BE COMP MCQ PDF

SCOA

Jordan PDF

APPROVED

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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	Anticedents	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	Unambioguos	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 perfforms what type of computation		Sequential	Parallel	approxiamate	both a and b	a
7	Who iniated idea of sofft 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 inprecise,probablistic	exact information	both a and b	d
11	Hard computing is also called as		evolutionary computing	conventional computing	non conventional computing	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 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 follwing 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 uncertainity		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 folloowing 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,mutiple 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|υa(x)>a}	{x|υa(x)>=a}	{x|υa(x)<a}	{x|υa(x)<=a}	b
29	The bandwidth(A) in a fuzzy set is given by		(A)=|x1*x2|	(A)=|x1+x2|	(A)=|x1-x2|	(A)=|x1/x2|	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|υa(x)>0}	{x|υa(x)<0}	{x|υa(x)<=0}	{x|υa(x)<0.5}	a
35	What denotes the core(A) in a fuzzy set?		{x|υa(x)>0}	{x|υa(x)=1}	{x|υa(x)>=0.5}	{x|υa(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 recognization	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.		deteministic	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	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.		1				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 agentbased models are usuallly 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 asssurance	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.		deteministic	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 ~ → complement)		{(4, 0.7), (2,1), (1,0.8)}	{(4, 0.3.): (5, 0), (6. 0.2) }	{(l, 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 μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8} μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5} Then the value of μ(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
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 μA+B(z) = maxx+y=z (min(μA(x), μB(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

98	A U (B U C) =		(A ∩ B) ∩ (A ∩ C)	(A UB) UC	(A UB) ∩ (A UC)	B ∩ A UC	b
99	Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction μA(x) = x / (x+2) Then the α cut corresponding to α = 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 ≤ B and B ≤ C and A ≤ 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 conjuctives antecedents is method of ----- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjuctives 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 (μ+μ) selection	(μ, λ)- selection based on the children only (μ+λ)- 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 (μ+μ) selection	(μ, λ)- selection based on the children only (μ+λ)- 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	(μ+λ): Select survivors among parents and offspring	(μ-λ): Select survivors among offspring only	(μ:λ): 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 diveristy 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.Intution, 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 prdicate 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.	**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	A
2.	**The membership functions are generally represented in** A.Tabular Form B.Graphical Form C.Mathematical Form D.Logical Form	B
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

	D.experience	
4.	**Three main basic features involved in characterizing membership function are** **A.**Intution, Inference, Rank Ordering **B.**Fuzzy Algorithm, Neural network, Genetic Algorithm **C.**Core, Support , Boundary **D.**Weighted Average, center of Sums, Median	C
5.	**The region of universe that is characterized by complete membership in the set is called** **A.**Core **B.**Support **C.**Boundary **D.**Fuzzy	A
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

	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

	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	B
11.	**Fuzzy Computing** **A.**doesnt deal with 2 valued logic	D

	B. mimics human behaviour **C.** deals with information which is vague, imprecise, uncertain, ambiguous, inexact, or probabilistic **D.** All of the above	
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 λ)complement ≠ ——(Aλ)complement (a) except for value of λ=0.5 (b) except for value of λ=1 (c) except for value of λ=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 × B) + (B × C) b) A × B) ∪ (A × C)	b

	c) (A × B) → (B × C) d) (A × C) ∪ (B × 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 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 __________	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

		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(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

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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) $(A \times B) \to (B \times C)$ d) $(A \times C) \cup (B \times C)$	b
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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.
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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.
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36.	_______________ is/are the way/s to represent uncertainty. a) Fuzzy Logic	Answer: d Explanation: Entropy is amount of uncertainty

	b) Probability c) Entropy d) All of the mentioned	involved in data. Represented by H(data).
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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	~x is ~A, ~x is ~B =>~x is ~A*~B
	Option B	~x is ~A, ~x is ~B =>~x is ~A-~B
	Option C	~x is ~A, ~x is ~B =>~x is ~A*∪~B
	Option D	~x is ~A, ~x is ~B =>~x is ~A∩~B
	Correct Answer	**D**
04	The negative rule of inference is	
	Option A	NOT (~x is ~A) => ~x is ~A
	Option B	NOT (~x is ~A) => ~ is ~A
	Option C	NOT (~x is ~A) => ~x is A
	Option D	NOT (~x is ~A) => x is A
	Correct Answer	**A**
05	In this mode of reasoning, the antecedents & consequents have fuzzy linguistiz 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 : Probor (a,b) = a+b - ab	
	Option A	True
	Option B	False
	Correct Answer	**A**

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	(μ+λ): Select survivors among parents and offspring
	Option C	(μ-λ): Select survivors among offspring only
	Option D	(μ:λ): 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 foundby multiplying the weights with their respective inputs, summing the results and multiplying with the transfer function. Therefore:

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 Learniing

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 : φ(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 x1, x2, x3............xn with weights w1, w2, ...wn 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. Σ wi
b. Σ xi
c. Σ wi + Σ xi
d. Σ wi* xi

Ans: d

Explanation: It is net input calculated as Σ wi* xi

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 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

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 mathamatical 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) McCullocch-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 calculatin the error in perceptron model & only difference between desired & target output is taken into account.

65. In neural how can connectons 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 it's 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 cab 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 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. Intution, 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 uncertainity

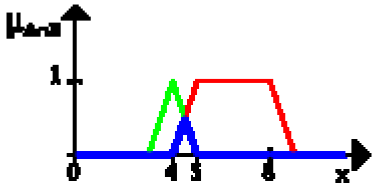
9. what are the following sequence of steps taken in designing a fuzzy logic machine?

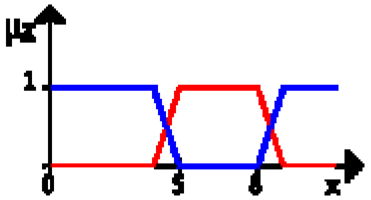
a. Fuzzification -> Rule Evaluation --> Defuzzification
b. Rule Evaluation -->Fuzzification ->Defuzzification
c. Defuzzification-->Rule Evaluation -->Fuzzification
d. Fuzzy Sets-->Defuzzification-->Rule Evaluation

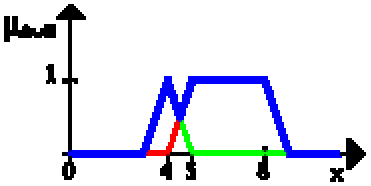
Ans: a

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. None

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.

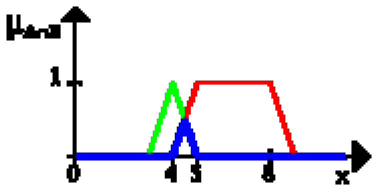
a. Fuzzy Logic
b. Probabilty

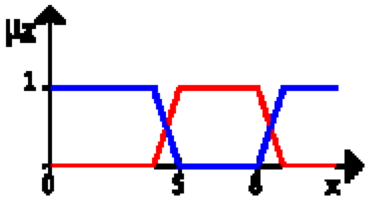
c. Entropy
d. All of the mentioned

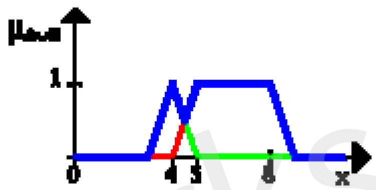
Ans: d

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.

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. doesnt 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. Intution, 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 monoronically 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 ⇔ Q is equivalent to (Where ~ 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 {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 {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 {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 defuzzufication techniques

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

Ans: d

Explanation: All above are defuzzification techniques

39. Following are defuzzufication 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 defuzzufication 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 qunlification:

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 μA(x) = x / x Then the α cut corresponding to α = 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 μA(x) = x Then the α cut corresponding to α = 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 μA(x) = x Then the α cut corresponding to α = 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 ∈ X at which μA(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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8}   then the value of μa ∩ μb 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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8}   then the value of μa U μb 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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8}   then the value of complement(~ μa)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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8}   then the value of complement(~ μb)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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value of AUB 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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value of A∩ 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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value difference(A|B)= A∩~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value AU~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~AU~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~AUB 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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~A∩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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~A∩~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~(A∩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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~(AUB) 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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of ~μ(AUB) (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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of μ(AU~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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of μ(~AUB) (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 μA+B(z) = max x+y=z (min(μA(x), μB(x)))
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

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

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

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

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

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

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

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 (u,lamdda): Select survivors among parents and offspring
B (u+lamdda): Select survivors among parents and offspring
C (u-lamdda): Select survivors among offspring only
D (u:lamdda): 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, $(u+\lambda)$ 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

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 l, 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 l, 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 l, 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 intertia, 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. Tij (t + n) = p . Tij(t) + ΔT is the formula for updating ….
a. pheromone level
b. evaporation rate
Ans: a
Explanation: p stands for evaporation rate

16. Tij (t + n) = p . Tij(t) + ΔT 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)=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)=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)=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)=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)= Accuracy measure
b. f(x)= 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+------+c2r2(gb-p) where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

a. c1r2(ib-p)

b. c1r1(ib-p)

c. c1r1(ib-gb)

d.c1r1(gb-ib)

Ans: b

Explanation: c1r1(ib-p) gives individual best

46. In PSO, V=V+c1r1(ib-p) where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

a. c1r2(gb-p)

b. c2r2(gb-p)

c. c2r2(ib-gb)

d.c2r2(gb-ib)

Ans: b

Explanation: c2r2(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∗) ≥ 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∗) ≤ 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∗) ≤ 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**	**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	Anticedents	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	Unambioguos	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 perfforms what type of computation		Sequential	Parallel	approxiamate	both a and b	a
7	Who iniated idea of sofft 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 inpreci	exact information	both a and b	d

				se,probablistic			
11	Hard computing is also called as		evolutionary computing	conventional computing	non conventional computing	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 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	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 solution to be searched	B
18	All of the follwing 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 uncertainity		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		member ship 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 folloowing 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,mutiple 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|Ua(x)>a}	{x|Ua(x)>=a}	{x|Ua(x)<a}	{x|Ua(x)<=a}	b
29	The bandwidth(A) in a fuzzy set is given by		(A)=|x1*x2|	(A)=|x1+x2|	(A)=|x1-x2|	(A)=|x1/x2|	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|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->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 recognization	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.		deteministic	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	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 usuallly 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 asssurance	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.		deteministic	non determinisic	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	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 ~ → complement)		{(4, 0.7), (2,1), (1,0.8)}	{(4, 0.3.): (5, 0), (6. 0.2) }	{(l, 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 μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8} μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5} Then the value of μ(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

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 $\mu A+B(z) = \max x+y=z$ $(\min(\mu A(x), \mu B(x)))$ 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
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 α = 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 ≤ B and B ≤ C and A ≤ 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 ≈	Probability ≈	None of these	b

				Forecasting	Forecasting		
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 conjuctives antecedents is method of ----- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjuctives 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 (μ+μ) selection	(μ, λ)-selection based on the children only (μ+λ)-selection based on both	Children replace the parent	All the mentioned	a

				the set of parent and children			
115	In Evolutionary strategy, survival selection is		Probabilistic selection (μ+μ) selection	(μ, λ)-selection based on the children only (μ+λ)-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	uses various recombination operators	none of the mentioned	b

				offspring			
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	(μ+λ): Select survivors among parents and offspring	(μ-λ): Select survivors among offspring only	(μ:λ): 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	offspring become parent by default	offspring never becomes parent	none of the mentioned	a

			next generation				
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 diveristy 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

Question No	Question	Answer Key
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	A
2.	**The membership functions are generally represented in** A. Tabular Form B. Graphical Form C. Mathematical Form D. Logical Form	B
3.	**Membership function can be thought of as a technique to solve empirical problems on the basis of** A. knowledge	D

	B. examples **C.** learning **D.** experience	
4.	**Three main basic features involved in characterizing membership function are** **A.** Intution, Inference, Rank Ordering **B.** Fuzzy Algorithm, Neural network, Genetic Algorith **C.** Core, Support , Boundary **D.** Weighted Average, center of Sums, Median	C
5.	**The region of universe that is characterized by complete membership in the set is called** **A.** Core **B.** Support **C.** Boundary **D.** Fuzzy	A
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	B

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 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	A
10.		B

	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.	**Fuzzy Computing** A. doesnt deal with 2 valued logic B. mimics human behaviour C. deals with information which is vague, imprecise, un ambiguous, inexact, or probabilistic D. All of the above	D
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

	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 λ)complement ≠ ______(Aλ)complement (a) except for value of λ=0.5 (b) except for value of λ=1 (c) except for value of λ=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 × B) + (B × C)	b

	b) A × B) ∪ (A × C) c) (A × B) → (B × C) d) (A × C) ∪ (B × 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(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

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A.Intution, Inference, Rank Ordering

B.Fuzzy Algorithm, Neural network, Genetic Algorithm

C.Core, Support , Boundary

D.Weighted Average, center of Sums, Median

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A.Core

B.Support

C.Boundary

D.Fuzzy

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is unity is called

A.sub normal fuzzy sets

B.normal fuzzy set

C.convex fuzzy set

D.concave fuzzy set

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A.1

B.0

C.infinite

D.Not defined

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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

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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 prdicate 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=s1 A’s are B’s & y= s2 C’s are D’s
Option A z= s2 C’s are D’s
Option B z= s2 A’s are B’s
Option C z= s2 C’s are D’s
Option D z= s3 E’s are F’s
Correct Answer D
03 The Conjunction rule is
Option A ~x is ~A, ~x is ~B =>~x is ~A*~B
Option B ~x is ~A, ~x is ~B =>~x is ~A-~B
Option C ~x is ~A, ~x is ~B =>~x is ~A*υ~B
Option D ~x is ~A, ~x is ~B =>~x is ~Aπ~B
Correct Answer D
04 The negative rule of inference is
Option A NOT (~x is ~A) => ~x is ~A
Option B NOT (~x is ~A) => ~ is ~A
Option C NOT (~x is ~A) => ~x is A
Option D NOT (~x is ~A) => x is A
Correct Answer A
05 In this mode of reasoning, the antecedents & consequents have fuzzy linguistiz 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: Probor (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 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

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)

	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	doesnt 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 prdicate 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
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	Intution, 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 monoronically 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.	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	What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert System	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	D
5	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.	C
6	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
7	What Is The Input And Output Of Step 2 - Apply Fuzzy Operator?	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?	Probor (a,b) = a-b + ab	Probor (a,b) = ab + ab	Probor (a,b) = a+b - ab	Probor (a,b) = a/b x ab	C
9	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
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, impreceise, uncertain, ambiguous, inexact, or probabilistic	All of the above	D
20	The membership functions are generally represented in__?	Tabular Form	Graphical Form	Mathematical Form	Logical Form	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 follo!ing.	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, Disjuctive	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	Boundry	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	Disjuctive rules	Both A and B	None of this	C
47	The rule base module contain……?	Conjuctive rules	Disjuctive 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 are 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 Syatem?	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
21	In ES(Evolution Strategies),individual are represented as vector of __________ numbers	Real Numbers	Integer Numbers	Positive Nmubers	Negative Nmubers	A
22	If the rate of success falls below _______ then the mutatiob is tooo explorative.	0.4	0.2	0.75	0.6	B
23	The simplest string representation is ___________	Binary String	character String	Both A and B	None of the above	A
24	Genetic Algorithm(GA) were studied from	Analytic point of view	Empirical point of view	Both of the above	None of the above	C

Option A (μ,λ): Select survivors among parents and offspring
Option B (μ+λ): Select survivors among parents and offspring
Option C (μ-λ): Select survivors among offspring only
Option D (μ:λ): 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 compunent of soft computing is	Neural Network	Fuzzy Loguc	Genetic Algorithms	All of the mentioned	4
9	Which is supervised learning	clustering	regression	association	dimensionalit y 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 foe both MISO and MIMO	Mamdani	Sugeno	Takagi	None of these	1
25	Which is not the diffuzzificationmetghod	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 differes 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	Discreate	Continuous	3
38	In GA individual memory is there	Yes	No			2
39	In GA individual operatior 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 maintaines 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	Probabilty	Entropy	All of the mentioned	4

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 regio	Cannot Distinguish	Collection of ordere	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Anticedents	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	Unambioguos	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neu	Fuzzy network and	Neural Science	Genetic Science	a
6	Hard computing perfforms what type of computation		Sequential	Parallel	approxiamate	both a and b	a
7	Who iniated idea of sofft 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 behav	deals with inpreci	exact information	both a and b	d
11	Hard computing is also called as		evolutionary comput	conventional com	non conventional co	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 behav	information proce	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 represer	Blind search usual	Blind search cannot	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can or	a solution found i	a solution that is the	a solution that require	C
17	When is a complete enumeration of solution used?		When a solution that	When there is enc	When the modeler	When there are an infi	B
18	All of the follwing are true about heuristics EXCEPT		heuristics are used w	heuristics are use	heuristics are used	heuristics are rules of	C
19	Which approach is most suited to structured problem with little uncertainity		Simuation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belong to the family of method in the		artifical intelligence a	optimization area	complete enumerat	Non computer based is	A
21	What does the 0 membership value means in the set		the object is fully insi	the object is not i	the object is partiall	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 functior	fuzzy logic operat	if-then rules	all the above	d
24	What does a fuzzifier do		coverts crisp input to	coverts crisp oupu	coverts fuzzy input	coverts fuzzy output to	a
25	Which of the folloowing is not defuzzifier method		centroid of area	mean of maximun	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 ante	only single part of	multiple part of ant	only single part of ante	c
28	The α cut of a fuzzy set A is a crisp set defined by :-		$\{x\mid_U a(x)>\alpha\}$	$\{x\mid_U a(x)>=\alpha\}$	$\{x\mid_U a(x)<\alpha\}$	$\{x\mid_U a(x)<=\alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A)=\lvert x1*x2\rvert$	$(A)=\lvert x1+x2\rvert$	$(A)=\lvert x1-x2\rvert$	$(A)=\lvert x1/x2\rvert$	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 con		{0/a,0.7/b,0.8/c,0.2/	{0/a,0.9/b,0.7/c,0	{0.8/a,0.7/b,0.8/c,0	{0/a,0.7/b,0.8/c,0.9/d,	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 uni		{1/a,0.9/b,0.1/c,0.5/	{0.8/a,0.9/b,0.2/c	{1/a,0.9/b,0.2/c,0.8	{1/a,0.9/b,0.2/c,0.8/d,	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 inte		{0.6/a,0.3/b,0.1/c,0.3	{0.6/a,0.8/b,0.1/c	{0.6/a,0.3/b,0.1/c,0	{0.6/a,0.3/b,0.2/c,0.3/	a
34	What denotes the support(A) in a fuzzy set?		$\{x\mid_U a(x)>0\}$	$\{x\mid_U a(x)<0\}$	$\{x\mid_U a(x)<=0\}$	$\{x\mid_U a(x)<0.5\}$	a
35	What denotes the core(A) in a fuzzy set?		$\{x\mid_U a(x)>0\}$	$\{x\mid_U a(x)=1\}$	$\{x\mid_U a(x)>=0.5\}$	$\{x\mid_U a(x)>0.8\}$	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 Ev	deffuzification->ru	rule evaluation->fuz	rule evaluation->defuz	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 a	optimization area	complete enumerat	Non computer based is	A
40	All of the follwing are suitable problem for genetic algorithm EXCEPT		pattern recognizatior	simulation of biol	simple optimization	dynamic process contr	C
41	Tabu search is an example of ?		heuristic	Evolutionary algor	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.		deteministic	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 developef by		Fredrik	Fodgel	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 represe	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 usuallly 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 computat	noneof these	a
65	GA stands for		genetic algorithm	genetic asssuranc	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 problem	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 representat	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.		deteministic	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 ~ → complement)		{(4, 0.7), (2,1), (1,0.8)	{(4, 0.3.): (5, 0), (6	{(l, 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 → Rule [illegible]	[illegible]	[illegible]	[illegible]	[illegible] → Fuzzification

