Explanation: As per the definition

102. Let A be a fuzzy set. Then 1-cut of A is usually called

- a)Support of A
- b) height of A
- c) Core of A
- d)cut of A5.

Ans: C

Explanation: core of MF has values 1

103. The boundary condition satisfied by the standard fuzzy complement is

- a) $c(0)=1$ and $c(1)=1$
- b) $c(0)=0$ and $c(1)=1$
- c) $c(0)=0$ and $c(1)=0$
- d) $c(0)=1$ and $c(1)=0$.

Ans: D

Explanation: Boundary is between 0 to 1 its complement is 1 to 0

104. Each fuzzy complement has atmost-----equilibrium.

- a)1
- b)2
- c) 3
- d) None of these

Ans: A

Explanation: MF is between 0 to 1

Subject: Soft computing Optimization Algorithm

Unit-4 Evolutionary Computing

1. Which of the following is not a discrete optimization problem?

- A Travelling salesman problem
- B Robot control
- C Chess playing program
- D Prediction of stock prices

Ans: B

Explanation: Robot control is controller system

2. Which of the following are discrete optimization problems?

- A Travelling salesman problem
- B Prediction of stock prices
- C Chess playing program
- D All of above

Ans: D

Explanation: All are applications of GA or EA

3. Exploration search is

- A Concerned with improving the current best solution by local search
- B Concerned with global search
- C Often resulting in getting stuck in local optima
- D None of above

Ans: B

Explanation: Exploitation means using already exist solutions and make refinement to it so it's fitness will improve

4. Evolutionary algorithm: Initialization

- A Individuals are normally generated randomly
- B Is concerned with generating candidate solutions
- C Heuristics for generating candidates can be applied
- D All of above

Ans: D

Explanation: All above are true

5. Evolutionary algorithm: Variation operators

- A Is a selection operator
- B Act on population level
- C Act on individual level
- D Are crossover and mutation

Ans: B, D

Explanation: variation operations are crossover and mutation

6. Evolutionary algorithm: Recombination

- A Also known as crossover
- B Combines elements of two or more genotypes
- C Also known as mutation
- D Also known as representation

Ans: A, B

Explanation: Recombination is also known as crossover

7. Evolutionary algorithm: Survivor selection

- A Is often stochastic
- B Also known as replacement
- C Can be fitness based
- D Can be age based

Ans: B,C,D

Explanation: Survivor selection can be based on fitness value, age

8. Evolutionary algorithm: Termination condition

- A Several termination criteria can be combined
- B Determines when to compute the fitness for a population
- C Should be avoided to get faster evolution
- D None of above

Ans: A

Explanation: Termination conditions like max iteration, time out, no change in fitness can be combined

9. Evolutionary algorithm: Termination condition

- A None of above
- B Determines when to compute the fitness for a population
- C Is checked in every generation
- D Should be avoided to get faster evolution

Ans: C

Explanation: checked after every iteration to end the search

10 Tree representation (choose multiple)

- A Is used in Genetic Programming
- B Mutation results in replacing a randomly chosen subtree by a randomly generated tree
- C Not suited for representing computer programs
- D Is used in Genetic Algorithms

Ans: A,B

Explanation: Suitable for GP to generate computer programs

11 Rank based selection

- A Results in less control of the selection pressure than fitness-proportionate selection
- B Use absolute rather than relative fitness
- C Ranking can be either linear or non-linear
- D None of above

Ans: C

Explanation: Chromosomes are ranked based on fitness value

12 Simple Genetic Algorithm (GA) (choose multiple)

- A Children compete with parents in survival selection
- B Both crossover and mutation are applied in each generation
- C The whole population is replaced with the resulting offspring
- D All of above

Ans: B,C

Explanation: Whole population get replaced with new child

13 Evolutionary Strategies (ES)

- A (μ , λ): Select survivors among parents and offspring
- B ($\mu+\lambda$): Select survivors among parents and offspring
- C ($\mu-\lambda$): Select survivors among offspring only
- D ($\mu:\lambda$): Select survivors among offspring only

Ans: B

Explanation: The form of $(\mu + \lambda)$ -ES models in which μ specified the size of the parent population and λ specified the size of the offspring population

14 What is most important to be concerned with in the evolution of repetitive problems?

- A Do multiple runs until a good solution is found
- B Execute one run until the solution is good enough
- C Get a reasonably good solution every time
- D Get a very good result just once

Ans: C

Explanation: Iterative process looking for good solutions in every iterations

15. What are normally the two best measurement units for an evolutionary algorithm?

- A Number of Generations
- B Elapsed time
- C CPU time
- D Population size

Ans: A, B

Explanation: CPU time is hardware dependent and number of population specifies size of search area.

16. What are normally the two best measurement units for an evolutionary algorithm?

- A Number of evaluations
- B Elapsed time
- C CPU time
- D Number of generations

Ans: B, D

Explanation: CPU time is hardware dependent and number of evaluations is not important

17 Tree representation (choose multiple)

- A Is used in Genetic Programming
- B Mutation results in replacing a randomly chosen subtree by a randomly generated tree
- C Suited for representing computer programs
- D All of above

Ans: D

Explanation: Suitable for GP to generate computer programs

18 Simple Genetic Algorithm (GA)

- A Fitness get evaluated at the end of every iteration
- B Both crossover and mutation are applied in each generation
- C The whole population is replaced with the resulting offspring
- D All of above

Ans: D

Explanation: Recombination-evaluation- replacement are steps of GA

19. In Evolutionary Strategy , individuals are represented as

- a. real value
- b. Binary
- c. tree
- d. Octal

Ans. A

Explanation: The focus of the evolution strategy (ES) paradigm was on real-valued function optimization. Hence, individuals were naturally represented as vectors of real numbers.

20. In early EA or ES, parent selection is based on

- a. Roulette Wheel
- b. Order of fitness
- c. Probabilistic normal distribution
- d. All of above

Ans: c

Explanation: parent selection is based on Probabilistic normal distribution

21. In EP, population is the combination of parent and child

- a. True
- b. False

Ans: a

Explanation: The evolutionary programming (EP) paradigm concentrated on models involving a fixed-size population of N parents, each of which produced a single offspring. The next generation of N parents was determined by combining both parents and children into a single population of size $2N$, rank ordering them by fitness and allowing only the top N to survive.

22. In GA, population is the combination of Parent and child

- a. True
- b. False

Ans: b

Explanation: parent gets replaced by child

23. In EA, the new offspring is forced to compete immediately for survival against an existing member of the population

- a. True
- b. False

Ans: a

Explanation: If the objective fitness of the child is greater than the selected member, the child survives and the old member dies off. Otherwise, the child dies without ever residing in the population.

24 In EA, the entire parent population dies off each generation and the offspring only compete with each other for survival

- a. non-overlapping models
- b. overlapping models

Ans: a

Explanation: As per definition

25 In EA, offspring compete with each other and parents for survival

- a. non-overlapping models
- b. overlapping models

Ans: b

Explanation: As per definition

26. In EA, premature convergence takes place due to

- a. Survival selection pressure
- b. Selection method

- c. Complexity of problems
- d. too much exploitation

Ans: d

Explanation: For problems that exhibit highly multi-modal (rugged) fitness landscapes or landscapes that change over time, too much exploitation generally results in premature convergence to suboptimal peaks in the space.

27. In EA, offspring compete with parent or other offspring is called...

- a. Survival Selection
- b. Tournament Selection
- c. Competition
- d. None of above

Ans: a

Explanation: As per the definition

28. In EV, $(\mu+\lambda)$ model is supported by

- a. Evolutionary Strategy
- b. Evolutionary Programming
- c. Evolutionary Algorithms
- d. All of Above

Ans: a

Explanation: The form of $(\mu + \lambda)$ -ES models in which μ specified the size of the parent population and λ specified the size of the offspring population

29. In EC, following are the selection methods

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. All are above

Ans: d

Explanation: These are non-overlapping generation modules

30. In EC, following are the selection methods

- a. Rank-Proportional Selection
- b. Tournament Selection
- c. Fitness-Proportional Selection
- d. All of above

Ans: d

Explanation: These are non-overlapping generation modules

31. In EC, genotype is selected based on maximum fitness value is called

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection

- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: b

Explanation: As per the definition

32. In EC, only the k most fit individuals are selected from a pool of individuals of size $r > k$ is ..

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: c

Explanation: As per the definition

33. In EC, selection based on sorting the members of a selection pool by fitness is ...

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: d

Explanation: As per the definition

34. In EC selection, picking q individuals from the selection pool using a uniform probability distribution with replacement and designating the winner of that tournament as the one with the best fitness is

- a. Rank-Proportional Selection
- b. Tournament Selection
- c. Fitness-Proportional Selection
- d. Fitness_biased

Ans: b

Explanation: As per the definition

35. The difference between rank proportional and tournament selection is that genotypes are sorted in order to fitness value in rank proportional

- a. True
- b. False

Ans: a

Explanation: A potential computational disadvantage to truncation and linear ranking selection methods is that they require the selection pool to be sorted by fitness.

36. The difference between truncation and tournament selection is that genotypes are sorted in order to fitness value in truncation proportional

- a. True
- b. False

Ans: a

Explanation: A potential computational disadvantage to truncation and linear ranking selection methods is that they require the selection pool to be sorted by fitness.

37. In EA, recombination operation on p1: AB|CD and p2: ab|cd produces

- a. ABab
- b. ABcd
- c. ABCD
- d. abCD

Ans: b

Explanation: Recombination operation in EA is crossover here at point 2

38. In EA, recombination operation on p1: ABC|DEF and p2: abc|def produces

- a. ABCabc
- b. ABCdef
- c. ABCDef
- d. abcDEF

Ans: b

Explanation: Recombination operation in EA is crossover here at point 3

Note: In evolutionary algorithms two parents produce single child, whereas in GA two parents produce 2 children.

39. In EA, recombination operation on p1: AB|CD|EF and p2: ab|cd|ef produces

- a. ABcdEF
- b. abCDEF
- c. ABCDef
- d. abcDEF

Ans: a

Explanation: Recombination operation in EA is crossover here at point 2 and 4

40. In EA, recombination operation on p1: A|BCDE|F and p2: a|bcde|f produces

- a. ABcdEF
- b. abCDEF
- c. AbcdeF
- d. abcDEF

Ans: c

Explanation: Recombination operation in EA is crossover here at point 2 and 4

41. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 1122 produces

- a. ABcd
- b. abCD

c. ABCD

d. abcd

Ans: a

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

42. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 2211 produces

a. ABcd

b. abCD

c. ABCD

d. abcd

Ans: b

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

43. In EA, recombination operation on p1: ABCDEF and p2: abcdef with flip sequence 221122 produces

a. ABcdcd

b. abCDef

c. ABCDef

d. abcdEF

Ans: b

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

44. In EA, recombination operation on p1: ABCDEF and p2: abcdef with flip sequence 112211 produces

a. ABcdEF

b. abCDef

c. ABCDef

d. abcdEF

Ans: a

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

45. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 1212 produces

a. ABcd

b. abCD

c. AbCd

d. abcd

Ans: c

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

46. In EA , parent selection and survival selection is same

- a. True
- b. False

Ans: b

Explanation: Offspring compute with parent or other offspring for survival is called survival selection

47. In Evolutionary Algorithm, the whole population is replaced with the resulting offspring

- a. True
- b. False

Ans: b

Explanation: population is combination of parents and offspring

48 Simple Evolutionary Algorithm (EA) (choose multiple)

- A Children compete with parents in survival selection
- B Both crossover and mutation are applied in each generation
- C The whole population is replaced with the resulting offspring
- D All of above

Ans: A, B

Explanation: population is combination of parents and offspring hence survival selection occurs

49. In EA, ----asexual operation is

- a. representation
- b. Recombination
- c. Mutation
- d. none of above

Ans: c

Explanation: Mutation is performed on single parent only

50. In EA, ----sexual operation is

- a. representation
- b. Recombination
- c. Mutation
- d. none of above

Ans: b

Explanation: Recombination (crossover) is performed on two parents

Unit-5 Genetic Algorithms

1 Genetic Algorithms: Variable length encoding is possible in

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans: A

Explanation: Variable size encoding is possible in Messy GA

2 Genetic Algorithms: parameters can be changes runtime

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans : B

Explanation: parameters can be changes runtime in adaptive GA

3. Genetic Programming: representation is

- A. binary encoding
- B: Tree encoding
- C: Hex encoding
- D: Real value encoding

Ans: B

Explanation: Tree encoding is used to represent computer programs in GP

4. Generation of Computer programs is possible in

- A: Genetic Algorithms
- B. Genetic Programming
- C. Evolutionary Algorithms
- D. Evolutionary Strategy

Ans: B

Explanation: Computer programs can be output in GP

5. Probability of sub string get propagated in next generation is derived by

- A. Schema theorem
- B. Holland Classifiers
- C. Roulette wheel
- D. fitness evaluation

Ans: A

Explanation: Schema theorem is used to compute Probability of sub string get propagated in next generation

6. Following are the evaluation parameters for schema theorem (Choose multiple answers)

- A. Schema order
- B. Schema length
- C. representation technique
- D. None of above

Ans: A, B

Explanation: order and length are used

7. Schema theorem defines, there is high probability for sub strings to propagate in next generation if

- A. high order and short length
- B. High order and long length
- C. Low order and short length
- D. Low order and long length

Ans: C

Explanation: As per the theorem

8. Genetic algorithm: Mutation operators

- A. Is a selection operator
- B. Act on population level
- C. Act on individual level
- D. Is an encoding technique

Ans: C

Explanation: mutation act on one parent at a time

9. Genetic algorithm: Selection operators

- A Is a mutation operator
- B Act on population level
- C Act on individual level
- D Is an encoding technique

Ans: B

Explanation: Selection is based on whole population

10. Genetic algorithm: Crossover operators

- A Is a mutation operator
- B Act on population level
- C Act two individual level
- D Is an encoding technique

Ans: c

Explanation: Crossover combines two parents to produce two childs

11. Genetic Algorithms: chromosomes are represented using:

- A binary
- B Octal
- C Real value
- D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string are way to represent chromosomes

12. Genetic Algorithms: Diversification is carried out due to

- A Selection
- B Mutation
- C Crossover
- D Fitness evaluation

Ans: B

Explanation: As per definition

13. Genetic algorithms: chromosomes are selected randomly in

- A. Roulette Wheel
- B. Tournament
- C. Rank Selection
- D. Random selection

Ans: D

Explanation: Random Selection selects chromosomes randomly

14. Genetic algorithms: chromosomes selected based on selective pressure by holding a tournament competition

- A. Roulette Wheel
- B. Tournament
- C. Rank Selection
- D. Random selection

Ans: B

Explanation: As per definition

15. Genetic algorithms: chromosomes are selected based on highest fitness value

- A. Roulette Wheel
- B. Tournament
- C. Rank Selection
- D. Random selection

Ans: C

Explanation: As per definition

16. Rank based selection

- A Use relative rather than absolute fitness
- B Use absolute rather than relative fitness
- C Results in less control of the selection pressure than fitness-proportionate selection
- D None of above

Ans: A

Explanation: As per definition

17. The process of taking two parent solutions and producing from them a child is called

- A. Selection
- B. Crossover
- C. Mutation
- D. Reproduction

Ans: B

Explanation: As per definition

18. The two mating chromosomes are cut once at corresponding points and the sections after the cuts exchanged.

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: A

Explanation: As per definition

19. The process of taking single parent solutions and producing a child is called

- A. Selection
- B. Crossover
- C. Mutation
- D. Reproduction

Ans: C

Explanation: As per definition

20. The two mating chromosomes are cut more than one at corresponding points and the sections after the cuts exchanged.

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: B

Explanation: As per definition

21. The two mating chromosomes are crossover with the help of mask

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: C

Explanation: As per definition

22. The three mating chromosomes are crossovered in

- A. Three parent crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: A

Explanation: As per definition

23. Probability of how often crossover will be performed can be mentioned in

- A. Three parent crossover
- B. Double point crossover
- C. Crossover probability
- D. Uniform crossover

Ans: A

Explanation: As per definition

24. A mutation chromosome generated by changing bit 0 to 1 and 1 to 0 is

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: B

Explanation: As per definition

25. A mutation chromosome generated by selecting random position and the bits next to that position are reversed

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: D

Explanation: As per definition

26. A mutation chromosome generated by exchanging bits at randomly selected positions is

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: A

Explanation: As per definition

27. How often parts of chromosome will be mutated is

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: C

Explanation: As per definition

28. Stopping criteria for Genetic Algorithms is

- A. No change in fitness
- B. Maximum generation
- C. Elapsed time
- D. All of above

Ans: D

Explanation: All are stopping criteria for GA

29. In this type of GA, the GA does the global optimization while local refinement is done by the conventional method

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans: d

Explanation: Hybrid allows combination of traditional approaches with GA

30. In this type of GA, task of a basic GA is distributed on different processors

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans: C

Explanation: Parallel GA allows parallel execution on different processor

31. Genetic algorithms are used if

- A. The search space is large, complex
- B. No mathematical analysis is available
- C. Traditional search methods fail
- D. All of above

Ans: D

Explanation: All are applications of GA

32. Application of Genetic Algorithm

- A. Optimization
- B. Machine and robotic learning

C. Economic Model

D. All of above

Ans: D

Explanation: All are applications of GA

33. Architecture-altering operation is special operation present in

- A. Genetic Algorithm
- B. Genetic Programming
- C. Evolutionary Algorithms
- D. Evolutionary Computing

Ans: B

Explanation: It is found in GP

34. Basic steps of GA

- A. selection- fitness evaluation- recombination
- B. recombination - selection- fitness evaluation
- C. Fitness evaluation- Selection-recombination
- D. Selection- recombination-fitness evaluation

Ans: D

Explanation: It is the general flow of GA

35. In GA , 10100011 is ----- chromosome representation

- a. Binary
- b. Octal
- c. Real value
- d. Hexadecimal

Ans: a

Explanation: it is binary encoding representation

36. In GA , 9CEF is ----- chromosome representation

- a. Binary
- b. Octal
- c. Real value
- d. Hexadecimal

Ans: d

Explanation: it is hexadecimal encoding representation

37. In GA , 2348 is ----- chromosome representation

- a. Binary
- b. Octal
- c. tree encoding
- d. Hexadecimal

Ans: b

Explanation: it is Octal encoding representation

38. In GA , 1 2 4 8 is ----- chromosome representation

- a. Binary
- b. Octal
- c. Permutation encoding
- d. Hexadecimal

Ans: c

Explanation: it is permutation or real valued encoding representation

39. In GA , 1.25 2.45 4.45 8.67 is ----- chromosome representation

- a. Binary
- b. Octal
- c. Value encoding
- d. Hexadecimal

Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

40. In GA , ABCD, DEFG is ----- chromosome representation

- a. Binary
- b. Octal
- c. Value encoding
- d. Hexadecimal

Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

41. In GA {right}, {back}, {white}is ----- chromosome representation

- a. Binary
- b. Octal
- c. Value encoding
- d. Hexadecimal

Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

42. In GA , {right}, {back}, {white} is one of chromosome representation

- a. True
- b. false

Ans: a

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

43. In GA , abcd, efgt is one of chromosome representation

- a. True
- b. false

Ans: a

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

44. In GA, p1: 1010, P2:1100 are parents chromosome, in single point , crossover point 2 (lsb) produces:

- a. c1: 1000 c2: 1110
- b. c1: 1010 c2:1110
- c. c1: 1000 c2:1111
- d. c1:1100 c2:1010

Ans: a

Explanation: interchange string after cross over point

45. In GA, p1: 1010, P2:1100 are parents chromosome, in single point, crossover point 3 (lsb) produces:

- a. c1: 1000 c2: 1110
- b. c1: 1010 c2:1110
- c. c1: 1000 c2:1111
- d. c1:1100 c2:1010

Ans: d

Explanation: interchange string after cross over point

46. In GA, p1: 101 00 000, P2:110 01 111 are parents chromosome, in two point, crossover point 3 ,5 (lsb) produces:

- a. c1: 100 00 111 c2: 111 00 111
- b. c1: 101 01 000 c2: 110 00 111
- c. c1: 100 01 000 c2: 110 01 111
- d. c1:110 00 000 c2:101 01 111

Ans: b

Explanation: interchange string between cross over point

47. In GA, p1: 101 00 000, P2:110 01 111 are parents chromosome, in two point, crossover point 2 ,7 (lsb) produces:

- a. c1: 1 000011 1 c2: 1 110011 1
- b. c1: 1 01 0000 1 c2: 1 10 01 11 0
- c. c1: 1 000100 0 c2: 1 100111 1
- d. c1:1 100000 0 c2:1 010111 1

Ans: b

Explanation: interchange string between cross over point

48. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 1010 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1111 c2: 0000
- c. c1: 0000 c2: 1010
- d. c1:1010 c2:1111

Ans: a

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

49. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 0101 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1010 c2: 0101
- c. c1: 0000 c2: 1010
- d. c1:1010 c2:1111

Ans: b

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

50. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 0001 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1010 c2: 0101
- c. c1: 0001 c2: 1110
- d. c1:1010 c2:1111

Ans: c

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

51. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 1212 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH

d. c1: EFAB

Ans: a

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

52. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 2121 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH
- d. c1: EFAB

Ans: b

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

53. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 1122 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH
- d. c1: EFAB

Ans: c

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

54. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 2211 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH
- d. c1: EFAB

Ans: d

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

55. In GA, p1: 4 1| 1 3| 6 5 , P2: 2 3|1 4| 5 6 are parents chromosome, in *order* crossover produces:

- a. c1: 4 1| 3 1| 6 5 c2: 2 3| 4 1| 5 6
- b. c1: 4 1| 1 3| 6 5 c2: 2 3| 4 1| 5 6
- c. c1: 4 1| 3 1| 6 5 c2: 2 3| 1 4| 5 6
- d. c1: 4 1| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: a

Explanation: child 1 inherits its left and right section from parent 1, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

56. In GA, p1: 4 1| 5 3| 6 5 , P2: 2 3|1 6| 5 6 are parents chromosome, in *order* crossover produces:

- a. c1: 4 1| 3 5| 6 5 c2: 2 3| 1 6| 5 6
- b. c1: 4 1| 1 3| 6 5 c2: 2 3| 4 1| 5 6
- c. c1: 4 1| 3 1| 6 5 c2: 2 3| 1 4| 5 6
- d. c1: 4 1| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: a

Explanation: child 1 inherits its left and right section from parent 1, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

57. In GA, p1: 4 6| 5 3| 1 5, P2: 2 3|1 6| 5 6 are parents chromosome, in *order* crossover produces:

- a. c1: 4 6| 5 3| 1 5 c2: 2 3| 6 1| 5 6
- b. c1: 4 6| 1 3| 6 5 c2: 2 3| 6 1| 5 6
- c. c1: 4 6| 3 5| 1 5 c2: 2 3| 1 6| 5 6
- d. c1: 4 6| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: c

Explanation: child 1 inherits its left and right section from parent 1, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

58. In GA, p1:0011 are parent chromosome, in *flipping mutation* chromosome 1001 produces:

- a. 1001
- b. 1000
- c. 1010
- d. 0011

Ans: c

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

59. In GA, p1:0011 are parent chromosome, in *flipping mutation* chromosome 0110 produces:

- a. 1001
- b. 1000
- c. 1010
- d. 0101

Ans: d

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

60. In GA, p1:1111 are parent chromosome, in *flipping mutation* chromosome 1001 produces:

- a. 1001
- b. 0110
- c. 1010
- d. 0011

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

61. In GA, p1:1111 are parent chromosome, in *flipping mutation* chromosome 1011 produces:

- a. 1001
- b. 1011
- c. 1010
- d. 0011

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

62. In GA, p1:1111 0000 are parent chromosome, in *flipping mutation* chromosome 0000 1111 produces:

- a. 1111 0000
- b. 1111 1111
- c. 0000 1111
- d. 0000 0000

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

63. In GA, p1:1111 0000 are parent chromosome, in *flipping mutation* chromosome 1111 0000 produces:

- a. 1111 0000
- b. 1111 1111
- c. 0000 1111
- d. 0000 0000

Ans: d

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

64. In GA, p1:11110000 are parent chromosome, in interchanging mutation at position 1 and 8 (lsb) produces:

- a. 01110001
- b. 1111 1111

c. 0000 1111

d. 0000 0000

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

65. In GA, p1:11110000 are parent chromosome, in interchanging mutation at position 2 and 7 (lsb) produces:

a. 10110010

b. 1111 1111

c. 0000 1111

d. 0000 0000

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

66. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 1 and 4 (lsb) produces:

a. 1001

b. 0110

c. 1010

d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

67. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 2 and 3 (lsb) produces:

a. 1001

b. 0110

c. 1010

d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

68. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 1 and 3 (lsb) produces:

a. 1001

b. 0110

c. 1100

d. 0101

Ans: c

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

69. In GA, p1:1101 are parent chromosome, in interchanging mutation at position 3 and 4 (lsb) produces:

- a. 1101
- b. 0110
- c. 1100
- d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

70. In GA, p1:1101 are parent chromosome, in interchanging mutation at position 3 and 2 (lsb) produces:

- a. 1101
- b. 0110
- c. 1010
- d. 0101

Ans: c

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

71. In GA, p1:11 01 are parent chromosome, in reversing mutation at position 2 (lsb) produces:

- a. 1001
- b. 0110
- c. 1010
- d. 1101

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

72. In GA, p1:1 101 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 1 001
- b. 0 110
- c. 1 110
- d. 1 101

Ans: c

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

72. In GA, p1:1 100 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 1 001
- b. 0 110
- c. 1 110
- d. 1 010

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

73. In GA, p1:110011 are parent chromosome, in reversing mutation at position 4 (lsb) produces:

- a. 11 0011
- b. 11 1001
- c. 11 1100
- d. 11 0100

Ans: b

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

74. In GA, p1:110011 are parent chromosome, in reversing mutation at position 2 (lsb) produces:

- a. 11 0011
- b. 11 1001
- c. 11 1100
- d. 11 0011

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

75. In GA, p1:110011 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 110 101
- b. 111 001
- c. 111 100
- d. 110 011

Ans: a

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

76. In schema theorem, 111**0, order of schema is...

- a. 2
- b. 3
- c. 1

d. None of above

Ans: a

Explanation: Order is number of * (don't care, i.e. 0 or 1)

77. In schema theorem, $1^*1^{**}0$, order of schema is...

a. 2

b. 1

c. 3

d. 6

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

78. In schema theorem, $1^{***}0$, order of schema is...

a. 2

b. 1

c. 3

d. 4

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

79. In schema theorem, $10^*0^*1^*$, order of schema is...

a. 2

b. 1

c. 3

d. 7

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

80. In schema theorem, 10^*0^* , order of schema is...

a. 2

b. 1

c. 3

d. 5

Ans: a

Explanation: Order is number of * (don't care, i.e. 0 or 1)

81. In schema theorem, 10^*0^* , length of schema is...

a. 2

b. 1

c. 3

d. 5

Ans: a

Explanation: length is number of elements in between first non *to last *

82. In schema theorem, 10^{**} , length of schema is...

- a. 2
- b. 1
- c. 0
- d. 5

Ans: c

Explanation: length is number of elements in between first non *to last *

83. In schema theorem, 100^{**} , length of schema is...

- a. 2
- b. 5
- c. 0
- d. 1

Ans: d

Explanation: length is number of elements in between first non *to last *

84. In schema theorem, $100^{**}0$, length of schema is...

- a. 4
- b. 5
- c. 0
- d. 1

Ans: a

Explanation: length is number of elements in between first non *to last *

85. In schema theorem, $1*00^{**}0$, length of schema is...

- a. 4
- b. 5
- c. 0
- d. 1

Ans: b

Explanation: length is number of elements in between first non *to last *

86. In schema theorem, $1*00^{**}$, length of schema is...

- a. 4
- b. 5
- c. 0
- d. 2

Ans: d

Explanation: length is number of elements in between first non *to last *

87. In schema theorem, 1^{***} , length of schema is...

- a. 4
- b. 5

c. 0

d. 2

Ans: c

Explanation: length is number of elements in between first non *to last *

88. In schema theorem, 1^{***} , length and order of schema is...

a. 4,1

b. 1,3

c. 0,3

d. 3,1

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of *

89. In schema theorem, $1^{***}1$, length and order of schema is...

a. 3,5

b. 1,3

c. 0,3

d. 3,3

Ans: d

Explanation: length is number of elements in between first non *to last * and order is no. of *

90. In schema theorem, 1^*1^*1 , length and order of schema is...

a. 3,2

b. 1,3

c. 0,3

d. 3,3

Ans: a

Explanation: length is number of elements in between first non *to last * and order is no. of *

91. In schema theorem, 10^*00^* , length and order of schema is...

a. 6,2

b. 6,4

c. 3,2

d. 2,3

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of *

92. In schema theorem, 10^*0^* , length and order of schema is...

a. 6,2

b. 6,4

c. 3,2

d. 2,2

Ans: d

Explanation: length is number of elements in between first non *to last * and order is no. of *

93. In schema theorem, 00^{**} , length and order of schema is...

a. 4,2

b. 2,4

c. 0,2

d. 2,2

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of *

94. Genetic Algorithms: chromosomes are represented using:

A binary

B Octal

C Hexadecimal

D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string are way to represent chromosomes

95. Genetic Algorithms: chromosomes are represented using:

A binary

B Tree

C Hexadecimal

D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string, tree are way to represent chromosomes

96. In GA: compute fitness of 00110011, where fitness function is number of ones

a. 2

b. 8

c. 4

d. 0

Ans: c

Explanation: Fitness is computed as number of ones

96. In GA: compute fitness of 0011, where fitness function is number of ones

a. 2

b. 8

c. 4

d. 0

Ans: a

Explanation: Fitness is computed as number of ones

97. In GA: compute fitness of 0011, where fitness function is number of ones, what would be the best solution

a. 2, 15

b. 8, 15

c. 4, 8

d. 0, 8

Ans: a

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

98. In GA: For fitness function is number of ones, what would be the best solution for 4 bit string

a. 8

b. 15

c. 4

d. 2

Ans: b

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

99. In GA: For fitness function is number of ones, what would be the global minimum solution for 5 bit string

a. 11111

b. 10000

c. 00000

d. 00101

Ans: c

Explanation: Fitness is computed as number of ones, hence 00000 will produce best solution

100. In GA: For fitness function equal to number of ones, what would be the best solution for 4 bit string

a. 0000

b. 1111

c. 1010

d. 1110

Ans: b

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

Unit-6 Swarm Intelligence

1. Swarm intelligence

- A Global behaviour appears as a result of centralized control
- B In Particle Swarm Optimization, velocity and position of particles are updated
- C The probability of choosing a new edge in ant colony optimization is proportional with the pheromone level of the edge
- D All of above

Ans: D

Explanation: All are types of swarm intelligence

2. Biologically inspired computation is appropriate for

- A Optimization
- B Modelling
- C Simulation
- D. All of above

Ans: D

Explanation: Biological processes are simulated, modelled to solve optimization problems

3. In PSO, at every iteration particle changes

- A. only position
- B. Only Velocity
- C. Position and Velocity both
- D. None of above

Ans: C

Explanation: At every iterations position and velocity is updating

4. In PSO particles position is depend upon

- A. Inertial
- B. Individual best position
- C. Global best position
- D. All of above

Ans: D

Explanation: Factors affecting position are inertia, global and local positions

5. ACO is used in

- A. Graph coloring problem
- B. Travelling Sales Man
- C. Network routing
- D. All of above

Ans: D

Explanation: All above are application of ACO

6. In ACO, pheromone level is directly proportional to the distance

A. True

B: False

Ans: B

Explanation: Minimum distance higher the pheromone level

7. In ACO, pheromone level is inversely proportional to the distance

A. True

B: False

Ans: A

Explanation: Minimum distance higher the pheromone level

8. Gradient descent is optimization technique used to find

A. Local maximum

B. Local Minimum

C. Both A and B

D. None of above

Ans B

Explanation: it optimizes problem of minimization

9. Gradient ascent is optimization technique used to find

A. Local maximum

B. Local Minimum

C. Both A and B

D. None of above

Ans A

Explanation: it optimizes problem of maximization

10. In ACO, pheromone amount get decreases with some fraction, called as

A. Evaporation rate

B. Decade rate

C. Pheromone trail

D. None of above

Ans: A

Explanation: As per the definition

11. Social behaviour of animals is observed and implemented artificially is called

A. Artificial neural network

B. Genetic Programming

C. Swarm Intelligence

D. Evolutionary computing

Ans: C

Explanation: As per the definition

12. In ACO, selection probability of next node by ant is

- A. proportional to pheromone level present on connection link
- B. inversely proportional to pheromone level present on connection link
- C. proportional to evaporation rate
- D. None of above

Ans: A

Explanation: probability is higher if pheromone is higher

13. In PSO, next position p is computed as

- A. $p=p+1$
- B. $p=p+velocity$

Ans: B

Explanation: As per the formula

14. Evaporation value is

- a. 0
- b. 1
- c. Between 0 to 1
- d. none of above

Ans: c

Explanation: Rate is in between 0 to 1

15. $T_{ij}(t + n) = p \cdot T_{ij}(t) + \Delta T$ is the formula for updating

- a. pheromone level
- b. evaporation rate

Ans: a

Explanation: p stands for evaporation rate

16. $T_{ij}(t + n) = p \cdot T_{ij}(t) + \Delta T$ in this formula p is set to

- a. 0
- b. 1
- c. $0 < p < 1$
- d. any value

Ans: c

Explanation: p stands for evaporation rate, set between 0 to 1

17. In TSP for an ant to decide which city to visit next is calculated based on

- a. greedy approach
- b. Genetic Algorithms
- c. ACO
- d. All are above

Ans: d

Explanation: TSP is non-deterministic problem can be solved by any of above technique.

18. In TSP for an ant to decide which city to visit next is calculated based on

- a. Transition probability
- b. Simple probability

Ans: a

Explanation: Values are normalized all over the values (i.e adjacent cities are considered)

19. In ACO based TSP transition probability is

- a. Combination of heuristic rules and pheromone level
- b. based on pheromone level only
- c. based on heuristic rules only
- d. none of above

Ans: a

Explanation: As per the formula, it is Combination of heuristic rules and pheromone level

20. In TSP, track of non-visited cities can be maintained by

- a. heuristic rules
- b. transition probability
- c. evaporation rate
- d. Pheromone updation rate

Ans: a

Explanation: Rules can be used to maintain list of visited and non-visited cities.

21. PSO is inspired from

- a. Birds behaviour searching for the food
- b. Ants searching for food
- c. Bees searching for the food
- d. All of above

Ans: a

Explanation: PSO is based on the behaviour of flock of birds or school of fish

22. ACO is inspired from

- a. Birds behaviour searching for the food

- b. Ants searching for food
- c. Bees searching for the food
- d. All of above

Ans: b

Explanation: ACO is based on the behaviour of ant colonies

23. In swarm intelligence control is decentralized.....

- a. True
- b. false

Ans: a

Explanation: Not having single point control

24. In PSO , number of particles present in search space are..

- a. 1
- b. 0
- c. any number
- d. none of above

Ans: c

Explanation: Depends on problem statement e.g. 20,30,100 etc

25. In PSO, if numbers of particles are less, algorithm will converge slowly

- a. true
- b. false

Ans. A

Explanation: If large number result will come faster

26. In swarm intelligence control is centralized.....

- a. True
- b. false

Ans: b

Explanation: Not having single point control

27. Compared with GA, all the particles tend to converge to the best solution quickly ...

- a. True
- b. false

Ans: a

Explanation: In PSO, only gBest (or lBest) gives out the information to others. It is a one - way information sharing mechanism. The evolution only looks for the best solution.

28. Particles update themselves with...

- a. evaporation rate
- b. Internal velocity
- c. fitness value
- d. All of above

Ans; b

Explanation: At every iteration position is updated by adding velocity

29. For optimizing function $f(x)=2x+2y$, how many minimum particles will be required

- a. 1
- b. 2
- c. infinite
- d. zero

Ans: b

Explanation: one for x and other for y

30. For optimizing function $f(x)=2x+2y+2z$, how many minimum particles will be required

- a. 1
- b. 2
- c. infinite
- d. 3

Ans: d

Explanation: one for x , one for y and other for z

31. For optimizing function $f(x)=2x+2y+2z$, which function is used for fitness evaluation

- a. $f(x)=1$
- b. $f(x)=0$
- c. $f(x)=2x+2y+2z$,
- d. $f(x)=\max[0,1]$

Ans: c

Explanation: In this case objective function is fitness function

32. For optimizing function $f(x)=2x$, which function is used for fitness evaluation

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=2x$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case objective function is fitness function

33. For optimizing function $f(x)=2$, how many minimum particles will be required

- a. 1
- b. 2
- c. infinite
- d. zero

Ans: d

Explanation: This function will not able to optimize because of constant value

34 For TSP, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{Min_distance}(i,j)$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the minimum distance or Euclidean distance

35 For TSP, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{Sqrt_root } (i^2-j^2)$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the minimum distance or Euclidean distance

36 In classification problem, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{error rate evaluation}$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the error rate or accuracy measure

37 In classification problem, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{Accuracy measure}$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the error rate or accuracy measure

38 In classification problem, function used for fitness evaluation is

- a. $f(x)= \text{Accuracy measure}$
- b. $f(x)= \text{error rate evaluation}$
- c. neither a nor b
- d. both a and b

Ans: d

Explanation: In this case fitness function will be the error rate or accuracy measure

39 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1,2 what would be the fitness value for each particle

- a. 0,1,2
- b. 1,2,1

- c. 1,1,1
- d. 2,1,1

Ans: b

Explanation: Put each value in the function separately

40 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1 what would be the fitness value for each particle

- a. 0,1,2
- b. 1,2,1
- c. 1,1,1
- d. -2,1,2

Ans: d

Explanation: Put each value in the function separately

41 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1 , which particle produce best solution

- a. P1
- b. P2
- c. P3
- d. All of above

Ans: c

Explanation: P3=1 produces 2 value (i.e. maximum solution)

42 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1 ,2 which particle produces optimal solution

- a. P1
- b. P2
- c. P3
- d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

43 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1 ,2 Optimal solution has value...

- a. 1
- b. 2
- c. 0
- d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

44. $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1, Optimal solution has value...

- a. 1
- b. 2
- c. 0
- d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

45. In PSO , $V=V+c_1r_1(ib-p) + c_2r_2(gb-p)$ where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

- a. $c_1r_2(ib-p)$
- b. $c_1r_1(ib-p)$
- c. $c_1r_1(ib-gb)$
- d. $c_1r_1(gb-ib)$

Ans: b

Explanation: $c_1r_1(ib-p)$ gives individual best

46. In PSO, $V=V+c_1r_1(ib-p) + c_2r_2(gb-p)$ where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

- a. $c_1r_2(gb-p)$
- b. $c_2r_2(gb-p)$
- c. $c_2r_2(ib-gb)$
- d. $c_2r_2(gb-ib)$

Ans: b

Explanation: $c_2r_2(gb-p)$ gives global best

47. In ACO, if B and C are adjacent node to A with pheromone level 2,3 respectively then, then ant starting with A will select node with transition probability ---

- a. B
- b. C

Ans: b

Explanation: transition probability without heuristic rule is calculated as for $c=3/2+3$,
 $b=2/2+3$

48. In ACO, if B and C are adjacent node to A with pheromone level 2,3 respectively then,
then ant starting with A will select node with transition probability ---

- a. 2/3
- b. 3/2
- c. 2/5
- d. 3/5

Ans: d

Explanation: transition probability without heuristic rule is calculated as for $c=3/2+3$,
 $b=2/2+3$

49. A real-valued function f defined on a domain X has
a global (or absolute) point at x^* if $f(x^*) \geq f(x)$ for all x in X .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: d

Explanation: Global X with maximum function value

50. A real-valued function f defined on a domain X has
a global (or absolute) point at x^* if $f(x^*) \leq f(x)$ for all x in X .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: c

Explanation: Global X with minimum function value

51. A real-valued function f defined on a domain X has a
local (or absolute) point at x^* if $f(x^*) \leq f(x)$ for all x in X within distance of x^* .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: a

Explanation: local X with minimum function value

52. A real-valued function f defined on a domain X has a local (or absolute) point at x^* if $f(x^*) \geq f(x)$ for all x in X within distance of x^* .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: b

Explanation: local X with maximum function value

This sheet is for 1 Mark questions

S.r No	Question	a	b	c	d	Correct Answer
e.g	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp	Distinguish two regions clearly	Cannot Distinguish two regions clearly	Collection of ordered pairs	None of these	a
2	In computing the output is called as	Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of	two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be	Ambiguous	Unambiguos	Inaccurate	None of these	b
5	Core of soft computing is	Fuzzy computing,neural computing,Genetic algorithm	Fuzzy network and artificial intelligence	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation	Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing	charles darwin	rich and berg	mc culloch	lofti a zadeh	d
8	Soft computing is based on	fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be	non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing	mimics human behaviour	deals with imprecise, probabilistic	exact information	both a and b	d
11	Hard computing is also called as	evolutionary computing	conventional computing	non conventional computing	probabilistic computing	b

12	Which computing produces accurate results	soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing	mimics human behaviour	information processing paradigm	both a and b	none of the above	c
14	Artificial neural network is used for	pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization	Blind search represent a guided approach while optimization is unguided	Blind search usually does not conclude in one step like some optimization methods.	Blind search cannot result in optimal solution whereas optimization method do	none of these	B
16	In modeling, an optimal solution is understood to be	a solution that can only be determined by an exhaustive enumeration testing of alternatives	a solution found in the least possible time and using the least possible computing resources	a solution that is the best based on criteria defined in the design phase	a solution that requires an algorithm for the determination	c
17	When is a complete enumeration of solution used?	When a solution that is "good enough" is fine and good heuristics are available	When there is enough time and computational power available	When the modeler requires a guided approach to problem solving	When there are an infinite number of solution to be searched	B
18	All of the following are true about heuristics EXCEPT	heuristics are used when the modeler requires a guided approach to problem solving	heuristics are used when a solution that is "good enough" is sought	heuristics are used when there is abundant time and computational power	heuristics are rules of good judgement	C

19	Which approach is most suited to structured problem with little uncertainty	Simuation	human intuition	Optimization	genetic algorithm	c
20	Genetic algorithm belong to the family of method in the	artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
21	What does the 0 membership value means in the set	the object is fully inside the set	the object is not in the set	the object is partially present in the set	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	a
23	The process of fuzzy interference system involes	membership functions	fuzzy logic operators	if-then rules	all the above	d
24	What does a fuzzifier do	coverts crisp input to linguistic variables	coverts crisp ouput to linguistic variables	coverts fuzzy input to linguistic variables	coverts fuzzy output to linguistic variables	a
25	Which of the following is not defuzzifier method	centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method	mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have	multiple part of antecedent,only single part of consequent	only single part of antecedent,multiple part of consequent	multiple part of antecedent,multiple part of consequent	only single part of antecedent,only single part of consequent	c
28	The a cut of a fuzzy set A is a crisp set defined by :-	$\{x U_a(x) > a\}$	$\{x U_a(x) \geq a\}$	$\{x U_a(x) < a\}$	$\{x U_a(x) \leq a\}$	b

29	The bandwidth(A) in a fuzzy set is given by	$(A)= x_1*x_2 $	$(A)= x_1+x_2 $	$(A)= x_1-x_2 $	$(A)= x_1/x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	b
31	A={1/a,0.3/b,0.2/c,0.8/d,0/e} B={0.6/a,0.9/b,0.1/c,0.3/d,0.2/e} What will be the complement of A?	{0/a,0.7/b,0.8/c,0.2/d,1/e}	{0/a,0.9/b,0.7/c,0.2/d,1/e}	{0.8/a,0.7/b,0.8/c,0.7/d,1/e}	{0/a,0.7/b,0.8/c,0.9/d,1/e}	a
32	A={1/a,0.3/b,0.2/c,0.8/d,0/e} B={0.6/a,0.9/b,0.1/c,0.3/d,0.2/e} What will be the union of AUB?	{1/a,0.9/b,0.1/c,0.5/d,0.2/e}	{0.8/a,0.9/b,0.2/c,0.5/d,0.2/e}	{1/a,0.9/b,0.2/c,0.8/d,0.2/e}	{1/a,0.9/b,0.2/c,0.8/d,0.8/e}	c
33	A={1/a,0.3/b,0.2/c,0.8/d,0/e} B={0.6/a,0.9/b,0.1/c,0.3/d,0.2/e} What will be the intersection of A and B ?	{0.6/a,0.3/b,0.1/c,0.3/d,0/e}	{0.6/a,0.8/b,0.1/c,0.3/d,0/e}	{0.6/a,0.3/b,0.1/c,0.5/d,0/e}	{0.6/a,0.3/b,0.2/c,0.3/d,1/e}	a
34	What denotes the support(A) in a fuzzy set?	$\{x U_a(x) > 0\}$	$\{x U_a(x) < 0\}$	$\{x U_a(x) \leq 0\}$	$\{x U_a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?	$\{x U_a(x) > 0\}$	$\{x U_a(x) = 1\}$	$\{x U_a(x) \geq 0.5\}$	$\{x U_a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c

37	which of the following is a sequence of steps taken in designning a fuzy logic machine	fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation->fuzzification->deffuzification	rule evaluation->defuzzification->fuzzification	a
38	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
39	Genetic algorithm belong to the family of method in the	artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
40	All of the follwing are suitable problem for genetic algorithm EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	c
41	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
43	mutation is applied on __ candidates.	one	two	more than two	noneof these	a
44	recombination is applied on __ candidates.	one	two	more than two	noneof these	b
45	LCS belongs to __ based methods?	rule based learning	genetic learning	both a and b	noneof these	a
46	Survival is __ approach.	deterministic	non deterministic	semi deterministic	noneof these	a
47	Evolutionary algorithms are a __ based approach	heuristic	metaheuristic	both a and b	noneof these	a
48	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d

51	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developef by	Fredrik	Fodgel	Frank	Flin	b
54	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
56	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm	Termination	selection	Recombinatio	Initialization	d
58	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover	discrete and intermedium	discrete and continuous	continuous and intemedium	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested.	TRUE	FALSE			B
61	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solutuon	none of these	c

62	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
63	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
64	EC stands for?	Evolutionary Computations	Evolutionary computer	Electronic computations	none of these	a
65	GA stands for	genetic algorithm	genetic assurance	genetic algorithm	none of these	a
66	LCS stands for	learning classes system	learning classifier systems	learned class system	none of these	b
67	GBML stands for	Genes based Machine learning	Genes based mobile learning	Genetic based machine learning	none of these	c
68	EV is dominantly used for solving ____.	optimization problems	NP problem	simple problems	none of these	a
69	EV is considered as?	adaptive	complex	both a and b	none of these	c
70	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
72	Parameters that affect GA	initial population	selection process	fitness function	all of these	d
73	Fitness function should be	maximum	minimum	intermediate	none of these	b
74	Evolutionary algorithms are a ___ based approach	heuristic	metaheuristic	both a and b	none of these	a

75	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
76	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
77	mutation is applied on __ candidates.	one	two	more than two	none of these	a
78	recombination is applied on __ candidates.	one	two	more than two	none of these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?	sub parents	parents	offspring	grand child	c
80	___ decides who becomes parents and how many children the parents have.	parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?	Parent Selection methods	Survival Selection methods	both a and b	none of these	c
82	LCS belongs to ___ based methods?	rule based learning	genetic learning	both a and b	none of these	a
83	Survival is ___ approach.	deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.	Hedges	Linguistic Variable	Fuzz Variable	None of the mentioned	a

85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?	associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is	Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d

90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned	c
92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where \sim → complement)	$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3), (5, 0), (6, 0.2)\}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be	$\{0.9, 0.5, 0.6, 0.8, 0.8\}$	$\{0.6, 0.2, 0.1, 0.7, 0.5\}$	$\{0.1, 0.5, 0.4, 0.2, 0.2\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	c

	Compute the value of adding the following two fuzzy integers: A = {(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)} B = {(0.5,11), (1,12), (0.5,13)} Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x,y} \min(\mu_A(x), \mu_B(y))$ Then, f(A+B) is equal to					
97	A = {(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)} B = {(0.5,11), (1,12), (0.5,13)} Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x,y} \min(\mu_A(x), \mu_B(y))$ Then, f(A+B) is equal to	{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)}	{(0.5,12), (0.6,13), (1,14), (0.7,15), (1,16), (1,17), (1,18)}	{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	d
98	A U (B U C) =	(A ∩ B) ∩ (A ∩ C)	(A ∪ B) ∪ C	(A ∪ B) ∩ (A ∪ C)	B ∩ A ∪ C	b
99	Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be	{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a	conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a

101	<p>Choose the correct statement</p> <p>1. A fuzzy set is a crisp set but the reverse is not true</p> <p>2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$</p> <p>3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous</p>	1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	----- defines logic function of two propositions	prepositions	Linguistic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ----- gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b

107	Multiple conjunctives antecedents is method of ----- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ----- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then z=c (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d

114	In Evolutionary programming, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)-selection based on the children only ($\mu+\lambda$)-selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)-selection based on the children only ($\mu+\lambda$)-selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a

119	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)	(μ,λ) : Select survivors among parents and offspring	$(\mu+\lambda)$: Select survivors among parents and offspring	$(\mu-\lambda)$: Select survivors among offspring only	$(\mu:\lambda)$: Select survivors among offspring only	b
123	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a

125	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126	(1+λ) ES	λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127	Termination condition for EA	mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
130	(1+1) ES	Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
131	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

This sheet is for 2 Mark questions						
S.r No	Question	a	b	c	d	Correct Answer
e.g	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	Who can deal with noisy input information	soft computing	hard computing	both a and b	none of the above	a
2	Ability to learn how to do task based on the data is done by	self organization	adaptive learning	fault tolerance	robustness	b
3	Which of the following is not a technique of soft computing	neural network	genetic algorithm	evolutionary algorithm	conventional algorithm	d
4	Fuzzy logic system is based on what type of rule	if-then	else-if	while	do-while	a
5	What is the function of dendrites in biological neural network	send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b
6	Expert system	combines different types of method and information	is a approach to design of learning algorithms	is an information base filled with knowledge of an expert formulated in terms of if-then rules	none of the above	c
7	Three main basic feature involved in characterizing member function are	intuition,inference,rank ordering	fuzzy algorithm,neural network,genetic algorithm	center of sums,median,core	core,support,boundary	d
8	What is the function of cell body in biological neural network	multiplies the incoming signals	sums the incoming signals	multiplies the outgoing signals	sums the outgoing signals	b

9	What is perceptron	a single layer feed forward neural network	a double layer associative neural network	a neural network that contains feedback	auto associative neural network	a
10	Which of the following computing is trial and error problem solver algorithm	hard computing	neural network	evolutionary computing	fuzzy logic	c
11	What are advantages of neural network	ability to learn by example	fault tolerant	both a and b	none of the above	c
12	Which of the following does not belong to the process of involuntary computing	selection	mutation	recombination	deletion	d
13	The Value of crisp set can be	either 0 or 1	near to 0 or 1	between 0 and 1	between 0.5 and 0.7	a
14	The room temrature is hot. Here the hot(use of lingustic variable is used) can be represented by	fuzzy set	crisp set	probabilistic set	none of the above	a
15	The value of set membership can be represented by	discrete set	degree of truth	probabilities	both b and c	b
16	Semiconductor layout & aircraft design are the application type of which domain?	Control	Design	Robotics	ML	B
17	Trajectory planning is the application type of which domain?	Control	Design	Robotics	ML	c
18	Filter design is the application type of which domain?	Control	Signal Processing	Robotics	ML	B
19	Pokers & Checkers are the application type of which of domain?	Control	Game Playing	Robotics	ML	B

20	Manufacturing & resource allocation are the application type of which domain?	Scheduling	Design	Robotics	ML	A
21	What is a crossover point in a fuzzy set?	$\{x u_a(x) < 0\}$	$\{x u_a(x) = 1\}$	$\{x u_a(x) = 0.5\}$	$\{x u_a(x) > 0\}$	c
22	If A and B are two fuzzy sets with membership function: $u_a(x)=\{0.2,0.5,0.6,0.1,0.9\}$ $u_b(x)=\{0.1,0.5,0.2,0.7,0.8\}$ THEN what will be the intersection of A and B	$\{0.2,0.5,0.6,0.7,0.9\}$	$\{0.2,0.3,0.8,0.1,0.5\}$	$\{0.5,0.1,0.6,0.1,0.8\}$	$\{0.1,0.5,0.2,0.1,0.8\}$	d
23	$A=\{0.1/1+0.2/2+0.3/3\}$ $B=\{0.6/1+0.5/2+0.4/3+0.5/4\}$ Find the set difference	$\{0.1/1+0.2/2+0.3/3\}$	$\{0.3/1+0.2/2+0.2/3\}$	$\{0.1/1+0.3/2+0.2/3\}$	$\{0.1/1+0.2/2+0.5/3\}$	a
24	With the help of which formula can we find the algebraic sum of two fuzzy sets A,B?	$\{u_A(x)+u_B(x)\}$ - $\{u_A(x)*u_B(x)\}$	$\{u_A(x)-u_B(x)\}$ - $\{u_A(x)*u_B(x)\}$	$\{u_A(x)/u_B(x)\}$ - $\{u_A(x)+u_B(x)\}$	$\{u_A(x)+u_B(x)\}+\{u_A(x)*u_B(x)\}$	a
25	With the help of which formula can we find the algebraic product of two fuzzy sets A,B?	$\{u_A(x)/u_B(x)\}$	$\{u_A(x)*u_B(x)\}$ * $\{u_A(x)-u_B(x)\}$	$\{u_A(x)*u_B(x)+\{u_A(x)+u_B(x)\}\}$	$\{u_A(x)*u_B(x)\}$	d
26	Which one of the following is the associative property for a crisp set	$AU(BUC)=(AU)BUC$	$BU(AUC)=CU(BUA)$	$AU(CUA)=B(AUC)$	all the above	a
27	Knowledge base is a combination of	rule base and data base	rule base and time base	time base and probability base	model base and data base	a
28	Fuzzy logic system is based on what type of rule	if-then	else-if	while	do-while	a
29	What is the function of dendrites in biological neural network	send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b
30	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A

31	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
32	_____ is a simulation method that let decision maker see what the model is doing and how it interact.	VIS	VIM	SIV	HIV	A
33	_____ systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	B
34	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?	Simulation	Optimization	human intuition	genetic algorithm	A
35	Which of the following is the advantage of simulation?	It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skills	It solves problem in one pass with no iteration.	A
36	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred	continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B
37	The defining length of a schema is useful to calculate _____ of the schema for _____.	Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A
38	Semiconductor layout & aircraft design are the application type of which domain?	Control	Design	Robotics	ML	B
39	Trajectory planning is the application type of which domain?	Control	Design	Robotics	ML	C
40	Filter design is the application type of which domain?	Control	Signal Processing	Robotics	ML	B

41	categories of EA are/is	Genetic Algorithm	genetic programing	learning Classifier Systems	all of these	d
42	Phases in which the LCS individuals are evaluated are	performance phase	reinforcement phase	both a and b	none of these	c
43	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	a
44	Genetic algorithm is a subset of _____.	evolutionary algorithm	dynamcic algorithm	both a&b	None of these	A
45	NP hard problems are also called as _____.	dcrete optimization	combinatori al optimization	evolutionary optimization	None of these	B
46	Genetic algorithm is first introduce by _____.	Charles Darwin	John Holland	Gregor Johan Mendel	None of these	B
47	_____ replicates the most successful solutions found in a population at a rate proportional to relative quality.	Selection	Recombinati on	Mutation	None of these	A
48	_____ decomposes two distinct solutions and then randomly mixes their parts to form novel solutions.	Selection	Recombinati on	Mutation	None of these	B
49	_____ randomly perturbs a candidate solution.	Selection	Recombinati on	Mutation	None of these	C
50	A _____ is a template consisting of a string composed of three symbol.	Wild symbol	Schema	Layout	None of these	B
51	{0,1,#} is the symbol alphabet ,where # is a special symbol.	Wild card	Schema	Layout	None of these	A
52	Metaheuristics are ?1)non deterministic 2)non approximate 3)not problem specific	1,2,3	1,2	1,3	2,3	c
53	In search techniques, as single point based contradicts population based similary deterministic contradicts ____?	Stochastic	simplex based	complex based	none	a

54	In swarm systems organisations are	centralized	decentralized	controlled by third party	none	b
55	Identify the working sequence of kmean clustering ? 1) redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids	1,3,2	3,2,1	2,3,1	2,1,3	c
56	Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	a
57	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms	1,2	1,2,3	2,3,4	all of these	d
58	pheromone quantity in ACO is ___ proportional to path selection.	directly	inversly	there is no connection	none	a
59	The ants prefer the smaller drop of honey over the more abundant, but less nutritious, sugar. This is the example of?	kruskal algorithm	Travelling salesman	Knapsack problem	NP hard problem	c
60	In kmeans clustering each cluster is associated with	centroid	edge	common point	none of them	a
61	What is EC?	computer based problem solving systems	Systems that uses computational models of evolutionary process	both a and b	none of these	c
62	Recombination is applied to	2 selected candidated	1 selected candidate	3 selected candidate	none of these	a
63	In EA mutation is applied to	2 candidate	1 candidate	3 candidate	none of these	b

64	EV is used for	solving optimization problems	finding solutions	both a and b	none of these	a
65	EV is considered as	complex	simple	complex and adaptive	all of these	c
66	GA stands for	Genetic Algorithm	genetic programing	genetic assurance	none of these	a
67	Features of GA	A string representation of chromosomes.	A fitness function being minimized.	A cross-over method and a mutation method.	all of these	d
68	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
69	Evolutionary programming was developed by	Fredrik	Fodgel	Frank	Flin	b
70	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
71	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
72	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
73	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d
74	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
75	What are different types of crossover	discrete and intermedium	discrete and continuous	continuous and intermedium	none of these	a
76	GP individual stores computer program	TRUE	FALSE			a

77	GP selection is	Deterministic selection	Tournament selection	nondeterministic selection	none of these	b
78	EP mutation is	Data specific	Data type specific	non specific	none of these	b
79	categories of EA are/is	Genetic Algorithm	genetic programing	learning Classifier Systems	all of these	d
80	Phases in which the LCS individuals are evaluated are	performance phase	reinforcement phase	both a and b	none of these	c
81	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	a
82	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	a
83	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____	Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	Fuzzy & Crisp Set	a
84	Fuzzy logic is usually represented as _____	IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	b
85	Three main basic features involved in characterizing membership function are	Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	Core, Support , Boundary	Weighted Average, center of Sums, Median	c
86	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b

87	Why can't we design a perfect neural network?	full operation is still not known of biological neurons	number of neuron is itself not precisely known	number of interconnection is very large & is very complex	all of the mentioned	d
88	Both Fuzzy logic and ANN are soft computing techniques because	Both gives precise and accurate results	ANN gives accurate result but fuzzy logic does not	In each, no precise mathematical model of the problem is required	Fuzzy logic gives accurate result but ANN does not	c
89	Internal state of neuron is called _____, is the function of the inputs the neurons receives	Weight	activation or activity level of neuron	Bias	None of these	b
90	Each connection link in ANN is associated with _____ which has information about the input signal.	neurons	weights	bias	activation function	b
91	In artificial Neural Network interconnected processing elements are called	nodes or neurons	weights	axons	Soma	a
92	The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to	infinite	1	0	0.5	d
93	The membership values of the membership function are not strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing	Convex Fuzzy Set	Non convex fuzzy set	Normal Fuzzy set	Sub normal fuzzy set	b
94	The cell body of neuron can be analogous to what mathamatical operation?	summing	differentiator	integrator	none of the mentioned	a

95	Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial Intelligence deal with predicate logic whereas soft computing deal with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols whereas soft computing is based on empirical data	Both (a) and (b)	None of the above	c
96	_____ is/are the way/s to represent uncertainty.	Fuzzy Logic	Probability	Entropy	All of the mentioned	d
97	Given two fuzzy sets A and B A={\{(x1,0.5),(x2,0.1),(x3,0.4)\}} and B={\{(x1,0.2),(x2,0.3),(x3,0.5)\}} then union of 2 sets A U B is	{(x1,0.5),(x2,0.1),(x3,0.4)}	{(x1,0.5),(x2,0.3),(x3,0.5)}	{(x1,0.2),(x2,0.3),(x3,0.5)}	{(x1,0.2),(x2,0.1),(x3,0.4)}	b
98	If A and B are two fuzzy sets with membership functions: $\mu_a(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$ $\mu_b(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_a \cap \mu_b$ will be	{0.2, 0.5, 0.6, 0.7, 0.9}	{0.2, 0.5, 0.2, 0.1, 0.8}	{0.1, 0.5, 0.6, 0.1, 0.8}	{0.1, 0.5, 0.2, 0.1, 0.8}	d
99	For $k > 1$, which of the following concept can be used to generate other linguistic hedge?	Concentration and dilation	Dilation	Concentration	None of the mentioned	c
100	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A U B is	{1.0, 0.45, 0.75}	{1, 0.2, 0.75}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	a
101	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A ∩ B is	{1.0, 0.45, 0.75}	{0.2, 0.20, 0.50}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	b

102	Mamdani-style inference involves which steps	Fuzzification of the input variables & Rule evaluation	Aggregation of the rule output & Defuzzification	Both a and b	either a or b	c
103	A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$	Core	Support	Cross-over	α - cut	c
104	Which statement is true?	Mamdani approach characterised by its low interpretability and low accuracy	Takagi and Sugeno's approach characterised by high accuracy but at the cost of high interpretability	Takagi and Sugeno's approach follows precise fuzzy modelling and obtains high accuracy but at the cost of low interpretability	Mamdani approach characterised by its low interpretability and high accuracy	c
105	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$	$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) < 1$	c
106	Which can be used as an input to fuzzy controller?	A fuzzy set	a crisp set	Both fuzzy set and Crisp set	None of these	b
107	What are the types of fuzzy logic sets?	Type-1 fuzzy set	Type-2 fuzzy set	Both a and b	None of these	c
108	How is fuzzy logic different from conventional control methods	IF and THEN approach	FOR approach	WHILE approach	DO approach	a
109	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \text{support } A(x)$, where A belongs to A. Then fuzzy set is called normal when	$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) > 1$	c
110	If A and B are sets and $A \cup B = A \cap B$ then	$A = B$	$A = 0$	$B = 0$	None of these	A

111	If x is A then y is B else y is C. The output of the given fuzzy rule is	A fuzzy set	a crisp set	a fuzzy relation	a membership function	c
112	What Is The First Step Of Fuzzy Logic Toolbox?	Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator(AND or OR) in the antecedent	Aggregation of the consequents across the rule	a
113	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	The input is a value greater than one and the output is a value less than the input	The input and output have both the same values	The input has two or more values and the output has a single truth value	d
114	What Is The Input And Output Of Step 3 - Apply Implication Method?	Input is a fuzzy set but the output is a whole value	Input is a fuzzy set but the output is a whole value	Input and Output have the same value	Input is a smaller value than the output value	b
115	What Is The Purpose Of Aggregation?	To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	a
116	Linguistic variable is	a variable whose values are words or sentences	any numerical value only	any binary value only	variable which contains TRUE or FALSE values only	a
117	Identification of Input, Output and state variables is performed in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	Identification of variables	d

118	Assigning linguistic label to each subset is done in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	fuzzy subset configuration	d
119	Disjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	a
120	Conjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	b
121	Categorial reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	a
122	Syllogistic reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	c
123	Qualitative reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	b

124	Dispositional reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	d
125	Mamdani systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	d
126	Sugeno systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	b
127	In the generational model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	a
128	In the steady-state model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	b
129	In the generational model of EA	each individual survives exactly for two generation	each individual survives exactly for one generation	cannot predict	each individual survives as many generations as want	b
130	In the steady-state model of EA	One offspring is generated per generation	two offsprings are generated per generation	cannot decide	more than two offsprings are generated per generation	a
131	Which of the following algorithm is most efficient for discontinuous and noisy problems?	Evolutionary algorithm	Classical optimization algorithm	Genetic algorithm	none	a

132	Each iteration of EA is referred to as	Generation	Iteration	population	None	a
133	Which of the following are evolutionary operators?	Selection	Crossover	Mutation	All of the above	d
134	In the $(\mu/\rho, \lambda)$ method of ES, parents are	selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	a
135	In the $(\mu/\rho+\lambda)$ method of ES, parents are	selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	b
136	Fitness scaling is desirable to ensure	Population diversity	selection pressure	that better solutions are selected only	relatively inferior solutions are not ignored	a
137	Which mutation operator is used in ES as reproduction operator?	one point	Gaussian mutation	two point	adaptive	b
138	Fitness proportionate selection methods are	Roulette wheel selection	Stochastic universal sampling	tournament selection	All the mentioned	d
139	In which selection method of survival selection there is no notion of fitness?	fitness based selection	elitism	Agebased selection	All the mentioned	c
140	In which selection strategy every individual has the same probability to be selected?	Roulette wheel selection	Uniform selection	tournament selection	Rank selection	b
141	High selection pressure is desirable, when we need	diversity not found in each generation	there is no improvement in successive GA iteration	faster termination of GA	fitness values are not uniformly distributed	c

142	Tournament selection scheme is more preferable when	when fitness values are uniformly distributed	population are with very diversified fitness values	when fitness values are not necessarily uniformly distributed	under all the above situations	b
143	Which of the following is not a characteristic of evolutionary algorithm?	Conceptual simplicity	Parallelism	Broad applicability	Artificial selection	d
144	What is the correct order of steps in evolutionary algorithm?	Select parents-recombine-mutate-evaluate	Select parents-recombine-evaluate-mutate-	Select parents-mutate - recombine-evaluate	Select parents-evaluate - recombine-mutate	a
145	Which of the following schemes are selection schemes in Evolutionary computation?	Hall of fame	Rank based selection	tournament selection	All of the above	d
146	To encode chromosomes which encoding schemes are used	binary encoding	finite state machine encoding	real value encoding	All of the above	d

This sheet is for 3 Mark questions						Correct Answer
S.r No	Question	a	b	c	d	
	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	What is defuzzification	conversion of fuzzy set to crisp set	conversion of crisp set to fuzzy set	conversion of fuzzy set to fuzzy logic	conversion of crisp set to crisp logic	a
2	What type of model is required for hard computing	mathematical	biological	chemical	probabilistic	a
3	Which of the following is/are basic component neuron	dendrites	axon	nucleus	all of the above	d
4	Which of the following computing technique has the ability of learning and adoption	neural network	evolutionary	hard	probabilistic	a
5	The truth value of the fuzzy set is	either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
6	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
7	which of the following is a sequence of steps taken in designing a fuzzy logic machine	fuzzification->Rule Evaluation->Defuzzification	defuzzification->rule evaluation->fuzzification	rule evaluation->fuzzification->defuzzification	rule evaluation->defuzzification->fuzzification	a
8	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
9	Genetic algorithm belongs to the family of method in the	artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A

10	All of the following are suitable problem for genetic algorithm EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
11	In which stage of the simulation methodology do you determine the variable and gather data	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
12	In which stage of the simulation methodology do you determine how long to run the simulation	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	D
13	In which stage of the simulation methodology do you determine the system boundaries and environment?	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
14	What BEST describes a simulation model with a limited number of variables, each with the finite number of values?	system dynamics simulation	discrete event simulation	continuous distribution simulation	Monte Carlo simulation	B
15	The advantage of visual interactive simulation include all of the following EXCEPT	Improvement in training using the simulation	reduced need for the decision maker involvement	The ability to see how a simulation works	improved presentation of simulation results	B
16	What can system dynamics modelling be used for?	qualitative method for analyzing a system	simulation models that test each subsystem in isolation	micro-level simulation models that examine individual values	studying system behaviour at an instant in time	A

17	In agent-based modelling ,agents are	the human workers or agents who use the system	communication links between simulation	Autonomous rule-based decision making units	the hardware platform used to conduct the simulation	C
18	Agent based modelling is best for all the following types of problem features EXCEPT	complex interactions	low uncertainty	Many inter-related factors	irregular data	B
19	What is the final stage of an agent based modelling(ABM) methodology?	Identifying the agents and determining their behaviour	Determining agent-related data	Validating agent behaviour against reality	determining the suitability of ABM	C
20	Which of the following is the advantage of simulation?	It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skills	It solves problem in one pass with no iteration.	A
21	The truth value of the fuzzy set is	either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
22	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
23	which of the following is a sequence of steps taken in designning a fuzy logic machine	fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation->fuzzification->deffuzification	rule evaluation->defuzzification->fuzzification	a
24	EV is dominantly used for solving ____.	optimization problems	NP problem	simple problems	noneof these	a

25	EV is considered as?	adaptive	complex	both a and b	none of these	c
26	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
27	Identify the drawbacks of clustering algorithms? 1) can generate empty clusters 2) can terminate at local minimum 3) can handle noisy data	1,2,3	1,2	3	2,3	b
28	generation of empty cluster problem in clustering can be overcome by?	ACO based clustering	PSO based clustering	kmeans	kmode	b
29	where does PSO based clustering terminates?	global optimum	local optimum	global maximum	local minimum	a
30	Each particle in PSO modifies its position according to ? 1) its velocity 2) its weight 3) its gbest and pbest	2,3	1,2	1,2,3	only 1	c
31	Applications of ACO are ? 1) shortest path 2) assignment problem 3) set problem	2,3	1,2	1,2,3		c
32	Evaporation of pheromones is ?	directly proportional to path length	inversely proportional to path length	constant	none	a
33	Metaheuristics does not include ?	evolutionary algorithms	tabu searching	simulated annealing	none	d
34	Metaheuristics are ? 1) non deterministic 2) non approximate 3) not problem specific	1,2,3	1,2	1,3	2,3	c

35	In search techniques, as single point based contradicts population based similary deterministic contradicts ___?	Stochastic	simplex based	complex based	none	a
36	In swarm systems organisations are	centralized	decentralized	controlled by third party	none	b
37	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids	1,3,2	3,2,1	2,3,1	2,1,3	c
38	Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	a
39	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms	1,2	1,2,3	2,3,4	all of these	d
40	pheromone quantity in ACO is ___ proportional to path selection.	directly	inversly	there is no connection	none	a
41	Recombination involves ___ candidates while mutation requires___ candidates, and the result is called___.	1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
42	Identify the correct sequence for evolitionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3)Create offspring 4)replace some parents	1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
43	Problems for which there is no efficient method to solve such problems exactly are called?	complex	hard	strong	none	b

44	EV is considered as ? 1)complex 2)adaptive	1	2	1,2	none	c
45	EV system was proposed for exploring a___ fitness space and can form___.	multipaked,clusters	single peaked,clusters	multipaked,hard problems	single peaked,hard problems	a
46	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recombination operator	1,2	1,2,3	2,3	1,3	b
47	Parameters that affect GA are ? 1)intial population 2)fitness function 3)ability to generate offspring	1,3	1,2	1,2,3	only 1	b
48	___focuses attention on high fitness individuals, thus exploiting the available fitness information.	clustering	offspring production	replace	selection	d
49	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
50	Genetic algorithm are heuristic methods that do not guarantee an optimal solution to a problem	TRUE	FALSE			A

51	A "What-if" model is most typically used for the most structured problems	TRUE	FALSE			B
52	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solutuon	none of these	C
53	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
54	_____ doesnot usually allow decision makers to see how a solution to a _____ evolves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
55	_____ is a simulation method that let decision maker see what the model is doing and how it interact.	VIS	VIM	SIV	HIV	A
56	_____ systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	B
57	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?	Simulation	Optimization	human intution	genetic algorithm	A
58	Which of the following is the advantage of simulation?	It can incorporate significant real life complexity	It always result in optimal solution	Simulation software requires special skils	It solves problem in one pass with no iteration.	A
59	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred	continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B

60	The defining length of a schema is useful to calculate ____ of the schema for _____.	Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A
61	Recombination involves ___ candidates while mutation requires ___ candidates, and the result is called _____.	1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
62	Identify the correct sequence for evolutionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3>Create offspring 4)replace some parents	1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
63	Problems for which there is no efficient method to solve such problems exactly are called?	complex	hard	strong	none	b
64	EV is considered as ? 1)complex 2) adaptive	1	2	1,2	none	c
65	EV system was proposed for exploring a ___ fitness space and can form ___.	multipaked,clusters	single peaked,clusters	multipaked,hard problems	single peaked,hard problems	a
66	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recombination operator	1,2	1,2,3	2,3	1,3	b
67	Parameters that affect GA are ? 1)intial population 2)fitness function 3)ability to generate offspring	1,3	1,2	1,2,3	only 1	b

68	___ focuses attention on high fitness individuals, thus exploiting the available fitness information.	clustering	offspring production	replace	selection	d
69	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
70	Evolution strategies uses ? 1)selection 2)recombination 3)real valued vector	1,2,3	2,3	1,3	only 2	a
71	which of the following statements are true regarding ES ? 1)Survival is deterministic 2)first allows the N best children to survive, and replaces the parents with these children. 3)allows the N best children and parents to survive.	only 1	1,2	only 2	1,2,3	d
72	Evolutionary Algorithms includes ? 1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	3,4	2,3,4	c
73	Heuristics include ?1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	1,2		d

74	Which of the following statements are true ? 1)mutation is applied to two selected candidates, the so-called parents, and results in one or two new candidates, the children 2) recombination is applied to one candidate and results in one new candidate.	only 1	only 2	both	none of these	d
75	The ___ is performed by selecting two sub trees by chance from the parents and exchange them to create the descendants.	GP crossover	GP Mutation	GP clustering	GP Recombination	a
76	The___ is performed by selecting a sub tree of the descendant by chance and to exchange the sub tree with an arbitrary generated new sub tree.	GP crossover	GP Mutation	GP clustering	GP Recombination	b
77	___ are able to learn simple “if {condition} then {action}” style rules23 by learning from feedback	ES	EA	LCS	Heuristics	c
78	Island model is related with ?	Distributed Evolutionary Algorithms	LCS	swarm intelligence	ACO	a
79	payoffs can be easily translated to a ___ function for an EA.	survival	reduction	comination	fitness	d
80	Identify the correct statements with respect to genetic algorithms? 1)A fitness function should maximized. 2)A replacement procedure. 3)A string representation of chromosomes.	1,2	2,3	1,2,3	1,3	b

81	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.	Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
82	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
83	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
84	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?	associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
85	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is	Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
86	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d

87	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d
88	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned	c
89	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
90	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
91	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)	$\{(4, 0.7), (2,1), (1,0.8)\}$	$\{(4, 0.3.): (5, 0), (6. 0.2) \}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6,0.2), (7, 1)\}$	$\{(3, 0.3), (6.0.2)\}$	c
92	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
93	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be	$\{0.9, 0.5, 0.6, 0.8, 0.8\}$	$\{0.6, 0.2, 0.1, 0.7, 0.5\}$	$\{0.1, 0.5, 0.4, 0.2, 0.2\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	c

	Compute the value of adding the following two fuzzy integers: A = {(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)} B = {(0.5,11), (1,12), (0.5,13)} Where fuzzy addition is defined as $\mu_{A+B}(z) = \max(x+y=z \cap (\mu_A(x), \mu_B(y)))$ Then, f(A+B) is equal to	{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)}	{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)}	{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	d
95	A U (B U C) =	$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
96	Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be	{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
97	The fuzzy proposition "IF X is E then Y is F" is a	conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
98	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A, B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous	1 only	2 and 3	1,2 and 3	None of these	b
99	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b

100	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c
101	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
102	---- defines logic function of two prepositions	prepositions	Linguistic hedges	truth tables	inference rules	c
103	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
104	Multiple conjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
105	Multiple disjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
106	IF x is A and y is B then $z=c$ (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
107	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b

108	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a aircraft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
109	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
110	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
111	In Evolutionary programming, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ) -selection based on the children only $(\mu+\lambda)$ -selection based on both the set of parent and children	Children replace the parent	All the mentioned	a

112	In Evolutionary strategy, survival selection is	Probabilistic selection $(\mu+\mu)$ selection	(μ, λ) -selection based on the children only $(\mu+\lambda)$ -selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
113	In Evolutionary programming, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
114	In Evolutionary strategy, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
115	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
116	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b

117	Step size in self-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
118	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
119	Evolutionary Strategies (ES)	(μ,λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b
120	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
121	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a

122	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
123	(1+λ) ES	λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
124	Termination condition for EA	mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
125	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
126	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
127	(1+1) ES	Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
128	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
129	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c

130	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d
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SCOA UNIT 2 MCQs

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

SCOA UNIT 2 MCQs

	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intution, Inference, Rank Ordering B.Fuzzy Algorithm, Neural network, Genetic Algorithm C.Core, Support , Boundary D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core B.Support C.Boundary D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

SCOA UNIT 2 MCQs

	<p>B.normal fuzzy set C.convex fuzzy set D.concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A.1 B.0 C.infinite D.Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A.normal fuzzy set B.subnormal fuzzy set. C.convex fuzzy set D.concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesn't deal with 2 valued logic</p>	D

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	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	<p>Defuzzification is done to obtain</p> <ul style="list-style-type: none"> a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above 	a
13.	<p>“The train is running fast”. Here ‘fast’ can be represented by</p> <ul style="list-style-type: none"> a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned 	a
14.	<p>Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$</p> <p>Then the crisp value of Young using MoM method is</p> <ul style="list-style-type: none"> a) 25 b) 20 c) 35 d) 50 	a
15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area 	c

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	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)\text{complement} \neq \text{---} (A\lambda)\text{complement}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

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	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

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	d) None of the above	
26.	Fuzzy logic is a form of a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic	Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.
27.	Traditional set theory is also known as Crisp Set theory. a) True b) False	Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set. 3. The truth values of traditional set theory is _____ and that of fuzzy set is _____
28.	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Answer: a Explanation: Refer the

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	<p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	definition of Fuzzy set and Crisp set.
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p> <p>a) Fuzzy Set b) Crisp Set</p>	<p>Answer: a Explanation: Fuzzy logic deals with linguistic variables.</p>
31.	<p>The values of the set membership is represented by</p> <p>a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c</p>	<p>Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.</p>
32.	What is meant by probability density function?	d

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	<p>a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables</p>	
33.	<p>Which of the following is used for probability theory sentences?</p> <p>a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned</p>	<p>Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.</p>
34.	<p>Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.</p> <p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy</p>

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		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <ul style="list-style-type: none"> a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned 	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <ul style="list-style-type: none"> a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned 	<p>Answer: c</p> <p>Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

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SCOA Unit I MCQ

- 1.** Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.
 - A.**True
 - B.**False

- 2.** The membership functions are generally represented in
 - A.**Tabular Form
 - B.**Graphical Form
 - C.**Mathematical Form
 - D.**Logical Form

- 3.** Membership function can be thought of as a technique to solve empirical problems on the basis of
 - A.**knowledge
 - B.**examples
 - C.**learning
 - D.**experience

- 4.** Three main basic features involved in characterizing membership function are
 - A.**Intuition, Inference, Rank Ordering
 - B.**Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.sub normal fuzzy sets

B.normal fuzzy set

C.convex fuzzy set

D.concave fuzzy set

7. In a Fuzzy set a prototypical element has a value

A.1

B.0

C.infinite

D.Not defined

- 8. A fuzzy set wherein no membership function has its value equal to 1 is called**
- A.**normal fuzzy set
B.Subnormal fuzzy set.
C.convex fuzzy set
D.concave fuzzy set
- 9. A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe**
- A.**convex fuzzy set
B.concave fuzzy set
C.Non concave Fuzzy set
D.Non Convex Fuzzy set
- 10. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.**
- A.**Convex Fuzzy Set
B.Non convex fuzzy set
C.Normal Fuzzy set
D.Sub normal fuzzy set
- 11. The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to**

A.infinite

B.1

C.0

D.0.5

12. Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

B.False

14. Artificial neural network used for

A.Pattern Recognition

B.Classification

C.Clustering

D.All of these

15. A Neural Network can answer

- A.**For Loop questions
- B.**what-if questions
- C.**IF-The-Else Analysis Questions
- D.**None of these

16. Ability to learn how to do tasks based on the data given for training or initial experience

- A.**Self Organization
- B.**Adaptive Learning
- C.**Fault tolerance
- D.**Robustness

17. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

- A.**Adaptive Learning
- B.**Self Organization
- C.**What-If Analysis
- D.**Supervised Learning

18. In artificial Neural Network interconnected processing elements are called

- A.**nodes or neurons

B.weights

C.axons

D.Soma

19. Each connection link in ANN is associated with _____ which has information about the input signal.

A.neurons

B.weights

C.bias

D.activation function

20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.True

B.False

21. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.Weight

B.activation or activity level of neuron

C.Bias

D.None of these

22. Neuron can send _____ signal at a time.

- A.**multiple
- B.**one
- C.**none
- D.**any number of

23. Artificial intelligence is

- A.**It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations
- B.**Computational procedure that takes some value as input and produces some value as output.
- C.**Science of making machines performs tasks that would require intelligence when performed by humans
- D.**None of these

24. Expert systems

- A.**Combining different types of method or information
- B.**Approach to the design of learning algorithms that is structured along the lines of the theory of evolution
- C.**an information base filled with the knowledge of an expert formulated in terms

of if-then rules

D.None of these

25. Falsification is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

26. Evolutionary computation is

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.

