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Sardar Patel University
Master of Computer Applications (M C A) III Semester
Examinations
PS03CMCA33 : Artificial Intelligence

Date: 21/10/2021**Time: 2.00 pm to 4.00 pm****Marks: 70****Q1 A Choose the most appropriate option.****[8]**

1 KBS stands for _____.

- a. Knowledge-Based System
- b. Knowledge-Biascd System
- c. A and B both
- d. None of these

2 Knowledge Engineer works with _____ to capture the knowledge.

- a. Experts
- b. Analysts
- c. Designer
- d. None of these

3 Which one of following is not a valid fuzzy connective?

- a. #
- b. /
- c. \
- d. All of these

4 _____ is the form of representation suitable for notations that cannot be defined precisely, but which depend upon their contexts.

- a. Crisp logic
- b. Fuzzy logic
- c. Static logic
- d. None of these

5 _____ is a building block of an ANN.

- a. Neuron
- b. Structure
- c. Topology
- d. Learning

6 _____ is an example of linearly separable problems.

- a. To select any one job from given three jobs
- b. To distinguish between red dots and blue dots
- c. To select one mobile from given five mobiles
- d. To select one elective course form many

7 _____ problem can be solved by GA.

- a. Scheduling problems
- b. Function optimization
- c. Both Scheduling problems and function optimization
- d. None of these

8 _____ is an example of genetic operator in GA.

- a. Mutation
- b. Crossover
- c. Selection
- d. All of these

(1)

P.T.O.

Q1 B Fill in the Blank/True/False or Answer in One Line (1 Mark Each).

- 1 What is natural intelligence?
- 2 What is heuristic search?
- 3 State True or False: Expert System is one of many categories of KBS.
- 4 Define: Fuzzy set.
- 5 State True or False: Fuzzy means everything is clear.
- 6 What is Fuzzy control system?
- 7 Define: Fuzzy preposition.
- 8 What is crisp logic?
- 9 Give full form of ANN.
- 10 State True or False: ANN is a connectionist type of system, where knowledge is stored indirectly in form of connections.
- 11 State True or False: Typical MLP (ANN) uses supervised learning.
- 12 List learning mechanism of single perceptron.
- 13 Define GA by giving its full form.
- 14 List two applications of GA.
- 15 What is role of fitness function in GA?
- 16 Define schema in GA.

Q2 Answer in Brief (ANY SEVEN - 2 Marks Each).

- 1 Draw Data Pyramid.
- 2 Explain role of Knowledge Engineer.
- 3 Differentiate between fuzzification and defuzzification.
- 4 Which are fuzzy connectives?
- 5 Draw single perceptron with all labels.
- 6 Give one major difference between supervised and unsupervised learning.
- 7 List one advantage and one disadvantage of an ANN.
- 8 Show two site mutations on digit 4 and digit 5 on encoded individual given as "11111".
- 9 Consider schema given as "11**11". Give two members of the schema.

Q3 Write a detailed note on the Turing test. [8]
OR

Q3 Explain: (i) Functional Knowledge Representation and (ii) Procedural Knowledge Representation by taking suitable examples. [8]

Q4 Define Fuzzy rules. Explain fuzzy rule based system taking suitable example. [8]

OR

Q4 Give examples of Fuzzy Intersection operation and Fuzzy Union operation. [8]

Q5 Explain how a typical MLP (ANN) learns. Explain in detail (i) forward pass and (ii) backward pass by taking suitable example ANN and training data. [8]

OR

Q5 Draw a multilayer ANN for selection of mobile using parameters of your choice. Do the followings. [8]

- (i) Draw the complete network with all labels and connections in it.
- (ii) List the input and output parameters.
- (iii) How many hidden layers and nodes in the hidden layer are used?
- (iv) Also provide 2 to 3 training data sets for the ANN.

Q6 List basic steps in GA. Also explain in detail how GA can be used to solve a function optimization problem by taking suitable example of your choice. [8]

OR

Q6 Take a problem of travelling sales person with 6 cities. Solve the problem using GA by taking alphabet or decimal encoding. Do the following. [8]

- (i) Give initial population having two valid and encoded routes.
- (ii) Design adjacency matrix.
- (iii) Generate two new routes.

SARDAR PATEL UNIVERSITY
MCA V Semester Examinations, 2011
MCA-502: Artificial Intelligence

Date: 15-11-2011

Time: 11:00 am to 2:00 pm

Marks: 70

Note: Write answers to both the sections in separate answer sheets.