96	If A and B are two fuzzy sets with membership functions μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8} μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5} Then the value of μ(A∪B)'(x) will be		{0.9, 0.5, 0.6, 0.8, 0.8	{0.6, 0.2, 0.1, 0.7,	{0.1, 0.5, 0.4, 0.2, 0.	{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 μA+B(z) = maxx+y=z (min(μA(x), μB(x))) Then, f(A+B) is equal to		{(0.5,12), (0.6,13), (1,	{(0.5,12), (0.6,13),	{(0.3,12), (0.5,13), (0	{(0.3,12), (0.5,13), (0.6	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 μA(x) = x / (x+2) Then the α cut corresponding to α = 0.5 will be		{0, 1, 2, 3, 4, 5, 6, 7, 8	{1, 2, 3, 4, 5, 6, 7,	{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 unqualifie	unconditional unc	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 ≤ B and B ≤ C and A ≤ 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 ≈ Forecastin	Probability ≈ Foreca	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise an	ANN gives accurat	In each, no precise r	Fuzzy gives exact resul	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 conjuctives antecedents is method of ----- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjuctives 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 (μ+μ) selection	(μ, λ)- selection based on the children only (μ+λ)- 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 (μ+μ) selection	(μ, λ)- selection based on the children only (μ+λ)- 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	(μ+λ): Select survivors among parents and offspring	(μ-λ): Select survivors among offspring only	(μ:λ): 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 diveristy 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
	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 t	conversion of crisp se	conversion of fuzzy set	conversion of crisp set to crisp log	a
2	What type of model is required for hard computing		mathematical	biological	chemical	probablistic	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 learing 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 designning a fuzy logic machine		fuzzification->Rule Evalu	deffuzification->rule e	rule evaluation->fuzzifi	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	Non computer based isolation are	A
10	All of the follwing are suitable problem for genetic algorithm EXCEPT		pattern recognization	simulation of biologic	simple optimization wi	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 simu	testing and validating t	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 simu	testing and validating t	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 simu	testing and validating t	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 simula	discrete event simulat	continous distribution	Monte carlo simulation	B
15	The advantage of visual interactive simulation include all of the following EXCEPT		Improvement in training	reduced need for the	The ability to see how a	improved presentation of simulat	B
16	What can system dynamics modelling be used for ?		qualitative method for a	simulation models tha	micro-level simulation	studying system behaviour at an i	A
17	In agent-based modelling ,agents are		the human workers or a	communication links	Autonomous rule-base	the hardware platform used to co	C
18	Agent based modelling is best for all the following types of problem features EXCEPT		complex interactions	low uncertainty	Many inter-related fact	irregular data	B
19	What is the final stage of an agent based modelling(ABM) methodology?		Identifying the agents a	Determining agent-re	Validating agent behav	determining the suitability of ABM	C
20	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
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 Evalu	deffuzification->rule e	rule evaluation->fuzzifi	rule evaluation->defuzzification->	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 n		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 clusterin	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 t	inversly proportiona	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 pa	none	b
37	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k 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 alg		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	Recombinbation 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 evoltionary 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 prob	single peaked,hard problems	a
46	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
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 usuallly used for_____________.		middle or low level of al	high level of abstracti	very high level of abstra	none of these	A
54	_____doesnot usually allow decision makers to see how a solution to a ___________envolves over time nor can de		Simulation ,Complex pr	Simulation,Easy probl	Genetics,Complex prob	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 t		Simulation	Optimization	human intution	genetic algorithm	A
58	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
59	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occur		continuous distribution	time dependent simu	system dynamics simul	discrete event simulation	B
60	The defining length of a schema is useful to calculate ______of the schema for__________.		Survival probability,cros	crossovers,survival pr	crossovers,length	length,crossover	A
61	Recombinbation 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 evoltionary 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 prob	single peaked,hard problems	a
66	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
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 childr	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 a	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 Evolutionar	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	{(l, 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 → Defuzzification [illegible]	Rule evaluation → Fuzzification [illegible]	Rule evaluation → Defuzzification [illegible]	→ Fuzzification
93	If A and B are two fuzzy sets with membership functions μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8} μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5} Then the value of μ(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
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 μA+B(z) = maxx+y=z (min(μA(x), μB(x))) Then, f(A+B) is equal to	{(0.5,12), (0.6,13), (1,14	{(0.5,12), (0.6,13), (1,1	{(0.3,12), (0.5,13), (0.5,	{(0.3,12), (0.5,13), (0.6,14), (1,15),	d
95	A U (B U 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 μA(x) = x / (x+2) Then the α cut corresponding to α = 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 propositio	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 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 ≈ Prediction	Fuzzy ≈ Forecasting	Probability ≈ Forecastir	None of these	b
100	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and a	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 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 disjuctives 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 (μ+μ) selection	(μ, λ)- selection based on the children only (μ+λ)- 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 (μ+μ) selection	(μ, λ)- selection based on the children only (μ+λ)- 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	(μ+λ): Select survivors among parents and offspring	(μ-λ): 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		mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diveristy 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 popluantion size of one	operates on popluantion size of zero	operates on popluantion 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

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 t	conversion of crisp se	conversion of fuzzy set	conversion of crisp set to crisp log	a
2	What type of model is required for hard computing		mathematical	biological	chemical	probablistic	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 learing 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 designning a fuzy logic machine		fuzzification->Rule Evalu	deffuzification->rule e	rule evaluation->fuzzifi	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	Non computer based isolation are	A
10	All of the follwing are suitable problem for genetic algorithm EXCEPT		pattern recognization	simulation of biologic	simple optimization wi	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 simu	testing and validating t	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 simu	testing and validating t	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 simu	testing and validating t	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 simula	discrete event simulat	continous distribution	Monte carlo simulation	B
15	The advantage of visual interactive simulation include all of the following EXCEPT		Improvement in training	reduced need for the	The ability to see how a	improved presentation of simulat	B
16	What can system dynamics modelling be used for ?		qualitative method for a	simulation models tha	micro-level simulation	studying system behaviour at an i	A
17	In agent-based modelling ,agents are		the human workers or a	communication links	Autonomous rule-base	the hardware platform used to co	C
18	Agent based modelling is best for all the following types of problem features EXCEPT		complex interactions	low uncertainty	Many inter-related fact	irregular data	B
19	What is the final stage of an agent based modelling(ABM) methodology?		Identifying the agents a	Determining agent-re	Validating agent behav	determining the suitability of ABM	C
20	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
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 Evalu	deffuzification->rule e	rule evaluation->fuzzifi	rule evaluation->defuzzification->	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 m		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 clusterin	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 t	inversly proportiona	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 pa	none	b
37	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k 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 alg		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 connectior	none	a
41	Recombinbation 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 evoltionary 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 prob	single peaked,hard problems	a
46	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
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 usuallly used for_____________.		middle or low level of al	high level of abstracti	very high level of abstra	none of these	A
54	_____doesnot usually allow decision makers to see how a solution to a ___________envolves over time nor can de		Simulation ,Complex pr	Simulation,Easy probl	Genetics,Complex prob	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 t		Simulation	Optimization	human intution	genetic algorithm	A
58	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
59	What BEST describes a simulation model in which it is not important to know exactly when a modeled event occur		continuous distribution	time dependent simu	system dynamics simul	discrete event simulation	B
60	The defining length of a schema is useful to calculate ______of the schema for__________.		Survival probability,cros	crossovers,survival pr	crossovers,length	length,crossover	A
61	Recombinbation 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 evoltionary 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 prob	single peaked,hard problems	a
66	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
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 childr	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 a	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 Evolutionar	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	{(l, 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 → Defuzzification [illegible]	Rule evaluation → Fuzzification [illegible]	Rule evaluation → Defuzzification [illegible]	a → Fuzzification
93	If A and B are two fuzzy sets with membership functions μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8} μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5} Then the value of μ(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
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 μA+B(z) = maxx+y=z (min(μA(x), μB(x))) Then, f(A+B) is equal to	{(0.5,12), (0.6,13), (1,14	{(0.5,12), (0.6,13), (1,1	{(0.3,12), (0.5,13), (0.5,	{(0.3,12), (0.5,13), (0.6,14), (1,15),	d
95	A U (B U 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 μA(x) = x / (x+2) Then the α cut corresponding to α = 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 pı	unconditional qualified propositic	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 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 ≈ Prediction	Fuzzy ≈ Forecasting	Probability ≈ Forecastir	None of these	b
100	Both fuzzy logic and artificial neural network are soft computing techniques because	Both gives precise and a	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 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 disjuctives 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 (μ+μ) selection	(μ, λ)- selection based on the children only (μ+λ)- 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 (μ+μ) selection	(μ, λ)- selection based on the children only (μ+λ)- 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	(μ+λ): Select survivors among parents and offspring	(μ-λ): 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		mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diveristy 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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	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 r	sum of incoming signa	transmit signals	b
6	Expert system		combines different typ	is a approach to desig	is an information base	none of the above	c
7	Three main basic feature involved in characterzing member function are		intuition,inference,rank	fuzzy algorithm,neura	center of sums,median	core,support,boundary	d
8	What is the function of cell body in biological neural network		multiplies the incoming	sums the incoming si	multiples the outgoing	sums the outgoing sign	b
9	What is perceptron		a single layer feed forw	a double layer associa	a neural network that	auto associative neural	a
10	Which of the follwing computing is trial and error problem solver algorithm		hard computing	neural network	evolutionary computin	fuzzy logic	c
11	What are advantages of neural network		ability to learn by exam	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?		$\{x \mid {}_{U}a(x)<0\}$	$\{x \mid {}_{U}a(x)=1\}$	$\{x \mid {}_{U}a(x)=0.5\}$	$\{x \mid Ua(x)>0\}$	c
22	If A and B are two fuzzy sets with membership function: ${}_{U}a(X)=\{0.2,0.5,0.6,0.1,0.9\}$ ${}_{U}b(X0)=\{0.1,0.5,0.2,$		{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?		$\{{}_{U}A(x)+{}_{u}B(x)\}-\{{}_{u}A(x)*{}_{u}B($	$\{{}_{U}A(x)-{}_{u}B(x)\}-\{{}_{u}A(x)*{}_{u}B$	$\{{}_{U}A(x)/{}_{u}B(x)\}-\{{}_{u}A(x)+{}_{u}B$	$\{{}_{U}A(x)+{}_{u}B(x)\}+\{{}_{u}A(x)*{}_{u}B$	a
25	With the help of which formula can we find the algebraic product of two fuzzy sets A,B?		{uA(x)/uB(x)}	{uA(x)*uB(x)}*{uA(x)-	{uA(x)*uB(x)+{uA(x)+u	{uA(x)*uB(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 ba	time base and probabi	model base and data b	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 r	sum of incoming signa	transmit signals	b
30	Discrete events and agent-based models are usuallly used for_____________.		middle or low level of a	high level of abstracti	very high level of abstr	none of these	A
31	_____doesnot usually allow decision makers to see how a solution to a ___________envolves over time		Simulation ,Complex pr	Simulation,Easy probl	Genetics,Complex prol	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 experimenta		Simulation	Optimization	human intution	genetic algorithm	A
35	Which of the following is the advantage of simulation?		It can incorporate signi	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 e		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,cro	crossovers,survival pr	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 Syst	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 optimi	evolutionary optimizat	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 rela		Selection	Recombination	Mutation	None of these	A
48	_________ decomposes two distinct solutions and then randomly mixes their parts to form novel soluti		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 contr		Stochastic	simplex based	complex based	none	a
54	In swarm systems organisations are		centalized	decentralized	controlled by third pa	none	b
55	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k c		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 syst		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		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 proble	Systems that uses cor	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 pr	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	A fitness function be	A cross-over method a	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 developef by		Fredrik	Fodgel	Frank	Flin	b
70	Evolution Strategies is developed with		selection	mutation	a population of size on	all of these	d
71	Evolution Strategies typically uses		real-valued vector repr	vector representation	time based representa	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 si	both a and b	none of these	c
75	What are different types of crossover		discrete and intermedi	discrete and continuc	continuous and interme	none of these	a
76	GP individual stores computer program		TRUE	FALSE			a
77	GP selection is		Deterministic selection	Tournament selection	nondeterministic selec	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 Syst	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 nor strictly monotonically increasing or decreasing or strictly monoronically 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 I	Conventional Artificia	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: μa(χ) ={0.2,0.5.,0.6,0.1,0.9} μb (χ)= {0.1,0.5,0.2,0.7,0.8} then the value of μa ∩ μb 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 ∈ X at which μA(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)=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	Identfication 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	Disjuctive 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	Conjuctive 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 valu	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 valu	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 discotinuous 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 (μ/ρ,λ) 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 (μ/ρ+λ) 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 characterstic 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 e	real value encoding	All of the above	d

S.r No	Question	Image	a	b	c	d	Correct Answer
	This sheet is for 2 Mark questions						
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 r	sum of incoming signa	transmit signals	b
6	Expert system		combines different typ	is a approach to desig	is an information base	none of the above	c
7	Three main basic feature involved in characterzing member function are		intuition,inference,rank	fuzzy algorithm,neura	center of sums,median	core,support,boundary	d
8	What is the function of cell body in biological neural network		multiplies the incoming	sums the incoming si	multiples the outgoing	sums the outgoing sign	b
9	What is perceptron		a single layer feed forw	a double layer associa	a neural network that	auto associative neural	a
10	Which of the follwing computing is trial and error problem solver algorithm		hard computing	neural network	evolutionary computin	fuzzy logic	c
11	What are advantages of neural network		ability to learn by exam	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∣Ua(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(X0)={0.1,0.5,0.2,		{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(	{$_{U}$A(x)-$_{u}$B(x)}-{$_{u}$A(x)*$_{u}$E	{$_{U}$A(x)/$_{u}$B(x)}-{$_{u}$A(x)+$_{u}$B	{$_{U}$A(x)+$_{u}$B(x)}+{$_{u}$A(x)*$_{u}$B	a
25	With the help of which formula can we find the algebraic product of two fuzzy sets A,B?		{uA(x)/uB(x)}	{uA(x)*uB(x)}*{uA(x)-	{uA(x)*uB(x)+{uA(x)+u	{uA(x)*uB(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 ba	time base and probabi	model base and data b	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 r	sum of incoming signa	transmit signals	b
30	Discrete events and agent-based models are usuallly used for_____________.		middle or low level of a	high level of abstracti	very high level of abstr	none of these	A
31	_____doesnot usually allow decision makers to see how a solution to a ___________envolves over time		Simulation ,Complex pr	Simulation,Easy probl	Genetics,Complex prol	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 experimenta		Simulation	Optimization	human intution	genetic algorithm	A
35	Which of the following is the advantage of simulation?		It can incorporate signi	It always result in opt	Simulation software re	It solves problem in one	A
36	What BEST describes a simulation model in which it is not important to know exactly when a modeled e		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,cro	crossovers,survival pr	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 Syst	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 optimi	evolutionary optimizat	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 rela		Selection	Recombination	Mutation	None of these	A
48	_________ decomposes two distinct solutions and then randomly mixes their parts to form novel soluti		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 contr		Stochastic	simplex based	complex based	none	a
54	In swarm systems organisations are		centalized	decentralized	controlled by third pa	none	b
55	Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k ce		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 syst		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 connectior	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 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 proble	Systems that uses cor	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 pr	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	A fitness function be	A cross-over method a	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 developef by		Fredrik	Fodgel	Frank	Flin	b
70	Evolution Strategies is developed with		selection	mutation	a population of size on	all of these	d
71	Evolution Strategies typically uses		real-valued vector repr	vector representatior	time based representa	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 si	both a and b	none of these	c
75	What are different types of crossover		discrete and intermedi	discrete and continuc	continuous and interme	none of these	a
76	GP individual stores computer program		TRUE	FALSE			a
77	GP selection is		Deterministic selection	Tournament selectior	nondeterministic selec	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 Syst	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 nor strictly monotonically increasing or decreasing or strictly monoronically 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 I	Conventional Artificia	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: $\mu a(\chi)$ ={0.2,0.5.,0.6,0.1,0.9} $\mu b(\chi)$= {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 ∈ X at which µA(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)=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	Identfication 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	Disjuctive 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	Conjuctive 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 valu	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 valu	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 discotinuous 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 (μ/ρ,λ) 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 (μ/ρ+λ) 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 characterstic 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 e	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 regio	Cannot Distinguisl	Collection of ordere	None of these	a
2	In computing the output is called as		Consequent	Outfeed	Anticedents	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	Unambioguos	Inaccurate	None of these	b
5	Core of soft computing is		Fuzzy computing,neu	Fuzzy network and	Neural Science	Genetic Science	a
6	Hard computing perfforms what type of computation		Sequential	Parallel	approxiamate	both a and b	a
7	Who iniated idea of sofft 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 behav	deals with inpreci	exact information	both a and b	d
11	Hard computing is also called as		evolutionary comput	conventional com	non conventional co	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 behav	information proce	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 represer	Blind search usual	Blind search cannot	none of these	B
16	In modeling,an optimal solution is understood to be		a solution that can or	a solution found i	a solution that is the	a solution that requires	C
17	When is a complete enumeration of solution used?		When a solution that	When there is eno	When the modeler	When there are an infi	B
18	All of the follwing are true about heuristics EXCEPT		heuristics are used w	heuristics are usec	heuristics are used v	heuristics are rules of g	C
19	Which approach is most suited to structured problem with little uncertainity		Simuation	human intuition	Optimization	genetic algorithm	C
20	Genetic algorithm belong to the family of method in the		artifical intelligence a	optimization area	complete enumerat	Non computer based is	A
21	What does the 0 membership value means in the set		the object is fully insi	the object is not i	the object is partiall	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 functior	fuzzy logic operat	if-then rules	all the above	d
24	What does a fuzzifier do		coverts crisp input to	coverts crisp oupu	coverts fuzzy input t	coverts fuzzy output to	a
25	Which of the folloowing 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 ante	only single part of	multiple part of ant	only single part of ante	c
28	The α cut of a fuzzy set A is a crisp set defined by :-		$\{x\vert_U a(x)>\alpha\}$	$\{x\vert_U a(x)>=\alpha\}$	$\{x\vert_U a(x)<\alpha\}$	$\{x\vert_U a(x)<=\alpha\}$	b
29	The bandwidth(A) in a fuzzy set is given by		$(A)=\vert x1*x2\vert$	$(A)=\vert x1+x2\vert$	$(A)=\vert x1-x2\vert$	$(A)=\vert x1/x2\vert$	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 com		{0/a,0.7/b,0.8/c,0.2/	{0/a,0.9/b,0.7/c,0	{0.8/a,0.7/b,0.8/c,0	{0/a,0.7/b,0.8/c,0.9/d,	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 uni		{1/a,0.9/b,0.1/c,0.5/	{0.8/a,0.9/b,0.2/c	{1/a,0.9/b,0.2/c,0.8,	{1/a,0.9/b,0.2/c,0.8/d,	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 inte		{0.6/a,0.3/b,0.1/c,0.3	{0.6/a,0.8/b,0.1/c	{0.6/a,0.3/b,0.1/c,0	{0.6/a,0.3/b,0.2/c,0.3/	a
34	What denotes the support(A) in a fuzzy set?		$\{x\vert_U a(x)>0\}$	$\{x\vert_U a(x)<0\}$	$\{x\vert_U a(x)<=0\}$	$\{x\vert_U a(x)<0.5\}$	a
35	What denotes the core(A) in a fuzzy set?		$\{x\vert_U a(x)>0\}$	$\{x\vert_U a(x)=1\}$	$\{x\vert_U a(x)>=0.5\}$	$\{x\vert_U a(x)>0.8\}$	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 Ev	deffuzification->ru	rule evaluation->fuz	rule evaluation->defuz	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 a	optimization area	complete enumerat	Non computer based is	A
40	All of the follwing are suitable problem for genetic algorithm EXCEPT		pattern recognization	simulation of biolo	simple optimization	dynamic process contr	C
41	Tabu search is an example of ?		heuristic	Evolutionary algor	ACO	PSO	a
42	Genetic algorithms are example of		heuristic	Evolutionary algor	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.		deteministic	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 algor	ACO	PSO	a
49	Genetic algorithms are example of		heuristic	Evolutionary algor	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 developef by		Fredrik	Fodgel	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 represer	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 tes		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 usuallly 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 ___________env		Simulation ,Complex	Simulation,Easy p	Genetics,Complex p	Genetics,Easy problem	A
64	EC stands for?		Evolutionary Comput	Evolutionary com	Electronic computat	noneof these	a
65	GA stands for		genetic algorithm	genetic asssuranc	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 problem	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 representat	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 algor	ACO	PSO	a