C.Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.

D.None of these

27. Extendible architecture is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

28. Massively parallel machine is

A.A programming language based on logic

B.A computer where each processor has its own operating system, its own memory, and its own hard disk

C.Describes the structure of the contents of a database.

D.None of these

29. Search space

A.The large set of candidate solutions possible for a problem

B.The information stored in a database that can be, retrieved with a single query.

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

30. $n(\log n)$ is referred to

A.A measure of the desired maximal complexity of data mining algorithms

B.A database containing volatile data used for the daily operation of an organization

C.Relational database management system

D.None of these

31. Perceptron is

- A.**General class of approaches to a problem.
- B.**Performing several computations simultaneously
- C.**Structures in a database those are statistically relevant
- D.**Simple forerunner of modern neural networks, without hidden layers

32. Prolog is

- A.**A programming language based on logic
- B.**A computer where each processor has its own operating system, its own memory, and its own hard disk
- C.**Describes the structure of the contents of a database
- D.**None of these

33. Shallow knowledge

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be, retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

34. Quantitative attributes are

- A.**A reference to the speed of an algorithm, which is quadratically dependent on the size of

the data

B.Attributes of a database table that can take only numerical values

C.Tools designed to query a database

D.None of these

35. Subject orientation

A.The science of collecting, organizing, and applying numerical facts

B.Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.None of these

36. Vector

A.It do not need the control of the human operator during their execution

B.An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.The validation of a theory on the basis of a finite number of examples

D.None of these

37. Transparency

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

38. Core of soft Computing is

- A.**Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.**Fuzzy Networks and Artificial Intelligence
- C.**Artificial Intelligence and Neural Science
- D.**Neural Science and Genetic Science

39. Who initiated the idea of Soft Computing

- A.**Charles Darwin
- B.**Lofti A Zadeh
- C.**Rechenberg
- D.**Mc_Culloch

40. Fuzzy Computing

- A.**mimics human behaviour
- B.**doesn't deal with 2 valued logic
- C.**deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.**All of the above

41. Neural Computing

- A.**mimics human brain
- B.**information processing paradigm
- C.**Both (a) and (b)
- D.**None of the above

42. Genetic Algorithm are a part of

- A.**Evolutionary Computing
- B.**inspired by Darwin's theory about evolution - "survival of the fittest"
- C.**are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D.**All of the above

43. What are the 2 types of learning

- A.**Improvised and unimprovised
- B.**supervised and unsupervised
- C.**Layered and unlayered
- D.**None of the above

44. Supervised Learning is

- A.**learning with the help of examples
- B.**learning without teacher
- C.**learning with the help of teacher
- D.**learning with computers as supervisor

45. Unsupervised learning is

- A.**learning without computers
- B.**problem based learning

C.learning from environment

D.learning from teachers

46. Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

47. In supervised learning

A.classes are not predefined

B.classes are predefined

C.classes are not required

D. classification is not done

This sheet is for 1 Mark questions

S.r No	Question	a	b	c	d	Correct
e.g	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp	Distinguish two regions clearly	Cannot Distinguish two	Collection of ordered pairs	None of these	a
2	In computing the output is called as	Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of	two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be	Ambiguous	Unambiguos	Inaccurate	None of these	b
5	Core of soft computing is	Fuzzy	Fuzzy network	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation	Sequential	Parallel	approxiamate	both a and b	a
7	Who initiated idea of soft computing	charles darwin	rich and berg	mc culloch	lofti a zadeh	d
8	Soft computing is based on	fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be	non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing	mimics human	deals with	exact information	both a and b	d
11	Hard computing is also called as	evolutionary	conventional	non conventional	probablistic computing	b
12	Which computing produces accurate results	soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing	mimics human	information	both a and b	none of the above	c
14	Artificial neural network is used for	pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization	Blind search represent a guided approach while optimization is unguided	Blind search usually does not conclude in one step like some optimization methods.	Blind search cannot result in optimal solution whereas optimization method do	none of these	B
16	In modeling,an optimal solution is understood to be	a solution that can only be determined by an exhaustive enumeration testing of alternatives	a solution found in the least possible time and using the least possible computing resources	a solution that is the best based on criteria defined in the design phase	a solution that requires an algorithm for the determination	C

17	When is a complete enumeration of solution used?	When a solution that is "good enough" is fine and good heuristics are available	When there is enough time and computational power available	When the modeler requires a guided approach to problem solving	When there are an infinite number of solution to be searched	B
18	All of the following are true about heuristics EXCEPT	heuristics are used when the modeler requires a guided approach to problem solving	heuristics are used when a solution that is "good enough" is sought	heuristics are used when there is abundant time and computational power	heuristics are rules of good judgement	C
19	Which approach is most suited to structured problem with little	Simuation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belong to the family of method in the	artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
21	What does the 0 membership value means in the set	the object is fully inside the set	the object is not in the set	the object is partially present in the set	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	a
23	The process of fuzzy interference system involves	membership functions	fuzzy logic operators	if-then rules	all the above	d
24	What does a fuzzifier do	converts crisp input to linguistic variables	converts crisp ouput to linguistic variables	converts fuzzy input to linguistic variables	converts fuzzy output to linguistic variables	a
25	Which of the following is not defuzzifier method	centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method	mamdani	sugeno	rivest	only a and b	d

27	A Fuzzy rule can have	multiple part of antecedent,only single part of consequent	only single part of antecedent,multiple part of consequent	multiple part of antecedent,multiple part of consequent	only single part of antecedent,only single part of consequent	c
28	The α cut of a fuzzy set A is a crisp set defined by :-	$\{x \cup a(x) > \alpha\}$	$\{x \cup a(x) \geq \alpha\}$	$\{x \cup a(x) < \alpha\}$	$\{x \cup a(x) \leq \alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by	$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1/x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?	$\{0/a, 0.7/b, 0.8/c, 0.2/d, 1/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.2/d, 1/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.7/d, 1/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 1/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of AUB?	$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0.2/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.5/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.8/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B ?	$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 1/e\}$	a
34	What denotes the support(A) in a fuzzy set?	$\{x \cup a(x) > 0\}$	$\{x \cup a(x) < 0\}$	$\{x \cup a(x) \leq 0\}$	$\{x \cup a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?	$\{x \cup a(x) > 0\}$	$\{x \cup a(x) = 1\}$	$\{x \cup a(x) \geq 0.5\}$	$\{x \cup a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designning a fuzy logic machine	fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation->fuzzification->deffuzification	rule evaluation->defuzzification->fuzzification	a
38	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
39	Genetic algorithm belong to the family of method in the	artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A

40	All of the following are suitable problem for genetic algorithm EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
41	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
43	mutation is applied on ___ candidates.	one	two	more than two	none of these	a
44	recombination is applied on ___ candidates.	one	two	more than two	none of these	b
45	LCS belongs to ___ based methods?	rule based learning	genetic learning	both a and b	none of these	a
46	Survival is ___ approach.	deterministic	non deterministic	semi deterministic	none of these	a
47	Evolutionary algorithms are a ___ based approach	heuristic	metaheuristic	both a and b	none of these	a
48	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by	Fredrik	Fogel	Frank	Flin	b
54	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
56	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d

58	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover	discrete and intermedium	discrete and continuous	continuous and intemedium	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested.	TRUE	FALSE			B
61	_____cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solutuon	none of these	C
62	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
63	_____doesnot usually allow decision makers to see how a solution to a _____envolves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
64	EC stands for?	Evolutionary Computatons	Evolutionary computer	Electronic computations	noneof these	a
65	GA stands for	genetic algorithm	genetic assurance	genese alforithm	noneof these	a
66	LCS stands for	learning classes system	learning classifier systems	learned class system	noneof these	b
67	GBML stands for	Genese based Machine learning	Genes based mobile learning	Genetic bsed machine learning	noneof these	c
68	EV is dominantly used for solving ____.	optimization problems	NP problem	simple problems	noneof these	a
69	EV is considered as?	adaptive	complex	both a and b	noneof these	c
70	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
72	Parameters that affect GA	initial population	selection process	fitness function	all of these	d

73	Fitness function should be	maximum	minimum	intermediate	none of these	b
74	Evolutionary algorithms are a ___ based approach	heuristic	metaheuristic	both a and b	none of these	a
75	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
76	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
77	mutation is applied on ___ candidates.	one	two	more than two	none of these	a
78	recombination is applied on ___ candidates.	one	two	more than two	none of these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?	sub parents	parents	offspring	grand child	c
80	___ decides who becomes parents and how many children the parents have.	parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?	Parent Selection methods	Survival Selection methods	both a and b	none of these	c
82	LCS belongs to ___ based methods?	rule based learning	genetic learning	both a and b	none of these	a
83	Survival is ___ approach.	deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called ___ that can be applied to fuzzy set theory.	Hedges	Linguistic Variable	Fuzzy Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a

87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?	associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is	Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned	c
92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)	$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3), (5, 0), (6, 0.2)\}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a

96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be	{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.5}	{0.1, 0.5, 0.4, 0.2, 0.2}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x,y} z = \min(\mu_A(x), \mu_B(y))$ Then, $f(A+B)$ is equal to	{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)}	{(0.5,12), (0.6,13), (1,14), (0.7,15), (1,15), (1,16), (1,17), (1,18)}	{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	d
98	$A \cup (B \cup C) =$	$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be	{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a	conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A, B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous	1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b

103	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	C
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	----- defines logic funtion of two prepositions	prepositions	Lingustic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ----- gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ----- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ----- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then z=c (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b

111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a

115	In Evolutionary strategy, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is	doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is	doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a

119	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)	(μ,λ) : Select survivors among parents and offspring	$(\mu+\lambda)$: Select survivors among parents and offspring	$(\mu-\lambda)$: Select survivors among offspring only	$(\mu:\lambda)$: Select survivors among offspring only	b
123	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b

124	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126	(1+ λ) ES	λ mutants can be generated from one parent	one mutant is generated	2 λ mutants can be generated	no mutants are generated	a
127	Termination condition for EA	mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
130	(1+1) ES	Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
131	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c

133	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d
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This sheet is for 2 Mark questions						
S.r No	Question	a	b	c	d	Correct Answer
e.g	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	Who can deal with noisy input information	soft computing	hard computing	both a and b	none of the above	a
2	Ability to learn how to do task based on the data is done by	self organization	adaptive learning	fault tolerance	robustness	b
3	Which of the following is not a technique of soft computing	neural network	genetic algorithm	evolutionary	conventional	d
4	Fuzzy logic system is based on what type of rule	if-then	else-if	while	do-while	a
5	What is the function of dendrites in biological neural network	send signals to	receive signals from	sum of incoming	transmit signals	b
6	Expert system	combines different	is a approach to	is an information	none of the above	c
7	Three main basic feature involved in characterizing member function are	intuition,inference,ran	fuzzy	center of	core,support,boundar	d
8	What is the function of cell body in biological neural network	multiples the	sums the incoming	multiples the	sums the outgoing	b
9	What is perceptron	a single layer feed	a double layer	a neural network that	auto associative	a
10	Which of the following computing is trial and error problem solver algorithm	hard computing	neural network	evolutionary	fuzzy logic	c
11	What are advantages of neural network	ability to learn by	fault tolerant	both a and b	none of the above	c
12	Which of the following does not belong to the process of involuntary computing	selection	mutation	recombination	deletion	d
13	The Value of crisp set can be	either 0 or 1	near to 0 or 1	between 0 and 1	between 0.5 and 0.7	a
14	The room temperature is hot. Here the hot(use of linguistic variable is used) can be	fuzzy set	crisp set	probabilistic set	none of the above	a
15	The value of set membership can be represented by	discrete set	degree of truth	probabilities	both b and c	b
16	Semiconductor layout & aircraft design are the application type of which domain?	Control	Design	Robotics	ML	B
17	Trajectory planning is the application type of which domain?	Control	Design	Robotics	ML	C
18	Filter design is the application type of which domain?	Control	Signal Processing	Robotics	ML	B
19	Pokers & Checkers are the application type of which domain?	Control	Game Playing	Robotics	ML	B
20	Manufacturing & resource allocation are the application type of which domain?	Scheduling	Design	Robotics	ML	A
21	What is a crossover point in a fuzzy set?	$\{x \cup a(x) < 0\}$	$\{x \cup a(x) = 1\}$	$\{x \cup a(x) = 0.5\}$	$\{x \cup a(x) > 0\}$	c
22	If A and B are two fuzzy sets with membership function: $\cup a(X) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$ $\cup b(X) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ THEN what will be the intersection of A and B	$\{0.2, 0.5, 0.6, 0.7, 0.9\}$	$\{0.2, 0.3, 0.8, 0.1, 0.5\}$	$\{0.5, 0.1, 0.6, 0.1, 0.8\}$	$\{0.1, 0.5, 0.2, 0.1, 0.8\}$	d
23	$A = \{0.1/1+0.2/2+0.3/3\}$ $B = \{0.6/1+0.5/2+0.4/3+0.5/4\}$ Find the set difference	$\{0.1/1+0.2/2+0.3/3\}$	$\{0.3/1+0.2/2+0.2/3\}$	$\{0.1/1+0.3/2+0.2/3\}$	$\{0.1/1+0.2/2+0.5/3\}$	a
24	With the help of which formula can we find the algebraic sum of two fuzzy sets A,B?	$\{\cup A(x) + \cup B(x)\} - \{\cup A(x) * \cup B(x)\}$	$\{\cup A(x) - \cup B(x)\} - \{\cup A(x) * \cup B(x)\}$	$\{\cup A(x) / \cup B(x)\} - \{\cup A(x) * \cup B(x)\}$	$\{\cup A(x) + \cup B(x)\} + \{\cup A(x) * \cup B(x)\}$	a
25	With the help of which formula can we find the algebraic product of two fuzzy sets A,B?	$\{\cup A(x) * \cup B(x)\}$	$\{\cup A(x) * \cup B(x)\} * \{\cup A(x) - \cup B(x)\}$	$\{\cup A(x) * \cup B(x)\} + \{\cup A(x) * \cup B(x)\}$	$\{\cup A(x) * \cup B(x)\}$	d
26	Which one of the following is the associative property for a crisp set	$AU(BUC) = (AUB)UC$	$BU(AUC) = CU(BUA)$	$AU(CUA) = B(AUC)$	all the above	a

27	Knowledge base is a combination of	rule base and data base	rule base and time base	time base and probability base	model base and data base	a
28	Fuzzy logic system is based on what type of rule	if-then	else-if	while	do-while	a
29	What is the function of dendrites in biological neural network	send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b
30	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
31	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
32	_____ is a simulation method that let decision maker see what the model is doing and how it interacts.	VIS	VIM	SIV	HIV	A
33	_____ systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	B
34	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?	Simulation	Optimization	human intuition	genetic algorithm	A
35	Which of the following is the advantage of simulation?	It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skills	It solves problem in one pass with no iteration.	A
36	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred	continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B
37	The defining length of a schema is useful to calculate _____ of the schema for _____.	Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A
38	Semiconductor layout & aircraft design are the application type of which domain?	Control	Design	Robotics	ML	B
39	Trajectory planning is the application type of which domain?	Control	Design	Robotics	ML	C
40	Filter design is the application type of which domain?	Control	Signal Processing	Robotics	ML	B
41	categories of EA are/is	Genetic Algorithm	genetic programming	learning Classifier Systems	all of these	d
42	Phases in which the LCS individuals are evaluated are	performance phase	reinforcement phase	both a and b	none of these	c
43	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	a
44	Genetic algorithm is a subset of _____.	evolutionary algorithm	dynamical algorithm	both a&b	None of these	A
45	NP hard problems are also called as _____.	discrete optimization	combinatorial optimization	evolutionary optimization	None of these	B
46	Genetic algorithm is first introduced by _____.	Charles Darwin	John Holland	Gregor Johann Mendel	None of these	B

47	_____ replicates the most successful solutions found in a population at a rate proportional to relative quality.	Selection	Recombination	Mutation	None of these	A
48	_____ decomposes two distinct solutions and then randomly mixes their parts to form novel solutions.	Selection	Recombination	Mutation	None of these	B
49	_____ randomly perturbs a candidate solution.	Selection	Recombination	Mutation	None of these	C
50	A _____ is a template consisting of a string composed of three symbol.	Wild symbol	Schema	Layout	None of these	B
51	{0,1,#} is the symbol alphabet ,where # is a special _____ symbol.	Wild card	Schema	Layout	None of these	A
52	Metaheuristics are ?1)non deterministic 2)non approximate 3)not problem specific	1,2,3	1,2	1,3	2,3	c
53	In search techniques, as single point based contradicts population based similiary deterministic contradicts ____?	Stochastic	simplex based	complex based	none	a
54	In swarm systems organisations are	centralized	decentralized	controlled by third party	none	b
55	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids	1,3,2	3,2,1	2,3,1	2,1,3	c
56	Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	a
57	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms	1,2	1,2,3	2,3,4	all of these	d
58	pheromone quantity in ACO is ____ proportional to path selection.	directly	inversly	there is no connection	none	a
59	The ants prefer the smaller drop of honey over the more abundant, but less nutritious, sugar. This is the example of?	kruskal algorithm	Travelling salesman	Knapsack problem	NP hard problem	c
60	In kmeans clustering each cluster is associated with	centroid	edge	common point	none of them	a
61	What is EC?	computer based problem solving systems	Systems that uses computational models of evolutionary process	both a and b	none of these	c
62	Recombination is applied to	2 selected candidated	1 selected candidate	3 selected candidate	none of these	a
63	In EA mutation is applied to	2 candidate	1 candidate	3 candidate	none of these	b
64	EV is used for	solving optimization problems	finding solutions	both a and b	none of these	a
65	EV is considered as	complex	simple	complex and adaptive	all of these	c
66	GA stands for	Genetic Algorithm	genetic programing	genetic assurance	none of these	a

67	Features of GA	A string representation of chromosomes.	A fitness function be to minimized.	A cross-over method and a mutation method.	all of these	d
68	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
69	Evolutionary programming was developed by	Fredrik	Fogel	Frank	Flin	b
70	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
71	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
72	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
73	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d
74	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
75	What are different types of crossover	discrete and intermedium	discrete and continuous	continuous and intermedium	none of these	a
76	GP individual stores computer program	TRUE	FALSE			a
77	GP selection is	Deterministic selection	Tournament selection	nondeterministic selection	none of these	b
78	EP mutation is	Data specific	Data type specific	non specific	none of these	b
79	categories of EA are/is	Genetic Algorithm	genetic programming	learning Classifier Systems	all of these	d
80	Phases in which the LCS individuals are evaluated are	performance phase	reinforcement phase	both a and b	none of these	c
81	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	a
82	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	a
83	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____	Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	Fuzzy & Crisp Set	a
84	Fuzzy logic is usually represented as	IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	b
85	Three main basic features involved in characterizing membership function are	Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	Core, Support , Boundary	Weighted Average, center of Sums, Median	c
86	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b

87	Why can't we design a perfect neural network?	full operation is still not known of biological neurons	number of neuron is itself not precisely known	number of interconnection is very large & is very complex	all of the mentioned	d
88	Both Fuzzy logic and ANN are soft computing techniques because	Both gives precise and accurate results	ANN gives accurate result but fuzzy logic doesnot	In each, no precise mathematical model of the problem is required	Fuzzy logic gives accurate result but ANN doesnot	c
89	Internal state of neuron is called _____, is the function of the inputs the neurons receives	Weight	activation or activity level of neuron	Bias	None of these	b
90	Each connection link in ANN is associated with _____ which has information about the input signal.	neurons	weights	bias	activation function	b
91	In artificial Neural Network interconnected processing elements are called	nodes or neurons	weights	axons	Soma	a
92	The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to	infinite	1	0	0.5	d
93	The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing	Convex Fuzzy Set	Non convex fuzzy set	Normal Fuzzy set	Sub normal fuzzy set	b
94	The cell body of neuron can be analogous to what mathamatical operation?	summing	differentiator	integrator	none of the mentioned	a
95	Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data	Both (a) and (b)	None of the above	c
96	_____ is/are the way/s to represent uncertainty.	Fuzzy Logic	Probability	Entropy	All of the mentioned	d
97	Given two fuzzy sets A and B A={((x1,0.5),(x2,0.1),(x3,0.4))} and B={((x1,0.2),(x2,0.3),(x3,0.5))} then union of 2 sets A U B is	{}((x1,0.5),(x2,0.1),(x3,0.4))	{}((x1,0.5),(x2,0.3),(x3,0.5))	{}((x1,0.2),(x2,0.3),(x3,0.5))	{}((x1,0.2),(x2,0.1),(x3,0.4))	b

	If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$ $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be		{0.2, 0.5, 0.6, 0.7, 0.9}	{0.2, 0.5, 0.2, 0.1, 0.8}	{0.1, 0.5, 0.6, 0.1, 0.8}	{0.1, 0.5, 0.2, 0.1, 0.8}	d
98	For k>1, which of the following concept can be used to generate other linguistic hedge?	Concentration and dilation	Dilation	Concentration	None of the mentioned	c	
100	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A U B is	{1.0, 0.45, 0.75}	{1, 0.2, 0.75}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	a	
101	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A ∩ B is	{1.0, 0.45, 0.75}	{0.2, 0.20, 0.50}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	b	
102	Mamdani-style inference involves which steps	Fuzzification of the input variables & Rule evaluation	Aggregation of the rule output & Defuzzification	Both a and b	either a or b	c	
103	A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$	Core	Support	Cross-over	α - cut	c	
104	Which statement is true?	Mamdani approach characterised by its low interpredictability and low accuracy	Takagi and Sugeno's approach characterised by high accuracy but at the cost of high interpretability	Takagi and Sugeno's approach follows precise fuzzy modelling and obtains high accuracy but at the cost of low interpretability	Mamdani approach characterised by its low interpretability and high accuracy	c	
105	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$	$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) < 1$	c	
106	Which can be used as an input to fuzzy controller?	A fuzzy set	a crisp set	Both fuzzy set and Crisp set	None of these	b	
107	What are the types of fuzzy logic sets?	Type-1 fuzzy set	Type-2 fuzzy set	Both a and b	None of these	c	
108	How is fuzzy logic different from conventional control methods	IF and THEN approach	FOR approach	WHILE approach	DO approach	a	
109	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \text{support } A(x)$, where A belongs to A. Then fuzzy set is called normal when	$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) > 1$	c	

110	If A and B are sets and $A \cup B = A \cap B$ then	A=B	A=0	B=0	None of these	A
111	If x is A then y is B else y is C. The output of the given fuzzy rule is	A fuzzy set	a crisp set	a fuzzy relation	a membership function	c
112	What Is The First Step Of Fuzzy Logic Toolbox?	Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator(AND or OR) in the antecedent	Aggregation of the consequents across the rule	a
113	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	The input is a value greater than one and the output is a value less than the input	The input and output have both the same values	The input has two or more values and the output has a single truth value	d
114	What Is The Input And Output Of Step 3 - Apply Implication Method?	Input is a fuzzy set but the output is a whole value	Input is a fuzzy set but the output is a whole value	Input and Output have the same value	Input is a smaller value than the output value	b
115	What Is The Purpose Of Aggregation?	To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	a
116	Linguistic variable is	a variable whose values are words or sentences	any numerical value only	any binary value only	variable which contains TRUE or FALSE values only	a
117	Identification of Input, Output and state variables is performed in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	Identification of variables	d
118	Assigning linguistic label to each subset is done in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	fuzzy subset configuration	d
119	Disjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	a
120	Conjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	b

121	Categorial reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	a
122	Syllogistic reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	c
123	Qualitative reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	b
124	Dispositional reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	d
125	Mamdani systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	d
126	Sugeno systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	b
127	In the generational model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	a
128	In the steady-state model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	b
129	In the generational model of EA	each individual survives exactly for two generation	each individual survives exactly for one generation	cannot predict	each individual survives as many generations as want	b

130	In the steady-state model of EA	One offspring is generated per generation	two offsprings are generated per generation	cannot decide	more than two offsprings are generated per generation	a
131	Which of the following algorithm is most efficient for discontinuous and noisy problems?	Evolutionary algorithm	Classical optimization algorithm	Genetic algorithm	none	a
132	Each iteration of EA is referred to as	Generation	Iteration	population	None	a
133	Which of the following are evolutionary operators?	Selection	Crossover	Mutation	All of the above	d
134	In the $(\mu/\rho,\lambda)$ method of ES, parents are	selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	a
135	In the $(\mu/\rho+\lambda)$ method of ES, parents are	selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	b
136	Fitness scaling is desirable to ensure	Population diversity	selection pressure	that better solutions are selected only	relatively inferior solutions are not ignored	a
137	Which mutation operator is used in ES as reproduction operator?	one point	Gaussian mutation	two point	adaptive	b
138	Fitness proportionate selection methods are	Roulette wheel selection	Stochastic universal sampling	tournament selection	All the mentioned	d
139	In which selection method of survival selection there is no notion of fitness?	fitness based selection	elitism	Agebased selection	All the mentioned	c
140	In which selection strategy every individual has the same probability to be selected?	Roulette wheel selection	Uniform selection	tournament selection	Rank selection	b
141	High selection pressure is desirable, when we need	diversity not found in each generation	there is no improvement in successive GA iteration	faster termination of GA	fitness values are not uniformly distributed	c
142	Tournament selection scheme is more preferable when	when fitness values are uniformly distributed	population are with very diversified fitness values	when fitness values are not necessarily uniformly distributed	under all the above situations	b
143	Which of the following is not a characteristic of evolutionary algorithm?	Conceptual simplicity	Parallelism	Broad applicability	Artificial selection	d

144	What is the correct order of steps in evolutionary algorithm?	Select parents-recombine-mutate-evaluate	Select parents-recombine-evaluate-mutate-	Select parents-mutate - recombine-evaluate	Select parents-evaluate -recombine-mutate	a
145	Which of the following schemes are selection schemes in Evolutionary computation?	Hall of fame	Rank based selection	tournament selection	All of the above	d
146	To encode chromosomes which encoding schemes are used	binary encoding	finite state machine encoding	real value encoding	All of the above	d

This sheet is for 3 Mark questions						
S.r	Question	a	b	c	d	Correct
	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	What is defuzzification	conversion of fuzzy	conversion of crisp	conversion of fuzzy	conversion of crisp set to crisp	a
2	What type of model is required for hard computing	mathematical	biological	chemical	probabilistic	a
3	Which of the following is/are basic component neuron	dendrites	axon	nucleus	all of the above	d
4	Which of the following computing technique has the ability of	neural network	evolutionary	hard	probabilistic	a
5	The truth value of the fuzzy set is	either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
6	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
7	which of the following is a sequence of steps taken in designing	fuzzification->Rule	deffuzification->rule	rule evaluation-	rule evaluation->defuzzification-	a
8	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
9	Genetic algorithm belong to the family of method in the	artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
10	All of the follwing are suitable problem for genetic algorithm EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
11	In which stage of the simulation methodology do you determine the variable and gather data	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	
12	In which stage of the simulation methodology do you determine how long to run the simulation	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	D
13	In which stage of the simulation methodology do you determine the system boundaries and enviroment?	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
14	What BEST describes a simulation model with a limited number of variables ,each with the finite number of values?	system dynamics simulation	discrete event simulation	continous distribution simulation	Monte carlo simulation	B
15	The advantage of visual interactive simulation include all of the following EXCEPT	Improvement in training using the simulation	reduced need for the decision maker involvement	The ability to see how a simulation works	improved presentation of simulation results	B
16	What can system dynamics modelling be used for ?	qualitative method for analyzing a system	simulation models that test each subsystem in isolation	micro-level simulation models that examine individual values	studying system behaviour at an instant in time	A
17	In agent-based modelling ,agents are	the human workers or agents who use the system	communication links between simulation	Autonomous rule-based decision making units	the hardware platform used to conduct the simulation	C

18	Agent based modelling is best for all the following types of problem features EXCEPT	complex interactions	low uncertainty	Many inter-related factors	irregular data	B
19	What is the final stage of an agent based modelling(ABM) methodology?	Identifying the agents and determining their behaviour	Determining agent-related data	Validating agent behaviour against reality	determining the suitability of ABM	C
20	Which of the following is the advantage of simulation?	It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skils	It solves problem in one pass with no iteration.	A
21	The truth value of the fuzzy set is	either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
22	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
23	which of the following is a sequence of steps taken in designning a fuzy logic machine	fuzzification->Rule Evaluation->Defuzzification	deffuzification->rule evaluation-evaluation->fuzzification	rule evaluation->fuzzification->deffuzification	rule evaluation->defuzzification->fuzzification	a
24	EV is dominantly used for solving ____.	optimization problems	NP problem	simple problems	noneof these	a
25	EV is considered as?	adaptive	complex	both a and b	noneof these	c
26	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
27	Identify the drawbacks of clustering algorithms? 1) can generate empty clusters 2) can terminate at local minimum 3)can handle noisy data	1,2,3	1,2	3	2,3	b
28	generation of empty cluster problem in clustering can be overcome by?	ACO based clustering	PSO based clustering	kmeans	kmode	b
29	where does PSO based clustering terminates?	global optimum	local optimum	global maximum	local minimum	a
30	Each particle in PSO modifies its position according to ? 1)its velocity 2)its weight 3) its gbest and pbest	2,3	1,2	1,2,3	only 1	c
31	Applications of ACO are ? 1)shortest path 2)assignment problem 3)set problem	2,3	1,2	1,2,3		c
32	Evaporation of pharomones is ?	directly proportional to path length	inversly proportional to path length	constant	none	a
33	Metaheuristics doesnot include ?	evolutinary algorithms	tabu searching	simulated annealing	none	d
34	Metaheuristics are ?1)non deterministic 2)non approximate 3)not problem specific	1,2,3	1,2	1,3	2,3	c
35	In search techniques, as single point based contradicts population based similary deterministic contradicts ____?	Stochastic	simplex based	complex based	none	a
36	In swarm systems organisations are	centalized	decentralized	controlled by third party	none	b

37	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids	1,3,2	3,2,1	2,3,1	2,1,3	c
38	Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	a
39	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms	1,2	1,2,3	2,3,4	all of these	d
40	pheromone quantity in ACO is ___ proportional to path selection.	directly	inversly	there is no connection	none	a
41	Recombinatoin involves ___candidates while mutation requires ___ candidates, and the result is called___.	1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
42	Identify the correct sequence for evolutionalry algorithms ? 1>Select genitors from parent population 2)Evaluate newborn offspring 3>Create offspring 4)replace some parents	1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
43	Problems for which there is no efficient method to solve such problems exactly are called?	complex	hard	strong	none	b
44	EV is considered as ? 1)complex 2) adaptive	1	2	1,2	none	c
45	EV system was proposed for exploring a___ fitness space and can form___.	multipieaked,clusters	single peaked,clusters	multipieaked,hard problems	single peaked,hard problems	a
46	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recombination operator	1,2	1,2,3	2,3	1,3	b
47	Parameters that affect GA are ? 1)intial population 2)fitness function 3)ability to generate offspring	1,3	1,2	1,2,3	only 1	b
48	___focuses attention on high fitness individuals, thus exploiting the available fitness information.	clustering	offspring production	replace	selection	d

49	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
50	Genetic algorithm are heuristic methods that do not guarantee an optimal solution to a problem	TRUE	FALSE			A
51	A "What-if" model is most typically used for the most structured problems	TRUE	FALSE			B
52	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solutuon	none of these	C
53	Discrete events and agent-based models are usuallyly used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
54	_____ doesnot usually allow decision makers to see how a solution to a _____envolves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
55	_____ is a simulation method that let decision maker see what the model is doing and how it interact.	VIS	VIM	SIV	HIV	A
56	____systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	B
57	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?	Simulation	Optimization	human intuition	genetic algorithm	A
58	Which of the following is the advantage of simulation?	It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skils	It solves problem in one pass with no iteration.	A
59	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred	continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B
60	The defining length of a schema is useful to calculate _____ of the schema for _____.	Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A

61	Recombination involves ___ candidates while mutation requires ___ candidates, and the result is called ___.	1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
62	Identify the correct sequence for evolutionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3)Create offspring 4)replace some parents	1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
63	Problems for which there is no efficient method to solve such problems exactly are called?	complex	hard	strong	none	b
64	EV is considered as ? 1)complex 2) adaptive	1	2	1,2	none	c
65	EV system was proposed for exploring a ___ fitness space and can form ___.	multipieaked,clusters	single peaked,clusters	multipieaked,hard problems	single peaked,hard problems	a
66	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recombination operator	1,2	1,2,3	2,3	1,3	b
67	Parameters that affect GA are ? 1)initial population 2)fitness function 3)ability to generate offspring	1,3	1,2	1,2,3	only 1	b
68	___ focuses attention on high fitness individuals, thus exploiting the available fitness information.	clustering	offspring production	replace	selection	d
69	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
70	Evolution strategies uses ? 1)selection 2)recombination 3)real valued vector	1,2,3	2,3	1,3	only 2	a
71	which of the following statements are true regarding ES ? 1)Survival is deterministic 2)first allows the N best children to survive, and replaces the parents with these children. 3)allows the N best children and parents to survive.	only 1	1,2	only 2	1,2,3	d
72	Evolutionary Algorithms includes ? 1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	3,4	2,3,4	c

73	Heuristics include ?1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	1,2		d
74	Which of the following statements are true ? 1)mutation is applied to two selected candidates, the so-called parents, and results in one or two new candidates, the children 2) recombination is applied to one candidate and results in one new candidate.	only 1	only 2	both	none of these	d
75	The ___ is performed by selecting two sub trees by chance from the parents and exchange them to create the descendants.	GP crossover	GP Mutation	GP clustering	GP Recombination	a
76	The ___ is performed by selecting a sub tree of the descendant by chance and to exchange the sub tree with an arbitrary generated new sub tree.	GP crossover	GP Mutation	GP clustering	GP Recombination	b
77	___ are able to learn simple "if {condition} then {action}" style rules23 by learning from feedback	ES	EA	LCS	Heuristics	c
78	Island model is related with ?	Distributed Evolutionary Algorithms	LCS	swarm intelligence	ACO	a
79	payoffs can be easily translated to a ___ function for an EA.	survival	reduction	comination	fitness	d
80	Identify the correct statements with respect to genetic algorithms? 1)A fitness function should maximized. 2)A replacement procedure. 3)A string representation of chromosomes.	1,2	2,3	1,2,3	1,3	b
81	There are also other operators, more linguistic in nature, called ___ that can be applied to fuzzy set theory.	Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
82	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
83	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
84	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?	associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c

85	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is	Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
86	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
87	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d
88	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned	c
89	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
90	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
91	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)	$\{(4, 0.7), (2,1), (1,0.8)\}$	$\{(4, 0.3.): (5, 0), (6, 0.2) \}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6,0.2), (7, 1)\}$	$\{(3, 0.3), (6,0.2)\}$	c
92	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
93	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be	$\{0.9, 0.5, 0.6, 0.8, 0.8\}$	$\{0.6, 0.2, 0.1, 0.7, 0.5\}$	$\{0.1, 0.5, 0.4, 0.2, 0.2\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	c
94	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_x y = z (\min(\mu_A(x), \mu_B(x)))$ Then, $f(A+B)$ is equal to	$\{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)\}$	$\{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)\}$	$\{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	$\{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	d
95	$A \cup (B \cup C) =$	$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b

96	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be	{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
97	The fuzzy proposition "IF X is E then Y is F" is a	conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
98	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous	1 only	2 and 3	1,2 and 3	None of these	b
99	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
100	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c
101	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
102	---- defines logic funtion of two prepositions	prepositions	Linguistic hedges	truth tables	inference rules	c
103	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
104	Multiple conjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
105	Multiple disjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
106	IF x is A and y is B then $z=c$ (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
107	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b

108	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
109	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
110	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
111	In Evolutionary programming, survival selection is	Probabilistic selection $(\mu+\mu)$ selection	(μ, λ) - selection based on the children only $(\mu+\lambda)$ - selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
112	In Evolutionary strategy, survival selection is	Probabilistic selection $(\mu+\mu)$ selection	(μ, λ) - selection based on the children only $(\mu+\lambda)$ - selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
113	In Evolutionary programming, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
114	In Evolutionary strategy, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b

115	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
116	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
117	Step size in self-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
118	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
119	Evolutionary Strategies (ES)	(μ,λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b
120	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
121	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
122	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a

123	(1+λ) ES	λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
124	Termination condition for EA	mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
125	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
126	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
127	(1+1) ES	Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
128	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
129	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c
130	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

SCOA- Multiple Choice Questions on Unit 1

Sr. No	Question	A	B	Op
1	Core of soft Computing is	Fuzzy Computing, Neural Computing, Genetic Algorithms	Fuzzy Networks and Artificial Intelligence	
2	Unsupervised learning is	learning without computers	problem based learning	
3	Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data	
4	The membership functions are generally represented in	Tabular Form	Graphical Form	
5	Three main basic features involved in characterizing membership function are	Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	
6	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	
7	Connections across the layers in standard topologies & among the units within a layer can be organised	in feedforward manner	in feedback manner	
8	Internal state of neuron is called _____, is the function of the inputs the neurons receives	Weight	activation or activity level of neuron	

9	Genetic Algorithm are a part of	Evolutionary Computing	inspired by Darwin's theory about evolution - "survival of the fittest"
10	Fuzzy Computing	mimics human behaviour	doesn't deal with 2 valued logic
11	For what purpose Feedback neural networks are primarily used?	classification	feature mapping
12	Which of the following is true for neural networks? (i) The training time depends on the size of the network. (ii) Neural networks can be simulated on a conventional computer. (iii) Artificial neurons are identical in operation to biological ones.	All of the mentioned	(ii) is true
13	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory	Hedges	Lingual Variable
14	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)(x)$ will be	{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.5}
15	Internal state of neuron is called _____, is the function of the inputs the neurons receives	Weight	activation or activity level of neuron
16	Membership function can be thought of as a technique to solve empirical problems on the basis of	knowledge	examples
17	Fuzzy Computing	doesn't deal with 2 valued logic	mimics human behaviour
18	Evolutionary computation is	Combining different types of method or information	Approach to the design of learning algorithms that is structured along the lines of the theory of

SCOA- Multiple Choice Questions on Unit 2

		Op	
Sr. No	Question	A	B
1	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup_{x \in X} \mu_A(x)$ where x belongs to A. Then the fuzzy set A is called normal when	$h(A)=0$	$h(A)<0$
2	Fuzzy logic is a form of	Two-valued logic	Crisp set logic
3	Consider a fuzzy set old as defined below old={\{(20,0),(30,0.2),(40,0.4),(50,0.6),(60,0.8),(70,1),(80,1)\}}. Then the alpha-cut for alpha=0.4 for the set old will	\{(40,0.3)\}	\{50,60,70,80\}
4	If A and B are two fuzzy sets with membership functions ? $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$? $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of ? Complement A? $\mu_B(x)$ will be	\{0.9, 0.5, 0.6, 0.8, 0.8\}	\{0.6, 0.2, 0.1, 0.7, 0.5\}
5	_____ is/are the way/s to represent uncertainty.	Fuzzy Logic	Probability
6	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1
7	Fuzzy logic is usually represented as	IF-THEN-ELSE rules	IF-THEN rules
8	If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$, $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be	\{0.2,0.5,0.6,0.7,0.9\}	\{0.2, 0.5, 0.2, 0.1, 0.8\}
9	A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$	Core	Support
10	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation
11	Which of the following is not true regarding the principles of fuzzy logic	Fuzzy Logic is a concept of Certain Degree	Boolean logic is a subset of Fuzzy logic
12	Which of the following is a type of Membership function?	Triangular	Trapezoidal
13	Using IF-THEN rule to create the output of fuzzy system is called	Inference	Implication

14	Which of the following is not a principle step in fuzzy technique	Fuzzify input	Apply implication method
15	Which is the set, whose membership only can be true or false, in bi-values Boolean logic	Boolean set	Crisp set
16	Defuzzification methods are	Lambda-cut-method	maxima method
17	What Is Fuzzy Inference Systems	process of formulating the mapping from	changing output value to match input value to give
18	What Is Another Name For Fuzzy Inference Systems	Fuzzy expert system	fuzzy modeling
19	Who initiate the idea of soft computing	charles darwin	zadeh
20	The region of universe that is characterized by complete membership in the set is called	Core	Support

SCOA- Multiple Choice Questions on Unit 3

		Op	
Sr. No	Question	A	B
1	Fuzzy logic is :	Used to respond to questions in a humanlike way	A new programming language used to

2	A robot is a _____	Computer-controlled machine that	Machine that thinks like a human
3	What is Fuzzy Inference Systems?	The process of formulating the mapping from a	Changing the output value to match the input
4	What Are The Two Types Of Fuzzy Inference Systems	Model-Type and System-Type	Momfred-Type and Semigi-Type
5	Where Has Fuzzy Inference Systems Been Implemented?	Wireless services, heat control and printers	Restrict power usage, telephone lines and sort data
6	What attempt was Mamdanis Fuzzy Inference Method Was Designed for?	Control any two combinations of any two products	Control a television and remote
7	What Is The First Step Of Fuzzy Logic Toolbox?	Fuzzification of the input variables	Defuzzification
8	What Is The Input And Output Of Step 3 - Apply Implication Method?	Input is a fuzzy set but the output is a whole	Input is a whole value but the output can be a
9	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____	Fuzzy Set	Crisp Set
10	Fuzzy Computing	doesnt deal with 2 valued logic	mimics human behavior
11	Sugeno approach to FLC design is Computationally more expensive compare to Mamdani approach because	Mamdani approach considers a less	Searching a rule in mamdani approach is simple
12	The Truth Value of R: "if mango is sweet then cost is high" Given P: mango is sweet with $\mu(P) = 0.3$ and Cost is high with $\mu(Q) = 0.7$ then	$\mu(R) = 0.3$	$\mu(R) = 0.5$
13	Fuzzy logic is a form of	Two values logic	Crisp Set logic
14	How is the Fuzzy logic different than Conventioal Control Method	IF and THEN approach	For Approach
15	In the following some statements are given i) Fuzzy set is crisp set but reverse is not true ii) if A,B, C are the three sets defined over universe of	I only	ii only
16	What Is The Purpose Of Aggregation?	To gather all the different fuzzy set outputs and	To gather all the possible inputs and use the
17	What is another name of Fuzzy inference system?	Fuzzy Controller System	Fuzzy expert System

SCOA- Multiple Choice Questions on Unit 4

Sr. No	Question	A	B
1	Evolutionary computation is	Combining different types of method or	Approach to the design of learning algorithms that is
2	Perceptron is	General class of approaches to a problem.	Performing several computations
3	3. Which one of the following is the smallest biological unit capable of evolving over time?	A cell	A species
4	Charles Darwin discussed all of the following except	Individual within species exhibit variability in form	Gene mutations are the sources of variation for
5	Initiating Force of evolution is _____	Variation	Natural Selection
6	Which of the following are the main components of Evolutionary Computing?	Initial population	Fitness function
7	The characteristics of individual is represented by	Chromosome	Gray code
8	Which is the main concept of Evolutionary computation?	Survival of fittest	Survival of weakest

9	Which of the following schemes are selection schemes in Evolutionary Computing?	Half of fame	Rank based selection
10	Which of the following Algorithm is most efficient for discontinuous and noisy problem	Evolutionary Algorithm	Classical optimization problem'
11	Each iteration of EA is referred to as	Generation	Iteration
12	Which Selection strategy is called ordinary based selection	Roulette wheel selection	Canonical selection
13	Roulette wheel selection is preferable when	fitness values are uniformly distributed	fitness values are non-uniformly distributed
14	0-1 Knapsack problem can be defined as	Minimum Optimization problem	maximum Optimization Problem
15	Darwin was the first scientist to propose the concept of evolution.	TRUE	FALSE
16	What molecular evidence do we have that all of life is related?	All life on earth has the same set of mutation in its	All life on earth has DNA
17	Tournament Selection scheme is more preferable when	fitness values are uniformly distributed	population are with very diversified fitness
18	Fitness Scaling is desirable to ensure	Population diversity	Selection pressure

SCOA- Multiple Choice Questions on Unit 5

Sr. No	Question	A	B	Op

1	All of the following are suitable problems for genetic algorithms EXCEPT ?	(a) dynamic process control	(b) pattern recognition with complex patterns
2	Genetic Algorithm are a part of _____.	(a) Evolutionary Computing	(b) hybrid evolutionary computing
3	Mutation in Binary string representation is achieved by _____ bits with fixed probability.	(a) flipping	(b) matching
4	This _____ reflects the process of natural selection where the fittest individuals are selected for reproduction in order to produce offspring of the	(a) natural Genetic Algorithm	(b) Genetic Algorithm
5	_____ is not the part of Genetic Algorithm.	(a) Mutation	(b) Selection
6	_____ alter the genetic composition of the offspring. These include crossover, mutation, selection, etc.	(a) Genetic Operators	(b) Genetic Algorithm
7	The _____ simply defined is a function which takes a candidate solution to the problem as input and produces as output how "fit" our how	(a) cross over operation	(b) selection-fitness function
8	This taking up of the entire population by one extremely fit solution is known as premature convergence.	(a) premature convergence	(b) fit convergence
9	_____ is the method OF Fitness Proportionate Selection	(a) Tournament Selection	(b) both
10	Termination condition for Genetic Algorithm is/are _____	(a) both	(b) When we reach an absolute number
11	In _____ every chromosome is a string of numbers, which represents the number in the sequence. Used	(a) Binary-String Encoding	(b) Permutation Encoding
12	In _____ selection chance to be selected is exactly proportional to fitness	(a) Rank selection	(b) Tournament Selection
13	Copying the best chromosomes (solutions) to new population before applying crossover and mutation is used in _____.	(a) Tournment Selection:	(b) Elitism
14	The _____ operator adds a random number taken from a Gaussian distribution with mean equal to the original value of each decision variable	(a) Flipbit	(b) Uniform
15	_____ populate the initial population using a known heuristic for the problem.	(a) Heuristic initialization	(b) Heuristic Geneticvalued initialization

16	Genetic Algorithm is a _____ search.	(a) Adaptive Heuristic	(b) Adaptive non-Heuristic
17	Complete set of Genetic Material is known as_____	(a) Genome	(b) Phenotype Gene
18	_____ involves shuffling of positions inside the chromosome	(a) Mutation	(b) Crossover
19	The set of samples on which the Genetic Algorithm works is termed as_____	(a) Testing sample	(b) Team sample
20	_____ are the coding schemes in the Gebetic Algorithm	(a) Hexadecimal	(b) Tree
21	In_____each chromosome is a string of either zero or one.	(a) Tree Encoding	(b) Hexadecimal Encoding
22	_____is defined as the possible form of the same gene.	(a) Allel	(b) chromosomes
23	If the integers are to be represented using _____ the encoded chromosomes will be smaller than those encoded with binary siring.	(a) Hexadecimal encoding	(b) Octal Encoding
24	The _____selection involves generating a random value between 0 and 1	(a) non-probabilistic tournament	(b)probabilistic tournament
25	The phase after selection phase in Genetic Algorithm is_____	(a) Crossover	(b) Mutation
26	In _____ a cross over point on the string to be mated is selected at random and bits next to the crossover point are exchanged.	(a) Single -Point crossover	(b) Uniform crossover
27	In uniform crossover operation,each bit from either parent is selectedwith a probability of _____ and then interchanged.	(a) 0.25	(b) 0.05
28	In uniform crossover whenever there is a 1in the mask,the gene is copies from _____parent and when there is a 0 in the mask,the gene is copies from	(a) first,second	(b) second,first
29	In _____ crossover the each individual is represented as the 2D array vector	(a) Single -Point crossover	(b) Matrix Crossover
30	In _____ the random crossover pointsalong row and column are choosenand then the string is dividecinto non-overlapping rectangular regions.	(a) Matrix Crossover	(b)non- Matrix Crossover
31	_____ is the type of Mutation	(a) Scramble	(b) point

32	Centralised GA and Distributed GA are subtypes of _____	(a) Sequential GA	(b) none
33	Genetational GA and Steady-state GA are subtypes of _____	(a) Sequential GA	(b) Sequential GA
34	The condition when there are two strings which correspond to same index but have conflicting alleles is known as	(a) over-specification	(b) under-specification
35	_____ GAs are suitable for massively parallel computers and consists of only spatially structured population.	(a) Fine-grained parallel GA	(b) Sequential GA
36	If integers are represented using Octal Encoding then,	A. The Encoded chromosome will be smaller than	B. The Encoded chromosome will be greater than
37	The advantage if Hexadecimal encoding over binary and octal encoding is,	A. Its bigger size	B. Its smaller size
38	Which of the following encoding is mainly used for evolving program expressions for GA	A. Tree Encoding	B. Value Encoding
39	Which of the following selection method involves generating a random value between 0 and 1?	A. Roulette wheel selection	B. Rank selection
40	Which of the following is NOT the type of crossover operators?	A. Single point Crossover	B. Three point crossover
41	In general, crossover may have	A. Favourable effect	B. Unfavorable effect
42	In Point mutation, if the random number is _____ than probability P, then that bit is flipped, else remains unchanged	A. Equal	B. Greater
43	A GA works on coded versions of the problem parameters instead of actual parameters themselves	A. FALSE	B. TRUE
44	What is/are the parameter(s) that need to be decided for initial population?	A. Size of the population	B. Method of selecting initial population
45	For minimization problem, following transformation is chosen	A. $1/1+f(x)$	B. $1/1-f(x)$
46	In simple GA, genes encoded are in	A. Variable length strings	B. Fixed length strings
47	Situation where two entries in a string correspond to the same index is called	A. No specification	B. Over-specification

48	Each string's suitability to the problem is evaluated based on its	A. Fitness measure	B. Population
49	The parallel GA can be executed on a	A. Seperate memory Multiprocessor	B. Shared memory B.Multiprocessor
50	Each solution has a spatial location and interacts only with some neighborhood termed as,	A. Gene	B. Deme
51	In multiple population course grained GA, genetic algorithm distributes the entire population to several sub-populations.	A. TRUE	B. FALSE
52	Which among the following is not the feature of Parallel GA	A. Least restrictive	B. Robust
53	Genetic programming is	A. Program dependent	B. Partially dependent
54	A GA is usually said to converge when	A. When the significant value of fitness	B. When the significant value of fitness is
55	All the results in solution space of Constraint based GA are not feasible	A. TRUE	B. FALSE
56	GA does not always gurantee to find a global optimum	A. FALSE	B. TRUE
57	Steady state GA requires	A. More generations to converge	B. Low computational cost
58	In _____ large portion of population is selected for crossover and mutation for replacing old individuals	A. Steady state GA	B. Parallel GA
59	Operating on the entire population also makes it possible yo reach global optimum and reduces the risk of becoming traped in local stationary point	A. TRUE	B. FALSE
60	A _____ is a permanent change in the sequence of DNA	A. Crossover	B. Mutation
61	The main aim of _____ is to search the parameter space	A. Selection	B. Mutation
62	_____ ensures that good chromosomes are not lost and can rapidly increase performance of GA	A. Rank selection	B. Tournament selection
63	_____ encoding is used in ordering problems like TSP	A. Value encoded	B. Permutation encoding

64	Encoding makes the work space discrete even though the functions may be continuous.	A. TRUE	B. FALSE
65	In Uniform crossover, bit from both the parents are chosen with probability of 0.4 and then interchanged.	A. TRUE	B. FALSE

SCOA- Multiple Choice Questions on Unit 6

		Op	
Sr. No	Question	A	B
1	Ant Colony Optimization is the subset of which type of computing	(a) Statistical Method	(b) Artificial Neural Network
2	Trapping of PCO into local optimum is termed as_____	(a) Convergence Trend	(b) Diversed Convergence
3	gbest and mbest values in PSO can be mutated with_____.	(a) Cauchy distribution	(b) Cauchy magnitude function
4	Premature Convergence can be avoided by using_____.	(a) optimal wavelength function	(b) Sigmoid function
5	As per the ring topology in PSO the neighbourhood of a particle is given by_____	(a) $i - imod(S), i, i+1 \text{ mod}(S)$	(b) $(a) i - imod(S)+i+i+1 \text{ mod}(S)$

6	_____ is the collective behavior of decentralized, self-organized systems which is employed in work on artificial intelligence	(a) Artificial Intelligence	(b) Swarm intelligence
7	In _____ the velocity of the particle is defined in terms of probability of bit changing.	(a) Real valued PSO	(b) Hyperparametic PSO
8	Craig Reynolds described the process of PSO in three stages as separation, _____, cohesion.	(a) crossover	(b) alignment
9	The best fit point in PSO is termed as _____.	(a) Global optimization point	(b) globally local point
10	PSO is inspired by _____.	(a) Genetic Evolution	(b) Dynamic Moments of Insects/Birds
11	In PSO each particle adjusts itself according to current position, current velocity, locally best and _____.	(a) Global best	(b) Optimally Best
12	PSO is _____ type of algorithm.	(a) Iterative	(b) Recursive
13	A memory in PSO is used to store _____	(a) iterative step	(b) iterative position
14	In PCO in each iteration every particle in the swarm gets one chance to move towards the global optimum by the magnitude equal to the _____.	(a) Strength	(b) Velocity
15	The set of links inside the swarm is termed as _____.	(a) Swarm connected network	(b) Topological ordering
16	A _____ method is applied to ensure that the new position lies within the search space.	(a) Confinement	(b) Grid Search Space
17	Stopping criteria for iterations is _____.	(a) maximum admissible error when optimal	(b) If the absolute difference
18	Formula of velocity on PSO is _____.	(a) $v = v + c_1 * \text{rand} * (\text{pbest-present}) +$	(a) $v = v + c_1 * \text{rand} * (\text{best-present}) -$
19	Empirically the value of $c_1 + c_2$ in PSO is _____.	(a) 6	(b) 4
20	Searching of new solution and finding the solution which is potentially best in PSO is termed as _____.	(a) Advancement	(b) Adversification
21	In random Adaptive Topology each particle informs _____ particles	(a) k-1	(b) k+1

22	In BPSO bit-by-bit updates are done _____. 	(a) statistically 	(b) both
23	The main idea of ACO is inspired by natural behaviour of _____. 	(a) ant 	(b) frogs
24	Ants find their food by means of chemical substance they secret called the _____ 	(a) nemoneon 	(b) antipheromone
25	Pheromone is considered as the _____to find the path in ACO. 	(a) Strength 	(b) Weakness

tion	C	D	Final Answer
Artificial Intelligence and Neural Science	Neural Science and Genetic Science	A	
learning from environment	learning from teachers	C	
Both (a) and (b)	None of the above	C	
Mathematical Form	Logical Form	B	
Core, Support , Boundary	Weighted Average, center of Sums, Median	C	
convex fuzzy set	concave fuzzy set	B	
both feedforward & feedback	either feedforward & feedback	D	
Bias	None of these	B	

Unit 1

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are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics	All of the above	D
deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic	All of the above	D
pattern mapping	none of the mentioned	D
(i) and (ii) are true	None of the mentioned	C
Fuzz Variable	None of the mentioned	A
{0.1, 0.5, 0.4, 0.2, 0.2}	{0.1, 0.5, 0.4, 0.2, 0.3}	C
Bias	None of these	B
learning	experience	D
deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic	All of the above	D
Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if then rules	None of these	B

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Unit 2

Question		Final Answer
C	D	
$h(A)=1$	$h(A)<1$	C
Many-valued logic	Binary set logic	C
$\{(20,0.1), (30,0.2)\}$	$\{(20,0),(30,0), (40,1), (50,1), (60,1), (70,1)\}$	D
$\{0.1, 0.5, 0.4, 0.2, 0.0\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	C
Entropy	All of the mentioned	D
Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	A
Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	B
$\{0.1, 0.5, 0.6, 0.1, 0.8\}$	$\{0.1, 0.5, 0.2, 0.1, 0.8\}$	D
Cross-over	α - cut	C
Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification	A
Japan is the most active member of Fuzzy member	Fuzzy logic follow the principle of	D
Sigma	All of the mentioned	D
Both the mentioned	None of the mentioned	C

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Defuzzify final output	None of the mentioned	D
Null set	None of the mentioned	B
centroid method	All of the mentioned	D
having higher output than input	having lower output than input	A
Fuzzy logic controller	All of the mentioned	D
culloch	Rechenberg	B
Boundary	Fuzzy	A

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option		Final Answer
C	D	
The result of fuzzy thinking	A term that indicates logical values	A

Unit 3

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Machine that replaces a human by performing complex mental	Type of virtual reality device that	A
Having a larger output than the input	Having a smaller output than	A
Mamdani-Type and Sugeno-Type). Mihni-Type and Sujgani-Type	C
Simulink, boiler and CD recording	Automatic control, decision	D
Control a steam engine and a boiler combination by synthesising a set of	Control a air craft and fuel level	C
Application of the fuzzy operator (AND or OR) in the antecedent	Aggregation of the consequents	A
Input and output have the same value	Input is a smaller value than the	B
Fuzzy & Crisp Set	None of the mentioned	A
deals with information which is vague, imprecise, uncertain,	All of the above	D
Sugeno approach consider a large number of rules in fuzzy rule	Computation of each rule in sugeno	D
$\mu (R) = 0.7$	$\mu (R) = 0.0$	C
Many valued logic	Binary Set logic	C
While Approach	Do approach	A
Both ii, iii	All i, ii, iii	C
To gather all the different fuzzy set outputs and average	To subtract all the output fuzzy	C
Fuzzy Modeling	All of the above	D

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Question		Final Answer
C	D	
Decision support systems that contain an information base filled	None of these	B
Structures in a database those are statistically relevant	Simple forerunner of modern	D
A population	An individual Organism	C
Natural selection removes organisms that are poorly adapted to	Organisms produce more	B
Competition	Adaptation	A
Mutation	All of Above	D
Initial Population	None	A
Phenotype	None	A

Unit 4

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Tournament selection	All of above	D
Genetic Algorithm	None	A
Population	None	A
Tournament Selection	Rank based Selection	D
Needs low selection pressure	needs high population diversity	A
0-1 Knapsack problem is not an optimization problem	None	B
		B
All life on earth has same number of DNA pairs	All life on earth stores its genetic	B
fitness values are non-uniformly distributed	under all the above situations	B
That better solution in a population selected only	Relatively inferior solutions are	A

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tion		Final Answer
C	D	

Unit 5

(c) simple optimization with few variables		(c) simple optimization with few
(c) stastistical evolutionary computing		(a) Evolutionary
(c) inversing		(a) flipping
(c) Hypothetical Genetic Algorithm		(b) Genetic Algorithm
(c) pairing chromosomes		(c) pairing chromosomes
(c) Genetic class selection		(a) Genetic Operators
(c) Fitness Function		(c) Fitness Function
(c) postmature convergence		(a) premature convergenc
(c) Rank Selection		(b) both
(c) When the objective function value has reached a certain pre-		(a) both
(c) none of the above		(a) Binary-String Encoding
(c) Roulette Wheel Selection		(c) Roulette Wheel Selection
(c) Steady-State Selection		(b) Elitism
(c) Shrink		(c) Shrink
(c) Random Initialization		(a) Heuristic initialization

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(c) Non-Adaptive Heuristic		(a) Adaptive Heuristic
(c) Genotype Gene		(a) Genome
(c) none		(a) Mutation
(c) Population		(c) Population
(c) both		(c) both
(c) none		(c) none
(c) both		(a) Allel
(c) both		(b) Octal Encoding
(c) none		(b)probabilistic tournament
(c) both at a time		(a) Crossover
(c) Multi -Point crossover		(a) Single - Point crossover
(c) 0.50		(c) 0.50
(c) none		(a) first,second
(c) Multi -Point crossover		(b) Matrix Crossover
(c) both		(a) Matrix Crossover
(c) both		(c) both

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(c) parallel GA		(c) parallel GA
(c) none		(a) Sequential GA
(c) none		(a) over-specification
(c) parallel GA		(a) Fine-grained parallel GA
C. The Encoded chromosome will be equal to those encoded		A
C. None of the above		B
C. Hexadecimal Encoding		A
C. Tournament selection		C
C. Matrix crossover		B
C. Either A or B		C
C. Smaller		C
C. None of the above		B
C. Both A and B		C
C. None of the above		A
C. None of the above		B
C. Under-specification		B

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C. Length of string		A
C. None of the above		B
C. None of the above		B
C. None of the above		A
C. Can yeild only one solution to the problem		C
C. Problem independent		C
C. When significant value of fitness increases		B
C. None of the above		A
C. None of the above		B
C. Both A and B		C
C. Generational GA		C
C. None of the above		A
C. Selection		B
C. Crossover		C
C. Elitism		C
C. Hexadecimal Encoding		B

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C. None of the above		A
C. None of the above		B

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tion		Final Answer
C	D	
(c) Swarm Intelligence		(c) Swarm Intelligence
(c) Premature Convergence		(c) Premature Convergence
(c) Sigmoid function		(a) Cauchy distribution
(c) wave function		(c) wave function
(c) (a) i-imod(S),i,i+1mod(S) - f(n)		(a) i-imod(S),i,i+1mod(S)

Unit 6

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(c) Computational Intelligence		(b) Swarm intelligence
(c) none		(a) Real valued PSO
(c) substitution		(b) Alignment
(c) Global effective point		(a) Global optimization point
(c) Artificially induced Intelligence		(a) Genetic Evolution
(c) currently best		(a) Global best
(c) None		(a) Iterative
(c) best position		(c) best position
(c) magnitude of displacement		(b) Velocity
(c) Topology		(c) Topology
(c) Topology Search		(a) Confinement
(c) both		(c) both
(c) (a) $v = v + c_1 * \text{rand} * (\text{pbest} + \text{present}) +$		(a) $v = v + c_1 * \text{rand} * (\text{pbest} -$
(c) 2		(b) 4
(c) Diversification		(c) Diversification
(c) $k+2$		(b) $k+1$

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(c) probabilistically		(c) probabilistic ally
(c) none		(a) ant
(c) pheromone		(c) pheromone
(c) weak entity		(a) Strength

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SOFT COMPUTING

UNIT – I

1. The structural constitute of a human brain is known as -----

- a) **Neuron** b)Cells c)Chromosomes d)Genes

2.Neural networks also known as -----

- a)Artificial Neural Network b)Artificial Neural Systems
c)**Both A and B** d) None of the above

3. Neurons also known as -----

- a)Neurodes b)Processing elements c)Nodes d)**All the above**

4. In the neuron, attached to the soma are long irregularly shaped filaments called-----

- a)**Dendrites** b)Axon c)Synapse d)Cerebellum

5. Signum function is defined as -----

- a) $\phi(I) = +1, I > 0, -1, I \leq 0$
b) $\phi(I)=0$
c) $\phi(I)=+1, I > 0$
d) $\phi(I)=-1, I \leq 0$

6. To generate the final output, the sum is passed on to a non-linear filter ϕ called

- a)Smash function b)sum function c)**Activation function** d)Output function

7. -----function is a continuous function that varies gradually between the asymptotic values 0 and 1 or -1 and +1

a)Activation function b)Thresholding function c)Signum function d)**Sigmoidal function**

8.-----produce negative output values

- a)**Hyperbolic tangent function** b)Parabolic tangent function
c)Tangent function d)None of the above

9.----- carrying the weights connect every input neuron to the output neuron but not vice-versa.

- a)**Feed forward network**
b)Fast forward network
c)Fast network
d)Forward network

10.----- has not feedback loop

- a) Neural network **b)Recurrent Network** c) Multilayer Network d) Feed forward network

11. In the learning method, the target output is not presented to the network -----

- a) Supervised learning **b)Unsupervised learning**

- c) Reinforced learning d) Hebbian learning

12. Combining a number of ADALINE is -----

- a) MULTILINE b) MULTIPLE LINE **C)MADALINE** d) MANYLINE

13. Neural network applications -----

- a) Pattern Recognition b) Optimization Problem c) Forecasting **d)All the above**

14.----- is a Systematic method for training multilayer artificial neural network

- a)Back propagation** b) Forward propagation c) Speed propagation d) Multilayer propagation

15. ----- is a computational model

- a) neuron b) cell **c)Perception** d) Neucleus

16. Intermediary layer is present in -----

- a)Multilayer feedforward perception model**

b) Multilayer perception model

c) Multilayer Feedforward model

d) None of the above

17. Linear Activation Operator equation is -----

- a) $O=gl, g=\tan\phi$**

b) $O=gl, g=\sin\phi$

c) $O=gl, g=\cos\phi$

d) $O=gl, g=-\tan\phi$

18.----- is never assured of finding global minimum as in the simple layer delta rule case.

- a)Back propagation** b) Front Propagation c) Propagation d) None above

19. The test of neural network is known as-----

- a)Inference Engine** b) Checking c) Deriving d) None

20. Application of Back Propagation

- a) Design of Journal Bearing b) Classification of soil
c) Hot Extrusion of soil **d) All the above**

21. Reinforced learning also known as -----

- a) Output based learning** b) Error based learning
c) Back propagation learning d) None

22. -----learning follows “Winner takes all” strategy

- a) Stochastic learning **b) Competitive learning** c) Hebbian learning d) BackPropagation learning

23. -----earlier neural network architecture,

- a) Rosenblatt Perception** b) Rosen Perception c) Roshon Perception d) None

24. In Rosenblatt’s Perception network has three units, sensory unit, association unit and -----

- a) Output unit **b) Response unit** c) feedback unit d) Result unit

25. ADALINE stands for -----

- a) Adaptive Linear Neural Element Network**
b) Adaptive Line Neural Network
c) Adapt Line Neural Element Network
d) Adaptive Linear Neural Network

PART-B

1. Explain model of artificial neuron
2. Differentiate Learning methods supervised, unsupervised, and reinforced learning
3. Explain Rosenblatt’s Perception
4. Explain ADALINE network
5. Explain Single layer ANN
6. Explain any one application of Back propagation networks

PART-C

1. Explain neural network architecture
2. Explain back propagation learning briefly
3. Explain basic concepts of neural network

UNIT-2

1.-----is a store house of associated patterns which are encoded in some form

- a) **Associative memory**
- b) Commutative memory
- c) Neural networks
- d) Memory

2. If the associated pattern pairs (x,y) are different and if the model recalls a y given an x or vice versa, then it is termed as -----

- a) Auto associative memory
- b) Hetero associative memory**
- c) neuro associative memory
- d) none

3. Autoassociative correlation memories are known as -----

- a) Auto correlators**
- b) Hetero Correlators
- c) Neuro Correlators
- d) None

4.----- recalls an output given an input in one feedforward pass

- a) Static networks**
- b) Dynamic networks
- c) Recurrent networks
- d) None

5.BAM stands for -----

- a) Bidirectional Associative Memory**
- b) v Associative Memory
- c) Biconventional Associative Memory
- d) None

6.----- associates patterns in bipolar forms that are real-coded

- a) Simplified Bidirectional Associative Memory**
- b) Bipolar form
- c) Bidirectional form
- d) None

7)----- uses bipolar coding

- a) Fabric defect identification
- b) Recognition of Characters**
- c) Design of Journal Bearing
- d) Classification of soil

8) Self-organizing network also known as -----

- a) Back Propagation network
- b) Training free counter propagation network**
- c) Propagation network
- d) none

9) Kesko proposed an energy function for the two states -----

- a) $E(A,B)=AMB^T$
- b) $E(A,B)=-AMB^T$**
- C) $E(A,B)=-AB^T$

$$D) E(A, B) = AB^T$$

10) BAM was introduced by -----

- a) Cruz b) Stubberd c) **Kosko** d) Rosenbatt

11) The algorithm which computes operator M is known as -----

- a) Memory algorithm b) **Recording Algorithm** c) Transfer Algorithm d) None

12) Real coding is used by -----

- a) Recognition of characters b) **Fabric defect identification**
c) Optimization d) Classification of soil

13) ART stands for -----

- a) **Adaptive Resonance Theory** b) Adaptive Recent Theory
c) Adapt Resonance Theory d) Adaptive Retail Theory

14) A program ----- is written in fortran for cluster formation

- a) **Vecquent** b) Vecant c) Vector d) Quantization

15) ----- networks were developed by carpenter and grossberg

- a) **ART** b) ARP c) ARC d) ARD

16) ----- of the network means that a pattern should not oscillate among different cluster units at different stages of training

- a) **Stability** b) Mobility c) Versatility d) Plasticity

17) ----- is the analog version of ART

- a) **ART2** b) ART1 c) ART2A d) ARTMAP

18) ----- test is incorporated into the adaptive backward network

- a) **Vigilance** b) Indulgence c) Revailance d) None

19) In ----- learning the weights are adjusted only when the external input matches one of the stored prototypes

- a) Supervised b) UnSupervised c) **Match-based** d) None

20) Kim et al. Proposed an ----- method using ART2 architecture.

- a) Pattern Recognition b) **Chinese Recognition method**

c)Character Recognition d)None

21)----- learning weight update during resonance occurs rapidly

a)Error-based **b) Fast** c)Slow d)Match-based

22)Comparison layer and recognition layer constitute -----

a)Attenuation **b)Attenuated System** c)Synaptic System d)None

23)ART1 is an elegant theory that address -----

a)Stability – plasticity dilemma

b)Stability dilemma

c)Plasticity dilemma

d)None

24)Supervised version of ART -----

a)ARTMAP

b)Fuzzy art

c)Fuzzy Artmap

d)ART1

25)Slow learning is used as -----

a)ART1

b)ART2

c)ARTMAP

d)Fuzzy ART

PART-B

1.Explain Auto Correlators

2.Explain HeterCorrelators

3.Explain any one application of associative memory

4.Explain Simplified ART architecture

5.Distinguish ART1 and ART2

6.Explain any one application of ART

PART-C

7.Explain Exponential BAM

8.Explain Classical ART network

9.Explain ART1 algorithm

UNIT-3

1.Fuzziness means -----

- a)Vagueness b)Clear c)Precise d)Certainty

2.----- are pictorial representations to denote a set

- a)Flow chart b)**Venn diagram** c)DFD d)ER diagrams

3.The number of elements in a set is called its -----

- a)modality b)placitivity c)**Cardinality** d)elasticity

4.A set with a single element is called -----

- a)Single set b)**Singleton set** c)1 set d)none

5.A ----- of a set A is the set of all possible subsets that are derivable from A including null set

- a)**Power set** b)Impower set c)Rational set d)Irrational set

6.The member ship function of fuzzy set not always be described by -----

- a)continuous b)**Discrete** c)crisp d)specific

7.Fuzzy relation is a fuzzy set defined on the Cartesian product of -----

- a)single set b)**crisp set** c)union set d)intersection set

8.Raising a fuzzy set to its second power is called -----

- a)**concentration** b)intersection c)conjunction d)disjunction

9.Taking a square root of fuzzy set is called -----

- a)**Dilemma** b)Dual c)dialama d)none

10.Fuzzy relation associates ----- to a varying degree of membership.

- a)records b)**tuples** c)felds d)none

11.In case of \Rightarrow operator, the proposition occurring before the " \Rightarrow " symbol is called-----

a. antecedent b.consequent c.conjunction d.disjunction

12. A truth table comprises rows known as -----

a. interpretations b.contradiction c.conjunction d.disjunction

13.A formula which has all its interpretations recording true is known as a -----

a.disjunction b.conjunction c.tautology d.antecedent

14.In propositional logic, ----- widely used for inferring facts.

a.pones b.modus c.modus ponens d.pons

15.----- represent objects that do not change values

a.constants b.variables c.predicates d.subject

16.----- are representative of associations between objects that are constants or variables and acquire truth values.

a.Subject b.Predicate c.Quantifier d.Functions

17.----- truth values are multivalued.

a.crisp logic b.boolean logic c.fuzzy logic d.none

18.Fuzzy logic propositions are also quantified by -----

a.fuzzy b.fuzzy qualifiers c.fuzzy quantifiers d.none

19.Fuzzy inference also referred to as -----

a.approximate reasoning b.reasoning c.fixed reasoning d.none

20.Conversion of a fuzzy set to single crisp value is called -----

a.fuzzification b.defuzzification c.fuzzy logic d.fuzzy rule

21.----- obtains centre of area occupied by the fuzzy set

a.center b.center of gravity c.center of area d.center point

22.The ----- is the arithmetic average of mean values of all intervals

a.mean b.mean of maxima c.maximum d.mean interval

23.The ----- are obtained by computing the minimum of the membership functions of the antecedents.

a.rule base b.rule strengths c.rules d.none

24.Relative quantifiers are defined as -----

a.0 to 10 **b.0 to 1** c.0 d.1

25.Fuzzy cruise controller has ----- inputs

a.2 b.3 c.1 d.0

PART-B

1.Explain fuzzy set

2.Explain crisp set

Explain fuzzy relations

3.Distinguish between crisp logic and predicate logic

4.Explain fuzzy quantifiers

5.Explain fuzzy logic

6.Explain fuzzy inference

PART-C

1.Explain Fuzzy System

2.Explain any one of applications of Fuzzy systems

3.Explain fuzzy rule based systems.

UNIT-IV

PART-A

1.----- mimic the principle of natural genetics

- a.Genetic programming **b.Genetic Algorithm** c.Genetic Evolution d.none

2.----- mimics the behaviour of social insects

- a.Swarm intelligence** b.Ant colony c.Gentic Algorithm d.none

3.Possible settings of traits are called in genes -----

- a.locus **b.alleles** c.genome d.genotype

4.----- means that the element of DNA is modified.

- a.Recombination b.Selection **c.Mutation** d.none

5.The ----- of an organism is measured by means of success of organism in life

- a.Strength **b.fitness** c.Gene d.Chromosome

6.The space for all possible feasible solutions is called -----

- a.space b.search **c.search space** d.area

7.----- is a way of representing individual genes

- a.conversion **b.encoding** c.coding d.none

8.In -----, every chromosomes is a string of numbers

- a.hexadecimal encoding b.octal encoding **c.Permutation encoding** d.none

9.----- is the first operator applied on population.

