 

# 2020(A)

*Time : 3 hours*

*Full Marks : 70*

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Answer any five questions.*

1. (a) What do you understand by AI ? What are AI problems ? What is the AI technique to solve an AI problem ? 7

   (b) Suppose you are given with two jugs, a 5 liters one and a 3 liters one. Neither has any marker on it. There is a pump that can be used to fill the jugs with water. How can you get 2 liters of water in the 5-liter jug ? Write the production rules to get the state space representation of the given problem. 7

2. (a) Consider the following set of axioms : 10

(i) Sham likes easy courses.

(ii) All courses in Arts department are easy.

(iii) All courses in Science department are not easy.

(iv) Physics is a Science course.

(v) Sketching is an Arts course.

Translate these sentences into predicate form and find using resolution principle "Which course does Sham like ?"

(b) Define functions in LISP to do the following : 4

(i) A function that finds maximum among three numbers.

(ii) A recursive function that implements member function.

3. (a) Explain hill climbing method of solving a problem. What are the problem in hill climbing search methods due to which they may fail to find the solutions ? 7



(b) Solve the given traveling salesman problem using branch and bound method. Assume the source city is A and the travelling salesman is to go through a found trip from city A to city A, visiting all other three cities B, C and D exactly once, covering minimum possible distance path : 7

| | A | B | C | D |
|---|---|---|---|---|
| A | - | 200 | 125 | 75 |
| B | 200 | - | 50 | 75 |
| C | 125 | 50 | - | 50 |
| D | 75 | 75 | 50 | - |

4. (a) Explain A* search algorithm. Differentiate between best first search and A* algorithm. 7

(b) Find the solution to the 8 puzzle problem using A* search algorithm. State the heuristic function used : 7

Initial State

| | | |
|---|---|---|
| 2 | | |
| 1 | 8 | 4 |
| 7 | 6 | 5 |

Goal State

| | | |
|---|---|---|
| 1 | 2 | 3 |
| 8 | | 4 |
| 7 | 6 | 5 |



5. (a)

5. (a) What do you understand by knowledge representation and mappings ? What are the various approaches to knowledge representation ? 7

(b) How can we represent knowledge using frames ? What are the reasoning actions that can be performed using frames ? 7

6. (a) Solve the cryptarithmetic puzzle : 7

(i) LOGIC + LOGIC = PROLOG

(II) BASE + BALL = GAME

(b) Draw a semantic network to represent : Every teacher likes intelligent students. 7

7. (a) What are the advantages and disadvantages of Expert System ? Discuss different existing Expert Systems. 10

(b) Write PROLOG program for : 4

(i) Revesring a list.

(ii) Implementing quick sort.



8. Differentiate all the following (Mention any two differences) : 2×7 = 14

(a) Breadth First Search Vs Depth First Search.

(b) Simple Hill Climbing Vs Steepest ascent Hill Climbing.

(c) Simulated Annealing Vs Hill Climbing.

(d) A* searching teachnique Vs AO* searching technique.

(e) Procedural knowledge Vs Declarative Knowledge.

(f) Conventional Computer System Vs Expert System.

(g) Supervised learning Vs Unsupervised learning.