		Section-I	
Q-1	A	Draw data pyramid and explain (a) data, (b) information and (c) knowledge in it. [3]	
	B	List various categories of knowledge based systems. Explain ANY THREE of them in brief. [4]	
	C	Discuss knowledge based system architecture. [3]	
	D	Write the Steepest Ascent Hill Climbing algorithm. [2]	
Q-2	A	Discuss in brief various difficulties in knowledge based system development. [2]	
	B	Discuss various issues in knowledge acquisition. [3]	
	C	How knowledge can be updated? What is machine learning? [3]	
	D	Explain procedural knowledge representation by taking suitable example. [4]	
Q-3	A	Differentiate fuzzy and crisp logic. [2]	
	B	Define following terms: (i) Membership function (ii) Fuzzification [2]	
	C	Discuss propositional logic by taking suitable example. [3]	
	D	Write a note on the fuzzy controller system. [4]	
		Section-II	
Q-4	A	Explain knowledge grid in short. [3]	
	B	Explain mobile agent in brief (one to two lines) with diagram. [3]	
	C	Draw diagrams of biologic neuron and artificial neuron with proper labels. [3]	
	D	Explain cross over and mutation using binary encoding strategies. [3]	
	E	Give structure of a multi-agent system. [3]	
Q-5	A	Define GA. Give typical algorithm/flowchart for the process of natural evolution. [5]	
	B	Write a short note on processes involved in knowledge management. [5]	
	C	Give an example of a single perceptron. What types of problem a single perceptron can solve? [5]	
	D	Explain constituent of soft computing with help of a diagram. Also give the strength of given constituents of soft computing. [5]	

XXXXX

Sardar Patel University
Master of Computer Applications (M C A) V Semester Examinations
PS05CMCA21/PS05CMCA01: Artificial Intelligence

Date: 16/11/2019

Saturday

Time: 2:00 pm to 5:00 pm

Marks: 70

Q.1 Select an appropriate answer for each the following questions: [08]

- 1) Soft computing is consortium of components such as _____.
 a) Fuzzy logic
 b) Artificial neural network
 c) Genetic algorithms
 d) All of these
- 2) _____ are the possible encoding strategies in genetic algorithms.
 a) Tree
 b) Binary
 c) Hexadecimal
 d) All of these
- 3) It is responsibility of _____ within a neuron to process inputs.
 a) A fitness function
 b) An activation functions
 c) A triangular function
 d) None of these
- 4) Learning in presence of data is called _____.
 a) Database learning
 b) Supervised learning
 c) Unsupervised learning
 d) None of these
- 5) Fault finding of machines falls in _____ domain of AI.
 a) Formal task
 b) Mundane task
 c) Expert task
 d) Informal task
- 6) The _____ algorithm covers all the possible search states at each level.
 a) Breadth first search
 b) Depth first search
 c) Generate and test
 d) None of these
- 7) When two or more rules are selected on given condition, then _____ strategy is used by the inference engine.
 a) Rule elimination
 b) Conflict resolution
 c) Rule Conjunction
 d) None of these
- 8) _____ is an example of defuzzification method.
 a) Modus ponens
 b) Centroid method
 c) Modus tollens
 d) None of these

Q.2 Answer following questions in brief. [ANY SEVEN]

- 1) Define AI and mention any two applications of it.
- 2) List any four less desirable characteristics of knowledge.
- 3) Define and describe in brief production system.
- 4) State advantages of using fuzzy logic.
- 5) List any four computer based information systems.
- 6) List all types of agents with one line description of it.
- 7) Use tree encoding and explain mutation and crossover operations on any two individual of your choice.
- 8) Define and describe hybrid soft computing systems.
- 9) Give outline of parallel relaxation in Hopfield network.

Q.3 [A] Draw the general structure of KBS and explain each of its [06] components.

[B] Explain (i) linked system and (ii) intelligent tutoring system in [06] detail.

OR

[B] Discuss advantages of knowledge based systems in detail. [06]

Q.4 [A] Write well-formed formula for following statements. [06]

1. Sita likes everything that Ram likes.
2. Some mushrooms are poisonous.
3. Ali like some of which Sita and Ram both like.

[B] Define and find (i) Union and (ii) Difference operations for [06] following fuzzy sets:

$$\tilde{A} = \{(x_1, 0.45), (x_2, 0.85), (x_3, 0.9)\} \text{ and}$$

$$\tilde{B} = \{(x_1, 0.6), (x_2, 0.75), (x_3, 0)\}.$$

OR

[B] Define fuzzy max-min composition. Obtain composition of relation [06] for $\tilde{R} \circ \tilde{S}$.