- a.Reproduction** b.Recombination c.Mutation d.none

10.----- means that the genes from the already discovered good individuals are exploited

- a.Diversity **b.Population diversity** c.Unity in diversity d.none

11.-----is the degree to which the better individuals are favoured

- a.Selective pressure** b.Reproduction pressure c.Recombination pressure d.Mutation

12.The selection method which is less noisy is -----

- a.stochastic remainder solution** b.Boltzman solution c.Remainder solution d.none

13.The ----- is referred the proportion of individuals in the the population which are replaced in each generation.

a.gap **b.generation gap** c.generation interval d.interval

14.Crossover operator proceeds in ----- steps

a.4 **b.3** c.5 d.2.

15.Matrix crossover is also known as -----

a.One dimensional **b.Two dimensional** c.Three dimensional d.none

16.-----performs linear inversion with a specified probability of 0.75.

a.Linear+end-inversion b.Discrete inversion c.Continuous inversion d.Mass inversion

17.----- of bit involves changing bits from 0 to 1 and 1 to 0.

a.Mutation b.Crossover c.Inversion d.Segregation

18.----- is a process in which a given bit pattern is transformed into another bit pattern by means of logical bit-wise operation.

a.Inversion b.Conversion **c.Masking** d.Segregation

19.In -----, inversion was applied with specified inversion probability p to each new individual when it is created.

a.Discrete **b.Continuous** c.Mass inversion d.none

20.The -----causes all the bits in the first operand to be shifted to the left by the number of positions indicated by the second operand.

a.Shift right **b.Shift left** c.Shift operator d.none

21.A ----- returns 1 if one of the bits have a value of 1 and the other has a value of 0 otherwise it returns a value 0.

a.bit wise or b.bit wise and c.not d.none

22.Population size, Mutation rate and cross over rate are together referred to as -----

a.control parameters b.central parameters c.connection parameters d.none

23.-----selection is slow cooling of molten metal to achieve the minimum function value in a minimization problem.

a.Boltzmann selection b.Tournament selection c.Roulette-wheel selection d.none

24.-----is not a particular method of selecting the parents.

a.Steady-state b.Elitism c.Boltzmann selection d.Tournament Selection

25.Reproduction operator is also known as -----

a.Recombination **b.Selection** c.Regeneration d.none

PART-B

- 1.Explain biological background of genetic algorithm
- 2.Explain Working principle of genetic algorithm
- 3.Explain any two types of encoding
- 4.Explain inheritance operators
- 5.Explain Mutation operator
- 6.Explain Bit-wise operator

PART-C

- 1.Explain Reproduction operator
- 2.Explain Inversion and Deletion
- 3.Explain Generation Cycle

UNIT-5

PART-A

1.Hybrid systems is combination of neural networks, fuzzy logic and -----

- a.**Genetic Algorithm** b.Genetic Programming c.Genetic d.none

2.In -----, one technology calls the other as a subroutine to process or manipulate information needed by it.

- a.**Auxiliary hybrid systems** b.Embedded hybrid systems

- c.sequential hybrid systems d.none

3.-----hyrbid systems make use of technologies in a pipeline fashion.

- a.auxialiary hybrid systems b.embedded hybrid systems

- c.sequential hybrid systems** d.none

4.-----hyrbid systems the technologies participating are integerated in such a manner that they appear interwined.

- a.auxialiary hybrid systems **b.embedded hybrid systems**

- c.sequential hybrid systems d.none

5.----- deals with uncertainty problems with its own merits and demerits

- a.neuro –fuzzy** b.neuro-genetic c.fuzzy –genetic d.none

6.Neural network can learn various tasks from -----

- a.training** b.testing c.learning d.none

7.-----exhibit non-linear functions to any desired degree of accuracy

- a.neuro –fuzzy b.neuro-genetic **c.fuzzy –genetic** d.none

8.----- use to determine the weights of a multilayer feedforward network with backpropagation learning

- a.neuro –fuzzy **b.neuro-genetic** c.fuzzy –genetic d.none

9.----- fuzzy input vectors to crisp outputs

- a.Fuzzy – backpropagation** b.neuro –fuzzy c.neuro-genetic d.fuzzy –genetic

10.-----is a neuro-fuzzy hybrid in which the host is a recurrent network with a kind of competitive learning.

- a.Fuzzy ARTMAP** b.Fuzzy art c.ARTMAP d.none

11.FAM Stands for -----

- a.Fuzzy Associative Memory b.Fuzzy association memory
- c.Fuzzy Assist Memory d.none

12.-----maps fuzzy sets and can encode fuzzy rules.

- a.**FAM** b.Fuzzy c.ART d.none

13.Fuzzy truck backer-upper system is application of -----

- a.FAM b.Fuzzy ART c.ART d.none

14.----- applicable on fuzzy optimization problems

- a.**Fuzzy-genetic** b.neuro – fuzzy c.fuzzy-logic d.fuzzy-backpropagation

15.-----learning have reported difficulties in learning the topology of the networks whose weights they optimize

- a.**Gradient descent learning** b.descent learning c.Gradient learning d.none

16.Applying neuronal learning capabilities to fuzzy systems is knowns as -----

- a.**NN driven fuzzy reasoning** b.fuzzy driven nn reasoning
- c.neural network reasoning d.none

17.----- can be applicable to mathematical relationship

- a. **neuro-fuzzy** b.fuzzy-neuro c.neuro-network d.none

18.----- is a multilayer feedforward network architecture with gradient learning.

- a.**backpropagation** b.forward propagation c.Propagation d.none

19. Recurrent network architectures adopting -----

- a.**hebbian learning** b.supervised learning c.unsupervised learning d.reinforced learning

20.----- set have no crisp boundaries

- a.**fuzzy** b.boolean c.crisp set d.none

21.GA-NN also known as -----

- a.**GANN** b.NNGA c.GA d.none

22.Image recognition under noisy is application of -----

- a.Fuzzy **b.Fuzzy art** c.art d.none

23.Genetic algorithm ----- uses to determine optimization

a.fitness function b.fit function c.strength function d.none

24.-----proposed neuro –fuzzy system

a.lee and lie b.kosko c.gradient d.lee

25.Knowledge-based evaluation and earthquake damage evaluation is application of -----

a.fuzzy-backpropagation b.neuro-fuzzy c.fuzzy d.none

PART-B

1.Explain neuro-fuzzy hybrids

2.Explain neuro-genetic hybrids

3.Explain fuzzy-genetic hybrids

4.Explain fuzzy-backpropagation network

5.Explain FAM

PART-C

1.Explain Hybrid Systems

2.Explain Fuzzy ARTMAP

3.Explain GA based backpropagation network

SCOA Unit I MCQ

- 1. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.**
A.True
B.False
- 2. The membership functions are generally represented in**
A.Tabular Form
B.Graphical Form
C.Mathematical Form
D.Logical Form
- 3. Membership function can be thought of as a technique to solve empirical problems on the basis of**
A.knowledge
B.examples
C.learning
D.experience
- 4. Three main basic features involved in characterizing membership function are**
A.Intuition, Inference, Rank Ordering
B.Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.sub normal fuzzy sets

B.normal fuzzy set

C.convex fuzzy set

D.concave fuzzy set

7. In a Fuzzy set a prototypical element has a value

A.1

B.0

C.infinite

D.Not defined

- 8. A fuzzy set wherein no membership function has its value equal to 1 is called**
- A.**normal fuzzy set
B.Subnormal fuzzy set.
C.convex fuzzy set
D.concave fuzzy set
- 9. A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe**
- A.**convex fuzzy set
B.concave fuzzy set
C.Non concave Fuzzy set
D.Non Convex Fuzzy set
- 10. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.**
- A.**Convex Fuzzy Set
B.Non convex fuzzy set
C.Normal Fuzzy set
D.Sub normal fuzzy set
- 11. The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to**

A.infinite

B.1

C.0

D.0.5

12. Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

B.False

14. Artificial neural network used for

A.Pattern Recognition

B.Classification

C.Clustering

D.All of these

15. A Neural Network can answer

- A.**For Loop questions
- B.**what-if questions
- C.**IF-The-Else Analysis Questions
- D.**None of these

16. Ability to learn how to do tasks based on the data given for training or initial experience

- A.**Self Organization
- B.**Adaptive Learning
- C.**Fault tolerance
- D.**Robustness

17. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

- A.**Adaptive Learning
- B.**Self Organization
- C.**What-If Analysis
- D.**Supervised Learning

18. In artificial Neural Network interconnected processing elements are called

- A.**nodes or neurons

B.weights

C.axons

D.Soma

19. Each connection link in ANN is associated with _____ which has information about the input signal.

A.neurons

B.weights

C.bias

D.activation function

20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.True

B.False

21. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.Weight

B.activation or activity level of neuron

C.Bias

D.None of these

22. Neuron can send _____ signal at a time.

- A.**multiple
- B.**one
- C.**none
- D.**any number of

23. Artificial intelligence is

- A.**It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations
- B.**Computational procedure that takes some value as input and produces some value as output.
- C.**Science of making machines performs tasks that would require intelligence when performed by humans
- D.**None of these

24. Expert systems

- A.**Combining different types of method or information
- B.**Approach to the design of learning algorithms that is structured along the lines of the theory of evolution
- C.**an information base filled with the knowledge of an expert formulated in terms

of if-then rules

D.None of these

25. Falsification is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

26. Evolutionary computation is

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.

C.Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.

D.None of these

27. Extendible architecture is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

28. Massively parallel machine is

A.A programming language based on logic

B.A computer where each processor has its own operating system, its own memory, and its own hard disk

C.Describes the structure of the contents of a database.

D.None of these

29. Search space

A.The large set of candidate solutions possible for a problem

B.The information stored in a database that can be, retrieved with a single query.

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

30. $n(\log n)$ is referred to

A.A measure of the desired maximal complexity of data mining algorithms

B.A database containing volatile data used for the daily operation of an organization

C.Relational database management system

D.None of these

31. Perceptron is

- A.**General class of approaches to a problem.
- B.**Performing several computations simultaneously
- C.**Structures in a database those are statistically relevant
- D.**Simple forerunner of modern neural networks, without hidden layers

32. Prolog is

- A.**A programming language based on logic
- B.**A computer where each processor has its own operating system, its own memory, and its own hard disk
- C.**Describes the structure of the contents of a database
- D.**None of these

33. Shallow knowledge

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be, retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

34. Quantitative attributes are

- A.**A reference to the speed of an algorithm, which is quadratically dependent on the size of

the data

B.Attributes of a database table that can take only numerical values

C.Tools designed to query a database

D.None of these

35. Subject orientation

A.The science of collecting, organizing, and applying numerical facts

B.Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.None of these

36. Vector

A.It do not need the control of the human operator during their execution

B.An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.The validation of a theory on the basis of a finite number of examples

D.None of these

37. Transparency

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

38. Core of soft Computing is

- A.**Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.**Fuzzy Networks and Artificial Intelligence
- C.**Artificial Intelligence and Neural Science
- D.**Neural Science and Genetic Science

39. Who initiated the idea of Soft Computing

- A.**Charles Darwin
- B.**Lofti A Zadeh
- C.**Rechenberg
- D.**Mc_Culloch

40. Fuzzy Computing

- A.**mimics human behaviour
- B.**doesn't deal with 2 valued logic
- C.**deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.**All of the above

41. Neural Computing

- A.**mimics human brain
- B.**information processing paradigm
- C.**Both (a) and (b)
- D.**None of the above

42. Genetic Algorithm are a part of

- A.**Evolutionary Computing
- B.**inspired by Darwin's theory about evolution - "survival of the fittest"
- C.**are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D.**All of the above

43. What are the 2 types of learning

- A.**Improvised and unimprovised
- B.**supervised and unsupervised
- C.**Layered and unlayered
- D.**None of the above

44. Supervised Learning is

- A.**learning with the help of examples
- B.**learning without teacher
- C.**learning with the help of teacher
- D.**learning with computers as supervisor

45. Unsupervised learning is

- A.**learning without computers
- B.**problem based learning

C.learning from environment

D.learning from teachers

46. Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

47. In supervised learning

A.classes are not predefined

B.classes are predefined

C.classes are not required

D. classification is not done

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Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

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	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intution, Inference, Rank Ordering B.Fuzzy Algorithm, Neural network, Genetic Algorithm C.Core, Support , Boundary D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core B.Support C.Boundary D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

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	<p>B.normal fuzzy set C.convex fuzzy set D.concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A.1 B.0 C.infinite D.Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A.normal fuzzy set B.subnormal fuzzy set. C.convex fuzzy set D.concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesn't deal with 2 valued logic</p>	D

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	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	<p>Defuzzification is done to obtain</p> <ul style="list-style-type: none"> a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above 	a
13.	<p>“The train is running fast”. Here ‘fast’ can be represented by</p> <ul style="list-style-type: none"> a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned 	a
14.	<p>Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$</p> <p>Then the crisp value of Young using MoM method is</p> <ul style="list-style-type: none"> a) 25 b) 20 c) 35 d) 50 	a
15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area 	c

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	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)^{\text{complement}} \neq \text{---} (A \lambda)^{\text{complement}}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

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	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

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	d) None of the above	
26.	<p>Fuzzy logic is a form of</p> <ul style="list-style-type: none"> a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic 	<p>Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.</p>
27.	<p>Traditional set theory is also known as Crisp Set theory.</p> <ul style="list-style-type: none"> a) True b) False 	<p>Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set.</p> <p>3. The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>
28.	<p>The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>	<p>Answer: a Explanation: Refer the</p>

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	<p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	definition of Fuzzy set and Crisp set.
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p> <p>a) Fuzzy Set b) Crisp Set</p>	<p>Answer: a Explanation: Fuzzy logic deals with linguistic variables.</p>
31.	<p>The values of the set membership is represented by</p> <p>a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c</p>	<p>Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.</p>
32.	What is meant by probability density function?	d

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	<p>a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables</p>	
33.	<p>Which of the following is used for probability theory sentences?</p> <p>a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned</p>	<p>Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.</p>
34.	<p>Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.</p> <p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy</p>

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		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <ul style="list-style-type: none"> a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned 	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <ul style="list-style-type: none"> a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned 	<p>Answer: c</p> <p>Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

SCOA UNIT 2 MCQs

This sheet is for 1 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions	Cannot Distinguish	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguous	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neuro	Fuzzy network and	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard bertrand	mc culloch	lofti zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behavior	deals with imprecise	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computation	conventional computation	non conventional computation	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behavior	information processing	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search representation	Blind search usually	Blind search cannot	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can be found	a solution found is	a solution that is the best	a solution that requires	C
17	When is a complete enumeration of solution used?		When a solution that is found	When there is enough time	When the modeler has time	When there are an infinite number of solutions	B
18	All of the following are true about heuristics EXCEPT		heuristics are used widely	heuristics are used well	heuristics are used often	heuristics are rules of thumb	C
19	Which approach is most suited to structured problem with little uncertainty		Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based is	A
21	What does the 0 membership value means in the set		the object is fully included	the object is not included	the object is partially included	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a
23	The process of fuzzy inference system involves		membership function	fuzzy logic operations	if-then rules	all the above	d
24	What does a fuzzifier do		converts crisp input to	converts crisp output to	converts fuzzy input to	converts fuzzy output to	a
25	Which of the following is not defuzzifier method		centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy inference method		mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have		multiple parts of antecedent	only single part of antecedent	multiple parts of antecedent	only single part of antecedent	c
28	The α cut of a fuzzy set A is a crisp set defined by :-		$\{x \cup_a(x) > \alpha\}$	$\{x \cup_a(x) = \alpha\}$	$\{x \cup_a(x) < \alpha\}$	$\{x \cup_a(x) \leq \alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1 / x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?		$\{0/a, 0.7/b, 0.8/c, 0.2/d, 0/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.3/d, 0/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of A and B?		$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B?		$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.2/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 0/e\}$	a
34	What denotes the support(A) in a fuzzy set?		$\{x \cup_a(x) > 0\}$	$\{x \cup_a(x) < 0\}$	$\{x \cup_a(x) = 0\}$	$\{x \cup_a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?		$\{x \cup_a(x) > 0\}$	$\{x \cup_a(x) = 1\}$	$\{x \cup_a(x) >= 0.5\}$	$\{x \cup_a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Evaluation	defuzzification->rule evaluation	rule evaluation->fuzzification	rule evaluation->defuzzification	a
38	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
39	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based is	A
40	All of the following are suitable problems for genetic algorithm EXCEPT		pattern recognition	simulation of biological systems	simple optimization	dynamic process control	C
41	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a

42	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
43	mutation is applied on __candidates.		one	two	more than two	noneof these	a
44	recombination is applied on __candidates.		one	two	more than two	noneof these	b
45	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	noneof these	a
46	Survival is __ approach.		deterministic	non deterministic	semi deterministic	noneof these	a
47	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
48	Tabu search is an example of ?		heuristic	Evolutionary algo	ACO	PSO	a
49	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
50	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?		line representation	String representat	Circular representat	all of these	b
52	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by		Fredrik	Fogel	Frank	Flin	b
54	Evolution Strategies is developed with		selection	mutation	a population of size	all of these	d
55	Evolution Strategies typically uses		real-valued vector re	vector representa	time based represen	none of these	a
56	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is		Parent population siz	Survival populatio	both a and b	none of these	c
59	What are different types of crossover		discrete and interme	discrete and conti	continuous and inte	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and te		TRUE	FALSE			B
61	_____cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solutuon	none of these	C
62	Discrete events and agent-based models are usually used for _____.		middle or low level o	high level of abstr	very high level of ab	none of these	A
63	_____doesnot usually allow decision makers to see how a solution to a _____en		Simulation ,Complex	Simulation,Easy p	Genetics,Complex p	Genetics,Easy problem	A
64	EC stands for?		Evolutionary Comput	Evolutionary com	Electronic computa	noneof these	a
65	GA stands for		genetic algorithm	genetic assuranc	genese alforithm	noneof these	a
66	LCS stands for		learning classes syste	learning classifier	learned class system	noneof these	b
67	GBML stands for		Genese based Machi	Genes based mob	Genetic bsed machi	noneof these	c
68	EV is dominantly used for solving ____.		optimization proble	NP problem	simple problems	noneof these	a
69	EV is considered as?		adaptive	complex	both a and b	noneof these	c
70	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?		line representation	String representa	Circular representat	all of these	b
72	Parameters that affect GA		initial population	selection process	fitness function	all of these	d
73	Fitness function should be		maximum	minimum	intermediate	noneof these	b
74	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
75	Tabu search is an example of ?		heuristic	Evolutionary algo	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
77	mutation is applied on __candidates.		one	two	more than two	noneof these	a
78	recombination is applied on __candidates.		one	two	more than two	noneof these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offsprings	grand child	c
80	____ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection methods	both a and b	noneof these	c
82	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	noneof these	a

83	Survival is _____ approach.		deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment		d
90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned		d
91	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned		c
92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned		c
93	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities		b
94	Given $U = \{1, 2, 3, 4, 5, 6, 7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3)\}: (5, 0), (6, (1, 2, 1), (3, 0.3)$	$\{(3, 0.3), (6, 0.2)\}$		c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification \rightarrow Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Fuzzification \rightarrow Rule Evaluation \rightarrow Defuzzification

96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to		{(0.5,12), (0.6,13), (1,14)}	{(0.5,12), (0.6,13), (1,14)}	{(0.3,12), (0.5,13), (1,14)}	{(0.3,12), (0.5,13), (1,14)}	d
98	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		{0, 1, 2, 3, 4, 5, 6, 7, 8}	{1, 2, 3, 4, 5, 6, 7, 8}	{2, 3, 4, 5, 6, 7, 8, 9}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified	unconditional unqualified	conditional qualified	unconditional qualified	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise answer	ANN gives accurate answer	In each, no precise answer	Fuzzy gives exact result	C
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	---- defines logic function of two propositions		prepositions	Linguistic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a

109	IF x is A and y is B then z=c (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b

116	In Evolutionary programming, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
119	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

123	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125 (1+1) ES			offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126 (1+λ) ES			λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127 Termination condition for EA			mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
130 (1+1) ES			Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
131	Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

This sheet is for 1 Mark questions

S.r No	Question	a	b	c	d	Correct Answer
e.g	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp	Distinguish two regions clearly	Cannot Distinguish two regions clearly	Collection of ordered pairs	None of these	a
2	In computing the output is called as	Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of	two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be	Ambiguous	Unambiguos	Inaccurate	None of these	b
5	Core of soft computing is	Fuzzy computing,neural computing,Genetic algorithm	Fuzzy network and artificial intelligence	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation	Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing	charles darwin	rich and berg	mc culloch	lofti a zadeh	d
8	Soft computing is based on	fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be	non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing	mimics human behaviour	deals with imprecise, probabilistic	exact information	both a and b	d
11	Hard computing is also called as	evolutionary computing	conventional computing	non conventional computing	probabilistic computing	b

12	Which computing produces accurate results	soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing	mimics human behaviour	information processing paradigm	both a and b	none of the above	c
14	Artificial neural network is used for	pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization	Blind search represent a guided approach while optimization is unguided	Blind search usually does not conclude in one step like some optimization methods.	Blind search cannot result in optimal solution whereas optimization method do	none of these	B
16	In modeling, an optimal solution is understood to be	a solution that can only be determined by an exhaustive enumeration testing of alternatives	a solution found in the least possible time and using the least possible computing resources	a solution that is the best based on criteria defined in the design phase	a solution that requires an algorithm for the determination	c
17	When is a complete enumeration of solution used?	When a solution that is "good enough" is fine and good heuristics are available	When there is enough time and computational power available	When the modeler requires a guided approach to problem solving	When there are an infinite number of solution to be searched	B
18	All of the following are true about heuristics EXCEPT	heuristics are used when the modeler requires a guided approach to problem solving	heuristics are used when a solution that is "good enough" is sought	heuristics are used when there is abundant time and computational power	heuristics are rules of good judgement	C

19	Which approach is most suited to structured problem with little uncertainty	Simuation	human intuition	Optimization	genetic algorithm	c
20	Genetic algorithm belong to the family of method in the	artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
21	What does the 0 membership value means in the set	the object is fully inside the set	the object is not in the set	the object is partially present in the set	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	a
23	The process of fuzzy interference system involes	membership functions	fuzzy logic operators	if-then rules	all the above	d
24	What does a fuzzifier do	coverts crisp input to linguistic variables	coverts crisp ouput to linguistic variables	coverts fuzzy input to linguistic variables	coverts fuzzy output to linguistic variables	a
25	Which of the following is not defuzzifier method	centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method	mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have	multiple part of antecedent,only single part of consequent	only single part of antecedent,multiple part of consequent	multiple part of antecedent,multiple part of consequent	only single part of antecedent,only single part of consequent	c
28	The a cut of a fuzzy set A is a crisp set defined by :-	$\{x U_a(x) > a\}$	$\{x U_a(x) \geq a\}$	$\{x U_a(x) < a\}$	$\{x U_a(x) \leq a\}$	b

29	The bandwidth(A) in a fuzzy set is given by	$(A)= x_1*x_2 $	$(A)= x_1+x_2 $	$(A)= x_1-x_2 $	$(A)= x_1/x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	b
31	A={1/a,0.3/b,0.2/c,0.8/d,0/e} B={0.6/a,0.9/b,0.1/c,0.3/d,0.2/e} What will be the complement of A?	{0/a,0.7/b,0.8/c,0.2/d,1/e}	{0/a,0.9/b,0.7/c,0.2/d,1/e}	{0.8/a,0.7/b,0.8/c,0.7/d,1/e}	{0/a,0.7/b,0.8/c,0.9/d,1/e}	a
32	A={1/a,0.3/b,0.2/c,0.8/d,0/e} B={0.6/a,0.9/b,0.1/c,0.3/d,0.2/e} What will be the union of AUB?	{1/a,0.9/b,0.1/c,0.5/d,0.2/e}	{0.8/a,0.9/b,0.2/c,0.5/d,0.2/e}	{1/a,0.9/b,0.2/c,0.8/d,0.2/e}	{1/a,0.9/b,0.2/c,0.8/d,0.8/e}	c
33	A={1/a,0.3/b,0.2/c,0.8/d,0/e} B={0.6/a,0.9/b,0.1/c,0.3/d,0.2/e} What will be the intersection of A and B ?	{0.6/a,0.3/b,0.1/c,0.3/d,0/e}	{0.6/a,0.8/b,0.1/c,0.3/d,0/e}	{0.6/a,0.3/b,0.1/c,0.5/d,0/e}	{0.6/a,0.3/b,0.2/c,0.3/d,1/e}	a
34	What denotes the support(A) in a fuzzy set?	$\{x U_a(x) > 0\}$	$\{x U_a(x) < 0\}$	$\{x U_a(x) \leq 0\}$	$\{x U_a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?	$\{x U_a(x) > 0\}$	$\{x U_a(x) = 1\}$	$\{x U_a(x) \geq 0.5\}$	$\{x U_a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c

37	which of the following is a sequence of steps taken in designning a fuzy logic machine	fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation->fuzzification->deffuzification	rule evaluation->defuzzification->fuzzification	a
38	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
39	Genetic algorithm belong to the family of method in the	artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
40	All of the follwing are suitable problem for genetic algorithm EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	c
41	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
43	mutation is applied on __ candidates.	one	two	more than two	noneof these	a
44	recombination is applied on __ candidates.	one	two	more than two	noneof these	b
45	LCS belongs to __ based methods?	rule based learning	genetic learning	both a and b	noneof these	a
46	Survival is __ approach.	deterministic	non deterministic	semi deterministic	noneof these	a
47	Evolutionary algorithms are a __ based approach	heuristic	metaheuristic	both a and b	noneof these	a
48	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d

51	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developef by	Fredrik	Fodgel	Frank	Flin	b
54	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
56	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm	Termination	selection	Recombinatio	Initialization	d
58	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover	discrete and intermedium	discrete and continuous	continuous and intemedium	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested.	TRUE	FALSE			B
61	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solutuon	none of these	c

62	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
63	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
64	EC stands for?	Evolutionary Computations	Evolutionary computer	Electronic computations	none of these	a
65	GA stands for	genetic algorithm	genetic assurance	genetic algorithm	none of these	a
66	LCS stands for	learning classes system	learning classifier systems	learned class system	none of these	b
67	GBML stands for	Genes based Machine learning	Genes based mobile learning	Genetic based machine learning	none of these	c
68	EV is dominantly used for solving ____.	optimization problems	NP problem	simple problems	none of these	a
69	EV is considered as?	adaptive	complex	both a and b	none of these	c
70	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
72	Parameters that affect GA	initial population	selection process	fitness function	all of these	d
73	Fitness function should be	maximum	minimum	intermediate	none of these	b
74	Evolutionary algorithms are a ___ based approach	heuristic	metaheuristic	both a and b	none of these	a

75	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
76	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
77	mutation is applied on __ candidates.	one	two	more than two	none of these	a
78	recombination is applied on __ candidates.	one	two	more than two	none of these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?	sub parents	parents	offspring	grand child	c
80	___ decides who becomes parents and how many children the parents have.	parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?	Parent Selection methods	Survival Selection methods	both a and b	none of these	c
82	LCS belongs to ___ based methods?	rule based learning	genetic learning	both a and b	none of these	a
83	Survival is ___ approach.	deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.	Hedges	Linguistic Variable	Fuzz Variable	None of the mentioned	a

85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?	associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is	Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d

90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned	c
92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where \sim → complement)	$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3), (5, 0), (6, 0.2)\}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be	$\{0.9, 0.5, 0.6, 0.8, 0.8\}$	$\{0.6, 0.2, 0.1, 0.7, 0.5\}$	$\{0.1, 0.5, 0.4, 0.2, 0.2\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	c

	Compute the value of adding the following two fuzzy integers: A = {(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)} B = {(0.5,11), (1,12), (0.5,13)} Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x,y} \min(\mu_A(x), \mu_B(y))$ Then, f(A+B) is equal to					
97	A = {(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)} B = {(0.5,11), (1,12), (0.5,13)} Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x,y} \min(\mu_A(x), \mu_B(y))$ Then, f(A+B) is equal to	{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)}	{(0.5,12), (0.6,13), (1,14), (0.7,15), (1,16), (1,17), (1,18)}	{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	d
98	A U (B U C) =	(A ∩ B) ∩ (A ∩ C)	(A ∪ B) ∪ C	(A ∪ B) ∩ (A ∪ C)	B ∩ A ∪ C	b
99	Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be	{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a	conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a

101	<p>Choose the correct statement</p> <p>1. A fuzzy set is a crisp set but the reverse is not true</p> <p>2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$</p> <p>3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous</p>	1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	----- defines logic function of two propositions	prepositions	Linguistic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ----- gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b

107	Multiple conjunctives antecedents is method of ----- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ----- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then z=c (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d

114	In Evolutionary programming, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)-selection based on the children only ($\mu+\lambda$)-selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)-selection based on the children only ($\mu+\lambda$)-selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a

119	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)	(μ,λ) : Select survivors among parents and offspring	$(\mu+\lambda)$: Select survivors among parents and offspring	$(\mu-\lambda)$: Select survivors among offspring only	$(\mu:\lambda)$: Select survivors among offspring only	b
123	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a

125	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126	(1+λ) ES	λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127	Termination condition for EA	mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
130	(1+1) ES	Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
131	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

This sheet is for 2 Mark questions						
S.r No	Question	a	b	c	d	Correct Answer
e.g	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	Who can deal with noisy input information	soft computing	hard computing	both a and b	none of the above	a
2	Ability to learn how to do task based on the data is done by	self organization	adaptive learning	fault tolerance	robustness	b
3	Which of the following is not a technique of soft computing	neural network	genetic algorithm	evolutionary algorithm	conventional algorithm	d
4	Fuzzy logic system is based on what type of rule	if-then	else-if	while	do-while	a
5	What is the function of dendrites in biological neural network	send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b
6	Expert system	combines different types of method and information	is a approach to design of learning algorithms	is an information base filled with knowledge of an expert formulated in terms of if-then rules	none of the above	c
7	Three main basic feature involved in characterizing member function are	intuition,inference,rank ordering	fuzzy algorithm,neural network,genetic algorithm	center of sums,median,core	core,support,boundary	d
8	What is the function of cell body in biological neural network	multiplies the incoming signals	sums the incoming signals	multiplies the outgoing signals	sums the outgoing signals	b

9	What is perceptron	a single layer feed forward neural network	a double layer associative neural network	a neural network that contains feedback	auto associative neural network	a
10	Which of the following computing is trial and error problem solver algorithm	hard computing	neural network	evolutionary computing	fuzzy logic	c
11	What are advantages of neural network	ability to learn by example	fault tolerant	both a and b	none of the above	c
12	Which of the following does not belong to the process of involuntary computing	selection	mutation	recombination	deletion	d
13	The Value of crisp set can be	either 0 or 1	near to 0 or 1	between 0 and 1	between 0.5 and 0.7	a
14	The room temrature is hot. Here the hot(use of lingustic variable is used) can be represented by	fuzzy set	crisp set	probabilistic set	none of the above	a
15	The value of set membership can be represented by	discrete set	degree of truth	probabilities	both b and c	b
16	Semiconductor layout & aircraft design are the application type of which domain?	Control	Design	Robotics	ML	B
17	Trajectory planning is the application type of which domain?	Control	Design	Robotics	ML	c
18	Filter design is the application type of which domain?	Control	Signal Processing	Robotics	ML	B
19	Pokers & Checkers are the application type of which of domain?	Control	Game Playing	Robotics	ML	B

20	Manufacturing & resource allocation are the application type of which domain?	Scheduling	Design	Robotics	ML	A
21	What is a crossover point in a fuzzy set?	$\{x u_a(x) < 0\}$	$\{x u_a(x) = 1\}$	$\{x u_a(x) = 0.5\}$	$\{x u_a(x) > 0\}$	c
22	If A and B are two fuzzy sets with membership function: $u_a(x)=\{0.2,0.5,0.6,0.1,0.9\}$ $u_b(x)=\{0.1,0.5,0.2,0.7,0.8\}$ THEN what will be the intersection of A and B	$\{0.2,0.5,0.6,0.7,0.9\}$	$\{0.2,0.3,0.8,0.1,0.5\}$	$\{0.5,0.1,0.6,0.1,0.8\}$	$\{0.1,0.5,0.2,0.1,0.8\}$	d
23	$A=\{0.1/1+0.2/2+0.3/3\}$ $B=\{0.6/1+0.5/2+0.4/3+0.5/4\}$ Find the set difference	$\{0.1/1+0.2/2+0.3/3\}$	$\{0.3/1+0.2/2+0.2/3\}$	$\{0.1/1+0.3/2+0.2/3\}$	$\{0.1/1+0.2/2+0.5/3\}$	a
24	With the help of which formula can we find the algebraic sum of two fuzzy sets A,B?	$\{u_A(x)+u_B(x)\}$ - $\{u_A(x)*u_B(x)\}$	$\{u_A(x)-u_B(x)\}$ - $\{u_A(x)*u_B(x)\}$	$\{u_A(x)/u_B(x)\}$ - $\{u_A(x)+u_B(x)\}$	$\{u_A(x)+u_B(x)\}+\{u_A(x)*u_B(x)\}$	a
25	With the help of which formula can we find the algebraic product of two fuzzy sets A,B?	$\{u_A(x)/u_B(x)\}$	$\{u_A(x)*u_B(x)\}$ * $\{u_A(x)-u_B(x)\}$	$\{u_A(x)*u_B(x)+\{u_A(x)+u_B(x)\}\}$	$\{u_A(x)*u_B(x)\}$	d
26	Which one of the following is the associative property for a crisp set	$AU(BUC)=(AU B)UC$	$BU(AUC)=CU(BUA)$	$AU(CUA)=B(AUC)$	all the above	a
27	Knowledge base is a combination of	rule base and data base	rule base and time base	time base and probability base	model base and data base	a
28	Fuzzy logic system is based on what type of rule	if-then	else-if	while	do-while	a
29	What is the function of dendrites in biological neural network	send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b
30	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A

31	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
32	_____ is a simulation method that let decision maker see what the model is doing and how it interact.	VIS	VIM	SIV	HIV	A
33	_____ systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	B
34	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?	Simulation	Optimization	human intuition	genetic algorithm	A
35	Which of the following is the advantage of simulation?	It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skills	It solves problem in one pass with no iteration.	A
36	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred	continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B
37	The defining length of a schema is useful to calculate _____ of the schema for _____.	Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A
38	Semiconductor layout & aircraft design are the application type of which domain?	Control	Design	Robotics	ML	B
39	Trajectory planning is the application type of which domain?	Control	Design	Robotics	ML	C
40	Filter design is the application type of which domain?	Control	Signal Processing	Robotics	ML	B

41	categories of EA are/is	Genetic Algorithm	genetic programing	learning Classifier Systems	all of these	d
42	Phases in which the LCS individuals are evaluated are	performance phase	reinforcement phase	both a and b	none of these	c
43	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	a
44	Genetic algorithm is a subset of _____.	evolutionary algorithm	dynamcic algorithm	both a&b	None of these	A
45	NP hard problems are also called as _____.	dcrete optimization	combinatori al optimization	evolutionary optimization	None of these	B
46	Genetic algorithm is first introduce by _____.	Charles Darwin	John Holland	Gregor Johan Mendel	None of these	B
47	_____ replicates the most successful solutions found in a population at a rate proportional to relative quality.	Selection	Recombinati on	Mutation	None of these	A
48	_____ decomposes two distinct solutions and then randomly mixes their parts to form novel solutions.	Selection	Recombinati on	Mutation	None of these	B
49	_____ randomly perturbs a candidate solution.	Selection	Recombinati on	Mutation	None of these	C
50	A _____ is a template consisting of a string composed of three symbol.	Wild symbol	Schema	Layout	None of these	B
51	{0,1,#} is the symbol alphabet ,where # is a special symbol.	Wild card	Schema	Layout	None of these	A
52	Metaheuristics are ?1)non deterministic 2)non approximate 3)not problem specific	1,2,3	1,2	1,3	2,3	c
53	In search techniques, as single point based contradicts population based similary deterministic contradicts ____?	Stochastic	simplex based	complex based	none	a

54	In swarm systems organisations are	centralized	decentralized	controlled by third party	none	b
55	Identify the working sequence of kmean clustering ? 1) redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids	1,3,2	3,2,1	2,3,1	2,1,3	c
56	Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	a
57	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms	1,2	1,2,3	2,3,4	all of these	d
58	pheromone quantity in ACO is ___ proportional to path selection.	directly	inversly	there is no connection	none	a
59	The ants prefer the smaller drop of honey over the more abundant, but less nutritious, sugar. This is the example of?	kruskal algorithm	Travelling salesman	Knapsack problem	NP hard problem	c
60	In kmeans clustering each cluster is associated with	centroid	edge	common point	none of them	a
61	What is EC?	computer based problem solving systems	Systems that uses computational models of evolutionary process	both a and b	none of these	c
62	Recombination is applied to	2 selected candidated	1 selected candidate	3 selected candidate	none of these	a
63	In EA mutation is applied to	2 candidate	1 candidate	3 candidate	none of these	b

64	EV is used for	solving optimization problems	finding solutions	both a and b	none of these	a
65	EV is considered as	complex	simple	complex and adaptive	all of these	c
66	GA stands for	Genetic Algorithm	genetic programing	genetic assurance	none of these	a
67	Features of GA	A string representation of chromosomes.	A fitness function being minimized.	A cross-over method and a mutation method.	all of these	d
68	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
69	Evolutionary programming was developed by	Fredrik	Fodgel	Frank	Flin	b
70	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
71	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
72	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
73	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d
74	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
75	What are different types of crossover	discrete and intermedium	discrete and continuous	continuous and intermedium	none of these	a
76	GP individual stores computer program	TRUE	FALSE			a

77	GP selection is	Deterministic selection	Tournament selection	nondeterministic selection	none of these	b
78	EP mutation is	Data specific	Data type specific	non specific	none of these	b
79	categories of EA are/is	Genetic Algorithm	genetic programing	learning Classifier Systems	all of these	d
80	Phases in which the LCS individuals are evaluated are	performance phase	reinforcement phase	both a and b	none of these	c
81	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	a
82	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	a
83	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____	Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	Fuzzy & Crisp Set	a
84	Fuzzy logic is usually represented as _____	IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	b
85	Three main basic features involved in characterizing membership function are	Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	Core, Support , Boundary	Weighted Average, center of Sums, Median	c
86	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b

87	Why can't we design a perfect neural network?	full operation is still not known of biological neurons	number of neuron is itself not precisely known	number of interconnection is very large & is very complex	all of the mentioned	d
88	Both Fuzzy logic and ANN are soft computing techniques because	Both gives precise and accurate results	ANN gives accurate result but fuzzy logic does not	In each, no precise mathematical model of the problem is required	Fuzzy logic gives accurate result but ANN does not	c
89	Internal state of neuron is called _____, is the function of the inputs the neurons receives	Weight	activation or activity level of neuron	Bias	None of these	b
90	Each connection link in ANN is associated with _____ which has information about the input signal.	neurons	weights	bias	activation function	b
91	In artificial Neural Network interconnected processing elements are called	nodes or neurons	weights	axons	Soma	a
92	The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to	infinite	1	0	0.5	d
93	The membership values of the membership function are not strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing	Convex Fuzzy Set	Non convex fuzzy set	Normal Fuzzy set	Sub normal fuzzy set	b
94	The cell body of neuron can be analogous to what mathamatical operation?	summing	differentiator	integrator	none of the mentioned	a

95	Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial Intelligence deal with predicate logic whereas soft computing deal with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols whereas soft computing is based on empirical data	Both (a) and (b)	None of the above	c
96	_____ is/are the way/s to represent uncertainty.	Fuzzy Logic	Probability	Entropy	All of the mentioned	d
97	Given two fuzzy sets A and B A={\{(x1,0.5),(x2,0.1),(x3,0.4)\}} and B={\{(x1,0.2),(x2,0.3),(x3,0.5)\}} then union of 2 sets A U B is	{(x1,0.5),(x2,0.1),(x3,0.4)}	{(x1,0.5),(x2,0.3),(x3,0.5)}	{(x1,0.2),(x2,0.3),(x3,0.5)}	{(x1,0.2),(x2,0.1),(x3,0.4)}	b
98	If A and B are two fuzzy sets with membership functions: $\mu_a(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$ $\mu_b(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_a \cap \mu_b$ will be	{0.2, 0.5, 0.6, 0.7, 0.9}	{0.2, 0.5, 0.2, 0.1, 0.8}	{0.1, 0.5, 0.6, 0.1, 0.8}	{0.1, 0.5, 0.2, 0.1, 0.8}	d
99	For $k > 1$, which of the following concept can be used to generate other linguistic hedge?	Concentration and dilation	Dilation	Concentration	None of the mentioned	c
100	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A U B is	{1.0, 0.45, 0.75}	{1, 0.2, 0.75}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	a
101	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A ∩ B is	{1.0, 0.45, 0.75}	{0.2, 0.20, 0.50}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	b

102	Mamdani-style inference involves which steps	Fuzzification of the input variables & Rule evaluation	Aggregation of the rule output & Defuzzification	Both a and b	either a or b	c
103	A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$	Core	Support	Cross-over	α - cut	c
104	Which statement is true?	Mamdani approach characterised by its low interpretability and low accuracy	Takagi and Sugeno's approach characterised by high accuracy but at the cost of high interpretability	Takagi and Sugeno's approach follows precise fuzzy modelling and obtains high accuracy but at the cost of low interpretability	Mamdani approach characterised by its low interpretability and high accuracy	c
105	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$	$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) < 1$	c
106	Which can be used as an input to fuzzy controller?	A fuzzy set	a crisp set	Both fuzzy set and Crisp set	None of these	b
107	What are the types of fuzzy logic sets?	Type-1 fuzzy set	Type-2 fuzzy set	Both a and b	None of these	c
108	How is fuzzy logic different from conventional control methods	IF and THEN approach	FOR approach	WHILE approach	DO approach	a
109	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \text{support } A(x)$, where A belongs to A. Then fuzzy set is called normal when	$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) > 1$	c
110	If A and B are sets and $A \cup B = A \cap B$ then	$A = B$	$A = 0$	$B = 0$	None of these	A

111	If x is A then y is B else y is C. The output of the given fuzzy rule is	A fuzzy set	a crisp set	a fuzzy relation	a membership function	c
112	What Is The First Step Of Fuzzy Logic Toolbox?	Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator(AND or OR) in the antecedent	Aggregation of the consequents across the rule	a
113	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	The input is a value greater than one and the output is a value less than the input	The input and output have both the same values	The input has two or more values and the output has a single truth value	d
114	What Is The Input And Output Of Step 3 - Apply Implication Method?	Input is a fuzzy set but the output is a whole value	Input is a fuzzy set but the output is a whole value	Input and Output have the same value	Input is a smaller value than the output value	b
115	What Is The Purpose Of Aggregation?	To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	a
116	Linguistic variable is	a variable whose values are words or sentences	any numerical value only	any binary value only	variable which contains TRUE or FALSE values only	a
117	Identification of Input, Output and state variables is performed in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	Identification of variables	d

118	Assigning linguistic label to each subset is done in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	fuzzy subset configuration	d
119	Disjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	a
120	Conjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	b
121	Categorial reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	a
122	Syllogistic reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	c
123	Qualitative reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	b

124	Dispositional reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	d
125	Mamdani systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	d
126	Sugeno systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	b
127	In the generational model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	a
128	In the steady-state model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	b
129	In the generational model of EA	each individual survives exactly for two generation	each individual survives exactly for one generation	cannot predict	each individual survives as many generations as want	b
130	In the steady-state model of EA	One offspring is generated per generation	two offsprings are generated per generation	cannot decide	more than two offsprings are generated per generation	a
131	Which of the following algorithm is most efficient for discontinuous and noisy problems?	Evolutionary algorithm	Classical optimization algorithm	Genetic algorithm	none	a

132	Each iteration of EA is referred to as	Generation	Iteration	population	None	a
133	Which of the following are evolutionary operators?	Selection	Crossover	Mutation	All of the above	d
134	In the $(\mu/\rho, \lambda)$ method of ES, parents are	selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	a
135	In the $(\mu/\rho+\lambda)$ method of ES, parents are	selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	b
136	Fitness scaling is desirable to ensure	Population diversity	selection pressure	that better solutions are selected only	relatively inferior solutions are not ignored	a
137	Which mutation operator is used in ES as reproduction operator?	one point	Gaussian mutation	two point	adaptive	b
138	Fitness proportionate selection methods are	Roulette wheel selection	Stochastic universal sampling	tournament selection	All the mentioned	d
139	In which selection method of survival selection there is no notion of fitness?	fitness based selection	elitism	Agebased selection	All the mentioned	c
140	In which selection strategy every individual has the same probability to be selected?	Roulette wheel selection	Uniform selection	tournament selection	Rank selection	b
141	High selection pressure is desirable, when we need	diversity not found in each generation	there is no improvement in successive GA iteration	faster termination of GA	fitness values are not uniformly distributed	c

142	Tournament selection scheme is more preferable when	when fitness values are uniformly distributed	population are with very diversified fitness values	when fitness values are not necessarily uniformly distributed	under all the above situations	b
143	Which of the following is not a characteristic of evolutionary algorithm?	Conceptual simplicity	Parallelism	Broad applicability	Artificial selection	d
144	What is the correct order of steps in evolutionary algorithm?	Select parents-recombine-mutate-evaluate	Select parents-recombine-evaluate-mutate-	Select parents-mutate - recombine-evaluate	Select parents-evaluate - recombine-mutate	a
145	Which of the following schemes are selection schemes in Evolutionary computation?	Hall of fame	Rank based selection	tournament selection	All of the above	d
146	To encode chromosomes which encoding schemes are used	binary encoding	finite state machine encoding	real value encoding	All of the above	d

This sheet is for 3 Mark questions						Correct Answer
S.r No	Question	a	b	c	d	
	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	What is defuzzification	conversion of fuzzy set to crisp set	conversion of crisp set to fuzzy set	conversion of fuzzy set to fuzzy logic	conversion of crisp set to crisp logic	a
2	What type of model is required for hard computing	mathematical	biological	chemical	probabilistic	a
3	Which of the following is/are basic component neuron	dendrites	axon	nucleus	all of the above	d
4	Which of the following computing technique has the ability of learning and adoption	neural network	evolutionary	hard	probabilistic	a
5	The truth value of the fuzzy set is	either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
6	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
7	which of the following is a sequence of steps taken in designing a fuzzy logic machine	fuzzification->Rule Evaluation->Defuzzification	defuzzification->rule evaluation->fuzzification	rule evaluation->fuzzification->defuzzification	rule evaluation->defuzzification->fuzzification	a
8	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
9	Genetic algorithm belongs to the family of methods in the	artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A

10	All of the following are suitable problem for genetic algorithm EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
11	In which stage of the simulation methodology do you determine the variable and gather data	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
12	In which stage of the simulation methodology do you determine how long to run the simulation	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	D
13	In which stage of the simulation methodology do you determine the system boundaries and environment?	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
14	What BEST describes a simulation model with a limited number of variables, each with the finite number of values?	system dynamics simulation	discrete event simulation	continuous distribution simulation	Monte Carlo simulation	B
15	The advantage of visual interactive simulation include all of the following EXCEPT	Improvement in training using the simulation	reduced need for the decision maker involvement	The ability to see how a simulation works	improved presentation of simulation results	B
16	What can system dynamics modelling be used for?	qualitative method for analyzing a system	simulation models that test each subsystem in isolation	micro-level simulation models that examine individual values	studying system behaviour at an instant in time	A

17	In agent-based modelling ,agents are	the human workers or agents who use the system	communication links between simulation	Autonomous rule-based decision making units	the hardware platform used to conduct the simulation	C
18	Agent based modelling is best for all the following types of problem features EXCEPT	complex interactions	low uncertainty	Many inter-related factors	irregular data	B
19	What is the final stage of an agent based modelling(ABM) methodology?	Identifying the agents and determining their behaviour	Determining agent-related data	Validating agent behaviour against reality	determining the suitability of ABM	C
20	Which of the following is the advantage of simulation?	It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skills	It solves problem in one pass with no iteration.	A
21	The truth value of the fuzzy set is	either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
22	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
23	which of the following is a sequence of steps taken in designning a fuzy logic machine	fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation->fuzzification->deffuzification	rule evaluation->defuzzification->fuzzification	a
24	EV is dominantly used for solving ____.	optimization problems	NP problem	simple problems	noneof these	a

25	EV is considered as?	adaptive	complex	both a and b	none of these	c
26	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
27	Identify the drawbacks of clustering algorithms? 1) can generate empty clusters 2) can terminate at local minimum 3) can handle noisy data	1,2,3	1,2	3	2,3	b
28	generation of empty cluster problem in clustering can be overcome by?	ACO based clustering	PSO based clustering	kmeans	kmode	b
29	where does PSO based clustering terminates?	global optimum	local optimum	global maximum	local minimum	a
30	Each particle in PSO modifies its position according to ? 1) its velocity 2) its weight 3) its gbest and pbest	2,3	1,2	1,2,3	only 1	c
31	Applications of ACO are ? 1) shortest path 2) assignment problem 3) set problem	2,3	1,2	1,2,3		c
32	Evaporation of pheromones is ?	directly proportional to path length	inversely proportional to path length	constant	none	a
33	Metaheuristics does not include ?	evolutionary algorithms	tabu searching	simulated annealing	none	d
34	Metaheuristics are ? 1) non deterministic 2) non approximate 3) not problem specific	1,2,3	1,2	1,3	2,3	c

35	In search techniques, as single point based contradicts population based similary deterministic contradicts ___?	Stochastic	simplex based	complex based	none	a
36	In swarm systems organisations are	centralized	decentralized	controlled by third party	none	b
37	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids	1,3,2	3,2,1	2,3,1	2,1,3	c
38	Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	a
39	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms	1,2	1,2,3	2,3,4	all of these	d
40	pheromone quantity in ACO is ___ proportional to path selection.	directly	inversly	there is no connection	none	a
41	Recombination involves ___ candidates while mutation requires___ candidates, and the result is called___.	1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
42	Identify the correct sequence for evolitionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3)Create offspring 4)replace some parents	1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
43	Problems for which there is no efficient method to solve such problems exactly are called?	complex	hard	strong	none	b

44	EV is considered as ? 1)complex 2)adaptive	1	2	1,2	none	c
45	EV system was proposed for exploring a___ fitness space and can form___.	multipaked,clusters	single peaked,clusters	multipaked,hard problems	single peaked,hard problems	a
46	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recombination operator	1,2	1,2,3	2,3	1,3	b
47	Parameters that affect GA are ? 1)intial population 2)fitness function 3)ability to generate offspring	1,3	1,2	1,2,3	only 1	b
48	___focuses attention on high fitness individuals, thus exploiting the available fitness information.	clustering	offspring production	replace	selection	d
49	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
50	Genetic algorithm are heuristic methods that do not guarantee an optimal solution to a problem	TRUE	FALSE			A

51	A "What-if" model is most typically used for the most structured problems	TRUE	FALSE			B
52	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solutuon	none of these	C
53	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
54	_____ doesnot usually allow decision makers to see how a solution to a _____ evolves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
55	_____ is a simulation method that let decision maker see what the model is doing and how it interact.	VIS	VIM	SIV	HIV	A
56	_____ systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	B
57	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?	Simulation	Optimization	human intution	genetic algorithm	A
58	Which of the following is the advantage of simulation?	It can incorporate significant real life complexity	It always result in optimal solution	Simulation software requires special skils	It solves problem in one pass with no iteration.	A
59	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred	continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B

60	The defining length of a schema is useful to calculate ____ of the schema for _____.	Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A
61	Recombination involves ___ candidates while mutation requires ___ candidates, and the result is called _____.	1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
62	Identify the correct sequence for evolutionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3>Create offspring 4)replace some parents	1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
63	Problems for which there is no efficient method to solve such problems exactly are called?	complex	hard	strong	none	b
64	EV is considered as ? 1)complex 2) adaptive	1	2	1,2	none	c
65	EV system was proposed for exploring a ___ fitness space and can form ___.	multipaked,clusters	single peaked,clusters	multipaked,hard problems	single peaked,hard problems	a
66	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recombination operator	1,2	1,2,3	2,3	1,3	b
67	Parameters that affect GA are ? 1)intial population 2)fitness function 3)ability to generate offspring	1,3	1,2	1,2,3	only 1	b

68	___ focuses attention on high fitness individuals, thus exploiting the available fitness information.	clustering	offspring production	replace	selection	d
69	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
70	Evolution strategies uses ? 1)selection 2)recombination 3)real valued vector	1,2,3	2,3	1,3	only 2	a
71	which of the following statements are true regarding ES ? 1)Survival is deterministic 2)first allows the N best children to survive, and replaces the parents with these children. 3)allows the N best children and parents to survive.	only 1	1,2	only 2	1,2,3	d
72	Evolutionary Algorithms includes ? 1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	3,4	2,3,4	c
73	Heuristics include ?1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	1,2		d

74	Which of the following statements are true ? 1)mutation is applied to two selected candidates, the so-called parents, and results in one or two new candidates, the children 2) recombination is applied to one candidate and results in one new candidate.	only 1	only 2	both	none of these	d
75	The ___ is performed by selecting two sub trees by chance from the parents and exchange them to create the descendants.	GP crossover	GP Mutation	GP clustering	GP Recombination	a
76	The___ is performed by selecting a sub tree of the descendant by chance and to exchange the sub tree with an arbitrary generated new sub tree.	GP crossover	GP Mutation	GP clustering	GP Recombination	b
77	___ are able to learn simple “if {condition} then {action}” style rules23 by learning from feedback	ES	EA	LCS	Heuristics	c
78	Island model is related with ?	Distributed Evolutionary Algorithms	LCS	swarm intelligence	ACO	a
79	payoffs can be easily translated to a ___ function for an EA.	survival	reduction	comination	fitness	d
80	Identify the correct statements with respect to genetic algorithms? 1)A fitness function should maximized. 2)A replacement procedure. 3)A string representation of chromosomes.	1,2	2,3	1,2,3	1,3	b

81	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.	Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
82	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
83	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
84	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?	associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
85	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is	Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
86	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d

87	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d
88	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned	c
89	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
90	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
91	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)	$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3), (5, 0), (6, 0.2)\}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
92	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
93	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be	$\{0.9, 0.5, 0.6, 0.8, 0.8\}$	$\{0.6, 0.2, 0.1, 0.7, 0.5\}$	$\{0.1, 0.5, 0.4, 0.2, 0.2\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	c

	Compute the value of adding the following two fuzzy integers: A = {(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)} B = {(0.5,11), (1,12), (0.5,13)} Where fuzzy addition is defined as $\mu_{A+B}(z) = \max(x+y=z \cap (\mu_A(x), \mu_B(y)))$ Then, f(A+B) is equal to	{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)}	{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)}	{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	d
95	A U (B U C) =	$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
96	Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be	{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
97	The fuzzy proposition "IF X is E then Y is F" is a	conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
98	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A, B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous	1 only	2 and 3	1,2 and 3	None of these	b
99	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b

100	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c
101	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
102	---- defines logic function of two prepositions	prepositions	Linguistic hedges	truth tables	inference rules	c
103	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
104	Multiple conjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
105	Multiple disjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
106	IF x is A and y is B then $z=c$ (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
107	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b

108	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a aircraft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
109	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
110	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
111	In Evolutionary programming, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ) -selection based on the children only $(\mu+\lambda)$ -selection based on both the set of parent and children	Children replace the parent	All the mentioned	a

112	In Evolutionary strategy, survival selection is	Probabilistic selection $(\mu+\mu)$ selection	(μ, λ) -selection based on the children only $(\mu+\lambda)$ -selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
113	In Evolutionary programming, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
114	In Evolutionary strategy, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
115	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
116	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b

117	Step size in self-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
118	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
119	Evolutionary Strategies (ES)	(μ,λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b
120	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
121	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a

122	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
123	(1+λ) ES	λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
124	Termination condition for EA	mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
125	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
126	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
127	(1+1) ES	Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
128	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
129	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c

130	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d
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SCOA UNIT 2 MCQs

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

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	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intution, Inference, Rank Ordering B.Fuzzy Algorithm, Neural network, Genetic Algorithm C.Core, Support , Boundary D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core B.Support C.Boundary D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

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	<p>B.normal fuzzy set C.convex fuzzy set D.concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A.1 B.0 C.infinite D.Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A.normal fuzzy set B.subnormal fuzzy set. C.convex fuzzy set D.concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesn't deal with 2 valued logic</p>	D

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	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	<p>Defuzzification is done to obtain</p> <ul style="list-style-type: none"> a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above 	a
13.	<p>“The train is running fast”. Here ‘fast’ can be represented by</p> <ul style="list-style-type: none"> a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned 	a
14.	<p>Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$</p> <p>Then the crisp value of Young using MoM method is</p> <ul style="list-style-type: none"> a) 25 b) 20 c) 35 d) 50 	a
15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area 	c

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	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)\text{complement} \neq \text{---} (A\lambda)\text{complement}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

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	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

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	d) None of the above	
26.	Fuzzy logic is a form of a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic	Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.
27.	Traditional set theory is also known as Crisp Set theory. a) True b) False	Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set. 3. The truth values of traditional set theory is _____ and that of fuzzy set is _____
28.	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Answer: a Explanation: Refer the

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	<p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	definition of Fuzzy set and Crisp set.
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p> <p>a) Fuzzy Set b) Crisp Set</p>	<p>Answer: a Explanation: Fuzzy logic deals with linguistic variables.</p>
31.	<p>The values of the set membership is represented by</p> <p>a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c</p>	<p>Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.</p>
32.	What is meant by probability density function?	d

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	<p>a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables</p>	
33.	<p>Which of the following is used for probability theory sentences?</p> <p>a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned</p>	<p>Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.</p>
34.	<p>Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.</p> <p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy</p>

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		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <ul style="list-style-type: none"> a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned 	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <ul style="list-style-type: none"> a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned 	<p>Answer: c</p> <p>Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

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SCOA Unit I MCQ

- 1.** Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.
 - A.**True
 - B.**False

- 2.** The membership functions are generally represented in
 - A.**Tabular Form
 - B.**Graphical Form
 - C.**Mathematical Form
 - D.**Logical Form

- 3.** Membership function can be thought of as a technique to solve empirical problems on the basis of
 - A.**knowledge
 - B.**examples
 - C.**learning
 - D.**experience

- 4.** Three main basic features involved in characterizing membership function are
 - A.**Intuition, Inference, Rank Ordering
 - B.**Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.sub normal fuzzy sets

B.normal fuzzy set

C.convex fuzzy set

D.concave fuzzy set

7. In a Fuzzy set a prototypical element has a value

A.1

B.0

C.infinite

D.Not defined

- 8. A fuzzy set wherein no membership function has its value equal to 1 is called**
- A.**normal fuzzy set
B.Subnormal fuzzy set.
C.convex fuzzy set
D.concave fuzzy set
- 9. A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe**
- A.**convex fuzzy set
B.concave fuzzy set
C.Non concave Fuzzy set
D.Non Convex Fuzzy set
- 10. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.**
- A.**Convex Fuzzy Set
B.Non convex fuzzy set
C.Normal Fuzzy set
D.Sub normal fuzzy set
- 11. The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to**

A.infinite

B.1

C.0

D.0.5

12. Fuzzy Computing

A.doesn't deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

B.False

14. Artificial neural network used for

A.Pattern Recognition

B.Classification

C.Clustering

D.All of these

15. A Neural Network can answer

- A.**For Loop questions
- B.**what-if questions
- C.**IF-The-Else Analysis Questions
- D.**None of these

16. Ability to learn how to do tasks based on the data given for training or initial experience

- A.**Self Organization
- B.**Adaptive Learning
- C.**Fault tolerance
- D.**Robustness

17. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

- A.**Adaptive Learning
- B.**Self Organization
- C.**What-If Analysis
- D.**Supervised Learning

18. In artificial Neural Network interconnected processing elements are called

- A.**nodes or neurons

B.weights

C.axons

D.Soma

19. Each connection link in ANN is associated with _____ which has information about the input signal.

A.neurons

B.weights

C.bias

D.activation function

20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.True

B.False

21. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.Weight

B.activation or activity level of neuron

C.Bias

D.None of these

22. Neuron can send _____ signal at a time.

- A.**multiple
- B.**one
- C.**none
- D.**any number of

23. Artificial intelligence is

- A.**It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations
- B.**Computational procedure that takes some value as input and produces some value as output.
- C.**Science of making machines performs tasks that would require intelligence when performed by humans
- D.**None of these

24. Expert systems

- A.**Combining different types of method or information
- B.**Approach to the design of learning algorithms that is structured along the lines of the theory of evolution
- C.**an information base filled with the knowledge of an expert formulated in terms

of if-then rules

D.None of these

25. Falsification is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

26. Evolutionary computation is

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.

C.Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.

D.None of these

27. Extendible architecture is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

28. Massively parallel machine is

A.A programming language based on logic

B.A computer where each processor has its own operating system, its own memory, and its own hard disk

C.Describes the structure of the contents of a database.

D.None of these

29. Search space

A.The large set of candidate solutions possible for a problem

B.The information stored in a database that can be, retrieved with a single query.

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

30. $n(\log n)$ is referred to

A.A measure of the desired maximal complexity of data mining algorithms

B.A database containing volatile data used for the daily operation of an organization

C.Relational database management system

D.None of these

31. Perceptron is

- A.**General class of approaches to a problem.
- B.**Performing several computations simultaneously
- C.**Structures in a database those are statistically relevant
- D.**Simple forerunner of modern neural networks, without hidden layers

32. Prolog is

- A.**A programming language based on logic
- B.**A computer where each processor has its own operating system, its own memory, and its own hard disk
- C.**Describes the structure of the contents of a database
- D.**None of these

33. Shallow knowledge

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be, retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

34. Quantitative attributes are

- A.**A reference to the speed of an algorithm, which is quadratically dependent on the size of

the data

B.Attributes of a database table that can take only numerical values

C.Tools designed to query a database

D.None of these

35. Subject orientation

A.The science of collecting, organizing, and applying numerical facts

B.Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.None of these

36. Vector

A.It do not need the control of the human operator during their execution

B.An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.The validation of a theory on the basis of a finite number of examples

D.None of these

37. Transparency

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

38. Core of soft Computing is

- A.**Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.**Fuzzy Networks and Artificial Intelligence
- C.**Artificial Intelligence and Neural Science
- D.**Neural Science and Genetic Science

39. Who initiated the idea of Soft Computing

- A.**Charles Darwin
- B.**Lofti A Zadeh
- C.**Rechenberg
- D.**Mc_Culloch

40. Fuzzy Computing

- A.**mimics human behaviour
- B.**doesn't deal with 2 valued logic
- C.**deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.**All of the above

41. Neural Computing

- A.**mimics human brain
- B.**information processing paradigm
- C.**Both (a) and (b)
- D.**None of the above

42. Genetic Algorithm are a part of

- A.**Evolutionary Computing
- B.**inspired by Darwin's theory about evolution - "survival of the fittest"
- C.**are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D.**All of the above

43. What are the 2 types of learning

- A.**Improvised and unimprovised
- B.**supervised and unsupervised
- C.**Layered and unlayered
- D.**None of the above

44. Supervised Learning is

- A.**learning with the help of examples
- B.**learning without teacher
- C.**learning with the help of teacher
- D.**learning with computers as supervisor

45. Unsupervised learning is

- A.**learning without computers
- B.**problem based learning

C.learning from environment

D.learning from teachers

46. Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

47. In supervised learning

A.classes are not predefined

B.classes are predefined

C.classes are not required

D. classification is not done

This sheet is for 1 Mark questions

S.r No	Question	a	b	c	d	Correct
e.g	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp	Distinguish two regions clearly	Cannot Distinguish two	Collection of ordered pairs	None of these	a
2	In computing the output is called as	Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of	two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be	Ambiguous	Unambiguos	Inaccurate	None of these	b
5	Core of soft computing is	Fuzzy	Fuzzy network	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation	Sequential	Parallel	approxiamate	both a and b	a
7	Who initiated idea of soft computing	charles darwin	rich and berg	mc culloch	lofti a zadeh	d
8	Soft computing is based on	fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be	non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing	mimics human	deals with	exact information	both a and b	d
11	Hard computing is also called as	evolutionary	conventional	non conventional	probablistic computing	b
12	Which computing produces accurate results	soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing	mimics human	information	both a and b	none of the above	c
14	Artificial neural network is used for	pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization	Blind search represent a guided approach while optimization is unguided	Blind search usually does not conclude in one step like some optimization methods.	Blind search cannot result in optimal solution whereas optimization method do	none of these	B
16	In modeling,an optimal solution is understood to be	a solution that can only be determined by an exhaustive enumeration testing of alternatives	a solution found in the least possible time and using the least possible computing resources	a solution that is the best based on criteria defined in the design phase	a solution that requires an algorithm for the determination	C

17	When is a complete enumeration of solution used?	When a solution that is "good enough" is fine and good heuristics are available	When there is enough time and computational power available	When the modeler requires a guided approach to problem solving	When there are an infinite number of solution to be searched	B
18	All of the following are true about heuristics EXCEPT	heuristics are used when the modeler requires a guided approach to problem solving	heuristics are used when a solution that is "good enough" is sought	heuristics are used when there is abundant time and computational power	heuristics are rules of good judgement	C
19	Which approach is most suited to structured problem with little	Simuation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belong to the family of method in the	artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
21	What does the 0 membership value means in the set	the object is fully inside the set	the object is not in the set	the object is partially present in the set	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	a
23	The process of fuzzy interference system involves	membership functions	fuzzy logic operators	if-then rules	all the above	d
24	What does a fuzzifier do	converts crisp input to linguistic variables	converts crisp output to linguistic variables	converts fuzzy input to linguistic variables	converts fuzzy output to linguistic variables	a
25	Which of the following is not defuzzifier method	centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method	mamdani	sugeno	rivest	only a and b	d

27	A Fuzzy rule can have	multiple part of antecedent,only single part of consequent	only single part of antecedent,multiple part of consequent	multiple part of antecedent,multiple part of consequent	only single part of antecedent,only single part of consequent	c
28	The α cut of a fuzzy set A is a crisp set defined by :-	$\{x \cup a(x) > \alpha\}$	$\{x \cup a(x) \geq \alpha\}$	$\{x \cup a(x) < \alpha\}$	$\{x \cup a(x) \leq \alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by	$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1/x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?	$\{0/a, 0.7/b, 0.8/c, 0.2/d, 1/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.2/d, 1/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.7/d, 1/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 1/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of AUB?	$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0.2/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.5/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.8/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B ?	$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 1/e\}$	a
34	What denotes the support(A) in a fuzzy set?	$\{x \cup a(x) > 0\}$	$\{x \cup a(x) < 0\}$	$\{x \cup a(x) \leq 0\}$	$\{x \cup a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?	$\{x \cup a(x) > 0\}$	$\{x \cup a(x) = 1\}$	$\{x \cup a(x) \geq 0.5\}$	$\{x \cup a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designning a fuzy logic machine	fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation->fuzzification->deffuzification	rule evaluation->defuzzification->fuzzification	a
38	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
39	Genetic algorithm belong to the family of method in the	artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A

40	All of the following are suitable problem for genetic algorithm EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
41	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
43	mutation is applied on ___ candidates.	one	two	more than two	none of these	a
44	recombination is applied on ___ candidates.	one	two	more than two	none of these	b
45	LCS belongs to ___ based methods?	rule based learning	genetic learning	both a and b	none of these	a
46	Survival is ___ approach.	deterministic	non deterministic	semi deterministic	none of these	a
47	Evolutionary algorithms are a ___ based approach	heuristic	metaheuristic	both a and b	none of these	a
48	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by	Fredrik	Fogel	Frank	Flin	b
54	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
56	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d

58	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover	discrete and intermedium	discrete and continuous	continuous and intemedium	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested.	TRUE	FALSE			B
61	_____cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solutuon	none of these	C
62	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
63	_____doesnot usually allow decision makers to see how a solution to a _____envolves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
64	EC stands for?	Evolutionary Computatons	Evolutionary computer	Electronic computations	noneof these	a
65	GA stands for	genetic algorithm	genetic assurance	genese alforithm	noneof these	a
66	LCS stands for	learning classes system	learning classifier systems	learned class system	noneof these	b
67	GBML stands for	Genese based Machine learning	Genes based mobile learning	Genetic bsed machine learning	noneof these	c
68	EV is dominantly used for solving ____.	optimization problems	NP problem	simple problems	noneof these	a
69	EV is considered as?	adaptive	complex	both a and b	noneof these	c
70	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
72	Parameters that affect GA	initial population	selection process	fitness function	all of these	d

73	Fitness function should be	maximum	minimum	intermediate	none of these	b
74	Evolutionary algorithms are a ___ based approach	heuristic	metaheuristic	both a and b	none of these	a
75	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
76	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
77	mutation is applied on ___ candidates.	one	two	more than two	none of these	a
78	recombination is applied on ___ candidates.	one	two	more than two	none of these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?	sub parents	parents	offspring	grand child	c
80	___ decides who becomes parents and how many children the parents have.	parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?	Parent Selection methods	Survival Selection methods	both a and b	none of these	c
82	LCS belongs to ___ based methods?	rule based learning	genetic learning	both a and b	none of these	a
83	Survival is ___ approach.	deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called ___ that can be applied to fuzzy set theory.	Hedges	Linguistic Variable	Fuzzy Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a

87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?	associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is	Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned	c
92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)	$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3), (5, 0), (6, 0.2)\}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a

96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be	{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.5}	{0.1, 0.5, 0.4, 0.2, 0.2}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x,y} z = \min(\mu_A(x), \mu_B(y))$ Then, $f(A+B)$ is equal to	{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,15), (1,16), (1,17), (1,18)}	{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,15), (1,16), (1,17), (1,18)}	{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}	d
98	$A \cup (B \cup C) =$	$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be	{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a	conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A, B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous	1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b

103	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	C
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	----- defines logic funtion of two prepositions	prepositions	Lingustic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ----- gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ----- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ----- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then z=c (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b

111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a

115	In Evolutionary strategy, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is	doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is	doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a

119	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)	(μ,λ) : Select survivors among parents and offspring	$(\mu+\lambda)$: Select survivors among parents and offspring	$(\mu-\lambda)$: Select survivors among offspring only	$(\mu:\lambda)$: Select survivors among offspring only	b
123	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b

124	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126	(1+ λ) ES	λ mutants can be generated from one parent	one mutant is generated	2 λ mutants can be generated	no mutants are generated	a
127	Termination condition for EA	mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
130	(1+1) ES	Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
131	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c

133	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d
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This sheet is for 2 Mark questions						
S.r No	Question	a	b	c	d	Correct Answer
e.g	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	Who can deal with noisy input information	soft computing	hard computing	both a and b	none of the above	a
2	Ability to learn how to do task based on the data is done by	self organization	adaptive learning	fault tolerance	robustness	b
3	Which of the following is not a technique of soft computing	neural network	genetic algorithm	evolutionary	conventional	d
4	Fuzzy logic system is based on what type of rule	if-then	else-if	while	do-while	a
5	What is the function of dendrites in biological neural network	send signals to	receive signals from	sum of incoming	transmit signals	b
6	Expert system	combines different	is a approach to	is an information	none of the above	c
7	Three main basic feature involved in characterizing member function are	intuition,inference,ran	fuzzy	center of	core,support,boundar	d
8	What is the function of cell body in biological neural network	multiples the	sums the incoming	multiples the	sums the outgoing	b
9	What is perceptron	a single layer feed	a double layer	a neural network that	auto associative	a
10	Which of the following computing is trial and error problem solver algorithm	hard computing	neural network	evolutionary	fuzzy logic	c
11	What are advantages of neural network	ability to learn by	fault tolerant	both a and b	none of the above	c
12	Which of the following does not belong to the process of involuntary computing	selection	mutation	recombination	deletion	d
13	The Value of crisp set can be	either 0 or 1	near to 0 or 1	between 0 and 1	between 0.5 and 0.7	a
14	The room temperature is hot. Here the hot(use of linguistic variable is used) can be	fuzzy set	crisp set	probabilistic set	none of the above	a
15	The value of set membership can be represented by	discrete set	degree of truth	probabilities	both b and c	b
16	Semiconductor layout & aircraft design are the application type of which domain?	Control	Design	Robotics	ML	B
17	Trajectory planning is the application type of which domain?	Control	Design	Robotics	ML	C
18	Filter design is the application type of which domain?	Control	Signal Processing	Robotics	ML	B
19	Pokers & Checkers are the application type of which domain?	Control	Game Playing	Robotics	ML	B
20	Manufacturing & resource allocation are the application type of which domain?	Scheduling	Design	Robotics	ML	A
21	What is a crossover point in a fuzzy set?	$\{x \cup a(x) < 0\}$	$\{x \cup a(x) = 1\}$	$\{x \cup a(x) = 0.5\}$	$\{x \cup a(x) > 0\}$	c
22	If A and B are two fuzzy sets with membership function: $\cup a(X) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$ $\cup b(X) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ THEN what will be the intersection of A and B	$\{0.2, 0.5, 0.6, 0.7, 0.9\}$	$\{0.2, 0.3, 0.8, 0.1, 0.5\}$	$\{0.5, 0.1, 0.6, 0.1, 0.8\}$	$\{0.1, 0.5, 0.2, 0.1, 0.8\}$	d
23	$A = \{0.1/1+0.2/2+0.3/3\}$ $B = \{0.6/1+0.5/2+0.4/3+0.5/4\}$ Find the set difference	$\{0.1/1+0.2/2+0.3/3\}$	$\{0.3/1+0.2/2+0.2/3\}$	$\{0.1/1+0.3/2+0.2/3\}$	$\{0.1/1+0.2/2+0.5/3\}$	a
24	With the help of which formula can we find the algebraic sum of two fuzzy sets A,B?	$\{\cup A(x) + \cup B(x)\} - \{\cup A(x) * \cup B(x)\}$	$\{\cup A(x) - \cup B(x)\} - \{\cup A(x) * \cup B(x)\}$	$\{\cup A(x) / \cup B(x)\} - \{\cup A(x) * \cup B(x)\}$	$\{\cup A(x) + \cup B(x)\} + \{\cup A(x) * \cup B(x)\}$	a
25	With the help of which formula can we find the algebraic product of two fuzzy sets A,B?	$\{\cup A(x) * \cup B(x)\}$	$\{\cup A(x) * \cup B(x)\} * \{\cup A(x) - \cup B(x)\}$	$\{\cup A(x) * \cup B(x)\} + \{\cup A(x) * \cup B(x)\}$	$\{\cup A(x) * \cup B(x)\}$	d
26	Which one of the following is the associative property for a crisp set	$AU(BUC) = (AUB)UC$	$BU(AUC) = CU(BUA)$	$AU(CUA) = B(AUC)$	all the above	a

27	Knowledge base is a combination of	rule base and data base	rule base and time base	time base and probability base	model base and data base	a
28	Fuzzy logic system is based on what type of rule	if-then	else-if	while	do-while	a
29	What is the function of dendrites in biological neural network	send signals to neurons	receive signals from neurons	sum of incoming signals	transmit signals	b
30	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
31	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
32	_____ is a simulation method that let decision maker see what the model is doing and how it interacts.	VIS	VIM	SIV	HIV	A
33	_____ systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	B
34	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?	Simulation	Optimization	human intuition	genetic algorithm	A
35	Which of the following is the advantage of simulation?	It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skills	It solves problem in one pass with no iteration.	A
36	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred	continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B
37	The defining length of a schema is useful to calculate _____ of the schema for _____.	Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A
38	Semiconductor layout & aircraft design are the application type of which domain?	Control	Design	Robotics	ML	B
39	Trajectory planning is the application type of which domain?	Control	Design	Robotics	ML	C
40	Filter design is the application type of which domain?	Control	Signal Processing	Robotics	ML	B
41	categories of EA are/is	Genetic Algorithm	genetic programming	learning Classifier Systems	all of these	d
42	Phases in which the LCS individuals are evaluated are	performance phase	reinforcement phase	both a and b	none of these	c
43	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	a
44	Genetic algorithm is a subset of _____.	evolutionary algorithm	dynamical algorithm	both a&b	None of these	A
45	NP hard problems are also called as _____.	discrete optimization	combinatorial optimization	evolutionary optimization	None of these	B
46	Genetic algorithm is first introduced by _____.	Charles Darwin	John Holland	Gregor Johann Mendel	None of these	B

47	_____ replicates the most successful solutions found in a population at a rate proportional to relative quality.	Selection	Recombination	Mutation	None of these	A
48	_____ decomposes two distinct solutions and then randomly mixes their parts to form novel solutions.	Selection	Recombination	Mutation	None of these	B
49	_____ randomly perturbs a candidate solution.	Selection	Recombination	Mutation	None of these	C
50	A _____ is a template consisting of a string composed of three symbol.	Wild symbol	Schema	Layout	None of these	B
51	{0,1,#} is the symbol alphabet ,where # is a special _____ symbol.	Wild card	Schema	Layout	None of these	A
52	Metaheuristics are ?1)non deterministic 2)non approximate 3)not problem specific	1,2,3	1,2	1,3	2,3	c
53	In search techniques, as single point based contradicts population based similiary deterministic contradicts ____?	Stochastic	simplex based	complex based	none	a
54	In swarm systems organisations are	centralized	decentralized	controlled by third party	none	b
55	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids	1,3,2	3,2,1	2,3,1	2,1,3	c
56	Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	a
57	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms	1,2	1,2,3	2,3,4	all of these	d
58	pheromone quantity in ACO is ____ proportional to path selection.	directly	inversly	there is no connection	none	a
59	The ants prefer the smaller drop of honey over the more abundant, but less nutritious, sugar. This is the example of?	kruskal algorithm	Travelling salesman	Knapsack problem	NP hard problem	c
60	In kmeans clustering each cluster is associated with	centroid	edge	common point	none of them	a
61	What is EC?	computer based problem solving systems	Systems that uses computational models of evolutionary process	both a and b	none of these	c
62	Recombination is applied to	2 selected candidated	1 selected candidate	3 selected candidate	none of these	a
63	In EA mutation is applied to	2 candidate	1 candidate	3 candidate	none of these	b
64	EV is used for	solving optimization problems	finding solutions	both a and b	none of these	a
65	EV is considered as	complex	simple	complex and adaptive	all of these	c
66	GA stands for	Genetic Algorithm	genetic programing	genetic assurance	none of these	a

