2016

MCA

5th Semester Examination

ARTIFICIAL INTELLIGENCE

PAPER—MCA-503

Full Marks : 100

Time : 3 Hours

The figures in the margin indicate full marks.

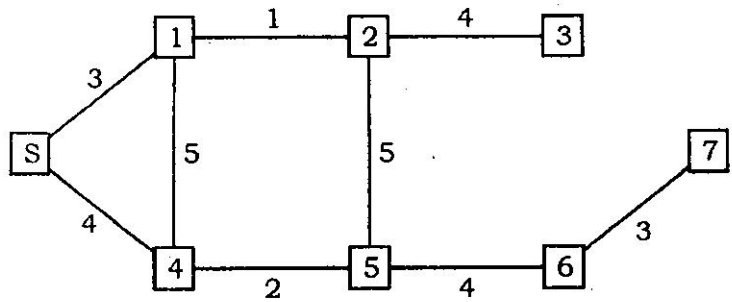
Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Answer any *five* questions.

1. Consider the graph given in Figure 1. Assume that the initial state is S and the goal state is 7. Find a path from the initial state to the goal state using A* search. Also report the solution cost. The straight line distance heuristic estimates for the nodes are as follows —

   h(1) = 14, h(2) =10, h(3) = 8, h(4) = 12, h(5) = 10, h(6) = 10, h(s) = 15.



14

2. Compare and contrast BFS and DFS. Explain the technique to overcome the drawbacks of both. 7+7

3. You are given two jugs of capacities 4 litres and 3 litres each. Neither the jug have any measuring marker on them. There is a pump to fill the jugs with water. How can you get exactly two litre of water in 4 litre jug? Formulate the problem in state space and draw complete diagram. 14

4. Represent the following sentence in predicate logic —

   (i) Not all students like history and biology.

   (ii) Only one student failed in History and Biology.

   (iii) There is a barber who shaves all men in town who do not share themselves.

(iv) Well, I like sandy and I do not like sandy.

(v) One more out burst like that and you will be in contempt of court.

(vi) No one in this class is wearing red shorts and white socks.

(vii) For everyone there is someone to love. 7×2

5. (a) Show that,

$((p \vee q) \wedge (\sim p \vee r)) \rightarrow (q \vee r)$ is a tautology.

(b) Write short notes on :

1. Simulated Annealing ;

2. Art Colony Optimization. 6+(4+4)

6. A game tree of height 4 has 36 terminal nodes. The root node at level 0 has 3 sons, and each node at level 2 has 3 sons. Each node at level 1 or level 3 has 2 sons. All terminal nodes are at level 4. The score of the terminal nodes from left to right are as follows :

4	9	5	6	2	7	3	4	4	5	5	7
3	6	8	9	4	8	6	4	1	6	6	4
6	2	7	8	7	8	6	6	2	6	3	2

Considering the above game tree answer the following :

(i) How many terminal values would get evaluated when the alpha-Beta procedure is run on this game tree ?

(ii) For each cut-off, point out whether the cut off is α-cut off or β-cutoff. 7+7

7. (a) What is an admissible heuristic ? Is it possible for A* to output minimum cost solution path even if the heuristic is inadmissible ? Explain.

(b) Using proper example show that the city block distance or sum of manhattan distance is admissible. 7+7

[Internal Assessment : 30]