\tilde{R}	Y1	Y2	Y3	Y4	\tilde{S}	Z1	Z2	Z3	Z4
X1	0.6	0.4	0.7	0.9	Y1	0.7	0.4	0.6	0.8
X2	0.8	0.1	0.2	0.3	Y2	0.1	0.9	0.3	0.2
X3	0.4	0.8	0.6	0.9	Y3	0.5	0.7	0.8	0.9
X4	0.6	0.1	0.3	0.8	Y4	0.5	0.3	0.3	0.5

Q.5 [A] Define and describe the term agent. Explain characteristics of an [06] intelligent agent in detail by giving its structure.

[B] Consider an arithmetic function defined as $y=f(x)=2x+3$, for all x [06] belong to interval $[0, 7]$; and solve it with genetic algorithm. Show encoding, genetic operations and fitness functions with the final optimization results.

OR

[B] Explain evolution of solution using genetic algorithm in the [06] typical travelling salesperson problem by considering five cities labeled as A, B, C, D, and E.

Q.6 [A] Write a short note on knowledge management. [06]

[B] Explain working of multilayer perceptron by taking suitable [06] example.

OR

[B] Consider following data and design a multilayer perceptron for the [06] same.

Brand	Price	OS	Processor	Memory	I1	I2	I3	I4
AApple	60000	9	7	6	1	0	0	0
DDell	58000	6	8	9	0	1	0	0
HHp	45000	7	6	8	0	0	1	0
..

SARDAR PATEL UNIVERSITY
Master of Computer Applications V Semester Examinations
PS05CMCA01 (Artificial Intelligence)

Date: 17 /11/2014

Time: 11:00 am to 2:00 pm

Marks: 70

Q-1**Select an appropriate answer for the following questions:****[08]**

1. It is the knowledge of _____, which is stored in the knowledge base of an expert system.
 - a) Expert
 - b) Knowledge engineer
 - c) User
 - d) None of these
2. A frame is _____.
 - a) A way of representing knowledge
 - b) Knowledge structure
 - c) Both a and b
 - d) None of these
3. Fuzzy logic is a form of _____.
 - a) Two-valued logic
 - b) Crisp set logic
 - c) Many-valued logic
 - d) Binary set logic
4. _____ are rules of thumb that may solve a problem, but do not guarantee a solution.
 - a) Strong methods
 - b) Heuristic
 - c) Virtual functions in AI
 - d) None of these
5. Which of the following is not a 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.
6. In an unsupervised learning _____.
 - a) Specific output values are given
 - b) Specific input values are given
 - c) Both inputs and outputs are given
 - d) Neither inputs nor outputs are given
7. _____ is a control program that is responsible for generating new knowledge from existing knowledge.
 - a) Knowledge base
 - b) Inference engine
 - c) Meta knowledge
 - d) Control Engine
8. _____ is problem solving strategy based on natural evolution.
 - a) Genetic algorithm
 - b) Fuzzy logic
 - c) Neural network
 - d) None of these

SARDAR PATEL UNIVERSITY
Master of Computer Applications V Semester Examinations
PS05CMCA01 (Artificial Intelligence)

Date: 17 /11/2014

Time: 11:00 am to 2:00 pm

Marks: 70**Q-1****Select an appropriate answer for the following questions:****[08]**

1. It is the knowledge of _____, which is stored in the knowledge base of an expert system.
 - a) Expert
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 - c) User
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8. _____ is problem solving strategy based on natural evolution.
 - a) Genetic algorithm
 - b) Fuzzy logic
 - c) Neural network
 - d) None of these

Q-2

Answer the following questions in brief. (ANY SEVEN)

1. Describe the Turing test.
2. Explain modus tollens.
3. Describe backward chaining.
4. List the categories of a typical KBS. Define them in one line each.
5. Give major difference between hill climbing and steepest ascent hill climbing search.
6. What is KQML? Explain in one to two lines.
7. What is unsupervised learning? Explain in one to two lines.
8. What is genetic programming? Explain in one to two lines.
9. Are there any stopping criteria to terminate evolution in a genetic algorithm? Explain any one in brief.