67	Features of GA	A string representation of chromosomes.	A fitness function be to minimized.	A cross-over method and a mutation method.	all of these	d
68	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
69	Evolutionary programming was developed by	Fredrik	Fogel	Frank	Flin	b
70	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
71	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
72	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
73	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d
74	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
75	What are different types of crossover	discrete and intermedium	discrete and continuous	continuous and intermedium	none of these	a
76	GP individual stores computer program	TRUE	FALSE			a
77	GP selection is	Deterministic selection	Tournament selection	nondeterministic selection	none of these	b
78	EP mutation is	Data specific	Data type specific	non specific	none of these	b
79	categories of EA are/is	Genetic Algorithm	genetic programming	learning Classifier Systems	all of these	d
80	Phases in which the LCS individuals are evaluated are	performance phase	reinforcement phase	both a and b	none of these	c
81	MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	a
82	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1	Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	a
83	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____	Fuzzy Set	Crisp Set	Fuzzy & Crisp Set	Fuzzy & Crisp Set	a
84	Fuzzy logic is usually represented as	IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	b
85	Three main basic features involved in characterizing membership function are	Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	Core, Support , Boundary	Weighted Average, center of Sums, Median	c
86	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b

87	Why can't we design a perfect neural network?	full operation is still not known of biological neurons	number of neuron is itself not precisely known	number of interconnection is very large & is very complex	all of the mentioned	d
88	Both Fuzzy logic and ANN are soft computing techniques because	Both gives precise and accurate results	ANN gives accurate result but fuzzy logic doesnot	In each, no precise mathematical model of the problem is required	Fuzzy logic gives accurate result but ANN doesnot	c
89	Internal state of neuron is called _____, is the function of the inputs the neurons receives	Weight	activation or activity level of neuron	Bias	None of these	b
90	Each connection link in ANN is associated with _____ which has information about the input signal.	neurons	weights	bias	activation function	b
91	In artificial Neural Network interconnected processing elements are called	nodes or neurons	weights	axons	Soma	a
92	The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to	infinite	1	0	0.5	d
93	The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing	Convex Fuzzy Set	Non convex fuzzy set	Normal Fuzzy set	Sub normal fuzzy set	b
94	The cell body of neuron can be analogous to what mathamatical operation?	summing	differentiator	integrator	none of the mentioned	a
95	Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data	Both (a) and (b)	None of the above	c
96	_____ is/are the way/s to represent uncertainty.	Fuzzy Logic	Probability	Entropy	All of the mentioned	d
97	Given two fuzzy sets A and B A={((x1,0.5),(x2,0.1),(x3,0.4))} and B={((x1,0.2),(x2,0.3),(x3,0.5))} then union of 2 sets A U B is	{}((x1,0.5),(x2,0.1),(x3,0.4)}	{}((x1,0.5),(x2,0.3),(x3,0.5)}	{}((x1,0.2),(x2,0.3),(x3,0.5)}	{}((x1,0.2),(x2,0.1),(x3,0.4)}	b

	If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$ $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be		{0.2, 0.5, 0.6, 0.7, 0.9}	{0.2, 0.5, 0.2, 0.1, 0.8}	{0.1, 0.5, 0.6, 0.1, 0.8}	{0.1, 0.5, 0.2, 0.1, 0.8}	d
98	For k>1, which of the following concept can be used to generate other linguistic hedge?	Concentration and dilation	Dilation	Concentration	None of the mentioned	c	
100	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A U B is	{1.0, 0.45, 0.75}	{1, 0.2, 0.75}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	a	
101	Consider A = {1.0, 0.20, 0.75} B = {0.2, 0.45, 0.50} A ∩ B is	{1.0, 0.45, 0.75}	{0.2, 0.20, 0.50}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	b	
102	Mamdani-style inference involves which steps	Fuzzification of the input variables & Rule evaluation	Aggregation of the rule output & Defuzzification	Both a and b	either a or b	c	
103	A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$	Core	Support	Cross-over	α - cut	c	
104	Which statement is true?	Mamdani approach characterised by its low interpredictability and low accuracy	Takagi and Sugeno's approach characterised by high accuracy but at the cost of high interpretability	Takagi and Sugeno's approach follows precise fuzzy modelling and obtains high accuracy but at the cost of low interpretability	Mamdani approach characterised by its low interpretability and high accuracy	c	
105	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$	$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) < 1$	c	
106	Which can be used as an input to fuzzy controller?	A fuzzy set	a crisp set	Both fuzzy set and Crisp set	None of these	b	
107	What are the types of fuzzy logic sets?	Type-1 fuzzy set	Type-2 fuzzy set	Both a and b	None of these	c	
108	How is fuzzy logic different from conventional control methods	IF and THEN approach	FOR approach	WHILE approach	DO approach	a	
109	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \text{support } A(x)$, where A belongs to A. Then fuzzy set is called normal when	$h(A) = 0$	$h(A) < 0$	$h(A) = 1$	$h(A) > 1$	c	

110	If A and B are sets and $A \cup B = A \cap B$ then	A=B	A=0	B=0	None of these	A
111	If x is A then y is B else y is C. The output of the given fuzzy rule is	A fuzzy set	a crisp set	a fuzzy relation	a membership function	c
112	What Is The First Step Of Fuzzy Logic Toolbox?	Fuzzification of the input variables	Defuzzification	Application of the fuzzy operator(AND or OR) in the antecedent	Aggregation of the consequents across the rule	a
113	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	The input is a value greater than one and the output is a value less than the input	The input and output have both the same values	The input has two or more values and the output has a single truth value	d
114	What Is The Input And Output Of Step 3 - Apply Implication Method?	Input is a fuzzy set but the output is a whole value	Input is a fuzzy set but the output is a whole value	Input and Output have the same value	Input is a smaller value than the output value	b
115	What Is The Purpose Of Aggregation?	To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs	To gather all the possible inputs and use the average to gain an output	To gather all the different fuzzy set outputs and average them out to get a single value	To subtract all the output fuzzy set values from the input values	a
116	Linguistic variable is	a variable whose values are words or sentences	any numerical value only	any binary value only	variable which contains TRUE or FALSE values only	a
117	Identification of Input, Output and state variables is performed in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	Identification of variables	d
118	Assigning linguistic label to each subset is done in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	fuzzy subset configuration	d
119	Disjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	a
120	Conjunctive system of rules is used for system	that requires at least one out of all rules it satisfies	all the rules to be jointly satisfied	both a and b	neither a nor b	b

121	Categorial reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	a
122	Syllogistic reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	c
123	Qualitative reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	b
124	Dispositional reasoning form of fuzzy reasoning	the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	the antecedents and consequents have fuzzy linguistic variables	antecedents with fuzzy quantifiers are related to inference rules	antecedents are dispositions	d
125	Mamdani systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	d
126	Sugeno systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	b
127	In the generational model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	a
128	In the steady-state model of EA	entire set of population is replaced by offsprings	One member of population is replaced	No population member is replaced	depends on fitness value	b
129	In the generational model of EA	each individual survives exactly for two generation	each individual survives exactly for one generation	cannot predict	each individual survives as many generations as want	b

130	In the steady-state model of EA	One offspring is generated per generation	two offsprings are generated per generation	cannot decide	more than two offsprings are generated per generation	a
131	Which of the following algorithm is most efficient for discontinuous and noisy problems?	Evolutionary algorithm	Classical optimization algorithm	Genetic algorithm	none	a
132	Each iteration of EA is referred to as	Generation	Iteration	population	None	a
133	Which of the following are evolutionary operators?	Selection	Crossover	Mutation	All of the above	d
134	In the $(\mu/\rho,\lambda)$ method of ES, parents are	selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	a
135	In the $(\mu/\rho+\lambda)$ method of ES, parents are	selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	b
136	Fitness scaling is desirable to ensure	Population diversity	selection pressure	that better solutions are selected only	relatively inferior solutions are not ignored	a
137	Which mutation operator is used in ES as reproduction operator?	one point	Gaussian mutation	two point	adaptive	b
138	Fitness proportionate selection methods are	Roulette wheel selection	Stochastic universal sampling	tournament selection	All the mentioned	d
139	In which selection method of survival selection there is no notion of fitness?	fitness based selection	elitism	Agebased selection	All the mentioned	c
140	In which selection strategy every individual has the same probability to be selected?	Roulette wheel selection	Uniform selection	tournament selection	Rank selection	b
141	High selection pressure is desirable, when we need	diversity not found in each generation	there is no improvement in successive GA iteration	faster termination of GA	fitness values are not uniformly distributed	c
142	Tournament selection scheme is more preferable when	when fitness values are uniformly distributed	population are with very diversified fitness values	when fitness values are not necessarily uniformly distributed	under all the above situations	b
143	Which of the following is not a characteristic of evolutionary algorithm?	Conceptual simplicity	Parallelism	Broad applicability	Artificial selection	d

144	What is the correct order of steps in evolutionary algorithm?	Select parents-recombine-mutate-evaluate	Select parents-recombine-evaluate-mutate-	Select parents-mutate - recombine-evaluate	Select parents-evaluate -recombine-mutate	a
145	Which of the following schemes are selection schemes in Evolutionary computation?	Hall of fame	Rank based selection	tournament selection	All of the above	d
146	To encode chromosomes which encoding schemes are used	binary encoding	finite state machine encoding	real value encoding	All of the above	d

This sheet is for 3 Mark questions						
S.r	Question	a	b	c	d	Correct
	Write down question	Option a	Option b	Option c	Option d	a/b/c/d
1	What is defuzzification	conversion of fuzzy	conversion of crisp	conversion of fuzzy	conversion of crisp set to crisp	a
2	What type of model is required for hard computing	mathematical	biological	chemical	probabilistic	a
3	Which of the following is/are basic component neuron	dendrites	axon	nucleus	all of the above	d
4	Which of the following computing technique has the ability of	neural network	evolutionary	hard	probabilistic	a
5	The truth value of the fuzzy set is	either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
6	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
7	which of the following is a sequence of steps taken in designing	fuzzification->Rule	deffuzification->rule	rule evaluation-	rule evaluation->defuzzification-	a
8	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
9	Genetic algorithm belong to the family of method in the	artifical intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
10	All of the follwing are suitable problem for genetic algorithm EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
11	In which stage of the simulation methodology do you determine the variable and gather data	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	
12	In which stage of the simulation methodology do you determine how long to run the simulation	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	D
13	In which stage of the simulation methodology do you determine the system boundaries and enviroment?	Defining the problem	Constructing the simulation model	testing and validating the model	designing the experiment	B
14	What BEST describes a simulation model with a limited number of variables ,each with the finite number of values?	system dynamics simulation	discrete event simulation	continous distribution simulation	Monte carlo simulation	B
15	The advantage of visual interactive simulation include all of the following EXCEPT	Improvement in training using the simulation	reduced need for the decision maker involvement	The ability to see how a simulation works	improved presentation of simulation results	B
16	What can system dynamics modelling be used for ?	qualitative method for analyzing a system	simulation models that test each subsystem in isolation	micro-level simulation models that examine individual values	studying system behaviour at an instant in time	A
17	In agent-based modelling ,agents are	the human workers or agents who use the system	communication links between simulation	Autonomous rule-based decision making units	the hardware platform used to conduct the simulation	C

18	Agent based modelling is best for all the following types of problem features EXCEPT	complex interactions	low uncertainty	Many inter-related factors	irregular data	B
19	What is the final stage of an agent based modelling(ABM) methodology?	Identifying the agents and determining their behaviour	Determining agent-related data	Validating agent behaviour against reality	determining the suitability of ABM	C
20	Which of the following is the advantage of simulation?	It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skils	It solves problem in one pass with no iteration.	A
21	The truth value of the fuzzy set is	either 0 or 1	between 0.2 to 0.6	between 0 and 1	greater than 1	c
22	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
23	which of the following is a sequence of steps taken in designning a fuzy logic machine	fuzzification->Rule Evaluation->Defuzzification	deffuzification->rule evaluation-evaluation->fuzzification	rule evaluation->fuzzification->deffuzification	rule evaluation->defuzzification->fuzzification	a
24	EV is dominantly used for solving ____.	optimization problems	NP problem	simple problems	noneof these	a
25	EV is considered as?	adaptive	complex	both a and b	noneof these	c
26	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
27	Identify the drawbacks of clustering algorithms? 1) can generate empty clusters 2) can terminate at local minimum 3)can handle noisy data	1,2,3	1,2	3	2,3	b
28	generation of empty cluster problem in clustering can be overcome by?	ACO based clustering	PSO based clustering	kmeans	kmode	b
29	where does PSO based clustering terminates?	global optimum	local optimum	global maximum	local minimum	a
30	Each particle in PSO modifies its position according to ? 1)its velocity 2)its weight 3) its gbest and pbest	2,3	1,2	1,2,3	only 1	c
31	Applications of ACO are ? 1)shortest path 2)assignment problem 3)set problem	2,3	1,2	1,2,3		c
32	Evaporation of pharomones is ?	directly proportional to path length	inversly proportional to path length	constant	none	a
33	Metaheuristics doesnot include ?	evolutinary algorithms	tabu searching	simulated annealing	none	d
34	Metaheuristics are ?1)non deterministic 2)non approximate 3)not problem specific	1,2,3	1,2	1,3	2,3	c
35	In search techniques, as single point based contradicts population based similary deterministic contradicts ____?	Stochastic	simplex based	complex based	none	a
36	In swarm systems organisations are	centalized	decentralized	controlled by third party	none	b

37	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k centroids 3)make clusters near centroids	1,3,2	3,2,1	2,3,1	2,1,3	c
38	Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	a
39	swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithms	1,2	1,2,3	2,3,4	all of these	d
40	pheromone quantity in ACO is ___ proportional to path selection.	directly	inversly	there is no connection	none	a
41	Recombinatoin involves ___candidates while mutation requires ___ candidates, and the result is called___.	1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
42	Identify the correct sequence for evolutionalry algorithms ? 1>Select genitors from parent population 2)Evaluate newborn offspring 3>Create offspring 4)replace some parents	1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
43	Problems for which there is no efficient method to solve such problems exactly are called?	complex	hard	strong	none	b
44	EV is considered as ? 1)complex 2) adaptive	1	2	1,2	none	c
45	EV system was proposed for exploring a___ fitness space and can form___.	multipieaked,clusters	single peaked,clusters	multipieaked,hard problems	single peaked,hard problems	a
46	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recombination operator	1,2	1,2,3	2,3	1,3	b
47	Parameters that affect GA are ? 1)intial population 2)fitness function 3)ability to generate offspring	1,3	1,2	1,2,3	only 1	b
48	___focuses attention on high fitness individuals, thus exploiting the available fitness information.	clustering	offspring production	replace	selection	d

49	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
50	Genetic algorithm are heuristic methods that do not guarantee an optimal solution to a problem	TRUE	FALSE			A
51	A "What-if" model is most typically used for the most structured problems	TRUE	FALSE			B
52	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solutuon	none of these	C
53	Discrete events and agent-based models are usuallyly used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
54	_____ doesnot usually allow decision makers to see how a solution to a _____envolves over time nor can decision makers interact with it.	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
55	_____ is a simulation method that let decision maker see what the model is doing and how it interact.	VIS	VIM	SIV	HIV	A
56	____systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	B
57	Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, and time compression?	Simulation	Optimization	human intuition	genetic algorithm	A
58	Which of the following is the advantage of simulation?	It can incorporate significant real-life complexity	It always result in optimal solution	Simulation software requires special skils	It solves problem in one pass with no iteration.	A
59	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occurred	continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B
60	The defining length of a schema is useful to calculate _____ of the schema for _____.	Survival probability,crossovers	crossovers,survival probability	crossovers,length	length,crossover	A

61	Recombination involves ___ candidates while mutation requires ___ candidates, and the result is called ___.	1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
62	Identify the correct sequence for evolutionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring 3)Create offspring 4)replace some parents	1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
63	Problems for which there is no efficient method to solve such problems exactly are called?	complex	hard	strong	none	b
64	EV is considered as ? 1)complex 2) adaptive	1	2	1,2	none	c
65	EV system was proposed for exploring a ___ fitness space and can form ___.	multipieaked,clusters	single peaked,clusters	multipieaked,hard problems	single peaked,hard problems	a
66	Empirical studies focused on a variety of issues, like ? 1) initialization strategies 2) probability of mutation 3)recombination operator	1,2	1,2,3	2,3	1,3	b
67	Parameters that affect GA are ? 1)initial population 2)fitness function 3)ability to generate offspring	1,3	1,2	1,2,3	only 1	b
68	___ focuses attention on high fitness individuals, thus exploiting the available fitness information.	clustering	offspring production	replace	selection	d
69	Identify the algorithm ?procedure EA { t = 0; initialize population P(t); evaluate P(t); until (done) { t = t + 1; parent_selection P(t); recombine P(t); mutate P(t); evaluate P(t); survive P(t); } }	ACO	PSO	EA	Kmean	c
70	Evolution strategies uses ? 1)selection 2)recombination 3)real valued vector	1,2,3	2,3	1,3	only 2	a
71	which of the following statements are true regarding ES ? 1)Survival is deterministic 2)first allows the N best children to survive, and replaces the parents with these children. 3)allows the N best children and parents to survive.	only 1	1,2	only 2	1,2,3	d
72	Evolutionary Algorithms includes ? 1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	3,4	2,3,4	c

73	Heuristics include ?1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	1,2		d
74	Which of the following statements are true ? 1)mutation is applied to two selected candidates, the so-called parents, and results in one or two new candidates, the children 2) recombination is applied to one candidate and results in one new candidate.	only 1	only 2	both	none of these	d
75	The ___ is performed by selecting two sub trees by chance from the parents and exchange them to create the descendants.	GP crossover	GP Mutation	GP clustering	GP Recombination	a
76	The ___ is performed by selecting a sub tree of the descendant by chance and to exchange the sub tree with an arbitrary generated new sub tree.	GP crossover	GP Mutation	GP clustering	GP Recombination	b
77	___ are able to learn simple "if {condition} then {action}" style rules23 by learning from feedback	ES	EA	LCS	Heuristics	c
78	Island model is related with ?	Distributed Evolutionary Algorithms	LCS	swarm intelligence	ACO	a
79	payoffs can be easily translated to a ___ function for an EA.	survival	reduction	comination	fitness	d
80	Identify the correct statements with respect to genetic algorithms? 1)A fitness function should maximized. 2)A replacement procedure. 3)A string representation of chromosomes.	1,2	2,3	1,2,3	1,3	b
81	There are also other operators, more linguistic in nature, called ___ that can be applied to fuzzy set theory.	Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
82	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
83	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
84	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?	associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c

85	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is	Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
86	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
87	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d
88	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned	c
89	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
90	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
91	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)	$\{(4, 0.7), (2,1), (1,0.8)\}$	$\{(4, 0.3.): (5, 0), (6, 0.2) \}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6,0.2), (7, 1)\}$	$\{(3, 0.3), (6,0.2)\}$	c
92	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
93	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be	$\{0.9, 0.5, 0.6, 0.8, 0.8\}$	$\{0.6, 0.2, 0.1, 0.7, 0.5\}$	$\{0.1, 0.5, 0.4, 0.2, 0.2\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	c
94	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_x y = z (\min(\mu_A(x), \mu_B(x)))$ Then, $f(A+B)$ is equal to	$\{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)\}$	$\{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)\}$	$\{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	$\{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$	d
95	$A \cup (B \cup C) =$	$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b

96	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be	{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
97	The fuzzy proposition "IF X is E then Y is F" is a	conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
98	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous	1 only	2 and 3	1,2 and 3	None of these	b
99	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
100	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c
101	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
102	---- defines logic funtion of two prepositions	prepositions	Linguistic hedges	truth tables	inference rules	c
103	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
104	Multiple conjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
105	Multiple disjunctives antecedents is method of ---- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
106	IF x is A and y is B then $z=c$ (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
107	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b

108	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
109	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
110	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
111	In Evolutionary programming, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
112	In Evolutionary strategy, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
113	In Evolutionary programming, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
114	In Evolutionary strategy, recombination is	does not use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b

115	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
116	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
117	Step size in self-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
118	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
119	Evolutionary Strategies (ES)	(μ,λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b
120	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
121	In Evolutionary Strategy,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
122	(1+1) ES	offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a

123	(1+λ) ES	λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
124	Termination condition for EA	mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
125	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
126	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
127	(1+1) ES	Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
128	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
129	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c
130	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

SCOA- Multiple Choice Questions on Unit 1

Sr. No	Question	A	B	Op
1	Core of soft Computing is	Fuzzy Computing, Neural Computing, Genetic Algorithms	Fuzzy Networks and Artificial Intelligence	
2	Unsupervised learning is	learning without computers	problem based learning	
3	Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic	Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data	
4	The membership functions are generally represented in	Tabular Form	Graphical Form	
5	Three main basic features involved in characterizing membership function are	Intuition, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	
6	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	
7	Connections across the layers in standard topologies & among the units within a layer can be organised	in feedforward manner	in feedback manner	
8	Internal state of neuron is called _____, is the function of the inputs the neurons receives	Weight	activation or activity level of neuron	

9	Genetic Algorithm are a part of	Evolutionary Computing	inspired by Darwin's theory about evolution - "survival of the fittest"
10	Fuzzy Computing	mimics human behaviour	doesn't deal with 2 valued logic
11	For what purpose Feedback neural networks are primarily used?	classification	feature mapping
12	Which of the following is true for neural networks? (i) The training time depends on the size of the network. (ii) Neural networks can be simulated on a conventional computer. (iii) Artificial neurons are identical in operation to biological ones.	All of the mentioned	(ii) is true
13	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory	Hedges	Lingual Variable
14	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)(x)$ will be	{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.5}
15	Internal state of neuron is called _____, is the function of the inputs the neurons receives	Weight	activation or activity level of neuron
16	Membership function can be thought of as a technique to solve empirical problems on the basis of	knowledge	examples
17	Fuzzy Computing	doesn't deal with 2 valued logic	mimics human behaviour
18	Evolutionary computation is	Combining different types of method or information	Approach to the design of learning algorithms that is structured along the lines of the theory of

SCOA- Multiple Choice Questions on Unit 2

		Op	
Sr. No	Question	A	B
1	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup_{x \in X} \mu_A(x)$ where x belongs to A. Then the fuzzy set A is called normal when	$h(A)=0$	$h(A)<0$
2	Fuzzy logic is a form of	Two-valued logic	Crisp set logic
3	Consider a fuzzy set old as defined below old={\{(20,0),(30,0.2),(40,0.4),(50,0.6),(60,0.8),(70,1),(80,1)\}}. Then the alpha-cut for alpha=0.4 for the set old will	\{(40,0.3)\}	\{50,60,70,80\}
4	If A and B are two fuzzy sets with membership functions ? $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$? $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of ? Complement A? $\mu_B(x)$ will be	\{0.9, 0.5, 0.6, 0.8, 0.8\}	\{0.6, 0.2, 0.1, 0.7, 0.5\}
5	_____ is/are the way/s to represent uncertainty.	Fuzzy Logic	Probability
6	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Either 0 or 1, between 0 & 1	Between 0 & 1, either 0 or 1
7	Fuzzy logic is usually represented as	IF-THEN-ELSE rules	IF-THEN rules
8	If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$, $\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be	\{0.2,0.5,0.6,0.7,0.9\}	\{0.2, 0.5, 0.2, 0.1, 0.8\}
9	A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$	Core	Support
10	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation
11	Which of the following is not true regarding the principles of fuzzy logic	Fuzzy Logic is a concept of Certain Degree	Boolean logic is a subset of Fuzzy logic
12	Which of the following is a type of Membership function?	Triangular	Trapezoidal
13	Using IF-THEN rule to create the output of fuzzy system is called	Inference	Implication

14	Which of the following is not a principle step in fuzzy technique	Fuzzify input	Apply implication method
15	Which is the set, whose membership only can be true or false, in bi-values Boolean logic	Boolean set	Crisp set
16	Defuzzification methods are	Lambda-cut-method	maxima method
17	What Is Fuzzy Inference Systems	process of formulating the mapping from	changing output value to match input value to give
18	What Is Another Name For Fuzzy Inference Systems	Fuzzy expert system	fuzzy modeling
19	Who initiate the idea of soft computing	charles darwin	zadeh
20	The region of universe that is characterized by complete membership in the set is called	Core	Support

SCOA- Multiple Choice Questions on Unit 3

		Op	
Sr. No	Question	A	B
1	Fuzzy logic is :	Used to respond to questions in a humanlike way	A new programming language used to

2	A robot is a _____	Computer-controlled machine that	Machine that thinks like a human
3	What is Fuzzy Inference Systems?	The process of formulating the mapping from a	Changing the output value to match the input
4	What Are The Two Types Of Fuzzy Inference Systems	Model-Type and System-Type	Momfred-Type and Semigi-Type
5	Where Has Fuzzy Inference Systems Been Implemented?	Wireless services, heat control and printers	Restrict power usage, telephone lines and sort data
6	What attempt was Mamdanis Fuzzy Inference Method Was Designed for?	Control any two combinations of any two products	Control a television and remote
7	What Is The First Step Of Fuzzy Logic Toolbox?	Fuzzification of the input variables	Defuzzification
8	What Is The Input And Output Of Step 3 - Apply Implication Method?	Input is a fuzzy set but the output is a whole	Input is a whole value but the output can be a
9	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____	Fuzzy Set	Crisp Set
10	Fuzzy Computing	doesnt deal with 2 valued logic	mimics human behavior
11	Sugeno approach to FLC design is Computationally more expensive compare to Mamdani approach because	Mamdani approach considers a less	Searching a rule in mamdani approach is simple
12	The Truth Value of R: "if mango is sweet then cost is high" Given P: mango is sweet with $\mu(P) = 0.3$ and Cost is high with $\mu(Q) = 0.7$ then	$\mu(R) = 0.3$	$\mu(R) = 0.5$
13	Fuzzy logic is a form of	Two values logic	Crisp Set logic
14	How is the Fuzzy logic different than Conventioal Control Method	IF and THEN approach	For Approach
15	In the following some statements are given i) Fuzzy set is crisp set but reverse is not true ii) if A,B, C are the three sets defined over universe of	I only	ii only
16	What Is The Purpose Of Aggregation?	To gather all the different fuzzy set outputs and	To gather all the possible inputs and use the
17	What is another name of Fuzzy inference system?	Fuzzy Controller System	Fuzzy expert System

SCOA- Multiple Choice Questions on Unit 4

Sr. No	Question	A	B
1	Evolutionary computation is	Combining different types of method or	Approach to the design of learning algorithms that is
2	Perceptron is	General class of approaches to a problem.	Performing several computations
3	3. Which one of the following is the smallest biological unit capable of evolving over time?	A cell	A species
4	Charles Darwin discussed all of the following except	Individual within species exhibit variability in form	Gene mutations are the sources of variation for
5	Initiating Force of evolution is _____	Variation	Natural Selection
6	Which of the following are the main components of Evolutionary Computing?	Initial population	Fitness function
7	The characteristics of individual is represented by	Chromosome	Gray code
8	Which is the main concept of Evolutionary computation?	Survival of fittest	Survival of weakest

9	Which of the following schemes are selection schemes in Evolutionary Computing?	Half of fame	Rank based selection
10	Which of the following Algorithm is most efficient for discontinuous and noisy problem	Evolutionary Algorithm	Classical optimization problem'
11	Each iteration of EA is referred to as	Generation	Iteration
12	Which Selection strategy is called ordinary based selection	Roulette wheel selection	Canonical selection
13	Roulette wheel selection is preferable when	fitness values are uniformly distributed	fitness values are non-uniformly distributed
14	0-1 Knapsack problem can be defined as	Minimum Optimization problem	maximum Optimization Problem
15	Darwin was the first scientist to propose the concept of evolution.	TRUE	FALSE
16	What molecular evidence do we have that all of life is related?	All life on earth has the same set of mutation in its	All life on earth has DNA
17	Tournament Selection scheme is more preferable when	fitness values are uniformly distributed	population are with very diversified fitness
18	Fitness Scaling is desirable to ensure	Population diversity	Selection pressure

SCOA- Multiple Choice Questions on Unit 5

Sr. No	Question	A	B	Op

1	All of the following are suitable problems for genetic algorithms EXCEPT ?	(a) dynamic process control	(b) pattern recognition with complex patterns
2	Genetic Algorithm are a part of _____.	(a) Evolutionary Computing	(b) hybrid evolutionary computing
3	Mutation in Binary string representation is achieved by _____ bits with fixed probability.	(a) flipping	(b) matching
4	This _____ reflects the process of natural selection where the fittest individuals are selected for reproduction in order to produce offspring of the	(a) natural Genetic Algorithm	(b) Genetic Algorithm
5	_____ is not the part of Genetic Algorithm.	(a) Mutation	(b) Selection
6	_____ alter the genetic composition of the offspring. These include crossover, mutation, selection, etc.	(a) Genetic Operators	(b) Genetic Algorithm
7	The _____ simply defined is a function which takes a candidate solution to the problem as input and produces as output how "fit" our how	(a) cross over operation	(b) selection-fitness function
8	This taking up of the entire population by one extremely fit solution is known as premature convergence.	(a) premature convergence	(b) fit convergence
9	_____ is the method OF Fitness Proportionate Selection	(a) Tournament Selection	(b) both
10	Termination conditionfor Genetic Algorithm is/are _____	(a) both	(b) When we reach an absolute number
11	In _____ every chromosome is a string of numbers, which represents the number in the sequence. Used	(a) Binary-String Encoding	(b) Permutation Encoding
12	In _____ selection chance to be selected is exactly proportional to fitness	(a) Rank selection	(b) Tournament Selection
13	Copying the best chromosomes (solutions) to new population before applying crossover and mutation is used in _____.	(a) Tournment Selection:	(b) Elitism
14	The _____ operator adds a random number taken from a Gaussian distribution with mean equal to the original value of each decision variable	(a) Flipbit	(b) Uniform
15	_____ populate the initial population using a known heuristic for the problem.	(a) Heuristic initialization	(b) Heuristic Geneticvalued initialization

16	Genetic Algorithm is a _____ search.	(a) Adaptive Heuristic	(b) Adaptive non-Heuristic
17	Complete set of Genetic Material is known as_____	(a) Genome	(b) Phenotype Gene
18	_____ involves shuffling of positions inside the chromosome	(a) Mutation	(b) Crossover
19	The set of samples on which the Genetic Algorithm works is termed as_____	(a) Testing sample	(b) Team sample
20	_____ are the coding schemes in the Gebetic Algorithm	(a) Hexadecimal	(b) Tree
21	In_____each chromosome is a string of either zero or one.	(a) Tree Encoding	(b) Hexadecimal Encoding
22	_____is defined as the possible form of the same gene.	(a) Allel	(b) chromosomes
23	If the integers are to be represented using _____ the encoded chromosomes will be smaller than those encoded with binary siring.	(a) Hexadecimal encoding	(b) Octal Encoding
24	The _____selection involves generating a random value between 0 and 1	(a) non-probabilistic tournament	(b)probabilistic tournament
25	The phase after selection phase in Genetic Algorithm is_____	(a) Crossover	(b) Mutation
26	In _____ a cross over point on the string to be mated is selected at random and bits next to the crossover point are exchanged.	(a) Single -Point crossover	(b) Uniform crossover
27	In uniform crossover operation,each bit from either parent is selectedwith a probability of _____ and then interchanged.	(a) 0.25	(b) 0.05
28	In uniform crossover whenever there is a 1in the mask,the gene is copies from _____parent and when there is a 0 in the mask,the gene is copies from	(a) first,second	(b) second,first
29	In _____ crossover the each individual is represented as the 2D array vector	(a) Single -Point crossover	(b) Matrix Crossover
30	In _____ the random crossover pointsalong row and column are choosenand then the string is dividecinto non-overlapping rectangular regions.	(a) Matrix Crossover	(b)non- Matrix Crossover
31	_____ is the type of Mutation	(a) Scramble	(b) point

32	Centralised GA and Distributed GA are subtypes of _____	(a) Sequential GA	(b) none
33	Genetational GA and Steady-state GA are subtypes of _____	(a) Sequential GA	(b) Sequential GA
34	The condition when there are two strings which correspond to same index but have conflicting alleles is known as	(a) over-specification	(b) under-specification
35	_____ GAs are suitable for massively parallel computers and consists of only spatially structured population.	(a) Fine-grained parallel GA	(b) Sequential GA
36	If integers are represented using Octal Encoding then,	A. The Encoded chromosome will be smaller than	B. The Encoded chromosome will be greater than
37	The advantage if Hexadecimal encoding over binary and octal encoding is,	A. Its bigger size	B. Its smaller size
38	Which of the following encoding is mainly used for evolving program expressions for GA	A. Tree Encoding	B. Value Encoding
39	Which of the following selection method involves generating a random value between 0 and 1?	A. Roulette wheel selection	B. Rank selection
40	Which of the following is NOT the type of crossover operators?	A. Single point Crossover	B. Three point crossover
41	In general, crossover may have	A. Favourable effect	B. Unfavorable effect
42	In Point mutation, if the random number is _____ than probability P, then that bit is flipped, else remains unchanged	A. Equal	B. Greater
43	A GA works on coded versions of the problem parameters instead of actual parameters themselves	A. FALSE	B. TRUE
44	What is/are the parameter(s) that need to be decided for initial population?	A. Size of the population	B. Method of selecting initial population
45	For minimization problem, following transformation is chosen	A. $1/1+f(x)$	B. $1/1-f(x)$
46	In simple GA, genes encoded are in	A. Variable length strings	B. Fixed length strings
47	Situation where two entries in a string correspond to the same index is called	A. No specification	B. Over-specification

48	Each string's suitability to the problem is evaluated based on its	A. Fitness measure	B. Population
49	The parallel GA can be executed on a	A. Seperate memory Multiprocessor	B. Shared memory B.Multiprocessor
50	Each solution has a spatial location and interacts only with some neighborhood termed as,	A. Gene	B. Deme
51	In multiple population course grained GA, genetic algorithm distributes the entire population to several sub-populations.	A. TRUE	B. FALSE
52	Which among the following is not the feature of Parallel GA	A. Least restrictive	B. Robust
53	Genetic programming is	A. Program dependent	B. Partially dependent
54	A GA is usually said to converge when	A. When the significant value of fitness	B. When the significant value of fitness is
55	All the results in solution space of Constraint based GA are not feasible	A. TRUE	B. FALSE
56	GA does not always gurantee to find a global optimum	A. FALSE	B. TRUE
57	Steady state GA requires	A. More generations to converge	B. Low computational cost
58	In _____ large portion of population is selected for crossover and mutation for replacing old individuals	A. Steady state GA	B. Parallel GA
59	Operating on the entire population also makes it possible yo reach global optimum and reduces the risk of becoming traped in local stationary point	A. TRUE	B. FALSE
60	A _____ is a permanent change in the sequence of DNA	A. Crossover	B. Mutation
61	The main aim of _____ is to search the parameter space	A. Selection	B. Mutation
62	_____ ensures that good chromosomes are not lost and can rapidly increase performance of GA	A. Rank selection	B. Tournament selection
63	_____ encoding is used in ordering problems like TSP	A. Value encoded	B. Permutation encoding

64	Encoding makes the work space discrete even though the functions may be continuous.	A. TRUE	B. FALSE
65	In Uniform crossover, bit from both the parents are chosen with probability of 0.4 and then interchanged.	A. TRUE	B. FALSE

SCOA- Multiple Choice Questions on Unit 6

		Op	
Sr. No	Question	A	B
1	Ant Colony Optimization is the subset of which type of computing	(a) Statistical Method	(b) Artificial Neural Network
2	Trapping of PCO into local optimum is termed as_____	(a) Convergence Trend	(b) Diversed Convergence
3	gbest and mbest values in PSO can be mutated with_____.	(a) Cauchy distribution	(b) Cauchy magnitude function
4	Premature Convergence can be avoided by using_____.	(a) optimal wavelength function	(b) Sigmoid function
5	As per the ring topology in PSO the neighbourhood of a particle is given by_____	(a) $i - imod(S), i, i+1 \text{ mod}(S)$	(b) $(a) i - imod(S)+i+i+1 \text{ mod}(S)$

6	_____ is the collective behavior of decentralized, self-organized systems which is employed in work on artificial intelligence	(a) Artificial Intelligence	(b) Swarm intelligence
7	In _____ the velocity of the particle is defined in terms of probability of bit changing.	(a) Real valued PSO	(b) Hyperparametic PSO
8	Craig Reynolds described the process of PSO in three stages as separation, _____, cohesion.	(a) crossover	(b) alignment
9	The best fit point in PSO is termed as _____.	(a) Global optimization point	(b) globally local point
10	PSO is inspired by _____.	(a) Genetic Evolution	(b) Dynamic Moments of Insects/Birds
11	In PSO each particle adjusts itself according to current position, current velocity, locally best and _____.	(a) Global best	(b) Optimally Best
12	PSO is _____ type of algorithm.	(a) Iterative	(b) Recursive
13	A memory in PSO is used to store _____	(a) iterative step	(b) iterative position
14	In PCO in each iteration every particle in the swarm gets one chance to move towards the global optimum by the magnitude equal to the _____.	(a) Strength	(b) Velocity
15	The set of links inside the swarm is termed as _____.	(a) Swarm connected network	(b) Topological ordering
16	A _____ method is applied to ensure that the new position lies within the search space.	(a) Confinement	(b) Grid Search Space
17	Stopping criteria for iterations is _____.	(a) maximum admissible error when optimal	(b) If the absolute difference
18	Formula of velocity on PSO is _____.	(a) $v = v + c_1 * \text{rand} * (\text{pbest-present}) +$	(a) $v = v + c_1 * \text{rand} * (\text{best-present}) -$
19	Empirically the value of $c_1 + c_2$ in PSO is _____.	(a) 6	(b) 4
20	Searching of new solution and finding the solution which is potentially best in PSO is termed as _____.	(a) Advancement	(b) Adversification
21	In random Adaptive Topology each particle informs _____ particles	(a) k-1	(b) k+1

22	In BPSO bit-by-bit updates are done _____. 	(a) statistically 	(b) both
23	The main idea of ACO is inspired by natural behaviour of _____. 	(a) ant 	(b) frogs
24	Ants find their food by means of chemical substance they secret called the _____ 	(a) nemoneon 	(b) antipheromone
25	Pheromone is considered as the _____to find the path in ACO. 	(a) Strength 	(b) Weakness

tion	C	D	Final Answer
Artificial Intelligence and Neural Science	Neural Science and Genetic Science	A	
learning from environment	learning from teachers	C	
Both (a) and (b)	None of the above	C	
Mathematical Form	Logical Form	B	
Core, Support , Boundary	Weighted Average, center of Sums, Median	C	
convex fuzzy set	concave fuzzy set	B	
both feedforward & feedback	either feedforward & feedback	D	
Bias	None of these	B	

are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics	All of the above	D
deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic	All of the above	D
pattern mapping	none of the mentioned	D
(i) and (ii) are true	None of the mentioned	C
Fuzz Variable	None of the mentioned	A
{0.1, 0.5, 0.4, 0.2, 0.2}	{0.1, 0.5, 0.4, 0.2, 0.3}	C
Bias	None of these	B
learning	experience	D
deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic	All of the above	D
Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if then rules	None of these	B

Question		Final Answer
C	D	
$h(A)=1$	$h(A)<1$	C
Many-valued logic	Binary set logic	C
$\{(20,0.1), (30,0.2)\}$	$\{(20,0),(30,0), (40,1), (50,1), (60,1), (70,1)\}$	D
$\{0.1, 0.5, 0.4, 0.2, 0.0\}$	$\{0.1, 0.5, 0.4, 0.2, 0.3\}$	C
Entropy	All of the mentioned	D
Between 0 & 1, between 0 & 1	Either 0 or 1, either 0 or 1	A
Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	B
$\{0.1, 0.5, 0.6, 0.1, 0.8\}$	$\{0.1, 0.5, 0.2, 0.1, 0.8\}$	D
Cross-over	α - cut	C
Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification	A
Japan is the most active member of Fuzzy member	Fuzzy logic follow the principle of	D
Sigma	All of the mentioned	D
Both the mentioned	None of the mentioned	C

Defuzzify final output	None of the mentioned	D
Null set	None of the mentioned	B
centroid method	All of the mentioned	D
having higher output than input	having lower output than input	A
Fuzzy logic controller	All of the mentioned	D
culloch	Rechenberg	B
Boundary	Fuzzy	A

option		Final Answer
C	D	
The result of fuzzy thinking	A term that indicates logical values	A

Machine that replaces a human by performing complex mental	Type of virtual reality device that	A
Having a larger output than the input	Having a smaller output than	A
Mamdani-Type and Sugeno-Type). Mihni-Type and Sugani-Type	C
Simulink, boiler and CD recording	Automatic control, decision	D
Control a steam engine and a boiler combination by synthesising a set of	Control a air craft and fuel level	C
Application of the fuzzy operator (AND or OR) in the antecedent	Aggregation of the consequents	A
Input and output have the same value	Input is a smaller value than the	B
Fuzzy & Crisp Set	None of the mentioned	A
deals with information which is vague, imprecise, uncertain,	All of the above	D
Sugeno approach consider a large number of rules in fuzzy rule	Computation of each rule in sugeno	D
$\mu (R) = 0.7$	$\mu (R) = 0.0$	C
Many valued logic	Binary Set logic	C
While Approach	Do approach	A
Both ii, iii	All i, ii, iii	C
To gather all the different fuzzy set outputs and average	To subtract all the output fuzzy	C
Fuzzy Modeling	All of the above	D

Question		Final Answer
C	D	
Decision support systems that contain an <u>information base filled</u>	None of these	B
Structures in a database those are statistically relevant	Simple forerunner of modern	D
A population	An individual Organism	C
Natural selection removes organisms that <u>are poorly adapted to</u>	Organisms produce more	B
Competition	Adaptation	A
Mutation	All of Above	D
Initial Population	None	A
Phenotype	None	A

Tournament selection	All of above	D
Genetic Algorithm	None	A
Population	None	A
Tournament Selection	Rank based Selection	D
Needs low selection pressure	needs high population diversity	A
0-1 Knapsack problem is not an optimization problem	None	B
		B
All life on earth has same number of DNA pairs	All life on earth stores its genetic	B
fitness values are non-uniformly distributed	under all the above situations	B
That better solution in a population selected only	Relatively inferior solutions are	A

Question		Final Answer
C	D	

(c) simple optimization with few variables		(c) simple optimization with few
(c) stastistical evolutionary computing		(a) Evolutionar y
(c) inversing		(a) flipping
(c) Hypothetical Genetic Algorithm		(b) Genetic Algorithm
(c) pairing chromosomes		(c) pairing chromosom es
(c) Genetic class selection		(a) Genetic Operators
(c) Fitness Function		(c) Fitness Function
(c) postmature convergence		(a) premature convergenc
(c) Rank Selection		(b) both
(c) When the objective function value has reached a certain pre-		(a) both
(c) none of the above		(a) Binary-String Encoding
(c) Roulette Wheel Selection		(c) Roulette Wheel Selection
(c) Steady-State Selection		(b) Elitism
(c) Shrink		(c) Shrink
(c) Random Initialization		(a) Heuristic initialization

(c) Non-Adaptive Heuristic		(a) Adaptive Heuristic
(c) Genotype Gene		(a) Genome
(c) none		(a) Mutation
(c) Population		(c) Population
(c) both		(c) both
(c) none		(c) none
(c) both		(a) Allel
(c) both		(b) Octal Encoding
(c) none		(b)probabilistic tournament
(c) both at a time		(a) Crossover
(c) Multi -Point crossover		(a) Single - Point crossover
(c) 0.50		(c) 0.50
(c) none		(a) first,second
(c) Multi -Point crossover		(b) Matrix Crossover
(c) both		(a) Matrix Crossover
(c) both		(c) both

(c) parallel GA		(c) parallel GA
(c) none		(a) Sequential GA
(c) none		(a) over-specification
(c) parallel GA		(a) Fine-grained parallel GA
C. The Encoded chromosome will be equal to those encoded		A
C. None of the above		B
C. Hexadecimal Encoding		A
C. Tournament selection		C
C. Matrix crossover		B
C. Either A or B		C
C. Smaller		C
C. None of the above		B
C. Both A and B		C
C. None of the above		A
C. None of the above		B
C. Under-specification		B

C. Length of string		A
C. None of the above		B
C. None of the above		B
C. None of the above		A
C. Can yeild only one solution to the problem		C
C. Problem independent		C
C. When significant value of fitness increases		B
C. None of the above		A
C. None of the above		B
C. Both A and B		C
C. Generational GA		C
C. None of the above		A
C. Selection		B
C. Crossover		C
C. Elitism		C
C. Hexadecimal Encoding		B

C. None of the above		A
C. None of the above		B

Question		Final Answer
C	D	
(c) Swarm Intelligence		(c) Swarm Intelligence
(c) Premature Convergence		(c) Premature Convergence
(c) Sigmoid function		(a) Cauchy distribution
(c) wave function		(c) wave function
(c) (a) i-imod(S),l,i+1mod(S) - f(n)		(a) i-imod(S),i,i+1mod(S)

(c) Computational Intelligence		(b) Swarm intelligence
(c) none		(a) Real valued PSO
(c) substitution		(b) Alignment
(c) Global effective point		(a) Global optimization point
(c) Artificially induced Intelligence		(a) Genetic Evolution
(c) currently best		(a) Global best
(c) None		(a) Iterative
(c) best position		(c) best position
(c) magnitude of displacement		(b) Velocity
(c) Topology		(c) Topology
(c) Topology Search		(a) Confinement
(c) both		(c) both
(c) (a) $v = v + c_1 * \text{rand} * (\text{pbest} + \text{present}) +$		(a) $v = v + c_1 * \text{rand} * (\text{pbest} -$
(c) 2		(b) 4
(c) Diversification		(c) Diversification
(c) $k+2$		(b) $k+1$

(c) probabilistically		(c) probabilistic ally
(c) none		(a) ant
(c) pheromone		(c) pheromone
(c) weak entity		(a) Strength

SOFT COMPUTING

UNIT – I

1. The structural constitute of a human brain is known as -----

- a) **Neuron** b)Cells c)Chromosomes d)Genes

2.Neural networks also known as -----

- a)Artificial Neural Network b)Artificial Neural Systems
c)**Both A and B** d) None of the above

3. Neurons also known as -----

- a)Neurodes b)Processing elements c)Nodes d)**All the above**

4. In the neuron, attached to the soma are long irregularly shaped filaments called-----

- a)**Dendrites** b)Axon c)Synapse d)Cerebellum

5. Signum function is defined as -----

- a) $\phi(I) = +1, I > 0, -1, I \leq 0$
b) $\phi(I)=0$
c) $\phi(I)=+1, I > 0$
d) $\phi(I)=-1, I \leq 0$

6. To generate the final output, the sum is passed on to a non-linear filter ϕ called

- a)Smash function b)sum function c)**Activation function** d)Output function

7. -----function is a continuous function that varies gradually between the asymptotic values 0 and 1 or -1 and +1

a)Activation function b)Thresholding function c)Signum function d)**Sigmoidal function**

8.-----produce negative output values

- a)**Hyperbolic tangent function** b)Parabolic tangent function
c)Tangent function d)None of the above

9.----- carrying the weights connect every input neuron to the output neuron but not vice-versa.

- a)**Feed forward network**
b)Fast forward network
c)Fast network
d)Forward network

10.----- has not feedback loop

- a) Neural network **b)Recurrent Network** c) Multilayer Network d) Feed forward network

11. In the learning method, the target output is not presented to the network -----

- a) Supervised learning **b)Unsupervised learning**

- c) Reinforced learning d) Hebbian learning

12. Combining a number of ADALINE is -----

- a) MULTILINE b) MULTIPLE LINE **C)MADALINE** d) MANYLINE

13. Neural network applications -----

- a) Pattern Recognition b) Optimization Problem c) Forecasting **d)All the above**

14.----- is a Systematic method for training multilayer artificial neural network

- a)Back propagation** b) Forward propagation c) Speed propagation d) Multilayer propagation

15. ----- is a computational model

- a) neuron b) cell **c)Perception** d) Neucleus

16. Intermediary layer is present in -----

- a)Multilayer feedforward perception model**

b) Multilayer perception model

c) Multilayer Feedforward model

d) None of the above

17. Linear Activation Operator equation is -----

- a) $O=gl, g=\tan\phi$**

b) $O=gl, g=\sin\phi$

c) $O=gl, g=\cos\phi$

d) $O=gl, g=-\tan\phi$

18.----- is never assured of finding global minimum as in the simple layer delta rule case.

- a)Back propagation** b) Front Propagation c) Propagation d) None above

19. The test of neural network is known as-----

- a)Inference Engine** b) Checking c) Deriving d) None

20. Application of Back Propagation

- a) Design of Journal Bearing b) Classification of soil
- c) Hot Extrusion of soil **d) All the above**

21. Reinforced learning also known as -----

- a) Output based learning** b) Error based learning
- c) Back propagation learning d) None

22. -----learning follows “Winner takes all” strategy

- a) Stochastic learning **b) Competitive learning** c) Hebbian learning d) BackPropagation learning

23. -----earlier neural network architecture,

- a) Rosenblatt Perception** b) Rosen Perception c) Roshon Perception d) None

24. In Rosenblatt’s Perception network has three units, sensory unit, association unit and -----

- a) Output unit **b) Response unit** c) feedback unit d) Result unit

25. ADALINE stands for -----

- a) Adaptive Linear Neural Element Network**
- b) Adaptive Line Neural Network
- c) Adapt Line Neural Element Network
- d) Adaptive Linear Neural Network

PART-B

1. Explain model of artificial neuron
2. Differentiate Learning methods supervised, unsupervised, and reinforced learning
3. Explain Rosenblatt’s Perception
4. Explain ADALINE network
5. Explain Single layer ANN
6. Explain any one application of Back propagation networks

PART-C

1. Explain neural network architecture
2. Explain back propagation learning briefly
3. Explain basic concepts of neural network

UNIT-2

1.-----is a store house of associated patterns which are encoded in some form

- a) **Associative memory**
- b) Commutative memory
- c) Neural networks
- d) Memory

2. If the associated pattern pairs (x,y) are different and if the model recalls a y given an x or vice versa, then it is termed as -----

- a) Auto associative memory
- b) Hetero associative memory**
- c) neuro associative memory
- d) none

3. Autoassociative correlation memories are known as -----

- a) Auto correlators**
- b) Hetero Correlators
- c) Neuro Correlators
- d) None

4.----- recalls an output given an input in one feedforward pass

- a) Static networks**
- b) Dynamic networks
- c) Recurrent networks
- d) None

5.BAM stands for -----

- a) Bidirectional Associative Memory**
- b) v Associative Memory
- c) Biconventional Associative Memory
- d) None

6.----- associates patterns in bipolar forms that are real-coded

- a) Simplified Bidirectional Associative Memory**
- b) Bipolar form
- c) Bidirectional form
- d) None

7)----- uses bipolar coding

- a) Fabric defect identification
- b) Recognition of Characters**
- c) Design of Journal Bearing
- d) Classification of soil

8) Self-organizing network also known as -----

- a) Back Propagation network
- b) Training free counter propagation network**
- c) Propagation network
- d) none

9) Kesko proposed an energy function for the two states -----

- a) $E(A,B)=AMB^T$
- b) $E(A,B)=-AMB^T$**
- C) $E(A,B)=-AB^T$

$$D) E(A, B) = AB^T$$

10) BAM was introduced by -----

- a) Cruz b) Stubberd c) **Kosko** d) Rosenbatt

11) The algorithm which computes operator M is known as -----

- a) Memory algorithm b) **Recording Algorithm** c) Transfer Algorithm d) None

12) Real coding is used by -----

- a) Recognition of characters b) **Fabric defect identification**
c) Optimization d) Classification of soil

13) ART stands for -----

- a) **Adaptive Resonance Theory** b) Adaptive Recent Theory
c) Adapt Resonance Theory d) Adaptive Retail Theory

14) A program ----- is written in fortran for cluster formation

- a) **Vecquent** b) Vecant c) Vector d) Quantization

15) ----- networks were developed by carpenter and grossberg

- a) **ART** b) ARP c) ARC d) ARD

16) ----- of the network means that a pattern should not oscillate among different cluster units at different stages of training

- a) **Stability** b) Mobility c) Versatility d) Plasticity

17) ----- is the analog version of ART

- a) **ART2** b) ART1 c) ART2A d) ARTMAP

18) ----- test is incorporated into the adaptive backward network

- a) **Vigilance** b) Indulgence c) Revailance d) None

19) In ----- learning the weights are adjusted only when the external input matches one of the stored prototypes

- a) Supervised b) UnSupervised c) **Match-based** d) None

20) Kim et al. Proposed an ----- method using ART2 architecture.

- a) Pattern Recognition b) **Chinese Recognition method**

c)Character Recognition d)None

21)----- learning weight update during resonance occurs rapidly

a)Error-based **b) Fast** c)Slow d)Match-based

22)Comparison layer and recognition layer constitute -----

a)Attenuation **b)Attenuated System** c)Synaptic System d)None

23)ART1 is an elegant theory that address -----

a)Stability – plasticity dilemma

b)Stability dilemma

c)Plasticity dilemma

d)None

24)Supervised version of ART -----

a)ARTMAP

b)Fuzzy art

c)Fuzzy Artmap

d)ART1

25)Slow learning is used as -----

a)ART1

b)ART2

c)ARTMAP

d)Fuzzy ART

PART-B

1.Explain Auto Correlators

2.Explain HeterCorrelators

3.Explain any one application of associative memory

4.Explain Simplified ART architecture

5.Distinguish ART1 and ART2

6.Explain any one application of ART

PART-C

7.Explain Exponential BAM

8.Explain Classical ART network

9.Explain ART1 algorithm

UNIT-3

1.Fuzziness means -----

- a)Vagueness b)Clear c)Precise d)Certainty

2.----- are pictorial representations to denote a set

- a)Flow chart b)**Venn diagram** c)DFD d)ER diagrams

3.The number of elements in a set is called its -----

- a)modality b)placitivity c)**Cardinality** d)elasticity

4.A set with a single element is called -----

- a)Single set b)**Singleton set** c)1 set d)none

5.A ----- of a set A is the set of all possible subsets that are derivable from A including null set

- a)**Power set** b)Impower set c)Rational set d)Irrational set

6.The member ship function of fuzzy set not always be described by -----

- a)continuous b)**Discrete** c)crisp d)specific

7.Fuzzy relation is a fuzzy set defined on the Cartesian product of -----

- a)single set b)**crisp set** c)union set d)intersection set

8.Raising a fuzzy set to its second power is called -----

- a)**concentration** b)intersection c)conjunction d)disjunction

9.Taking a square root of fuzzy set is called -----

- a)**Dilemma** b)Dual c)dialama d)none

10.Fuzzy relation associates ----- to a varying degree of membership.

- a)records b)**tuples** c)felds d)none

11.In case of \Rightarrow operator, the proposition occurring before the " \Rightarrow " symbol is called-----

a. antecedent b.consequent c.conjunction d.disjunction

12. A truth table comprises rows known as -----

a. interpretations b.contradiction c.conjunction d.disjunction

13.A formula which has all its interpretations recording true is known as a -----

a.disjunction b.conjunction c.tautology d.antecedent

14.In propositional logic, ----- widely used for inferring facts.

a.pones b.modus c.modus ponens d.pons

15.----- represent objects that do not change values

a.constants b.variables c.predicates d.subject

16.----- are representative of associations between objects that are constants or variables and acquire truth values.

a.Subject b.Predicate c.Quantifier d.Functions

17.----- truth values are multivalued.

a.crisp logic b.boolean logic c.fuzzy logic d.none

18.Fuzzy logic propositions are also quantified by -----

a.fuzzy b.fuzzy qualifiers c.fuzzy quantifiers d.none

19.Fuzzy inference also referred to as -----

a.approximate reasoning b.reasoning c.fixed reasoning d.none

20.Conversion of a fuzzy set to single crisp value is called -----

a.fuzzification b.defuzzification c.fuzzy logic d.fuzzy rule

21.----- obtains centre of area occupied by the fuzzy set

a.center b.center of gravity c.center of area d.center point

22.The ----- is the arithmetic average of mean values of all intervals

a.mean b.mean of maxima c.maximum d.mean interval

23.The ----- are obtained by computing the minimum of the membership functions of the antecedents.

a.rule base b.rule strengths c.rules d.none

24.Relative quantifiers are defined as -----

a.0 to 10 **b.0 to 1** c.0 d.1

25.Fuzzy cruise controller has ----- inputs

a.2 b.3 c.1 d.0

PART-B

1.Explain fuzzy set

2.Explain crisp set

Explain fuzzy relations

3.Distinguish between crisp logic and predicate logic

4.Explain fuzzy quantifiers

5.Explain fuzzy logic

6.Explain fuzzy inference

PART-C

1.Explain Fuzzy System

2.Explain any one of applications of Fuzzy systems

3.Explain fuzzy rule based systems.

UNIT-IV

PART-A

1.----- mimic the principle of natural genetics

- a.Genetic programming **b.Genetic Algorithm** c.Genetic Evolution d.none

2.----- mimics the behaviour of social insects

- a.Swarm intelligence** b.Ant colony c.Gentic Algorithm d.none

3.Possible settings of traits are called in genes -----

- a.locus **b.alleles** c.genome d.genotype

4.----- means that the element of DNA is modified.

- a.Recombination b.Selection **c.Mutation** d.none

5.The ----- of an organism is measured by means of success of organism in life

- a.Strength **b.fitness** c.Gene d.Chromosome

6.The space for all possible feasible solutions is called -----

- a.space b.search **c.search space** d.area

7.----- is a way of representing individual genes

- a.conversion **b.encoding** c.coding d.none

8.In -----, every chromosomes is a string of numbers

- a.hexadecimal encoding b.octal encoding **c.Permutation encoding** d.none

9.----- is the first operator applied on population.

- a.Reproduction** b.Recombination c.Mutation d.none

10.----- means that the genes from the already discovered good individuals are exploited

- a.Diversity **b.Population diversity** c.Unity in diversity d.none

11.-----is the degree to which the better individuals are favoured

- a.Selective pressure** b.Reproduction pressure c.Recombination pressure d.Mutation

12.The selection method which is less noisy is -----

- a.stochastic remainder solution** b.Boltzman solution c.Remainder solution d.none

13.The ----- is referred the proportion of individuals in the the population which are replaced in each generation.

a.gap **b.generation gap** c.generation interval d.interval

14.Crossover operator proceeds in ----- steps

a.4 **b.3** c.5 d.2.

15.Matrix crossover is also known as -----

a.One dimensional **b.Two dimensional** c.Three dimensional d.none

16.-----performs linear inversion with a specified probability of 0.75.

a.Linear+end-inversion b.Discrete inversion c.Continuous inversion d.Mass inversion

17.----- of bit involves changing bits from 0 to 1 and 1 to 0.

a.Mutation b.Crossover c.Inversion d.Segregation

18.----- is a process in which a given bit pattern is transformed into another bit pattern by means of logical bit-wise operation.

a.Inversion b.Conversion **c.Masking** d.Segregation

19.In -----, inversion was applied with specified inversion probability p to each new individual when it is created.

a.Discrete **b.Continuous** c.Mass inversion d.none

20.The -----causes all the bits in the first operand to be shifted to the left by the number of positions indicated by the second operand.

a.Shift right **b.Shift left** c.Shift operator d.none

21.A ----- returns 1 if one of the bits have a value of 1 and the other has a value of 0 otherwise it returns a value 0.

a.bit wise or b.bit wise and c.not d.none

22.Population size, Mutation rate and cross over rate are together referred to as -----

a.control parameters b.central parameters c.connection parameters d.none

23.-----selection is slow cooling of molten metal to achieve the minimum function value in a minimization problem.

a.Boltzmann selection b.Tournament selection c.Roulette-wheel selection d.none

24.-----is not a particular method of selecting the parents.

a.Steady-state b.Elitism c.Boltzmann selection d.Tournament Selection

25.Reproduction operator is also known as -----

a.Recombination **b.Selection** c.Regeneration d.none

PART-B

- 1.Explain biological background of genetic algorithm
- 2.Explain Working principle of genetic algorithm
- 3.Explain any two types of encoding
- 4.Explain inheritance operators
- 5.Explain Mutation operator
- 6.Explain Bit-wise operator

PART-C

- 1.Explain Reproduction operator
- 2.Explain Inversion and Deletion
- 3.Explain Generation Cycle

UNIT-5

PART-A

1.Hybrid systems is combination of neural networks, fuzzy logic and -----

- a.**Genetic Algorithm** b.Genetic Programming c.Genetic d.none

2.In -----, one technology calls the other as a subroutine to process or manipulate information needed by it.

- a.**Auxiliary hybrid systems** b.Embedded hybrid systems

- c.sequential hybrid systems d.none

3.-----hyrbid systems make use of technologies in a pipeline fashion.

- a.auxialiary hybrid systems b.embedded hybrid systems

- c.sequential hybrid systems** d.none

4.-----hyrbid systems the technologies participating are integerated in such a manner that they appear interwined.

- a.auxialiary hybrid systems **b.embedded hybrid systems**

- c.sequential hybrid systems d.none

5.----- deals with uncertainty problems with its own merits and demerits

- a.neuro –fuzzy** b.neuro-genetic c.fuzzy –genetic d.none

6.Neural network can learn various tasks from -----

- a.training** b.testing c.learning d.none

7.-----exhibit non-linear functions to any desired degree of accuracy

- a.neuro –fuzzy b.neuro-genetic **c.fuzzy –genetic** d.none

8.----- use to determine the weights of a multilayer feedforward network with backpropagation learning

- a.neuro –fuzzy **b.neuro-genetic** c.fuzzy –genetic d.none

9.----- fuzzy input vectors to crisp outputs

- a.Fuzzy – backpropagation** b.neuro –fuzzy c.neuro-genetic d.fuzzy –genetic

10.-----is a neuro-fuzzy hybrid in which the host is a recurrent network with a kind of competitive learning.

- a.Fuzzy ARTMAP** b.Fuzzy art c.ARTMAP d.none

11.FAM Stands for -----

- a.Fuzzy Associative Memory b.Fuzzy association memory
- c.Fuzzy Assist Memory d.none

12.-----maps fuzzy sets and can encode fuzzy rules.

- a.**FAM** b.Fuzzy c.ART d.none

13.Fuzzy truck backer-upper system is application of -----

- a.FAM b.Fuzzy ART c.ART d.none

14.----- applicable on fuzzy optimization problems

- a.**Fuzzy-genetic** b.neuro – fuzzy c.fuzzy-logic d.fuzzy-backpropagation

15.-----learning have reported difficulties in learning the topology of the networks whose weights they optimize

- a.**Gradient descent learning** b.descent learning c.Gradient learning d.none

16.Applying neuronal learning capabilities to fuzzy systems is knowns as -----

- a.**NN driven fuzzy reasoning** b.fuzzy driven nn reasoning
- c.neural network reasoning d.none

17.----- can be applicable to mathematical relationship

- a. **neuro-fuzzy** b.fuzzy-neuro c.neuro-network d.none

18.----- is a multilayer feedforward network architecture with gradient learning.

- a.**backpropagation** b.forward propagation c.Propagation d.none

19. Recurrent network architectures adopting -----

- a.**hebbian learning** b.supervised learning c.unsupervised learning d.reinforced learning

20.----- set have no crisp boundaries

- a.**fuzzy** b.boolean c.crisp set d.none

21.GA-NN also known as -----

- a.**GANN** b.NNGA c.GA d.none

22.Image recognition under noisy is application of -----

- a.Fuzzy **b.Fuzzy art** c.art d.none

23.Genetic algorithm ----- uses to determine optimization

a.fitness function b.fit function c.strength function d.none

24.-----proposed neuro –fuzzy system

a.lee and lie b.kosko c.gradient d.lee

25.Knowledge-based evaluation and earthquake damage evaluation is application of -----

a.fuzzy-backpropagation b.neuro-fuzzy c.fuzzy d.none

PART-B

1.Explain neuro-fuzzy hybrids

2.Explain neuro-genetic hybrids

3.Explain fuzzy-genetic hybrids

4.Explain fuzzy-backpropagation network

5.Explain FAM

PART-C

1.Explain Hybrid Systems

2.Explain Fuzzy ARTMAP

3.Explain GA based backpropagation network

SCOA Unit I MCQ

- 1. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.**
A.True
B.False

- 2. The membership functions are generally represented in**
A.Tabular Form
B.Graphical Form
C.Mathematical Form
D.Logical Form

- 3. Membership function can be thought of as a technique to solve empirical problems on the basis of**
A.knowledge
B.examples
C.learning
D.experience

- 4. Three main basic features involved in characterizing membership function are**
A.Intuition, Inference, Rank Ordering
B.Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.sub normal fuzzy sets

B.normal fuzzy set

C.convex fuzzy set

D.concave fuzzy set

7. In a Fuzzy set a prototypical element has a value

A.1

B.0

C.infinite

D.Not defined

- 8. A fuzzy set wherein no membership function has its value equal to 1 is called**
- A.**normal fuzzy set
B.Subnormal fuzzy set.
C.convex fuzzy set
D.concave fuzzy set
- 9. A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe**
- A.**convex fuzzy set
B.concave fuzzy set
C.Non concave Fuzzy set
D.Non Convex Fuzzy set
- 10. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.**
- A.**Convex Fuzzy Set
B.Non convex fuzzy set
C.Normal Fuzzy set
D.Sub normal fuzzy set
- 11. The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to**

A.infinite

B.1

C.0

D.0.5

12. Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

B.False

14. Artificial neural network used for

A.Pattern Recognition

B.Classification

C.Clustering

D.All of these

15. A Neural Network can answer

- A.**For Loop questions
- B.**what-if questions
- C.**IF-The-Else Analysis Questions
- D.**None of these

16. Ability to learn how to do tasks based on the data given for training or initial experience

- A.**Self Organization
- B.**Adaptive Learning
- C.**Fault tolerance
- D.**Robustness

17. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

- A.**Adaptive Learning
- B.**Self Organization
- C.**What-If Analysis
- D.**Supervised Learning

18. In artificial Neural Network interconnected processing elements are called

- A.**nodes or neurons

B.weights

C.axons

D.Soma

19. Each connection link in ANN is associated with _____ which has information about the input signal.

A.neurons

B.weights

C.bias

D.activation function

20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.True

B.False

21. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.Weight

B.activation or activity level of neuron

C.Bias

D.None of these

22. Neuron can send _____ signal at a time.

- A.**multiple
- B.**one
- C.**none
- D.**any number of

23. Artificial intelligence is

- A.**It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations
- B.**Computational procedure that takes some value as input and produces some value as output.
- C.**Science of making machines performs tasks that would require intelligence when performed by humans
- D.**None of these

24. Expert systems

- A.**Combining different types of method or information
- B.**Approach to the design of learning algorithms that is structured along the lines of the theory of evolution
- C.**an information base filled with the knowledge of an expert formulated in terms

of if-then rules

D.None of these

25. Falsification is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

26. Evolutionary computation is

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.

C.Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.

D.None of these

27. Extendible architecture is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

28. Massively parallel machine is

A.A programming language based on logic

B.A computer where each processor has its own operating system, its own memory, and its own hard disk

C.Describes the structure of the contents of a database.

D.None of these

29. Search space

A.The large set of candidate solutions possible for a problem

B.The information stored in a database that can be, retrieved with a single query.

