Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐   **Total No. of Pages : 02**

Total No. of Questions : 08

M.Tech.(IT)E4(2015 & Onwards)/(CSE Engg.) EI-IV (2015 to 2017)(Sem.–3)
ADVANCE AI
Subject Code : MTCS-306
Paper ID : [74156]

Time : 3 Hrs.   **Max. Marks : 100**

INSTRUCTION TO CANDIDATES :
1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

1. a) What do you understand with constraint satisfaction technique? What is constraint space? Discuss the constraint satisfaction algorithm in detail. Trace the execution of the constraint satisfaction procedure in solving the cryptarithmetic problem :

   CROSS + ROADS = DANGER

   b) Differentiate between tree based breadth-first and depth-first search strategies based on completeness, time and space complexities.

2. a) Discuss the following with respect to reasoning under uncertainty :

   i) Bayesian networks

   ii) Markov networks

   b) Describe the merits and demerits of scripts in Knowledge Representation.

3. a) Consider 3-Dimensional Tic-Tac-Toe. Discuss representational issues and analyze the complexity of the state space. Propose a heuristic for playing this game.

   b) Elaborate various applications of software agents.

4. a) What do you understand by the term "Autonomy" in the context of multiagent systems? Explain.

   b) Describe the salient features of an rational agent. Also differentiate between Learning agents and Information gathering agents.

5. Explain the resolution algorithm for propositional logic.
    Consider the statements in the following paragraph :

    "*Every human, animal and bird is living thing that breathe and eat. All birds can fly. All man and woman are humans who have two legs. Cat is an animal and has a fur. All animals have skin and can move. Giraffe is an animal who is tall and has long legs. Parrot is a bird and is green in color*"

    For the above paragraph, provide predicate logic and semantic net representations.

6. a) Why the various operators are required in the Genetic Algorithm? Explain.

    b) Write the conceptual dependency representation for the following sentences :

    i) Sid cleaned the room.

    ii) Rid gifted a pen to Fid.

7. a) Prove that if a heuristic is consistent, it must be admissible. Construct an admissible heuristic that is not consistent.

    b) Is the effectiveness of alpha-beta pruning highly dependent on the order in which the successors are examined? Justify your answer.

8. Write short notes on the following :

    a) Swarm systems

    b) Beam search

    c) Bayes' Rule

    d) Goal based agents