76	Genetic algorithms are example of		heuristic	Evolutionary algor	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.		deteministic	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 ~ → complement)		{(4, 0.7), (2,1), (1,0.8)	{(4, 0.3.): (5, 0), (6	{(l, 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 → Rule e[illegible]	[illegible]	[illegible]	[illegible] → Fuzzification	
96	If A and B are two fuzzy sets with membership functions μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8} μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5} Then the value of μ(AUB)'(x) will be		{0.9, 0.5, 0.6, 0.8, 0.8	{0.6, 0.2, 0.1, 0.7,	{0.1, 0.5, 0.4, 0.2, 0.	{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 μA+B(z) = maxx+y=z (min(μA(x), μB(x))) Then, f(A+B) is equal to		{(0.5,12), (0.6,13), (1,	{(0.5,12), (0.6,13),	{(0.3,12), (0.5,13), (	{(0.3,12), (0.5,13), (0.6,	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 μA(x) = x / (x+2) Then the α cut corresponding to α = 0.5 will be		{0, 1, 2, 3, 4, 5, 6, 7, 8	{1, 2, 3, 4, 5, 6, 7,	{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 unqualifi	unconditional unq	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 ≤ B and B ≤ C and A ≤ 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 ≈ Forecastin	Probability ≈ Foreca	None of these	b
103	Both fuzzy logic and artificial neural network are soft computing techniques because		Both gives precise an	ANN gives accurat	In each, no precise r	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 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 conjuctives antecedents is method of ----- in FLC		decomposition rule	formation of rule	truth tables	All of the above	a
108	Multiple disjuctives 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 diveristy 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

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 unlayered

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 prdicate 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

1**4: Three main basic features involved in characterizing membership function are**

A.Intution, 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 monoronically increasing than decreasing.

A.Convex Fuzzy Set

B.Non convex fuzzy set

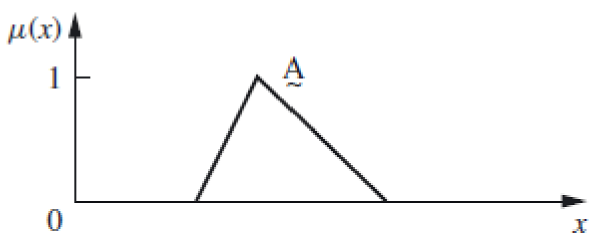
C.Normal Fuzzy set

D.Sub normal fuzzy set

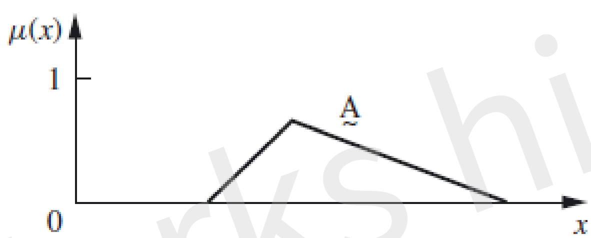
Answer B

21: Match the Column

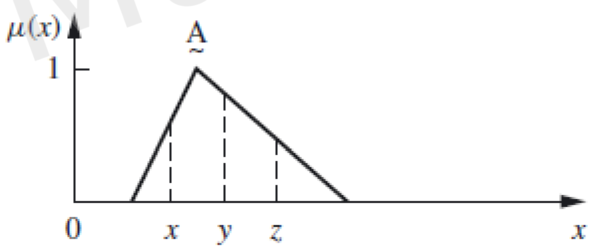
List I



(a)

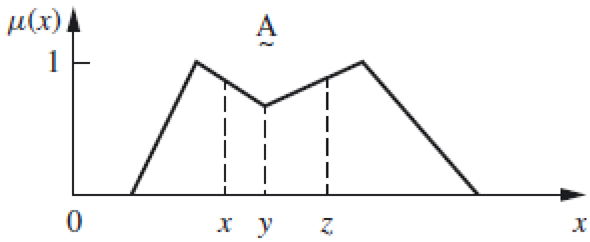


(b)



(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:

$\mu a(\chi)$ ={0.2,0.5.,0.6,0.1,0.9} and $\mu b(\chi)$= {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 (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 ~ → complement)

a. {(4, 0.7), (2,1), (1,0.8)}

b.{(4, 0.3.): (5, 0), (6. 0.2) }

c.{(l, 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:

$$R = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{cc} y_1 & y_2 \end{array} \\ \begin{bmatrix} 0.6 & 0.4 \\ 0.7 & 0.3 \end{bmatrix} \end{array} \text{ and } S = \begin{array}{c} \\ y_1 \\ y_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.8 & 0.5 & 0.1 \\ 0.0 & 0.6 & 0.4 \end{bmatrix} \end{array}$$

(1) $T = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} 0.4 & 0.6 & 0.4 \\ 0.7 & 0.7 & 0.7 \end{bmatrix} \end{array}$

(2) $T = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} 0.4 & 0.6 & 0.4 \\ 0.8 & 0.5 & 0.4 \end{bmatrix} \end{array}$

(3) $T = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} 0.6 & 0.5 & 0.4 \\ 0.7 & 0.5 & 0.3 \end{bmatrix} \end{array}$

(4) $T = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} 0.6 & 0.5 & 0.5 \\ 0.7 & 0.7 & 0.7 \end{bmatrix} \end{array}$

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

$R = \begin{array}{c c} & \begin{array}{cc} y_1 & y_2 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} 0.6 & 0.4 \\ 0.7 & 0.3 \end{bmatrix} \end{array}$ and $S = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} y_1 \\ y_2 \end{array} & \begin{bmatrix} 0.8 & 0.5 & 0.1 \\ 0.0 & 0.6 & 0.4 \end{bmatrix} \end{array}$

(A) $T = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.68 & 0.89 & 0.39 \\ 0.76 & 0.72 & 0.32 \end{bmatrix} \end{array}$

(B) $T = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.68 & 0.89 & 0.39 \\ 0.72 & 0.76 & 0.32 \end{bmatrix} \end{array}$

(C) $T = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.63 & 0.42 & 0.25 \\ 0.72 & 0.48 & 0.20 \end{bmatrix} \end{array}$

(D) $T = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.05 & 0.35 & 0.14 \\ 0.04 & 0.28 & 0.16 \end{bmatrix} \end{array}$

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

$$R = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{cc} y_1 & y_2 \end{array} \\ \begin{bmatrix} 0.6 & 0.4 \\ 0.7 & 0.3 \end{bmatrix} \end{array} \text{ and } S = \begin{array}{c} \\ y_1 \\ y_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.8 & 0.5 & 0.1 \\ 0.0 & 0.6 & 0.4 \end{bmatrix} \end{array}$$

(A) $T = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} .5 & .7 & .5 \\ .8 & .8 & .8 \end{bmatrix} \end{array}$

(B) $T = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} 0.7 & 0.6 & 0.5 \\ 0.8 & 0.6 & 0.4 \end{bmatrix} \end{array}$

(C) $T = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} .5 & .7 & .5 \\ .9 & .6 & .5 \end{bmatrix} \end{array}$

(D) $T = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} 0.7 & 0.6 & 0.5 \\ 0.8 & 0.8 & 0.8 \end{bmatrix} \end{array}$

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

μA+B(z) = maxx+y=z (min(μA(x), μB(x)))

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 W1 = -3.9 and W2 = 1.1 with threshold value T = 0.3. What output does it give for the input x1 = 1.3 and x2 = 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)}

$$\mu_{A+B}(z) = \underset{x+y=z}{\oplus} (\mu_A(x) \otimes \mu_B(y))$$

$$f(A+B) \text{ is } \_\_\_\_\_\_\_\_\_\_ . \left[\text{Note} : \begin{array}{l} \oplus \equiv \max \\ \otimes \equiv \min \end{array}\right]$$

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 updation rule of weight vector is given by

a.w(n + 1)=w(n)+η[d(n)-y(n)]

b.w(n + 1)=w(n)–η[d(n)-y(n)]

c. w(n + 1)=w(n)+η[d(n)-y(n)]* x (n)

d. w(n + 1)=w(n)–η[d(n)-y(n)]* x (n)

Answer c

55. A fuzzy set A on R is .... iff A(λx1 + (1 – λ)x2) ≥ min [A(x1), A(x2)] for all x1, x2 ∈ R and all λ ∈ [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

μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}

μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}

Then the value of μ(A∪B)'(x) will be

a.{0.9, 0.5, 0.6, 0.8, 0.8}

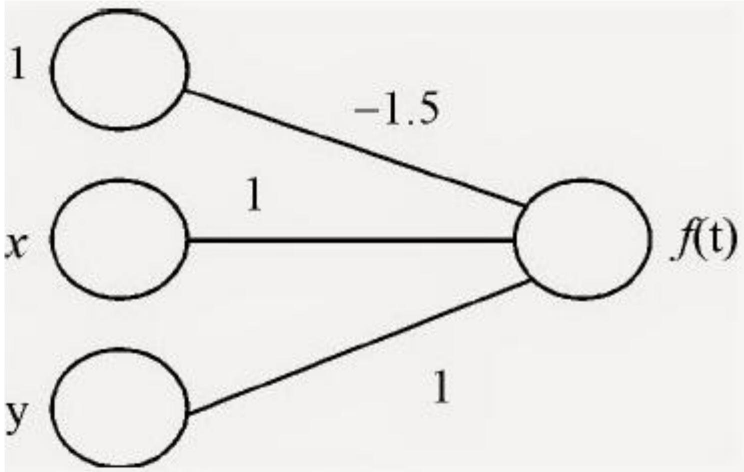
b.{0.6, 0.2, 0.1, 0.7, 0.5}

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



and $f(t)$ defined as

$$f(t) = \begin{cases} 1, & t > 0 \\ 0, & t \leq 0 \end{cases}$$

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∈ [,] 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∈ [,], 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 :

$\phi(V) = Z + (1/ 1 + \exp(-x * V + Y))$,

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 x1, x2, x3............xn with weights w1, w2, ...wn 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.Σ wi   b.Σ xi   c.Σ wi + Σ xi   d.Σ wi* xi

Answer d

78. A neuron with 3 inputs has the weight vector [0.2 -0.1 0.1]^T and a bias θ = 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. Probor (a,b) = a-b + ab

B. Probor (a,b) = ab + ab

C. Probor (a,b) = a+b - ab

D. Probor (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

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	Anticedents	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	Unambioguos	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 perfforms what type of computation	Sequential	Parallel	approxiamate	both a and b	a
7	Who iniated idea of sofft 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 inprecise, probablistic	exact information	both a and b	d
11	Hard computing is also called as	evolutionary computing	conventional computing	non conventional computing	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 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 follwing 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 uncertainity	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,mutiple 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|Ua(x)>a}	{x|Ua(x)>=a}	{x|Ua(x)<a}	{x|Ua(x)<=a}	b

<table>
<tr><td>29</td><td>The bandwidth(A) in a fuzzy set is given by</td><td>(A)=|x1*x2|</td><td>(A)=|x1+x2|</td><td>(A)=|x1-x2|</td><td>(A)=|x1/x2|</td><td>c</td></tr>
<tr><td>30</td><td>The intersection of two fuzzy sets is the_______of each element from two sets</td><td>maximum</td><td>minimum</td><td>equal to</td><td>not equal to</td><td>b</td></tr>
<tr><td>31</td><td>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?</td><td>{0/a,0.7/b,0.8/c,0.2/d,1/e}</td><td>{0/a,0.9/b,0.7/c,0.2/d,1/e}</td><td>{0.8/a,0.7/b,0.8/c,0.7/d,1/e}</td><td>{0/a,0.7/b,0.8/c,0.9/d,1/e}</td><td>a</td></tr>
<tr><td>32</td><td>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?</td><td>{1/a,0.9/b,0.1/c,0.5/d,0.2/e}</td><td>{0.8/a,0.9/b,0.2/c,0.5/d,0.2/e}</td><td>{1/a,0.9/b,0.2/c,0.8/d,0.2/e}</td><td>{1/a,0.9/b,0.2/c,0.8/d,0.8/e}</td><td>c</td></tr>
<tr><td>33</td><td>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 ?</td><td>{0.6/a,0.3/b,0.1/c,0.3/d,0/e}</td><td>{0.6/a,0.8/b,0.1/c,0.3/d,0/e}</td><td>{0.6/a,0.3/b,0.1/c,0.5/d,0/e}</td><td>{0.6/a,0.3/b,0.2/c,0.3/d,1/e}</td><td>a</td></tr>
<tr><td>34</td><td>What denotes the support(A) in a fuzzy set?</td><td>{x|Ua(x)>0}</td><td>{x|Ua(x)<0}</td><td>{x|Ua(x)<=0}</td><td>{x|Ua(x)<0.5}</td><td>a</td></tr>
<tr><td>35</td><td>What denotes the core(A) in a fuzzy set?</td><td>{x|Ua(x)>0}</td><td>{x|Ua(x)=1}</td><td>{x|Ua(x)>=0.5}</td><td>{x|Ua(x)>0.8}</td><td>b</td></tr>
<tr><td>36</td><td>Fuzzy logic deals with which of the following</td><td>fuzzy set</td><td>fuzzy algebra</td><td>both a and b</td><td>none of the above</td><td>c</td></tr>
</table>

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 recognization	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.	deteministic	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 representatio n	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 representatio n	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 n	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 usuallly 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 Computations	Evolutionary computer	Electronic computations	noneof these	a
65	GA stands for	genetic algorithm	genetic asssurance	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.	deteministic	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 ~ → complement)	{(4, 0.7), (2,1), (1,0.8)}	{(4, 0.3.): (5, 0), (6. 0.2) }	{(l, 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 μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8} μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5} Then the value of μ(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

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 μA+B(z) = maxx+y=z (min(μA(x), μB(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**
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 μA(x) = x / (x+2) Then the α cut corresponding to α = 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 ≤ B and B ≤ C and A ≤ 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 conjuctives antecedents is method of ----- in FLC	decomposition rule	formation of rule	truth tables	All of the above	**a**
108	Multiple disjuctives 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 (μ+μ) selection	(μ, λ)-selection based on the children only (μ+λ)-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 (μ+μ) selection	(μ, λ)-selection based on the children only (μ+λ)-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 recombinatio n 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 recombinatio n 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	(μ+λ): Select survivors among parents and offspring	(μ-λ): Select survivors among offspring only	(μ:λ): 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 diveristy 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 characterzing 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	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 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|Ua(x)<0}	{x|Ua(x)=1}	{x|Ua(x)=0.5}	{x|Ua(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} $_{U}b(X0)$={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?	{UA(x)+uB(x) }- {uA(x)*uB(x) }	{UA(x)-uB(x)}-{uA(x)*uB(x) }	{UA(x)/uB(x)}-{uA(x)+uB(x)}	{UA(x)+uB(x)}+{uA(x)*uB(x)}	**a**
25	With the help of which formula can we find the algebraic product of two fuzzy sets A,B?	{uA(x)/uB(x)}	{uA(x)*uB(x) }*{uA(x)- uB(x)}	{uA(x)*uB(x)+{uA(x)+uB(x)}}	{uA(x)*uB(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(AU C)	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 usuallly 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 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	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 representati on of chromosom es.	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 developef 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 representati ons	vector representati on	time based representation	none of these	a
72	in ES survival is	indeterminis tic	deterministi c	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 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	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 nor strictly monotonically increasing or decreasing or strictly monoronically 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	differentiato r	integrator	none of the mentioned	**a**

95	Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial Intelligence deal with prdicate 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: μa(χ) ={0.2,0.5.,0.6,0.1,0.9} μb (χ)= {0.1,0.5,0.2,0.7,0.8} then the value of μa ∩ μb 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 ∈ X at which μA(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)=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	Identfication 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	Disjuctive 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	Conjuctive 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 discotinuous 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 (μ/ρ,λ) 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 (μ/ρ+λ) 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 characterstic 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**	a	b	c	d	**Correct Answer**
	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	probablistic	**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 learing 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 designning a fuzy logic machine	fuzzification->Rule Evaluation->Deffuzification	deffuzification->rule evaluation->fuzzification	rule evaluation->fuzzification->deffuzification	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 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 recognization	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 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->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 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	Recombinbation 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 evoltionary 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)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 usuallly 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 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	Recombinbation 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 evoltionary 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)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 Recombinatio n	**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 Recombinatio n	**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 ~ → complement)	{(4, 0.7), (2,1), (1,0.8)}	{(4, 0.3.): (5, 0), (6. 0.2) }	{(l, 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 μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8} μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5} Then the value of μ(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**

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 ∪ (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 α cut corresponding to α = 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 ≤ B and B ≤ C and A ≤ 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 ≈ Prediction	Fuzzy ≈ Forecasting	Probability ≈ 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	decompositio n rule	formation of rule	truth tables	All of the above	a
105	Multiple disjuctives antecedents is method of ----- in FLC	decompositio n 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 (μ+μ) selection	(μ, λ)-selection based on the children only (μ+λ)-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 (μ+μ) selection	(μ, λ)-selection based on the children only (μ+λ)-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	(μ+λ): Select survivors among parents and offspring	(μ-λ): 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	mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diveristy 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**

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) $\phi(I) = +1, I>0, -1, I<=0$

b) $\phi(I)=0$

c) $\phi(I)=+1, I>0$

d) $\phi(I)=-1, I<=0$

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.Intermediatry 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=gI,g=tanϕ

b) O=gI,g=sinϕ

c) O=gI,g=cosϕ

d) O=gI,g=-tanϕ

18.--------------- is never assured of finding global minimum as in the simple layer delta rulecase.

