Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II (Old course)• REMEDIAL EXAMINATION – SUMMER 2015

Subject Code: 1710410 **Date:16/05/2015**

Subject Name: Introduction to Artificial Intelligence

Time: 02:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** What is Artificial Intelligence? Briefly discuss any five AI problem characteristics with respect to Chess problem. **07**

(b) Give state space representation for following problems **07**

(i) Missionaries and Cannibals Problem (ii) Water Jug Problem

Q.2 **(a)** Explain advantages and drawbacks of Iterative Deepening Search compared to Breadth First Search and Depth First Search. **07**

(b) What is Best First Search (BFS)? Given initial and goal state of 8-puzzle problem, trace execution BFS for Eight Puzzle problem upto tree depth 3 (THREE), step by step showing content of OPEN and CLOSE list. **07**

2	3	8
1	6	4
7		5

Initial State

1	2	3
8		4
7	6	5

Goal State

OR

(b) Solve following cryptarithmetic problem using constraint satisfaction search. **07**

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  C R O S S
  R O A D S
 ----------
 D A N G E R
```

Q.3 **(a)** Explain Genetic algorithm with suitable example. Also state its applications. **07**

(b) Use Minimax with Alpha-Beta cutoff search to find best move for game tree shown in Figure-1. Assume that the first player is the maximizing player. Find out following things: (i) How many Alpha-cutoffs are there? (ii) How many Beta-cutoffs are there? (iii) What is the final value of Alpha? (iv) Finally, which branch of the tree is selected as best move? **07**

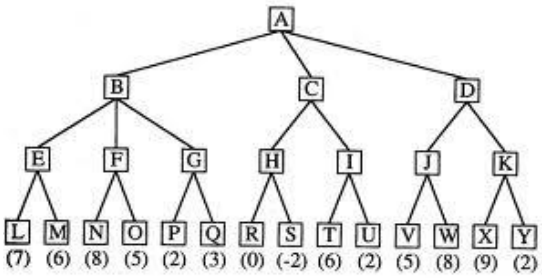

Figure-1

OR

Q.3 **(a)** Explain Simulated Annealing. Discuss its applications in detail. **07**

(b) Which algorithm can be used for solving two player game problems? Discuss efficiency of Minimax search and Minimax with Alpha-Beta cutoff search. **07**

Q.4 **(a)** You are given following problem statements: **07**

Jay, Mike and John belong to the Royal Club. Every member in the club is either a mountain climber or a skier or both. Jay likes whatever Mike dislikes and dislikes whatever Mike likes. Jay likes rain and snow. No mountain climber likes rain. Every skier likes snow.

Convert above statements to predicate logic statements and then to clause form.

(b) Compare linearly separable and non-separable problems. State whether following problems are linearly separable or non-separable? **07**

(i) X-OR GATE problem (ii) AND-GATE Problem

State which Neural Network can be used for solving linearly non-separable problems and why?

OR

Q.4 **(a)** Explain Unification algorithm with appropriate example. What is its usefulness? **07**

(b) Explain following terms with suitable example **07**

(i) Monotonic Reasoning
(ii) Non-monotonic Reasoning
(iii) Bayes Network
(iv) Backward chaining

Q.5 **(a)** What is Expert System? Briefly explain components of Expert System. What are the advantages of Expert System? **07**

(b) For flight simulator data the determination of certain changes in operating conditions of the aircraft is made on the basis of hard breakpoints in the Mach region. Let us define a fuzzy set to represent the condition of ñnearò a Mach number of 0.74. Further, define a second fuzzy set to represent the condition of ñin the region ofò a Mach number of 0.74. In typical simulation data, a Mach number of 0.74 is a hard breakpoint. **07**

$$A = \text{near Mach } 0.74 = \left\{\frac{0}{0.730} + \frac{0.8}{0.735} + \frac{1}{0.740} + \frac{0.6}{0.745} + \frac{0}{0.750}\right\}$$

$$B = \text{in the region of Mach } 0.74 = \left\{\frac{0}{0.730} + \frac{0.4}{0.735} + \frac{0.8}{0.740} + \frac{1}{0.745} + \frac{0.6}{0.750}\right\}$$

Find out (i) $A \vee B$ (ii) $A \wedge B$ (iii) $\tilde{A}$ (i.e. Negation of A) (iv) $\tilde{A} \vee B$

OR

Q.5 **(a)** Explain Feed Forward Neural Network with backpropagation algorithm. Explain anyone application in detail. **07**

(b) What is defuzzification? Explain following defuzzification methods with suitable example. **07**

(i) Maximum membership method (iii) Mean max membership method
(ii) Weighted average method

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