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

30. $n(\log n)$ is referred to

A.A measure of the desired maximal complexity of data mining algorithms

B.A database containing volatile data used for the daily operation of an organization

C.Relational database management system

D.None of these

31. Perceptron is

- A.**General class of approaches to a problem.
- B.**Performing several computations simultaneously
- C.**Structures in a database those are statistically relevant
- D.**Simple forerunner of modern neural networks, without hidden layers

32. Prolog is

- A.**A programming language based on logic
- B.**A computer where each processor has its own operating system, its own memory, and its own hard disk
- C.**Describes the structure of the contents of a database
- D.**None of these

33. Shallow knowledge

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be, retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

34. Quantitative attributes are

- A.**A reference to the speed of an algorithm, which is quadratically dependent on the size of

the data

B.Attributes of a database table that can take only numerical values

C.Tools designed to query a database

D.None of these

35. Subject orientation

A.The science of collecting, organizing, and applying numerical facts

B.Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.None of these

36. Vector

A.It do not need the control of the human operator during their execution

B.An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.The validation of a theory on the basis of a finite number of examples

D.None of these

37. Transparency

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

38. Core of soft Computing is

- A.**Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.**Fuzzy Networks and Artificial Intelligence
- C.**Artificial Intelligence and Neural Science
- D.**Neural Science and Genetic Science

39. Who initiated the idea of Soft Computing

- A.**Charles Darwin
- B.**Lofti A Zadeh
- C.**Rechenberg
- D.**Mc_Culloch

40. Fuzzy Computing

- A.**mimics human behaviour
- B.**doesn't deal with 2 valued logic
- C.**deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.**All of the above

41. Neural Computing

- A.**mimics human brain
- B.**information processing paradigm
- C.**Both (a) and (b)
- D.**None of the above

42. Genetic Algorithm are a part of

- A.**Evolutionary Computing
- B.**inspired by Darwin's theory about evolution - "survival of the fittest"
- C.**are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D.**All of the above

43. What are the 2 types of learning

- A.**Improvised and unimprovised
- B.**supervised and unsupervised
- C.**Layered and unlayered
- D.**None of the above

44. Supervised Learning is

- A.**learning with the help of examples
- B.**learning without teacher
- C.**learning with the help of teacher
- D.**learning with computers as supervisor

45. Unsupervised learning is

- A.**learning without computers
- B.**problem based learning

C.learning from environment

D.learning from teachers

46. Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

47. In supervised learning

A.classes are not predefined

B.classes are predefined

C.classes are not required

D. classification is not done

SCOA UNIT 2 MCQs

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

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	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intution, Inference, Rank Ordering B.Fuzzy Algorithm, Neural network, Genetic Algorithm C.Core, Support , Boundary D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core B.Support C.Boundary D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

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	<p>B.normal fuzzy set C.convex fuzzy set D.concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A.1 B.0 C.infinite D.Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A.normal fuzzy set B.subnormal fuzzy set. C.convex fuzzy set D.concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesn't deal with 2 valued logic</p>	D

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	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	<p>Defuzzification is done to obtain</p> <ul style="list-style-type: none"> a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above 	a
13.	<p>“The train is running fast”. Here ‘fast’ can be represented by</p> <ul style="list-style-type: none"> a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned 	a
14.	<p>Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$</p> <p>Then the crisp value of Young using MoM method is</p> <ul style="list-style-type: none"> a) 25 b) 20 c) 35 d) 50 	a
15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area 	c

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	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)^{\text{complement}} \neq \text{---} (A \lambda)^{\text{complement}}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

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	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

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	d) None of the above	
26.	<p>Fuzzy logic is a form of</p> <ul style="list-style-type: none"> a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic 	<p>Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.</p>
27.	<p>Traditional set theory is also known as Crisp Set theory.</p> <ul style="list-style-type: none"> a) True b) False 	<p>Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set.</p> <p>3. The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>
28.	<p>The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>	<p>Answer: a Explanation: Refer the</p>

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	<p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	definition of Fuzzy set and Crisp set.
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p> <p>a) Fuzzy Set b) Crisp Set</p>	<p>Answer: a Explanation: Fuzzy logic deals with linguistic variables.</p>
31.	<p>The values of the set membership is represented by</p> <p>a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c</p>	<p>Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.</p>
32.	What is meant by probability density function?	d

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	<p>a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables</p>	
33.	<p>Which of the following is used for probability theory sentences?</p> <p>a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned</p>	<p>Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.</p>
34.	<p>Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.</p> <p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy</p>

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		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <ul style="list-style-type: none"> a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned 	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <ul style="list-style-type: none"> a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned 	<p>Answer: c</p> <p>Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

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This sheet is for 1 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions	Cannot Distinguish	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguous	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neuro	Fuzzy network and	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard bertrand	mc culloch	lofti zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behavior	deals with imprecise	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computation	conventional computation	non conventional computation	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behavior	information processing	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search representation	Blind search usually	Blind search cannot	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can be found	a solution found is	a solution that is the best	a solution that requires	C
17	When is a complete enumeration of solution used?		When a solution that is found	When there is enough time	When the modeler has time	When there are an infinite number of solutions	B
18	All of the following are true about heuristics EXCEPT		heuristics are used widely	heuristics are used well	heuristics are used often	heuristics are rules of thumb	C
19	Which approach is most suited to structured problem with little uncertainty		Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based is	A
21	What does the 0 membership value means in the set		the object is fully included	the object is not included	the object is partially included	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a
23	The process of fuzzy inference system involves		membership function	fuzzy logic operations	if-then rules	all the above	d
24	What does a fuzzifier do		converts crisp input to	converts crisp output to	converts fuzzy input to	converts fuzzy output to	a
25	Which of the following is not defuzzifier method		centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy inference method		mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have		multiple parts of antecedent	only single part of antecedent	multiple parts of antecedent	only single part of antecedent	c
28	The α cut of a fuzzy set A is a crisp set defined by :-		$\{x \cup_a(x) > \alpha\}$	$\{x \cup_a(x) = \alpha\}$	$\{x \cup_a(x) < \alpha\}$	$\{x \cup_a(x) \leq \alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1 / x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?		$\{0/a, 0.7/b, 0.8/c, 0.2/d, 0/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.3/d, 0/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of A and B?		$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B?		$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.2/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 0/e\}$	a
34	What denotes the support(A) in a fuzzy set?		$\{x \cup_a(x) > 0\}$	$\{x \cup_a(x) < 0\}$	$\{x \cup_a(x) = 0\}$	$\{x \cup_a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?		$\{x \cup_a(x) > 0\}$	$\{x \cup_a(x) = 1\}$	$\{x \cup_a(x) >= 0.5\}$	$\{x \cup_a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Evaluation	defuzzification->rule evaluation	rule evaluation->fuzzification	rule evaluation->defuzzification	a
38	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
39	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based is	A
40	All of the following are suitable problems for genetic algorithm EXCEPT		pattern recognition	simulation of biological systems	simple optimization	dynamic process control	C
41	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a

42	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
43	mutation is applied on __candidates.		one	two	more than two	noneof these	a
44	recombination is applied on __candidates.		one	two	more than two	noneof these	b
45	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	noneof these	a
46	Survival is __ approach.		deterministic	non deterministic	semi deterministic	noneof these	a
47	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
48	Tabu search is an example of ?		heuristic	Evolutionary algo	ACO	PSO	a
49	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
50	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?		line representation	String representat	Circular representat	all of these	b
52	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by		Fredrik	Fogel	Frank	Flin	b
54	Evolution Strategies is developed with		selection	mutation	a population of size	all of these	d
55	Evolution Strategies typically uses		real-valued vector re	vector representa	time based represen	none of these	a
56	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is		Parent population siz	Survival populatio	both a and b	none of these	c
59	What are different types of crossover		discrete and interme	discrete and conti	continuous and inte	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and te		TRUE	FALSE			B
61	_____cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solutuon	none of these	C
62	Discrete events and agent-based models are usually used for _____.		middle or low level o	high level of abstr	very high level of ab	none of these	A
63	_____doesnot usually allow decision makers to see how a solution to a _____en		Simulation ,Complex	Simulation,Easy p	Genetics,Complex p	Genetics,Easy problem	A
64	EC stands for?		Evolutionary Comput	Evolutionary com	Electronic computa	noneof these	a
65	GA stands for		genetic algorithm	genetic assuranc	genese alforithm	noneof these	a
66	LCS stands for		learning classes syste	learning classifier	learned class system	noneof these	b
67	GBML stands for		Genese based Machi	Genes based mob	Genetic bsed machi	noneof these	c
68	EV is dominantly used for solving ____.		optimization proble	NP problem	simple problems	noneof these	a
69	EV is considered as?		adaptive	complex	both a and b	noneof these	c
70	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?		line representation	String representa	Circular representat	all of these	b
72	Parameters that affect GA		initial population	selection process	fitness function	all of these	d
73	Fitness function should be		maximum	minimum	intermediate	noneof these	b
74	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
75	Tabu search is an example of ?		heuristic	Evolutionary algo	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
77	mutation is applied on __candidates.		one	two	more than two	noneof these	a
78	recombination is applied on __candidates.		one	two	more than two	noneof these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offsprings	grand child	c
80	____ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection methods	both a and b	noneof these	c
82	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	noneof these	a

83	Survival is _____ approach.		deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment		d
90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned		d
91	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned		c
92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned		c
93	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities		b
94	Given $U = \{1, 2, 3, 4, 5, 6, 7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3)\}$: $\{(5, 0), (6, 0)\}$	$\{(1, 1), (2, 1), (3, 0.3)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification \rightarrow Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Fuzzification \rightarrow Rule Evaluation \rightarrow Defuzzification

96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to		{(0.5,12), (0.6,13), (1,14)}	{(0.5,12), (0.6,13), (1,14)}	{(0.3,12), (0.5,13), (1,14)}	{(0.3,12), (0.5,13), (1,14)}	d
98	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		{0, 1, 2, 3, 4, 5, 6, 7, 8}	{1, 2, 3, 4, 5, 6, 7, 8}	{2, 3, 4, 5, 6, 7, 8, 9}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified	unconditional unqualified	conditional qualified	unconditional qualified	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise answer	ANN gives accurate answer	In each, no precise answer	Fuzzy gives exact result	C
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	---- defines logic function of two propositions		prepositions	Linguistic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a

109	IF x is A and y is B then z=c (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b

116	In Evolutionary programming, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
119	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

123	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125 (1+1) ES			offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126 (1+λ) ES			λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127 Termination condition for EA			mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
130 (1+1) ES			Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
131	Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

This sheet is for 1 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions clearly	Cannot Distinguish two regions clearly	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguos	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neural computing,Genetic algorithm	Fuzzy network and artificial intelligence	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard bertrand	mc culloch	lofti a zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behaviour	deals with imprecise,probabilistic	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computing	conventional computing	non conventional computing	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behaviour	information processing paradigm	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search represents a guided approach while optimization is unguided	Blind search usually does not conclude in one step like some optimization methods.	Blind search cannot result in optimal solution whereas some optimization methods do	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can only be determined by an exhaustive enumeration testing of alternatives	a solution found in the least possible time and using the least possible computing resources	a solution that is the best based on criteria defined in the design phase	a solution that requires an algorithm for the determination	C
17	When is a complete enumeration of solution used?		When a solution that is "good enough" is fine and good heuristics are available	When there is enough time and computational power available	When the modeler requires a guided approach to problem solving	When there are an infinite number of solutions to be searched	B
18	All of the following are true about heuristics EXCEPT		heuristics are used when the modeler requires a guided approach to problem solving	heuristics are used when a solution that is "good enough" is sought	heuristics are used when there is abundant time and computational power	heuristics are rules of good judgement	C
19	Which approach is most suited to structured problem with little uncertainty		Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
21	What does the 0 membership value mean in the set		the object is fully inside the set	the object is not in the set	the object is partially present in the set	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a

23	The process of fuzzy interference system involves	membership functions	fuzzy logic operators	if-then rules	all the above	d
24	What does a fuzzifier do	converts crisp input to linguistic variables	converts crisp output to linguistic variables	converts fuzzy input to linguistic variables	converts fuzzy output to linguistic variables	a
25	Which of the following is not defuzzifier method	centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy interference method	mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have	multiple part of antecedent, only single part of consequent	only single part of antecedent, multiple part of consequent	multiple part of antecedent, multiple part of consequent	only single part of antecedent, only single part of consequent	c
28	The a cut of a fuzzy set A is a crisp set defined by :-	$\{x u_A(x) > a\}$	$\{x u_A(x) \geq a\}$	$\{x u_A(x) < a\}$	$\{x u_A(x) \leq a\}$	b
29	The bandwidth(A) in a fuzzy set is given by	$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1/x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets	maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?	$\{0/a, 0.7/b, 0.8/c, 0.2/d, 1/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.2/d, 1/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.7/d, 1/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 1/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of AUB?	$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0.2/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.5/d, 0.2/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0.8/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B ?	$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 1/e\}$	a

34	What denotes the support(A) in a fuzzy set?	$\{x u_A(x) > 0\}$	$\{x u_A(x) < 0\}$	$\{x u_A(x) \leq 0\}$	$\{x u_A(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?	$\{x u_A(x) > 0\}$	$\{x u_A(x) = 1\}$	$\{x u_A(x) \geq 0.5\}$	$\{x u_A(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designing a fuzzy logic machine	fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation>fuzzification>defuzzification	rule evaluation->defuzzification->fuzzification	a
38	can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
39	Genetic algorithm belongs to the family of methods in the	artificial intelligence area	optimization area	complete enumeration family of methods	Non computer based isolation area	A
40	All of the following are suitable problems for genetic algorithm EXCEPT	pattern recognition	simulation of biological models	simple optimization with few variables	dynamic process control	C
41	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
42	Genetic algorithms are examples of	heuristic	Evolutionary algorithm	ACO	PSO	b
43	mutation is applied on candidates.	one	two	more than two	none of these	a
44	recombination is applied on candidates.	one	two	more than two	none of these	b
45	LCS belongs to ___ based methods?	rule based learning	genetic learning	both a and b	none of these	a
46	Survival is ___ approach.	deterministic	non deterministic	semi deterministic	none of these	a

47	Evolutionary algorithms are a _____ based approach	heuristic	metaheuristic	both a and b	none of these	a
48	Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
49	Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
50	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
52	what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by	Fredrik	Fogel	Frank	Flin	b
54	Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
55	Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
56	in ES survival is	indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
59	What are different types of crossover	discrete and intermediate	discrete and continuous	continuous and intermediate	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and tested.		1			B
61	_____ cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solution	none of these	c
62	Discrete events and agent-based models are usually used for _____.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
63	_____ does not usually allow decision makers to see how a solution to a _____ involves over time nor can decision makers interact with it.	Simulation, Complex problem	Simulation, Easy problem	Genetics, Complex problem	Genetics, Easy problem	A
64	EC stands for?	Evolutionary Computations	Evolutionary computer	Electronic computations	none of these	a
65	GA stands for	genetic algorithm	genetic assurance	genetic algorithm	none of these	a
66	LCS stands for	learning classes system	learning classifier systems	learned class system	none of these	b
67	GBML stands for	Genetic based Machine learning	Genetic based mobile learning	Genetic based machine learning	none of these	c
68	EV is dominantly used for solving _____.	optimization problems	NP problem	simple problems	none of these	a
69	EV is considered as?	adaptive	complex	both a and b	none of these	c
70	Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
72	Parameters that affect GA	initial population	selection process	fitness function	all of these	d

73	Fitness function should be		maximum	minimum	intermediate	none of these	b
74	Evolutionary algorithms are a ___ based approach		heuristic	metaheuristic	both a and b	none of these	a
75	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algorithm	ACO	PSO	b
77	mutation is applied on ___ candidates.		one	two	more than two	none of these	a
78	recombination is applied on ___ candidates.		one	two	more than two	none of these	b

79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offsprings	grand child	c
80	___ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection methods	both a and b	none of these	c
82	LCS belongs to ___ based methods?		rule based learning	genetic learning	both a and b	none of these	a
83	Survival is ___ approach.		deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called ___ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by		Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment	d
90	For what purpose Feedback neural networks are primarily used?		classification	feature mapping	pattern mapping	none of the mentioned	d
91	Operations in the neural networks can perform what kind of operations?		serial	parallel	serial or parallel	none of the mentioned	c

92	What is ART in neural networks?		automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
93	The values of the set membership is represented by _____		Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
94	Given $U = \{1,2,3,4,5,6,7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3.): (5, 0), (6, 0.2) \}$	$\{(1, 1), (2, 1), (3, 0.3), (4, 1), (6, 0.2), (7, 1)\}$	$\{(3, 0.3), (6, 0.2)\}$	c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?		Fuzzification → Rule evaluation → Defuzzification	Fuzzification → Defuzzification → Rule evaluation	Rule evaluation → Fuzzification → Defuzzification	Rule evaluation → Defuzzification → Fuzzification	a
96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.5}	{0.1, 0.5, 0.4, 0.2, 0.2}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3, 1), (0.6, 2), (1, 3), (0.7, 4), (0.2, 5)\}$ $B = \{(0.5, 11), (1, 12), (0.5, 13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max(x+y=z, \min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to		$\{(0.5, 12), (0.6, 13), (1, 14), (0.7, 15), (0.7, 16), (1, 17), (1, 18)\}$	$\{(0.5, 12), (0.6, 13), (1, 14), (1, 15), (1, 16), (1, 17), (1, 18)\}$	$\{(0.3, 12), (0.5, 13), (0.5, 14), (1, 15), (0.7, 16), (0.5, 17), (0.2, 18)\}$	$\{(0.3, 12), (0.5, 13), (0.6, 14), (1, 15), (0.7, 16), (0.5, 17), (0.2, 18)\}$	d

98	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	{2, 3, 4, 5, 6, 7, 8, 9, 10}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified proposition	unconditional unqualified proposition	conditional qualified proposition	unconditional qualified proposition	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy ≈ Prediction	Fuzzy ≈ Forecasting	Probability ≈ Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise and accurate result	ANN gives accurate result, but fuzzy logic does not	In each, no precise mathematical model of problem is acquired	Fuzzy gives exact result but ANN does not	c

104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	----- defines logic funtion of two prepositions	prepositions	Lingustic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ---gives an approximate idea of the number of elements of a subset fulfilling certain conditions	Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ---- - in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ---- - in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
109	IF x is A and y is B then $z=c$ (c is constant), is	rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called	normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?	Model-Type and System-Type	Momfred-type and Semigitype	Mamdani-type and Sugeno-type	Mihni-type and Sujganitype	c
113	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is	Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b
116	In Evolutionary programming, recombination is	doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is	doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size changes dynamically	size=1	a
119	Step size in dynamic EP :	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size changes dynamically	size=1	b
120	Step size in self-adaptive EP	deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size changes dynamically	size=1	c

121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations	1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)	(μ,λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

123	In Evolutionary programming,	Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
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126	(1+λ) ES	λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127	Termination condition for EA	maximally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming does not use crossover operators	d
130	(1+1) ES	Operates on population size of two	operates on population size of one	operates on population size of zero	operates on population size of λ	a
131	Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

SCOA Unit I MCQ

- 1. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.**
A.True
B.False

- 2. The membership functions are generally represented in**
A.Tabular Form
B.Graphical Form
C.Mathematical Form
D.Logical Form

- 3. Membership function can be thought of as a technique to solve empirical problems on the basis of**
A.knowledge
B.examples
C.learning
D.experience

- 4. Three main basic features involved in characterizing membership function are**
A.Intuition, Inference, Rank Ordering
B.Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.sub normal fuzzy sets

B.normal fuzzy set

C.convex fuzzy set

D.concave fuzzy set

7. In a Fuzzy set a prototypical element has a value

A.1

B.0

C.infinite

D.Not defined

- 8. A fuzzy set wherein no membership function has its value equal to 1 is called**
- A.**normal fuzzy set
B.Subnormal fuzzy set.
C.convex fuzzy set
D.concave fuzzy set
- 9. A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe**
- A.**convex fuzzy set
B.concave fuzzy set
C.Non concave Fuzzy set
D.Non Convex Fuzzy set
- 10. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.**
- A.**Convex Fuzzy Set
B.Non convex fuzzy set
C.Normal Fuzzy set
D.Sub normal fuzzy set
- 11. The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to**

A.infinite

B.1

C.0

D.0.5

12. Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

B.False

14. Artificial neural network used for

A.Pattern Recognition

B.Classification

C.Clustering

D.All of these

15. A Neural Network can answer

- A.**For Loop questions
- B.**what-if questions
- C.**IF-The-Else Analysis Questions
- D.**None of these

16. Ability to learn how to do tasks based on the data given for training or initial experience

- A.**Self Organization
- B.**Adaptive Learning
- C.**Fault tolerance
- D.**Robustness

17. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

- A.**Adaptive Learning
- B.**Self Organization
- C.**What-If Analysis
- D.**Supervised Learning

18. In artificial Neural Network interconnected processing elements are called

- A.**nodes or neurons

B.weights

C.axons

D.Soma

19. Each connection link in ANN is associated with _____ which has information about the input signal.

A.neurons

B.weights

C.bias

D.activation function

20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.True

B.False

21. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.Weight

B.activation or activity level of neuron

C.Bias

D.None of these

22. Neuron can send _____ signal at a time.

- A.**multiple
- B.**one
- C.**none
- D.**any number of

23. Artificial intelligence is

- A.**It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations
- B.**Computational procedure that takes some value as input and produces some value as output.
- C.**Science of making machines performs tasks that would require intelligence when performed by humans
- D.**None of these

24. Expert systems

- A.**Combining different types of method or information
- B.**Approach to the design of learning algorithms that is structured along the lines of the theory of evolution
- C.**an information base filled with the knowledge of an expert formulated in terms

of if-then rules

D.None of these

25. Falsification is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

26. Evolutionary computation is

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.

C.Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.

D.None of these

27. Extendible architecture is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

28. Massively parallel machine is

A.A programming language based on logic

B.A computer where each processor has its own operating system, its own memory, and its own hard disk

C.Describes the structure of the contents of a database.

D.None of these

29. Search space

A.The large set of candidate solutions possible for a problem

B.The information stored in a database that can be, retrieved with a single query.

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

30. $n(\log n)$ is referred to

A.A measure of the desired maximal complexity of data mining algorithms

B.A database containing volatile data used for the daily operation of an organization

C.Relational database management system

D.None of these

31. Perceptron is

- A.**General class of approaches to a problem.
- B.**Performing several computations simultaneously
- C.**Structures in a database those are statistically relevant
- D.**Simple forerunner of modern neural networks, without hidden layers

32. Prolog is

- A.**A programming language based on logic
- B.**A computer where each processor has its own operating system, its own memory, and its own hard disk
- C.**Describes the structure of the contents of a database
- D.**None of these

33. Shallow knowledge

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be, retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

34. Quantitative attributes are

- A.**A reference to the speed of an algorithm, which is quadratically dependent on the size of

the data

B.Attributes of a database table that can take only numerical values

C.Tools designed to query a database

D.None of these

35. Subject orientation

A.The science of collecting, organizing, and applying numerical facts

B.Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.None of these

36. Vector

A.It do not need the control of the human operator during their execution

B.An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.The validation of a theory on the basis of a finite number of examples

D.None of these

37. Transparency

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

38. Core of soft Computing is

- A.**Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.**Fuzzy Networks and Artificial Intelligence
- C.**Artificial Intelligence and Neural Science
- D.**Neural Science and Genetic Science

39. Who initiated the idea of Soft Computing

- A.**Charles Darwin
- B.**Lofti A Zadeh
- C.**Rechenberg
- D.**Mc_Culloch

40. Fuzzy Computing

- A.**mimics human behaviour
- B.**doesn't deal with 2 valued logic
- C.**deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.**All of the above

41. Neural Computing

- A.**mimics human brain
- B.**information processing paradigm
- C.**Both (a) and (b)
- D.**None of the above

42. Genetic Algorithm are a part of

- A.**Evolutionary Computing
- B.**inspired by Darwin's theory about evolution - "survival of the fittest"
- C.**are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D.**All of the above

43. What are the 2 types of learning

- A.**Improvised and unimprovised
- B.**supervised and unsupervised
- C.**Layered and unlayered
- D.**None of the above

44. Supervised Learning is

- A.**learning with the help of examples
- B.**learning without teacher
- C.**learning with the help of teacher
- D.**learning with computers as supervisor

45. Unsupervised learning is

- A.**learning without computers
- B.**problem based learning

C.learning from environment

D.learning from teachers

46. Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

47. In supervised learning

A.classes are not predefined

B.classes are predefined

C.classes are not required

D. classification is not done

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

	<u>D.</u> experience	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p><u>A.</u>Intuition, Inference, Rank Ordering <u>B.</u>Fuzzy Algorithm, Neural network, Genetic Algorithm <u>C.</u>Core, Support , Boundary <u>D.</u>Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p><u>A.</u>Core <u>B.</u>Support <u>C.</u>Boundary <u>D.</u>Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p><u>A.</u>sub normal fuzzy sets</p>	B

	<u>B.</u> normal fuzzy set <u>C.</u> convex fuzzy set <u>D.</u> concave fuzzy set	
7.	In a Fuzzy set a prototypical element has a value <u>A.</u> 1 <u>B.</u> 0 <u>C.</u> infinite <u>D.</u> Not defined	A
8.	A fuzzy set wherein no membership function has its value equal to 1 is called <u>A.</u> normal fuzzy set <u>B.</u> subnormal fuzzy set. <u>C.</u> convex fuzzy set <u>D.</u> concave fuzzy set	B
9.	A fuzzy set has a membership function whose membership values	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesnt deal with 2 valued logic</p>	D

	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	Defuzzification is done to obtain a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above	a
13.	“The train is running fast”. Here ‘fast’ can be represented by a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned	a
14.	Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$ Then the crisp value of Young using MoM method is a) 25 b) 20 c) 35 d) 50	a
15.	f the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value. a) with the median of all the area	c

	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)\text{complement} \neq (A\lambda)\text{complement}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is c then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

	d) None of the above	
26.	Fuzzy logic is a form of a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic	Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.
27.	Traditional set theory is also known as Crisp Set theory. a) True b) False	Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set. 3. The truth values of traditional set theory is _____ and that of fuzzy set is _____
28.	The truth values of traditional set theory is _____ and that of fuzzy set is _____	Answer: a Explanation: Refer the

	a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1	definition of Fuzzy set and Crisp set.
29.	How many types of random variables are available? a) 1 b) 2 c) 3 d) 4	Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.
30.	The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____. a) Fuzzy Set b) Crisp Set	Answer: a Explanation: Fuzzy logic deals with linguistic variables.
31.	The values of the set membership is represented by a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c	Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.
32.	What is meant by probability density function?	d

	a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables	
33.	Which of the following is used for probability theory sentences? a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned	Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.
34.	Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following. a) AND b) OR c) NOT d) EX-OR	Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;
35.	Fuzzy logic is usually represented as a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned	Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy

		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices. Rules are usually expressed in the form: IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <p>a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned</p>	<p>Answer: d Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <p>a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned</p>	<p>Answer: c Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

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Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

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	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intuition, Inference, Rank Ordering</p> <p>B.Fuzzy Algorithm, Neural network, Genetic Algorithm</p> <p>C.Core, Support , Boundary</p> <p>D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core</p> <p>B.Support</p> <p>C.Boundary</p> <p>D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

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	<p>B. normal fuzzy set C. convex fuzzy set D. concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A. 1 B. 0 C. infinite D. Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A. normal fuzzy set B. subnormal fuzzy set. C. convex fuzzy set D. concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

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	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesnt deal with 2 valued logic</p>	D

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	<p>B. mimics human behaviour</p> <p>C. deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D. All of the above</p>	
12.	Defuzzification is done to obtain a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above	a
13.	“The train is running fast”. Here ‘fast’ can be represented by a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned	a
14.	Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$ Then the crisp value of Young using MoM method is a) 25 b) 20 c) 35 d) 50	a

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15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area b) with the mean of all the area c) with the largest area d) with the smallest area 	c
16.	<p>Which of the following is not a centroid method?</p> <ul style="list-style-type: none"> a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM) 	d
17.	<p>What are the following sequence of steps taken in designing a fuzzy logic machine?</p> <ul style="list-style-type: none"> (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification 	a
18.	<p>If A is a fuzzy set, then $(A \lambda)$complement \neq $(A\lambda)$complement</p> <ul style="list-style-type: none"> (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ 	a
19.	<p>The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$</p> <ul style="list-style-type: none"> a) 2 	B

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	b) 5 c) 4 d) 1	
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$ c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	b
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d

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24.	<p>In triangular fuzzy number (l, m, u), what does 'm' represents:</p> <ul style="list-style-type: none"> a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above 	C
25.	<p>Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis?</p> <ul style="list-style-type: none"> a) Vector normalization b) Linear normalization c) Both A and B d) None of the above 	b
26.	<p>Fuzzy logic is a form of</p> <ul style="list-style-type: none"> a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic 	<p>Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.</p>
27.	<p>Traditional set theory is also known as Crisp Set theory.</p> <ul style="list-style-type: none"> a) True b) False 	<p>Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There is only two crisp values true or false. In case of fuzzy logic there are</p>

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		<p>many values. With weight say x the member is in the set.</p> <p>3. The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>
28.	<p>The truth values of traditional set theory is _____ and that of fuzzy set is _____</p> <p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	<p>Answer: a Explanation: Refer the definition of Fuzzy set and Crisp set.</p>
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p>	<p>Answer: a</p>

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	a) Fuzzy Set b) Crisp Set	Explanation: Fuzzy logic deals with linguistic variables.
31.	The values of the set membership is represented by a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c	Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.
32.	What is meant by probability density function? a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables	d
33.	Which of the following is used for probability theory sentences? a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned	Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.
34.	Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.	Answer: a, b, c

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	<p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b</p> <p>Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <p>a) Fuzzy Logic</p>	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty</p>

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	b) Probability c) Entropy d) All of the mentioned	involved in data. Represented by $H(\text{data})$.
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <p>a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned</p>	Answer: c Explanation: Local structure is usually associated with linear rather than exponential growth in complexity

Soft Computing & Optimization Algorithms [Multiple Choice Question] **UNIT No-03****Name of Content: Fuzzy Systems- Fuzzy Controller**

01	Fuzzy logic is :	
	Option A	Used to respond to questions in a human like way
	Option B	A new programming language used to program animation
	Option C	The result of fuzzy thinking
	Option D	A term that indicates logical values greater than one
	Correct Answer	A
02	What are the following sequence of steps taken in designing a fuzzy logic machine?	
	Option A	Rule evaluation->Fuzzification->Defuzzification
	Option B	Fuzzification->Rule evaluation->Defuzzification
	Option C	Fuzzy Sets->Defuzzification->Rule evaluation
	Option D	Defuzzification->Rule evaluation->Fuzzification
	Correct Answer	B
03	Fuzzy logic is a form of	
	Option A	Two-valued logic
	Option B	Crisp set logic
	Option C	Many-valued logic
	Option D	Binary set logic
	Correct Answer	C
04	The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$	
	Option A	$h(A) = 0$
	Option B	$h(A) < 0$
	Option C	$h(A)=1$
	Option D	$h(A)<1$
	Correct Answer	C
05	Assumptions in Fuzzy Logic Control (FLC) Design	
	Option A	Existence of a knowledge body
	Option B	Range of precision
	Option C	The plant is observable and controllable
	Option D	All of the above
	Correct Answer	D

Name of Content: Fuzzy Rule Base & Approximate Reasoning

01	Fuzzy logic uses	
	Option A	Global variables
	Option B	Linguistic variables
	Option C	Local variables
	Option D	Approximate variables
	Correct Answer	B
02	_____ as an operator acts on fuzzy set representing meaning of its operand	
	Option A	Defuzzification
	Option B	Truth table
	Option C	Linguistic hedges
	Option D	Propositions
	Correct Answer	C
03	The major components of the FLC	
	Option A	Fuzzifier & Defuzzifier
	Option B	Fuzzy Rule Base & Knowledge Base
	Option C	Inference Engine
	Option D	All of the above
	Correct Answer	D
04	Which of the following not an Advantages of Fuzzy Logic Control	
	Option A	Cheaper
	Option B	Robust
	Option C	Reliability
	Option D	Expensive
	Correct Answer	D
05	Examples of Fuzzy quantifiers are words like	
	Option A	Most
	Option B	Many
	Option C	Few
	Option D	All of the above
	Correct Answer	D
06	Fuzzy truth qualification claims the degree of truth of fuzzy proposition	
	Option A	True
	Option B	False
	Correct Answer	A

07	Propositions in fuzzy logic involves	
	Option A	Fuzzy predicate
	Option B	Fuzzy Quantifier
	Option C	Fuzzy Qualifier
	Option D	All of the above
	Correct Answer	D
08	Formation of Rules: I: Assignment statement; II: Conditional statement; III: Unconditional statement	
	Option A	Only I
	Option B	Only I & II
	Option C	Only I, II & III
	Option D	Only II & III
	Correct Answer	C
09	Methods used for decomposition of rules	
	Option A	Multiple conjunctive antecedents
	Option B	Multiple disjunctive antecedents
	Option C	Conditional statement
	Option D	All of the above
	Correct Answer	D
10	Multiple conjunctive antecedents based on	
	Option A	Fuzzy union operation
	Option B	Fuzzy intersection operation
	Option C	Fuzzy condition operation
	Option D	Fuzzy difference operation
	Correct Answer	B
11	Two methods of Aggregation of fuzzy rules	
	Option A	Conjunctive system of rules
	Option B	Disjunctive system of rules
	Option C	Both a & b
	Option D	Neither a nor b
	Correct Answer	C
12	In disjunctive system of rules, output determined by performing fuzzy union of all individual rule consequents	
	Option A	True
	Option B	False
	Correct Answer	A

Name of Content: Fuzzy Reasoning and Fuzzy Inference system

01	In this form of reasoning, the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities	
	Option A	Qualitative Reasoning
	Option B	Categorial Reasoning
	Option C	Syllogistic Reasoning
	Option D	Dispositional Reasoning
	Correct Answer	B
02	A Fuzzy syllogism can be expressed as $x=s_1$ A's are B's & $y=s_2$ C's are D's	
	Option A	$z=s_2$ C's are D's
	Option B	$z=s_2$ A's are B's
	Option C	$z=s_2$ C's are D's
	Option D	$z=s_3$ E's are F's
	Correct Answer	D
03	The Conjunction rule is	
	Option A	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \cap \sim B$
	Option B	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A - \sim B$
	Option C	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \ast \sim B$
	Option D	$\sim x \text{ is } \sim A, \sim x \text{ is } \sim B \Rightarrow \sim x \text{ is } \sim A \cap \sim B$
	Correct Answer	D
04	The negative rule of inference is	
	Option A	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } \sim A$
	Option B	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } A$
	Option C	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow \sim x \text{ is } A$
	Option D	NOT ($\sim x \text{ is } \sim A$) $\Rightarrow x \text{ is } A$
	Correct Answer	A
05	In this mode of reasoning, the antecedents & consequents have fuzzy linguistic variables	
	Option A	Qualitative Reasoning
	Option B	Categorial Reasoning
	Option C	Syllogistic Reasoning
	Option D	Dispositional Reasoning
	Correct Answer	A

07	How many types are available in machine learning?	
	Option A	1
	Option B	2
	Option C	3
	Option D	4
	Correct Answer	C
08	How the decision tree reaches its decision?	
	Option A	Single test
	Option B	Two test
	Option C	Sequence of test
	Option D	No test
	Correct Answer	C
09	What Is Fuzzy Inference Systems?	
	Option A	The process of formulating the mapping from a given input to an output using fuzzy logic
	Option B	Changing the output value to match the input value to give it an equal balance
	Option C	Having a larger output than the input
	Option D	Having a smaller output than the input
	Correct Answer	A
10	Where Has Fuzzy Inference Systems Been Implemented?	
	Option A	Wireless services, heat control and printers
	Option B	Restrict power usage, telephone lines and sort data
	Option C	Simulink, boiler and CD recording
	Option D	Automatic control, decision analysis and data classification
	Correct Answer	D
11	What Is Another Name For Fuzzy Inference Systems?	
	Option A	Fuzzy Expert System
	Option B	Fuzzy Modelling
	Option C	Fuzzy Logic Controller
	Option D	All of the above
	Correct Answer	D
12	The Equation For Probabilistic: Prob(a,b) = a+b - ab	
	Option A	True
	Option B	False
	Correct Answer	A

Soft Computing & Optimization Algorithms [Multiple Choice Question] **UNIT No-04**

Name of Content: Basic Evolutionary Processes, EV: A Simple Evolutionary System

- 01 The tendency of population to remain in genetic equilibrium may be disturbed by
Option A Random mating
Option B Lack of migration
Option C Lack of mutations
Option D Lack of random mating

Correct Answer **D**

- 02 One of the important consequences of geographical isolation is:
Option A Random creation of new species
Option B No change in the isolated fauna
Option C Preventing Speciation
Option D Speciation through reproductive isolation

Correct Answer **D**

- 03 What is meant by the term Darwin fitness?
Option A The ability to survive and reproduce
Option B High aggressiveness
Option C Healthy appearance
Option D Physical strength

Correct Answer **A**

- 04 Diversification in plant life appeared:
Option A Due to abrupt mutations
Option B Suddenly on earth
Option C By seed dispersal
Option D Due to long periods of evolutionary changes

Correct Answer **D**

- 05 Chemical reactions could have converted simple organic compounds into _____ for the origin of life
Option A Micromolecules
Option B Nitrogen, oxygen and other gases
Option C Cells
Option D Macromolecules

Correct Answer **D**

- 06 Which one of the following sequences was proposed by Darwin and Wallace for organic evolution?
- Option A Overproduction, variations, constancy of population size, natural selection
- Option B Variations, constancy of population size, overproduction, natural selection
- Option C Overproduction, constancy of population size, variations, natural selection
- Option D Variations, natural selection, overproduction, constancy of population size
- Correct Answer** **C**
- 07 _____ is a subset of evolutionary computation,[1] a generic population-based meta-heuristic optimization algorithm
- Option A Genetic Algorithm
- Option B Evolutionary algorithm (EA)
- Option C Simulated Annealing
- Option D Artificial Intelligence
- Correct Answer** **B**
- 08 An EA uses mechanisms inspired by biological evolution, such as
- Option A mutation
- Option B recombination
- Option C selection
- Option D All of the above
- Correct Answer** **D**
- 09 Genetic Algorithms are
- Option A a class of algorithms that try and build solutions by introducing evolution and selection of the best in a population of candidate solutions
- Option B Methods, based on the theory of natural selection and evolutionary biology, for solving optimization problems.
- Option C A heuristic search method used in artificial intelligence and computing.
- Option D All of the above
- Correct Answer** **D**
- 10 Objects forming possible solutions within the original problem context are referred to as
- Option A Phenotypes
- Option B Genotypes
- Option C Genes
- Option D Chromosomes
- Correct Answer** **A**

Name of Content: Canonical Evolutionary Algorithms

- 01 In Evolutionary algorithm, An individual consist of
Option A Genotype and phenotypes
Option B Parent selection and crossover
Option C Genotype and a fitness function
Option D Mutation and recombination
- Correct Answer C**
- 02 Evolutionary Strategies were developed in the sixties by
Option A John Holland
Option B Rechenberg and Schwefe
Option C Allen and Karjalainen
Option D Ryan and Collins
- Correct Answer B**
- 03 EA heuristic follows
Option A Initialization
Option B Evaluation
Option C Mutation and selection
Option D All of the above
- Correct Answer D**
- 04 Selection is based on
Option A Ranking of the individual fitness
Option B Recombination of parents
Option C Mutation of parameter
Option D None of the above
- Correct Answer A**
- 05 The Simple evolution strategy operates on population of size two:
Option A The current point (parent)
Option B Result of its mutation (one offspring)
Option C Both a and b
Option D None of the above
- Correct Answer C**
- 06 Depending on search space & objective function, recombination & mutation of strategy parameter may or may not occur in specific algorithm
Option A True
Option B False
- Correct Answer A**

Name of Content: A Unified view of Simple EAs

01 EA consist of following elements

- | | |
|----------|---------------------------|
| Option A | Parent Population size |
| Option B | Survival selection method |
| Option C | Parent selection method |
| Option D | All of the above |

Correct Answer **D**

02 _____ which of the following method determines to be kept in the next generation

- | | |
|----------|--------------------|
| Option A | Parent selection |
| Option B | Mutation |
| Option C | Recombination |
| Option D | Survival selection |

Correct Answer **D**

03 Roulette wheel selection scheme is preferable when

- | | |
|----------|--|
| Option A | Fitness values are uniformly distributed |
| Option B | Fitness values are non-uniformly distributed |
| Option C | Needs low selection pressure |
| Option D | Needs high population diversity |

Correct Answer **A**

04 A genetic operator used in genetic algorithms for selecting potentially useful solutions for recombination.

- | | |
|----------|---------------------------------|
| Option A | Fitness proportionate selection |
| Option B | Roulette wheel selection |
| Option C | Rank selection method |
| Option D | Stochastic universal sampling |

Correct Answer **A & B**

05 _____ is a method of selecting an individual from a population of individuals in a genetic algorithm.

- | | |
|----------|-------------------------------|
| Option A | Roulette wheel selection |
| Option B | Rank selection method |
| Option C | Tournament selection |
| Option D | Stochastic Universal Sampling |

Correct Answer **C**

06 As selection pressure increases, fitter solutions are more likely to survive

- | | |
|----------|-------|
| Option A | True |
| Option B | False |

Correct Answer **A**

- 07 What are normally the two best measurement units for an evolutionary algorithm?
- Option A Number of evaluations
Option B Number of generations
Option C Elapsed & CPU time
Option D Both a & b
- Correct Answer D**
- 08 What is most important to be concerned with in the evolution of repetitive problems?
- Option A Do multiple runs until a good solution is found
Option B Execute one run until the solution is good enough
Option C Get a reasonably good solution every time
Option D Get a very good result just once
- Correct Answer C**
- 09 Evolutionary Strategies (ES)
- Option A (μ, λ) : Select survivors among parents and offspring
Option B $(\mu + \lambda)$: Select survivors among parents and offspring
Option C $(\mu - \lambda)$: Select survivors among offspring only
Option D $(\mu : \lambda)$: Select survivors among offspring only
- Correct Answer B**
- 10 Rank based selection
- Option A Use relative rather than absolute fitness
Option B Use absolute rather than relative fitness
Option C Results in less control of the selection pressure than fitness-proportionate selection
Option D Ranking can be either linear or non-linear
- Correct Answer A & D**

Subject: Soft computing Optimization Algorithm
MCQs Unit- I

1. Neural Computing
 - A. mimics human brain
 - B. information processing paradigm
 - C. Both (a) and (b)
 - D. None of the above

Ans: C

Explanation: NN is used for data processing modelled on human brain

2. Genetic Algorithm are a part of

- A. Evolutionary Computing
- B. inspired by Darwin's theory about evolution - "survival of the fittest"
- C. are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D. All of the above

Ans: D

Explanation: It is part of EA

3. What are the 2 types of learning

- A. Improvised and unimprovised
- B. supervised and unsupervised
- C. Layered and unlayered
- D. None of the above

Ans: B

Explanation: Supervised and unsupervised are two types

4. Supervised Learning is
 - A. learning with the help of examples
 - B. learning without teacher
 - C. learning with the help of teacher
 - D. learning with computers as supervisor

Ans: C

Explanation: Training data is present

5. Unsupervised learning is

- A. learning without computers
- B. problem based learning
- C. learning from environment
- D. learning from teachers

Ans: C

Explanation: without training data

6. Conventional AI is different from soft computing in the sense

- A. Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic
- B. Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data
- C. Both (a) and (b)
- D. None of the above

Ans: C

Explanation: Soft computing covers fuzzy, supervised NN algorithms

7. In Supervised learning:

- A. classes are not predefined
- B. classes are predefined
- C. classes are not required
- D. classification is not done

Ans: B

Explanation: Training data is present

8. A 4-input neuron has weights 1, 2, 3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. The output will be:

- a) 238
- b) 76
- c) 119
- d) 123

Ans: a

Explanation: The output is found by multiplying the weights with their respective inputs, summing the results and multiplying with the transfer function. Therefore:

$$\text{Output} = 2 * (1*4 + 2*10 + 3*5 + 4*20) = 238$$

9. ANN is composed of large number of highly interconnected processing elements (neurons) working in unison to solve problems.

A. True

B. False

Ans: A

Explanation: As per architecture it is true

10. Artificial neural network used for

A. Pattern Recognition

B. Classification

C. Clustering

D. All of these

Ans: D

11. A Neural Network can answer

A. For Loop questions

B. what-if questions

C. IF-The-Else Analysis Questions

D. None of these

Ans: B

Explanation: Generally used for prediction and classification

12. Ability to learn how to do tasks based on the data given for training or initial experience

A. Self Organization

B. Adaptive Learning

C. Fault tolerance

D. Robustness

Ans: B

Explanation: Adaption allows learn from self experiences

13. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

A. Adaptive Learning

B. Self Organization

C. What-If Analysis

D. Supervised Learnning

Ans: B

Explanation: SOM is unsupervised NN

14. In artificial Neural Network interconnected processing elements are called

- A. nodes or neurons
- B. weights
- C. axons
- D. Soma

Ans: A

Explanation: As per the definition

15. Each connection link in ANN is associated with _____ which has information about the input signal.

- A. Neurons
- B. Weights
- C. Bias
- D. activation function

Ans: B

Explanation: As per the definition

16. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

- A. True
- B. False

Ans: A

17. Internal state of neuron is called _____, is the function of the inputs the neurons receives

- A. Weight
- B. activation or activity level of neuron
- C. Bias
- D. None of these

Ans: B

Explanation: As per the definition

18. Neuron can send _____ signal at a time.

- A. multiple

- B. one
- C. none
- D. any number

Ans: B

Explanation: can receive multiple signals but send only one signal (single output)

19. What is perceptron?

- a) a single layer feed-forward neural network with pre-processing
- b) an auto-associative neural network
- c) a double layer auto-associative neural network
- d) a neural network that contains feedback

Ans: a

Explanation:

20. The perceptron is a single layer feed-forward neural network. It is not an auto-associative network because it has no feedback and is not a multiple layer neural network because the pre-processing stage is not made of neuron

21. Why is the XOR problem exceptionally interesting to neural network researchers?

- a) Because it can be expressed in a way that allows you to use a neural network
- b) Because it is complex binary operation that cannot be solved using neural networks
- c) Because it can be solved by a single layer perceptron
- d) Because it is the simplest linearly inseparable problem that exists.

Ans:d

Explanation: it is the simplest non linearly problem

22. What is back propagation?

- a) It is another name given to the curvy function in the perceptron
- b) It is the transmission of error back through the network to adjust the inputs
- c) It is the transmission of error back through the network to allow weights to be adjusted so that the network can learn
- d) None of the mentioned

Answer: c

Explanation: Back propagation is the transmission of error back through the network to allow weights to be adjusted so that the network can learn.

23. Neural Networks are complex _____ with many parameters.

- a) Linear Functions
- b) Nonlinear Functions

- c) Discrete Functions
- d) Exponential Functions

Answer: a

Explanation: Neural networks are complex linear functions with many parameters.

24. A perceptron adds up all the weighted inputs it receives, and if it exceeds a certain value, it outputs a 1, otherwise it just outputs a 0.

- a) True
- b) False
- c) Sometimes – it can also output intermediate values as well
- d) Can't say

Answer: a

Explanation: Yes the perceptron works like that.

25. The network that involves backward links from output to the input and hidden layers is called _____

- a) Self organizing maps
- b) Perceptrons
- c) Recurrent neural network
- d) Multi layered perceptron

Answer: c

Explanation: RNN (Recurrent neural network) topology involves backward links from output to the input and hidden layers.

26. Which of the following is an application of NN (Neural Network)?

- a) Sales forecasting
- b) Data validation
- c) Risk management
- d) All of the mentioned

Answer: d

Explanation: All mentioned options are applications of Neural Network.

27 Artificial neural networks

- A Are trained by adjusting the network size
- B Are trained by adjusting weights
- C The weights are either all positive or all negative
- D The learning rate controls the amount of weight change

Ans: B , D

28 Why use Multi Layer Perceptron instead of a single layer perceptron?

- A Faster learning

- B Easier programming
- C Can solve more complex problems
- D Can learn multiple decision boundaries

Ans: c,D

29. The activation function in a multilayer perceptron
- A Does thresholding to 0 or 1
 - B Is used to compute the output value of a node
 - C Is used for initialization of the network
 - D Makes it possible to train non-linear decision boundaries

And: B,D

30 Which of the following neural networks uses supervised learning?

- (A) Multilayer perceptron
- (B) Self organizing feature map
- (C) Hopfield network
- (D) M_P neuron

Ans: A

Explanation: Training is not possible for MP neuron

31. Identify the following activation function : $\phi(V) = Z + (1 / (1 + \exp(-x * V + Y)))$, Z, X, Y are parameters
- a. Step function
 - b. Ramp function
 - c. Sigmoid function
 - d. Gaussian function

Ans: C

Explanation: it is sigmoid function

- 32 . An artificial neuron receives n inputs $x_1, x_2, x_3, \dots, x_n$ with weights w_1, w_2, \dots, w_n attached to the input links. The weighted sum _____ is computed to be passed on to a non-linear filter Φ called activation function to release the output.
- a. $\sum w_i$
 - b. $\sum x_i$
 - c. $\sum w_i + \sum x_i$
 - d. $\sum w_i * x_i$

Ans: d

Explanation: It is net input calculated as $\sum w_i * x_i$

33. Which of the following can be used for clustering of data ?

- a. Single layer perception
- b. Multilayer perception
- c. Self organizing map
- d. Radial basis function

Ans: C

Explanation: SOM is unsupervised NN based on grouping of elements based on similarity

34. Perceptron learning, Delta learning and LMS learning are learning methods which falls under the category of

- a. Error correction learning - learning with a teacher
- b. Reinforcement learning - learning with a critic
- c. Hebbian learning
- d. Competitive learning - learning without a teacher

Ans: a

Explanation: It is one of the supervised learning algorithm.

35 Which of the following model has ability to learn?

- a) pitts model
- b) rosenblatt perceptron model
- c) both rosenblatt and pitts model
- d) neither rosenblatt nor pitts

Answer: b

Explanation: Weights are fixed in pitts model but adjustable in rosenblatt.

36 When both inputs are 1, what will be the output of the pitts model nand gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: a

Explanation: Check the truth table of simply a nand gate.

37 When both inputs are 1, what will be the output of the pitts model AND gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: b

Explanation: Check the truth table of simply a And gate.

38. When both inputs are 1, what will be the output of the pitts model OR gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: b

Explanation: Check the truth table of simply a OR gate.

39. When both inputs are 1, what will be the output of the pitts model XOR gate ?

- a) 0
- b) 1
- c) either 0 or 1
- d) z

Answer: a

Explanation: Check the truth table of simply a XOR gate.

40. Does McCulloch-pitts model have ability of learning?

- a) yes
- b) no

Answer: b

Explanation: Weights are fixed.

41. What is an activation value?

- a) weighted sum of inputs
- b) threshold value
- c) main input to neuron
- d) none of the mentioned

Answer: a

Explanation: It is definition of activation value

42. Positive sign of weight indicates?

- a) excitatory input
- b) inhibitory input
- c) can be either excitatory or inhibitory as such
- d) none of the mentioned

Answer: a

Explanation: Sign convention of neuron.

43. Negative sign of weight indicates?

- a) excitatory input
- b) inhibitory input
- c) excitatory output
- d) inhibitory output

Answer: b

Explanation: Sign convention of neuron.

44. The amount of output of one unit received by another unit depends on what?

- a) output unit
- b) input unit
- c) activation value
- d) weight

Answer: d

Explanation: Activation is sum of weighted sum of inputs, which gives desired output..hence output depends on weights.

45. The process of adjusting the weight is known as?

- a) activation
- b) synchronisation
- c) learning
- d) none of the mentioned

Answer: c

Explanation: Basic definition of learning in neural nets .

46. The procedure to incrementally update each of weights in neural is referred to as?

- a) synchronisation
- b) learning law
- c) learning algorithm
- d) both learning algorithm & law

Answer: d

Explanation: Basic definition of learning law in neural.

47. In what ways can output be determined from activation value?

- a) deterministically
- b) stochastically
- c) both deterministically & stochastically
- d) none of the mentioned

Answer: c

Explanation: This is the most important trait of input processing & output determination in neural networks.

48. How can output be updated in neural network?

- a) synchronously
- b) asynchronously

- c) both synchronously & asynchronously
- d) none of the mentioned

Answer: c

Explanation: Output can be updated at same time or at different time in the networks.

49. What is asynchronous update in neural netwks?

- a) output units are updated sequentially
- b) output units are updated in parallel fashion
- c) can be either sequentially or in parallel fashion
- d) none of the mentioned

Answer: a

Explanation: Output are updated at different time in the networks.

50. Who developed the first learning machine in which connection strengths could be adapted automatically?

- a) McCulloch-pitts
- b) Marvin Minsky
- c) Hopfield
- d) none of the mentioned

Answer: b

Explanation: In 1954 Marvin Minsky developed the first learning machine in which connection strengths could be adapted automatically & efficiebtly.

51. Who proposed the first perceptron model in 1958?

- a) McCulloch-pitts
- b) Marvin Minsky
- c) Hopfield
- d) Rosenblatt

Answer: d

Explanation: Rosenblatt proposed the first perceptron model in 1958 .

52. What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?

- a) associative nature of networks
- b) distributive nature of networks
- c) both associative & distributive
- d) none of the mentioned

Answer: c

Explanation: General characteristics of ANNs.

53. What was the name of the first model which can perform wieghted sum of inputs?

- a) McCulloch-pitts neuron model
- b) Marvin Minsky neuron model

- c) Hopfield model of neuron
- d) none of the mentioned

Answer: a

Explanation: McCulloch-pitts neuron model can perform weighted sum of inputs followed by threshold logic operation.

54. The cell body of neuron can be analogous to what mathematical operation?

- a) summing
- b) differentiator
- c) integrator
- d) none of the mentioned

Answer: a

Explanation: Because adding of potential(due to neural fluid) at different parts of neuron is the reason of its firing.

55. What is the critical threshold voltage value at which neuron get fired?

- a) 30mv
- b) 20mv
- c) 25mv
- d) 10mv

Answer: d

Explanation: This critical is founded by series of experiments conducted by neural scientist.

60 . Does there is any effect on particular neuron which got repeatedly fired ?

- a) yes
- b) no

Answer: a

Explanation: The strength of neuron to fire in future increases.

61. What is name of above mechanism?

- a) hebb rule learning
- b) error correction learning
- c) memory based learning
- d) none of the mentioned

View Answer

Answer: a

Explanation: It follows from basic definition of hebb rule learning.

62. What is hebb's rule of learning

- a) the system learns from its past mistakes
- b) the system recalls previous reference inputs & respective ideal outputs
- c) the strength of neural connection get modified accordingly

d) none of the mentioned

Answer:c

Explanation: The strength of neuron to fire in future increases, if it is fired repeatedly.

63. Who invented perceptron neural networks?

a) McCulloch-pitts

b) Widrow

c) Minsky & papert

d) Rosenblatt

Answer: d

Explanation: The perceptron is one of the earliest neural networks. Invented at the Cornell Aeronautical Laboratory in 1957 by Frank Rosenblatt, the Perceptron was an attempt to understand human memory, learning, and cognitive processes.

64. What is delta (error) in perceptron model of neuron?

a) error due to environmental condition

b) difference between desired & target output

c) can be both due to difference in target output or environmental condition

d) none of the mentioned

Answer: a

Explanation: All other parameters are assumed to be null while calculating the error in perceptron model & only difference between desired & target output is taken into account.

65. In neural how can connections between different layers be achieved?

a) interlayer

b) intralayer

c) both interlayer and intralayer

d) either interlayer or intralayer

Answer: c

Explanation: Connections between layers can be made to one unit to another and within the units of a layer.

66. Connections across the layers in standard topologies & among the units within a layer can be organised?

a) in feedforward manner

b) in feedback manner

c) both feedforward & feedback

d) either feedforward & feedback

Answer: d

Explanation: Connections across the layers in standard topologies can be in feedforward manner or in feedback manner but not both.

67. State whether Hebb's law is supervised learning or of unsupervised type?

a) supervised

b) unsupervised

c) either supervised or unsupervised

d) can be both supervised & unsupervised

Answer: b

Explanation: No desired output is required for its implementation.

68. Following approach has deterministic and well written rules:

- a. Soft Computing
- b. hard computing

Ans: b

Explanation: Hard computing is based on deterministic fixed algorithms

69. Uncertainty can be handled in ---

- a. Soft Computing
- b. hard computing

Ans:

Explanation: Fuzzy a type of soft computing is more suitable to handle uncertainty

70. Different soft computing approaches can be combined to improve efficiency:

- a. True
- b. False

Ans: a

Explanation: there are different hybrid approaches available.

Subject: Soft computing Optimization Algorithm

MCQs Unit- II and III (Fuzzy Logic)

1. The membership functions are generally represented in

- a. Tabular Form
- b. Graphical Form
- c. Mathematical Form
- d. Logical Form

Ans: b

Explanation: Membership functions are presented in the form of plots

2. Three main basic features involved in characterizing membership function are

- a. Intuition, Inference, Rank Ordering
- b. Fuzzy Algorithm, Neural network, Genetic Algorithm
- c. Core, Support , Boundary
- d. Weighted Average, center of Sums, Median

Ans: C

Explanation: As per the diagram of MF

3 A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

- a. sub normal fuzzy sets
- b. normal fuzzy set
- c. convex fuzzy set
- d. concave fuzzy set

Ans: b

Explanation: As per the definition

4 A fuzzy set wherein no membership function has its value equal to 1 is called

- a. normal fuzzy set
- b. subnormal fuzzy set.
- c. convex fuzzy set
- d. concave fuzzy set

Ans: b

Explanation: As per the definition

5. Who initiated the idea of Soft Computing

- a. Charles Darwin
- b. Lofti A Zadeh
- c. Mc_Culloch
- d. Rechenberg

Ans: b

6. Core of soft Computing is.....

- a. Fuzzy Computing, Neural Computing, Genetic Algorithms
- b. Fuzzy Networks and Artificial Intelligence
- c. Artificial Intelligence and Neural Science
- d. Neural Science and Genetic Science

Ans: a

Explanation: As per the definition

7. Fuzzy logic is usually represented as

- a. IF-THEN-ELSE rules
- b. IF-THEN rules
- c. Both IF-THEN-ELSE rules & IF-THEN rules
- d. None of the mentioned

Ans: b

Explanation: Rules are usually expressed in the form: IF variable IS property THEN action

8. Which of the following is not true regarding the principles of fuzzy logic?

- a. Fuzzy logic follows the principle of Aristotle and Buddha
- b. Fuzzy logic is a concept of 'certain degree'
- c. Japan is currently the most active users of fuzzy logic
- d. Boolean logic is a subset of fuzzy logic

Ans: b

Explanation: Fuzzy deals with uncertainty

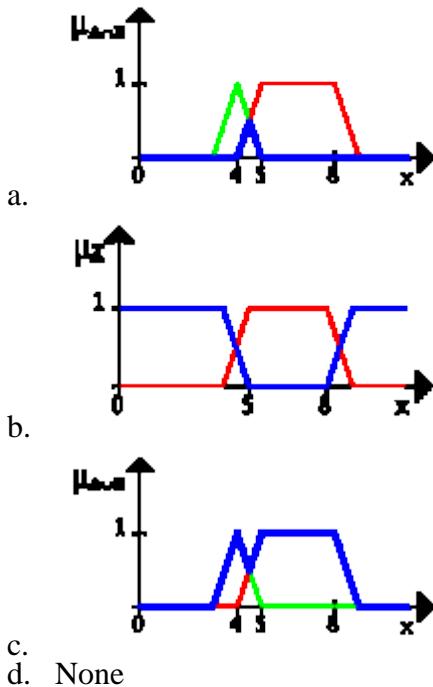
9. what are the following sequence of steps taken in designing a fuzzy logic machine?

- a. Fuzzification -> Rule Evaluation --> Defuzzification
- b. Rule Evaluation -->Fuzzification ->Defuzzification
- c. Defuzzification-->Rule Evaluation -->Fuzzification
- d. Fuzzy Sets-->Defuzzification-->Rule Evaluation

Ans: a

Explanation: fuzzification, rule evaluation and defuzzification are the general steps

10. Given these fuzzy graphs for member functions A and B.Which of the following graphs yields the result of the operation A OR B.



Ans: C

11. What Is Fuzzy Inference Systems?

- a. The process of formulating the mapping from a given input to an output using fuzzy logic
- b. Changing the output value to match the input value to give it an equal balance
- c. Having a larger output than the input
- d. Having a smaller output than the input

Ans: a

12. What Is another Name For Fuzzy Inference Systems?

- a. Fuzzy Expert System
- b. Fuzzy Modelling
- c. Fuzzy Logic Controller
- d. All the Options

Ans: a

13. _____ is/are the way/s to represent uncertainty.

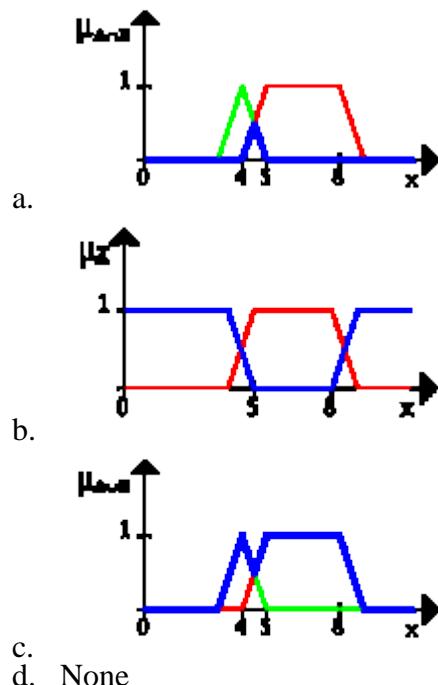
- a. Fuzzy Logic
- b. Probabilty

- c. Entropy
- d. All of the mentioned

Ans: d

Explanation: Entropy is amount of uncertainty involved in data.

14. Given these fuzzy graphs for member functions A and B. Which of the following graphs yields the result of the operation A AND B.



Ans: a

15. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.

- A. True
- B. False

Ans: A

16. Fuzzy Computing

- A. mimics human behaviour
- B. doesn't deal with 2 valued logic
- C. deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D. All of the above

Ans: D

Explanation: Fuzzy deals with imprecise, uncertain, ambiguous, inexact, or probabilistic can represent linguistic variables and partial membership in more than two sets

17 The region of universe that is characterized by complete membership in the set is called

A. Core

B. Support

C. Boundary

D. Fuzzy

Ans: A

Explanation: As per the definition

18 Three main basic features involved in characterizing membership function are

A. Intuition, Inference, Rank Ordering

B. Fuzzy Algorithm, Neural network, Genetic Algorithm

C. Core, Support , Boundary

D. Weighted Average, center of Sums, Median

Ans: C

Explanation: As per the definition

19 Membership function can be thought of as a technique to solve empirical problems on the basis of

A. knowledge

B. examples

C. learning

D. experience

Ans: D

Explanation: It depends on individual's perception

20 In a Fuzzy set a prototypical element has a value

A. 1

B. 0

C. infinite

D. Not defined

Ans: A

Explanation: As per the definition

21 A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe

- A. convex fuzzy set
- B. concave fuzzy set
- C. Non concave Fuzzy set
- D. Non Convex Fuzzy set

Ans: A

Explanation: As per the definition

22. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.

- A. Convex Fuzzy Set
- B. Non convex fuzzy set
- C. Normal Fuzzy set
- D. Sub normal fuzzy set

Ans: B

Explanation: As per the definition

23 The process of converting crisp input to fuzzy output is called as.....

- A. Fuzzification
- B. Defuzzification

Ans: A

Explanation: As per the definition

24 The process of converting fuzzy input to crisp output is called as.....

- A. Fuzzification
- B. Defuzzification

Ans: B

Explanation: As per the definition

25. Traditional set theory is called as....

- a. Fuzzy sets
- b. Crisp sets

Explanation: As per the definition

26. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **Intersection** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: A

27. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **Union** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: B

28. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **complement for A** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: C

29. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy **complement for B** operation is represented as

- a) $\min(mf_A, mf_B)$
- b) $\max(mf_A, mf_B)$
- c) $1 - mf_A$
- d) $1 - mf_B$

Ans: d

30 In propositional logic $P \Leftrightarrow Q$ is equivalent to (Where \sim denotes NOT):

- a. $\sim(P \vee Q) \wedge \sim(Q \vee P)$
- b. $(\sim P \vee Q) \wedge (\sim Q \vee P)$
- c. $(P \vee Q) \wedge (Q \vee P)$
- d. $\sim(P \vee Q) \rightarrow \sim(Q \vee P)$

Ans:B

31. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy **fuzzy min-max composition** is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: b

32. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy **fuzzy max-min composition** is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: a

33. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy **fuzzy max-product composition** is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: c

34. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **A Union B**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: a

35. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **A Intersect B**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: b

36. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **complement of A**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: c

37. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then **complement of B**

- a.** {1,0.5,0.8}
- b.** {0.9,0.2,0}
- c.** {0,0.8, 0.2}
- d.** {0.1,0.5,1}

Ans: d

38. Following are defuzzification techniques

- a. Max-membership principle
- b. Centroid method
- c. Weighted average method.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques

39. Following are defuzzification techniques

- a. Lamdda cut method
- b. Centroid method
- c. Center of sums.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques

40. Following are defuzzification techniques

- a. Mean-max membership
- b. Center of large area
- c. First of maxima, last of maxima.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques

41. fuzzy approximate reasoning methods are

- a. categorical reasoning;
- b. qualitative reasoning;
- c. syllogistic reasoning;
- d. All of above

Ans: d

Explanation: All above are techniques of approximation

42. fuzzy approximate reasoning methods are

- a. categorical reasoning;
- b. qualitative reasoning;
- c. dispositional reasoning.
- d. All of above

Ans: d

Explanation: All above are techniques of approximation

43. Following are types of fuzzy Inference system

- a. Fuzzy controller
- b. Fuzzy expert system
- c. Mamdani FIS
- d. none of above

Ans: C

Explanation: Mamdani and Sugeno are types of FIS

44. Following are types of fuzzy Inference system

- a. Fuzzy controller
- b. Fuzzy expert system
- c. Sugeno FIS
- d. none of above

Ans: C

Explanation: Mamdani and Sugeno are types of FIS

45. Fuzzy propositions like short, Tall, Quick are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fu:zzy qualifiers

Ans: a

Explanation: Fuzzy predicates are tall, short , quick

46. Fuzzy propositions like moderately, rather, slightly are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy qualifiers

Ans:b

Explanation: As per the definition

47. Fuzzy propositions like most, several, many, & frequently are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fu:zzy qualifiers

Ans: C

Explanation: As per the definition

48. Fuzzy propositions that shows truth value or probability value are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy qualifiers

Ans: d

Explanation: As per the definition

49. Fuzzy propositions like rail, short, Tall, Quick are comes under

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy possibility qualification:

Ans: A

Explanation: As per the definition

50. In which type of FIS (fuzzy inference System) , output membership function is linear or constant

- a. Sugeno FIS
- b. Mamdani FIS

Ans: a

51. For describing fuzzy variables, modifiers like very, highly, slightly, moderately, plus, minus, fairly are called

- a. Linguistic variables
- b. Linguistic hedges

Ans: b

Explanation: As per the definition

52. For fuzzy variable Height, values like tall, small are called as

- a. Linguistic variables
- b. Linguistic hedges

Ans: a

Explanation: As per the definition

53. The values of the set membership is represented by _____

- a) Discrete Set
- b) Degree of truth
- c) Probabilities
- d) Both Degree of truth & Probabilities

Answer: b

Explanation: Both Probabilities and degree of truth ranges between 0 – 1.

54. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____

- a) Fuzzy Set
- b) Crisp Set
- c) Fuzzy & Crisp Set
- d) None of the mentioned

Answer: a

Explanation: Fuzzy logic deals with linguistic variables.

55. The truth values of traditional set theory is _____ and that of fuzzy set is _____

- a) Either 0 or 1, between 0 & 1
- b) Between 0 & 1, either 0 or 1
- c) Between 0 & 1, between 0 & 1
- d) Either 0 or 1, either 0 or 1

Answer: a

Explanation: Refer the definition of Fuzzy set and Crisp set.

56. Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.

- a) AND
- b) OR
- c) NOT
- d) All of the mentioned

Answer: d

Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;

57. Like relational databases there does exists fuzzy relational databases.

- a) True
- b) False

Answer: a

Explanation: Once fuzzy relations are defined, it is possible to develop fuzzy relational databases. The first fuzzy relational database, FRDB, appeared in Maria Zemankova dissertation.

58 What is the form of Fuzzy logic?

- a) Two-valued logic
- b) Crisp set logic
- c) Many-valued logic
- d) Binary set logic

Answer: c

Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.

59. What Is The Purpose Of Aggregation?

- A. To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs
- B. To gather all the possible inputs and use the average to gain an output
- C. To gather all the different fuzzy set outputs and averages them out to get a single value
- D. To subtract all the output fuzzy set values from the input values

Ans: A

Explanation: Aggregate operation combines them into single fuzzy set. (it is not a average)

60. What Are The Two Types Of Fuzzy Inference Systems?

- A. Model-Type and System-Type
- B. Momfred-Type and Semigi-Type
- C. Mamdani-Type and Sugeno-Type
- D. Mihni-Type and Sujgani-Type

Ans: C

Explanation: Mamdani and Sugeno are types of FIS

61. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be

- a. $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- b. $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- c. $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- d. None of the above

Answer:c

Explanation: e.g $0/2 < 0.5$ hence $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$

62. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 2$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {4, 5, 6, 7, 8, 9, 10}
- d. None of the above

Answer: d

Explanation: no membership value above 2

63. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / x$ Then the α cut corresponding to $\alpha = 1$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {4, 5, 6, 7, 8, 9, 10}
- d. None of the above

Answer: b

Explanation: all the values equal or above to α are considered in α cut

64. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x$ Then the α cut corresponding to $\alpha = 5$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {5, 6, 7, 8, 9, 10}
- d. None of the above

Answer:C

Answer: all the values equal or above to α are considered in α cut

65. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x$ Then the α cut corresponding to $\alpha = 8$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {9, 10}
- c. {8, 9, 10}
- d. None of the above

Answer:C

Explanation: all the values equal or above to α are considered in α cut

66 . Consider a fuzzy set old as defined below

Old = {(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)}

Then the alpha-cut for alpha = 0.4 for the set old will be

- a.** $\{(40, 0.4)\}$
- b.** $\{50, 60, 70, 80\}$
- c.** $\{(20, 0.1), (30, 0.2)\}$
- d.** $\{(20, 0), (30, 0), (40, 1), (50, 1), (60, 1), (70, 1), (80, 1)\}$

Ans: d

Explanation: all the values equal or above to α are considered in α cut

68 . Consider a fuzzy set old as defined below

$$\text{Old} = \{(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)\}$$

Then the alpha-cut for alpha = 1 for the set old will be

- a.** $\{(40, 0.4)\}$
- b.** $\{70, 80\}$
- c.** $\{(20, 0.1), (30, 0.2)\}$
- d.** $\{(20, 0), (30, 0), (40, 0), (50, 0), (60, 0), (70, 1), (80, 1)\}$

Ans: d

Explanation: all the values equal or above to α are considered in α cut

69. The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$

- a.** $h(A) = 0$
- b.** $h(A) < 0$
- c.** $h(A) = 1$
- d.** $h(A) < 1$

Ans: c

Explanation: Support of MF =1

70. A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$

- a.** Core
- b.** Support
- c.** Cross-over
- d.** α - cut

Ans: c

Explanation: Cross-over point =0.5

71. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.1, 0.5, 0.6, 0.1, 0.8\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: d

Explanation: intersection is minimum value of MF

72. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cup \mu_B$ will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.1, 0.5, 0.6, 0.1, 0.8\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: a

Explanation: Union is maximum value of MF

73. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of complement($\sim \mu_A$) will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.8, 0.5, 0.4, 0.9, 0.1\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: c

Explanation: complement is 1-mf

74. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of complement($\sim \mu_B$) will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.9, 0.5, 0.8, 0.3, 0.2\}$
- c. $\{0.8, 0.5, 0.4, 0.9, 0.1\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$

Ans: b

Explanation: complement is 1-mf

75. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value of $A \cup B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: a

Explanation: Maximum of mf

76. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value of $A \cap B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: minimum of mf

77. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim A$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans:c

Explanation: 1- mf

78. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans:d

Explanation: 1- mf

78. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $A \cap \sim B$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) min of mf

79. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $A \cup \sim B$ will be

- a. $\{0.5, 0.6, 0.8, 0.2\}$
- b. $\{0.1, 0.3, 0.1, 0\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: a

Explanation: i) 1- mf ii) max of mf

80. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim A \cup \sim B$ will be

- a. $\{0.5, 0.6, 0.8, 0.2\}$
- b. $\{0.9, 0.6, 0.5, 0.8\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) max of mf

81. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim A \cup B$ will be

- a. $\{0.5, 0.6, 0.8, 0.2\}$
- b. $\{0.9, 0.7, 0.5, 1\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) max of mf

82. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cap B)$ will be

- a. $\{0.5, 0.4, 0.1, 0.8\}$
- b. $\{0.9, 0.7, 0.5, 1\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: a

Explanation: i) 1- mf ii) min of mf

83. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cap \sim B)$ will be

- a. $\{0.5, 0.4, 0.1, 0.8\}$
- b. $\{0.9, 0.7, 0.8, 0.8\}$
- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$

Ans: b

Explanation: i) 1- mf ii) min of mf

84. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cap B)$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.5, 0.6, 0.5, 0\}$
- d. $\{0.9, 0.7, 0.9, 0.8\}$

Ans: d

Explanation: i) min of mf ii) 1- mf

85. If A and B are two fuzzy sets with membership functions:

$$\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$ then the value $\sim(A \cup B)$ will be

- a. $\{0.5, 0.4, 0.5, 1\}$
- b. $\{0.1, 0.3, 0.1, 0.2\}$
- c. $\{0.5, 0.6, 0.5, 0\}$
- d. $\{0.9, 0.7, 0.9, 0.8\}$

Ans: b

Explanation: i) max of mf ii) 1- mf

86. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cup B)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.1, 0.5, 0.4, 0.2, 0.2\}$
- d. $\{0.1, 0.5, 0.4, 0.2, 0.3\}$

Ans: a

Explanation: Union is maximum of MF

87. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cap B)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.1, 0.5, 0.4, 0.2, 0.2\}$
- d. $\{0.1, 0.5, 0.4, 0.2, 0.3\}$

Ans: b

Explanation: Intersection is minimum of MF

88. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim \mu(A)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.4, 0.5, 0.9, 0.3, 0.2\}$
- d. $\{0.1, 0.8, 0.4, 0.2, 0.5\}$

Ans: c

Explanation: Complement is 1- of MF

89. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim \mu(B)(x)$ will be

- a. $\{0.9, 0.5, 0.6, 0.8, 0.8\}$
- b. $\{0.6, 0.2, 0.1, 0.7, 0.5\}$
- c. $\{0.4, 0.5, 0.9, 0.3, 0.2\}$

- d.** {0.1, 0.8, 0.4, 0.2, 0.5}

Ans: d

Explanation: Complement is 1- of MF

90. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim\mu(A \cup B)(x)$ will be

- a.** {0.9, 0.5, 0.6, 0.8, 0.8}
- b.** {0.6, 0.2, 0.1, 0.7, 0.5}
- c.** {0.4, 0.5, 0.9, 0.3, 0.2}
- d.** {0.1, 0.5, 0.4, 0.2, 0.2}

Ans: d

Explanation: Max of MF then 1- of MF

91. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cup \sim B)(x)$ will be

- a.** {0.9, 0.5, 0.6, 0.8, 0.8}
- b.** {0.6, 0.2, 0.1, 0.7, 0.5}
- c.** {0.6, 0.8, 0.4, 0.7, 0.8}
- d.** {0.1, 0.8, 0.4, 0.2, 0.5}

Ans: c

Explanation: Max of MF , 1- of MF

92. If A and B are two fuzzy sets with membership functions

$$\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(\sim A \cup B)(x)$ will be

- a.** {0.9, 0.5, 0.6, 0.8, 0.8}
- b.** {0.6, 0.2, 0.1, 0.7, 0.5}
- c.** {0.4, 0.5, 0.9, 0.3, 0.2}
- d.** {0.9, 0.5, 0.9, 0.8, 0.5}

Ans: d

Explanation: Max of MF , 1- of MF

93. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____

- a) Fuzzy Set
- b) Crisp Set
- c) Fuzzy & Crisp Set
- d) None of the mentioned

Answer: a

Explanation: Fuzzy logic deals with linguistic variables.

94. The values of the set membership is represented by _____

- a) Discrete Set
- b) Degree of truth
- c) Probabilities
- d) Both Degree of truth & Probabilities

Answer: b

Explanation: Both Probabilities and degree of truth ranges between 0 – 1.

95. Japanese were the first to utilize fuzzy logic practically on high-speed trains in Sendai.

- a) True
- b) False

Answer: a

Explanation: None.

96 Compute the value of adding the following two fuzzy integers:

$$A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$$

$$B = \{(0.5,11), (1,12), (0.5,13)\}$$

Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(y)))$

Then, $f(A+B)$ is equal to

- a. $\{(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)\}$
- b. $\{(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)\}$
- c. $\{(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$
- d. $\{(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)\}$

Ans: d

Explanation: As per the formula

97. Let R and S be two fuzzy relations defined as follows. Then, the resulting relation, T, which relates elements of universe of X to elements of universe of Z using max-product composition is given by

$$R = \begin{matrix} & y_1 & y_2 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.7 & 0.5 \\ 0.8 & 0.4 \end{matrix} \right] \end{matrix}$$

and $S = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} y_1 \\ y_2 \end{matrix} & \left[\begin{matrix} 0.9 & 0.6 & 0.2 \\ 0.1 & 0.7 & 0.5 \end{matrix} \right] \\ z_1 & z_2 & z_3 \end{matrix}$

(A) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.68 & 0.89 & 0.39 \\ 0.76 & 0.72 & 0.32 \end{matrix} \right] \end{matrix}$

(B) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.68 & 0.89 & 0.39 \\ 0.72 & 0.76 & 0.32 \end{matrix} \right] \end{matrix}$

(C) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.63 & 0.42 & 0.25 \\ 0.72 & 0.48 & 0.20 \end{matrix} \right] \end{matrix}$

(D) $T = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \left[\begin{matrix} 0.05 & 0.35 & 0.14 \\ 0.04 & 0.28 & 0.16 \end{matrix} \right] \end{matrix}$

Ans: D

Explanation: As per the formula

98. Consider above example and compute Max_min composition, Min_max composition

Ans: []

Explanation: As per the formula i) max (min(u(R),u(s)), ii) min(max(u(R),u(s))

99. Let A be the set of comfortable houses given as follows. Then the set of comfortable and affordable houses is

$$A = \left\{ \frac{x_1}{0.8}, \frac{x_2}{0.9}, \frac{x_3}{0.1}, \frac{x_4}{0.7} \right\}$$

and B be the set of affordable houses

$$B = \left\{ \frac{x_1}{0.9}, \frac{x_2}{0.8}, \frac{x_3}{0.6}, \frac{x_4}{0.2} \right\}$$

(A) $\left\{ \frac{x_1}{0.8}, \frac{x_2}{0.8}, \frac{x_3}{0.1}, \frac{x_4}{0.2} \right\}$

(B) $\left\{ \frac{x_1}{0.9}, \frac{x_2}{0.9}, \frac{x_3}{0.6}, \frac{x_4}{0.7} \right\}$

(C) $\left\{ \frac{x_1}{0.8}, \frac{x_2}{0.8}, \frac{x_3}{0.6}, \frac{x_4}{0.7} \right\}$

(D) $\left\{ \frac{x_1}{0.7}, \frac{x_2}{0.7}, \frac{x_3}{0.7}, \frac{x_4}{0.9} \right\}$

Ans: B

Explanation: AND is Minimum of MF

100. Fuzzy membership function with only one member with value one is called..

- a. Singleton
- b. Core
- c. Boundary
- d. Support

Ans: a:

Explanation: As per the definition

101. Let $h(A)$ denote the height of a fuzzy set A. A is called a normal fuzzy set if

- a) $h(A)=0$
- b) $h(A)=1$
- c) $h(A)<1$
- d) $h(A)>1$

Ans: b

Explanation: As per the definition

102. Let A be a fuzzy set. Then 1-cut of A is usually called

- a)Support of A
- b) height of A
- c) Core of A
- d)cut of A5.

Ans: C

Explanation: core of MF has values 1

103. The boundary condition satisfied by the standard fuzzy complement is

- a) $c(0)=1$ and $c(1)=1$
- b) $c(0)=0$ and $c(1)=1$
- c) $c(0)=0$ and $c(1)=0$
- d) $c(0)=1$ and $c(1)=0$.

Ans: D

Explanation: Boundary is between 0 to 1 its complement is 1 to 0

104. Each fuzzy complement has atmost-----equilibrium.

- a)1
- b)2
- c) 3
- d) None of these

Ans: A

Explanation: MF is between 0 to 1

Subject: Soft computing Optimization Algorithm

Unit-4 Evolutionary Computing

1. Which of the following is not a discrete optimization problem?

- A Travelling salesman problem
- B Robot control
- C Chess playing program
- D Prediction of stock prices

Ans: B

Explanation: Robot control is controller system

2. Which of the following are discrete optimization problems?

- A Travelling salesman problem
- B Prediction of stock prices
- C Chess playing program
- D All of above

Ans: D

Explanation: All are applications of GA or EA

3. Exploration search is

- A Concerned with improving the current best solution by local search
- B Concerned with global search
- C Often resulting in getting stuck in local optima
- D None of above

Ans: B

Explanation: Exploitation means using already exist solutions and make refinement to it so it's fitness will improve

4. Evolutionary algorithm: Initialization

- A Individuals are normally generated randomly
- B Is concerned with generating candidate solutions
- C Heuristics for generating candidates can be applied
- D All of above

Ans: D

Explanation: All above are true

5. Evolutionary algorithm: Variation operators

- A Is a selection operator
- B Act on population level
- C Act on individual level
- D Are crossover and mutation

Ans: B, D

Explanation: variation operations are crossover and mutation

6. Evolutionary algorithm: Recombination

- A Also known as crossover
- B Combines elements of two or more genotypes
- C Also known as mutation
- D Also known as representation

Ans: A, B

Explanation: Recombination is also known as crossover

7. Evolutionary algorithm: Survivor selection

- A Is often stochastic
- B Also known as replacement
- C Can be fitness based
- D Can be age based

Ans: B,C,D

Explanation: Survivor selection can be based on fitness value, age

8. Evolutionary algorithm: Termination condition

- A Several termination criteria can be combined
- B Determines when to compute the fitness for a population
- C Should be avoided to get faster evolution
- D None of above

Ans: A

Explanation: Termination conditions like max iteration, time out, no change in fitness can be combined

9. Evolutionary algorithm: Termination condition

- A None of above
- B Determines when to compute the fitness for a population
- C Is checked in every generation
- D Should be avoided to get faster evolution

Ans: C

Explanation: checked after every iteration to end the search

10 Tree representation (choose multiple)

- A Is used in Genetic Programming
- B Mutation results in replacing a randomly chosen subtree by a randomly generated tree
- C Not suited for representing computer programs
- D Is used in Genetic Algorithms

Ans: A,B

Explanation: Suitable for GP to generate computer programs

11 Rank based selection

- A Results in less control of the selection pressure than fitness-proportionate selection
- B Use absolute rather than relative fitness
- C Ranking can be either linear or non-linear
- D None of above

Ans: C

Explanation: Chromosomes are ranked based on fitness value

12 Simple Genetic Algorithm (GA) (choose multiple)

- A Children compete with parents in survival selection
- B Both crossover and mutation are applied in each generation
- C The whole population is replaced with the resulting offspring
- D All of above

Ans: B,C

Explanation: Whole population get replaced with new child

13 Evolutionary Strategies (ES)

- A (μ , λ): Select survivors among parents and offspring
- B ($\mu+\lambda$): Select survivors among parents and offspring
- C ($\mu-\lambda$): Select survivors among offspring only
- D ($\mu:\lambda$): Select survivors among offspring only

Ans: B

Explanation: The form of $(\mu + \lambda)$ -ES models in which μ specified the size of the parent population and λ specified the size of the offspring population

14 What is most important to be concerned with in the evolution of repetitive problems?

- A Do multiple runs until a good solution is found
- B Execute one run until the solution is good enough
- C Get a reasonably good solution every time
- D Get a very good result just once

Ans: C

Explanation: Iterative process looking for good solutions in every iterations

15. What are normally the two best measurement units for an evolutionary algorithm?

- A Number of Generations
- B Elapsed time
- C CPU time
- D Population size

Ans: A, B

Explanation: CPU time is hardware dependent and number of population specifies size of search area.

16. What are normally the two best measurement units for an evolutionary algorithm?

- A Number of evaluations
- B Elapsed time
- C CPU time
- D Number of generations

Ans: B, D

Explanation: CPU time is hardware dependent and number of evaluations is not important

17 Tree representation (choose multiple)

- A Is used in Genetic Programming
- B Mutation results in replacing a randomly chosen subtree by a randomly generated tree
- C Suited for representing computer programs
- D All of above

Ans: D

Explanation: Suitable for GP to generate computer programs

18 Simple Genetic Algorithm (GA)

- A Fitness get evaluated at the end of every iteration
- B Both crossover and mutation are applied in each generation
- C The whole population is replaced with the resulting offspring
- D All of above

Ans: D

Explanation: Recombination-evaluation- replacement are steps of GA

19. In Evolutionary Strategy , individuals are represented as

- a. real value
- b. Binary
- c. tree
- d. Octal

Ans. A

Explanation: The focus of the evolution strategy (ES) paradigm was on real-valued function optimization. Hence, individuals were naturally represented as vectors of real numbers.

20. In early EA or ES, parent selection is based on

- a. Roulette Wheel
- b. Order of fitness
- c. Probabilistic normal distribution
- d. All of above

Ans: c

Explanation: parent selection is based on Probabilistic normal distribution

21. In EP, population is the combination of parent and child

- a. True
- b. False

Ans: a

Explanation: The evolutionary programming (EP) paradigm concentrated on models involving a fixed-size population of N parents, each of which produced a single offspring. The next generation of N parents was determined by combining both parents and children into a single population of size $2N$, rank ordering them by fitness and allowing only the top N to survive.

22. In GA, population is the combination of Parent and child

- a. True
- b. False

Ans: b

Explanation: parent gets replaced by child

23. In EA, the new offspring is forced to compete immediately for survival against an existing member of the population

- a. True
- b. False

Ans: a

Explanation: If the objective fitness of the child is greater than the selected member, the child survives and the old member dies off. Otherwise, the child dies without ever residing in the population.

24 In EA, the entire parent population dies off each generation and the offspring only compete with each other for survival

- a. non-overlapping models
- b. overlapping models

Ans: a

Explanation: As per definition

25 In EA, offspring compete with each other and parents for survival

- a. non-overlapping models
- b. overlapping models

Ans: b

Explanation: As per definition

26. In EA, premature convergence takes place due to

- a. Survival selection pressure
- b. Selection method

- c. Complexity of problems
- d. too much exploitation

Ans: d

Explanation: For problems that exhibit highly multi-modal (rugged) fitness landscapes or landscapes that change over time, too much exploitation generally results in premature convergence to suboptimal peaks in the space.