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)Versitality d)Placticity

17)------------------- is the analogus 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.Disitinguish 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)placiticity **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. interpredations 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 solutionb.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 the 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

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 foundby multiplying the weights with their respective inputs, summing the results and multiplying with the transfer function. Therefore:

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 Learniing

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 : φ(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 x1, x2, x3............xn with weights w1, w2, ...wn 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. Σ wi
b. Σ xi
c. Σ wi + Σ xi
d. Σ wi* xi

Ans: d

Explanation: It is net input calculated as Σ wi* xi

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 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

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 mathamatical 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) McCullocch-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 calculatin the error in perceptron model & only difference between desired & target output is taken into account.

65. In neural how can connectons 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 it's 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 cab 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 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. Intution, 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 uncertainity

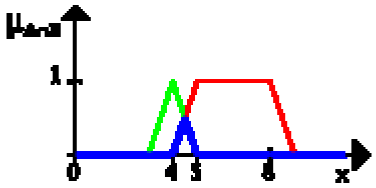
9. what are the following sequence of steps taken in designing a fuzzy logic machine?

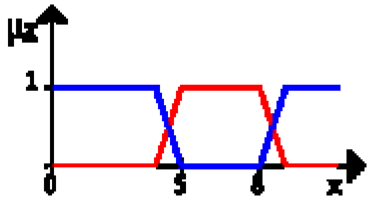
a. Fuzzification -> Rule Evaluation --> Defuzzification
b. Rule Evaluation -->Fuzzification ->Defuzzification
c. Defuzzification-->Rule Evaluation -->Fuzzification
d. Fuzzy Sets-->Defuzzification-->Rule Evaluation

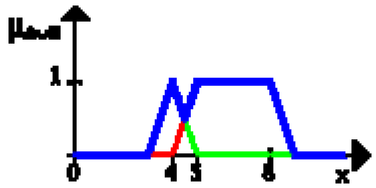
Ans: a

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. None

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.

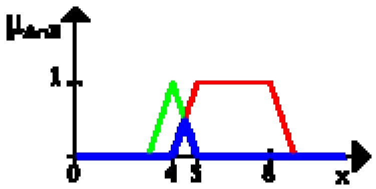
a. Fuzzy Logic
b. Probabilty

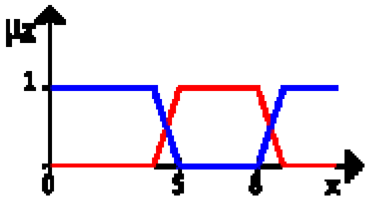
c. Entropy
d. All of the mentioned

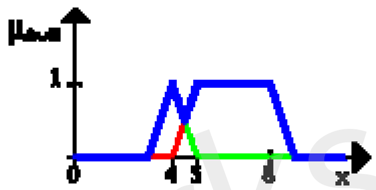
Ans: d

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.


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. doesnt 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. Intution, 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 monoronically 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 ~ 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 {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 {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 {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 defuzzufication techniques

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

Ans: d

Explanation: All above are defuzzification techniques

39. Following are defuzzufication 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 defuzzufication 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 qunlification:

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
μA(x) = x / (x+2) Then the α cut corresponding to α = 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
μA(x) = x / (x+2) Then the α cut corresponding to α = 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 μA(x) = x / x Then the α cut corresponding to α = 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 μA(x) = x Then the α cut corresponding to α = 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 μA(x) = x Then the α cut corresponding to α = 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 ∈ X at which μA(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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8}   then the value of μa ∩ μb 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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8}   then the value of μa U μb 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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8}   then the value of complement(~ μa)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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8}   then the value of complement(~ μb)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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value of AUB 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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value of A∩ 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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value difference(A|B)= A∩~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value AU~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~AU~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~AUB 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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~A∩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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~A∩~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~(A∩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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~(AUB) 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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of μ(A∪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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of μ(A∩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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of ~μ(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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of ~μ(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 $\sim\mu(AUB)$ (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 $\mu(AU\sim B)$ (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 $\mu(\sim AUB)$ (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 μA+B(z) = max x+y=z (min(μA(x), μB(x)))
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

$$R = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{cc} y_1 & y_2 \end{array} \\ \begin{bmatrix} 0.7 & 0.5 \\ 0.8 & 0.4 \end{bmatrix} \end{array}$$

$$\text{and} \quad S = \begin{array}{c} \\ y_1 \\ y_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.9 & 0.6 & 0.2 \\ 0.1 & 0.7 & 0.5 \end{bmatrix} \end{array}$$

(A) $T = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.68 & 0.89 & 0.39 \\ 0.76 & 0.72 & 0.32 \end{bmatrix} \end{array}$

(B) $T = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.68 & 0.89 & 0.39 \\ 0.72 & 0.76 & 0.32 \end{bmatrix} \end{array}$

(C) $T = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.63 & 0.42 & 0.25 \\ 0.72 & 0.48 & 0.20 \end{bmatrix} \end{array}$

(D) $T = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{bmatrix} 0.05 & 0.35 & 0.14 \\ 0.04 & 0.28 & 0.16 \end{bmatrix} \end{array}$

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 (u,lamdda): Select survivors among parents and offspring
B (u+lamdda): Select survivors among parents and offspring
C (u-lamdda): Select survivors among offspring only
D (u:lamdda): 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, (u+λ) 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

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 l, 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 l, 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 l, 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 intertia, 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. $Tij\ (t + n) = p\ .\ Tij(t) + \Delta T$ is the formula for updating ….
a. pheromone level
b. evaporation rate
Ans: a
Explanation: p stands for evaporation rate

16. $Tij\ (t + n) = p\ .\ Tij(t) + \Delta T$ 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)=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)=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)=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)=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)= Accuracy measure
b. f(x)= 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+------+c2r2(gb-p) where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

a. c1r2(ib-p)

b. c1r1(ib-p)

c. c1r1(ib-gb)

d.c1r1(gb-ib)

Ans: b

Explanation: c1r1(ib-p) gives individual best

46. In PSO, V=V+c1r1(ib-p) where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

a. c1r2(gb-p)

b. c2r2(gb-p)

c. c2r2(ib-gb)

d.c2r2(gb-ib)

Ans: b

Explanation: c2r2(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
View Answer

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
View Answer

Answer: a
Explanation: None.

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
View Answer

Answer: d
Explanation: None.

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.

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(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.

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:
Output = 2 * (1*4 + 2*10 + 3*5 + 4*20) = 238.

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 cam 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.

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 continue
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.

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.

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 => 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.

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.

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.

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.

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.

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.

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 Learniing

Answer Report Discuss

Option: B

Explanation :

Read more: http://www.avatto.com/computer-science/test/mcqs/soft-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 :

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 :

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/mcqs/soft-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/mcqs/soft-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 prdicate 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/mcqs/soft-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.

Intution, 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 :

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 monoronically increasing than decreasing.

A.

Convex Fuzzy Set

B.

Non convex fuzzy set

C.

Normal Fuzzy set

D.

Sub normal fuzzy set

Answer Report Discuss

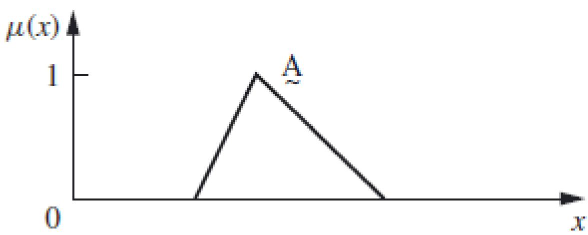
Option: B

Explanation :

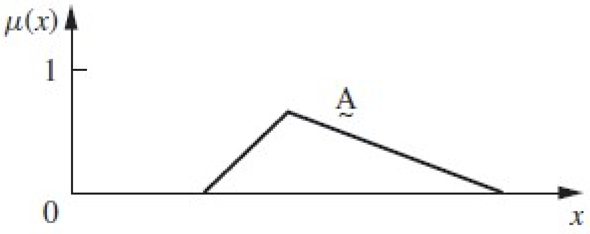
11:

Match the Column

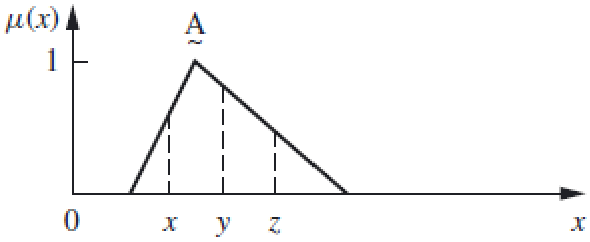
List I



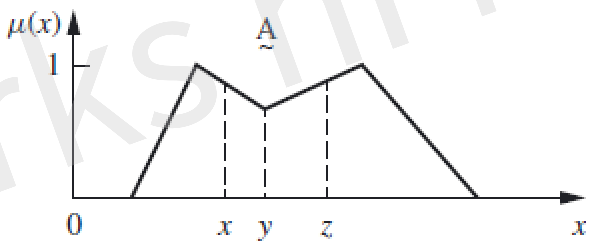
(a)



(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/mcqs/soft-computing/questions/369/3.html#ixzz46VGTKXoG

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

Introduction to Soft Computing

Solution to GA-01

Optimization problems, GA operators - Encoding and Selection

1) An optimization problem is stated as follows:

$maximize\ f(x, y) = \frac{x^2}{2} + \frac{125}{y^2}$ 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.

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) ∈, 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.
(c) Needs low selection pressure.
(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.

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 foundby multiplying the weights with their respective inputs, summing the results and multiplying with the transfer function. Therefore:
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 Learniing 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 x1, x2, x3...........xn with weights w1, w2, ...wn 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. Σ wi
b. Σ xi
c. Σ wi + Σ xi d. Σ wi* xi
Ans: d

Explanation: It is net input calculated as Σ wi* xi
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 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

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 mathamatical 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) McCullocch-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 calculatin the error in perceptron model & only difference between desired & target output is taken into account.
65. In neural how can connectons 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 it's implementation.
MMCOE,Pune

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 cab 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 combined to improve efficiency: a. True
b. False
Ans: a
Explanation: there are different hybrid approaches available.
MMCOE,Pune

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. Intution, 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 uncertainity
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. Probabilty
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. doesnt 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. Intution, 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 monoronically 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 ⇔ Q is equivalent to (Where ~ denotes NOT):
a. b. c. d.
~ (P ∨ Q) ^ ~ (Q ∨ P) (~ P ∨ Q) ^ (~ Q ∨ P) (P ∨ Q) ^ (Q ∨ P)
~ (P ∨ Q) → ~ (Q ∨ 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 {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 {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 {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 defuzzufication techniques
a. Max·membership principle b. Centroid method
c. Weighted average merhod. d. All of above
Ans: d
Explanation: All above are defuzzification techniques
39. Following are defuzzufication 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 defuzzufication 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: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 qunlification:
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 ∈ X at which μA(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: μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8} then the value of μa ∩ μb 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: μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8} then the value of μa U μb 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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8} then the value of complement(~ μa)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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8} then the value of complement(~ μb)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: μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {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 AUB will be
Explanation: Maximum of mf
76. If A and B are two fuzzy sets with membership functions: μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {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∩ B will be
Explanation: minimum of mf
77. If A and B are two fuzzy sets with membership functions: μa(χ) ={0.1,0.3.,0.5,0.2}

μb (χ)= {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 ~A will be
78. If A and B are two fuzzy sets with membership functions: μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {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 ~B will be

78. If A and B are two fuzzy sets with membership functions: μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {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∩~B will be
Explanation: i) 1- mf ii) min of mf
79. If A and B are two fuzzy sets with membership functions: μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {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 AU~B will be
Explanation: i) 1- mf ii) max of mf
80. If A and B are two fuzzy sets with membership functions: μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {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 ~AU~B will be
Explanation: i) 1- mf ii) max of mf
81. If A and B are two fuzzy sets with membership functions: μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {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 ~AUB will be
Explanation: i) 1- mf ii) max of mf

82. If A and B are two fuzzy sets with membership functions: μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {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 ~A∩B will be
Explanation: i) 1- mf ii) min of mf
83. If A and B are two fuzzy sets with membership functions: μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {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 ~A∩~B will be
Explanation: i) 1- mf ii) min of mf
84. If A and B are two fuzzy sets with membership functions: μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {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 ~(A∩B) will be
Explanation: i) min of mf ii) 1- mf
85. If A and B are two fuzzy sets with membership functions: μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {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 ~(AUB) will be
Explanation: i) max of mf ii) 1- mf

86. If A and B are two fuzzy sets with membership functions μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of μ(A∪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 μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of μ(A∩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 μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of ~μ(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 μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of ~μ(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 μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of ~μ(AUB) (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 μ(AU~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 μ(~AUB) (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 $\mu_{A+B}(z) = \max_{x+y=z} (\min(\mu_A(x), \mu_B(x)))$ 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 (u,lamdda): Select survivors among parents and offspring B (u+lamdda): Select survivors among parents and offspring C (u-lamdda): Select survivors among offspring only
D (u:lamdda): 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, (u+λ) model is supported by a. Evolutionary Strategy
b. Evolutionary Programming
c. Evolutionary Algorithms
d. All of Above
Ans: a
Explanation: The form of (μ + λ)-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

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 l, 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 l, 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 l, 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 intertia, 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. $Tij (t + n) = p . Tij(t) + \Delta T$ is the formula for updating .... a. pheromone level
b. evaporation rate
Ans: a
Explanation: p stands for evaporation rate
16. $Tij (t + n) = p . Tij(t) + \Delta T$ 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)=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)=Sqrt_root (i2-j2)
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)=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)=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)= Accuracy measure
b. f(x)= 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-x2 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-x2 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-x2 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-x2 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-x2 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-x2 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+------+c2r2(gb-p) where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position
a. c1r2(ib-p)
b. c1r1(ib-p)
c. c1r1(ib-gb)
d.c1r1(gb-ib)
Ans: b
Explanation: c1r1(ib-p) gives individual best
46. In PSO, V=V+c1r1(ib-p) where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position
a. c1r2(gb-p)
b. c2r2(gb-p)
c. c2r2(ib-gb)
d.c2r2(gb-ib)
Ans: b
Explanation: c2r2(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) $\phi(I) =+1, I>0, -1, I<=0$

b) $\phi(I)=0$

c) $\phi(I)=+1,I>0$

d) $\phi(I)=-1,I<=0$

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.Intermediatry 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=gI,g=tanϕ

b) O=gI,g=sinϕ

c) O=gI,g=cosϕ

d) O=gI,g=-tanϕ

18.--------------- is never assured of finding global minimum as in the simple layer delta rulecase.

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)Versitality d)Placticity

17)------------------- is the analogus 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.Disitinguish 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)placiticity **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. interpredations 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 solutionb.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 the 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

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 foundby multiplying the weights with their respective inputs, summing the results and multiplying with the transfer function. Therefore:

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 Learniing

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 : φ(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 x1, x2, x3............xn with weights w1, w2, ...wn 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. Σ wi
b. Σ xi
c. Σ wi + Σ xi
d. Σ wi* xi

Ans: d

Explanation: It is net input calculated as Σ wi* xi

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 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

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 mathamatical 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) McCullocch-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 calculatin the error in perceptron model & only difference between desired & target output is taken into account.

65. In neural how can connectons 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 it's 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 cab 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 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. Intution, 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 uncertainity

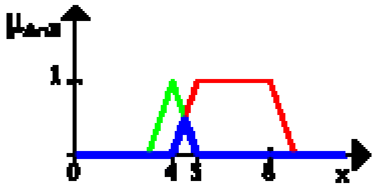
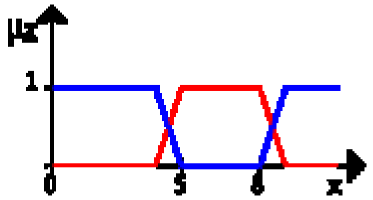
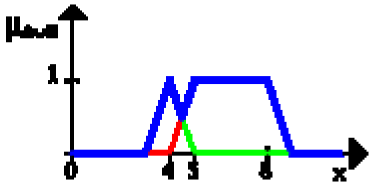
9. what are the following sequence of steps taken in designing a fuzzy logic machine?

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. None

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.

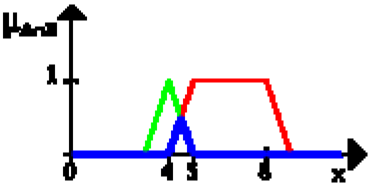
a. Fuzzy Logic
b. Probabilty

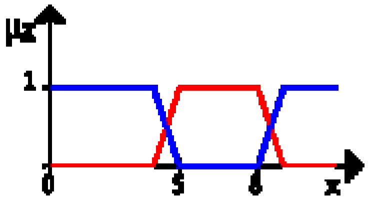
c. Entropy
d. All of the mentioned

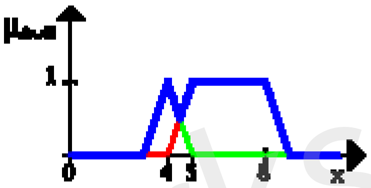
Ans: d

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.