Q-3[A] Draw structure of a knowledge based system. Explain each component in one to two lines. [06]
[B] Differentiate blind and weak method of searching. Give two examples of weak searching methods. [06]

OR

[B] Define productions. Where are productions used? Explain the typical structure of production rule in an expert system. Also state the role of working memory in a typical production system. [06]

Q-4[A] Give the structure (diagram) of a typical fuzzy control system. [06]
[B] Define membership function. Develop a membership function for tall people. [06]

OR

[B] Explain various de-fuzzification methods using suitable examples. [06]

Q-5[A] Explain how a collaborative agent works using a suitable example. Also draw the architecture showing components of the collaborative agents in the same example. [06]

[B] Discuss in brief the working of a typical GA with the help of diagram. [06]

OR

[B] Explain the use of adjacency matrix in solving traveling salesperson problem using GA. [06]

Q-6[A] Describe the process of knowledge management with the help of a diagram. [06]

[B] Selection of a suitable crop depends on various factors. Some of the factors are given in the following table. Consider the following table and design/fit the multi layer perceptron neural network according to the given data. [06]

X ₁	X ₂	X ₃	X ₄	X ₅	O ₁	O ₂	O ₃
Crop type	Land	Rain	Fertilizer	Irrigation	Crop 1	Crop 2	Crop 3
0.4	0.3	0.4	0.7	0.5	1	0	0
0.5	0.4	0.6	0.5	0.6	0	1	0
0.6	0.6	0.4	0.3	0.6	0	0	1

OR

[B] Explain fixed increment perceptron learning. [06]

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SARDAR PATEL UNIVERSITY
M.C.A Master of Computer Applications
Semester –V External Examinations, April 2018
PS05CMCA01 – Artificial Intelligence
Tuesday, 10th April, 2018

Time: 11:00 a.m. to 02:00 p.m.

Max Marks: 70

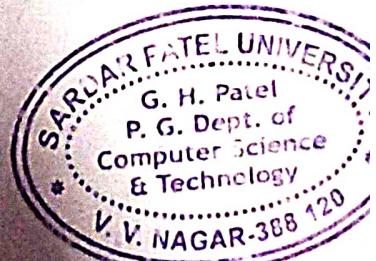
[8]

Q1. Choose the most appropriate option for each question.

- i. AI tries to solve those problems at which at the moment humans are _____ than machine.
A) inferior B) better
C) equal D) none of these
- ii. _____ searching technique will never get trapped in blind alley.
A) DFS B) BFS
C) FCFS D) None of these
- iii. _____ is a logic that offers distinct and single value for given situation.
A) Crisp logic B) Fuzzy logic
C) Complex logic D) All of the above
- iv. The rule which says if $P \Rightarrow Q$ and $Q \Rightarrow R$ then $P \Rightarrow R$ is called as _____.
A) Modus tollens B) Modus ponens
C) Chain rule D) Transitivity rule
- v. _____ is an artificial neural network model.
A) Perceptron model B) Kohonen model
C) Hopfield model D) All of these
- vi. _____ is a stopping criteria of genetic algorithm.
A) Number of iteration B) Users choice
C) Solution reached D) All of these
- vii. A single perceptron can solve _____ problems.
A) linearly separable B) non linearly separable
C) formal real life D) None of these
- viii. _____ is an example of activation function.
A) Membership functions B) Sigmoid
C) fitness D) None of these

Q2. Answer the following questions (Any Seven):

- a. List and explain characteristics of knowledge in brief.
- b. Give full form of (i) OAS and (ii) DSS.
- c. Explain the process of De-fuzzification.
- d. Define fuzzy set. Give one example of fuzzy set.
- e. Explain in brief the parallel relaxation in neural network.
- f. Explain where genetic algorithms should be used?
- g. Define and explain use of KQML.
- h. Explain concept mapping as a tool for knowledge discovery.
- i. Show genetic mutation and cross over using tree encoding strategy.



Q3. Answer the following questions:

a. List the methods for testing intelligence of machine. Explain any one of them in detail.

b. Draw and explain in detail the general structure of KBS.

OR

b. Discuss limitations of KBS in detail.

[6]

Q4. Answer the following questions:

a. Define and explain fuzzy set operations (i) Union, (ii) Intersection and (iii) Difference with

example for each.

[6]

b. Explain fuzzy systems. Mention any three applications of fuzzy systems.

[6]

OR

b. Given $T(\tilde{P}) = 0.9$ and $T(\tilde{Q}) = 0.65$, then find (i) $T(\tilde{P} \wedge \tilde{Q})$ and (ii) $T(\tilde{P} \Rightarrow \tilde{Q})$.

[6]

Q5. Answer the following questions:

a. Explain how genetic algorithm works by giving its diagram.