27. In EA, offspring compete with parent or other offspring is called...

- a. Survival Selection
- b. Tournament Selection
- c. Competition
- d. None of above

Ans: a

Explanation: As per the definition

28. In EV, $(\mu+\lambda)$ model is supported by

- a. Evolutionary Strategy
- b. Evolutionary Programming
- c. Evolutionary Algorithms
- d. All of Above

Ans: a

Explanation: The form of $(\mu + \lambda)$ -ES models in which μ specified the size of the parent population and λ specified the size of the offspring population

29. In EC, following are the selection methods

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. All are above

Ans: d

Explanation: These are non-overlapping generation modules

30. In EC, following are the selection methods

- a. Rank-Proportional Selection
- b. Tournament Selection
- c. Fitness-Proportional Selection
- d. All of above

Ans: d

Explanation: These are non-overlapping generation modules

31. In EC, genotype is selected based on maximum fitness value is called

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection

- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: b

Explanation: As per the definition

32. In EC, only the k most fit individuals are selected from a pool of individuals of size $r > k$ is ..

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: c

Explanation: As per the definition

33. In EC, selection based on sorting the members of a selection pool by fitness is ...

- a. Uniform (Neutral) Selection
- b. Fitness-Biased Selection
- c. Truncation Selection
- d. Rank-Proportional Selection

Ans: d

Explanation: As per the definition

34. In EC selection, picking q individuals from the selection pool using a uniform probability distribution with replacement and designating the winner of that tournament as the one with the best fitness is

- a. Rank-Proportional Selection
- b. Tournament Selection
- c. Fitness-Proportional Selection
- d. Fitness_biased

Ans: b

Explanation: As per the definition

35. The difference between rank proportional and tournament selection is that genotypes are sorted in order to fitness value in rank proportional

- a. True
- b. False

Ans: a

Explanation: A potential computational disadvantage to truncation and linear ranking selection methods is that they require the selection pool to be sorted by fitness.

36. The difference between truncation and tournament selection is that genotypes are sorted in order to fitness value in truncation proportional

- a. True
- b. False

Ans: a

Explanation: A potential computational disadvantage to truncation and linear ranking selection methods is that they require the selection pool to be sorted by fitness.

37. In EA, recombination operation on p1: AB|CD and p2: ab|cd produces

- a. ABab
- b. ABcd
- c. ABCD
- d. abCD

Ans: b

Explanation: Recombination operation in EA is crossover here at point 2

38. In EA, recombination operation on p1: ABC|DEF and p2: abc|def produces

- a. ABCabc
- b. ABCdef
- c. ABCDef
- d. abcDEF

Ans: b

Explanation: Recombination operation in EA is crossover here at point 3

Note: In evolutionary algorithms two parents produce single child, whereas in GA two parents produce 2 children.

39. In EA, recombination operation on p1: AB|CD|EF and p2: ab|cd|ef produces

- a. ABcdEF
- b. abCDEF
- c. ABCDef
- d. abcDEF

Ans: a

Explanation: Recombination operation in EA is crossover here at point 2 and 4

40. In EA, recombination operation on p1: A|BCDE|F and p2: a|bcde|f produces

- a. ABcdEF
- b. abCDEF
- c. AbcdeF
- d. abcDEF

Ans: c

Explanation: Recombination operation in EA is crossover here at point 2 and 4

41. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 1122 produces

- a. ABcd
- b. abCD

c. ABCD

d. abcd

Ans: a

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

42. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 2211 produces

a. ABcd

b. abCD

c. ABCD

d. abcd

Ans: b

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

43. In EA, recombination operation on p1: ABCDEF and p2: abcdef with flip sequence 221122 produces

a. ABcdcd

b. abCDef

c. ABCDef

d. abcdEF

Ans: b

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

44. In EA, recombination operation on p1: ABCDEF and p2: abcdef with flip sequence 112211 produces

a. ABcdEF

b. abCDef

c. ABCDef

d. abcdEF

Ans: a

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

45. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 1212 produces

a. ABcd

b. abCD

c. AbCd

d. abcd

Ans: c

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

46. In EA , parent selection and survival selection is same

- a. True
- b. False

Ans: b

Explanation: Offspring compute with parent or other offspring for survival is called survival selection

47. In Evolutionary Algorithm, the whole population is replaced with the resulting offspring

- a. True
- b. False

Ans: b

Explanation: population is combination of parents and offspring

48 Simple Evolutionary Algorithm (EA) (choose multiple)

- A Children compete with parents in survival selection
- B Both crossover and mutation are applied in each generation
- C The whole population is replaced with the resulting offspring
- D All of above

Ans: A, B

Explanation: population is combination of parents and offspring hence survival selection occurs

49. In EA, ----asexual operation is

- a. representation
- b. Recombination
- c. Mutation
- d. none of above

Ans: c

Explanation: Mutation is performed on single parent only

50. In EA, ----sexual operation is

- a. representation
- b. Recombination
- c. Mutation
- d. none of above

Ans: b

Explanation: Recombination (crossover) is performed on two parents

Unit-5 Genetic Algorithms

1 Genetic Algorithms: Variable length encoding is possible in

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans: A

Explanation: Variable size encoding is possible in Messy GA

2 Genetic Algorithms: parameters can be changes runtime

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans : B

Explanation: parameters can be changes runtime in adaptive GA

3. Genetic Programming: representation is

- A. binary encoding
- B: Tree encoding
- C: Hex encoding
- D: Real value encoding

Ans: B

Explanation: Tree encoding is used to represent computer programs in GP

4. Generation of Computer programs is possible in

- A: Genetic Algorithms
- B. Genetic Programming
- C. Evolutionary Algorithms
- D. Evolutionary Strategy

Ans: B

Explanation: Computer programs can be output in GP

5. Probability of sub string get propagated in next generation is derived by

- A. Schema theorem
- B. Holland Classifiers
- C. Roulette wheel
- D. fitness evaluation

Ans: A

Explanation: Schema theorem is used to compute Probability of sub string get propagated in next generation

6. Following are the evaluation parameters for schema theorem (Choose multiple answers)

- A. Schema order
- B. Schema length
- C. representation technique
- D. None of above

Ans: A, B

Explanation: order and length are used

7. Schema theorem defines, there is high probability for sub strings to propagate in next generation if

- A. high order and short length
- B. High order and long length
- C. Low order and short length
- D. Low order and long length

Ans: C

Explanation: As per the theorem

8. Genetic algorithm: Mutation operators

- A. Is a selection operator
- B. Act on population level
- C. Act on individual level
- D. Is an encoding technique

Ans: C

Explanation: mutation act on one parent at a time

9. Genetic algorithm: Selection operators

- A Is a mutation operator
- B Act on population level
- C Act on individual level
- D Is an encoding technique

Ans: B

Explanation: Selection is based on whole population

10. Genetic algorithm: Crossover operators

- A Is a mutation operator
- B Act on population level
- C Act two individual level
- D Is an encoding technique

Ans: c

Explanation: Crossover combines two parents to produce two childs

11. Genetic Algorithms: chromosomes are represented using:

- A binary
- B Octal
- C Real value
- D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string are way to represent chromosomes

12. Genetic Algorithms: Diversification is carried out due to

- A Selection
- B Mutation
- C Crossover
- D Fitness evaluation

Ans: B

Explanation: As per definition

13. Genetic algorithms: chromosomes are selected randomly in

- A. Roulette Wheel
- B. Tournament
- C. Rank Selection
- D. Random selection

Ans: D

Explanation: Random Selection selects chromosomes randomly

14. Genetic algorithms: chromosomes selected based on selective pressure by holding a tournament competition

- A. Roulette Wheel
- B. Tournament
- C. Rank Selection
- D. Random selection

Ans: B

Explanation: As per definition

15. Genetic algorithms: chromosomes are selected based on highest fitness value

- A. Roulette Wheel
- B. Tournament
- C. Rank Selection
- D. Random selection

Ans: C

Explanation: As per definition

16. Rank based selection

- A Use relative rather than absolute fitness
- B Use absolute rather than relative fitness
- C Results in less control of the selection pressure than fitness-proportionate selection
- D None of above

Ans: A

Explanation: As per definition

17. The process of taking two parent solutions and producing from them a child is called

- A. Selection
- B. Crossover
- C. Mutation
- D. Reproduction

Ans: B

Explanation: As per definition

18. The two mating chromosomes are cut once at corresponding points and the sections after the cuts exchanged.

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: A

Explanation: As per definition

19. The process of taking single parent solutions and producing a child is called

- A. Selection
- B. Crossover
- C. Mutation
- D. Reproduction

Ans: C

Explanation: As per definition

20. The two mating chromosomes are cut more than one at corresponding points and the sections after the cuts exchanged.

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: B

Explanation: As per definition

21. The two mating chromosomes are crossover with the help of mask

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: C

Explanation: As per definition

22. The three mating chromosomes are crossovered in

- A. Three parent crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: A

Explanation: As per definition

23. Probability of how often crossover will be performed can be mentioned in

- A. Three parent crossover
- B. Double point crossover
- C. Crossover probability
- D. Uniform crossover

Ans: A

Explanation: As per definition

24. A mutation chromosome generated by changing bit 0 to 1 and 1 to 0 is

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: B

Explanation: As per definition

25. A mutation chromosome generated by selecting random position and the bits next to that position are reversed

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: D

Explanation: As per definition

26. A mutation chromosome generated by exchanging bits at randomly selected positions is

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: A

Explanation: As per definition

27. How often parts of chromosome will be mutated is

- A. Interchanging
- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: C

Explanation: As per definition

28. Stopping criteria for Genetic Algorithms is

- A. No change in fitness
- B. Maximum generation
- C. Elapsed time
- D. All of above

Ans: D

Explanation: All are stopping criteria for GA

29. In this type of GA, the GA does the global optimization while local refinement is done by the conventional method

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans: d

Explanation: Hybrid allows combination of traditional approaches with GA

30. In this type of GA, task of a basic GA is distributed on different processors

- A. Messy GA
- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans: C

Explanation: Parallel GA allows parallel execution on different processor

31. Genetic algorithms are used if

- A. The search space is large, complex
- B. No mathematical analysis is available
- C. Traditional search methods fail
- D. All of above

Ans: D

Explanation: All are applications of GA

32. Application of Genetic Algorithm

- A. Optimization
- B. Machine and robotic learning

C. Economic Model

D. All of above

Ans: D

Explanation: All are applications of GA

33. Architecture-altering operation is special operation present in

- A. Genetic Algorithm
- B. Genetic Programming
- C. Evolutionary Algorithms
- D. Evolutionary Computing

Ans: B

Explanation: It is found in GP

34. Basic steps of GA

- A. selection- fitness evaluation- recombination
- B. recombination - selection- fitness evaluation
- C. Fitness evaluation- Selection-recombination
- D. Selection- recombination-fitness evaluation

Ans: D

Explanation: It is the general flow of GA

35. In GA , 10100011 is ----- chromosome representation

- a. Binary
- b. Octal
- c. Real value
- d. Hexadecimal

Ans: a

Explanation: it is binary encoding representation

36. In GA , 9CEF is ----- chromosome representation

- a. Binary
- b. Octal
- c. Real value
- d. Hexadecimal

Ans: d

Explanation: it is hexadecimal encoding representation

37. In GA , 2348 is ----- chromosome representation

- a. Binary
- b. Octal
- c. tree encoding
- d. Hexadecimal

Ans: b

Explanation: it is Octal encoding representation

38. In GA , 1 2 4 8 is ----- chromosome representation

- a. Binary
- b. Octal
- c. Permutation encoding
- d. Hexadecimal

Ans: c

Explanation: it is permutation or real valued encoding representation

39. In GA , 1.25 2.45 4.45 8.67 is ----- chromosome representation

- a. Binary
- b. Octal
- c. Value encoding
- d. Hexadecimal

Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

40. In GA , ABCD, DEFG is ----- chromosome representation

- a. Binary
- b. Octal
- c. Value encoding
- d. Hexadecimal

Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

41. In GA {right}, {back}, {white}is ----- chromosome representation

- a. Binary
- b. Octal
- c. Value encoding
- d. Hexadecimal

Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

42. In GA , {right}, {back}, {white} is one of chromosome representation

- a. True
- b. false

Ans: a

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

43. In GA , abcd, efgt is one of chromosome representation

- a. True
- b. false

Ans: a

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

44. In GA, p1: 1010, P2:1100 are parents chromosome, in single point , crossover point 2 (lsb) produces:

- a. c1: 1000 c2: 1110
- b. c1: 1010 c2:1110
- c. c1: 1000 c2:1111
- d. c1:1100 c2:1010

Ans: a

Explanation: interchange string after cross over point

45. In GA, p1: 1010, P2:1100 are parents chromosome, in single point, crossover point 3 (lsb) produces:

- a. c1: 1000 c2: 1110
- b. c1: 1010 c2:1110
- c. c1: 1000 c2:1111
- d. c1:1100 c2:1010

Ans: d

Explanation: interchange string after cross over point

46. In GA, p1: 101 00 000, P2:110 01 111 are parents chromosome, in two point, crossover point 3 ,5 (lsb) produces:

- a. c1: 100 00 111 c2: 111 00 111
- b. c1: 101 01 000 c2: 110 00 111
- c. c1: 100 01 000 c2: 110 01 111
- d. c1:110 00 000 c2:101 01 111

Ans: b

Explanation: interchange string between cross over point

47. In GA, p1: 101 00 000, P2:110 01 111 are parents chromosome, in two point, crossover point 2 ,7 (lsb) produces:

- a. c1: 1 000011 1 c2: 1 110011 1
- b. c1: 1 01 0000 1 c2: 1 10 01 11 0
- c. c1: 1 000100 0 c2: 1 100111 1
- d. c1:1 100000 0 c2:1 010111 1

Ans: b

Explanation: interchange string between cross over point

48. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 1010 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1111 c2: 0000
- c. c1: 0000 c2: 1010
- d. c1:1010 c2:1111

Ans: a

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

49. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 0101 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1010 c2: 0101
- c. c1: 0000 c2: 1010
- d. c1:1010 c2:1111

Ans: b

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

50. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 0001 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1010 c2: 0101
- c. c1: 0001 c2: 1110
- d. c1:1010 c2:1111

Ans: c

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

51. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 1212 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH

d. c1: EFAB

Ans: a

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

52. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 2121 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH
- d. c1: EFAB

Ans: b

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

53. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 1122 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH
- d. c1: EFAB

Ans: c

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

54. In GA, p1: ABCD, P2:EFGH are parents chromosome, in *Precedence Preservative* crossover mask 2211 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH
- d. c1: EFAB

Ans: d

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

55. In GA, p1: 4 1| 1 3| 6 5 , P2: 2 3|1 4| 5 6 are parents chromosome, in *order* crossover produces:

- a. c1: 4 1| 3 1| 6 5 c2: 2 3| 4 1| 5 6
- b. c1: 4 1| 1 3| 6 5 c2: 2 3| 4 1| 5 6
- c. c1: 4 1| 3 1| 6 5 c2: 2 3| 1 4| 5 6
- d. c1: 4 1| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: a

Explanation: child 1 inherits its left and right section from parent 1, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

56. In GA, p1: 4 1| 5 3| 6 5 , P2: 2 3|1 6| 5 6 are parents chromosome, in *order* crossover produces:

- a. c1: 4 1| 3 5| 6 5 c2: 2 3| 1 6| 5 6
- b. c1: 4 1| 1 3| 6 5 c2: 2 3| 4 1| 5 6
- c. c1: 4 1| 3 1| 6 5 c2: 2 3| 1 4| 5 6
- d. c1: 4 1| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: a

Explanation: child 1 inherits its left and right section from parent 1, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

57. In GA, p1: 4 6| 5 3| 1 5, P2: 2 3|1 6| 5 6 are parents chromosome, in *order* crossover produces:

- a. c1: 4 6| 5 3| 1 5 c2: 2 3| 6 1| 5 6
- b. c1: 4 6| 1 3| 6 5 c2: 2 3| 6 1| 5 6
- c. c1: 4 6| 3 5| 1 5 c2: 2 3| 1 6| 5 6
- d. c1: 4 6| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: c

Explanation: child 1 inherits its left and right section from parent 1, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

58. In GA, p1:0011 are parent chromosome, in *flipping mutation* chromosome 1001 produces:

- a. 1001
- b. 1000
- c. 1010
- d. 0011

Ans: c

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

59. In GA, p1:0011 are parent chromosome, in *flipping mutation* chromosome 0110 produces:

- a. 1001
- b. 1000
- c. 1010
- d. 0101

Ans: d

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

60. In GA, p1:1111 are parent chromosome, in *flipping mutation* chromosome 1001 produces:

- a. 1001
- b. 0110
- c. 1010
- d. 0011

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

61. In GA, p1:1111 are parent chromosome, in *flipping mutation* chromosome 1011 produces:

- a. 1001
- b. 1011
- c. 1010
- d. 0011

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

62. In GA, p1:1111 0000 are parent chromosome, in *flipping mutation* chromosome 0000 1111 produces:

- a. 1111 0000
- b. 1111 1111
- c. 0000 1111
- d. 0000 0000

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

63. In GA, p1:1111 0000 are parent chromosome, in *flipping mutation* chromosome 1111 0000 produces:

- a. 1111 0000
- b. 1111 1111
- c. 0000 1111
- d. 0000 0000

Ans: d

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

64. In GA, p1:11110000 are parent chromosome, in interchanging mutation at position 1 and 8 (lsb) produces:

- a. 01110001
- b. 1111 1111

c. 0000 1111

d. 0000 0000

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

65. In GA, p1:11110000 are parent chromosome, in interchanging mutation at position 2 and 7 (lsb) produces:

a. 10110010

b. 1111 1111

c. 0000 1111

d. 0000 0000

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

66. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 1 and 4 (lsb) produces:

a. 1001

b. 0110

c. 1010

d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

67. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 2 and 3 (lsb) produces:

a. 1001

b. 0110

c. 1010

d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

68. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 1 and 3 (lsb) produces:

a. 1001

b. 0110

c. 1100

d. 0101

Ans: c

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

69. In GA, p1:1101 are parent chromosome, in interchanging mutation at position 3 and 4 (lsb) produces:

- a. 1101
- b. 0110
- c. 1100
- d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

70. In GA, p1:1101 are parent chromosome, in interchanging mutation at position 3 and 2 (lsb) produces:

- a. 1101
- b. 0110
- c. 1010
- d. 0101

Ans: c

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

71. In GA, p1:11 01 are parent chromosome, in reversing mutation at position 2 (lsb) produces:

- a. 1001
- b. 0110
- c. 1010
- d. 1101

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

72. In GA, p1:1 101 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 1 001
- b. 0 110
- c. 1 110
- d. 1 101

Ans: c

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

72. In GA, p1:1 100 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 1 001
- b. 0 110
- c. 1 110
- d. 1 010

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

73. In GA, p1:110011 are parent chromosome, in reversing mutation at position 4 (lsb) produces:

- a. 11 0011
- b. 11 1001
- c. 11 1100
- d. 11 0100

Ans: b

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

74. In GA, p1:110011 are parent chromosome, in reversing mutation at position 2 (lsb) produces:

- a. 11 0011
- b. 11 1001
- c. 11 1100
- d. 11 0011

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

75. In GA, p1:110011 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 110 101
- b. 111 001
- c. 111 100
- d. 110 011

Ans: a

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

76. In schema theorem, 111**0, order of schema is...

- a. 2
- b. 3
- c. 1

d. None of above

Ans: a

Explanation: Order is number of * (don't care, i.e. 0 or 1)

77. In schema theorem, $1^*1^{**}0$, order of schema is...

a. 2

b. 1

c. 3

d. 6

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

78. In schema theorem, $1^{***}0$, order of schema is...

a. 2

b. 1

c. 3

d. 4

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

79. In schema theorem, $10^*0^*1^*$, order of schema is...

a. 2

b. 1

c. 3

d. 7

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

80. In schema theorem, 10^*0^* , order of schema is...

a. 2

b. 1

c. 3

d. 5

Ans: a

Explanation: Order is number of * (don't care, i.e. 0 or 1)

81. In schema theorem, 10^*0^* , length of schema is...

a. 2

b. 1

c. 3

d. 5

Ans: a

Explanation: length is number of elements in between first non *to last *

82. In schema theorem, 10^{**} , length of schema is...

- a. 2
- b. 1
- c. 0
- d. 5

Ans: c

Explanation: length is number of elements in between first non *to last *

83. In schema theorem, 100^{**} , length of schema is...

- a. 2
- b. 5
- c. 0
- d. 1

Ans: d

Explanation: length is number of elements in between first non *to last *

84. In schema theorem, $100^{**}0$, length of schema is...

- a. 4
- b. 5
- c. 0
- d. 1

Ans: a

Explanation: length is number of elements in between first non *to last *

85. In schema theorem, $1*00^{**}0$, length of schema is...

- a. 4
- b. 5
- c. 0
- d. 1

Ans: b

Explanation: length is number of elements in between first non *to last *

86. In schema theorem, $1*00^{**}$, length of schema is...

- a. 4
- b. 5
- c. 0
- d. 2

Ans: d

Explanation: length is number of elements in between first non *to last *

87. In schema theorem, 1^{***} , length of schema is...

- a. 4
- b. 5

c. 0

d. 2

Ans: c

Explanation: length is number of elements in between first non *to last *

88. In schema theorem, 1^{***} , length and order of schema is...

a. 4,1

b. 1,3

c. 0,3

d. 3,1

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of *

89. In schema theorem, $1^{***}1$, length and order of schema is...

a. 3,5

b. 1,3

c. 0,3

d. 3,3

Ans: d

Explanation: length is number of elements in between first non *to last * and order is no. of *

90. In schema theorem, 1^*1^*1 , length and order of schema is...

a. 3,2

b. 1,3

c. 0,3

d. 3,3

Ans: a

Explanation: length is number of elements in between first non *to last * and order is no. of *

91. In schema theorem, 10^*00^* , length and order of schema is...

a. 6,2

b. 6,4

c. 3,2

d. 2,3

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of *

92. In schema theorem, 10^*0^* , length and order of schema is...

a. 6,2

b. 6,4

c. 3,2

d. 2,2

Ans: d

Explanation: length is number of elements in between first non *to last * and order is no. of *

93. In schema theorem, 00^{**} , length and order of schema is...

a. 4,2

b. 2,4

c. 0,2

d. 2,2

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of *

94. Genetic Algorithms: chromosomes are represented using:

A binary

B Octal

C Hexadecimal

D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string are way to represent chromosomes

95. Genetic Algorithms: chromosomes are represented using:

A binary

B Tree

C Hexadecimal

D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string, tree are way to represent chromosomes

96. In GA: compute fitness of 00110011, where fitness function is number of ones

a. 2

b. 8

c. 4

d. 0

Ans: c

Explanation: Fitness is computed as number of ones

96. In GA: compute fitness of 0011, where fitness function is number of ones

a. 2

b. 8

c. 4

d. 0

Ans: a

Explanation: Fitness is computed as number of ones

97. In GA: compute fitness of 0011, where fitness function is number of ones, what would be the best solution

a. 2, 15

b. 8, 15

c. 4, 8

d. 0, 8

Ans: a

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

98. In GA: For fitness function is number of ones, what would be the best solution for 4 bit string

a. 8

b. 15

c. 4

d. 2

Ans: b

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

99. In GA: For fitness function is number of ones, what would be the global minimum solution for 5 bit string

a. 11111

b. 10000

c. 00000

d. 00101

Ans: c

Explanation: Fitness is computed as number of ones, hence 00000 will produce best solution

100. In GA: For fitness function equal to number of ones, what would be the best solution for 4 bit string

a. 0000

b. 1111

c. 1010

d. 1110

Ans: b

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

Unit-6 Swarm Intelligence

1. Swarm intelligence

- A Global behaviour appears as a result of centralized control
- B In Particle Swarm Optimization, velocity and position of particles are updated
- C The probability of choosing a new edge in ant colony optimization is proportional with the pheromone level of the edge
- D All of above

Ans: D

Explanation: All are types of swarm intelligence

2. Biologically inspired computation is appropriate for

- A Optimization
- B Modelling
- C Simulation
- D. All of above

Ans: D

Explanation: Biological processes are simulated, modelled to solve optimization problems

3. In PSO, at every iteration particle changes

- A. only position
- B. Only Velocity
- C. Position and Velocity both
- D. None of above

Ans: C

Explanation: At every iterations position and velocity is updating

4. In PSO particles position is depend upon

- A. Inertial
- B. Individual best position
- C. Global best position
- D. All of above

Ans: D

Explanation: Factors affecting position are inertia, global and local positions

5. ACO is used in

- A. Graph coloring problem
- B. Travelling Sales Man
- C. Network routing
- D. All of above

Ans: D

Explanation: All above are application of ACO

6. In ACO, pheromone level is directly proportional to the distance

A. True

B: False

Ans: B

Explanation: Minimum distance higher the pheromone level

7. In ACO, pheromone level is inversely proportional to the distance

A. True

B: False

Ans: A

Explanation: Minimum distance higher the pheromone level

8. Gradient descent is optimization technique used to find

A. Local maximum

B. Local Minimum

C. Both A and B

D. None of above

Ans B

Explanation: it optimizes problem of minimization

9. Gradient ascent is optimization technique used to find

A. Local maximum

B. Local Minimum

C. Both A and B

D. None of above

Ans A

Explanation: it optimizes problem of maximization

10. In ACO, pheromone amount get decreases with some fraction, called as

A. Evaporation rate

B. Decade rate

C. Pheromone trail

D. None of above

Ans: A

Explanation: As per the definition

11. Social behaviour of animals is observed and implemented artificially is called

A. Artificial neural network

B. Genetic Programming

C. Swarm Intelligence

D. Evolutionary computing

Ans: C

Explanation: As per the definition

12. In ACO, selection probability of next node by ant is

- A. proportional to pheromone level present on connection link
- B. inversely proportional to pheromone level present on connection link
- C. proportional to evaporation rate
- D. None of above

Ans: A

Explanation: probability is higher if pheromone is higher

13. In PSO, next position p is computed as

- A. $p=p+1$
- B. $p=p+velocity$

Ans: B

Explanation: As per the formula

14. Evaporation value is

- a. 0
- b. 1
- c. Between 0 to 1
- d. none of above

Ans: c

Explanation: Rate is in between 0 to 1

15. $T_{ij}(t + n) = p \cdot T_{ij}(t) + \Delta T$ is the formula for updating

- a. pheromone level
- b. evaporation rate

Ans: a

Explanation: p stands for evaporation rate

16. $T_{ij}(t + n) = p \cdot T_{ij}(t) + \Delta T$ in this formula p is set to

- a. 0
- b. 1
- c. $0 < p < 1$
- d. any value

Ans: c

Explanation: p stands for evaporation rate, set between 0 to 1

17. In TSP for an ant to decide which city to visit next is calculated based on

- a. greedy approach
- b. Genetic Algorithms
- c. ACO
- d. All are above

Ans: d

Explanation: TSP is non-deterministic problem can be solved by any of above technique.

18. In TSP for an ant to decide which city to visit next is calculated based on

- a. Transition probability
- b. Simple probability

Ans: a

Explanation: Values are normalized all over the values (i.e adjacent cities are considered)

19. In ACO based TSP transition probability is

- a. Combination of heuristic rules and pheromone level
- b. based on pheromone level only
- c. based on heuristic rules only
- d. none of above

Ans: a

Explanation: As per the formula, it is Combination of heuristic rules and pheromone level

20. In TSP, track of non-visited cities can be maintained by

- a. heuristic rules
- b. transition probability
- c. evaporation rate
- d. Pheromone updation rate

Ans: a

Explanation: Rules can be used to maintain list of visited and non-visited cities.

21. PSO is inspired from

- a. Birds behaviour searching for the food
- b. Ants searching for food
- c. Bees searching for the food
- d. All of above

Ans: a

Explanation: PSO is based on the behaviour of flock of birds or school of fish

22. ACO is inspired from

- a. Birds behaviour searching for the food

- b. Ants searching for food
- c. Bees searching for the food
- d. All of above

Ans: b

Explanation: ACO is based on the behaviour of ant colonies

23. In swarm intelligence control is decentralized.....

- a. True
- b. false

Ans: a

Explanation: Not having single point control

24. In PSO , number of particles present in search space are..

- a. 1
- b. 0
- c. any number
- d. none of above

Ans: c

Explanation: Depends on problem statement e.g. 20,30,100 etc

25. In PSO, if numbers of particles are less, algorithm will converge slowly

- a. true
- b. false

Ans. A

Explanation: If large number result will come faster

26. In swarm intelligence control is centralized.....

- a. True
- b. false

Ans: b

Explanation: Not having single point control

27. Compared with GA, all the particles tend to converge to the best solution quickly ...

- a. True
- b. false

Ans: a

Explanation: In PSO, only gBest (or lBest) gives out the information to others. It is a one - way information sharing mechanism. The evolution only looks for the best solution.

28. Particles update themselves with...

- a. evaporation rate
- b. Internal velocity
- c. fitness value
- d. All of above

Ans; b

Explanation: At every iteration position is updated by adding velocity

29. For optimizing function $f(x)=2x+2y$, how many minimum particles will be required

- a. 1
- b. 2
- c. infinite
- d. zero

Ans: b

Explanation: one for x and other for y

30. For optimizing function $f(x)=2x+2y+2z$, how many minimum particles will be required

- a. 1
- b. 2
- c. infinite
- d. 3

Ans: d

Explanation: one for x , one for y and other for z

31. For optimizing function $f(x)=2x+2y+2z$, which function is used for fitness evaluation

- a. $f(x)=1$
- b. $f(x)=0$
- c. $f(x)=2x+2y+2z$,
- d. $f(x)=\max[0,1]$

Ans: c

Explanation: In this case objective function is fitness function

32. For optimizing function $f(x)=2x$, which function is used for fitness evaluation

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=2x$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case objective function is fitness function

33. For optimizing function $f(x)=2$, how many minimum particles will be required

- a. 1
- b. 2
- c. infinite
- d. zero

Ans: d

Explanation: This function will not able to optimize because of constant value

34 For TSP, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{Min_distance}(i,j)$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the minimum distance or Euclidean distance

35 For TSP, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{Sqrt_root } (i^2-j^2)$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the minimum distance or Euclidean distance

36 In classification problem, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{error rate evaluation}$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the error rate or accuracy measure

37 In classification problem, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{Accuracy measure}$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the error rate or accuracy measure

38 In classification problem, function used for fitness evaluation is

- a. $f(x)= \text{Accuracy measure}$
- b. $f(x)= \text{error rate evaluation}$
- c. neither a nor b
- d. both a and b

Ans: d

Explanation: In this case fitness function will be the error rate or accuracy measure

39 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1,2 what would be the fitness value for each particle

- a. 0,1,2
- b. 1,2,1

- c. 1,1,1
- d. 2,1,1

Ans: b

Explanation: Put each value in the function separately

40 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1 what would be the fitness value for each particle

- a. 0,1,2
- b. 1,2,1
- c. 1,1,1
- d. -2,1,2

Ans: d

Explanation: Put each value in the function separately

41 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1 , which particle produce best solution

- a. P1
- b. P2
- c. P3
- d. All of above

Ans: c

Explanation: P3=1 produces 2 value (i.e. maximum solution)

42 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1 ,2 which particle produces optimal solution

- a. P1
- b. P2
- c. P3
- d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

43 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1 ,2 Optimal solution has value...

- a. 1
- b. 2
- c. 0
- d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

44. $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1, Optimal solution has value...

- a. 1
- b. 2
- c. 0
- d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

45. In PSO , $V=V+c_1r_1(ib-p) + c_2r_2(gb-p)$ where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

- a. $c_1r_2(ib-p)$
- b. $c_1r_1(ib-p)$
- c. $c_1r_1(ib-gb)$
- d. $c_1r_1(gb-ib)$

Ans: b

Explanation: $c_1r_1(ib-p)$ gives individual best

46. In PSO, $V=V+c_1r_1(ib-p) + c_2r_2(gb-p)$ where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

- a. $c_1r_2(gb-p)$
- b. $c_2r_2(gb-p)$
- c. $c_2r_2(ib-gb)$
- d. $c_2r_2(gb-ib)$

Ans: b

Explanation: $c_2r_2(gb-p)$ gives global best

47. In ACO, if B and C are adjacent node to A with pheromone level 2,3 respectively then, then ant starting with A will select node with transition probability ---

- a. B
- b. C

Ans: b

Explanation: transition probability without heuristic rule is calculated as for $c=3/2+3$,
 $b=2/2+3$

48. In ACO, if B and C are adjacent node to A with pheromone level 2,3 respectively then, then ant starting with A will select node with transition probability ---

- a. 2/3
- b. 3/2
- c. 2/5
- d. 3/5

Ans: d

Explanation: transition probability without heuristic rule is calculated as for $c=3/2+3$,
 $b=2/2+3$

49. A real-valued function f defined on a domain X has
a global (or absolute) point at x^* if $f(x^*) \geq f(x)$ for all x in X .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: d

Explanation: Global X with maximum function value

50. A real-valued function f defined on a domain X has
a global (or absolute) point at x^* if $f(x^*) \leq f(x)$ for all x in X .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: c

Explanation: Global X with minimum function value

51. A real-valued function f defined on a domain X has a
local (or absolute) point at x^* if $f(x^*) \leq f(x)$ for all x in X within distance of x^* .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: a

Explanation: local X with minimum function value

52. A real-valued function f defined on a domain X has a local (or absolute) point at x^* if $f(x^*) \geq f(x)$ for all x in X within distance of x^* .

- a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: b

Explanation: local X with maximum function value

Artificial Intelligence Questions and Answers – Fuzzy Logic – 1

This set of Artificial Intelligence MCQs focuses on “Fuzzy Logic – 1”.

1. Fuzzy logic is a form of

- a) Two-valued logic
- b) Crisp set logic
- c) Many-valued logic
- d) Binary set logic

[View Answer](#)

Answer: c

Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.

2. Traditional set theory is also known as Crisp Set theory.

- a) True
- b) False

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Answer: a

Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There is only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set

3. The truth values of traditional set theory is _____ and that of fuzzy set is

- a) Either 0 or 1, between 0 & 1
- b) Between 0 & 1, either 0 or 1
- c) Between 0 & 1, between 0 & 1
- d) Either 0 or 1, either 0 or 1

[View Answer](#)

Answer: a

Explanation: Refer the definition of Fuzzy set and Crisp set.

4. Fuzzy logic is extension of Crisp set with an extension of handling the concept of Partial Truth.

- a) True
- b) False

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Answer: a

Explanation: None.

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5. How many types of random variables are available?

- a) 1
- b) 2
- c) 3
- d) 4

[View Answer](#)

Answer: c

Explanation: The three types of random variables are Boolean, discrete and continuous.

6. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .

- a) Fuzzy Set

- b) Crisp Set

[View Answer](#)

Answer: a

Explanation: Fuzzy logic deals with linguistic variables.

7. The values of the set membership is represented by

- a) Discrete Set

- b) Degree of truth

- c) Probabilities

- d) Both b & c

[View Answer](#)

Answer: b

Explanation: Both Probabilities and degree of truth ranges between 0 – 1.

8. What is meant by probability density function?

- a) Probability distributions

- b) Continuous variable

- c) Discrete variable

- d) Probability distributions for Continuous variables

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Answer: d

Explanation: None.

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9. Japanese were the first to utilize fuzzy logic practically on high-speed trains in Sendai.

- a) True

- b) False

[View Answer](#)

Answer: a

Explanation: None.

10. Which of the following is used for probability theory sentences?

- a) Conditional logic

- b) Logic
- c) Extension of propositional logic
- d) None of the mentioned

[View Answer](#)

Answer: c

Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.

Artificial Intelligence Questions and Answers – Fuzzy Logic – 2

This set of Artificial Intelligence MCQs focuses on “Fuzzy Logic – 2”.

1. Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.

- a) AND
- b) OR
- c) NOT
- d) EX-OR

[View Answer](#)

Answer: a, b, c

Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;

2. There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.

- a) Hedges
- b) Lingual Variable
- c) Fuzz Variable
- d) None of the mentioned

[View Answer](#)

Answer: a

Explanation: None.

3. Where does the Bayes rule can be used?

- a) Solving queries
- b) Increasing complexity
- c) Decreasing complexity
- d) Answering probabilistic query

[View Answer](#)

Answer: d

Explanation: Bayes rule can be used to answer the probabilistic queries conditioned on one piece of evidence.

4. What does the Bayesian network provides?

- a) Complete description of the domain
- b) Partial description of the domain
- c) Complete description of the problem
- d) None of the mentioned

[View Answer](#)

Answer: a

Explanation: A Bayesian network provides a complete description of the domain.
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5. Fuzzy logic is usually represented as

- a) IF-THEN-ELSE rules
- b) IF-THEN rules
- c) Both a & b
- d) None of the mentioned

[View Answer](#)

Answer: b

Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.

Rules are usually expressed in the form:

IF variable IS property THEN action

6. Like relational databases there does exists fuzzy relational databases.

- a) True
- b) False

[View Answer](#)

Answer: a

Explanation: Once fuzzy relations are defined, it is possible to develop fuzzy relational databases. The first fuzzy relational database, FRDB, appeared in Maria Zemankova's dissertation.

7. _____ is/are the way/s to represent uncertainty.

- a) Fuzzy Logic
- b) Probability
- c) Entropy
- d) All of the mentioned

[View Answer](#)

Answer: d

Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.

8. _____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.

- a) Fuzzy Relational DB
- b) Ecorithms

- c) Fuzzy Set
- d) None of the mentioned

[View Answer](#)

Answer: c

Explanation: Local structure is usually associated with linear rather than exponential growth in complexity.

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9. Which condition is used to influence a variable directly by all the others?

- a) Partially connected
- b) Fully connected
- c) Local connected
- d) None of the mentioned

[View Answer](#)

Answer: b

Explanation: None.

10. What is the consequence between a node and its predecessors while creating Bayesian network?

- a) Conditionally dependent
- b) Dependent
- c) Conditionally independent
- d) Both a & b

[View Answer](#)

Answer: c

Explanation: The semantics to derive a method for constructing Bayesian networks were led to the consequence that a node can be conditionally independent of its predecessors

Artificial Intelligence Questions and Answers – Neural Networks – 1

This set of Artificial Intelligence MCQs focuses on “Neural Networks – 1”.

1. A 3-input neuron is trained to output a zero when the input is 110 and a one when the input is 111. After generalization, the output will be zero when and only when the input is:

- a) 000 or 110 or 011 or 101
- b) 010 or 100 or 110 or 101
- c) 000 or 010 or 110 or 100
- d) 100 or 111 or 101 or 001

[View Answer](#)

Answer: c

Explanation: The truth table before generalization is:

Inputs Output

000	\$
001	\$
010	\$
011	\$
100	\$
101	\$
110	0
111	1

where \$ represents don't know cases and the output is random.

After generalization, the truth table becomes:

Inputs Output

000	0
001	1
010	0
011	1
100	0
101	1
110	0
111	1

2. A perceptron is:

- a) a single layer feed-forward neural network with pre-processing
- b) an auto-associative neural network
- c) a double layer auto-associative neural network
- d) a neural network that contains feedback

[View Answer](#)

Answer: a

Explanation: The perceptron is a single layer feed-forward neural network. It is not an

auto-associative network because it has no feedback and is not a multiple layer neural network because the pre-processing stage is not made of neurons.

3. An auto-associative network is:

- a) a neural network that contains no loops
- b) a neural network that contains feedback
- c) a neural network that has only one loop
- d) a single layer feed-forward neural network with pre-processing

[View Answer](#)

Answer: b

Explanation: An auto-associative network is equivalent to a neural network that contains feedback. The number of feedback paths(loops) does not have to be one.

4. A 4-input neuron has weights 1, 2, 3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. The output will be:

- a) 238
- b) 76
- c) 119
- d) 123

[View Answer](#)

Answer: a

Explanation: The output is found by multiplying the weights with their respective inputs, summing the results and multiplying with the transfer function. Therefore:
$$\text{Output} = 2 * (1*4 + 2*10 + 3*5 + 4*20) = 238.$$

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5. Which of the following is true?

- (i) On average, neural networks have higher computational rates than conventional computers.
 - (ii) Neural networks learn by example.
 - (iii) Neural networks mimic the way the human brain works.
- a) All of the mentioned are true
 - b) (ii) and (iii) are true
 - c) (i), (ii) and (iii) are true
 - d) None of the mentioned

[View Answer](#)

Answer: a

Explanation: Neural networks have higher computational rates than conventional computers because a lot of the operation is done in parallel. That is not the case when the neural network is simulated on a computer. The idea behind neural nets is based on the way the human brain works. Neural nets cannot be programmed, they can only learn by examples.

6. Which of the following is true for neural networks?

- (i) The training time depends on the size of the network.
- (ii) Neural networks can be simulated on a conventional computer.
- (iii) Artificial neurons are identical in operation to biological ones.

- a) All of the mentioned
- b) (ii) is true
- c) (i) and (ii) are true
- d) None of the mentioned

[View Answer](#)

Answer: c

Explanation: The training time depends on the size of the network; the number of neuron is greater and therefore the number of possible ‘states’ is increased. Neural networks can be simulated on a conventional computer but the main advantage of neural networks – parallel execution – is lost. Artificial neurons are not identical in operation to the biological ones.

7. What are the advantages of neural networks over conventional computers?

- (i) They have the ability to learn by example
 - (ii) They are more fault tolerant
 - (iii)They are more suited for real time operation due to their high ‘computational’ rates
- a) (i) and (ii) are true
 - b) (i) and (iii) are true
 - c) Only (i)
 - d) All of the mentioned

[View Answer](#)

Answer: d

Explanation: Neural networks learn by example. They are more fault tolerant because they are always able to respond and small changes in input do not normally cause a change in output. Because of their parallel architecture, high computational rates are achieved.

8. Which of the following is true?

Single layer associative neural networks do not have the ability to:

- (i) perform pattern recognition
 - (ii) find the parity of a picture
 - (iii)determine whether two or more shapes in a picture are connected or not
- a) (ii) and (iii) are true
 - b) (ii) is true
 - c) All of the mentioned
 - d) None of the mentioned

[View Answer](#)

Answer: a

Explanation: Pattern recognition is what single layer neural networks are best at but they don’t have the ability to find the parity of a picture or to determine whether two shapes are connected or not.

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9. Which is true for neural networks?

- a) It has set of nodes and connections
- b) Each node computes it’s weighted input

- c) Node could be in excited state or non-excited state
- d) All of the mentioned

[View Answer](#)

Answer: d

Explanation: All mentioned are the characteristics of neural network.

10. Neuro software is:

- a) A software used to analyze neurons
- b) It is powerful and easy neural network
- c) Designed to aid experts in real world
- d) It is software used by Neuro surgeon

[View Answer](#)

Answer: b

Explanation: None.

Artificial Intelligence Questions and Answers – Neural Networks – 2

This set of Artificial Intelligence MCQs focuses on “Neural Networks – 2”.

1. Why is the XOR problem exceptionally interesting to neural network researchers?
- a) Because it can be expressed in a way that allows you to use a neural network
 - b) Because it is complex binary operation that cannot be solved using neural networks
 - c) Because it can be solved by a single layer perceptron
 - d) Because it is the simplest linearly inseparable problem that exists.

[View Answer](#)

Answer: d

Explanation: None.

2. What is back propagation?

- a) It is another name given to the curvy function in the perceptron
- b) It is the transmission of error back through the network to adjust the inputs
- c) It is the transmission of error back through the network to allow weights to be adjusted so that the network can learn.
- d) None of the mentioned

[View Answer](#)

Answer: c

Explanation: Back propagation is the transmission of error back through the network to allow weights to be adjusted so that the network can learn.

3. Why are linearly separable problems of interest of neural network researchers?

- a) Because they are the only class of problem that network can solve successfully
- b) Because they are the only class of problem that Perceptron can solve successfully

- c) Because they are the only mathematical functions that are continuous
- d) Because they are the only mathematical functions you can draw

[View Answer](#)

Answer: b

Explanation: Linearly separable problems of interest of neural network researchers because they are the only class of problem that Perceptron can solve successfully

4. Which of the following is not the promise of artificial neural network?

- a) It can explain result
- b) It can survive the failure of some nodes
- c) It has inherent parallelism
- d) It can handle noise

[View Answer](#)

Answer: a

Explanation: The artificial Neural Network (ANN) cannot explain result.
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5. Neural Networks are complex _____ with many parameters.

- a) Linear Functions
- b) Nonlinear Functions
- c) Discrete Functions
- d) Exponential Functions

[View Answer](#)

Answer: a

Explanation: Neural networks are complex linear functions with many parameters.

6. A perceptron adds up all the weighted inputs it receives, and if it exceeds a certain value, it outputs a 1, otherwise it just outputs a 0.

- a) True
- b) False
- c) Sometimes – it can also output intermediate values as well
- d) Can't say

[View Answer](#)

7. The name for the function in question 16 is

- a) Step function
- b) Heaviside function
- c) Logistic function
- d) Perceptron function

[View Answer](#)

Answer: b

Explanation: Also known as the step function – so answer 1 is also right. It is a hard thresholding function, either on or off with no in-between.

8. Having multiple perceptrons can actually solve the XOR problem satisfactorily: this is because each perceptron can partition off a linear part of the space itself, and they can then combine their results.

- a) True – this works always, and these multiple perceptrons learn to classify even complex problems.
- b) False – perceptrons are mathematically incapable of solving linearly inseparable functions, no matter what you do
- c) True – perceptrons can do this but are unable to learn to do it – they have to be explicitly hand-coded
- d) False – just having a single perceptron is enough

[View Answer](#)

Answer: c

Explanation: None.

advertisements

9. The network that involves backward links from output to the input and hidden layers is called as ____.

- a) Self organizing maps
- b) Perceptrons
- c) Recurrent neural network
- d) Multi layered perceptron

[View Answer](#)

Answer: c

Explanation: RNN (Recurrent neural network) topology involves backward links from output to the input and hidden layers.

10. Which of the following is an application of NN (Neural Network)?

- a) Sales forecasting
- b) Data validation
- c) Risk management
- d) All of the mentioned

[View Answer](#)

Answer: d

Explanation: All mentioned options are applications of Neural Network

Artificial Intelligence Questions and Answers – Learning – 3

This set of Artificial Intelligence MCQs focuses on “Learning – 3”.

1. Which is not a desirable property of a logical rule-based system?

- a) Locality
- b) Attachment
- c) Detachment
- d) Truth-Functionality

e) Global attribute

[View Answer](#)

Answer: b

Explanation: Locality: In logical systems, whenever we have a rule of the form $A \Rightarrow B$, we can conclude B, given evidence A, without worrying about any other rules.

Detachment: Once a logical proof is found for a proposition B, the proposition can be used regardless of how it was derived .That is, it can be detachment from its justification. Truth-functionality: In logic, the truth of complex sentences can be computed from the truth of the components. However, there are no Attachment properties lies in a Rule-based system. Global attribute defines a particular problem space as user specific and changes according to user's plan to problem.

2. How is Fuzzy Logic different from conventional control methods?

- a) IF and THEN Approach
- b) FOR Approach
- c) WHILE Approach
- d) DO Approach
- e) Else If approach

[View Answer](#)

Answer: a

Explanation: FL incorporates a simple, rule-based IF X AND Y THEN Z approach to a solving control problem rather than attempting to model a system mathematically.

3. In an Unsupervised learning

- a) Specific output values are given
- b) Specific output values are not given
- c) No specific Inputs are given
- d) Both inputs and outputs are given
- e) Neither inputs nor outputs are given

[View Answer](#)

Answer: b

Explanation: The problem of unsupervised learning involves learning patterns in the input when no specific output values are supplied. We cannot expect the specific output to test your result. Here the agent does not know what to do, as he is not aware of the fact what propose system will come out. We can say an ambiguous un-proposed situation.

4. Inductive learning involves finding a

- a) Consistent Hypothesis
- b) Inconsistent Hypothesis
- c) Regular Hypothesis
- d) Irregular Hypothesis
- e) Estimated Hypothesis

[View Answer](#)

Answer: a

Explanation: Inductive learning involves finding a consistent hypothesis that agrees with examples. The difficulty of the task depends on the chosen representation.
advertisements

5. Computational learning theory analyzes the sample complexity and computational complexity of

- a) Unsupervised Learning
- b) Inductive learning
- c) Forced based learning
- d) Weak learning
- e) Knowledge based learning

[View Answer](#)

Answer: b

Explanation: Computational learning theory analyzes the sample complexity and computational complexity of inductive learning. There is a tradeoff between the expressiveness of the hypothesis language and the ease of learning.

6. If a hypothesis says it should be positive, but in fact, it is negative, we call it

- a) A consistent hypothesis
- b) A false negative hypothesis
- c) A false positive hypothesis
- d) A specialized hypothesis
- e) A true positive hypothesis

[View Answer](#)

Answer: c

Explanation: Consistent hypothesis go with examples, If the hypothesis says it should be negative but infect it is positive, it is false negative. If a hypothesis says it should be positive, but in fact, it is negative, it is false positive. In a specialized hypothesis we need to have certain restrict or special conditions.

7. Neural Networks are complex _____ with many parameters.

- a) Linear Functions
- b) Nonlinear Functions
- c) Discrete Functions
- d) Exponential Functions
- e) Power Functions

[View Answer](#)

Answer: b

Explanation: Neural networks parameters can be learned from noisy data and they have been used for thousands of applications, so it varies from problem to problem and thus use nonlinear functions.

8. A perceptron is a _____.

- a) Feed-forward neural network
- b) Back-propagation algorithm
- c) Back-tracking algorithm
- d) Feed Forward-backward algorithm

e) Optimal algorithm with Dynamic programming

[View Answer](#)

Answer: a

Explanation: A perceptron is a Feed-forward neural network with no hidden units that can be representing only linear separable functions. If the data are linearly separable, a simple weight updated rule can be used to fit the data exactly.

advertisements

9. Which of the following statement is true?

- a) Not all formal languages are context-free
- b) All formal languages are Context free
- c) All formal languages are like natural language
- d) Natural languages are context-oriented free
- e) Natural language is formal

[View Answer](#)

Answer: a

Explanation: Not all formal languages are context-free.

10. Which of the following statement is not true?

- a) The union and concatenation of two context-free languages is context-free
- b) The reverse of a context-free language is context-free, but the complement need not be
- c) Every regular language is context-free because it can be described by a regular grammar
- d) The intersection of a context-free language and a regular language is always context-free
- e) The intersection two context-free languages is context-free

[View Answer](#)

Answer: e

Explanation: The union and concatenation of two context-free languages is context-free; but intersection need not be.

Artificial Intelligence Questions and Answers – Learning – 2

This set of Artificial Intelligence MCQs focuses on “Learning – 2”.

1. Factors which affect the performance of learner system does not include

- a) Representation scheme used
- b) Training scenario
- c) Type of feedback
- d) Good data structures

[View Answer](#)

Answer: d

Explanation: Factors which affect the performance of learner system does not include good data structures.

2. Different learning method does not include:

- a) Memorization
- b) Analogy
- c) Deduction
- d) Introduction

[View Answer](#)

Answer: d

Explanation: Different learning methods include memorization, analogy and deduction.

3. Which of the following is the model used for learning?

- a) Decision trees
- b) Neural networks
- c) Propositional and FOL rules
- d) All of the mentioned

[View Answer](#)

Answer: d

Explanation: Decision trees, Neural networks, Propositional rules and FOL rules all are the models of learning.

4. Automated vehicle is an example of _____.

- a) Supervised learning
- b) Unsupervised learning
- c) Active learning
- d) Reinforcement learning

[View Answer](#)

Answer: a

Explanation: In automatic vehicle set of vision inputs and corresponding actions are available to learner hence it's an example of supervised learning.

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5. Following is an example of active learning:

- a) News Recommender system
- b) Dust cleaning machine
- c) Automated vehicle
- d) None of the mentioned

[View Answer](#)

Answer: a

Explanation: In active learning, not only the teacher is available but the learner can ask suitable perception-action pair example to improve performance.

6. In which of the following learning the teacher returns reward and punishment to learner?

- a) Active learning
- b) Reinforcement learning
- c) Supervised learning
- d) Unsupervised learning

[View Answer](#)

Answer: b

Explanation: Reinforcement learning is the type of learning in which teacher returns award or punishment to learner.

7. Decision trees are appropriate for the problems where:

- a) Attributes are both numeric and nominal
- b) Target function takes on a discrete number of values.
- c) Data may have errors
- d) All of the mentioned

[View Answer](#)

Answer: d

Explanation: Decision trees can be used in all the conditions stated.

8. Which of the following is not an application of learning?

- a) Data mining
- b) WWW
- c) Speech recognition
- d) None of the mentioned

[View Answer](#)

Answer: d

Explanation: All mentioned options are applications of learning.
advertisements

9. Which of the following is the component of learning system?

- a) Goal
- b) Model
- c) Learning rules
- d) All of the mentioned

[View Answer](#)

Answer: d

Explanation: Goal, model, learning rules and experience are the components of learning system.

10. Following is also called as exploratory learning:

- a) Supervised learning
- b) Active learning
- c) Unsupervised learning
- d) Reinforcement learning

[View Answer](#)

Answer: c

Explanation: In unsupervised learning no teacher is available hence it is also called unsupervised learning.

Artificial Intelligence Questions and Answers – Learning – 1

This set of Artificial Intelligence MCQs focuses on “Learning – 1”.

1. What will take place as the agent observes its interactions with the world?

- a) Learning
- b) Hearing
- c) Perceiving
- d) Speech

[View Answer](#)

Answer: a

Explanation: Learning will take place as the agent observes its interactions with the world and its own decision making process.

2. Which modifies the performance element so that it makes better decision?

- a) Performance element
- b) Changing element
- c) Learning element
- d) None of the mentioned

[View Answer](#)

Answer: c

Explanation: A learning element modifies the performance element so that it can make better decision.

3. How many things are concerned in design of a learning element?

- a) 1
- b) 2
- c) 3
- d) 4

[View Answer](#)

Answer: c

Explanation: The three main issues are affected in design of a learning element are components, feedback and representation.

4. What is used in determining the nature of the learning problem?

- a) Environment
- b) Feedback
- c) Problem
- d) All of the mentioned

[View Answer](#)

Answer: b

Explanation: The type of feedback is used in determining the nature of the learning problem that the agent faces.

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5. How many types are available in machine learning?

- a) 1
- b) 2
- c) 3
- d) 4

[View Answer](#)

Answer: c

Explanation: The three types of machine learning are supervised, unsupervised and reinforcement.

6. Which is used for utility functions in game playing algorithm?

- a) Linear polynomial
- b) Weighted polynomial
- c) Polynomial
- d) Linear weighted polynomial

[View Answer](#)

Answer: d

Explanation: Linear weighted polynomial is used for learning element in the game playing programs.

7. Which is used to choose among multiple consistent hypotheses?

- a) Razor
- b) Ockham razor
- c) Learning element
- d) None of the mentioned

[View Answer](#)

Answer: b

Explanation: Ockham razor prefers the simplest hypothesis consistent with the data intuitively.

8. What will happen if the hypothesis space contains the true function?

- a) Realizable
- b) Unrealizable
- c) Both a & b
- d) None of the mentioned

[View Answer](#)

Answer: b

Explanation: A learning problem is realizable if the hypothesis space contains the true function.

advertisements

9. What takes input as an object described by a set of attributes?

- a) Tree

- b) Graph
- c) Decision graph
- d) Decision tree

[View Answer](#)

Answer: d

Explanation: Decision tree takes input as an object described by a set of attributes and returns a decision.

10. How the decision tree reaches its decision?

- a) Single test
- b) Two test
- c) Sequence of test
- d) No test

[View Answer](#)

Answer: c

Explanation: A decision tree reaches its decision by performing a sequence of tests

1: ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.

True

B.

False

C.

D.

[Answer Report Discuss](#)

Option: A

Explanation :

2:

Artificial neural network used for

A.

Pattern Recognition

B.

Classification

C.

Clustering

D.

All of these

[Answer Report Discuss](#)

Option: D

Explanation :

3:

A Neural Network can answer

A.

For Loop questions

B.

what-if questions

C.

IF-The-Else Analysis Questions

D.

None of these

[Answer Report Discuss](#)

Option: B

Explanation :

| 4:

Ability to learn how to do tasks based on the data given for training or initial experience

A.

Self Organization

B.

Adaptive Learning

C.
Fault tolerance

D.
Robustness

[Answer Report Discuss](#)

Option: B

Explanation :

| 5: Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

A.
Adaptive Learning

B.
Self Organization

C.
What-If Analysis

D.
Supervised Learning

[Answer Report Discuss](#)

Option: B

Explanation :

Read more: <http://www.avatto.com/computer-science/test/mcqs/software-computing/ann/514/1.html#ixzz46VE8CQAp>

6:

In artificial Neural Network interconnected processing elements are called

A.

nodes or neurons

B.

weights

C.

axons

D.

Soma

[Answer](#) [Report](#) [Discuss](#)

Option: A

Explanation :

7:

Each connection link in ANN is associated with _____ which has information about the input signal.

A.

neurons

B.

weights

C.
bias

D.
activation function

[Answer](#) [Report](#) [Discuss](#)

Option: B

Explanation :

8:

Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.
True

B.
False

C.

D.

[Answer](#) [Report](#) [Discuss](#)

Option: A

Explanation :

9:

Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.
Weight

B.

activation or activity level of neuron

C.

Bias

D.

None of these

[Answer](#) [Report](#) [Discuss](#)

Option: B

Explanation :

| 10:

Neuron can send _____ signal at a time.

A.

multiple

B.

one

C.

none

D.

any number of

[Answer](#) [Report](#) [Discuss](#)

Option: B

Explanation :

Read more: <http://www.avatto.com/computer-science/test/mcqs/software-computing/ann/514/2.html#ixzz46VEVzf3a>

1:

Artificial intelligence is

A

It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations

B.

Computational procedure that takes some value as input and produces some value as output.

C.

Science of making machines performs tasks that would require intelligence when performed by humans

D

None of these

[Answer](#) [Report](#) [Discuss](#)

Option: C

Explanation :

2:

Expert systems

A

Combining different types of method or information

B.

Approach to the design of learning algorithms that is structured along the lines of the theory of evolution

C.

an information base filled with the knowledge of an expert formulated in terms of if-then rules

D

None of these

[Answer](#) [Report](#) [Discuss](#)

Option: C

Explanation :

3:

Falsification is

A.

Modular design of a software application that facilitates the integration of new modules

B.

Showing a universal law or rule to be invalid by providing a counter example

C.

A set of attributes in a database table that refers to data in another table

D.

None of these

[Answer](#) [Report](#) [Discuss](#)

Option: B

Explanation :

4:

Evolutionary computation is

A

Combining different types of method or information

B.

Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.

C.

Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.

D

None of these

[Answer](#) [Report](#) [Discuss](#)

Option: B

Explanation :

5:

Extendible architecture is

A.

Modular design of a software application that facilitates the integration of new modules

B.

Showing a universal law or rule to be invalid by providing a counter example

C.

A set of attributes in a database table that refers to data in another table

D.

None of these

[Answer](#) [Report](#) [Discuss](#)

Option: A

Explanation :

Read more: <http://www.avatto.com/computer-science/test/mcq...>

6:

Massively parallel machine is

A.

A programming language based on logic

B.

A computer where each processor has its own operating system, its own memory, and its own hard disk

C.

Describes the structure of the contents of a database.

D.

None of these

[Answer](#) [Report](#) [Discuss](#)

Option: B

Explanation :

7:

Search space

A

_ The large set of candidate solutions possible for a problem

B.

The information stored in a database that can be, retrieved with a single query.

C.

Worth of the output of a machine learning program that makes it understandable for humans

D

_ None of these

[Answer](#) [Report](#) [Discuss](#)

Option: A

Explanation :

8:

$n(\log n)$ is referred to

A.

A measure of the desired maximal complexity of data mining algorithms

B.

A database containing volatile data used for the daily operation of an organization

C.

Relational database management system

D.

None of these

[Answer](#) [Report](#) [Discuss](#)

Option: A

Explanation :

9:

Perceptron is

A.

General class of approaches to a problem.

B.

Performing several computations simultaneously

C.

Structures in a database those are statistically relevant

D.

Simple forerunner of modern neural networks, without hidden layers

[Answer](#) [Report](#) [Discuss](#)

Option: D

Explanation :

10:

Prolog is

A.

A programming language based on logic

B.

A computer where each processor has its own operating system, its own memory, and its own hard disk

C.

Describes the structure of the contents of a database

D.

None of these

[Answer](#) [Report](#) [Discuss](#)

Option: A

Explanation :

11:

Shallow knowledge

A

The large set of candidate solutions possible for a problem

B.

The information stored in a database that can be, retrieved with a single query

C.

Worth of the output of a machine learning program that makes it understandable for humans

D

_ None of these

[Answer](#) [Report](#) [Discuss](#)

Option: B

Explanation :

12:

Quantitative attributes are

A.

A reference to the speed of an algorithm, which is quadratically dependent on the size of the data

B.

Attributes of a database table that can take only numerical values

C.

Tools designed to query a database

D.

None of these

[Answer](#) [Report](#) [Discuss](#)

Option: B

Explanation :

13:

Subject orientation

A.

The science of collecting, organizing, and applying numerical facts

B.

Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.

One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.

None of these

[Answer](#) [Report](#) [Discuss](#)

Option: C

Explanation :

14:

Vector

A.

It do not need the control of the human operator during their execution

B.

An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.

The validation of a theory on the basis of a finite number of examples

D.

None of these

[Answer](#) [Report](#) [Discuss](#)

Option: B

Explanation :

| 15:

Transparency

A

_ The large set of candidate solutions possible for a problem

B.

_ The information stored in a database that can be retrieved with a single query

C.

_ Worth of the output of a machine learning program that makes it understandable for humans

D

_ None of these

[Answer](#) [Report](#) [Discuss](#)

Option: C

Explanation :

Read more: <http://www.avatto.com/computer-science/test/mcqsoft-computing/questions/192/3.html#ixzz46VFK5DKd>

1:

Core of soft Computing is

A.

Fuzzy Computing, Neural Computing, Genetic Algorithms

B.

Fuzzy Networks and Artificial Intelligence

C.

Artificial Intelligence and Neural Science

D.

Neural Science and Genetic Science

[Answer](#) [Report](#) [Discuss](#)

Option: A

Explanation :

2:

Who initiated the idea of Soft Computing

A.

Charles Darwin

B.

Lofti A Zadeh

C.

Rechenberg

D.

Mc_Culloch

[Answer](#) [Report](#) [Discuss](#)

Option: B

Explanation :

3:

Fuzzy Computing

A

_ mimics human behaviour

B.

doesnt deal with 2 valued logic

C.

deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D

_ All of the above

[Answer](#) [Report](#) [Discuss](#)

Option: D

Explanation :

| 4:
Neural Computing

A.
mimics human brain

B.
information processing paradigm

C.
Both (a) and (b)

D.
None of the above

[Answer](#) [Report](#) [Discuss](#)

Option: C

Explanation :

| 5:
Genetic Algorithm are a part of

A
. Evolutionary Computing

B.
inspired by Darwin's theory about evolution - "survival of the fittest"

C.
are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics

D

- All of the above

[Answer](#) [Report](#) [Discuss](#)

Option: D

Explanation

Read more: <http://www.avatto.com/computer-science/test/mcqsoft-computing/introduction/512/1.html#ixzz46VFZ9z1x>

6:

What are the 2 types of learning

A.

Improvised and unimprovised

B.

supervised and unsupervised

C.

Layered and unlayered

D.

None of the above

[Answer](#) [Report](#) [Discuss](#)

Option: B

Explanation :

7:

Supervised Learning is

A. learning with the help of examples

B. learning without teacher

C. learning with the help of teacher

D. learning with computers as supervisor

[Answer](#) [Report](#) [Discuss](#)

Option: C

Explanation :

8:
Unsupervised learning is

A. learning without computers

B. problem based learning

C. learning from environment

D. learning from teachers

[Answer Report Discuss](#)

Option: C

Explanation :

| 9:

Conventional Artificial Intelligence is different from soft computing in the sense

A.

Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.

Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.

Both (a) and (b)

D.

None of the above

[Answer Report Discuss](#)

Option: C

Explanation :

| 10:

In supervised learning

A.

classes are not predefined

B.

classes are predefined

C.

classes are not required

D.

classification is not done

[Answer](#) [Report](#) [Discuss](#)

Option: B

Explanation :

Read more: <http://www.avatto.com/computer-science/test/mcqsoft-computing/introduction/512/2.html#ixzz46VFqvgSd>

1:

Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.

A.

True

B.

False

C.

D.

[Answer](#) [Report](#) [Discuss](#)

Option: A

Explanation :

2:

The membership functions are generally represented in

A.

Tabular Form

B.

Graphical Form

C.

Mathematical Form

D.

Logical Form

[Answer](#) [Report](#) [Discuss](#)

Option: B

Explanation :

3:

Membership function can be thought of as a technique to solve empirical problems on the basis of

A.

knowledge

B.

examples

C.

learning

- D.
experience

[Answer](#) [Report](#) [Discuss](#)

Option: D

Explanation :

4: Three main basic features involved in characterizing membership function are

- A.
Intuition, Inference, Rank Ordering

- B.
Fuzzy Algorithm, Neural network, Genetic Algorithm

- C.
Core, Support , Boundary

- D.
Weighted Average, center of Sums, Median

[Answer](#) [Report](#) [Discuss](#)

Option: C

Explanation :

5:
The region of universe that is characterized by complete membership in the set is called

- A.
Core

B.
Support

C.
Boundary

D.
Fuzzy

[Answer](#) [Report](#) [Discuss](#)

Option: A

Explanation :

Read more: <http://www.avatto.com/computer-science/test/mcqsoft-computing/questions/369/1.html#ixzz46VG385ou>

6: A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.
sub normal fuzzy sets

B.
normal fuzzy set

C.
convex fuzzy set

D.
concave fuzzy set

[Answer](#) [Report](#) [Discuss](#)

7:

In a Fuzzy set a prototypical element has a value

A.

1

B.

0

C.

infinite

D.

Not defined

[Answer](#) [Report](#) [Discuss](#)

Option: A

Explanation :

8:

A fuzzy set wherein no membership function has its value equal to 1 is called

A.

normal fuzzy set

B.

subnormal fuzzy set.

C.

convex fuzzy set

D.

concave fuzzy set

[Answer Report Discuss](#)

Option: B

Explanation :

9: A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe

A.

convex fuzzy set

B.

concave fuzzy set

C.

Non concave Fuzzy set

D.

Non Convex Fuzzy set

[Answer Report Discuss](#)

Option: A

Explanation :

| 10:

The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.

A.

Convex Fuzzy Set

B.

Non convex fuzzy set

C.

Normal Fuzzy set

D.

Sub normal fuzzy set

[Answer](#) [Report](#) [Discuss](#)

Option: B

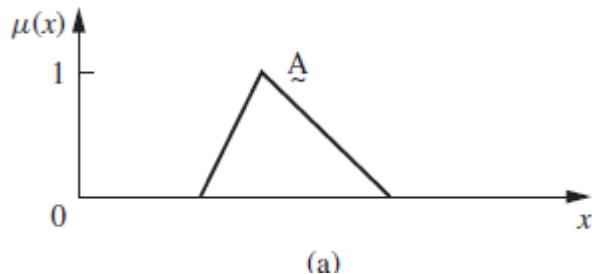
Explanation :

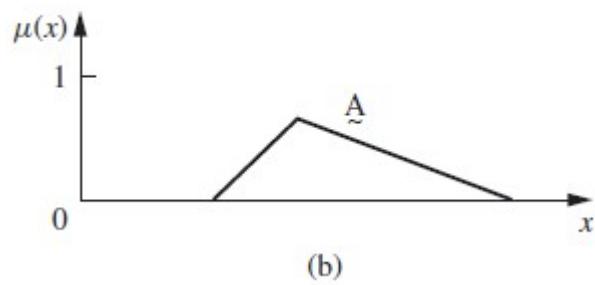
Read more: <http://www.avatto.com/computer-science/test/mcqs/software-computing/questions/369/2.html#ixzz46VGHJtYr>

| 11:

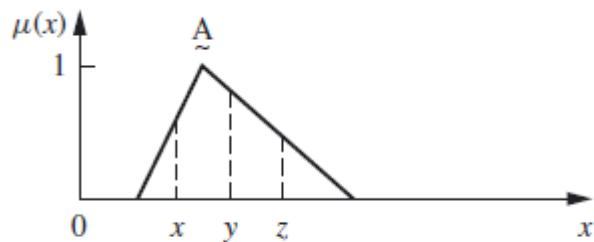
Match the Column

List I

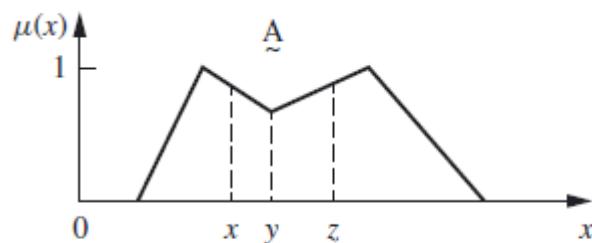




(b)



(c)



(d)

List II

- 1 Subnormal Fuzzy Set
- 2 Normal Fuzzy Set
- 3 Non Convex Normal Fuzzy Set
- 4 Convex Normal Fuzzy Set

A.

a b c d

2 1 4 3

B.

a b c d

1 2 3 4

C.

a b c d

4 3 2 1

D.

a b c d

3 2 1 4

[Answer](#) [Report](#) [Discuss](#)

Option: A

Explanation :

12: The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to

A.

infinite

B.

1

C.

0

D. 0.5

[Answer](#) [Report](#) [Discuss](#)

Option: D

Explanation :

Read more: <http://www.avatto.com/computer-science/test/mcqsoft-computing/questions/369/3.html#ixzz46VGTXoG>

[Questions](#)

1. Which of the following(s) is/are found in Genetic Algorithms?

- (i) evolution
- (ii) selection
- (iii) reproduction
- (iv) mutation



: Your [answer](#) is

(a)

i & ii only

(b)

i, ii & iii only

(c)

ii, iii & iv only

(d)

all of the above

2. Matching between terminologies of Genetic Algorithms and Genetics:

Genetic Algorithms	Genetics (biology)
(a) representation structures	(i) external disturbance, such as cosmic radiation
(b) crossover	(ii) chromosomes
(c) mutation	(iii) survivability
(d) selection	(iv) sexual reproduction



: Your [answer](#) is .3

4. (a)

5. _____

6. (b) _____

7. _____

8. (c) _____

9. _____

10.(d) _____

11. _____

12. Where are Genetic Algorithms applicable?

(i)

real time application

(ii)

biology

(iii)

Artificial Life

(iv)

economics



: Your [answer](#) is

(a)

i, ii & iii only

(b)

ii, iii & iv only

(c)

i, iii & iv only

(d)

all of the above

13. Which of the following(s) is/are the pre-requisite(s) when Genetic Algorithms are applied to solve problems?

(i)

encoding of solutions

(ii)

well-understood search space

(iii)

method of evaluating the suitability of the solutions

(iv)

contain only one optimal solution



: Your [answer](#) is

(a)

i & ii only

(b)

ii & iii only

(c)

i & iii only

(d)

iii & iv only

14. Which of the following statement(s) is/are true?

(i)

Genetic Algorithm is a randomised parallel search algorithm, based on the principles of natural selection, the process of evolution.

(ii)

GAs are exhaustive, giving out all the optimal solutions to a given problem.

(iii)

GAs are used for solving optimization problems and modeling evolutionary phenomena in the natural world.

(iv)

Despite their utility, GAs remain a poorly understood topic.



: Your [answer](#) is

(a)

i, ii & iii only

(b)

ii, iii & iv only

(c)

i, iii & iv only

(d)

all of the above

15. If crossover between chromosome in search space does not produce significantly different offsprings, what does it imply? (if offspring consist of one half of each parent)

(i)

The crossover operation is not successful.

(ii)

Solution is about to be reached.

(iii)

Diversity is so poor that the parents involved in the crossover operation are similar.

(iv)

The search space of the problem is not ideal for GAs to operate.



: Your [answer](#) is

(a)

ii, iii & iv only

(b)

ii & iii only

(c)

i, iii & iv only

(d)

all of the above

16. Which of the following comparison is true?



: Your [answer](#) is

(a)

In the event of restricted access to information, GAs win out in that they require much fewer information to operate than other search.

(b)

Under any circumstances, GAs always outperform other algorithms.

(c)

The qualities of solutions offered by GAs for any problems are always better than those provided by other search.

(d)

GAs could be applied to any problem, whereas certain algorithms are applicable to limited domains.

17. Which of the following statement(s) is/are true?

(i)

Artificial Life is analytic, trying to break down complex phenomena into their basic components.

(ii)

Alife is a kind of Artificial Intelligence (AI).

(iii)

Alife pursues a two-fold goal: increasing our understanding of nature and enhancing our insight into artificial models, thereby providing us with the ability to improve their performance.

(iv)

Alife extends our studies of biology, life-as-we-know-it, to the larger domain of possible life, life-as-it-could-be.



: Your [answer](#) is

(a)

i & ii only

(b)

iii & iv only

(c)

i, ii & iii only

(d)

all of the above

18. Where is Artificial Life applicable?

(i)

film (movie, video) production

(ii)

biology

(iii)

robotics

(iv)

air traffic control



: Your answer is

(a)

i, ii & iii only

(b)

ii, iii & iv only

(c)

i, iii & iv only

(d)

all of the above

19. Who can be benefited from Alife?

(i)

children

(ii)

designers

(iii)

artists

(iv)

patients



: Your answer is

(a)

i, ii & iii only

(b)

ii, iii & iv only

(c)

i, iii & iv only

(d)

all of the above

Q1.

Which of the following(s) is/are found in Genetic Algorithms?

The correct answer is (d).

An initial population evolves to some optimal solutions. Selection biases for better individuals, judged by their fitness values; two individuals are chosen for reproducing offspring. By combining portions of good individuals, this process is likely to create even better individuals



Q2.

Matching between terminologies of Genetic Algorithms and Genetics:

The correct answer is :

(a)

(ii)

(b)

(iv)

(c)

(i)

(d)

(iii)



Q3.

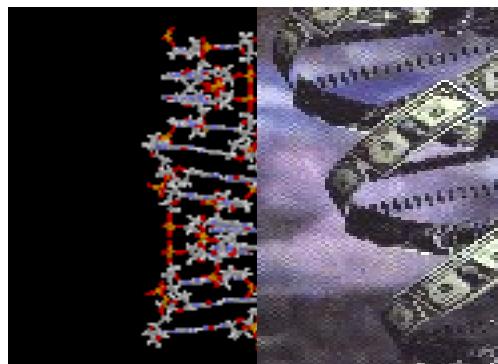
Where are Genetic Algorithms applicable?

The correct answer is (b).

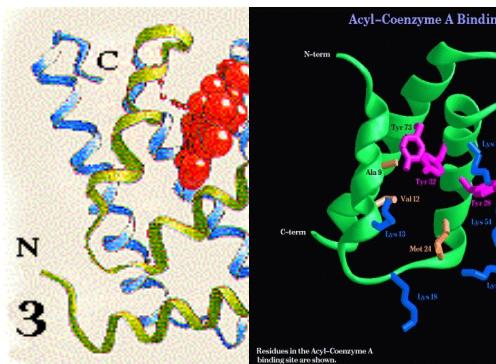
Genetic Algorithms can be used to evolve strategies for interaction in the Prisoner's Dilemma in economics. GAs are used as a computational method in

Alife - simulation of living systems starting with single cells and evolving to organisms, societies or even whole economic systems. These features compete for the limited resources in this virtual world. In biology, GAs are used in [protein structure prediction](#), [protein folding](#), [stability of DNA hairpins](#) and [modeling of immune system](#)

DNA structures



Protein Structures



It cannot be applied in real time systems. The response time is critical. However, GAs cannot guarantee to find a solution. The time spent in evaluation of fitness function and other genetic operations is substantially large, especially in a poorly-understood, complex search space



Q4.

Which of the following(s) is/are the requirement(s) when Genetic Algorithms are applied to solve problems?

The correct answer is (c).

The problem is mapped into a set of strings with each string representing a [potential solution](#) (i.e. chromosomes). A fitness function is required to compare and tell which solution is better. GA performance is heavily dependent on the representation chosen

GAs are designed to efficiently search large, non-linear, poorly understood search space where expert knowledge is scarce or difficult to encode and where traditional techniques fail. However, domain knowledge guides GAs to obtain the optimal solutions. Moreover, GAs are powerful enough to solve for a set of (nearly) optimal solutions



Q5.

Which of the following statement(s) is/are true?

The correct answer is (c).

The search space is too complex for exhaustive search such that GAs successfully find robust solutions after evaluating only a few percent of the full parameter space

It can never be guaranteed that GAs will find an optimal solution or even any solution at all

Their probabilistic nature and reliance on frequent interactions of members of a large population make a complete analytic understanding of GAs extremely difficult



Q6.

If crossover between chromosome in search space does not produce significantly different offspring, what does it imply? (if offspring consist of one half of each parent)

The correct answer is (b).

When crossover operation does not produce significantly different offsprings, it shows that the parents involved are almost identical. Hence, it means that solution is about to be reached. However, this solution derived is not necessarily the optimal solution. From here, we could see that mutation is necessary to maintain the diversity of the population so that GAs would not be trapped in partial solutions



Q7.

Which of the following comparison is true?

The correct answer is (a).