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. doesnt 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. Intution, 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 monoronically 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 ~ 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 {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 {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 {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 defuzzufication techniques

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

Ans: d

Explanation: All above are defuzzification techniques

39. Following are defuzzufication 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 defuzzufication 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 qunlification:

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 α = 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 α = 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 μA(x) = x / x Then the α cut corresponding to α = 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 μA(x) = x Then the α cut corresponding to α = 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 μA(x) = x Then the α cut corresponding to α = 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 ∈ X at which μA(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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8}   then the value of μa ∩ μb 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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8}   then the value of μa U μb 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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8}   then the value of complement(~ μa)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:
μa(χ) ={0.2,0.5.,0.6,0.1,0.9}
μb (χ)= {0.1,0.5,0.2,0.7,0.8}   then the value of complement(~ μb)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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value of AUB 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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value of A∩ 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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value difference(A|B)= A∩~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value AU~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~AU~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~AUB 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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~A∩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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~A∩~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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~(A∩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:
μa(χ) ={0.1,0.3.,0.5,0.2}
μb (χ)= {0.5,0.4,0.1,1}   then the value ~(AUB) 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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of μ(A∪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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of μ(A∩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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of ~μ(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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of ~μ(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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of ~μ(AUB) (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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of μ(AU~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
μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}
μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}
Then the value of μ(~AUB) (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 μA+B(z) = max x+y=z (min(μA(x), μB(x)))
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

$$R = \begin{array}{c c} & \begin{array}{cc} y_1 & y_2 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} 0.7 & 0.5 \\ 0.8 & 0.4 \end{bmatrix} \end{array}$$

$$\text{and} \quad S = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} y_1 \\ y_2 \end{array} & \begin{bmatrix} 0.9 & 0.6 & 0.2 \\ 0.1 & 0.7 & 0.5 \end{bmatrix} \end{array}$$

(A) $T = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} 0.68 & 0.89 & 0.39 \\ 0.76 & 0.72 & 0.32 \end{bmatrix} \end{array}$

(B) $T = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} 0.68 & 0.89 & 0.39 \\ 0.72 & 0.76 & 0.32 \end{bmatrix} \end{array}$

(C) $T = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} 0.63 & 0.42 & 0.25 \\ 0.72 & 0.48 & 0.20 \end{bmatrix} \end{array}$

(D) $T = \begin{array}{c c} & \begin{array}{ccc} z_1 & z_2 & z_3 \end{array} \\ \begin{array}{c} x_1 \\ x_2 \end{array} & \begin{bmatrix} 0.05 & 0.35 & 0.14 \\ 0.04 & 0.28 & 0.16 \end{bmatrix} \end{array}$

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 (u,lamdda): Select survivors among parents and offspring
B (u+lamdda): Select survivors among parents and offspring
C (u-lamdda): Select survivors among offspring only
D (u:lamdda): 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, (u+λ) 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

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 l, 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 l, 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 l, 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 intertia, 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. Tij (t + n) = p . Tij(t) + ΔT is the formula for updating ….
a. pheromone level
b. evaporation rate
Ans: a
Explanation: p stands for evaporation rate

16. Tij (t + n) = p . Tij(t) + ΔT 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)=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)=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)=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)=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)= Accuracy measure
b. f(x)= 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+------+c2r2(gb-p) where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

a. c1r2(ib-p)

b. c1r1(ib-p)

c. c1r1(ib-gb)

d.c1r1(gb-ib)

Ans: b

Explanation: c1r1(ib-p) gives individual best

46. In PSO, V=V+c1r1(ib-p) where c : cognitive term, r: random numbers, gb: global best, ib: individual best, p : current position

a. c1r2(gb-p)

b. c2r2(gb-p)

c. c2r2(ib-gb)

d.c2r2(gb-ib)

Ans: b

Explanation: c2r2(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∗) ≥ 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∗) ≤ 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∗) ≤ 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

Sinhgad Technical Education Society's
Sinhgad Institute of Technology, Lonavala
Class- B.E. Subjet- Soft Computing and Optimization Algorithms Faculty- Mr. Yerate D.A.

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
	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	Intution, 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 ia 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 ia A then y is B else y is C* . Then relation is eqivalent to	$(A \times B) + (B \times C)$	$(A \times B) \cup (\bar{A} \times C)$	$(A \times B) \rightarrow (B \times C)$	$(A \times C) \cup (B \times C)$	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

	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
4	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.	1				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
5	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
	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

6	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

Sinhgad Technical Education Society's

Sinhgad Institute of Technology, Lonavala

Class- B.E. Subjet- Soft Computing and Optimization Algorithms Faculty- Mr. Yerate D.A.

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 prdicate 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	1				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 sucessfully	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
	8	A fuzzy set A is closed if:	lim x → −∞μ (x) = 1 and lim x → +∞ (x) =	lim x → −∞μ (x) = lim x → +∞ (x) = 0	lim x → −∞μ (x) = 0 and lim x → +∞ (x) = 1	lim x → −∞μ (x) = lim x → +∞ (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

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(AXY) 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	
6	29	Premature convergence of PSO is	Once PSO traps in global optimum, it is dificult to jump out of global optimum	Once PSO traps in local optimum, it is dificult to jump out of local optimum	Once PSO traps in local optimum, it is dificult to jump out of global optimum	Once PSO traps in global optimum, it is dificult to jump out of local optimum	2	
	30	Takugi-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	

<u>SET A:</u>

Part A: - 20 questions 1 mark each (20x1=20 marks)

1. The structural constitute of a human brain is known as ------------------

a) Neuron

b) Cells

c) Chromosomes

d) Genes

ANS: Neuron

2. Neural networks also known as -----------------------

a) Artificial Neural Network

b) Artificial Neural Systems

c) Both A and B

d) None of the above

ANS: **Both A and B**

3. Neurons also known as -----------------

a) Neurodes

b)Processing elements

c) Nodes

d) All the above

ANS: **All the above**

4. --------------- mimic the principle of natural genetics

a. Genetic programming

b. Genetic Algorithm

c. Genetic Evolution

d. none

ANS: **Genetic Algorithm**

5. ------------ mimics the behaviour of social insects

a. Swarm intelligence

b. Ant colony

c. Gentic Algorithm

d. none

ANS: **Swarm intelligence**

6. Possible settings of traits are called in genes -------------------

a. locus

b. alleles

c. genome

d. genotype

ANS: **alleles**

7. --------------- recalls an output given an input in one feed forward pass

a) Static networks

b) Dynamic networks

c) Recurrent networks

d) None

ANS: **Static networks**

8. BAM stands for ----------------

a) Bidirectional Associative Memory

b) v Associative Memory

c) Biconventional Associative Memory

d) None

ANS: **Bidirectional Associative Memory**

9. ----------------- associates patterns in bipolar forms that are real-coded.

a) Simplified Bidirectional Associative Memory

b) Bipolar form

c) Bidirectional form

d) None

ANS: **Simplified Bidirectional Associative Memory**

10) ---------------------- uses bipolar coding

a) Fabric defect identification

b) Recognition of Characters

c) Design of Journal Bearing

d) Classification of soil

ANS: **Recognition of Characters**

11. -------------- 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

ANS: **embedded hybrid systems**

12. ------------- deals with uncertainty problems with its own merits and demerits

a. neuro –fuzzy

b. neuro-genetic

c. fuzzy –genetic

d. none

ANS: **neuro –fuzzy**

13. Neural network can learn various tasks from -------------

a. training

b. testing

c. learning

d. none

ANS: **training**

14. -------------exhibit non-linear functions to any desired degree of accuracy

a. neuro –fuzzy

b. neuro-genetic

c. fuzzy –genetic

d. none

ANS: **fuzzy –genetic**

15. ---------------- use to determine the weights of a multilayer feedforward network with backpropagation learning

a. neuro –fuzzy

b. neuro-genetic

c. fuzzy –genetic

d. none

ANS: **neuro-genetic**

16. Taking a square root of fuzzy set is called -------------------

a) Dilemma

b) Dual

c) dialama

d) none

ANS: **Dilemma**

17. Fuzzy relation associates ------------ to a varying degree of membership.

a) records

b) tuples

c) felds

d) none

ANS: **tuples**

18. In case of => operator, the proposition occurring before the “=>” symbol is called---------

a. antecedent

b. consequent

c. conjunction

d. disjunction

ANS: **antecedent**

19. A truth table comprises rows known as -------------

a. interpredations

b. contradiction

c. conjunction

d. disjunction

ANS: **interpredations**

20. 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

ANS: **Unsupervised learning**

Part B: - 15 questions 2 mark each (15x2=30 marks)

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

ANS: **Associative 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

ANS: **Hetero associative memory**

3. Autoassociative correlation memories are known as ---------------

a) Auto correlators

b) Hetero Correlators

c)Neuro Correlators

d) None

ANS: **Auto correlators**

4. Hybrid systems is combination of neural networks, fuzzy logic and --------------

a. Genetic Algorithm

b. Genetic Programming

c. Genetic

d. none

ANS: **Genetic Algorithm**

5. 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

ANS: **Auxiliary hybrid systems**

6. ------------hybrid systems make use of technologies in a pipeline fashion.

a. auxiliary hybrid systems

b. embedded hybrid systems

c. sequential hybrid systems

d. none

ANS: **sequential hybrid systems**

7. A set with a single element is called -----------

a) Single set

b) Singleton set

c) 1 set

d) none

ANS: **Singleton set**

8. 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

ANS: **Power set**

9. The member ship function of fuzzy set not always be described by ----------------

a) continuous

b) Discrete

c) crisp

d) specific

ANS: **Discrete**

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

a) Single set

b) Crisp set

c) union set

d) intersection set

ANS: **crisp set**

11. Raising a fuzzy set to its second power is called --------------

a) Concentration

b) intersection

c) conjunction

d) disjunction

ANS: **concentration**

12. ---------------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

ANS: Sigmoidal function

13. -----------------produce negative output values

a) Hyperbolic tangent function

b) Parabolic tangent function

c) Tangent function

d) None of the above

ANS: **Hyperbolic tangent function**

14. -------------------- 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) network

ANS: **Feed forward network**

15. ------------- has not feedback loop

a) Neural network

b) Recurrent Network

c) Multilayer Network

d) Feed forward network

ANS: **Recurrent Network**

Part C: - 5 questions 4 mark each (05x4=20 marks)

1. Fuzziness means -------------

a) Vagueness

b) Clear

c) Precise

d) Certainty

ANS: **Vagueness**

2. ---------------- are pictorial representations to denote a set

a)Flow chart

b) Venn diagram

c) DFD

d) ER diagrams

ANS: **Venn diagram**

3. The number of elements in a set is called its -------------

a) Modality

b) Plasticity

c) Cardinality

d) Elasticity

ANS: **Cardinality**

4. In the neuron, attached to the soma are long irregularly shaped filaments called--------------

a) Dendrites

b) Axon

c) Synapse

d) Cerebellum

ANS: **Dendrites**

5. Signum function is defined as -------------------

a) ϕ(I) =+1, I>0, -1, I<=0

b) ϕ(I)=0

c) ϕ(I)=+1,I>0

d) ϕ(I)=-1,I<=0

ANS: **ϕ(I) =+1, I>0, -1, I<=0**

SET B

Part A: - 20 questions 1 mark each (20x1=20 marks)

1. Combining a number of ADALINE is ----------------

a) MULTILINE

b) MULTIPLE LINE

C) MADALINE

d) MANYLINE

ANS: **MADALINE**

2. Neural network applications -----------------

a) Pattern Recognition

b) Optimization Problem

c) Forecasting

d) All the above

ANS: All the above

3. ------------------ is a Systematic method for training multilayer artificial neural network

a) Back propagation

b) Forward propagation

c) Speed propagation

d) Multilayer propagation

ANS: **Back propagation**

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

a. disjunction

b.conjunction

c. tautology

d. antecedent

ANS: **tautology**

5. In propositional logic, ---------------- widely used for inferring facts.

a. pones

b. modus

c. modus ponens

d. pons

ANS: **modus ponens**

6. ------------------ represent objects that do not change values

a. constants

b. variables

c. predicates

d. subject

ANS: **constants**

7. ------------------------ are representative of associations between objects that are constants or variables and acquire truth values.

a. Subject

b. Predicate

c. Quantifier

d. Functions

ANS: **Predicate**

8. --------------------- is a computational model

a) neuron

b) cell

c) Perception

d) Neucleus

ANS: **Perception**

9. Intermediatry layer is present in ----------------------

a) Multilayer feedforward perception model

b) Multilayer perception model

c) Multilayer Feedforward model

d) None of the above

ANS: **Multilayer feedforward perception model**

10. Linear Activation Operator equation is ---------------

a) O=gI,g=tanϕ

b) O=gI,g=sinϕ

c) O=gI,g=cosϕ

d) O=gI,g=-tanϕ

ANS: **O=gI,g=tanϕ**

11. --------------- is never assured of finding global minimum as in the simple layer delta rulecase.

a) Back propagation

b) Front Propagation

c) Propagation

d) None above

ANS: **Back propagation**

12. The test of neural network is known as--------------

a) Inference Engine

b) Checking

c) Deriving

d) None

ANS: Inference Engine

13. Application of Back Propagation……………………….

a) Design of Journal Bearing

b) Classification of soil

c) Hot Extrusion of soil

d) All the above

ANS: All the above

14. Reinforced learning also known as ----------------

a) Output based learning

b) Error based learning

c) Back propagation learning

d) None

ANS: **Output based learning**

15. ---------------------learning follows "Winner takes all" strategy

a) Stochastic learning

b) Competitive learning

c) Hebbian learning

d) BackPropagation learning

ANS: **Competitive learning**

16. ------------------earlier neural network architecture,

a) Rosenblatt Perception

b) Rosen Perception

c) Roshon Perception

d) None

ANS: **Rosenblatt Perception**

17. ----------------- truth values are multivalued.

a. crisp logic

b. boolean logic

c. fuzzy logic

d. none

ANS: **fuzzy logic**

18. Fuzzy logic propositions are also quantified by --------------

a. fuzzy

b. fuzzy qualifiers

c. fuzzy quantifiers

d. none

ANS: **fuzzy quantifiers**

19. Fuzzy inference also referred to as --------------

a. approximate reasoning

b. reasoning

c. fixed reasoning

d. none

ANS: **approximate reasoning**

20. Conversion of a fuzzy set to single crisp value is called -----------------

a. fuzzification

b. defuzzification

c. fuzzy logic

d. fuzzy rule

ANS: **fuzzification**

Part B: - 15 questions 2 mark each (15x2=30 marks)

1. ------------ is the first operator applied on population.

a. Reproduction

b. Recombination

c. Mutation

d. none

ANS: **Reproduction**

2. ------------------ means that the genes from the already discovered good individuals are exploited

a. Diversity

b. Population diversity

c. Unity in diversity

d. none

ANS: **Population diversity**

3. -------------is the degree to which the better individuals are favoured

a. Selective pressure

b. Reproduction pressure

c. Recombination pressure

d. Mutation

ANS: **Selective pressure**

4. The selection method which is less noisy is -----------

a. stochastic remainder solution

b. Boltzman solution

c. Remainder solution

d. none

ANS: **stochastic remainder solution**

5. Real coding is used by ----------------

a) Recognition of characters

b) Fabric defect identification

c) Optimization

d) Classification of soil

ANS: **Fabric defect identification**

6. ART stands for ------------------

a) Adaptive Resonance Theory

b) Adaptive Recent Theory

c) Adapt Resonance Theory

d) Adaptive Retail Theory

ANS: **Adaptive Resonance Theory**

7. A program -------------- is written in fortran for cluster formation

a) Vecquent

b) Vecant

c) Vector

d) Quantization

ANS: **Vecquent**

8. ----------------- networks were developed by carpenter and grossberg

a) ART

b) ARP

c) ARC

d) ARD

ANS: **ART**

9. 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

ANS: **generation gap**

10. Crossover operator proceeds in ------------- steps

a. 4

b. 3

c.5

d.2

ANS: **3**

11. Matrix crossover is also known as ------------

a. One dimensional

b. Two dimensional

c. Three dimensional

d. none

ANS: **Two dimensional**

12. ------------------performs linear inversion with a specified probability of 0.75.

a. Linear+end-inversion

b. Discrete inversion

c. Continuous inversion

d. Mass inversion

ANS: **Linear+end-inversion**

13. ---------------- of bit involves changing bits from 0 to 1 and 1 to 0.

a. Mutation

b. Crossover

c. Inversion

d. Segregation

ANS: **Mutation**

14. -------------------- 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

ANS: **Masking**

15. Fuzzy truck backer-upper system is application of ---------------

a. FAM

b. Fuzzy ART

c. ART

d. none

ANS: Fuzzy ART

Part C: - 5 questions 4 mark each (05x4=20 marks)

1. 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

ANS: **Activation function**

2. ------------------ means that the element of DNA is modified.

a. Recombination

b. Selection

c. Mutation

d. none

ANS: **Mutation**

3. The -------------- of an organism is measured by means of success of organism in life

a. Strength

b. fitness

c. Gene

d. Chromosome

ANS: **fitness**

4. The space for all possible feasible solutions is called ------------------

a. space

b. search

c. search space

d. area

ANS: **search space**

5. ------------- is a way of representing individual genes

a. conversion

b. encoding

c. coding

d. none

ANS: **encoding**

SET C

Part A: - 20 questions 1 mark each (20x1=20 marks)

1. --------------- obtains centre of area occupied by the fuzzy set

a. center

b. center of gravity

c. center of area

d. center point

ANS: **center of gravity**

2. The ---------------- is the arithmetic average of mean values of all intervals

a. mean

b. mean of maxima

c. maximum

d. mean interval

ANS: **mean of maxima**

3. The ------------------ are obtained by computing the minimum of the membership functions of the antecedents.

a. rule base

b. rule strengths

c. rules

d. none

ANS: **rule base**

4. Relative quantifiers are defined as ---------

a. 0 to 10

b. 0 to 1

c.0

d.1

ANS: **0 to 1**

5. Fuzzy cruise controller has --------------- inputs

a. 2

b.3

c.1

d.0

ANS: **2**

6. 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

ANS: **Continuous**

7. The -------------causes all the bits in the first operand to the 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

ANS: **Shift left**

8. 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

ANS: **bit wise OR**

9. Population size, Mutation rate and cross over rate are together referred to as ---------------

a. control parameters

b. central parameters

c. connection parameters

d. none

ANS: **control parameters**

10. -------------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

ANS: **Boltzmann selection**

11. ---------------is not a particular method of selecting the parents.

a. Steady-state

b. Elitism

c. Boltzmann selection

d. Tournament Selection

ANS: **Steady-state**

12. Reproduction operator is also known as ---------

a. Recombination

b. Selection

c. Regeneration

d. none

ANS: **Selection**

13. Recurrent network architectures adopting -------------

a. hebbian learning

b. supervised learning

c. unsupervised learning

d. reinforced learning

ANS: **hebbian learning**

14. ------------ set have no crisp boundaries

a. fuzzy

b. boolean

c. crisp set

d. none

ANS: **fuzzy**

15. GA-NN also known as -----------

a. GANN

b. NNGA

c. GA

d. none

ANS: **GANN**

16. Image recognition under noisy is application of --------

a. Fuzzy

b. Fuzzy art

c. art

d. none

ANS: **Fuzzy art**

17. Genetic algorithm ------------- uses to determine optimization

a. fitness function

b. fit function

c. strength function

d. none

ANS: **fitness function**

18. ------------proposed neuro –fuzzy system

a. lee and lie

b.kosko

c.gradient

d.lee

ANS: **lee and lie**

19. Knowledge-based evaluation and earthquake damage evaluation is application of -----------

a. fuzzy-backpropagation

b. neuro-fuzzy

c. fuzzy

d. none

ANS: **fuzzy-backpropagation**

20. 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

ANS: **Response unit**

Part B: - 15 questions 2 mark each (15x2=30 marks)

1. ----------------- applicable on fuzzy optimization problems

a. Fuzzy-genetic

b. neuro – fuzzy

c. fuzzy-logic

d. fuzzy-backpropagation

ANS: **Fuzzy-genetic**

2. --------------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

ANS: **Gradient descent learning**

3. 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

ANS: **NN driven fuzzy reasoning**

4. ---------- can be applicable to mathematical relationship

a. neuro-fuzzy

b. fuzzy-neuro

c. neuro-network

d. none

ANS: **neuro-fuzzy**

5. ------------- is a multilayer feedforward network architecture with gradient learning.

a. backpropagation

b. forward propagation

c. Propagation

d. none

ANS: **backpropagation**

6) ----------------- of the network means that a pattern should not oscillate among different cluster units at different stages of training

a) Stability

b) Mobility

c) Versitality

d) Placticity

ANS: **Stability**

7) ------------------- is the analogus version of ART

a) ART2

b) ART1

c) ART2A

d) ARTMAP

ANS: **ART2**

8) ----------------- test is incorporated into the adaptive backward network

a) Vigilance

b) Indulgence

c) Revailance

d) None

ANS: **Vigilance**

9) 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

ANS: **Match-based**

10) Kim et al. Proposed an ----------------- method using ART2 architecture.

a) Pattern Recognition

b) Chinese Recognition method

c) Character Recognition

d) None

ANS: **Chinese Recognition method**

11) --------------- learning weight update during resonance occurs rapidly

a) Error-based

b) Fast

c) Slow

d) Match-based

ANS: **Fast**

12) Comparison layer and recognition layer constitute -----------

a) Attenuation

b) Attenuated System

c) Synaptic System

d) None

ANS: **Attenuated System**

13) ART1 is an elegant theory that address ------------------

a) Stability – plasticity dilemma

b) Stability dilemma

c) Plasticity dilemma

d) None

ANS: **Stability – plasticity dilemma**

14) Supervised version of ART -----------------

a) ARTMAP

b) Fuzzy art

c) Fuzzy Artmap

d) ART1

ANS: **ARTMAP**

15) Slow learning is used as -----------------

a) ART1

b) ART2

c) ARTMAP

d) Fuzzy ART

ANS: **ART2**

Part C: - 5 questions 4 mark each (05x4=20 marks)

1. In --------------, every chromosomes is a string of numbers

a. hexadecimal encoding

b. octal encoding

c. Permutation encoding

d. none

ANS: **Permutation encoding**

2. Self-organizing network also known as ----–--------------

a) Back Propagation network

b) Training free counter propagation network

c) Propagation network

d) none

ANS: **Training free counter propagation network**

3. 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) $E(A,B)=AB^T$

ANS: **$E(A,B)=-AMB^T$**

4. BAM was introduced by ----------------------

a) Cruz

b) Stubberd

c) Kosko

d) Rosenbatt

ANS: **Kosko**

5. The algorithm which computes operator M is known as ------------------

a) Memory algorithm

b) Recording Algorithm

c) Transfer Algorithm

d) None

ANS: **Recording Algorithm**

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) $\phi(I) =+1, I>0, -1, I<=0$

b) $\phi(I)=0$

c) $\phi(I)=+1, I>0$

d) $\phi(I)=-1, I<=0$

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.Intermediatry 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=gI,g=tanϕ

b) O=gI,g=sinϕ

c) O=gI,g=cosϕ

d) O=gI,g=-tanϕ

18.--------------- is never assured of finding global minimum as in the simple layer delta rulecase.