[6]

b. Maximize $f(x,y) = x + 2y$; where x and y belong to $[0, 7]$ with help of genetic algorithms. Also

state the maximized value for function.

[6]

OR

b. Explain supervised learning in multi layer feed forward perceptron in detail.

[6]

Q6. Answer the following questions:

a. Define a collaborative agent. Also discuss an example of a collaborative agent by giving its diagram.

[6]

b. Explain in brief (i) multi agent system, (ii) unsupervised learning, and (iii) fitness function.

[6]

OR

b. Define soft computing and hard computing. Also list constituents of soft computing with brief description of each.

[6]

SARDAR PATEL UNIVERSITY
M.C.A Master of Computer Applications
Semester -V External Examinations, October 2018
PS05CMCA01 – Artificial Intelligence

Time: 2:00 p.m to 05:00 p.m.

Tuesday, 23rd October, 2018

Max Marks: 70

Q1. Choose the most appropriate option for each question. [8]

- _____ test determines whether the given program is intelligent or not.

A) Covering	B) Turing
C) Partitioning	D) Fuzzy
- _____ approach is also called as goal directed/driven approach.

A) Forward chaining	B) Backward chaining
C) BFS	D) All of these
- The rule $\sim P \Rightarrow \sim Q$ and Q is true, then P is true is _____.

A) Modus Ponens	B) Modus Tollens
C) Chain Rule	D) None of these
- Quantifiers are not present in _____ logic.

A) Predicate	B) Proposition
C) Both A and B	D) None of these
- _____ is an artificial neural network model that uses parallel relaxation.

A) Perceptron model	B) Kohonen model
C) Hopfield model	D) All of these
- The principle of genetic algorithm is based on _____.

A) Natural evolution	B) Fine logic
C) Statistics	D) Binary logic
- _____ is the characteristic of an agent.

A) Pro-activeness	B) Co-operation
C) Autonomy	D) All of these
- _____ method of learning in ANN requires datasets.

A) supervised	B) Unsupervised
C) Parallel	D) None of these

[14]

Q2. Answer the following questions (Any Seven):

- Differentiate between CBIS and KBS.
- Write only algorithm for generate – and – test method.
- Define fuzzy set and give one example of fuzzy set.
- List any four components of predicate logic.
- Give any two activation functions of ANN.
- Define knowledge management process. Also list its advantages.
- Explain (i) mutation and (ii) crossover in binary encoding in GA.
- Define soft computing. Also list constituents of soft computing.
- List any two applications of AI that make the Web intelligent.

(P.T.O.)

1.

Q3. Answer the following questions:

- a. Define AI. List the domain areas of AI. Discuss advantages and disadvantages of AI. [6]
- b. Explain hill climbing search method by giving its algorithm and its variation in detail. [6]
- s. b. Draw the general structure of KBS. Also list and explain any one category of KBS in detail. [6]

Q4. Answer the following questions:

- a. Write a detailed note on fuzzy rule based system. [6]
- b. For Fuzzy sets $\tilde{A} = \{(x_1, 0.3), (x_2, 0), (x_3, 0.7)\}$ and $\tilde{B} = \{(x_1, 0.6), (x_2, 1), (x_3, 0.7)\}$ Find
 (1) $\tilde{A} \oplus \tilde{B}^c$
 (2) $(\tilde{A} \oplus \tilde{B}) \cap \tilde{B}$

OR

- b. Define fuzzy prepositions and discuss fuzzy connectives with their use in detail by taking suitable examples. [6]

Q5. Answer the following questions:

- a. Draw biological neuron and an artificial neuron. Also explain how an artificial neuron is working. [6]
- b. Explain in detail how a perceptron solves a linearly separable problem. [6]

OR

- b. Design a neural network to select a course based on following data. [6]

	X1	X2	X3	X4	X5	O1	O2	O3
Sr. No.	Job Prospects	Personal Interest	Successes History	Available Resources	Availability of Teacher	Elective 1	Elective 2	Elective 3
1	Very high	Good	Acceptable	Acceptable	Good	1	0	0
2	Very high	Less	Good	Good	Acceptable	0	1	0
..

Q6. Answer the following questions:

- a. Define mobile agent. Explain working of a typical mobile agent by giving its diagram. [6]
- b. Minimize $f(x) = x + 2$; where x belongs to $[1, 31]$ with help of genetic algorithms.
 Take the initial population as $\{11011, 01101, 10011\}$.
 What is the value of x that optimizes the function?
 What is the minimum function value?

OR

- b. Draw outline of typical genetic algorithm cycle. Also explain its working in detail. [6]