- This is true since GAs require only information that would evaluate the fitness function for the possible solutions (individuals in search space). But for other searches which generally require more information, like differentiability of problem function, might find it hard to find them.
- This holds true in most circumstances. However, if the search space is small enough, other search like [hill-climbing or heuristic](#), which are very effective in exploring small space, would just perform as good.
- GAs have only been developed for a couple of decades while traditional searches have been investigated for a longer time. Thus GAs do not necessarily produce a better quality solution.
- Evidently certain algorithms are only applicable to limited domains . However, certain difficulties, like encoding of problems, might hinder the use of GAs.



Q8.

Which of the following statement(s) is/are true?

The correct answer is (b).

[Alife](#) is characterised by a bottom-up synthesis approach, so that the robotics work tends to aim for insect-like capability rather than human, and complex behaviours are developed by putting together more simple ones. Artificial forms of evolution such as Genetic Algorithms and Genetic Programming are widely used to evolve solutions or behaviours rather than designing them in a top-down fashion in [Artificial Intelligence](#)



Q9.

Where is Artificial Life applicable?

The correct answer is (d).

Alife is [applicable](#) in many fields, such as a walking [robot](#) shown on the right



Q10.

Who can be benefited from Alife?

The correct answer is (d).

Children can use various computational tools (including [GA](#) and Electronic Bricks) to build artificial creatures, exploring



.some of the central ideas of Alife

GAs can be applied to the design of [laminated composite structures](#), [circuit designs](#) and [the improvement of Pareto optimal designs](#). Genetic programming can help artists to create many [pictures](#). Medical problems can also be detected: [Medibrains](#)

 [...Go Back](#)

Unit 6 - Week 4

Course outline

How does an NPTEL online course work?

Week 0 Assignment 0

Week 1

Week 2

Week 3

Week 4

- Lecture 16 : GA Operator : Encoding schemes

- Lecture 17 : GA operator : Encoding schemes (contd.)

- Lecture 18 : GA Operator : Selection

- Lecture 19 : GA Operator Selection (Contd.)

- Lecture 20 : GA Operator: Crossover techniques

- Lecture material of Week 4

Quiz : Week 4 Assignment 4

Week 4 Feedback Form

Week 5

Week 6

Week 7

Week 8

Text Transcripts

Download Videos

Detail Solution

Live Interactive Session

Week 4 Assignment 4

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-26, 23:59 IST.

- 1) An optimization problem is stated as follows:

$$\text{maximize } f(x,y) = \frac{x^2}{2} + \frac{125}{y^2} \text{ where } x, y \in R^+$$

The above optimization problem comes under the category of

- a. Unconstrained optimization problem.
- b. Linear optimization problem.
- c. Integer value optimization problem.
- d. Real value optimization problem.

No, the answer is incorrect.

Score: 0

Accepted Answers:

a.

- 2) Which of the following(s) is/are the pre-requisite(s) when Genetic Algorithms are applied to solve problems?

- (i) Encoding of solutions.
- (ii) Well-understood search space.
- (iii) Method of evaluating the suitability of the solutions.
- (iv) Contain only one optimal solution.

- a. i & ii only.
- b. ii & iii only.
- c. i & iii only.
- d. iii & iv only.

No, the answer is incorrect.

Score: 0

Accepted Answers:

c.

- 3) Which of the following(s) is/are found in Genetic Algorithms?

- i. Evolution.
 - ii. Selection.
 - iii. Reproduction.
 - iv. Mutation.
- a. i & ii only.
 - b. i, ii & iii only.
 - c. ii, iii & iv only.
 - d. All of the above.

No, the answer is incorrect.

Score: 0

Accepted Answers:

d.

- 4) Which statement is true for "Binary encoding" techniques

- a. Representing a sequence of elements.
- b. Representing a gene in terms of values or symbols or string.
- c. Representing a gene in terms of bits.
- d. Representing in the form of a tree of objects.

No, the answer is incorrect.

Score: 0

Accepted Answers:

c.

- 5) Which GA operation is computationally most expensive?

- a. Initial population creation.
- b. Selection of sub-population for mating.
- c. Reproduction to produce next generation.
- d. Convergence testing.

No, the answer is incorrect.

Score: 0

Accepted Answers:

c.

- 7) The purpose of the fitness evaluation operation is

- a. To check whether all individual satisfies the constraints given in the problem.
- b. To decide the termination point.
- c. To select the best individuals.
- d. To identify the individual with worst cost function.

No, the answer is incorrect.

Score: 0

Accepted Answers:

c.

- 8) Which one of the following is not necessarily be considered as GA parameters?

- a. N , the population size.
- b. ϵ , the obtainable accuracy.
- c. μ_p , the mutation probability.
- d. \bar{f} , the average fitness score.

No, the answer is incorrect.

Score: 0

Accepted Answers:

d.

- 9) Which of the following optimization problem(s) can be better solved with Order GA?

- a. 0-1 Knapsack problem.
- b. Travelling salesman problem.
- c. Job shop scheduling problem.
- d. Optimal binary search tree construction problem.

No, the answer is incorrect.

Score: 0

Accepted Answers:

b.

- 10) Which selection strategy is called ordinal based selection?

- a. Roulette Wheel selection.
- b. Canonical selection.
- c. Tournament selection.
- d. Rank-based selection

No, the answer is incorrect.

Score: 0

Accepted Answers:

d.

- 11) Roulette wheel selection scheme is preferable when

- a. Fitness values are uniformly distributed.
- b. Fitness values are non-uniformly distributed.
- c. Needs low selection pressure.
- d. Needs high population diversity.

No, the answer is incorrect.

Score: 0

Accepted Answers:

a.

- 12) What GA encoding scheme suffers from Hamming cliff problem?

- a. Binary coded GA.
- b. Real coded GA.
- c. Order GA.
- d. Tree coded GA.

No, the answer is incorrect.

Score: 0

Accepted Answers:

b.

- 13) An inflection or saddle point is a point, that is

- a. Minimum at that point
- b. Maximum at that point
- c. Either minimum or maximum
- d. Neither minimum nor maximum

No, the answer is incorrect.

Score: 0

Accepted Answers:

d.

- 14) If a function is defined as $y = f(x)$, then its dual problem can be defined as

- a. $y^* = f(-x)$
- b. $y^* = e^{f(x)}$
- c. $y^* = \frac{1}{f(x)}$
- d. $y^* = \frac{1}{f(-x)}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

c.

- 15) 0-1 Knapsack problem can be defined as

- a. Minimum optimization problem
- b. Maximum optimization problem
- c. The 0-1 Knapsack problem is not an optimization problem
- d. None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

b.

Introduction to Soft Computing

Solution to GA-01

Optimization problems, GA operators - Encoding and Selection

- 1) An optimization problem is stated as follows:

$$\text{maximize } f(x, y) = \frac{x^2}{2} + \frac{125}{y^2} \text{ where } x, y \in R^+$$

The above optimization problem comes under the category of

- (a) Unconstrained optimization problem.
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- (c) Integer value optimization problem.
- (d) Real value optimization problem.

- 2) Which of the following(s) is/are the pre-requisite(s) when Genetic Algorithms are applied to solve problems?

- (i) Encoding of solutions.
 - (ii) Well-understood search space.
 - (iii) Method of evaluating the suitability of the solutions.
 - (iv) Contain only one optimal solution.
-
- (a) i & ii only.
 - (b) ii & iii only.
 - (c) i & iii only.
 - (d) iii & iv only.

- 3) Which of the following(s) is/are found in Genetic Algorithms?

- (i) Evolution.
 - (ii) Selection.
 - (iii) Reproduction.
 - (iv) Mutation.
-
- (a) i & ii only.
 - (b) i, ii & iii only.
 - (c) ii, iii & iv only.

- (d) All of the above.
- 4) Suppose, all steps in both SGA and SSGA remain same, except instead of selecting two individuals from the current population of size N , N_p ($N_p \ll N$) individuals as in SGA are selected. Then,
- (a) Generation gap of SGA will be more than that of SSGA.
 - (b) Generation gap of SSGA will be more than that of SGA.
 - (c) Generation gap in both algorithms remains same.
 - (d) Nothing can be said precisely.
- 5) Which GA operation is computationally most expensive?
- (a) Initial population creation.
 - (b) Selection of sub-population for mating.
 - (c) Reproduction to produce next generation.
 - (d) Convergence testing.
- 6) Which of the following is not true for Genetic algorithms?
- (a) It is a probabilistic search algorithm.
 - (b) It is guaranteed to give global optimum solutions.
 - (c) If an optimization problem has more than one solution, then it will return all the solutions.
 - (d) It is an iterative process suitable for parallel programming.
- 7) The purpose of the fitness evaluation operation is
- (a) To check whether all individual satisfies the constraints given in the problem.
 - (b) To decide the termination point.
 - (c) To select the best individuals.
 - (d) To identify the individual with worst cost function.

8) Which one of the following is not necessarily be considered as GA parameters?

- (a) N , the population size.
- (b) ϵ , the obtainable accuracy.
- (c) μ_p , the mutation probability.
- (d) \bar{f} , the average fitness score.

9) Which of the following optimization problem(s) can be better solved with Order GA?

- (a) 0-1 Knapsack problem.
- (b) Travelling salesman problem.
- (c) Job shop scheduling problem.
- (d) Optimal binary search tree construction problem.

10) Which of the following is not a valid chromosome in Order GA?

(a)

1	3	5	7	2	4	6	8
---	---	---	---	---	---	---	---

(b)

A	B	D	E	A	F	H	G
---	---	---	---	---	---	---	---

(c)

1	0	0	1	1	0	0	1
---	---	---	---	---	---	---	---

(d)

14.6	-23.4	177.23
------	-------	--------

- 11) Roulette wheel selection scheme is preferable when
- (a) Fitness values are uniformly distributed.
 - (b) Fitness values are non-uniformly distributed.
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 - (d) Needs high population diversity.
- 12) What GA encoding scheme suffers from Hamming cliff problem?
- (a) Binary coded GA.
 - (b) Real coded GA.
 - (c) Order GA.
 - (d) Tree coded GA.

SCOA UNIT 2 MCQs

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

SCOA UNIT 2 MCQs

	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intution, Inference, Rank Ordering B.Fuzzy Algorithm, Neural network, Genetic Algorithm C.Core, Support , Boundary D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core B.Support C.Boundary D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

SCOA UNIT 2 MCQs

	<p>B.normal fuzzy set C.convex fuzzy set D.concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A.1 B.0 C.infinite D.Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A.normal fuzzy set B.subnormal fuzzy set. C.convex fuzzy set D.concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesn't deal with 2 valued logic</p>	D

SCOA UNIT 2 MCQs

	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	<p>Defuzzification is done to obtain</p> <ul style="list-style-type: none"> a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above 	a
13.	<p>“The train is running fast”. Here ‘fast’ can be represented by</p> <ul style="list-style-type: none"> a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned 	a
14.	<p>Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$</p> <p>Then the crisp value of Young using MoM method is</p> <ul style="list-style-type: none"> a) 25 b) 20 c) 35 d) 50 	a
15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area 	c

SCOA UNIT 2 MCQs

	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)\text{complement} \neq \text{---} (A\lambda)\text{complement}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

SCOA UNIT 2 MCQs

	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

SCOA UNIT 2 MCQs

	d) None of the above	
26.	<p>Fuzzy logic is a form of</p> <ul style="list-style-type: none"> a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic 	<p>Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.</p>
27.	<p>Traditional set theory is also known as Crisp Set theory.</p> <ul style="list-style-type: none"> a) True b) False 	<p>Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set.</p> <p>3. The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>
28.	<p>The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>	<p>Answer: a Explanation: Refer the</p>

SCOA UNIT 2 MCQs

	<p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	definition of Fuzzy set and Crisp set.
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p> <p>a) Fuzzy Set b) Crisp Set</p>	<p>Answer: a Explanation: Fuzzy logic deals with linguistic variables.</p>
31.	<p>The values of the set membership is represented by</p> <p>a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c</p>	<p>Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.</p>
32.	What is meant by probability density function?	d

SCOA UNIT 2 MCQs

	<p>a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables</p>	
33.	<p>Which of the following is used for probability theory sentences?</p> <p>a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned</p>	<p>Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.</p>
34.	<p>Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.</p> <p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy</p>

SCOA UNIT 2 MCQs

		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <ul style="list-style-type: none"> a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned 	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <ul style="list-style-type: none"> a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned 	<p>Answer: c</p> <p>Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

SCOA UNIT 2 MCQs

SCOA Unit I MCQ

- 1. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.**
A.True
B.False

- 2. The membership functions are generally represented in**
A.Tabular Form
B.Graphical Form
C.Mathematical Form
D.Logical Form

- 3. Membership function can be thought of as a technique to solve empirical problems on the basis of**
A.knowledge
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- 4. Three main basic features involved in characterizing membership function are**
A.Intuition, Inference, Rank Ordering
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C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.sub normal fuzzy sets

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C.convex fuzzy set

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7. In a Fuzzy set a prototypical element has a value

A.1

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- 8. A fuzzy set wherein no membership function has its value equal to 1 is called**
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C.0

D.0.5

12. Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

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14. Artificial neural network used for

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- A.**For Loop questions
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16. Ability to learn how to do tasks based on the data given for training or initial experience

- A.**Self Organization
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20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

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- A.**Combining different types of method or information
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of if-then rules

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A.Modular design of a software application that facilitates the integration of new modules

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Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
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	<p>D.experience</p>	
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11.	<p>Fuzzy Computing</p> <p>A.doesn't deal with 2 valued logic</p>	D

SCOA UNIT 2 MCQs

	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	<p>Defuzzification is done to obtain</p> <ul style="list-style-type: none"> a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above 	a
13.	<p>“The train is running fast”. Here ‘fast’ can be represented by</p> <ul style="list-style-type: none"> a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned 	a
14.	<p>Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$</p> <p>Then the crisp value of Young using MoM method is</p> <ul style="list-style-type: none"> a) 25 b) 20 c) 35 d) 50 	a
15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area 	c

SCOA UNIT 2 MCQs

	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)^{\text{complement}} \neq \text{---} (A \lambda)^{\text{complement}}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

SCOA UNIT 2 MCQs

	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

SCOA UNIT 2 MCQs

	d) None of the above	
26.	<p>Fuzzy logic is a form of</p> <ul style="list-style-type: none"> a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic 	<p>Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.</p>
27.	<p>Traditional set theory is also known as Crisp Set theory.</p> <ul style="list-style-type: none"> a) True b) False 	<p>Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set.</p> <p>3. The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>
28.	<p>The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>	<p>Answer: a Explanation: Refer the</p>

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	<p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	definition of Fuzzy set and Crisp set.
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p> <p>a) Fuzzy Set b) Crisp Set</p>	<p>Answer: a Explanation: Fuzzy logic deals with linguistic variables.</p>
31.	<p>The values of the set membership is represented by</p> <p>a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c</p>	<p>Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.</p>
32.	What is meant by probability density function?	d

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	<p>a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables</p>	
33.	<p>Which of the following is used for probability theory sentences?</p> <p>a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned</p>	<p>Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.</p>
34.	<p>Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.</p> <p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy</p>

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		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <ul style="list-style-type: none"> a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned 	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <ul style="list-style-type: none"> a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned 	<p>Answer: c</p> <p>Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

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This sheet is for 1 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions	Cannot Distinguish	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguous	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neuro	Fuzzy network and	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard bertrand	mc culloch	lofti zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behavior	deals with imprecise	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computation	conventional computation	non conventional computation	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behavior	information processing	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search representation	Blind search usually	Blind search cannot	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can be found	a solution found is	a solution that is the best	a solution that requires	C
17	When is a complete enumeration of solution used?		When a solution that is found	When there is enough time	When the modeler has time	When there are an infinite number of solutions	B
18	All of the following are true about heuristics EXCEPT		heuristics are used widely	heuristics are used often	heuristics are used sometimes	heuristics are rules of thumb	C
19	Which approach is most suited to structured problem with little uncertainty		Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based is	A
21	What does the 0 membership value means in the set		the object is fully included	the object is not included	the object is partially included	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a
23	The process of fuzzy inference system involves		membership function	fuzzy logic operations	if-then rules	all the above	d
24	What does a fuzzifier do		converts crisp input to	converts crisp output to	converts fuzzy input to	converts fuzzy output to	a
25	Which of the following is not defuzzifier method		centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy inference method		mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have		multiple parts of antecedent	only single part of antecedent	multiple parts of antecedent	only single part of antecedent	c
28	The α cut of a fuzzy set A is a crisp set defined by :-		$\{x \cup a(x) > \alpha\}$	$\{x \cup a(x) = \alpha\}$	$\{x \cup a(x) < \alpha\}$	$\{x \cup a(x) \leq \alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1 / x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?		$\{0/a, 0.7/b, 0.8/c, 0.2/d, 0/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.3/d, 0/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of A and B?		$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B?		$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.2/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 0/e\}$	a
34	What denotes the support(A) in a fuzzy set?		$\{x \cup a(x) > 0\}$	$\{x \cup a(x) < 0\}$	$\{x \cup a(x) = 0\}$	$\{x \cup a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?		$\{x \cup a(x) > 0\}$	$\{x \cup a(x) = 1\}$	$\{x \cup a(x) > 0.5\}$	$\{x \cup a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Evaluation	defuzzification->rule evaluation	rule evaluation->fuzzification	rule evaluation->defuzzification	a
38	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
39	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based is	A
40	All of the following are suitable problems for genetic algorithm EXCEPT		pattern recognition	simulation of biological systems	simple optimization	dynamic process control	C
41	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a

42	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
43	mutation is applied on __candidates.		one	two	more than two	noneof these	a
44	recombination is applied on __candidates.		one	two	more than two	noneof these	b
45	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	noneof these	a
46	Survival is __ approach.		deterministic	non deterministic	semi deterministic	noneof these	a
47	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
48	Tabu search is an example of ?		heuristic	Evolutionary algo	ACO	PSO	a
49	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
50	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?		line representation	String representat	Circular representat	all of these	b
52	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by		Fredrik	Fogel	Frank	Flin	b
54	Evolution Strategies is developed with		selection	mutation	a population of size	all of these	d
55	Evolution Strategies typically uses		real-valued vector re	vector representa	time based represen	none of these	a
56	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is		Parent population siz	Survival populatio	both a and b	none of these	c
59	What are different types of crossover		discrete and interme	discrete and conti	continuous and inte	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and te		TRUE	FALSE			B
61	_____cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solutuon	none of these	C
62	Discrete events and agent-based models are usually used for _____.		middle or low level o	high level of abstr	very high level of ab	none of these	A
63	_____doesnot usually allow decision makers to see how a solution to a _____en		Simulation ,Complex	Simulation,Easy p	Genetics,Complex p	Genetics,Easy problem	A
64	EC stands for?		Evolutionary Comput	Evolutionary com	Electronic computa	noneof these	a
65	GA stands for		genetic algorithm	genetic assuranc	genese alforithm	noneof these	a
66	LCS stands for		learning classes syste	learning classifier	learned class system	noneof these	b
67	GBML stands for		Genese based Machi	Genes based mob	Genetic bsed machi	noneof these	c
68	EV is dominantly used for solving ____.		optimization proble	NP problem	simple problems	noneof these	a
69	EV is considered as?		adaptive	complex	both a and b	noneof these	c
70	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?		line representation	String representa	Circular representat	all of these	b
72	Parameters that affect GA		initial population	selection process	fitness function	all of these	d
73	Fitness function should be		maximum	minimum	intermediate	noneof these	b
74	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
75	Tabu search is an example of ?		heuristic	Evolutionary algo	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
77	mutation is applied on __candidates.		one	two	more than two	noneof these	a
78	recombination is applied on __candidates.		one	two	more than two	noneof these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offsprings	grand child	c
80	____ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection methods	both a and b	noneof these	c
82	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	noneof these	a

83	Survival is _____ approach.		deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment		d
90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned		d
91	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned		c
92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned		c
93	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities		b
94	Given $U = \{1, 2, 3, 4, 5, 6, 7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3)\}: (5, 0), (6, (1, 2, 1), (3, 0.3)$	$\{(3, 0.3), (6, 0.2)\}$		c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification \rightarrow Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Defuzzification \rightarrow Fuzzification	

96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to		{(0.5,12), (0.6,13), (1,14)}	{(0.5,12), (0.6,13), (1,14)}	{(0.3,12), (0.5,13), (1,14)}	{(0.3,12), (0.5,13), (1,14)}	d
98	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		{0, 1, 2, 3, 4, 5, 6, 7, 8}	{1, 2, 3, 4, 5, 6, 7, 8}	{2, 3, 4, 5, 6, 7, 8, 9}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified	unconditional unqualified	conditional qualified	unconditional qualified	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise answer	ANN gives accurate answer	In each, no precise answer	Fuzzy gives exact result	C
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	---- defines logic function of two propositions		prepositions	Linguistic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a

109	IF x is A and y is B then z=c (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b

116	In Evolutionary programming, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
119	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

123	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125 (1+1) ES			offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126 (1+λ) ES			λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127 Termination condition for EA			mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
130 (1+1) ES			Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
131	Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d

MCQs Unit- I

1. Neural Computing

- A. mimics human brain
- B. information processing paradigm C. Both (a) and (b)
- D. None of the above

Ans: C

Explanation: NN is used for data processing modelled on human brain

2. Genetic Algorithm are a part of

- A. Evolutionary Computing

B. inspired by Darwin's theory about evolution - "survival of the fittest"

C. are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics

D. All of the above

Ans: D

Explanation: It is part of EA

3. What are the 2 types of learning

- A. Improvised and unimprovised

- B. supervised and unsupervised

- C. Layered and unlayered

- D. None of the above

Ans: B

Explanation: Supervised and unsupervised are two types

4. Supervised Learning is

- A. learning with the help of examples

- B. learning without teacher

- C. learning with the help of teacher

- D. learning with computers as supervisor

Ans: C

Explanation: Training data is present 5. Unsupervised learning is MMCOE,Pune

- A. learning without computers

- B. problem based learning

- C. learning from environment

- D. learning from teachers

Ans: C

Explanation: without training data

6. Conventional AI is different from soft computing in the sense

A. Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B. Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C. Both (a) and (b)

D. None of the above

Ans: C

Explanation: Soft computing covers fuzzy, supervised NN algorithms

7. In Supervised learning:

A. classes are not predefined B. classes are predefined

C. classes are not required D. classification is not done Ans: B

Explanation: Training data is present

8. A 4-input neuron has weights 1, 2, 3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. The output will be:

- a) 238
- b) 76
- c) 119
- d) 123

Ans: a

Explanation: The output is found by multiplying the weights with their respective inputs, summing the results and multiplying with the transfer function. Therefore:

$$\text{Output} = 2 * (1*4 + 2*10 + 3*5 + 4*20) = 238$$

MMCOE,Pune

9. ANN is composed of large number of highly interconnected processing elements (neurons) working in unison to solve problems.

A. True B. False Ans: A

Explanation: As per architecture it is true 10. Artificial neural network used for

- A. Pattern Recognition
- B. Classification
- C. Clustering
- D. All of these

Ans: D

11. A Neural Network can answer

- A. For Loop questions
- B. what-if questions
- C. IF-The-Else Analysis Questions
- D. None of these

Ans: B

Explanation: Generally used for prediction and classification

12. Ability to learn how to do tasks based on the data given for training or initial experience

- A. Self Organization
- B. Adaptive Learning
- C. Fault tolerance
- D. Robustness

Ans: B

Explanation: Adaption allows learn from self experiences

13. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

- A. Adaptive Learning
- B. Self Organization
- C. What-If Analysis
- D. Supervised Learning

Ans: B

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Explanation: SOM is unsupervised NN

14. In artificial Neural Network interconnected processing elements are called

- A. nodes or neurons
- B. weights
- C. axons
- D. Soma

Ans: A

Explanation: As per the definition

15. Each connection link in ANN is associated with _____ which has information about the input signal.

A. Neurons

B. Weights

C. Bias

D. activation function Ans: B

Explanation: As per the definition

16. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A. True B. False Ans: A

17. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A. Weight

B. activation or activity level of neuron C. Bias

D. None of these

Ans: B

Explanation: As per the definition

18. Neuron can send _____ signal at a time. A. multiple

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B. one

C. none

D. any number

Ans: B

Explanation: can receive multiple signals but send only one signal (single output)

19. What is perceptron?

a) a single layer feed-forward neural network with pre-processing b) an auto-associative neural network

c) a double layer auto-associative neural network

d) a neural network that contains feedback

Ans: a Explanation:

20. The perceptron is a single layer feed-forward neural network. It is not an auto-associative network because it has no feedback and is not a multiple layer neural network because the pre-processing stage is not made of neuron

21. Why is the XOR problem exceptionally interesting to neural network researchers? a) Because it can be expressed in a way that allows you to use a neural network

b) Because it is complex binary operation that cannot be solved using neural networks c) Because it can be solved by a single layer perceptron

d) Because it is the simplest linearly inseparable problem that exists. Ans:d

Explanation: it is the simplest non linearly problem

22. What is back propagation?

a) It is another name given to the curvy function in the perceptron

b) It is the transmission of error back through the network to adjust the inputs

c) It is the transmission of error back through the network to allow weights to be adjusted so that the network can learn

d) None of the mentioned

Answer: c

Explanation: Back propagation is the transmission of error back through the network to allow weights to be adjusted so that the network can learn.

23. Neural Networks are complex _____ with many parameters. a) Linear Functions

b) Nonlinear Functions

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- c) Discrete Functions
- d) Exponential Functions

Answer: a

Explanation: Neural networks are complex linear functions with many parameters.

24. A perceptron adds up all the weighted inputs it receives, and if it exceeds a certain value, it outputs a 1, otherwise it just outputs a 0.

- a) True
- b) False
- c) Sometimes – it can also output intermediate values as well
- d) Can't say

Answer: a

Explanation: Yes the perceptron works like that.

25. The network that involves backward links from output to the input and hidden layers is called

-
- a) Self organizing maps
 - b) Perceptrons
 - c) Recurrent neural network
 - d) Multi layered perceptron

Answer: c

Explanation: RNN (Recurrent neural network) topology involves backward links from output to the input and hidden layers.

26. Which of the following is an application of NN (Neural Network)?

- a) Sales forecasting
- b) Data validation
- c) Risk management
- d) All of the mentioned

Answer: d

Explanation: All mentioned options are applications of Neural Network.

27 Artificial neural networks

- A Are trained by adjusting the network size
- B Are trained by adjusting weights
- C The weights are either all positive or all negative
- D The learning rate controls the amount of weight change

Ans: B , D

28 Why use Multi Layer Perceptron instead of a single layer perceptron? A Faster learning

MMCOE,Pune

- B Easier programming
- C Can solve more complex problems
- D Can learn multiple decision boundaries

Ans: c,D

29. The activation function in a multilayer perceptron

- A Does thresholding to 0 or 1
- B Is used to compute the output value of a node
- C Is used for initialization of the network
- D Makes it possible to train non-linear decision boundaries

And: B,D

30 Which of the following neural networks uses supervised learning?

- (A) Multilayer perceptron
- (B) Self organizing feature map
- (C) Hopfield network
- (D) M_P neuron

Ans: A

Explanation: Training is not possible for MP neuron

31. Identify the following activation function : $\phi(V) = Z + (1/1 + \exp(-x * V + Y))$, Z, X, Y are parameters
- a. Step function
 - b. Ramp function
 - c. Sigmoid function
 - d. Gaussian function

Ans: C

Explanation: it is sigmoid function

- 32 . An artificial neuron receives n inputs $x_1, x_2, x_3, \dots, x_n$ with weights w_1, w_2, \dots, w_n attached to the input links. The weighted sum _____ is computed to be passed on to a non-linear filter Φ called activation function to release the output.

- a. $\sum w_i$
- b. $\sum x_i$
- c. $\sum w_i + \sum x_i$
- d. $\sum w_i * x_i$

Ans: d

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Explanation: It is net input calculated as $\sum w_i * x_i$

33. Which of the following can be used for clustering of data ? a. Single layer perception
b. Multilayer perception c. Self organizing map d. Radial basis function Ans: C

Explanation: SOM is unsupervised NN based on grouping of elements based on similarity

34. Perceptron learning, Delta learning and LMS learning are learning methods which falls under the category of

- a. Error correction learning - learning with a teacher b. Reinforcement learning - learning with a critic
- c. Hebbian learning
- d. Competitive learning - learning without a teacher Ans: a

Explanation: It is one of the supervised learning algorithm.

- 35 Which of the following model has ability to learn? a) pitts model
b) rosenblatt perceptron model
c) both rosenblatt and pitts model
d) neither rosenblatt nor pitts

Answer: b

Explanation: Weights are fixed in pitts model but adjustable in rosenblatt.

- 36 When both inputs are 1, what will be the output of the pitts model nand gate ? a) 0

- b) 1
- c) either 0 or 1
- d) z

Answer: a

Explanation: Check the truth table of simply a nand gate.

- 37 When both inputs are 1, what will be the output of the pitts model AND gate ? a) 0

- b) 1
- c) either 0 or 1
- d) z

Answer: b

Explanation: Check the truth table of simply a And gate.

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38. When both inputs are 1, what will be the output of the pitts model OR gate ? a) 0
b) 1

c) either 0 or 1

d) z

Answer: b

Explanation: Check the truth table of simply a OR gate.

39. When both inputs are 1, what will be the output of the pitts model XOR gate ? a) 0

b) 1

c) either 0 or 1

d) z

Answer: a

Explanation: Check the truth table of simply a XOR gate.

40. Does McCulloch-pitts model have ability of learning? a) yes

b) no

Answer: b

Explanation: Weights are fixed. 41. What is an activation value? a) weighted sum of inputs

b) threshold value

c) main input to neuron

d) none of the mentioned

Answer: a

Explanation: It is definition of activation value

42. Positive sign of weight indicates?

a) excitatory input

b) inhibitory input

c) can be either excitatory or inhibitory as such d) none of the mentioned

Answer: a

Explanation: Sign convention of neuron.

43. Negative sign of weight indicates? a) excitatory input

b) inhibitory input

c) excitatory output

d) inhibitory output

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Answer: b

Explanation: Sign convention of neuron.

44. The amount of output of one unit received by another unit depends on what? a) output unit

b) input unit

c) activation value

d) weight

Answer: d

Explanation: Activation is sum of wieghted sum of inputs, which gives desired output..hence output depends on weights.

45. The process of adjusting the weight is known as? a) activation

b) synchronisation

c) learning

d) none of the mentioned

Answer: c

Explanation: Basic definition of learning in neural nets .

46. The procedure to incrementally update each of weights in neural is referred to as? a)

synchronisation

- b) learning law
- c) learning algorithm
- d) both learning algorithm & law

Answer: d

Explanation: Basic definition of learning law in neural.

47. In what ways can output be determined from activation value? a) deterministically

- b) stochastically
- c) both deterministically & stochastically
- d) none of the mentioned

Answer: c

Explanation: This is the most important trait of input processing & output determination in neural networks.

48. How can output be updated in neural network? a) synchronously

- b) asynchronously

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- c) both synchronously & asynchronously
- d) none of the mentioned

Answer: c

Explanation: Output can be updated at same time or at different time in the networks.

49. What is asynchronous update in neural netwks? a) output units are updated sequentially

- b) output units are updated in parallel fashion
- c) can be either sequentially or in parallel fashion
- d) none of the mentioned

Answer: a

Explanation: Output are updated at different time in the networks.

50. Who developed the first learning machine in which connection strengths could be adapted automatically?

- a) McCulloch-pitts
- b) Marvin Minsky
- c) Hopfield
- d) none of the mentioned

Answer: b

Explanation: In 1954 Marvin Minsky developed the first learning machine in which connection strengths could be adapted automatically & efficiebtly.

51. Who proposed the first perceptron model in 1958? a) McCulloch-pitts

- b) Marvin Minsky
- c) Hopfield
- d) Rosenblatt

Answer: d

Explanation: Rosenblatt proposed the first perceptron model in 1958 .

52. What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?

- a) associative nature of networks
- b) distributive nature of networks
- c) both associative & distributive
- d) none of the mentioned

Answer: c

Explanation: General characteristics of ANNs.

53. What was the name of the first model which can perform wieghted sum of inputs? a) McCulloch-pitts neuron model

b) Marvin Minsky neuron model

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c) Hopfield model of neuron

d) none of the mentioned

Answer: a

Explanation: McCulloch-pitts neuron model can perform weighted sum of inputs followed by threshold logic operation.

54. The cell body of neuron can be analogous to what mathematical operation? a) summing

b) differentiator

c) integrator

d) none of the mentioned

Answer: a

Explanation: Because adding of potential(due to neural fluid) at different parts of neuron is the reason of its firing.

55. What is the critical threshold voltage value at which neuron get fired? a) 30mv

b) 20mv

c) 25mv

d) 10mv

Answer: d

Explanation: This critical is founded by series of experiments conducted by neural scientist.

60 . Does there is any effect on particular neuron which got repeatedly fired ? a) yes

b) no

Answer: a

Explanation: The strength of neuron to fire in future increases.

61. What is name of above mechanism? a) hebb rule learning

b) error correction learning

c) memory based learning

d) none of the mentioned View Answer

Answer: a

Explanation: It follows from basic definition of hebb rule learning.

62. What is hebb's rule of learning

a) the system learns from its past mistakes

b) the system recalls previous reference inputs & respective ideal outputs c) the strength of neural connection get modified accordingly

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d) none of the mentioned

Answer:c

Explanation: The strength of neuron to fire in future increases, if it is fired repeatedly.

63. Who invented perceptron neural networks? a) McCulloch-pitts

b) Widrow

c) Minsky & papert

d) Rosenblatt

Answer: d

Explanation: The perceptron is one of the earliest neural networks. Invented at the Cornell Aeronautical Laboratory in 1957 by Frank Rosenblatt, the Perceptron was an attempt to understand human memory, learning, and cognitive processes.

64. What is delta (error) in perceptron model of neuron?

- a) error due to environmental condition
- b) difference between desired & target output
- c) can be both due to difference in target output or environmental condition
- d) none of the mentioned

Answer: a

Explanation: All other parameters are assumed to be null while calculating the error in perceptron model & only difference between desired & target output is taken into account.

65. In neural how can connections between different layers be achieved? a) interlayer

- b) intralayer
- c) both interlayer and intralayer
- d) either interlayer or intralayer

Answer: c

Explanation: Connections between layers can be made to one unit to another and within the units of a layer.

66. Connections across the layers in standard topologies & among the units within a layer can be organised?

- a) in feedforward manner
- b) in feedback manner
- c) both feedforward & feedback
- d) either feedforward & feedback

Answer: d

Explanation: Connections across the layers in standard topologies can be in feedforward manner or in feedback manner but not both.

67. State whether Hebb's law is supervised learning or of unsupervised type? a) supervised

- b) unsupervised
- c) either supervised or unsupervised
- d) can be both supervised & unsupervised

Answer: b

Explanation: No desired output is required for its implementation.

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68. Following approach has deterministic and well written rules: a. Soft Computing

- b. hard computing

Ans: b

Explanation: Hard computing is based on deterministic fixed algorithms

69. Uncertainty can be handled in --- a. Soft Computing

- b. hard computing

Ans:

Explanation: Fuzzy a type of soft computing is more suitable to handle uncertainty

70. Different soft computing approaches can be combined to improve efficiency: a. True

- b. False

Ans: a

Explanation: there are different hybrid approaches available.

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MCQs Unit- II and III (Fuzzy Logic)

1. The membership functions are generally represented in

- a. Tabular Form
- b. Graphical Form
- c. Mathematical Form
- d. Logical Form

Ans: b

Explanation: Membership functions are presented in the form of plots

2. Three main basic features involved in characterizing membership function are

- a. Intuition, Inference, Rank Ordering
- b. Fuzzy Algorithm, Neural network, Genetic Algorithm
- c. Core, Support , Boundary
- d. Weighted Average, center of Sums, Median

Ans: C

Explanation: As per the diagram of MF

3 A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

- a. sub normal fuzzy sets
- b. normal fuzzy set
- c. convex fuzzy set
- d. concave fuzzy set

Ans: b

Explanation: As per the definition

4 A fuzzy set wherein no membership function has its value equal to 1 is called

- a. normal fuzzy set
- b. subnormal fuzzy set.
- c. convex fuzzy set
- d. concave fuzzy set

Ans: b

Explanation: As per the definition

5. Who initiated the idea of Soft Computing

- a. Charles Darwin
- b. Lofti A Zadeh
- c. Mc_Culloch
- d. Rechenberg

Ans: b

6. Core of soft Computing is.....

- a. Fuzzy Computing, Neural Computing, Genetic Algorithms
- b. Fuzzy Networks and Artificial Intelligence
- c. Artificial Intelligence and Neural Science
- d. Neural Science and Genetic Science

Ans: a

Explanation: As per the definition

7. Fuzzy logic is usually represented as

- a. IF-THEN-ELSE rules
- b. IF-THEN rules
- c. Both IF-THEN-ELSE rules & IF-THEN rules

d. None of the mentioned

Ans: b

Explanation: Rules are usually expressed in the form: IF variable IS property THEN action 8. Which of the following is not true regarding the principles of fuzzy logic?

- a. Fuzzy logic follows the principle of Aristotle and Buddha
- b. Fuzzy logic is a concept of 'certain degree'
- c. Japan is currently the most active users of fuzzy logic
- d. Boolean logic is a subset of fuzzy logic

Ans: b

Explanation: Fuzzy deals with uncertainty

9. what are the following sequence of steps taken in designing a fuzzy logic machine?

- a. Fuzzification -> Rule Evaluation --> Defuzzification
- b. Rule Evaluation -->Fuzzification ->Defuzzification
- c. Defuzzification-->Rule Evaluation -->Fuzzification
- d. Fuzzy Sets-->Defuzzification-->Rule Evaluation

Ans: a

Explanation: fuzzification, rule evaluation and defuzzyfication are the general steps

10. Given these fuzzy graphs for member functions A and B.Which of the following graphs yields the result of the operation A OR B.

- a.
- b.
- c. d.

Ans: C

11. What Is Fuzzy Inference Systems?

- a. The process of formulating the mapping from a given input to an output using fuzzy logic
- b. Changing the output value to match the input value to give it an equal balance
- c. Having a larger output than the input
- d. Having a smaller output than the input

Ans: a

12. What Is another Name For Fuzzy Inference Systems?

- a. Fuzzy Expert System
- b. Fuzzy Modelling
- c. Fuzzy Logic Controller
- d. All the Options

Ans: a

13._____ is/are the way/s to represent uncertainty.

- a. Fuzzy Logic b. Probability

None

- c. Entropy

- d. All of the mentioned

Ans: d

Explanation: Entropy is amount of uncertainty involved in data.

14. Given these fuzzy graphs for member functions A and B.Which of the following graphs yields the result of the operation A AND B.

- a.
- b.

- c.
- d. None

Ans: a

15. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.

- A. True
- B. False

Ans: A

16. Fuzzy Computing

- A. mimics human behaviour
- B. doesn't deal with 2 valued logic
- C. deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D. All of the above Ans: D

Explanation: Fuzzy deals with imprecise, uncertain, ambiguous, inexact, or probabilistic can represent linguistic variables and partial membership in more than two sets

17 The region of universe that is characterized by complete membership in the set is called

- A. Core
- B. Support
- C. Boundary
- D. Fuzzy

Ans: A

Explanation: As per the definition

18 Three main basic features involved in characterizing membership function are A. Intuition, Inference, Rank Ordering

- B. Fuzzy Algorithm, Neural network, Genetic Algorithm
- C. Core, Support , Boundary
- D. Weighted Average, center of Sums, Median

Ans: C

Explanation: As per the definition

19 Membership function can be thought of as a technique to solve empirical problems on the basis of

- A. knowledge
- B. examples
- C. learning
- D. experience

Ans: D

Explanation: It depends on individual's perception

20 In a Fuzzy set a prototypical element has a value

- A. 1
- B. 0
- C. infinite
- D. Not defined

Ans: A

Explanation: As per the definition

21 A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe

- A. convex fuzzy set
- B. concave fuzzy set
- C. Non concave Fuzzy set
- D. Non Convex Fuzzy set

Ans: A

Explanation: As per the definition

22. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.

- A. Convex Fuzzy Set
- B. Non convex fuzzy set
- C. Normal Fuzzy set
- D. Sub normal fuzzy set

Ans: B

Explanation: As per the definition

23 The process of converting crisp input to fuzzy output is called as.....

- A. Fuzzification B. Defuzzification

Ans: A

Explanation: As per the definition

24 The process of converting fuzzy input to crisp output is called as.....

- A. Fuzzification B. Defuzzification

Ans: B

Explanation: As per the definition

25. Traditional set theory is called as.... a. Fuzzy sets

- b. Crisp sets

Explanation: As per the definition

26. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy

Intersection operation is represented as a) $\min(mf_A, mf_B)$

- b) $\max(mf_A, mf_B)$

- c) $1-mf_A$

- d) $1-mf_B$

Ans: A

27. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy Union operation is represented as

- a) $\min(mf_A, mf_B)$ b) $\max(mf_A, mf_B)$ c) $1-mf_A$

- d) $1-mf_B$

Ans: B

28. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy complement for A operation is represented as a) $\min(mf_A, mf_B)$

- b) $\max(mf_A, mf_B)$

- c) $1-mf_A$

- d) $1-mf_B$

Ans: C

29. If A and B are two fuzzy sets and mf_A and mf_B are membership functions then Fuzzy complement for B operation is represented as

- a) $\min(mf_A, mf_B)$ b) $\max(mf_A, mf_B)$ c) $1-mf_A$

- d) $1-mf_B$

Ans: d

30 In propositional logic $P \Leftrightarrow Q$ is equivalent to (Where \sim denotes NOT):

- a. b. c. d.

$$\sim(P \vee Q) \wedge \sim(Q \vee P) \quad (\sim P \vee Q) \wedge (\sim Q \vee P) \quad (P \vee Q) \wedge (Q \vee P)$$

$$\sim(P \vee Q) \rightarrow \sim(Q \vee P)$$

Ans:B

31. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy fuzzy min-max composition is represented as a. $\max\{\min[mf_R(x,y).mf_S(y,z)]\}$

- b. $\min\{\max[mf_R(x,y).mf_S(y,z)]\}$

- c. $\max\{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$

- d. None of above

Ans: b

32. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy fuzzy max-min composition is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: a

33. If $R(X,Y)$ and $S(Y,Z)$ are two fuzzy relations and mf_R and mf_S are membership functions then Fuzzy fuzzy max-product composition is represented as

- a. $\max \{\min[mf_R(x,y).mf_S(y,z)]\}$
- b. $\min \{\max [mf_R(x,y).mf_S(y,z)]\}$
- c. $\max \{\text{Product}[mf_R(x,y).mf_S(y,z)]\}$
- d. None of above

Ans: c

34. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then A Union B

- a. $\{1,0.5,0.8\}$
- b. $\{0.9,0.2,0\}$
- c. $\{0,0.8, 0.2\}$
- d. $\{0.1,0.5,1\}$

Ans: a

35. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then A Intersect B

- a. $\{1,0.5,0.8\}$
- b. $\{0.9,0.2,0\}$
- c. $\{0,0.8, 0.2\}$
- d. $\{0.1,0.5,1\}$

Ans: b

36. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then complement of A

- a. $\{1,0.5,0.8\}$
- b. $\{0.9,0.2,0\}$
- c. $\{0,0.8, 0.2\}$
- d. $\{0.1,0.5,1\}$

Ans: c

37. $A=\{1/2+ 0.2/4+0.8/6\}$, $B=\{0.9/2+ 0.5/4+0/6\}$, then complement of B

- a. $\{1,0.5,0.8\}$
- b. $\{0.9,0.2,0\}$
- c. $\{0,0.8, 0.2\}$
- d. $\{0.1,0.5,1\}$

Ans: d

38. Following are defuzzification techniques

- a. Max-membership principle
- b. Centroid method
- c. Weighted average method.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques

39. Following are defuzzification techniques

- a. Lambda cut method
- b. Centroid method
- c. Center of sums.
- d. All of above

Ans: d

Explanation: All above are defuzzification techniques 40. Following are defuzzification techniques

- a. Mean-max membership
- b. Center of large area
- c. First of maxima, last of maxima. d. All of above

Ans: d

Explanation: All above are defuzzification techniques 41. fuzzy approximate reasoning methods are

- a. categorical reasoning;
- b. qualitative reasoning;
- c. syllogistic reasoning;
- d. All of above

Ans: d

Explanation: All above are techniques of approximation 42. fuzzy approximate reasoning methods are

- a. categorical reasoning;
- b. qualitative reasoning;
- c. dispositional reasoning.
- d. Allofabove

Ans: d

Explanation: All above are techniques of approximation

43. Following are types of fuzzy Inference system

- a. Fuzzy controller
- b. Fuzzy expert system
- c. Mamdani FIS
- d. none of above

Ans: C

Explanation: Mamdani and Sugeno are types of FIS 44. Following are types of fuzzy Inference system

- a. Fuzzy controller
- b. Fuzzy expert system
- c. Sugeno FIS
- d. none of above

Ans: C

Explanation: Mamdani and Sugeno are types of FIS 45. Fuzzy propositions like short, Tall, Quick are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fu:zy qualifiers

Ans: a

Explanation: Fuzzy predicates are tall, short , quick

46. Fuzzy propositions like moderately, rather, slightly are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy qualifiers

Ans:b

Explanation: As per the definition

47. Fuzzy propositions like most, several, many, & frequently are

- a. Fuzzy predicates

- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy qualifiers

Ans: C

Explanation: As per the definition

48. Fuzzy propositions that shows truth value or probability value are

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy qualifiers

Ans: d

Explanation: As per the definition

49. Fuzzy propositions like rail, short, Tall, Quick are comes under

- a. Fuzzy predicates
- b. Fuzzy-predicate modifiers
- c. Fuzzy quantifiers
- d. Fuzzy possibility qualification:

Ans: A

Explanation: As per the definition

50. In which type of FIS (fuzzy inference System) , output membership function is linear or constant

- a. Sugeno FIS
- b. Mamdani FIS

Ans: a

51. For describing fuzzy variables, modifiers like very, highly, slightly, moderately, plus, minus, fairly are called

- a. Linguistic variables
- b. Linguistic hedges

Ans: b

Explanation: As per the definition

52. For fuzzy variable Height, values like tall, small are called as a. Linguistic variables

- b. Linguistic hedges

Ans: a

Explanation: As per the definition

53. The values of the set membership is represented by _____ a) Discrete Set

- b) Degree of truth
- c) Probabilities

d) Both Degree of truth & Probabilities Answer: b

Explanation: Both Probabilities and degree of truth ranges between 0 – 1.

54. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by

- _____
- a) Fuzzy Set
 - b) Crisp Set
 - c) Fuzzy & Crisp Set
 - d) None of the mentioned

Answer: a

Explanation: Fuzzy logic deals with linguistic variables.

55. The truth values of traditional set theory is _____ and that of fuzzy set is _____

- a) Either 0 or 1, between 0 & 1
- b) Between 0 & 1, either 0 or 1
- c) Between 0 & 1, between 0 & 1
- d) Either 0 or 1, either 0 or 1

Answer: a

Explanation: Refer the definition of Fuzzy set and Crisp set.

56. Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following. a) AND

- b) OR
- c) NOT
- d) All of the mentioned

Answer: d

Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;

57. Like relational databases there does exists fuzzy relational databases. a) True

- b) False

Answer: a

Explanation: Once fuzzy relations are defined, it is possible to develop fuzzy relational databases. The first fuzzy relational database, FRDB, appeared in Maria Zemankova dissertation.

58 What is the form of Fuzzy logic? a) Two-valued logic

- b) Crisp set logic
- c) Many-valued logic
- d) Binary set logic

Answer: c

Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.

59. What Is The Purpose Of Aggregation?

- A. To gather all the different fuzzy set outputs and combine them into a single fuzzy set outputs
- B. To gather all the possible inputs and use the average to gain an output
- C. To gather all the different fuzzy set outputs and averages them out to get a single value D. To subtract all the output fuzzy set values from the input values

Ans: A

Explanation: Aggregate operation combines them into single fuzzy set. (it is not a average)

60. What Are The Two Types Of Fuzzy Inference Systems? A. Model-Type and System-Type

- B. Momfred-Type and Semigi-Type
- C. Mamdani-Type and Sugeno-Type
- D. Mihni-Type and Sujgani-Type

Ans: C

Explanation: Mamdani and Sugeno are types of FIS

61. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction

$\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be

- a. $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- b. $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- c. $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- d. None of the above

Answer:c

Explanation: e.g $0/2 < 0.5$ hence $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$

62. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 2$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {4, 5, 6, 7, 8, 9, 10}
- d. None of the above

Answer: d

Explanation: no membership value above 2

63. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / x$ Then the α cut corresponding to $\alpha = 1$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {4, 5, 6, 7, 8, 9, 10}
- d. None of the above

Answer: b

Explanation: all the values equal or above to α are considered in α cut

64. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x$ Then the α cut corresponding to $\alpha = 5$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- c. {5, 6, 7, 8, 9, 10}
- d. None of the above

Answer:C

Answer: all the values equal or above to α are considered in α cut

65. Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x$ Then the α cut corresponding to $\alpha = 8$ will be

- a. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
- b. {9, 10}
- c. {8, 9, 10}
- d. None of the above

Answer:C

Explanation: all the values equal or above to α are considered in α cut

66 . Consider a fuzzy set old as defined below

Old = {(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)}

Then the alpha-cut for alpha = 0.4 for the set old will be

- a. {(40,0.4)}
- b. {50, 60, 70, 80}
- c. {(20, 0.1), (30, 0.2)}
- d. {(20, 0), (30, 0), (40, 1), (50,1), (60, 1), (70, 1), (80, 1)}

Ans: d

Explanation: all the values equal or above to α are considered in α cut

68 . Consider a fuzzy set old as defined below

Old = {(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)}

Then the alpha-cut for alpha = 1 for the set old will be

- a. {(40,0.4)}
- b. {70, 80}
- c. {(20, 0.1), (30, 0.2)}
- d. {(20, 0), (30, 0), (40, 0), (50,0), (60, 0), (70, 1), (80, 1)}

Ans: d

Explanation: all the values equal or above to α are considered in α cut

69. The height $h(A)$ of a fuzzy set A is defined as $h(A) = \sup A(x)$

- a. $h(A) = 0$
- b. $h(A) < 0$
- c. $h(A) = 1$
- d. $h(A) < 1$

Ans: c

Explanation: Support of MF =1

70. A _____ point of a fuzzy set A is a point $x \in X$ at which $\mu_A(x) = 0.5$

- a. Core
- b. Support
- c. Cross-over
- d. α -cut

Ans: c

Explanation: Cross-over point =0.5

71. If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cap \mu_B$ will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.1, 0.5, 0.6, 0.1, 0.8\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$ Ans: d

Explanation: intersection is minimum value of MF

72. If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of $\mu_A \cup \mu_B$ will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.1, 0.5, 0.6, 0.1, 0.8\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$ Ans: a

Explanation: Union is maximum value of MF

73. If A and B are two fuzzy sets with membership functions:

$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of complement($\sim \mu_A$) will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.2, 0.5, 0.2, 0.1, 0.8\}$
- c. $\{0.8, 0.5, 0.4, 0.9, 0.1\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$ Ans: c

Explanation: complement is 1-mf

74. If A and B are two fuzzy sets with membership functions:

$\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$ then the value of complement($\sim \mu_B$) will be

- a. $\{0.2, 0.5, 0.6, 0.7, 0.9\}$
- b. $\{0.9, 0.5, 0.8, 0.3, 0.2\}$
- c. $\{0.8, 0.5, 0.4, 0.9, 0.1\}$
- d. $\{0.1, 0.5, 0.2, 0.1, 0.8\}$ Ans: b

Explanation: complement is 1-mf

75. If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$

- a. $\{0.5, 0.4, 0.5, 1\}$

- b. $\{0.1, 0.3, 0.1, 0.2\}$

- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$ Ans: a

then the value of $A \cup B$ will be

Explanation: Maximum of mf

76. If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$

$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$

- a. $\{0.5, 0.4, 0.5, 1\}$

- b. $\{0.1, 0.3, 0.1, 0.2\}$

- c. $\{0.9, 0.7, 0.5, 0.8\}$
- d. $\{0.5, 0.6, 0.8, 0\}$ Ans: b

then the value of $A \cap B$ will be

Explanation: minimum of mf

77. If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$

$$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$$

- a. {0.5, 0.4, 0.5, 1}
- b. {0.1, 0.3, 0.1, 0.2}
- c. {0.9, 0.7, 0.5, 0.8} d. {0.5, 0.6, 0.8, 0} Ans:c

Explanation: 1- mf

then the value $\sim A$ will be

$$78. \text{ If } A \text{ and } B \text{ are two fuzzy sets with membership functions: } \mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$$

- a. {0.5, 0.4, 0.5, 1}
- b. {0.1, 0.3, 0.1, 0.2}
- c. {0.9, 0.7, 0.5, 0.8} d. {0.5, 0.6, 0.8, 0} Ans:d

Explanation: 1- mf

then the value $\sim B$ will be

$$78. \text{ If } A \text{ and } B \text{ are two fuzzy sets with membership functions: } \mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$$

- a. {0.5, 0.4, 0.5, 1}
- b. {0.1, 0.3, 0.1, 0}
- c. {0.9, 0.7, 0.5, 0.8} d. {0.5, 0.6, 0.8, 0} Ans: b

then the value difference($A|B$)= $A \cap \sim B$ will be

Explanation: i) 1- mf ii) min of mf

$$79. \text{ If } A \text{ and } B \text{ are two fuzzy sets with membership functions: } \mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$$

- a. {0.5, 0.6, 0.8, 0.2} b. {0.1, 0.3, 0.1, 0}
- c. {0.9, 0.7, 0.5, 0.8} d. {0.5, 0.6, 0.8, 0} Ans: a

then the value $A \cup \sim B$ will be

Explanation: i) 1- mf ii) max of mf

$$80. \text{ If } A \text{ and } B \text{ are two fuzzy sets with membership functions: } \mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$$

- a. {0.5, 0.6, 0.8, 0.2} b. {0.9, 0.6, 0.5, 0.8}
- c. {0.9, 0.7, 0.5, 0.8} d. {0.5, 0.6, 0.8, 0} Ans: b

then the value $\sim A \cup \sim B$ will be

Explanation: i) 1- mf ii) max of mf

$$81. \text{ If } A \text{ and } B \text{ are two fuzzy sets with membership functions: } \mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$$

- a. {0.5, 0.6, 0.8, 0.2} b. {0.9, 0.7, 0.5, 1}
- c. {0.9, 0.7, 0.5, 0.8} d. {0.5, 0.6, 0.8, 0} Ans: b

then the value $\sim A \cup B$ will be

Explanation: i) 1- mf ii) max of mf

$$82. \text{ If } A \text{ and } B \text{ are two fuzzy sets with membership functions: } \mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$$

- a. {0.5, 0.4, 0.1, 0.8} b. {0.9, 0.7, 0.5, 1}
- c. {0.9, 0.7, 0.5, 0.8} d. {0.5, 0.6, 0.8, 0} Ans: a

then the value $\sim A \cap B$ will be

Explanation: i) 1- mf ii) min of mf

$$83. \text{ If } A \text{ and } B \text{ are two fuzzy sets with membership functions: } \mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$$

$$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$$

- a. {0.5,0.4,0.1,0.8} b. {0.9,0.7,0.8,0.8}
 c. {0.9, 0.7, 0.5, 0.8 } d. {0.5, 0.6, 0.8, 0} Ans: b

then the value $\sim A \cap \sim B$ will be

Explanation: i) 1- mf ii) min of mf

84. If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$

$$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$$

- a. {0.5,0.4,0.5,1}

- b. {0.1,0.3,0.1,0.2} c. {0.5, 0.6, 0.5, 0 } d. {0.9, 0.7, 0.9, 0.8} Ans: d

then the value $\sim(A \cap B)$ will be

Explanation: i) min of mf ii) 1- mf

85. If A and B are two fuzzy sets with membership functions: $\mu_A(x) = \{0.1, 0.3, 0.5, 0.2\}$

$$\mu_B(x) = \{0.5, 0.4, 0.1, 1\}$$

- a. {0.5,0.4,0.5,1}

- b. {0.1,0.3,0.1,0.2} c. {0.5, 0.6, 0.5, 0 } d. {0.9, 0.7, 0.9, 0.8} Ans: b

then the value $\sim(A \cup B)$ will be

Explanation: i) max of mf ii) 1- mf

86. If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cup B)(x)$ will be

- a. {0.9, 0.5, 0.6, 0.8, 0.8} b. {0.6, 0.2, 0.1, 0.7, 0.5} c. {0.1, 0.5, 0.4, 0.2, 0.2} d. {0.1, 0.5, 0.4, 0.2, 0.3} Ans:

a

Explanation: Union is maximum of MF

87. If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\mu(A \cap B)(x)$ will be

- a. {0.9, 0.5, 0.6, 0.8, 0.8} b. {0.6, 0.2, 0.1, 0.7, 0.5} c. {0.1, 0.5, 0.4, 0.2, 0.2} d. {0.1, 0.5, 0.4, 0.2, 0.3} Ans:

b

Explanation: Intersection is minimum of MF

88. If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim \mu(A)(x)$ will be

- a. {0.9, 0.5, 0.6, 0.8, 0.8} b. {0.6, 0.2, 0.1, 0.7, 0.5} c. {0.4, 0.5, 0.9, 0.3, 0.2} d. {0.1, 0.8, 0.4, 0.2, 0.5} Ans:

c

Explanation: Complement is 1- of MF

89. If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim \mu(B)(x)$ will be

- a. {0.9, 0.5, 0.6, 0.8, 0.8} b. {0.6, 0.2, 0.1, 0.7, 0.5} c. {0.4, 0.5, 0.9, 0.3, 0.2}

- d. {0.1, 0.8, 0.4, 0.2, 0.5} Ans: d

Explanation: Complement is 1- of MF

90. If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$

$$\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$$

Then the value of $\sim \mu(A \cup B)(x)$ will be

- a. {0.9, 0.5, 0.6, 0.8, 0.8} b. {0.6, 0.2, 0.1, 0.7, 0.5} c. {0.4, 0.5, 0.9, 0.3, 0.2} d. {0.1, 0.5, 0.4, 0.2, 0.2} Ans:

d

Explanation: Max of MF then 1- of MF

91. If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$
 $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$
 Then the value of $\mu(A \cup \sim B)(x)$ will be
 a. {0.9, 0.5, 0.6, 0.8, 0.8} b. {0.6, 0.2, 0.1, 0.7, 0.5} c. {0.6, 0.8, 0.4, 0.7, 0.8} d. {0.1, 0.8, 0.4, 0.2, 0.5} Ans:
 c

Explanation: Max of MF , 1- of MF

92. If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$
 $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$
 Then the value of $\mu(\sim A \cup B)(x)$ will be
 a. {0.9, 0.5, 0.6, 0.8, 0.8} b. {0.6, 0.2, 0.1, 0.7, 0.5} c. {0.4, 0.5, 0.9, 0.3, 0.2} d. {0.9, 0.5, 0.9, 0.8, 0.5} Ans:
 d

Explanation: Max of MF , 1- of MF

93. The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____

- a) Fuzzy Set
- b) Crisp Set
- c) Fuzzy & Crisp Set
- d) None of the mentioned

Answer: a

Explanation: Fuzzy logic deals with linguistic variables.

94. The values of the set membership is represented by _____ a) Discrete Set
 b) Degree of truth
 c) Probabilities
 d) Both Degree of truth & Probabilities

Answer: b

Explanation: Both Probabilities and degree of truth ranges between 0 – 1.

95. Japanese were the first to utilize fuzzy logic practically on high-speed trains in Sendai. a) True
 b) False

Answer: a

Explanation: None.

- 96 Compute the value of adding the following two fuzzy integers:

$$A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$$

$$B = \{(0.5,11), (1,12), (0.5,13)\}$$

- Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x,y} \min(\mu_A(x), \mu_B(y))$ Then, $f(A+B)$ is equal to
 a. {(0.5,12), (0.6,13), (1,14), (0.7,15), (0.7,16), (1,17), (1,18)}
 b. {(0.5,12), (0.6,13), (1,14), (1,15), (1,16), (1,17), (1,18)}
 c. {(0.3,12), (0.5,13), (0.5,14), (1,15), (0.7,16), (0.5,17), (0.2,18)} d. {(0.3,12), (0.5,13), (0.6,14), (1,15), (0.7,16), (0.5,17), (0.2,18)}

Ans: d

Explanation: As per the formula

97. Let R and S be two fuzzy relations defined as follows. Then, the resulting relation, T, which relates elements of universe of X to elements of universe of Z using max-product composition is given by

Ans: D

Explanation: As per the formula

98. Consider above example and compute Max_min composition, Min_max composition Ans: []

Explanation: As per the formula i) $\max(\min(u(R), u(S)))$, ii) $\min(\max(u(R), u(S)))$

99. Let A be the set of comfortable houses given as follows. Then the set of comfortable and affordable houses is

Ans: B

Explanation: AND is Minimum of MF

100. Fuzzy membership function with only one member with value one is called..

- a. Singleton
- b. Core
- c. Boundary
- d. Support

Ans: a:

Explanation: As per the definition

101. Let $h(A)$ denote the height of a fuzzy set A. A is called a normal fuzzy set if a) $h(A)=0$

- b) $h(A)=1$
- c) $h(A)<1$
- d) $h(A)>1$

Ans: b

Explanation: As per the definition

102. Let A be a fuzzy set. Then 1-cut of A is usually called a)Support of A

- b) height of A
- c) Core of A
- d) cut of A5.

Ans: C

Explanation: core of MF has values 1

103. The boundary condition satisfied by the standard fuzzy complement is a) $c(0)=1$ and $c(1)=1$
b) $c(0)=0$ and $c(1)=1$
c) $c(0)=0$ and $c(1)=0$
d) $c(0)=1$ and $c(1)=0$. Ans: D

Explanation: Boundary is between 0 to 1 its complement is 1 to 0

104. Each fuzzy complement has atmost-----equilibrium. a)1

- b)2
- c) 3
- d) None of these

Ans: A

Explanation: MF is between 0 to 1

Unit-4 Evolutionary Computing

1. Which of the following is not a discrete optimization problem?

- A Travelling salesman problem
- B Robot control
- C Chess playing program
- D Prediction of stock prices

Ans: B

Explanation: Robot control is controller system

2. Which of the following are discrete optimization problems?

- A Travelling salesman problem
- B Prediction of stock prices
- C Chess playing program
- D All of above

Ans: D

Explanation: All are applications of GA or EA

3. Exploration search is

- A Concerned with improving the current best solution by local search
- B Concerned with global search
- C Often resulting in getting stuck in local optima
- D None of above

Ans: B

Explanation: Exploitation means using already exist solutions and make refinement to it so it's fitness will improve

4. Evolutionary algorithm: Initialization

- A Individuals are normally generated randomly
- B Is concerned with generating candidate solutions
- C Heuristics for generating candidates can be applied
- D All of above

Ans: D

Explanation: All above are true

5. Evolutionary algorithm: Variation operators

- A Is a selection operator
- B Act on population level
- C Act on individual level
- D Are crossover and mutation

Ans: B, D

Explanation: variation operations are crossover and mutation

6. Evolutionary algorithm: Recombination

- A Also known as crossover
- B Combines elements of two or more genotypes
- C Also known as mutation
- D Also known as representation

Ans: A, B

Explanation: Recombination is also known as crossover

7. Evolutionary algorithm: Survivor selection

- A Is often stochastic
- B Also known as replacement
- C Can be fitness based
- D Can be age based

Ans: B,C,D

Explanation: Survivor selection can be based on fitness value, age

8. Evolutionary algorithm: Termination condition

- A Several termination criteria can be combined
- B Determines when to compute the fitness for a population
- C Should be avoided to get faster evolution
- D None of above

Ans: A

Explanation: Termination conditions like max iteration, time out, no change in fitness can be combined

9. Evolutionary algorithm: Termination condition

A None of above

B Determines when to compute the fitness for a population

C Is checked in every generation

D Should be avoided to get faster evolution

Ans: C

Explanation: checked after every iteration to end the search

10 Tree representation (choose multiple)

A Is used in Genetic Programming

B Mutation results in replacing a randomly chosen subtree by a randomly generated tree C Not suited for representing computer programs

D Is used in Genetic Algorithms

Ans: A,B

Explanation: Suitable for GP to generate computer programs

11 Rank based selection

A Results in less control of the selection pressure than fitness-proportionate selection B Use absolute rather than relative fitness

C Ranking can be either linear or non-linear

D None of above

Ans: C

Explanation: Chromosomes are ranked based on fitness value

12 Simple Genetic Algorithm (GA) (choose multiple)

A Children compete with parents in survival selection

B Both crossover and mutation are applied in each generation C The whole population is replaced with the resulting offspring D All of above

Ans: B,C

Explanation: Whole population get replaced with new child

13 Evolutionary Strategies (ES)

A (μ , λ): Select survivors among parents and offspring B ($\mu+\lambda$): Select survivors among parents and offspring C ($\mu-\lambda$): Select survivors among offspring only

D ($\mu:\lambda$): Select survivors among offspring only

Ans: B

Explanation: The form of $(\mu + \lambda)$ -ES models in which μ specified the size of the parent population and λ specified the size of the offspring population

14 What is most important to be concerned with in the evolution of repetitive problems? A Do multiple runs until a good solution is found

B Execute one run until the solution is good enough

C Get a reasonably good solution every time

D Get a very good result just once

Ans: C

Explanation: Iterative process looking for good solutions in every iterations

15. What are normally the two best measurement units for an evolutionary algorithm? A Number of Generations

B Elapsed time

C CPU time

D Population size Ans: A, B

Explanation: CPU time is hardware dependent and number of population specifies size of search area.

16. What are normally the two best measurement units for an evolutionary algorithm? A Number of evaluations

B Elapsed time

C CPU time

D Number of generations

Ans: B, D

Explanation: CPU time is hardware dependent and number of evaluations is not important

17 Tree representation (choose multiple)

A Is used in Genetic Programming

B Mutation results in replacing a randomly chosen subtree by a randomly generated tree C Suited for representing computer programs

D All of above

Ans: D

Explanation: Suitable for GP to generate computer programs

18 Simple Genetic Algorithm (GA)

A Fitness get evaluated at the end of every iteration

B Both crossover and mutation are applied in each generation C The whole population is replaced with the resulting offspring D All of above

Ans: D

Explanation: Recombination-evaluation- replacement are steps of GA

19. In Evolutionary Strategy , individuals are represented as a. real value

b. Binary

c. tree

d. Octal Ans: A

Explanation: The focus of the evolution strategy (ES) paradigm was on real-valued function optimization. Hence, individuals were naturally represented as vectors of real numbers.

20. In early EA or ES, parent selection is based on a. Roulette Wheel

b. Order of fitness

c. Probabilistic normal distribution

d. All of above Ans: c

Explanation: parent selection is based on Probabilistic normal distribution

21. In EP, population is the combination of parent and child a. True

b. False

Ans: a

Explanation: The evolutionary programming (EP) paradigm concentrated on models involving a fixed-size population of N parents, each of which produced a single offspring. The next generation of N parents was determined by combining both parents and children into a single population of size 2N, rank ordering them by fitness and allowing only the top N to survive.

22. In GA, population is the combination of Parent and child a. True

b. False

Ans: b

Explanation: parent gets replaced by child

23. In EA, the new offspring is forced to compete immediately for survival against an existing member of the population

a. True

b. False

Ans: a

Explanation: If the objective fitness of the child is greater than the selected member, the child survives and the old member dies off. Otherwise, the child dies without ever residing in the population.

24 In EA, the entire parent population dies off each generation and the offspring only compete with each other for survival

a. non-overlapping models

b. overlapping models

Ans: a

Explanation: As per definition

25 In EA, offspring compete with each other and parents for survival

a. non-overlapping models

b. overlapping models

Ans: b

Explanation: As per definition

26. In EA, premature convergence takes place due to a. Survival selection pressure

b. Selection method

c. Complexity of problems

d. too much exploitation

Ans: d

Explanation: For problems that exhibit highly multi-modal (rugged) fitness landscapes or landscapes that change over time, too much exploitation generally results in premature convergence to suboptimal peaks in the space.

27. In EA, offspring compete with parent or other offspring is called... a. Survival Selection

b. Tournament Selection

c. Competition

d. None of above

Ans: a

Explanation: As per the definition

28. In EV, $(\mu+\lambda)$ model is supported by a. Evolutionary Strategy

b. Evolutionary Programming

c. Evolutionary Algorithms

d. All of Above

Ans: a

Explanation: The form of $(\mu + \lambda)$ -ES models in which μ specified the size of the parent population and λ specified the size of the offspring population

29. In EC, following are the selection methods a. Uniform (Neutral) Selection

b. Fitness-Biased Selection

c. Truncation Selection

d. All are above

Ans: d

Explanation: These are non-overlapping generation modules

30. In EC, following are the selection methods a. Rank-Proportional Selection

b. Tournament Selection

c. Fitness-Proportional Selection

d. All of above

Ans: d

Explanation: These are non-overlapping generation modules

31. In EC, genotype is selected based on maximum fitness value is called
a. Uniform (Neutral) Selection b. Fitness-Biased Selection

c. Truncation Selection

d. Rank-Proportional Selection Ans: b

Explanation: As per the definition

32. In EC, only the k most fit individuals are selected from a pool of individuals of size $r > k$ is ..

a. Uniform (Neutral) Selection

b. Fitness-Biased Selection

c. Truncation Selection

d. Rank-Proportional Selection Ans: c

Explanation: As per the definition

33. In EC, selection based on sorting the members of a selection pool by fitness is ... a. Uniform (Neutral) Selection

b. Fitness-Biased Selection

c. Truncation Selection

d. Rank-Proportional Selection Ans: d

Explanation: As per the definition

34. In EC selection, picking q individuals from the selection pool using a uniform probability distribution with replacement and designating the winner of that tournament as the one with the best fitness is
a. Rank-Proportional Selection

b. Tournament Selection

c. Fitness-Proportional Selection d. Fitness_biased

Ans: b

Explanation: As per the definition

35. The difference between rank proportional and tournament selection is that genotypes are sorted in order to fitness value in rank proportional

a. True

b. False

Ans: a

Explanation: A potential computational disadvantage to truncation and linear ranking selection methods is that they require the selection pool to be sorted by fitness.

36. The difference between truncation and tournament selection is that genotypes are sorted in order to fitness value in truncation proportional

a. True

b. False

Ans: a

Explanation: A potential computational disadvantage to truncation and linear ranking selection methods is that they require the selection pool to be sorted by fitness.

37. In EA, recombination operation on p1: AB|CD and p2: ab|cd produces

a. ABab

b. ABcd

c. ABCD

d. abCD

Ans: b

Explanation: Recombination operation in EA is crossover here at point 2

38. In EA, recombination operation on p1: ABC|DEF and p2: abc|def produces

- a. ABCabc
- b. ABCdef
- c. ABCDef
- d. abcDEF

Ans: b

Explanation: Recombination operation in EA is crossover here at point 3

Note: In evolutionary algorithms two parents produces single child, whereas in GA two parent produces 2 children.

39. In EA, recombination operation on p1: AB|CD|EF and p2: ab|cd|ef produces

- a. ABcdEF
- b. abCDEF
- c. ABCDef
- d. abcDEF

Ans: a

Explanation: Recombination operation in EA is crossover here at point 2 and 4

40. In EA, recombination operation on p1: A|BCDE|F and p2: a|bcde|f produces

- a. ABcdEF
- b. abCDEF
- c. AbcdeF
- d. abcDEF

Ans: c

Explanation: Recombination operation in EA is crossover here at point 2 and 4

41. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 1122 produces

- a. ABcd
- b. abCD
- c. ABCD
- d. abcd

Ans: a

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

42. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 2211 produces

- a. ABcd
- b. abCD
- c. ABCD
- d. abcd

Ans: b

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

43. In EA, recombination operation on p1: ABCDEF and p2: abcdef with flip sequence 221122 produces

- a. ABcdcd
- b. abCDef
- c. ABCDef
- d. abcdEF

Ans: b

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

44. In EA, recombination operation on p1: ABCDEF and p2: abcdef with flip sequence 112211 produces

- a. ABcdEF
- b. abCDef
- c. ABCDef
- d. abcdEF

Ans: a

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

45. In EA, recombination operation on p1: ABCD and p2: abcd with flip sequence 1212 produces

- a. ABcd
- b. abCD
- c. AbCd
- d. abcd

Ans: c

Explanation: Recombination operation in EA is crossover here for flip sequence 1 select parent 1 and two for parent 2

46. In EA , parent selection and survival selection is same a. True

- b. False

Ans: b

Explanation: Offspring compute with parent or other offspring for survival is called survival selection

47. In Evolutionary Algorithm, the whole population is replaced with the resulting offspring a. True

- b. False

Ans: b

Explanation: population is combination of parents and offspring

48 Simple Evolutionary Algorithm (EA) (choose multiple)

A Children compete with parents in survival selection

B Both crossover and mutation are applied in each generation C The whole population is replaced with the resulting offspring D All of above

Ans: A, B

Explanation: population is combination of parents and offspring hence survival selection occurs

49. In EA, ----exual operation is a. representation

- b. Recombination

- c. Mutation

- d. none of above

Ans: c

Explanation: Mutation is performed on single parent only

50. In EA, ----sexual operation is a. representation

- b. Recombination

- c. Mutation

- d. none of above

Ans: b

Explanation: Recombination (crossover) is performed on two parents

Unit-5 Genetic Algorithms

1 Genetic Algorithms: Variable length encoding is possible in A. Messy GA

- B. Adaptive GA

- C. Parallel GA

- D. Hybrid GA

Ans: A

Explanation: Variable size encoding is possible in Messy GA

2 Genetic Algorithms: parameters can be changes runtime A. Messy GA

- B. Adaptive GA
- C. Parallel GA
- D. Hybrid GA

Ans : B

Explanation: parameters can be changes runtime in adaptive GA

- 3. Genetic Programming: representation is A. binary encoding

B: Tree encoding

C: Hex encoding

D: Real value encoding

Ans: B

Explanation: Tree encoding is used to represent computer programs in GP

- 4. Generation of Computer programs is possible in A: Genetic Algorithms

B. Genetic Programming

C. Evolutionary Algorithms

D. Evolutionary Strategy

Ans: B

Explanation: Computer programs can be output in GP

- 5. Probability of sub string get propagated in next generation is derived by A. Schema theorem

B. Holland Classifiers

C. Roulette wheel

D. fitness evaluation

Ans: A

Explanation: Schema theorem is used to compute Probability of sub string get propagated in next generation

- 6. Following are the evaluation parameters for schema theorem (Choose multiple answers) A. Schema order

B. Schema length

C. representation technique

D. None of above

Ans: A, B

Explanation: order and length are used

- 7. Schema theorem defines, there is high probability for sub strings to propagate in next generation if

A. high order and short length

B. High order and long length

C. Low order and short length D. Low order and long length Ans: C

Explanation: As per the theorem

- 8. Genetic algorithm: Mutation operators A. Is a selection operator

B. Act on population level

C. Act on individual level

D. Is an encoding technique

Ans: C

Explanation: mutation act on one parent at a time

- 9. Genetic algorithm: Selection operators A Is a mutation operator

B Act on population level

C Act on individual level

D Is an encoding technique

Ans: B

Explanation: Selection is based on whole population

10. Genetic algorithm: Crossover operators A Is a mutation operator

B Act on population level

C Act two individual level

D Is an encoding technique

Ans: c

Explanation: Crossover combines two parents to produce two childs

11. Genetic Algorithms: chromosomes are represented using: A binary

B Octal

C Real value

D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string are way to represent chromosomes

12. Genetic Algorithms: Diversification is carried out due to A Selection

B Mutation

C Crossover

D Fitness evaluation

Ans: B

Explanation: As per definition

13. Genetic algorithms: chromosomes are selected randomly in A. Roulette Wheel

B. Tournament

C. Rank Selection

D. Random selection

Ans: D

Explanation: Random Selection selects chromosomes randomly

14. Genetic algorithms: chromosomes selected based on selective pressure by holding a tournament competition

A. Roulette Wheel

B. Tournament

C. Rank Selection

D. Random selection

Ans: B

Explanation: As per definition

15. Genetic algorithms: chromosomes are selected based on highest fitness value A. Roulette Wheel

B. Tournament

C. Rank Selection

D. Random selection

Ans: C

Explanation: As per definition

16. Rank based selection

A Use relative rather than absolute fitness

B Use absolute rather than relative fitness

C Results in less control of the selection pressure than fitness-proportionate selection D None of above

Ans: A

Explanation: As per definition

17. The process of taking two parent solutions and producing from them a child is called A. Selection

- B. Crossover
- C. Mutation
- D. Reproduction

Ans: B

Explanation: As per definition

18. The two mating chromosomes are cut once at corresponding points and the sections after the cuts exchanged.

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: A

Explanation: As per definition

19. The process of taking single parent solutions and producing a child is called A. Selection

- B. Crossover
- C. Mutation
- D. Reproduction

Ans: C

Explanation: As per definition

20. The two mating chromosomes are cut more than one at corresponding points and the sections after the cuts exchanged.

- A. Single point crossover
- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: B

Explanation: As per definition

21. The two mating chromosomes are crossover with the help of mask A. Single point crossover

- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: C

Explanation: As per definition

22. The three mating chromosomes are crossovered in A. Three parent crossover

- B. Double point crossover
- C. Multipoint crossover
- D. Uniform crossover

Ans: A

Explanation: As per definition

23. Probability of how often crossover will be performed can be mentioned in A. Three parent crossover

- B. Double point crossover
- C. Crossover probability
- D. Uniform crossover

Ans: A

Explanation: As per definition

24. A mutation chromosome generated by changing bit 0 to 1 and 1 to 0 is A. Interchanging

- B. Flipping
- C. Mutation probability
- D. Reversing

Ans: B

Explanation: As per definition

25. A mutation chromosome generated by selecting random position and the bits next to that position are reversed

A. Interchanging

B. Flipping

C. Mutation probability

D. Reversing

Ans: D

Explanation: As per definition

26. A mutation chromosome generated by exchanging bits at randomly selected positions is A.

Interchanging

B. Flipping

C. Mutation probability

D. Reversing

Ans: A

Explanation: As per definition

27. How often parts of chromosome will be mutated is A. Interchanging

B. Flipping

C. Mutation probability

D. Reversing

Ans: C

Explanation: As per definition

28. Stopping criteria for Genetic Algorithms is A. No change in fitness

B. Maximum generation

C. Elapsed time

D. All of above

Ans: D

Explanation: All are stopping criteria for GA

29. In this type of GA, the GA does the global optimization while local refinement is done by the conventional method

A. Messy GA

B. Adaptive GA

C. Parallel GA

D. Hybrid GA

Ans: d

Explanation: Hybrid allows combination of traditional approaches with GA

30. In this type of GA, task of a basic GA is distributed on different processors

A. Messy GA

B. Adaptive GA

C. Parallel GA

D. Hybrid GA

Ans: C

Explanation: Parallel GA allows parallel execution on different processor

31. Genetic algorithms are used if

A. The search space is large, complex

B. No mathematical analysis is available C. Traditional search methods fail

D. All of above

Ans: D

Explanation: All are applications of GA

- 32. Application of Genetic Algorithm A. Optimization
- B. Machine and robotic learning

- C. Economic Model

- D. All of above

Ans: D

Explanation: All are applications of GA

- 33. Architecture-altering operation is special operation present in A. Genetic Algorithm

- B. Genetic Programming

- C. Evolutionary Algorithms

- D. Evolutionary Computing

Ans: B

Explanation: It is found in GP

- 34. Basic steps of GA

- A. selection- fitness evaluation- recombination
- B. recombination - selection- fitness evaluation
- C. Fitness evaluation- Selection-recombination
- D. Selection- recombination-fitness evaluation

Ans: D

Explanation: It is the general flow of GA

- 35. In GA , 10100011 is ----- chromosome representation
- a. Binary

- b. Octal

- c. Real value

- d. Hexadecimal

Ans: a

Explanation: it is binary encoding representation

- 36. In GA , 9CEF is ----- chromosome representation
- a. Binary

- b. Octal

- c. Real value

- d. Hexadecimal

Ans: d

Explanation: it is hexadecimal encoding representation

- 37. In GA , 2348 is ----- chromosome representation
- a. Binary

- b. Octal

- c. tree encoding

- d. Hexadecimal

Ans: b

Explanation: it is Octal encoding representation

- 38. In GA , 1 2 4 8 is ----- chromosome representation
- a. Binary

- b. Octal

- c. Permutation encoding

- d. Hexadecimal

Ans: c

Explanation: it is permutation or real valued encoding representation

- 39. In GA , 1.25 2.45 4.45 8.67 is ----- chromosome representation
- a. Binary

- b. Octal

- c. Value encoding

d. Hexadecimal Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

40. In GA , ABCD, DEFG is ----- chromosome representation a. Binary

b. Octal

c. Value encoding

d. Hexadecimal Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

41. In GA {right}, {back}, {white}is ----- chromosome representation a. Binary

b. Octal

c. Value encoding

d. Hexadecimal Ans: c

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

42. In GA , {right}, {back}, {white} is one of chromosome representation a. True

b. false

Ans: a

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

43. In GA , abcd, efgt is one of chromosome representation a. True

b. false

Ans: a

Explanation: In value encoding every chromosome is a string of some values. Values can be anything connected to problem, form numbers, real numbers or characters to some complicated objects.