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)Versitality d)Placticity

17)------------------- is the analogus 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.Disitinguish 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)placiticity **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. interpredations 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 solutionb.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 the 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

1. 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

A. h(A)=0
B. h(A)<0
*C. h(A)=1
D. h(A)<1

2. Fuzzy logic is a form of

A. Two-valued logic
B. Crisp set logic
* C. Many-valued logic
D. Binary 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=0.8 for the set old will be

A. {(40,0.3)}
B. {50,60,70,80}
C. {(20,0.1),(30,0.2)}
*D. {(60,1),(70,1),(80,1)}

4. ______________ is/are the way/s to represent uncertainty.

A. Fuzzy Logic
B. Probability
C. Entropy
*D. All of the mentioned

6. How is Fuzzy Logic different from conventional control methods?
*A. IF and THEN Approach
5B. FOR Approach
C. WHILE Approach
D. DO Approach

7. 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 U B(x) will be

*A. {0.9, 0.5, 0.6, 0.8, 0.8}
B. {0.6, 0.5, 0.6, 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}

8. Given U = {1, 2, 3, 4, 5, 6, 7} A = {(1, 0.7), (3, 1), (7, 0.8)} then ~A will be : (where ~ = complement)

A. {(4, 0.7), (2, 1), (1, 0.8)}

B. {(4, 0.3), (5, 0), (6, 0.2)}
*C. {(1, 0.3), (2, 1), (3, 0), (4, 1), (5,1), (6, 1), (7, 0.2)}
D. {(3, 0.3), (6.0.2)}

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

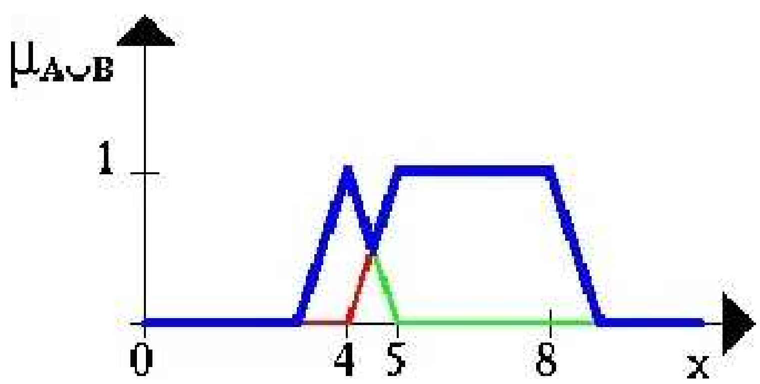
C. Fuzzy Sets->Defuzzification->Rule evaluation

D. Defuzzification->Rule evaluation->Fuzzification

10. 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 the above

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



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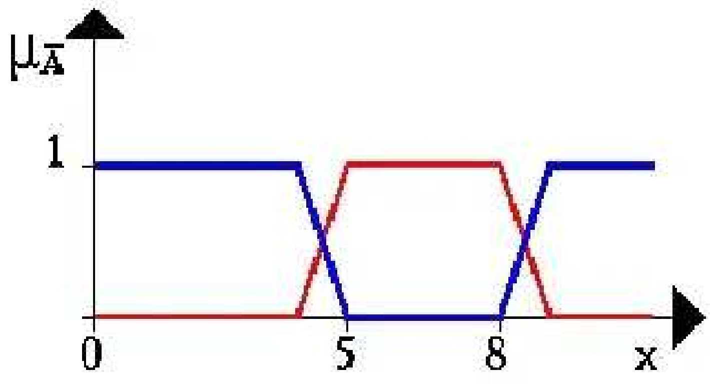
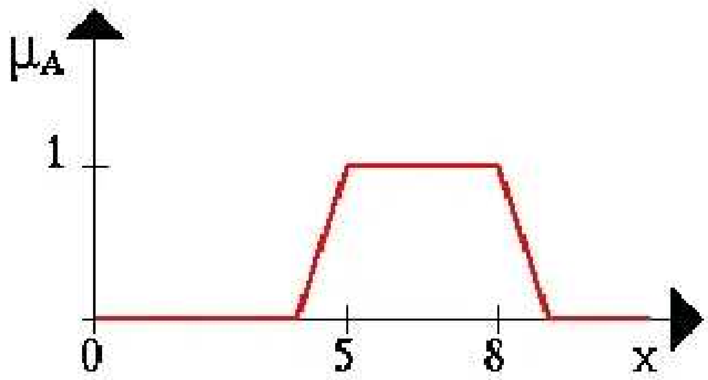
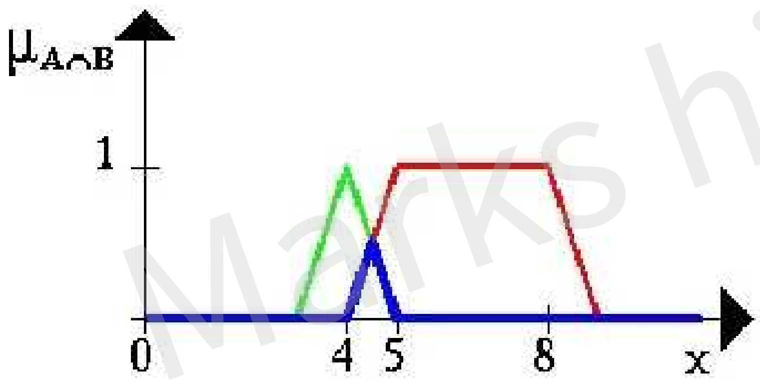






12.Which of the following is not true regarding the principles of fuzzy logic ?

Fuzzy logic is a concept of `certain degree'.

*Fuzzy logic follows the principle of Aristotle and Buddha.

Japan is currently the most active users of fuzzy logic.

Boolean logic is a subset of fuzzy logic.

13. If A and B are two fuzzy sets with membership functions:
$\mu a(\chi)$ ={0.2, 0.5., 0.6, 0.1, 0.9}
μb (χ)= {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}

14. Traditional set theory is also known as Crisp set theory

*TRUE
FALSE

15. The truth values of traditional set theory is _________________ and that of fuzzy set ______

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

16. Fuzzy logic is extension of Crisp set with an extension of handling the concept of Partial Truth.

*TRUE
FALSE

17. The room temerature is hot. Here the hot (use of linguistic variable is used) can be represented by ________________

A. Crisp Set

B. Fuzzy Set*

18. The Values of the set membership is represented by

A. Discrete Set
B. Degree of Truth *

C. Probabilities

D. Both B & C

19. Fuzzy set theory defines fuzzy operators. Choose the fuzzy operators from the following

A. AND*

B. OR*

C. NOT*

D. X-OR

20. There are also other operators, more linguistic in nature, called ______________that can be applied to fuzzy set theory

A. Hedges*

B. Lingustic Variable

C. Fuzzy Variables

D. None of the above

21. 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

22. Defuzzification is the process of ____________

A. Transforming a crisp quantity to fuzzy quantity

B. Transforming a fuzzy quantity to crisp quantity *

C. Precise data is converted into imprecise data.

D. Imprecise data is converted into precise data.*

23. Following is are the Defuzzification method

A. Maximum membership principle,

B.centroid method,

C. weighted average method

D.All the above *

24. The Statement “ when I say the temperature is 45° Celsius, the viewer converts the crisp input value into a linguistic variable like favourable temperature for the human body, hot or cold” indicates which process?

A. Fuzzification *

B Defuzzification

C.Both B & C

D. None of the above

25. Following is not the fuzzification method

A. Maximum membership principle *

B. Intuition, inference,

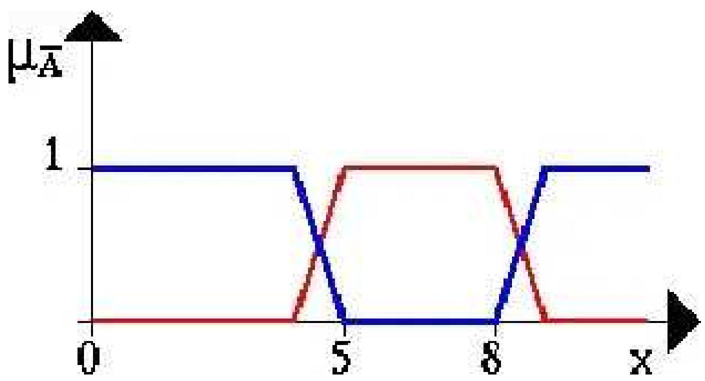
C. rank ordering

D. angular fuzzy sets,

26 . Lambda-cut is the one of the Defuzzification technique

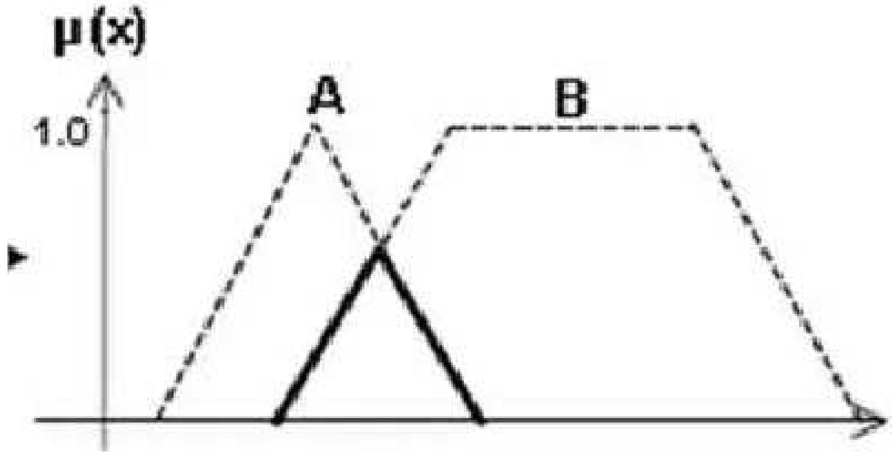
A. True *
B. False

27 . Which of the following fuzzy operation is indicated by the given graph?



A. Union
B. Intersection
C. Complement*
D. None of the above

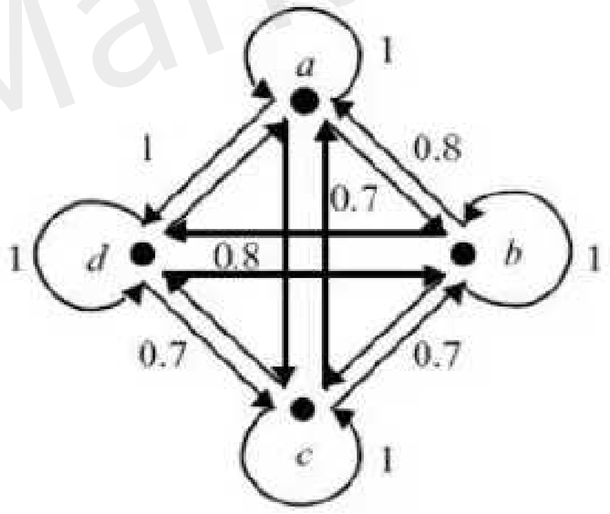
27 . Which of the following fuzzy operation is indicated by the given graph?



E. Union
F. Intersection*
G. Complement
H. None of the above

28. The following diagram shows the fuzzy relation and its corresponding digraph. Identify the type of following fuzzy relation.

	a	b	c	d
a	1.0	0.8	0.7	1.0
b	0.8	1.0	0.7	0.8
c	0.7	0.7	1.0	0.7
d	1.0	0.8	0.7	1.0



A. Symmetric
B. Equivalence*
C. Reflexive
D. Transitive

29. Which of the following is/are the feature of the associative memory networks?

A. It can be consider as a store house of associated pattern which are recalled after stimulus.

B. These types of memories are also called Content-Addressable Memory CAM.

C. Associative memory makes a parallel search with the stored patterns as data files.

D. All of the above *

30. A single layer neural network in which the input training vector and the output target vectors are the same are called as _______________

A. Hetero Associative memory

B. Auto Associative Memory*

C. Hopfield Network

D. None of the above

31. Static Associative memories always work with ________________ type of neural network.

A. Feed-back Neural Network

B. Feed-forward Neural Network *

C. Recurrent Neural Network

D. All of the above

32. Which of the following learning law is used to train the Associative memory networks.

A. Hebb's learning law

B. Outer product Rule

C. Both A & B *

D. None of the above

33. A single layer neural network where the input training vector and the output target vectors are not the same are called as ___________

A. Hetero Associative memory *

B. Auto Associative Memory

C. Hopfield Network

D. None of the above

34. The patterns are stored in the networks in terms of ______________.

A. Input vector

B. Weight vector *

C. Output Vector

D. All the Above

35. The formula for weight adjustment using Hebb's rule in heter-associative networks during testing is as follow.

A. wij(new)=wij(old)+xiyj*

B. wij(new)=wij(old)+xjyi

C. wij(new)=wij(old)+ΔW

D. None of the above

36. Building an Associative memory is nothing but constructing the connection weight matrix W such that when an input pattern is presented, the stored pattern associated with input pattern is retrieved, this process of constructing connection weights is called as

A. Decoding

B. Encoding *

C. Multiplexing

D. All the above

37. The Process of retrieving a stored pattern with given input pattern in associative memory networks is called as __________

A. Decoding *

B. Encoding

C. Both A & B

D. All the above

39. Following are the characteristics of the Hopfield Networks

A. It is a fully connected single layer recurrent network.

B. Hopfield neural network was invented by Dr. John J. Hopfield.

C. The Hopfield network is commonly used for auto-association and optimization tasks.

D. All the above*

40. Discrete Hopfield Networks has symmetrical weights with no self-connections i.e., $\mathbf{w}^{ij} = \mathbf{w}_{ji}$ and $\mathbf{w}_{ii} = \mathbf{0}$. The statement is TRUE or False?

A. True

B. False

41. Which of the following statement is FALSE regarding Hopfield Network?

A. Weights in the connections are symmetric.

B. Can deal with only discrete Input & Output*

C. Only one updated its activation at a time(Asynchronous Update)

D. All the above are True.

42. Following are the characteristics of the Hopfield Networks

A. The single-layer nonlinear feedback BAM network.

B. heteroassociative content-addressable memory

C. The connections between the layers are bidirectional.

D. All the above.

43. The following statement is True or False. “Signals are sent only from one layer to the other at any step of the process, not simultaneously in both directions in Bi-directional Associative memory”

A. True*

B. false

44. Mapping from 4-inputs to 2-outputs shown below is which type of Association?

Input	Output
1 0 0 0	1 0
1 1 0 0	1 0
0 0 0 1	0 1
0 0 1 1	0 1

A. Auto Association
B. Hetero Association*
C. Both A& B
D. None of the above

45. For hetero associative network, if input pattern is [0 0 1 1] and output pattern is [0 1]. Then using outer product rule, the calculated weight matrix is as follows:

A. *

$$\begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 1 \\ 0 & 1 \end{bmatrix}$$

B.

$$\begin{bmatrix} 1 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}$$

C.

$$\begin{bmatrix} 1 & 0 \\ 1 & 0 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}$$

D.

$$\begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & 1 \end{bmatrix}$$

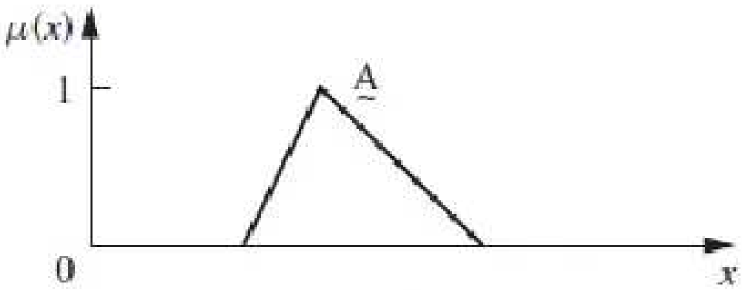
46. The region of universe that is characterized by complete membership in the set is called

Support
Boundary
Fuzzy
Core *

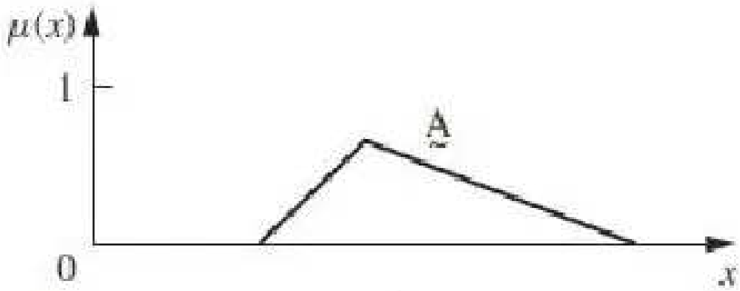
47. A fuzzy set wherein no membership function has its value equal to 1 is called

A. normal fuzzy set
*B. subnormal fuzzy set.
C. convex fuzzy set
D. concave fuzzy set

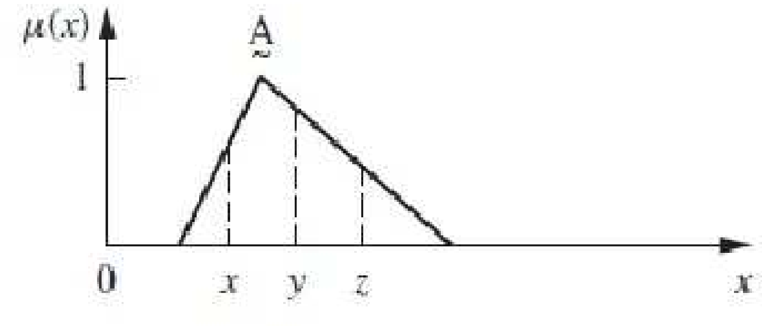
48.



