CMCSQ/D-23   **24050**

ARTIFICIAL INTELLIGENCE
MS-20-34(iii)

Time : Three Hours]   [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **1** is compulsory. All questions carry equal marks.

1. (a) Differentiate between universal and existential quantifiers using suitable examples.

    (b) Write a brief note on Turing Test.

    (c) In what scenarios might Hill Climbing struggle to find an optimal solution ?

    (d) How does the choice of selection mechanism impact the performance of a genetic algorithm ?

Unit I

2. (a) Discuss the following normal forms using examples :

    (i) Conjunctive Normal Form

    (ii) Disjunctive Normal Form

    (iii) Prenex Normal Form.

(b) What qualities should be there in a knowledge representation scheme ? Write a note on use of associative networks to represent the knowledge.

3. (a) What is Most General Unifier (MGU) ? Write the unification algorithm to find MGU.

(b) What is Skolemization in the context of First-Order Logic ? Why might Skolemization be necessary and how is it carried out ? Discuss.

Unit II

4. (a) Differentiate between Breadth First Search (BFS) and Depth First Search (DFS). When is it advisable to use DFS over BFS ? Discuss.

(b) What do you understand by state space representation of the problem ? Explain using suitable example.

5. (a) What is the difference between forward and backward search ? What are the factors deciding the direction of the search ? Discuss.

(b) What is alpha and beta pruning ? How does it helps in refining mini-max search ? Discuss.

Unit III

6. (a) Discuss the concept of conflict resolution in Production Systems. How are conflicts typically resolved when multiple rules are applicable ?

(b) What is Fuzzy Logic and how does it differ from classical (crisp) logic ? Explain the concept of fuzzy sets and fuzzy membership functions.

7. (a) How are Production Systems related to Rule-Based Expert Systems ? Discuss, how a Production System can be used to build an expert system.

(b) What is Bayesian Probability Theory ? Explain the concept of prior probability, likelihood and posterior probability in Bayesian inference.

Unit IV

8. (a) How are solutions represented in the genetic algorithm ? Provide examples of different representation schemes used in GAs.

(b) What is crossover operation ? Discuss variations of crossover and mutation operators.

9. (a) What is the role of generalization in learning by induction ? Provide examples of how generalization occurs in the context of inductive learning.

(b) What is the role of the fitness function in a genetic algorithm ? How does the choice of a fitness function impact the effectiveness of the algorithm ?