44. In GA, p1: 1010, P2:1100 are parents chromosome, in single point , crossover point 2 (lsb) produces:

a. c1: 1000 c2: 1110

b. c1: 1010 c2:1110

c. c1: 1000 c2:1111

d. c1:1100 c2:1010

Ans: a

Explanation: interchange string after cross over point

45. In GA, p1: 1010, P2:1100 are parents chromosome, in single point, crossover point 3 (lsb) produces:

a. c1: 1000 c2: 1110

b. c1: 1010 c2:1110

c. c1: 1000 c2:1111

d. c1:1100 c2:1010

Ans: d

Explanation: interchange string after cross over point

46. In GA, p1: 101 00 000, P2:110 01 111 are parents chromosome, in two point, crossover point 3 ,5 (lsb) produces:

a. c1: 100 00 111 c2: 111 00 111

b. c1: 101 01 000 c2: 110 00 111

c. c1: 100 01 000 c2: 110 01 111

d. c1:110 00 000 c2:101 01 111

Ans: b

Explanation: interchange string between cross over point

47. In GA, p1: 101 00 000, P2:110 01 111 are parents chromosome, in two point, crossover point 2 ,7 (lsb) produces:

- a. c1: 1 000011 1 c2: 1 110011 1
- b. c1: 1 01 0000 1 c2: 1 10 01 11 0
- c. c1: 1 000100 0 c2: 1 100111 1
- d. c1:1 100000 0 c2:1 010111 1

Ans: b

Explanation: interchange string between cross over point

48. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 1010 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1111 c2: 0000
- c. c1: 0000 c2: 1010
- d. c1:1010 c2:1111

Ans: a

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

49. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 0101 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1010 c2: 0101
- c. c1: 0000 c2: 1010
- d. c1:1010 c2:1111

Ans: b

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

50. In GA, p1: 0000, P2:1111 are parents chromosome, in uniform crossover mask 0001 produces:

- a. c1: 0101 c2: 1010
- b. c1: 1010 c2: 0101
- c. c1: 0001 c2: 1110
- d. c1:1010 c2:1111

Ans: c

Explanation: Where there is a 1 in the crossover mask, the gene is copied from the first parent, and where there is a 0 in the mask the gene is copied from the second parent

51. In GA, p1: ABCD, P2:EFGH are parents chromosome, in Precedence Preservative crossover mask 1212 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH
- d. c1: EFAB

Ans: a

Explanation: The vector defines the order in which the operations are successively drawn from parent 1 and parent 2

52. In GA, p1: ABCD, P2:EFGH are parents chromosome, in Precedence Preservative crossover mask 2121 produces:

- a. c1: AECH
- b. c1: EBGD
- c. c1: ABGH

d. c1: EFAB

Ans: b

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

53. In GA, p1: ABCD, P2:EFGH are parents chromosome, in Precedence Preservative crossover mask 1122 produces:

a. c1: AECH

b. c1: EBGD

c. c1: ABGH

d. c1: EFAB

Ans: c

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

54. In GA, p1: ABCD, P2:EFGH are parents chromosome, in Precedence Preservative crossover mask 2211 produces:

a. c1: AECH

b. c1: EBGD

c. c1: ABGH

d. c1: EFAB

Ans: d

Explanation: The vector defines the order in which the operations are successively drawn from parent I and parent 2

55. In GA, p1: 4 1| 1 3| 6 5 , P2: 2 3|1 4| 5 6 are parents chromosome, in order crossover produces:

a. c1: 4 1| 3 1| 6 5 c2: 2 3| 4 1| 5 6

b. c1: 4 1| 1 3| 6 5 c2: 2 3| 4 1| 5 6

c. c1: 4 1| 3 1| 6 5 c2: 2 3| 1 4| 5 6

d. c1: 4 1| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: a

Explanation: child 1 inherits its left and right section from parent I, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

56. In GA, p1: 4 1| 5 3| 6 5 , P2: 2 3|1 6| 5 6 are parents chromosome, in order crossover produces:

a. c1: 4 1| 3 5| 6 5 c2: 2 3| 1 6| 5 6

b. c1: 4 1| 1 3| 6 5 c2: 2 3| 4 1| 5 6

c. c1: 4 1| 3 1| 6 5 c2: 2 3| 1 4| 5 6

d. c1: 4 1| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: a

Explanation: child 1 inherits its left and right section from parent I, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

57. In GA, p1: 4 6| 5 3| 1 5, P2: 2 3|1 6| 5 6 are parents chromosome, in order crossover produces:

a. c1: 4 6| 5 3| 1 5 c2: 2 3| 6 1| 5 6

b. c1: 4 6| 1 3| 6 5 c2: 2 3| 6 1| 5 6

c. c1: 4 6| 3 5| 1 5 c2: 2 3| 1 6| 5 6

d. c1: 4 6| 3 1| 5 6 c2: 2 3| 4 1| 6 5

Ans: c

Explanation: child 1 inherits its left and right section from parent I, and its middle section is determined by the genes in the middle section of parent 1 in the order in which the values appear in parent 2.

58. In GA, p1:0011 are parent chromosome, in flipping mutation chromosome 1001 produces:

- a. 1001
- b. 1000
- c. 1010
- d. 0011

Ans: c

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

59. In GA, p1:0011 are parent chromosome, in flipping mutation chromosome 0110 produces:

- a. 1001
- b. 1000
- c. 1010
- d. 0101

Ans: d

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

60. In GA, p1:1111 are parent chromosome, in flipping mutation chromosome 1001 produces:

- a. 1001
- b. 0110
- c. 1010
- d. 0011

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

61. In GA, p1:1111 are parent chromosome, in flipping mutation chromosome 1011 produces:

- a. 1001
- b. 1011
- c. 1010
- d. 0011

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

62. In GA, p1:1111 0000 are parent chromosome, in flipping mutation chromosome 0000 1111 produces:

- a. 1111 0000
- b. 1111 1111
- c. 0000 1111
- d. 0000 0000

Ans: b

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

63. In GA, p1:1111 0000 are parent chromosome, in flipping mutation chromosome 1111 0000 produces:

- a. 1111 0000
- b. 1111 1111
- c. 0000 1111
- d. 0000 0000

Ans: d

Explanation: Flipping of a bit involves changing 0 to 1 and 1 or 0 based on a mutation chromosome generated (for value 1).

64. In GA, p1:11110000 are parent chromosome, in interchanging mutation at position 1 and 8 (lsb) produces:

- a. 01110001
- b. 1111 1111
- c. 0000 1111
- d. 0000 0000

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

65. In GA, p1:11110000 are parent chromosome, in interchanging mutation at position 2 and 7 (lsb) produces:

- a. 10110010
- b. 1111 1111
- c. 0000 1111
- d. 0000 0000

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

66. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 1 and 4 (lsb) produces:

- a. 1001
- b. 0110
- c. 1010
- d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

67. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 2 and 3 (lsb) produces:

- a. 1001
- b. 0110
- c. 1010
- d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

68. In GA, p1:1001 are parent chromosome, in interchanging mutation at position 1 and 3 (lsb) produces:

- a. 1001
- b. 0110
- c. 1100
- d. 0101

Ans: c

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

69. In GA, p1:1101 are parent chromosome, in interchanging mutation at position 3 and 4 (lsb) produces:

- a. 1101
- b. 0110
- c. 1100
- d. 0101

Ans: a

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

70. In GA, p1:1101 are parent chromosome, in interchanging mutation at position 3 and 2 (lsb) produces:

- a. 1101
- b. 0110
- c. 1010
- d. 0101

Ans: c

Explanation: Two random positions of the string are chosen and the bits corresponding to those positions are interchanged

71. In GA, p1:11 01 are parent chromosome, in reversing mutation at position 2 (lsb) produces:

- a. 1001
- b. 0110
- c. 1010
- d. 1101

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

72. In GA, p1:1 101 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 1 001
- b. 0 110
- c. 1 110
- d. 1 101

Ans: c

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

72. In GA, p1:1 100 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 1 001
- b. 0 110
- c. 1 110
- d. 1 010

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

73. In GA, p1:110011 are parent chromosome, in reversing mutation at position 4 (lsb) produces:

- a. 11 0011
- b. 11 1001
- c. 11 1100
- d. 11 0100

Ans: b

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

74. In GA, p1:110011 are parent chromosome, in reversing mutation at position 2 (lsb) produces:

- a. 11 0011
- b. 11 1001
- c. 11 1100
- d. 11 0011

Ans: d

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

75. In GA, p1:110011 are parent chromosome, in reversing mutation at position 3 (lsb) produces:

- a. 110 101
- b. 111 001
- c. 111 100
- d. 110 011

Ans: a

Explanation: A random position is chosen and the bits next to that position are reversed and child chromosome is produced

76. In schema theorem, 111**0, order of schema is... a. 2

- b. 3
- c. 1
- d. None of above

Ans: a

Explanation: Order is number of * (don't care, i.e. 0 or 1)

77. In schema theorem, 1*1**0, order of schema is... a. 2

- b. 1
- c. 3
- d. 6

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

78. In schema theorem, 1***0, order of schema is... a. 2

- b. 1
- c. 3
- d. 4

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

79. In schema theorem, 10*0*1*, order of schema is... a. 2

- b. 1
- c. 3
- d. 7

Ans: c

Explanation: Order is number of * (don't care, i.e. 0 or 1)

80. In schema theorem, 10*0*, order of schema is... a. 2

- b. 1
- c. 3
- d. 5

Ans: a

Explanation: Order is number of * (don't care, i.e. 0 or 1)

81. In schema theorem, 10^*0^* , length of schema is... a. 2

- b. 1
- c. 3
- d. 5

Ans: a

Explanation: length is number of elements in between first non *to last *

82. In schema theorem, 10^{**} , length of schema is... a. 2

- b. 1
- c. 0
- d. 5

Ans: c

Explanation: length is number of elements in between first non *to last *

83. In schema theorem, 100^{**} , length of schema is... a. 2

- b. 5
- c. 0
- d. 1

Ans: d

Explanation: length is number of elements in between first non *to last *

84. In schema theorem, $100^{**}0$, length of schema is... a. 4

- b. 5
- c. 0
- d. 1

Ans: a

Explanation: length is number of elements in between first non *to last *

85. In schema theorem, $1^*00^{**}0$, length of schema is... a. 4

- b. 5
- c. 0
- d. 1

Ans: b

Explanation: length is number of elements in between first non *to last *

86. In schema theorem, 1^*00^{**} , length of schema is... a. 4

- b. 5
- c. 0
- d. 2

Ans: d

Explanation: length is number of elements in between first non *to last *

87. In schema theorem, 1^{***} , length of schema is... a. 4

- b. 5
- c. 0
- d. 2

Ans: c

Explanation: length is number of elements in between first non *to last *

88. In schema theorem, 1^{***} , length and order of schema is... a. 4,1

- b. 1,3

c. 0,3

d. 3,1

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of * 89. In schema theorem, $1^{***}1$, length and order of schema is...

a. 3,5

b. 1,3

c. 0,3

d. 3,3

Ans: d

Explanation: length is number of elements in between first non *to last * and order is no. of * 90. In schema theorem, 1^*1^*1 , length and order of schema is...

a. 3,2

b. 1,3

c. 0,3

d. 3,3

Ans: a

Explanation: length is number of elements in between first non *to last * and order is no. of *

91. In schema theorem, 10^*00^* , length and order of schema is... a. 6,2

b. 6,4

c. 3,2

d. 2,3

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of * 92. In schema theorem, 10^*0^* , length and order of schema is...

a. 6,2

b. 6,4

c. 3,2

d. 2,2

Ans: d

Explanation: length is number of elements in between first non *to last * and order is no. of * 93. In schema theorem, 00^{**} , length and order of schema is...

a. 4,2

b. 2,4

c. 0,2

d. 2,2

Ans: c

Explanation: length is number of elements in between first non *to last * and order is no. of * 94.

Genetic Algorithms: chromosomes are represented using:

A binary

B Octal

C Hexadecimal

D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string are way to represent chromosomes

95. Genetic Algorithms: chromosomes are represented using: A binary

B Tree

C Hexadecimal

D All of above

Ans: D

Explanation: Binary , octal , hex, real value, decimal , string, tree are way to represent chromosomes

96. In GA: compute fitness of 00110011, where fitness function is number of ones a. 2

b. 8

c. 4

d. 0

Ans: c

Explanation: Fitness is computed as number of ones

96. In GA: compute fitness of 0011, where fitness function is number of ones a. 2

b. 8

c. 4

d. 0

Ans: a

Explanation: Fitness is computed as number of ones

97. In GA: compute fitness of 0011, where fitness function is number of ones, what would be the best solution

a. 2, 15

b. 8, 15

c. 4, 8

d. 0, 8

Ans: a

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

98. In GA: For fitness function is number of ones, what would be the best solution for 4 bit string

a. 8

b. 15

c. 4

d. 2

Ans: b

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

99. In GA: For fitness function is number of ones, what would be the global minimum solution for 5 bit string

a. 11111

b. 10000

c. 00000

d. 00101

Ans: c

Explanation: Fitness is computed as number of ones, hence 00000 will produce best solution

100. In GA: For fitness function equal to number of ones, what would be the best solution for 4 bit string

a. 0000

b. 1111

c. 1010

d. 1110

Ans: b

Explanation: Fitness is computed as number of ones, hence 1111 will produce best solution

Unit-6 Swarm Intelligence

1. Swarm intelligence

- A Global behaviour appears as a result of centralized control
- B In Particle Swarm Optimization, velocity and position of particles are updated
- C The probability of choosing a new edge in ant colony optimization is proportional with the pheromone level of the edge
- D All of above

Ans: D

Explanation: All are types of swarm intelligence

2. Biologically inspired computation is appropriate for A Optimization

B Modelling

C Simulation

D. All of above Ans: D

Explanation: Biological processes are simulated, modelled to solve optimization problems

3. In PSO, at every iteration particle changes A. only position

B. Only Velocity

C. Position and Velocity both

D. None of above

Ans: C

Explanation: At every iterations position and velocity is updating

4. In PSO particles position is depend upon

A. Inertial

B. Individual best position

C. Global best position

D. All of above

Ans: D

Explanation: Factors affecting position are inertia, global and local positions

5. ACO is used in

A. Graph coloring problem

B. Travelling Sales Man

C. Network routing

D. All of above

Ans: D

Explanation: All above are application of ACO

6. In ACO, pheromone level is directly proportional to the distance A. True

B: False

Ans: B

Explanation: Minimum distance higher the pheromone level

7. In ACO, pheromone level is inversely proportional to the distance A. True

B: False

Ans: A

Explanation: Minimum distance higher the pheromone level

8. Gradient descent is optimization technique used to find A. Local maximum

B. Local Minimum

C. Both A and B

D. None of above

Ans B

Explanation: it optimizes problem of minimization

9. Gradient ascent is optimization technique used to find A. Local maximum

B. Local Minimum

C. Both A and B

D. None of above Ans A

Explanation: it optimizes problem of maximization

10. In ACO, pheromone amount get decreases with some fraction, called as A. Evaporation rate

B. Decade rate

C. Pheromone trail

D. None of above

Ans: A

Explanation: As per the definition

11. Social behaviour of animals is observed and implemented artificially is called A. Artificial neural network

B. Genetic Programming

C. Swarm Intelligence

D. Evolutionary computing

Ans: C

Explanation: As per the definition

12. In ACO, selection probability of next node by ant is

A. proportional to pheromone level present on connection link

B. inversely proportional to pheromone level present on connection link C. proportional to evaporation rate

D. None of above

Ans: A

Explanation: probability is higher if pheromone is higher

13. In PSO, next position p is computed as A. $p=p+1$

B. $p=p+velocity$

Ans: B

Explanation: As per the formula

14. Evaporation value is a. 0

b. 1

c. Between 0 to 1

d. none of above

Ans: c

Explanation: Rate is in between 0 to 1

15. $T_{ij}(t+n) = p \cdot T_{ij}(t) + \Delta T$ is the formula for updating a. pheromone level

b. evaporation rate

Ans: a

Explanation: p stands for evaporation rate

16. $T_{ij}(t+n) = p \cdot T_{ij}(t) + \Delta T$ in this formula p is set to a. 0

b. 1

c. $0 < p < 1$

d. any value Ans: c

Explanation: p stands for evaporation rate, set between 0 to 1

17. In TSP for an ant to decide which city to visit next is calculated based on a. greedy approach

b. Genetic Algorithms

c. ACO

d. All are above

Ans: d

Explanation: TSP is non-deterministic problem can be solved by any of above technique.

18. In TSP for an ant to decide which city to visit next is calculated based on a. Transition probability

b. Simple probability

Ans: a

Explanation: Values are normalized all over the values (i.e adjacent cities are considered)

19. In ACO based TSP transition probability is

a. Combination of heuristic rules and pheromone level

b. based on pheromone level only

c. based on heuristic rules only

d. none of above

Ans: a

Explanation: As per the formula, it is Combination of heuristic rules and pheromone level

20. In TSP, track of non-visited cities can be maintained by a. heuristic rules

b. transition probability

c. evaporation rate

d. Pheromone updation rate

Ans: a

Explanation: Rules can be used to maintain list of visited and non-visited cities.

21. PSO is inspired from

a. Birds behaviour searching for the food

b. Ants searching for food

c. Bees searching for the food

d. All of above

Ans: a

Explanation: PSO is based on the behaviour of flock of birds or school of fish

22. ACO is inspired from

a. Birds behaviour searching for the food

b. Ants searching for food

c. Bees searching for the food

d. All of above

Ans: b

Explanation: ACO is based on the behaviour of ant colonies

23. In swarm intelligence control is decentralized..... a. True

b. false

Ans: a

Explanation: Not having single point control

24. In PSO , number of particles present in search space are.. a. 1

b. 0

c. any number

d. none of above

Ans: c

Explanation: Depends on problem statement e.g. 20,30,100 etc

25. In PSO, if numbers of particles are less, algorithm will converge slowly a. true

b. false

Ans. A

Explanation: If large number result will come faster

26. In swarm intelligence control is centralized..... a. True

b. false

Ans: b

Explanation: Not having single point control

27. Compared with GA, all the particles tend to converge to the best solution quickly ... a. True

b. false

Ans: a

Explanation: In PSO, only gBest (or lBest) gives out the information to others. It is a one - way information sharing mechanism. The evolution only looks for the best solution.

28. Particles update themselves with... a. evaporation rate

b. Internal velocity

c. fitness value

d. All of above

Ans; b

Explanation: At every iteration position is updated by adding velocity

29. For optimizing function $f(x)=2x+2y$, how many minimum particles will be required a. 1

b. 2

c. infinite

d. zero

Ans: b

Explanation: one for x and other for y

30. For optimizing function $f(x)=2x+2y+2z$, how many minimum particles will be required a. 1

b. 2

c. infinite

d. 3

Ans: d

Explanation: one for x , one for y and other for z

31. For optimizing function $f(x)=2x+2y+2z$, which function is used for fitness evaluation a. $f(x)=1$

b. $f(x)=0$

c. $f(x)=2x+2y+2z$,

d. $f(x)=\max[0,1]$

Ans: c

Explanation: In this case objective function is fitness function

32. For optimizing function $f(x)=2x$, which function is used for fitness evaluation a. $f(x)=1$

b. $f(x)=2$

c. $f(x)=2x$

d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case objective function is fitness function

33. For optimizing function $f(x)=2$, how many minimum particles will be required a. 1

b. 2

c. infinite

d. zero

Ans: d

Explanation: This function will not able to optimize because of constant value

34 For TSP, function used for fitness evaluation is

- a. $f(x)=1$
- b. $f(x)=2$
- c. $f(x)=\text{Min_distance}(i,j)$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the minimum distance or Euclidean distance

35 For TSP, function used for fitness evaluation is a. $f(x)=1$

- b. $f(x)=2$
- c. $f(x)=\text{Sqrt_root } (i^2-j^2)$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the minimum distance or Euclidean distance

36 In classification problem, function used for fitness evaluation is a. $f(x)=1$

- b. $f(x)=2$
- c. $f(x)=\text{error rate evaluation}$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the error rate or accuracy measure

37 In classification problem, function used for fitness evaluation is a. $f(x)=1$

- b. $f(x)=2$
- c. $f(x)=\text{Accuracy measure}$
- d. $f(x)=\max[1,2]$

Ans: c

Explanation: In this case fitness function will be the error rate or accuracy measure

38 In classification problem, function used for fitness evaluation is a. $f(x)=\text{ Accuracy measure}$

- b. $f(x)=\text{ error rate evaluation}$
- c. neither a nor b
- d. both a and b

Ans: d

Explanation: In this case fitness function will be the error rate or accuracy measure

39 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1,2 what would be the fitness value for each particle

- a. 0,1,2 b. 1,2,1
- c. 1,1,1 d. 2,1,1

Ans: b

Explanation: Put each value in the function separately

40 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1 what would be the fitness value for each particle

- a. 0,1,2 b. 1,2,1 c. 1,1,1 d. -2,1,2

Ans: d

Explanation: Put each value in the function separately

41 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1 , which particle produce best solution

- a. P1
- b. P2

c. P3

d. All of above

Ans: c

Explanation: P3=1 produces 2 value (i.e. maximum solution)

42 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1 ,2 which particle produces optimal solution

a. P1

b. P2

c. P3

d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

43 $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with 0,1 ,2 Optimal solution has value...

a. 1

b. 2

c. 0

d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

44. $f(x)=1+2x-x^2$ if there are three particles p1,p2,p3 with -1, 0,1, Optimal solution has value...

a. 1

b. 2

c. 0

d. All of above

Ans: b

Explanation: P2=1 produces 2 value (i.e. maximum output)

45. In PSO , $V=V+c_1r_1(ib-p) + c_2r_2(gb-p)$ where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

a. $c_1r_2(ib-p)$

b. $c_1r_1(ib-p)$

c. $c_1r_1(ib-gb)$

d. $c_1r_1(gb-ib)$

Ans: b

Explanation: $c_1r_1(ib-p)$ gives individual best

46. In PSO, $V=V+c_1r_1(ib-p) + c_2r_2(gb-p)$ where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

a. $c_1r_2(gb-p)$

b. $c_2r_2(gb-p)$

c. $c_2r_2(ib-gb)$

d. $c_2r_2(gb-ib)$

Ans: b

Explanation: $c_2r_2(gb-p)$ gives global best

47. In ACO, if B and C are adjacent node to A with pheromone level 2,3 respectively then, then ant starting with A will select node with transition probability ---

a. B b. C

Ans: b

Explanation: transition probability without heuristic rule is calculated as for $c=3/2+3$, $b=2/2+3$

48. In ACO, if B and C are adjacent node to A with pheromone level 2,3 respectively then, then ant starting with A will select node with transition probability ---

- a. 2/3
- b. 3/2
- c. 2/5 d. 3/5 Ans: d

Explanation: transition probability without heuristic rule is calculated as for $c=3/2+3$, $b=2/2+3$

49. A real-valued function f defined on a domain X has

- a global (or absolute) point at x^* if $f(x^*) \geq f(x)$ for all x in X . a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: d

Explanation: Global X with maximum function value

50. A real-valued function f defined on a domain X has

- a global (or absolute) point at x^* if $f(x^*) \leq f(x)$ for all x in X . a. Local minima
- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: c

Explanation: Global X with minimum function value

51. A real-valued function f defined on a domain X has a

local (or absolute) point at x^* if $f(x^*) \leq f(x)$ for all x in X within distance of x^* . a. Local minima

- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: a

Explanation: local X with minimum function value

52. A real-valued function f defined on a domain X has a

local (or absolute) point at x^* if $f(x^*) \geq f(x)$ for all x in X within distance of x^* . a. Local minima

- b. Local Maxima
- c. Global Minima
- d. Global maxima

Ans: b

Explanation: local X with maximum function value

SOFT COMPUTING

UNIT – I

1. The structural constitute of a human brain is known as -----

- a) **Neuron** b)Cells c)Chromosomes d)Genes

2.Neural networks also known as -----

- a)Artificial Neural Network b)Artificial Neural Systems
c)**Both A and B** d) None of the above

3. Neurons also known as -----

- a)Neurodes b)Processing elements c)Nodes d)**All the above**

4. In the neuron, attached to the soma are long irregularly shaped filaments called-----

- a)**Dendrites** b)Axon c)Synapse d)Cerebellum

5. Signum function is defined as -----

- a) $\phi(I) = +1, I > 0, -1, I \leq 0$
b) $\phi(I)=0$
c) $\phi(I)=+1, I > 0$
d) $\phi(I)=-1, I \leq 0$

6. To generate the final output, the sum is passed on to a non-linear filter ϕ called

- a)Smash function b)sum function c)**Activation function** d)Output function

7. -----function is a continuous function that varies gradually between the asymptotic values 0 and 1 or -1 and +1

a)Activation function b)Thresholding function c)Signum function d)**Sigmoidal function**

8.-----produce negative output values

- a)**Hyperbolic tangent function** b)Parabolic tangent function
c)Tangent function d)None of the above

9.----- carrying the weights connect every input neuron to the output neuron but not vice-versa.

- a)**Feed forward network**
b)Fast forward network
c)Fast network
d)Forward network

10.----- has not feedback loop

- a) Neural network **b)Recurrent Network** c) Multilayer Network d) Feed forward network

11. In the learning method, the target output is not presented to the network -----

- a) Supervised learning **b)Unsupervised learning**

- c) Reinforced learning d) Hebbian learning

12. Combining a number of ADALINE is -----

- a) MULTILINE b) MULTIPLE LINE **C)MADALINE** d) MANYLINE

13. Neural network applications -----

- a) Pattern Recognition b) Optimization Problem c) Forecasting **d)All the above**

14.----- is a Systematic method for training multilayer artificial neural network

- a)Back propagation** b) Forward propagation c) Speed propagation d) Multilayer propagation

15. ----- is a computational model

- a) neuron b) cell **c)Perception** d) Neucleus

16. Intermediary layer is present in -----

- a)Multilayer feedforward perception model**

b) Multilayer perception model

c) Multilayer Feedforward model

d) None of the above

17. Linear Activation Operator equation is -----

- a) $O=gl, g=\tan\phi$**

b) $O=gl, g=\sin\phi$

c) $O=gl, g=\cos\phi$

d) $O=gl, g=-\tan\phi$

18.----- is never assured of finding global minimum as in the simple layer delta rule case.

- a)Back propagation** b) Front Propagation c) Propagation d) None above

19. The test of neural network is known as-----

- a)Inference Engine** b) Checking c) Deriving d) None

20. Application of Back Propagation

- a) Design of Journal Bearing b) Classification of soil
c) Hot Extrusion of soil **d) All the above**

21. Reinforced learning also known as -----

- a) Output based learning** b) Error based learning
c) Back propagation learning d) None

22. -----learning follows “Winner takes all” strategy

- a) Stochastic learning **b) Competitive learning** c) Hebbian learning d) BackPropagation learning

23. -----earlier neural network architecture,

- a) Rosenblatt Perception** b) Rosen Perception c) Roshon Perception d) None

24. In Rosenblatt’s Perception network has three units, sensory unit, association unit and -----

- a) Output unit **b) Response unit** c) feedback unit d) Result unit

25. ADALINE stands for -----

- a) Adaptive Linear Neural Element Network**
b) Adaptive Line Neural Network
c) Adapt Line Neural Element Network
d) Adaptive Linear Neural Network

PART-B

1. Explain model of artificial neuron
2. Differentiate Learning methods supervised, unsupervised, and reinforced learning
3. Explain Rosenblatt’s Perception
4. Explain ADALINE network
5. Explain Single layer ANN
6. Explain any one application of Back propagation networks

PART-C

1. Explain neural network architecture
2. Explain back propagation learning briefly
3. Explain basic concepts of neural network

UNIT-2

1.-----is a store house of associated patterns which are encoded in some form

- a) **Associative memory**
- b) Commutative memory
- c) Neural networks
- d) Memory

2. If the associated pattern pairs (x,y) are different and if the model recalls a y given an x or vice versa, then it is termed as -----

- a) Auto associative memory
- b) Hetero associative memory**
- c) neuro associative memory
- d) none

3. Autoassociative correlation memories are known as -----

- a) Auto correlators**
- b) Hetero Correlators
- c) Neuro Correlators
- d) None

4.----- recalls an output given an input in one feedforward pass

- a) Static networks**
- b) Dynamic networks
- c) Recurrent networks
- d) None

5.BAM stands for -----

- a) Bidirectional Associative Memory**
- b) v Associative Memory
- c) Biconventional Associative Memory
- d) None

6.----- associates patterns in bipolar forms that are real-coded

- a) Simplified Bidirectional Associative Memory**
- b) Bipolar form
- c) Bidirectional form
- d) None

7)----- uses bipolar coding

- a) Fabric defect identification
- b) Recognition of Characters**
- c) Design of Journal Bearing
- d) Classification of soil

8) Self-organizing network also known as -----

- a) Back Propagation network
- b) Training free counter propagation network**
- c) Propagation network
- d) none

9) Kesko proposed an energy function for the two states -----

a) $E(A,B) = AMB^T$

b) $E(A,B) = -AMB^T$

C) $E(A,B) = -AB^T$

$$D) E(A, B) = AB^T$$

10) BAM was introduced by -----

- a) Cruz b) Stubberd c) **Kosko** d) Rosenbatt

11) The algorithm which computes operator M is known as -----

- a) Memory algorithm b) **Recording Algorithm** c) Transfer Algorithm d) None

12) Real coding is used by -----

- a) Recognition of characters b) **Fabric defect identification**
c) Optimization d) Classification of soil

13) ART stands for -----

- a) **Adaptive Resonance Theory** b) Adaptive Recent Theory
c) Adapt Resonance Theory d) Adaptive Retail Theory

14) A program ----- is written in fortran for cluster formation

- a) **Vecquent** b) Vecant c) Vector d) Quantization

15) ----- networks were developed by carpenter and grossberg

- a) **ART** b) ARP c) ARC d) ARD

16) ----- of the network means that a pattern should not oscillate among different cluster units at different stages of training

- a) **Stability** b) Mobility c) Versatility d) Plasticity

17) ----- is the analog version of ART

- a) **ART2** b) ART1 c) ART2A d) ARTMAP

18) ----- test is incorporated into the adaptive backward network

- a) **Vigilance** b) Indulgence c) Revailance d) None

19) In ----- learning the weights are adjusted only when the external input matches one of the stored prototypes

- a) Supervised b) UnSupervised c) **Match-based** d) None

20) Kim et al. Proposed an ----- method using ART2 architecture.

- a) Pattern Recognition b) **Chinese Recognition method**

c)Character Recognition d)None

21)----- learning weight update during resonance occurs rapidly

a)Error-based **b) Fast** c)Slow d)Match-based

22)Comparison layer and recognition layer constitute -----

a)Attenuation **b)Attenuated System** c)Synaptic System d)None

23)ART1 is an elegant theory that address -----

a)Stability – plasticity dilemma

b)Stability dilemma

c)Plasticity dilemma

d)None

24)Supervised version of ART -----

a)ARTMAP

b)Fuzzy art

c)Fuzzy Artmap

d)ART1

25)Slow learning is used as -----

a)ART1

b)ART2

c)ARTMAP

d)Fuzzy ART

PART-B

1.Explain Auto Correlators

2.Explain HeterCorrelators

3.Explain any one application of associative memory

4.Explain Simplified ART architecture

5.Distinguish ART1 and ART2

6.Explain any one application of ART

PART-C

7.Explain Exponential BAM

8.Explain Classical ART network

9.Explain ART1 algorithm

UNIT-3

1.Fuzziness means -----

- a)Vagueness b)Clear c)Precise d)Certainty

2.----- are pictorial representations to denote a set

- a)Flow chart b)**Venn diagram** c)DFD d)ER diagrams

3.The number of elements in a set is called its -----

- a)modality b)placitivity c)**Cardinality** d)elasticity

4.A set with a single element is called -----

- a)Single set b)**Singleton set** c)1 set d)none

5.A ----- of a set A is the set of all possible subsets that are derivable from A including null set

- a)**Power set** b)Impower set c)Rational set d)Irrational set

6.The member ship function of fuzzy set not always be described by -----

- a)continuous b)**Discrete** c)crisp d)specific

7.Fuzzy relation is a fuzzy set defined on the Cartesian product of -----

- a)single set b)**crisp set** c)union set d)intersection set

8.Raising a fuzzy set to its second power is called -----

- a)**concentration** b)intersection c)conjunction d)disjunction

9.Taking a square root of fuzzy set is called -----

- a)**Dilemma** b)Dual c)dialama d)none

10.Fuzzy relation associates ----- to a varying degree of membership.

- a)records b)**tuples** c)felds d)none

11.In case of \Rightarrow operator, the proposition occurring before the " \Rightarrow " symbol is called-----

a. antecedent b.consequent c.conjunction d.disjunction

12. A truth table comprises rows known as -----

a. interpretations b.contradiction c.conjunction d.disjunction

13.A formula which has all its interpretations recording true is known as a -----

a.disjunction b.conjunction c.tautology d.antecedent

14.In propositional logic, ----- widely used for inferring facts.

a.pones b.modus c.modus ponens d.pons

15.----- represent objects that do not change values

a.constants b.variables c.predicates d.subject

16.----- are representative of associations between objects that are constants or variables and acquire truth values.

a.Subject b.Predicate c.Quantifier d.Functions

17.----- truth values are multivalued.

a.crisp logic b.boolean logic c.fuzzy logic d.none

18.Fuzzy logic propositions are also quantified by -----

a.fuzzy b.fuzzy qualifiers c.fuzzy quantifiers d.none

19.Fuzzy inference also referred to as -----

a.approximate reasoning b.reasoning c.fixed reasoning d.none

20.Conversion of a fuzzy set to single crisp value is called -----

a.fuzzification b.defuzzification c.fuzzy logic d.fuzzy rule

21.----- obtains centre of area occupied by the fuzzy set

a.center b.center of gravity c.center of area d.center point

22.The ----- is the arithmetic average of mean values of all intervals

a.mean b.mean of maxima c.maximum d.mean interval

23.The ----- are obtained by computing the minimum of the membership functions of the antecedents.

a.rule base b.rule strengths c.rules d.none

24.Relative quantifiers are defined as -----

a.0 to 10 **b.0 to 1** c.0 d.1

25.Fuzzy cruise controller has ----- inputs

a.2 b.3 c.1 d.0

PART-B

1.Explain fuzzy set

2.Explain crisp set

Explain fuzzy relations

3.Distinguish between crisp logic and predicate logic

4.Explain fuzzy quantifiers

5.Explain fuzzy logic

6.Explain fuzzy inference

PART-C

1.Explain Fuzzy System

2.Explain any one of applications of Fuzzy systems

3.Explain fuzzy rule based systems.

UNIT-IV

PART-A

1.----- mimic the principle of natural genetics

- a.Genetic programming **b.Genetic Algorithm** c.Genetic Evolution d.none

2.----- mimics the behaviour of social insects

- a.Swarm intelligence** b.Ant colony c.Gentic Algorithm d.none

3.Possible settings of traits are called in genes -----

- a.locus **b.alleles** c.genome d.genotype

4.----- means that the element of DNA is modified.

- a.Recombination b.Selection **c.Mutation** d.none

5.The ----- of an organism is measured by means of success of organism in life

- a.Strength **b.fitness** c.Gene d.Chromosome

6.The space for all possible feasible solutions is called -----

- a.space b.search **c.search space** d.area

7.----- is a way of representing individual genes

- a.conversion **b.encoding** c.coding d.none

8.In -----, every chromosomes is a string of numbers

- a.hexadecimal encoding b.octal encoding **c.Permutation encoding** d.none

9.----- is the first operator applied on population.

- a.Reproduction** b.Recombination c.Mutation d.none

10.----- means that the genes from the already discovered good individuals are exploited

- a.Diversity **b.Population diversity** c.Unity in diversity d.none

11.-----is the degree to which the better individuals are favoured

- a.Selective pressure** b.Reproduction pressure c.Recombination pressure d.Mutation

12.The selection method which is less noisy is -----

- a.stochastic remainder solution** b.Boltzman solution c.Remainder solution d.none

13.The ----- is referred the proportion of individuals in the the population which are replaced in each generation.

a.gap **b.generation gap** c.generation interval d.interval

14.Crossover operator proceeds in ----- steps

a.4 **b.3** c.5 d.2.

15.Matrix crossover is also known as -----

a.One dimensional **b.Two dimensional** c.Three dimensional d.none

16.-----performs linear inversion with a specified probability of 0.75.

a.Linear+end-inversion b.Discrete inversion c.Continuous inversion d.Mass inversion

17.----- of bit involves changing bits from 0 to 1 and 1 to 0.

a.Mutation b.Crossover c.Inversion d.Segregation

18.----- is a process in which a given bit pattern is transformed into another bit pattern by means of logical bit-wise operation.

a.Inversion b.Conversion **c.Masking** d.Segregation

19.In -----, inversion was applied with specified inversion probability p to each new individual when it is created.

a.Discrete **b.Continuous** c.Mass inversion d.none

20.The -----causes all the bits in the first operand to be shifted to the left by the number of positions indicated by the second operand.

a.Shift right **b.Shift left** c.Shift operator d.none

21.A ----- returns 1 if one of the bits have a value of 1 and the other has a value of 0 otherwise it returns a value 0.

a.bit wise or b.bit wise and c.not d.none

22.Population size, Mutation rate and cross over rate are together referred to as -----

a.control parameters b.central parameters c.connection parameters d.none

23.-----selection is slow cooling of molten metal to achieve the minimum function value in a minimization problem.

a.Boltzmann selection b.Tournament selection c.Roulette-wheel selection d.none

24.-----is not a particular method of selecting the parents.

a.Steady-state b.Elitism c.Boltzmann selection d.Tournament Selection

25.Reproduction operator is also known as -----

a.Recombination **b.Selection** c.Regeneration d.none

PART-B

- 1.Explain biological background of genetic algorithm
- 2.Explain Working principle of genetic algorithm
- 3.Explain any two types of encoding
- 4.Explain inheritance operators
- 5.Explain Mutation operator
- 6.Explain Bit-wise operator

PART-C

- 1.Explain Reproduction operator
- 2.Explain Inversion and Deletion
- 3.Explain Generation Cycle

UNIT-5

PART-A

1.Hybrid systems is combination of neural networks, fuzzy logic and -----

- a.**Genetic Algorithm** b.Genetic Programming c.Genetic d.none

2.In -----, one technology calls the other as a subroutine to process or manipulate information needed by it.

- a.**Auxiliary hybrid systems** b.Embedded hybrid systems

- c.sequential hybrid systems d.none

3.-----hyrbid systems make use of technologies in a pipeline fashion.

- a.auxialiary hybrid systems b.embedded hybrid systems

- c.sequential hybrid systems** d.none

4.-----hyrbid systems the technologies participating are integerated in such a manner that they appear interwined.

- a.auxialiary hybrid systems **b.embedded hybrid systems**

- c.sequential hybrid systems d.none

5.----- deals with uncertainty problems with its own merits and demerits

- a.neuro –fuzzy** b.neuro-genetic c.fuzzy –genetic d.none

6.Neural network can learn various tasks from -----

- a.training** b.testing c.learning d.none

7.-----exhibit non-linear functions to any desired degree of accuracy

- a.neuro –fuzzy b.neuro-genetic **c.fuzzy –genetic** d.none

8.----- use to determine the weights of a multilayer feedforward network with backpropagation learning

- a.neuro –fuzzy **b.neuro-genetic** c.fuzzy –genetic d.none

9.----- fuzzy input vectors to crisp outputs

- a.Fuzzy – backpropagation** b.neuro –fuzzy c.neuro-genetic d.fuzzy –genetic

10.-----is a neuro-fuzzy hybrid in which the host is a recurrent network with a kind of competitive learning.

- a.Fuzzy ARTMAP** b.Fuzzy art c.ARTMAP d.none

11.FAM Stands for -----

- a.Fuzzy Associative Memory b.Fuzzy association memory
- c.Fuzzy Assist Memory d.none

12.-----maps fuzzy sets and can encode fuzzy rules.

- a.**FAM** b.Fuzzy c.ART d.none

13.Fuzzy truck backer-upper system is application of -----

- a.FAM b.Fuzzy ART c.ART d.none

14.----- applicable on fuzzy optimization problems

- a.**Fuzzy-genetic** b.neuro – fuzzy c.fuzzy-logic d.fuzzy-backpropagation

15.-----learning have reported difficulties in learning the topology of the networks whose weights they optimize

- a.**Gradient descent learning** b.descent learning c.Gradient learning d.none

16.Applying neuronal learning capabilities to fuzzy systems is knowns as -----

- a.**NN driven fuzzy reasoning** b.fuzzy driven nn reasoning
- c.neural network reasoning d.none

17.----- can be applicable to mathematical relationship

- a. **neuro-fuzzy** b.fuzzy-neuro c.neuro-network d.none

18.----- is a multilayer feedforward network architecture with gradient learning.

- a.**backpropagation** b.forward propagation c.Propagation d.none

19. Recurrent network architectures adopting -----

- a.**hebbian learning** b.supervised learning c.unsupervised learning d.reinforced learning

20.----- set have no crisp boundaries

- a.**fuzzy** b.boolean c.crisp set d.none

21.GA-NN also known as -----

- a.**GANN** b.NNGA c.GA d.none

22.Image recognition under noisy is application of -----

- a.Fuzzy **b.Fuzzy art** c.art d.none

23.Genetic algorithm ----- uses to determine optimization

a.fitness function b.fit function c.strength function d.none

24.-----proposed neuro –fuzzy system

a.lee and lie b.kosko c.gradient d.lee

25.Knowledge-based evaluation and earthquake damage evaluation is application of -----

a.fuzzy-backpropagation b.neuro-fuzzy c.fuzzy d.none

PART-B

1.Explain neuro-fuzzy hybrids

2.Explain neuro-genetic hybrids

3.Explain fuzzy-genetic hybrids

4.Explain fuzzy-backpropagation network

5.Explain FAM

PART-C

1.Explain Hybrid Systems

2.Explain Fuzzy ARTMAP

3.Explain GA based backpropagation network

SCOA Unit I MCQ

- 1. Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.**
A.True
B.False

- 2. The membership functions are generally represented in**
A.Tabular Form
B.Graphical Form
C.Mathematical Form
D.Logical Form

- 3. Membership function can be thought of as a technique to solve empirical problems on the basis of**
A.knowledge
B.examples
C.learning
D.experience

- 4. Three main basic features involved in characterizing membership function are**
A.Intuition, Inference, Rank Ordering
B.Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

5. The region of universe that is characterized by complete membership in the set is called

A.Core

B.Support

C.Boundary

D.Fuzzy

6. A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called

A.sub normal fuzzy sets

B.normal fuzzy set

C.convex fuzzy set

D.concave fuzzy set

7. In a Fuzzy set a prototypical element has a value

A.1

B.0

C.infinite

D.Not defined

- 8. A fuzzy set wherein no membership function has its value equal to 1 is called**
- A.**normal fuzzy set
B.Subnormal fuzzy set.
C.convex fuzzy set
D.concave fuzzy set
- 9. A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe**
- A.**convex fuzzy set
B.concave fuzzy set
C.Non concave Fuzzy set
D.Non Convex Fuzzy set
- 10. The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monoronically increasing than decreasing.**
- A.**Convex Fuzzy Set
B.Non convex fuzzy set
C.Normal Fuzzy set
D.Sub normal fuzzy set
- 11. The crossover points of a membership function are defined as the elements in the universe for which a particular fuzzy set has values equal to**

A.infinite

B.1

C.0

D.0.5

12. Fuzzy Computing

A.doesnt deal with 2 valued logic

B.mimics human behaviour

C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic

D.All of the above

13. ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems.

A.True

B.False

14. Artificial neural network used for

A.Pattern Recognition

B.Classification

C.Clustering

D.All of these

15. A Neural Network can answer

- A.**For Loop questions
- B.**what-if questions
- C.**IF-The-Else Analysis Questions
- D.**None of these

16. Ability to learn how to do tasks based on the data given for training or initial experience

- A.**Self Organization
- B.**Adaptive Learning
- C.**Fault tolerance
- D.**Robustness

17. Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is

- A.**Adaptive Learning
- B.**Self Organization
- C.**What-If Analysis
- D.**Supervised Learning

18. In artificial Neural Network interconnected processing elements are called

- A.**nodes or neurons

B.weights

C.axons

D.Soma

19. Each connection link in ANN is associated with _____ which has information about the input signal.

A.neurons

B.weights

C.bias

D.activation function

20. Neurons or artificial neurons have the capability to model networks of original neurons as found in brain

A.True

B.False

21. Internal state of neuron is called _____, is the function of the inputs the neurons receives

A.Weight

B.activation or activity level of neuron

C.Bias

D.None of these

22. Neuron can send _____ signal at a time.

- A.**multiple
- B.**one
- C.**none
- D.**any number of

23. Artificial intelligence is

- A.**It uses machine-learning techniques. Here program can learn From past experience and adapt themselves to new situations
- B.**Computational procedure that takes some value as input and produces some value as output.
- C.**Science of making machines performs tasks that would require intelligence when performed by humans
- D.**None of these

24. Expert systems

- A.**Combining different types of method or information
- B.**Approach to the design of learning algorithms that is structured along the lines of the theory of evolution
- C.**an information base filled with the knowledge of an expert formulated in terms

of if-then rules

D.None of these

25. Falsification is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

26. Evolutionary computation is

A.Combining different types of method or information

B.Approach to the design of learning algorithms that is structured along the lines of the theory of evolution.

C.Decision support systems that contain an information base filled with the knowledge of an expert formulated in terms of if-then rules.

D.None of these

27. Extendible architecture is

A.Modular design of a software application that facilitates the integration of new modules

B.Showing a universal law or rule to be invalid by providing a counter example

C.A set of attributes in a database table that refers to data in another table

D.None of these

28. Massively parallel machine is

A.A programming language based on logic

B.A computer where each processor has its own operating system, its own memory, and its own hard disk

C.Describes the structure of the contents of a database.

D.None of these

29. Search space

A.The large set of candidate solutions possible for a problem

B.The information stored in a database that can be, retrieved with a single query.

C.Worth of the output of a machine learning program that makes it understandable for humans

D.None of these

30. $n(\log n)$ is referred to

A.A measure of the desired maximal complexity of data mining algorithms

B.A database containing volatile data used for the daily operation of an organization

C.Relational database management system

D.None of these

31. Perceptron is

- A.**General class of approaches to a problem.
- B.**Performing several computations simultaneously
- C.**Structures in a database those are statistically relevant
- D.**Simple forerunner of modern neural networks, without hidden layers

32. Prolog is

- A.**A programming language based on logic
- B.**A computer where each processor has its own operating system, its own memory, and its own hard disk
- C.**Describes the structure of the contents of a database
- D.**None of these

33. Shallow knowledge

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be, retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

34. Quantitative attributes are

- A.**A reference to the speed of an algorithm, which is quadratically dependent on the size of

the data

B.Attributes of a database table that can take only numerical values

C.Tools designed to query a database

D.None of these

35. Subject orientation

A.The science of collecting, organizing, and applying numerical facts

B.Measure of the probability that a certain hypothesis is incorrect given certain observations.

C.One of the defining aspects of a data warehouse, which is specially built around all the existing applications of the operational data

D.None of these

36. Vector

A.It do not need the control of the human operator during their execution

B.An arrow in a multi-dimensional space. It is a quantity usually characterized by an ordered set of scalars

C.The validation of a theory on the basis of a finite number of examples

D.None of these

37. Transparency

- A.**The large set of candidate solutions possible for a problem
- B.**The information stored in a database that can be retrieved with a single query
- C.**Worth of the output of a machine learning program that makes it understandable for humans
- D.**None of these

38. Core of soft Computing is

- A.**Fuzzy Computing, Neural Computing, Genetic Algorithms
- B.**Fuzzy Networks and Artificial Intelligence
- C.**Artificial Intelligence and Neural Science
- D.**Neural Science and Genetic Science

39. Who initiated the idea of Soft Computing

- A.**Charles Darwin
- B.**Lofti A Zadeh
- C.**Rechenberg
- D.**Mc_Culloch

40. Fuzzy Computing

- A.**mimics human behaviour
- B.**doesn't deal with 2 valued logic
- C.**deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic
- D.**All of the above

41. Neural Computing

- A.**mimics human brain
- B.**information processing paradigm
- C.**Both (a) and (b)
- D.**None of the above

42. Genetic Algorithm are a part of

- A.**Evolutionary Computing
- B.**inspired by Darwin's theory about evolution - "survival of the fittest"
- C.**are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics
- D.**All of the above

43. What are the 2 types of learning

- A.**Improvised and unimprovised
- B.**supervised and unsupervised
- C.**Layered and unlayered
- D.**None of the above

44. Supervised Learning is

- A.**learning with the help of examples
- B.**learning without teacher
- C.**learning with the help of teacher
- D.**learning with computers as supervisor

45. Unsupervised learning is

- A.**learning without computers
- B.**problem based learning

C.learning from environment

D.learning from teachers

46. Conventional Artificial Intelligence is different from soft computing in the sense

A.Conventional Artificial Intelligence deal with predicate logic where as soft computing deal with fuzzy logic

B.Conventional Artificial Intelligence methods are limited by symbols where as soft computing is based on empirical data

C.Both (a) and (b)

47. In supervised learning

A.classes are not predefined

B.classes are predefined

C.classes are not required

D. classification is not done

SCOA UNIT 2 MCQs

Question No	Question	Answer Key
1.	<p>Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous.</p> <p>A.True B.False</p>	A
2.	<p>The membership functions are generally represented in</p> <p>A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form</p>	B
3.	<p>Membership function can be thought of as a technique to solve empirical problems on the basis of</p> <p>A.knowledge B.examples C.learning</p>	D

SCOA UNIT 2 MCQs

	<p>D.experience</p>	
4.	<p>Three main basic features involved in characterizing membership function are</p> <p>A.Intution, Inference, Rank Ordering B.Fuzzy Algorithm, Neural network, Genetic Algorithm C.Core, Support , Boundary D.Weighted Average, center of Sums, Median</p>	C
5.	<p>The region of universe that is characterized by complete membership in the set is called</p> <p>A.Core B.Support C.Boundary D.Fuzzy</p>	A
6.	<p>A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called</p> <p>A.sub normal fuzzy sets</p>	B

SCOA UNIT 2 MCQs

	<p>B.normal fuzzy set C.convex fuzzy set D.concave fuzzy set</p>	
7.	<p>In a Fuzzy set a prototypical element has a value</p> <p>A.1 B.0 C.infinite D.Not defined</p>	A
8.	<p>A fuzzy set wherein no membership function has its value equal to 1 is called</p> <p>A.normal fuzzy set B.subnormal fuzzy set. C.convex fuzzy set D.concave fuzzy set</p>	B
9.	<p>A fuzzy set has a membership function whose membership values</p>	A

	<p>are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe</p> <p>A.convex fuzzy set B.concave fuzzy set C.Non concave Fuzzy set D.Non Convex Fuzzy set</p>	
10.	<p>The membership values of the membership function are nor strictly monotonically increasing or decreasing or strictly monotonically increasing than decreasing.</p> <p>A.Convex Fuzzy Set B.Non convex fuzzy set C.Normal Fuzzy set D.Sub normal fuzzy set</p>	B
11.	<p>Fuzzy Computing</p> <p>A.doesn't deal with 2 valued logic</p>	D

SCOA UNIT 2 MCQs

	<p>B.mimics human behaviour</p> <p>C.deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic</p> <p>D.All of the above</p>	
12.	<p>Defuzzification is done to obtain</p> <ul style="list-style-type: none"> a) Crisp output b) The best rule to follow c) Precise fuzzy value d) None of the above 	a
13.	<p>“The train is running fast”. Here ‘fast’ can be represented by</p> <ul style="list-style-type: none"> a) Fuzzy Set b) Crisp Set c) Fuzzy and Crisp Set d) None of the mentioned 	a
14.	<p>Suppose, a fuzzy set Young is defined as follows: $Young = (10, 0.5), (20, 0.8), (30, 0.8), (40, 0.5), (50, 0.3)$</p> <p>Then the crisp value of Young using MoM method is</p> <ul style="list-style-type: none"> a) 25 b) 20 c) 35 d) 50 	a
15.	<p>If the fuzzy set has two sub regions, then the centre of gravity of the sub region _____ can be used to calculate the defuzzified value.</p> <ul style="list-style-type: none"> a) with the median of all the area 	c

SCOA UNIT 2 MCQs

	b) with the mean of all the area c) with the largest area d) with the smallest area	
16.	Which of the following is not a centroid method? a) Centre of gravity method (CoG) b) Centre of sum method (CoS) c) Centre of area method (CoA) d) Centre of Mass (CoM)	d
17.	What are the following sequence of steps taken in designing a fuzzy logic machine? (a) Fuzzification->Rule evaluation->Defuzzification (b) Rule evaluation->Fuzzification->Defuzzification (c) Fuzzy Sets->Defuzzification->Rule evaluation (d) Defuzzification->Rule evaluation->Fuzzification	a
18.	If A is a fuzzy set, then $(A \lambda)^{\text{complement}} \neq \text{---} (A \lambda)^{\text{complement}}$ (a) except for value of $\lambda=0.5$ (b) except for value of $\lambda=1$ (c) except for value of $\lambda=0$ (d) for all values of λ	a
19.	The cardinality of the given set $A = \{1, 2, 3, 4, 5\}$ a) 2 b) 5 c) 4 d) 1	B
20.	If x is A then y is B else y is C then the relation R is equivalent to a) $(A \times B) + (B \times C)$ b) $A \times B \cup (A \times C)$	b

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	c) $(A \times B) \rightarrow (B \times C)$ d) $(A \times C) \cup (B \times C)$	
21.	What are the applications of Fuzzy Inference Systems? a) Wireless services, heat control and printers b) Restrict power usage, telephone lines and sort data c) Simulink, boiler and CD recording d) Automatic control, decision analysis and data classification	d
22.	Fuzzy logic is a form of : a) Two valued logic b) Crisp set logic c) Many valued logic d) Binary set logic	c
23.	The main objective of fuzzy AHP is: a) To increase the ambiguity of human judgement b) Eliminate the ambiguous and vagueness of the human judgement c) Control human biasness d) B and C	d
24.	In triangular fuzzy number (l, m, u), what does 'm' represents: a) Smallest likely value b) Most probable value c) Largest possible value d) None of the above	C
25.	Which type of normalization method is used to eliminate the units of criteria in case of VIKOR analysis? a) Vector normalization b) Linear normalization c) Both A and B	b

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	d) None of the above	
26.	<p>Fuzzy logic is a form of</p> <ul style="list-style-type: none"> a) Two-valued logic b) Crisp set logic c) Many-valued logic d) Binary set logic 	<p>Answer: c Explanation: With fuzzy logic set membership is defined by certain value. Hence it could have many values to be in the set.</p>
27.	<p>Traditional set theory is also known as Crisp Set theory.</p> <ul style="list-style-type: none"> a) True b) False 	<p>Answer: a Explanation: Traditional set theory set membership is fixed or exact either the member is in the set or not. There are only two crisp values true or false. In case of fuzzy logic there are many values. With weight say x the member is in the set.</p> <p>3. The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>
28.	<p>The truth values of traditional set theory is _____ and that of fuzzy set is _____</p>	<p>Answer: a Explanation: Refer the</p>

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	<p>a) Either 0 or 1, between 0 & 1 b) Between 0 & 1, either 0 or 1 c) Between 0 & 1, between 0 & 1 d) Either 0 or 1, either 0 or 1</p>	definition of Fuzzy set and Crisp set.
29.	<p>How many types of random variables are available?</p> <p>a) 1 b) 2 c) 3 d) 4</p>	<p>Answer: c Explanation: The three types of random variables are Boolean, discrete and continuous.</p>
30.	<p>The room temperature is hot. Here the hot (use of linguistic variable is used) can be represented by _____ .</p> <p>a) Fuzzy Set b) Crisp Set</p>	<p>Answer: a Explanation: Fuzzy logic deals with linguistic variables.</p>
31.	<p>The values of the set membership is represented by</p> <p>a) Discrete Set b) Degree of truth c) Probabilities d) Both b & c</p>	<p>Answer: b Explanation: Both Probabilities and degree of truth ranges between 0 – 1.</p>
32.	What is meant by probability density function?	d

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	<p>a) Probability distributions b) Continuous variable c) Discrete variable d) Probability distributions for Continuous variables</p>	
33.	<p>Which of the following is used for probability theory sentences?</p> <p>a) Conditional logic b) Logic c) Extension of propositional logic d) None of the mentioned</p>	<p>Answer: c Explanation: The version of probability theory we present uses an extension of propositional logic for its sentences.</p>
34.	<p>Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.</p> <p>a) AND b) OR c) NOT d) EX-OR</p>	<p>Answer: a, b, c Explanation: The AND, OR, and NOT operators of Boolean logic exist in fuzzy logic, usually defined as the minimum, maximum, and complement;</p>
35.	<p>Fuzzy logic is usually represented as</p> <p>a) IF-THEN-ELSE rules b) IF-THEN rules c) Both a & b d) None of the mentioned</p>	<p>Answer: b Explanation: Fuzzy set theory defines fuzzy operators on fuzzy sets. The problem in applying this is that the appropriate fuzzy</p>

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		<p>operator may not be known. For this reason, fuzzy logic usually uses IF-THEN rules, or constructs that are equivalent, such as fuzzy associative matrices.</p> <p>Rules are usually expressed in the form:</p> <p>IF variable IS property THEN action</p>
36.	<p>_____ is/are the way/s to represent uncertainty.</p> <ul style="list-style-type: none"> a) Fuzzy Logic b) Probability c) Entropy d) All of the mentioned 	<p>Answer: d</p> <p>Explanation: Entropy is amount of uncertainty involved in data. Represented by $H(\text{data})$.</p>
37.	<p>_____ are algorithms that learn from their more complex environments (hence eco) to generalize, approximate and simplify solution logic.</p> <ul style="list-style-type: none"> a) Fuzzy Relational DB b) Ecorithms c) Fuzzy Set d) None of the mentioned 	<p>Answer: c</p> <p>Explanation: Local structure is usually associated with linear rather than exponential growth in complexity</p>

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This sheet is for 1 Mark questions							
S.r No	Question	Image	a	b	c	d	Correct Answer
e.g	Write down question	img.jpg	Option a	Option b	Option c	Option d	a/b/c/d
1	When we say that the boundary is crisp		Distinguish two regions	Cannot Distinguish	Collection of ordered pairs	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Antecedents	Premise	a
3	Fuzzy logic is a form of		two valued logic	crisp set logic	many value logic	binary set logic	c
4	Control actions while computing should be		Ambiguous	Unambiguous	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neuro	Fuzzy network and	Neural Science	Genetic Science	a
6	Hard computing performs what type of computation		Sequential	Parallel	approximate	both a and b	a
7	Who initiated idea of soft computing		charles darwin	richard bertrand	mc culloch	lofti zadeh	d
8	Soft computing is based on		fuzzy logic	neural science	crisp software	binary logic	a
9	In soft computing the problems,algorithms can be		non adaptive	adaptive	static	all of the above	b
10	Fuzzy Computing		mimics human behavior	deals with imprecise	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computation	conventional computation	non conventional computation	probabilistic computing	b
12	Which computing produces accurate results		soft computing	hard computing	both a and b	none of the above	b
13	Neural network computing		mimics human behavior	information processing	both a and b	none of the above	c
14	Artificial neural network is used for		pattern recognition	classification	clustering	all of the above	d
15	How does blind search differ from optimization		Blind search representation	Blind search usually	Blind search cannot	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can be found	a solution found is	a solution that is the best	a solution that requires	C
17	When is a complete enumeration of solution used?		When a solution that	When there is enough time	When the modeler	When there are an infinite number of	B
18	All of the following are true about heuristics EXCEPT		heuristics are used widely	heuristics are used in optimization	heuristics are used in genetic algorithms	heuristics are rules of thumb	C
19	Which approach is most suited to structured problem with little uncertainty		Simulation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based is	A
21	What does the 0 membership value means in the set		the object is fully included	the object is not included	the object is partially included	none of the above	b
22	The union of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	a
23	The process of fuzzy inference system involves		membership function	fuzzy logic operations	if-then rules	all the above	d
24	What does a fuzzifier do		converts crisp input to	converts crisp output	converts fuzzy input to	converts fuzzy output to	a
25	Which of the following is not defuzzifier method		centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
26	Which of the following is/are type of fuzzy inference method		mamdani	sugeno	rivest	only a and b	d
27	A Fuzzy rule can have		multiple parts of antecedent	only single part of antecedent	multiple parts of antecedent	only single part of antecedent	c
28	The α cut of a fuzzy set A is a crisp set defined by :-		$\{x \cup_a(x) > \alpha\}$	$\{x \cup_a(x) = \alpha\}$	$\{x \cup_a(x) < \alpha\}$	$\{x \cup_a(x) \leq \alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A) = x_1 * x_2 $	$(A) = x_1 + x_2 $	$(A) = x_1 - x_2 $	$(A) = x_1 / x_2 $	c
30	The intersection of two fuzzy sets is the _____ of each element from two sets		maximum	minimum	equal to	not equal to	b
31	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the complement of A?		$\{0/a, 0.7/b, 0.8/c, 0.2/d, 0/e\}$	$\{0/a, 0.9/b, 0.7/c, 0.3/d, 0/e\}$	$\{0.8/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	$\{0/a, 0.7/b, 0.8/c, 0.9/d, 0/e\}$	a
32	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the union of A and B?		$\{1/a, 0.9/b, 0.1/c, 0.5/d, 0/e\}$	$\{0.8/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	$\{1/a, 0.9/b, 0.2/c, 0.8/d, 0/e\}$	c
33	$A = \{1/a, 0.3/b, 0.2/c, 0.8/d, 0/e\}$ $B = \{0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e\}$ What will be the intersection of A and B?		$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.8/b, 0.1/c, 0.2/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.1/c, 0.3/d, 0/e\}$	$\{0.6/a, 0.3/b, 0.2/c, 0.3/d, 0/e\}$	a
34	What denotes the support(A) in a fuzzy set?		$\{x \cup_a(x) > 0\}$	$\{x \cup_a(x) < 0\}$	$\{x \cup_a(x) = 0\}$	$\{x \cup_a(x) < 0.5\}$	a
35	What denotes the core(A) in a fuzzy set?		$\{x \cup_a(x) > 0\}$	$\{x \cup_a(x) = 1\}$	$\{x \cup_a(x) >= 0.5\}$	$\{x \cup_a(x) > 0.8\}$	b
36	Fuzzy logic deals with which of the following		fuzzy set	fuzzy algebra	both a and b	none of the above	c
37	which of the following is a sequence of steps taken in designing a fuzzy logic machine		fuzzification->Rule Evaluation	defuzzification->rule evaluation	rule evaluation->fuzzification	rule evaluation->defuzzification	a
38	can a crisp set be a fuzzy set?		no	yes	depends	all of the above	b
39	Genetic algorithm belongs to the family of method in the		artificial intelligence area	optimization area	complete enumeration	Non computer based is	A
40	All of the following are suitable problems for genetic algorithm EXCEPT		pattern recognition	simulation of biological systems	simple optimization	dynamic process control	C
41	Tabu search is an example of ?		heuristic	Evolutionary algorithm	ACO	PSO	a

42	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
43	mutation is applied on __candidates.		one	two	more than two	noneof these	a
44	recombination is applied on __candidates.		one	two	more than two	noneof these	b
45	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	noneof these	a
46	Survival is __ approach.		deterministic	non deterministic	semi deterministic	noneof these	a
47	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
48	Tabu search is an example of ?		heuristic	Evolutionary algo	ACO	PSO	a
49	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
50	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
51	Chromosomes are actually ?		line representation	String representat	Circular representat	all of these	b
52	what are the parameters that affect GA are/is		selection process	initial population	both a and b	none of these	c
53	Evolutionary programming was developed by		Fredrik	Fogel	Frank	Flin	b
54	Evolution Strategies is developed with		selection	mutation	a population of size	all of these	d
55	Evolution Strategies typically uses		real-valued vector re	vector representa	time based represen	none of these	a
56	in ES survival is		indeterministic	deterministic	both a and b	none of these	d
57	What is the first step in Evolutionary algorithm		Termination	selection	Recombination	Initialization	d
58	Elements of ES are/is		Parent population siz	Survival populatio	both a and b	none of these	c
59	What are different types of crossover		discrete and interme	discrete and conti	continuous and inte	none of these	a
60	Determining the duration of the simulation occurs before the model is validated and te		TRUE	FALSE			B
61	_____cannot easily be transferred from one problem domain to another		optimal solution	analytical solution	simulation solutuon	none of these	C
62	Discrete events and agent-based models are usually used for _____.		middle or low level o	high level of abstr	very high level of ab	none of these	A
63	_____doesnot usually allow decision makers to see how a solution to a _____en		Simulation ,Complex	Simulation,Easy p	Genetics,Complex p	Genetics,Easy problem	A
64	EC stands for?		Evolutionary Comput	Evolutionary com	Electronic computa	noneof these	a
65	GA stands for		genetic algorithm	genetic assuranc	genese alforithm	noneof these	a
66	LCS stands for		learning classes syste	learning classifier	learned class system	noneof these	b
67	GBML stands for		Genese based Machi	Genes based mob	Genetic bsed machi	noneof these	c
68	EV is dominantly used for solving ____.		optimization proble	NP problem	simple problems	noneof these	a
69	EV is considered as?		adaptive	complex	both a and b	noneof these	c
70	Idea of genetic algorithm came from		machines	Birds	ACO	genetics	d
71	Chromosomes are actually ?		line representation	String representa	Circular representat	all of these	b
72	Parameters that affect GA		initial population	selection process	fitness function	all of these	d
73	Fitness function should be		maximum	minimum	intermediate	noneof these	b
74	Evolutionary algorithms are a __ based approach		heuristic	metaheuristic	both a and b	noneof these	a
75	Tabu search is an example of ?		heuristic	Evolutionary algo	ACO	PSO	a
76	Genetic algorithms are example of		heuristic	Evolutionary algo	ACO	PSO	b
77	mutation is applied on __candidates.		one	two	more than two	noneof these	a
78	recombination is applied on __candidates.		one	two	more than two	noneof these	b
79	Applying recombination and mutation leads to a set of new candidates, called as ?		sub parents	parents	offsprings	grand child	c
80	____ decides who becomes parents and how many children the parents have.		parent combination	Parent selection	Parent mutation	Parent replace	b
81	Basic elements of EA are ?		Parent Selection methods	Survival Selection methods	both a and b	noneof these	c
82	LCS belongs to __ based methods?		rule based learning	genetic learning	both a and b	noneof these	a

83	Survival is _____ approach.		deterministic	non deterministic	semi deterministic	none of these	a
84	There are also other operators, more linguistic in nature, called _____ that can be applied to fuzzy set theory.		Hedges	Lingual Variable	Fuzz Variable	None of the mentioned	a
85	A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly monotonically increasing than strictly monotonically decreasing with increasing values for elements in the universe		convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Fuzzy set	a
86	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network		(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
87	What is the feature of ANNs due to which they can deal with noisy, fuzzy, inconsistent data?		associative nature of networks	distributive nature of networks	both associative & distributive	none of the mentioned	c
88	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is		Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
89	Any soft-computing methodology is characterised by	Precise solution	control actions are unambiguous and accurate	control actions is formally defined	algorithm which can easily adapt with the change of dynamic environment		d
90	For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned		d
91	Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned		c
92	What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned		c
93	The values of the set membership is represented by _____	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities		b
94	Given $U = \{1, 2, 3, 4, 5, 6, 7\}$ $A = \{(3, 0.7), (5, 1), (6, 0.8)\}$ then A will be: (where $\sim \rightarrow$ complement)		$\{(4, 0.7), (2, 1), (1, 0.8)\}$	$\{(4, 0.3)\}: (5, 0), (6, (1, 2, 1), (3, 0.3)$	$\{(3, 0.3), (6, 0.2)\}$		c
95	What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification \rightarrow Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Rule Evaluation \rightarrow Defuzzification	Fuzzification \rightarrow Rule Evaluation \rightarrow Defuzzification

96	If A and B are two fuzzy sets with membership functions $\mu_A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$ $\mu_B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$ Then the value of $\mu(A \cup B)'(x)$ will be		{0.9, 0.5, 0.6, 0.8, 0.8}	{0.6, 0.2, 0.1, 0.7, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.1}	{0.1, 0.5, 0.4, 0.2, 0.3}	c
97	Compute the value of adding the following two fuzzy integers: $A = \{(0.3,1), (0.6,2), (1,3), (0.7,4), (0.2,5)\}$ $B = \{(0.5,11), (1,12), (0.5,13)\}$ Where fuzzy addition is defined as $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(y)))$ Then, $f(A+B)$ is equal to		{(0.5,12), (0.6,13), (1,14)}	{(0.5,12), (0.6,13), (1,14)}	{(0.3,12), (0.5,13), (1,14)}	{(0.3,12), (0.5,13), (1,14)}	d
98	$A \cup (B \cup C) =$		$(A \cap B) \cap (A \cap C)$	$(A \cup B) \cup C$	$(A \cup B) \cap (A \cup C)$	$B \cap A \cup C$	b
99	Consider a fuzzy set A defined on the interval $X = [0, 10]$ of integers by the membership Junction $\mu_A(x) = x / (x+2)$ Then the α cut corresponding to $\alpha = 0.5$ will be		{0, 1, 2, 3, 4, 5, 6, 7, 8}	{1, 2, 3, 4, 5, 6, 7, 8}	{2, 3, 4, 5, 6, 7, 8, 9}	None of the above	c
100	The fuzzy proposition "IF X is E then Y is F" is a		conditional unqualified	unconditional unqualified	conditional qualified	unconditional qualified	a
101	Choose the correct statement 1. A fuzzy set is a crisp set but the reverse is not true 2. If A,B and C are three fuzzy sets defined over the same universe of discourse such that $A \leq B$ and $B \leq C$ and $A \leq C$ 3. Membership function defines the fuzziness in a fuzzy set irrespecive of the elements in the set, which are discrete or continuous		1 only	2 and 3	1,2 and 3	None of these	b
102	An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is		Fuzzy \approx Prediction	Fuzzy \approx Forecasting	Probability \approx Forecasting	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise answer	ANN gives accurate answer	In each, no precise answer	Fuzzy gives exact result	C
104	A fuzzy set whose membership function has at least one element x in the universe whose membership value is unity is called		sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
105	---- defines logic function of two propositions		prepositions	Linguistic hedges	truth tables	inference rules	c
106	In fuzzy propositions, ---- gives an approximate idea of the number of elements of a subset fulfilling certain conditions		Fuzzy predicate and predicate modifiers	Fuzzy quantifiers	Fuzzy qualifiers	All of the above	b
107	Multiple conjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjunctives antecedents is method of ---- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a

109	IF x is A and y is B then z=c (c is constant), is		rule in zero order FIS	rule in first order FIS	both a and b	neither a nor b	a
110	A fuzzy set wherein no membership function has its value equal to 1 is called		normal fuzzy set	subnormal fuzzy set.	convex fuzzy set	concave fuzzy set	b
111	Mamdani's Fuzzy Inference Method Was Designed To Attempt What?		Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control any two combinations of any two products by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a steam engine and a boiler combination by synthesising a set of linguistic control rules obtained from experienced human operations.	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
112	What Are The Two Types Of Fuzzy Inference Systems?		Model-Type and System-Type	Momfred-type and Semigi-type	Mamdani-type and Sugeno-type	Mihni-type and Sujgani-type	c
113	What Is Another Name For Fuzzy Inference Systems?		Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
114	In Evolutionary programming, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	a
115	In Evolutionary strategy, survival selection is		Probabilistic selection ($\mu+\mu$) selection	(μ, λ)- selection based on the children only ($\mu+\lambda$)- selection based on both the set of parent and children	Children replace the parent	All the mentioned	b

116	In Evolutionary programming, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	a
117	In Evolutionary strategy, recombination is		doesnot use recombination to produce offspring. It only uses mutation	uses recombination such as cross over to produce offspring	uses various recombination operators	none of the mentioned	b
118	Step size in non-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	a
119	Step size in dynamic EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	b
120	Step size in self-adaptive EP :		deviation in step sizes remain static	deviation in step sizes change over time using some deterministic function	deviation in step size change dynamically	size=1	c
121	What are normally the two best measurement units for an evolutionary algorithm? 1. Number of evaluations 2. Elapsed time 3. CPU Time 4. Number of generations		1 and 2	2 and 3	3 and 4	1 and 4	d
122	Evolutionary Strategies (ES)		(μ, λ): Select survivors among parents and offspring	($\mu+\lambda$): Select survivors among parents and offspring	($\mu-\lambda$): Select survivors among offspring only	($\mu:\lambda$): Select survivors among offspring only	b

123	In Evolutionary programming,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	b
124	In Evolutionary Strategy,		Individuals are represented by real-valued vector	Individual solution is represented as a Finite State Machine	Individuals are represented as binary string	none of the mentioned	a
125 (1+1) ES			offspring becomes parent if offspring's fitness is as good as parent of next generation	offspring become parent by default	offspring never becomes parent	none of the mentioned	a
126 (1+λ) ES			λ mutants can be generated from one parent	one mutant is generated	2λ mutants can be generated	no mutants are generated	a
127 Termination condition for EA			mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diversity drops under a given threshold	All the mentioned	d
128	Which of the following operator is simplest selection operator?		Random selection	Proportional selection	tournament selection	none	a
129	Which crossover operators are used in evolutionary programming?		Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
130 (1+1) ES			Operates on population size of two	operates on populantion size of one	operates on populantion size of zero	operates on populantion size of λ	a
131	Which of these emphasize of development of behavioral models?		Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
132	EP applies which evolutionary operators?		variation through application of mutation operators	selection	both a and b	none of the mentioned	c
133	Which selection strategy works with negative fitness value?		Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d