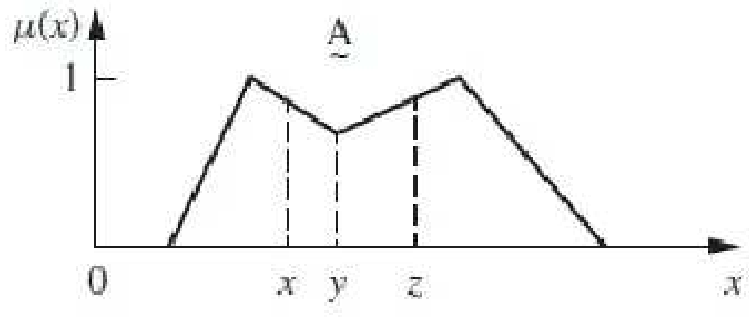
(a)



(b)



(c)



(d)

1 Subnormal Fuzzy Set

2 Normal Fuzzy Set

3 Non Convex Normal Fuzzy Set

4 Convex Normal Fuzzy Set

*A. a-2, b-1, c-4, d -3

2 1 4 3

B. a-1 b-2 c-3 d-4

1 2 3 4

C. a-4 b-3 c-2 d-1

4 3 2 1

D. a-3, b-2 c-1 d-4

3 2 1 4

49. 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 *

Question	a	b	c	d	Answer
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
Who initiated the idea of Soft Computing	Charles Darwin	Lofti A Zadeh	Rechenberg	Mc_Culloch	b
In supervised learningÂ	classes are not predefined	classes are predefined	classes are not required	classification is not done	b
Artificial neural network used for	Pattern Recognition	Classification	Clustering	All of these	d
A Neural Network can answer	For Loop questions	what-if questions	IF-The-Else Analysis Questions	None of these	b
Hard computing produce	precise solutions	fuzzy solution	approximate solution	None of these	a
Hard computing is strictly	Parallel	sequential	Both	None of these	b
Principle compunent of soft computing is	Neural Network	Fuzzy Loguc	Genetic Algorithms	All of the mentioned	d
Which is supervised learning	clustering	regression	association	dimensionality reduction	b
In supervised learning, training set of data includes	Input	Output	Both input and output	None	c
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 â€" 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	b
Which of the following is not a hybrid system?	Embedded hybrid system	Sequential hybrid system	Auxiliary hybrid system	Parallel hybrid system	d
Command to start matlab fuzzy toolbox is	fis	fuzzy	fuzzybox	fuzzytool	b
In terms of computing we have	antecedent	consequent	mapping function	All of the mentioned	d
Fuzzy logic is a form of	Two valued logic	Many valued logic	Crisp set logic	Binary set logic	b
Traditional set theory is also known as Crisp set theory.	True	False			a
In a Fuzzy set a prototypical element has a value	1	0	Infinite	Not Defined	a
Which of the following is a type of Membership function?	Triangular	Trapezoidal	Sigmoid	All of the above	d
Which of the following is not a type of Membership function?	S-shape	Bell shape	Truncated Gaussian	None of these	d
What is the independent variable of fuzzy output?	Maturity	Membership	Generic Element	None of these	a
Fuzzy Implication is also known as	Fuzzy logic	Fuzzy IF-THEN rule	Fuzzy expert system	None of these	b
Ways to compute fuzzy rule A-> B is	A coupled with B	A entails B	Both	None of these	c
System is used foe both MISO and MIMO	Mamdani	Sugeno	Takagi	None of these	a
Which is not the diffuzzificationmetghod	Centre of gravity method	Centre of sum method	Centre of perimeter method	Centre of area method	c
Which of this is not a fuzzy controller	Domestic Shower Controller	Water purifier controller	Train brake power controller	Angular JS Controller	d
In Evolutionary algorithm____ operator is prime operator	selection	mutation	recombination	initialization	b
In evolutionary algorithm selection is ____________	deterministic	probabilistic	both	None of these	a
Evolutionary Algorithm deals with self adaptation	Yes	No			a
Problem domain of Evolutionary Algorithm is	discrete optimization	continuous optimization	combinatorial optimization	None of these	b
Evolutionary Algorithm solves_______ problem	NP-complete	NP-hard	P	None of these	b
Category of EP based on scaling function	Non adaptive	Non Dynamic	Non self-adaptive	Adaptive	a
Evolutionary algorithm differes from genetic algorithm as it does not have	Crossover	mutation	Selection	Reproduction	a
Evolutionary algorithms classified as	Evolutionary Programming	Evolutionary Strategies	Genetic Algorithms	All of the mentioned	d
compared to Traditional approach EA takes _____ CPU time	Large	Small	Equal	None of these	a
Genetic Algorithm is superset of Evolutionary Algorithm	True	False			b
Optimization in GA is	Metaheuristic	Stochastic	Discreate	Continuous	c
In GA individual memory is there	Yes	No			b
In GA individual operatior is	Crossover point	Mutation	pbest	gbest	b
In __________ each individual survives for exactly one generation	Generation Model	Steady state Model	Population Model	Tournament Model	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
Which of these are adaptive heuristic search algorithms	evolutionary algorithms	genetic algorithms	Binary search	None of these	b
In Genetic algorithm string operate with	Real values	binary number	Decimal Number	None of these	b
Parallel GA	Generational	Steady state	Distributed	None of these	c
Examples of stopping criteria in GA can be	Generation limit	No change in fitness	Elapsed time	All of the mentioned	d
Category of GBML systems	Pittsburg Approach	Divide n conquer approach	Michi Approach	None of these	a
PGA is	Parallel Genetic Algorithm	Proportional Genetic Algorithm	Perceptron based Genetic Algorithm	None of these	a
In artificial Neural Network interconnected processing elements are called	nodes or neurons	weights	axons	Soma	a
Neuron can send ________ signal at a time.	Multiple	One	Two	Three	b
Example of hard computing	Robot movement	Hand written character recognition	money allocation	searching problem	d
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.	a
In case of layer calculation, the maximum time involved in	Input layer computation.	Hidden layer computation.	Output layer computation.	Equal effort in each layer.	d
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	d
An equivalence between Fuzzy vs. Probability to that of Prediction vs. Forecasting is	Fuzzy=Prediction	Fuzzy= Forecasting	Probability=Forecasting	None of these	b
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	c
Where is the minimum criterion used ?	When there is an AND operation	When there is an OR operation	In De-Morganâ€™s theorem	None of these	a
How is Fuzzy Logic different from conventional control methods?	IF and THEN Approach	FOR Approach	WHILE Approach	DO Approach	a
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	Intution, Inference, Rank Ordering	Fuzzy Algorithm, Neural network, Genetic Algorithm	Core, Support , Boundary	Weighted Average, center of Sums, Median	c
Membership function defines the fuzziness in a fuzzy set irrespective of the elements in the set, which are discrete or continuous	True	False			a
Membership function can be thought of as a technique to solve empirical problems on the basis of	knowledge	examples	learning	experience	d
The region of universe that is characterized by complete membership in the set is called	Core	Support	Boundary	Fuzzy	a
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	a
If if x ia 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
If if x ia A then y is B else y is C . Then relation is eqivalent to	(A Ã— B) + (B Ã— C)	(A Ã— B) â^ª (AÂ¯ Ã— C)	(A Ã— B) â†' (B Ã— C)	(A Ã— C) â^ª (B Ã— C)	b
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 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	a
Fuzzy Set theory defines fuzzy operators. Choose the fuzzy operators from the following.	AND	OR	NOT	All of the mentioned	d
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	a
In Lamda-cut method the value of Î» can be	Greater than 10	Between 1 and 10	Between 0 and 1	Any value	c
If the fuzzy set has two sub regions, then the centre of gravity of the sub region ________________ can be used to calculate the	with the median of all the area	with the mean of all the area	with the largest area	with the smallest area	c
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)	d
Let A be a fuzzy set. Then 1-cut of A is usually called	support	height	core	alpha-cut	c
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	b
A fuzzy convexity is set whose membership values are strictly monolithically	increasing	decreasing	increasing and then decreasing	All of the mentioned	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 c	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	Wireless services, heat control and printers	Simulink, boiler and CD recording	Automatic control, decision analysis and data clas	d
What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert System	Fuzzy Modelling	Fuzzy Logic Controller	All of the mentioned	d
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	b
Motivation for EA is	Mathematical based properties	Natural selection	Gradient properties	None of these	b
Genetic algorithms are heuristic methods that do not guarantee an optimal solution to a problem.	1	0			a
How many genes will be used in a chromosome of each individual if the number of cities is 10?	5	10	100	4	b
Is it advisable to apply genetic algorithm for all kinds of optimization problem	Yes	No			b
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
What GA encoding scheme suffers from Hamming cliff problem?	Binary coded GA	Real coded GA	Order GA	Tree coded GA	a
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	a
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	a

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 pressu	c
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 preâ€mature convergence of the solutio	c to a subâ€
Which of the following is a fitness scaling approach?	Linear scaling	Sigma scaling	Power law scaling	All of the mentioned	d
In genetic algorithm, the mutation is a genetic operator used to maintain-	Genetic Diversity	Linear scaling	Sigma scaling	None of these	a
Important aspect of GA	Definition of objective function	Implementation of genetic representation	Implementation of genetic operators	All of the mentioned	d
Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial Intelligence deal with prdicate logic where as soft computing de	Conventional Artificial Intelligence methods are limited by symbols whe	Both (a) and (b)	None of the above	c
ANN is composed of large number of highly interconnected processing elements(neurons) working in unison to solve problems	1	0			a
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 netwo	c
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 netwo	c
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	c
Why are linearly separable problems of interest to neural network researchers?	Because they are the only class of problems that a network can solve sucessfully	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 per	b
Fuzzy logic is usually represented as-	IF-THEN-ELSE rules	IF-THEN rules	Both a & b	None of the mentioned	b
A fuzzy set A is closed if:	lim x â†' â^'â^žÎ¼ (x) = 1 and lim x â†' +â^ž (x) =	lim x â†' â^'â^žÎ¼ (x) = lim x â†' +â^ž (x) = 0	lim x â†' â^'â^žÎ¼ (x) = 0 and lim x â†' +â^ž (x) = 1	lim x â†' â^'â^žÎ¼ (x) = lim x â†' +â^ž (x) = 1	b
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
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	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
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 clas	d
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	a
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 Yo	20	25	30	35	b
What Is Fuzzy Inference Systems?	The process of formulating the mapping from a given input to an output using fuzzy lo	The process of formulating the mapping from a given input to an outpu	Having a larger output than the input	Having a smaller output than the input	a
Mamdani's Fuzzy Inference Method Was Designed To Attempt What?	Control any two combinations of any two products by synthesising a set of linguistic c	Control a television and remote combination by synthesising a set of lin	Control a steam engine and a boiler combination by synthesising a set c	Control a air craft and feul level combination by s	c
R=(AXB)U(ÃƒXY) 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	d

Question	a	b	c	d	Answer
An equivalence between Fuzzy vs Probability to that of Prediction vs Forecasting is	Fuzzy â‰ˆ Prediction	Fuzzy â‰ˆ Forecasting	Probability â‰ˆ Forecasting	None of these	b
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
#NAME?	prepositions	Lingustic hedges	truth tables	inference rules	c
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
Multiple conjuctives antecedents is method of ----- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
Multiple disjuctives antecedents is method of ----- in FLC	decomposition rule	formation of rule	truth tables	All of the above	a
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
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
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 exp	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 hur	Control a air craft and fuel level combination by synthesising a set of linguistic control rules obtained from experienced human operations.	c
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
What Is Another Name For Fuzzy Inference Systems?	Fuzzy Expert system	Fuzzy Modelling	Fuzzy Logic Controller	All of the above	d
In Evolutionary programming, survival selection is	Probabilistic selection (Î¼+Î¼) selection	(Î¼, Î»)- selection based on the children only	Children replace the parent	All the mentioned	a
In Evolutionary strategy, survival selection is	Probabilistic selection (Î¼+Î¼) selection	(Î¼, Î»)- selection based on the children only	Children replace the parent	All the mentioned	b
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
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
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
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
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
What are normally the two best measurement units for an evolutionary algorithm?	1 and 2	2 and 3	3 and 4	1 and 4	d
Evolutionary Strategies (ES)	(Âµ,Î»): Select survivors among parents and offspring	(Âµ+Î»): Select survivors among parents and offspring	(Âµ-Î»): Select survivors among offspring only	(Âµ:Î»): Select survivors among offspring only	b
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
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
(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
(1+Î») ES	Î» mutants can be generated from one parent	one mutant is generated	2Î» mutants can be generated	no mutants are generated	a
Termination condition for EA	mazimally allowed CPU time is elapsed	total number of fitness evaluations reaches a given limit	population diveristy drops under a given threshold	All the mentioned	d
Which of the following operator is simplest selection operator?	Random selection	Proportional selection	tournament selection	none	a
Which crossover operators are used in evolutionary programming?	Single point crossover	two point crossover	Uniform crossover	evolutionary programming doesnot use crossover operators	d
(1+1) ES	Operates on population size of two	operates on popolantion size of one	operates on popolantion size of zero	operates on popolantion size of Î»	a
Which of these emphasize of development of behavioral models?	Evolutionary programming	Genetic programming	Genetic algorithm	All the mentioned	a
EP applies which evolutionary operators?	variation through application of mutation operators	selection	both a and b	none of the mentioned	c
Which selection strategy works with negative fitness value?	Roulette wheel selection	Stochastic universal sampling	tournament selection	Rank selection	d
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
In computing the output is called as	Consequent	Outfeed	Anticedents	Premise	a
Fuzzy logic is a form of	two valued logic	crisp set logic	many value logic	binary set logic	c
Control actions while computing should be	Ambiguous	Unambioguos	Inaccurate	None of these	b
Core of soft computing is	Fuzzy computing,neural computing,Genetic algorithm	Fuzzy network and artificial intelligence	Neural Science	Genetic Science	a
Hard computing perfforms what type of computation	Sequential	Parallel	approxiamate	both a and b	a
Who iniated idea of sofft computing	charles darwin	rich and berg	mc culloch	lofti a zadeh	d
Soft computing is based on	fuzzy logic	neural science	crisp software	binary logic	a
In soft computing the problems,algorithms can be	non adaptive	adaptive	static	all of the above	b
Fuzzy Computing	mimics human behaviour	deals with inprecise,probablistic	exact information	both a and b	d
Hard computing is also called as	evolutionary computing	conventional computing	non conventional computing	probablistic computing	b
Which computing produces accurate results	soft computing	hard computing	both a and b	none of the above	b
Neural network computing	mimics human behaviour	information processing paradigm	both a and b	none of the above	c
Artificial neural network is used for	pattern recognition	classification	clustering	all of the above	d
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
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
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
All of the follwing 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
Which approach is most suited to structured problem with little uncertainity	Simuation	human intuition	Optimization	genetic algorithm	C
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
The union of two fuzzy sets is the of each element from two sets	maximum	minimum	equal to	not equal to	a
The process of fuzzy interference system involes	membership functions	fuzzy logic operators	if-then rules	all the above	d
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
Which of the folloowing is not defuzzifier method	centroid of area	mean of maximum	largest of maximum	hypotenuse of triangle	d
Which of the following is/are type of fuzzy interference method	mamdani	sugeno	rivest	only a and b	d
A Fuzzy rule can have	multiple part of antecedent,only single part of consequent	only single part of antecedent,mutiple part of consequent	multiple part of antecedent,multiple part of consequent	only single part of antecedent,only single part of consequent	c
The a cut of a fuzzy set A is a crisp set defined by :-	{x|Ua(x)>a}	{x|Ua(x)>=a}	{x|Ua(x)<a}	{x|Ua(x)<=a}	b
The bandwidth(A) in a fuzzy set is given by	(A)=|x1*x2|	(A)=|x1+x2|	(A)=|x1-x2|	(A)=|x1/x2|	c
The intersection of two fuzzy sets is the of each element from two sets	maximum	minimum	equal to	not equal to	b
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
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
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
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
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
Tabu search is an example of ?	heuristic	Evolutionary algorithm	ACO	PSO	a
Genetic algorithms are example of	heuristic	Evolutionary algorithm	ACO	PSO	b
mutation is applied on candidates.	one	two	more than two	noneof these	a
recombination is applied on candidates.	one	two	more than two	noneof these	b
LCS belongs to based methods?	rule based learning	genetic learning	both a and b	noneof these	a
Survival is approach.	deteministic	non deterministic	semi deterministic	noneof these	a
Evolutionary algorithms are a based approach	heuristic	metaheuristic	both a and b	noneof these	a
Chromosomes are actually ?	line representation	String representation	Circular representation	all of these	b
Determining the duration of the simulation occurs before the model is validated and tested.	TRUE	FALSE			B
EC stands for?	Evolutionary Computatons	Evolutionary computer	Electronic computations	noneof these	a
GA stands for	genetic algorithm	genetic assurance	genese alforithm	noneof these	a
LCS stands for	learning classes system	learning classifier systems	learned class system	noneof these	b
GBML stands for	Genese based Machine learning	Genes based mobile learning	Genetic bsed machine learning	noneof these	c
Parameters that affect GA	initial population	selection process	fitness function	all of these	d
Fitness function should be	maximum	minimum	intermediate	noneof these	b
Applying recombination and mutation leads to a set of new candidates, called as ?	sub parents	parents	offsprings	grand child	c
decides who becomes parents and how many children the parents have.	parent combination	Parent selection	Parent mutation	Parent replace	b
Basic elements of EA are ?	Parent Selection methods	Survival Selection methods	both a and b	noneof these	c
Which of the following neural networks uses supervised learning?	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
Given U = {1,2,3,4,5,6,7}	{(4, 0.7), (2,1), (1,0.8)}	{(4, 0.3); (5, 0), (6, 0.2) }	{(l, 1), (2, 1), (3, 0.3), (4, 1), (6,0.2), (7, 1)}	{(3, 0.3), (6.0.2)}	c
If A and B are two fuzzy sets with membership functions	{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:	{(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
Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction	{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
Choose the correct statement	1 only	2 and 3	1,2 and 3	None of these	b
A fuzzy set whose membership function has at least one element x in the universe whose membership value	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
In Evolutionary programming, survival selection is	Probabilistic selection (Î¼+Î¼) selection	(Î¼, Î»)- selection based on the children only	Children replace the parent	All the mentioned	a
In Evolutionary strategy, survival selection is	Probabilistic selection (Î¼+Î¼) selection	(Î¼, Î»)- selection based on the children only	Children replace the parent	All the mentioned	b
What are normally the two best measurement units for an evolutionary algorithm?	1 and 2	2 and 3	3 and 4	1 and 4	d

Question	a	b	c	d	Answer
What are the types of fuzzy logic sets?	Type-1 fuzzy set	Type-2 fuzzy set	Both a and b	None of these	c
How is fuzzy logic different from conventional control methods	IF and THEN approach	FOR approach	WHILE approach	DO approach	a
The height h(A) of a fuzzy set A is defined as h(A)=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
If A and B are sets and A U B= A â‹, B then	A=B	A=0	B=0	None of these	A
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
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 anteced	Aggregation of the consequents across the rule	a
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 v	The input and output have both the same values	The input has two or more values and the output has a single truth v	d
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
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 g	To gather all the different fuzzy set outputs and average the	To subtract all the output fuzzy set values from the input values	a
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
Identfication of Input, Output and state variables is performed in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	Identification of variables	d
Assigning linguistic label to each subset is done in which step of FLC?	Fuzzy configuration	Defuzzification	combining fuzzy outputs	fuzzy subset configuration	d
Disjuctive 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
Conjuctive 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
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 va	antecedents with fuzzy quantifiers are related to inference r	antecedents are dispositions	a
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 va	antecedents with fuzzy quantifiers are related to inference r	antecedents are dispositions	c
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 va	antecedents with fuzzy quantifiers are related to inference r	antecedents are dispositions	b
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 va	antecedents with fuzzy quantifiers are related to inference r	antecedents are dispositions	d
Mamdani systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	d
Sugeno systems are	MISO systems	MIMO systems	Only MISO systems	both a and b	b
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
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
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
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
Which of the following algorithm is most efficient for discotinuous and noisy problems?	Evolutionary algorithm	Classical optimization algorithm	Genetic algorithm	none	a
Each iteration of EA is referred to as	Generation	Iteration	population	None	a
Which of the following are evolutionary operators?	Selection	Crossover	Mutation	All of the above	d
In the (Î¼/Ï,Î») method of ES, parents are	selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	a
In the (Î¼/Ï+Î») method of ES, parents are	selected from offspring	selected from both the parents and offspring	selected from new population	Not selected	b
Fitness scaling is desirable to ensure	Population diversity	selection pressure	that better solutions are selected only	relatively inferior solutions are not ignored	a
Which mutation operator is used in ES as reproduction operator?	one point	Gaussian mutation	two point	adaptive	b
Fitness proportionate selection methods are	Roulette wheel selection	Stochastic universal sampling	tournament selection	All the mentioned	d
In which selection method of survival selection there is no notion of fitness?	fitness based selection	elitism	Agebased selection	All the mentioned	c
In which selection strategy every individual has the same probability to be selected?	Roulette wheel selection	Uniform selection	tournament selection	Rank selection	b
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
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 distribute	under all the above situations	b
Which of the following is not a characterstic of evolutionary algorithm?	Conceptual simplicity	Parallelism	Broad applicability	Artificial selection	d
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
Which of the following schemes are selection schemes in Evolutionary computation?	Hall of fame	Rank based selection	tournament selection	All of the above	d
To encode chromosomes which encoding schemes are used	binary encoding	finite state machine encoding	real value encoding	All of the above	d
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
What type of model is required for hard computing	mathematical	biological	chemical	probablistic	a
Which of the following is/are basic component neuron	dendrites	axon	nucleus	all of the above	d
Which of the following computing technique has the ability of learing and adoption	neural network	evolutionary	hard	probabilistic	a
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
Fuzzy logic deals with which of the following	fuzzy set	fuzzy algebra	both a and b	none of the above	c
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
can a crisp set be a fuzzy set?	no	yes	depends	all of the above	b
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
All of the follwing are suitable problem for genetic algorithm EXCEPT	pattern recognization	simulation of biological models	simple optimization with few variables	dynamic process control	C
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
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
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
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
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
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 value	studying system behaviour at an instant in time	A
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
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
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
EV is dominantly used for solving ___.	optimization problems	NP problem	simple problems	noneof these	a
EV is considered as?	adaptive	complex	both a and b	noneof these	c
Idea of genetic algorithm came from	machines	Birds	ACO	genetics	d
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
generation of empty cluster problem in clustering can be overcome by?	ACO based clustering	PSO based clustering	kmeans	kmode	b
where does PSO based clustering terminates?	global optimum	local optimum	global maximum	local minimum	a
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
Applications of ACO are ? 1)shortest path 2)assignment problem 3)set problem	2,3	1,2	1,2,3		c
Evaporation of pharomones is ?	directly proportional to path length	inversly proportional to path length	constant	none	a
Metaheuristics doesnot include ?	evolutinary algorithms	tabu searching	simulated annealing	none	d
Recombinbation involves __candidates while mutation requires__ candidates, and the result is called___.	1,2,offspring	2,1,offspring	1,2,parent	2,1,parent	a
Identify the correct sequence for evoltionary algorithms ? 1)Select genitors from parent population 2)Evaluate newborn offspring	1,2,3,4	1,3,2,4	2,1,3,4	2,3,1,4	b
Problems for which there is no efficient method to solve such problems exactly are called?	complex	hard	strong	none	b
EV is considered as ? 1)complex 2) adaptive	1	2	1,2	none	c
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
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
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
___focuses attention on high fitness individuals, thus exploiting the available fitness information.	clustering	offspring production	replace	selection	d
Identify the algorithm ?procedure EA	ACO	PSO	EA	Kmean	c
Genetic algorithm are heuristic methods that do not guarantee an optimal solution to a problem	TRUE	FALSE			A
A "What-if" model is most typically used for the most structured problems	TRUE	FALSE			B
__________cannot easily be transferred from one problem domain to another	optimal solution	analytical solution	simulation solutuon	none of these	C
Evolution strategies uses ? 1)selection 2)recombination 3)real valued vector	1,2,3	2,3	1,3	only 2	a
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 par	only 1	1,2	only 2	1,2,3	d
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
Heuristics include ?1) tabu search 2)simulated annealing 3)ES 4)genetic algorithms	1,2,3,4	2,3	1,2		d
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 ca	only 1	only 2	both	none of these	d
The ___ is performed by selecting two sub trees	GP crossover	GP Mutation	GP clustering	GP Recombination	a
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
___ are able to learn simple â€œif {condition} then {action}â€ style rules23 by learning from feedback	ES	EA	LCS	Heuristics	c
Island model is related with ?	Distributed Evolutionary Algorithms	LCS	swarm intelligence	ACO	a
payoffs can be easily translated to a ___ function for an EA.	survival	reduction	comination	fitness	d
Identify the correct statements with respect to genetic algorithms? 1)A fitness function should maximized. 2)A replacement procedure. 3)A string rep	1,2	2,3	1,2,3	1,3	b
There are also other operators, more linguistic in nature, called __________ that can be applied to fuzzy set theory.	Hedges	Lingual Variable	Â Fuzz Variable	None of the mentioned	a
A fuzzy set has a membership function whose membership values are strictly monotonically increasing or strictly monotonically decreasing or strictly	convex fuzzy set	concave fuzzy set	Non concave Fuzzy set	Non Convex Â Fuzzy set	a

Which of the following neural networks uses supervised learning?	(A) only	(B) only	(A) and (B) only	(A) and (C) only	a
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
Feature of ANN in which ANN Â creates its own organization or representation of information it receives during learning time isÂ	Adaptive Learning	Self Organization	What-If Analysis	Supervised Learning	b
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 envirc	d
For what purpose Feedback neural networks are primarily used?	classification	feature mapping	pattern mapping	none of the mentioned	d
Operations in the neural networks can perform what kind of operations?	serial	parallel	serial or parallel	none of the mentioned	c
What is ART in neural networks?	automatic resonance theory	artificial resonance theory	adaptive resonance theory	none of the mentioned	c
The values of the set membership is represented by ___________	Discrete Set	Degree of truth	Probabilities	Both Degree of truth & Probabilities	b
Given U = {1,2,3,4,5,6,7}	{(4, 0.7), (2,1), (1,0.8)}	{(4, 0.3.): (5, 0), (6. 0.2) }	{(l, 1), (2, 1), (3, 0.3), (4, 1), (6,0.2), (7, 1)}	{(3, 0.3), (6.0.2)}	c
What are the following sequence of steps taken in designing a fuzzy logic machine ?	Fuzzification â†' Rule evaluation â†' Defuzzification	Fuzzification â†' Defuzzification â†' Rule evaluation	Rule evaluation â†' Fuzzification â†' Defuzzification	Rule evaluation â†' Defuzzification â†' Fuzzification	a
If A and B are two fuzzy sets with membership functions	{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:	{(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
A U (B U C) =	(A âˆ© B) âˆ© (A âˆ© C)	(A âˆª B) âˆª C	(A âˆª B) âˆ© (A âˆª C)	B âˆ© A âˆª C	b
Consider a fuzzy set A defined on the interval X = [0, 10] of integers by the membership Junction	{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
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
Choose the correct statement	1 only	2 and 3	1,2 and 3	None of these	b

Question	a	b	c	d	Answer
Sequence of steps in EA	initialization-> selection->mutation->crossover->termination	initialization-> selection->crossover->termination	initialization-> selection->crossover->mutation->termination	None of these	c
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	a
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	b
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	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
If crossover between chromosomes in search space does not produce significantly different offspring, what doe	ii, iii & iv only	ii, iii only	i, iii & iv only	All of the mentioned	b
In Rankâ€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 element	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.	c
Real Coded GA flow is-	Random mutation- Polynomial mutation	Polynomial mutation-Random mutation	Flipping-Random mutation- Polynomial mutation	None	a
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	a
Binary Coded GA flow is-	Flipping-Interchanging-Reversing	Reversing- Flipping-Interchanging-	Interchanging-Reversing-Flipping	None	a
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	a
Takugi-Sugeno approach to FLC design is computationally more expensive compared to Mamdani approach bec	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	d
Who can deal with noisy input information	soft computing	hard computing	both a and b	none of the above	a
Ability to learn how to do task based on the data is done by	self organization	adaptive learning	fault tolerance	robustness	b
Which of the following is not a technique of soft computing	neural network	genetic algorithm	evolutionary algorithm	conventional algorithm	d
Fuzzy logic system is based on what type of rule	if-then	else-if	while	do-while	a
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
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
Three main basic feature involved in characterzing member function are	intuition,inference,rank ordering	fuzzy algorithm,neural network,genetic algorithm	center of sums,median,core	core,support,boundary	d
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
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
Which of the follwing computing is trial and error problem solver algorithm	hard computing	neural network	evolutionary computing	fuzzy logic	c
What are advantages of neural network	ability to learn by example	fault tolerant	both a and b	none of the above	c
Which of the following does not belong to the process of involuntary computing	selection	mutation	recombination	deletion	d
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
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
The value of set membership can be represented by	discrete set	degree of truth	probabilities	both b and c	b
Semiconductor layout & aircraft design are the application type of which domain?	Control	Design	Robotics	ML	B
Trajectory planning is the application type of which domain?	Control	Design	Robotics	ML	C
Filter design is the application type of which domain?	Control	Signal Processing	Robotics	ML	B
Pokers & Checkers are the application type of which of domain?	Control	Game Playing	Robotics	ML	B
Manufacturing & resource allocation are the application type of which domain?	Scheduling	Design	Robotics	ML	A
What is a crossover point in a fuzzy set?	{x|Ua(x)<0}	{x|Ua(x)=1}	{x|Ua(x)=0.5}	{x|Ua(x)>0}	c
If A and B are two fuzzy sets with membership function: Ua(X)={0.2,0.5,0.6,0.1,0.9} Ub(X0)={0.1,0.5,0.2,0.7,0.	{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
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
With the help of which formula can we find the algebraic sum of two fuzzy sets A,B?	{UA(x)+uB(x)}-{uA(x)*uB(x)}	{UA(x)-uB(x)}-{uA(x)*uB(x)}	{UA(x)/uB(x)}-{uA(x)+uB(x)}	{UA(x)+uB(x)}+{uA(x)*uB(x)}	a
With the help of which formula can we find the algebraic product of two fuzzy sets A,B?	{uA(x)/uB(x)}	{uA(x)*uB(x)}*{uA(x)-uB(x)}	{uA(x)*uB(x)+{uA(x)+uB(x)}}	{uA(x)*uB(x)}	d
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
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
Discrete events and agent-based models are usuallly used for______________.	middle or low level of abstractions	high level of abstraction	very high level of abstraction	none of these	A
_____doesnot usually allow decision makers to see how a solution to a ___________envolves over time nor can	Simulation ,Complex problem	Simulation,Easy problem	Genetics,Complex problem	Genetics,Easy problem	A
_____ is a simulation method that let decision maker see what the model is doing and how it interact.	VIS	VIM	SIV	HIV	A
____systems,especially those developed for the military and video-game industry	VIS	VIM	SIV	HIV	B
Which approach is most suited to complex problem with significant uncertainty, a need for experimentation, an	Simulation	Optimization	human intution	genetic algorithm	A
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
What BEST describes a simulation model in which it is not important to know exactly when a modeled event occ	continuous distribution simulation	time dependent simulation	system dynamics simulation	discrete event simulation	B
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
categories of EA are/is	Genetic Algorithm	genetic programing	learning Classifier Systems	all of these	d
Phases in which the LCS individuals are evaluated are	performance phase	reinforcement phase	both a and b	none of these	c
MA sometimes called as	Hybrid EA	Integrated EA	both a and b	none of these	a
Genetic algorithm is a subset of_______.	evolutionary algorithm	dynamcic algorithm	both a&b	None of these	A
NP hard problems are also called as________.	dicrete optimization	combinatorial optimization	evolutionary optimization	None of these	B
Genetic algorithm is first introduce by_______.	Charles Darwin	John Holland	Gregor Johan Mendel	None of these	B
__________ replicates the most successful solutions found in a population at a rate proportional to relative qual	Selection	Recombination	Mutation	None of these	A
_________ decomposes two distinct solutions and then randomly mixes their parts to form novel solutions.	Selection	Recombination	Mutation	None of these	B
__________ randomly perturbs a candidate solution.	Selection	Recombination	Mutation	None of these	C
A ________ is a template consisting of a string composed of three symbol.	Wild symbol	Schema	Layout	None of these	B
{0,1,#} is the symbol alphabet ,where # is a special ______symbol.	Wild card	Schema	Layout	None of these	A
Metaheuristics are ?1)non deterministic 2)non approximate 3)not problem specific	1,2,3	1,2	1,3	2,3	c
In search techniques, as single point based contradicts population based similary deterministic contradicts ___?	Stochastic	simplex based	complex based	none	a
In swarm systems organisations are	centalized	decentralized	controlled by third party	none	b
Identify the working sequence of kmean clustering ? 1)redefine cluster centeroids 2)intialize the k centroids 3)m	1,3,2	3,2,1	2,3,1	2,1,3	c
Every particle in the system takes experience from previous particle ?	PSO	ACO	clustering	none	a
swarm intelligence includes ? 1)bee colony algorithm 2)ant colony algorithm 3) PSO 4)immune system algorithm	1,2	1,2,3	2,3,4	all of these	d
pheromone quantity in ACO is ___ proportional to path selection.	directly	inversly	there is no connection	none	a
The ants prefer the smaller drop of honey over the more abundant, but less nutritious, sugar. This is the exampl	kruskal algorithm	Travelling salesman	Knapsack problem	NP hard problem	c
In kmeans clustering each cluster is associated with	centroid	edge	common point	none of them	a
What is EC?	computer based problem solving systems	Systems that uses computational models of evolutionary process	both a and b	none of these	c
Recombination is applied to	2 selected candidated	1 selected candidate	3 selected candidate	none of these	a
In EA mutation is applied to	2 candidate	1 candidate	3 candidate	none of these	b
EV is used for	solving optimization problems	finding solutions	both a and b	none of these	a
EV is considered as	complex	simple	complex and adaptive	al of these	c
GA stands for	Genetic Algorithm	genetic programing	genetic assurance	none of these	a
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
what are the parameters that affect GA are/is	selection process	initial population	both a and b	none of these	c
Evolutionary programming was developef by	Fredrik	Fodgel	Frank	Flin	b
Evolution Strategies is developed with	selection	mutation	a population of size one	all of these	d
Evolution Strategies typically uses	real-valued vector representations	vector representation	time based representation	none of these	a
in ES survival is	indeterministic	deterministic	both a and b	none of these	d
What is the first step in Evolutionary algorithm	Termination	selection	Recombination	Initialization	d
Elements of ES are/is	Parent population size	Survival population size	both a and b	none of these	c
What are different types of crossover	discrete and intermedium	discrete and continuous	continuous and intemedium	none of these	a
GP individual stores computer program	TRUE	FALSE			a
GP selection is	Deterministic selection	Tournament selection	nondeterministic selection	none of these	b
EP mutation is	Data specific	Data type specific	non specific	none of these	b
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	Â Either 0 or 1, either 0 or 1	a
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
Fuzzy logic is usually represented as ___________	Â IF-THEN-ELSE rules	IF-THEN rules	Both IF-THEN-ELSE rules & IF-THEN rules	None of the mentioned	b
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
A fuzzy set whose membership function has at least one element x in the universe whose membership value	sub normal fuzzy sets	normal fuzzy set	convex fuzzy set	concave fuzzy set	b
Â Why canâ€™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
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
Internal state of neuron is called __________, is the function of the inputs the neurons receives	WeightÂ	activation or activity level of neuron	Bias	None of these	b
Each connection link in ANN is associated with ________ Â which has information about the input signal.	neurons	weights	bias	activation function	b
In artificial Neural Network interconnected processing elements are called	nodes or neurons	weights	axons	Soma	a
The crossover points of a membership function are defined as the elements in the universe for which a particula	infinite	1	0	0.5	d
The membership values of the membership functionÂ are nor strictly monotonically increasing or decreasing or	Convex Fuzzy Set	Non convex fuzzy set	Normal Fuzzy set	Sub normal fuzzy set	b
The cell body of neuron can be analogous to what mathamatical operation?	summing	differentiator	integrator	none of the mentioned	a
Conventional Artificial Intelligence is different from soft computing in the sense	Conventional Artificial Intelligence deal with prdicate logic where as soft computing deal	Conventional Artificial Intelligence methods are limited by symbols where as soft com	Both (a) and (b)	None of the above	c
Â _____________ is/are the way/s to represent uncertainty.	Fuzzy Logic	Probability	Entropy	All of the mentioned	d
Given two fuzzy sets A and B	{(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:	{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
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
Consider	{1.0, 0.45, 0.75}	{1,0.2,0.75}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	a
Consider	{1.0, 0.45, 0.75}	{0.2, 0.20, 0.50}	{0.2, 0.45, 0.50}	{1, 0.45, 1}	b
Mamdani-style inference involves which steps	Fuzzification of the input variables	Aggregation of the rule output	Both a and b	either a or b	c
A __________ point of a fuzzy set A is a point x â^^Â X at which ÂµA(x) = 0.5	Core	Support	Cross-over	Î± - cut	c
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 ir	Takagi and Sugeno's approach follows precise fuzzy modelling and obtains high accuracy but at the cos	Mamdani approach characterised by its low interpretability and high accuracy	c
The height h(A) of a fuzzy set A is defined as	h(A) = 0	h(A) <0	h(A)=1	h(A)<1	c
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