Answer all question

Time allowed: 02 Hours

1.

i. What do you mean by acting rationally in AI?

(10 Marks)

ii. What is NP-Complete problem?

(20 Marks)

iii. Consider the following problem:

Three cannibals and three missionaries are standing on the west bank of a river. A boat is available that will hold either one or two people. if the missionaries are ever outnumbered- on either bank or in the boat – the cannibals will eat them. You have to determine a sequence of trips that will get everyone across the river to the east bank.

a) Choose a suitable state representation and show how you would use it to encode the start state and the goal state

b) How many distinct states occur in this problem?

c) Show the state space graph. Do not draw any illegal state. Number all distinct states and terminates the search at any repeated state (In any path). Clearly mark a possible path from the start state to the goal state.

(70 Marks)

2.

i. Consider the graph (not drawn to scale) with arc length shown on the arcs, Use A* Search Strategy to find path from **UBC** to **SP**
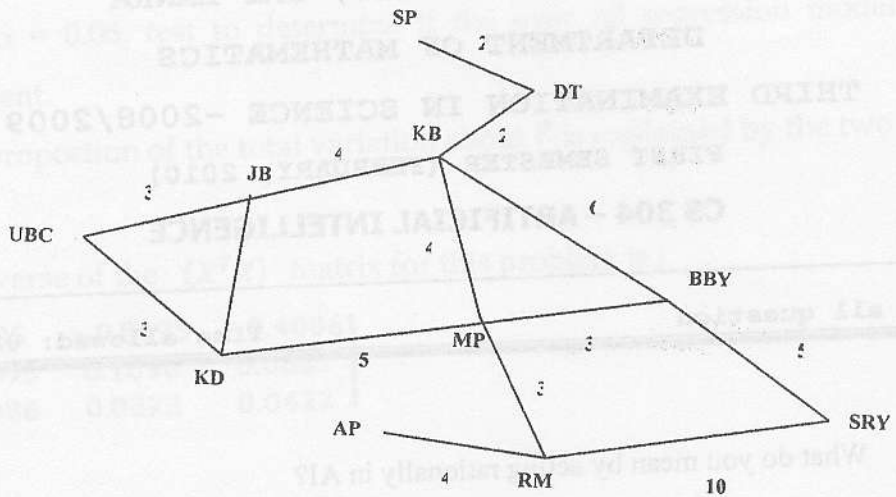
You may assume the following heuristic values for the distance to SP:

h(SP) = 0   h(DT) = 2
h(KB) = 3   h(JB) = 3
h(UBC) = 5   h(KD) =6
h(MP) =7   h(BBY) =8
h(AP) = 8   h(RM) = 9
h(SRY) = 19

(60 Marks)

ii. Explain with a search tree why greedy-search method will not find the best solution.

(20 Marks)

iii. Compare depth-first and breadth-first search for the following scenarios
   a. Some paths are extremely long, or even infinite
   b. All paths are of similar length
   c. All paths are of similar length, and all paths lead to a goal state
   d. High branching factor

(20 Marks)

3.

i. Explain with example, why a Depth-First Search method preferred by human?

(20 Marks)

ii. In what situations hill climbing can be fooled? Explain it.

(15 Marks)

iii. The puzzle consists of a 3 × 3 grid, with the numbers 0 through 7 on tiles within the grid and one blank square. Tiles can be slid about within the grid, but a tile can only be moved into the empty square if it is adjacent to the empty square. The start state of the puzzle is a random configuration, and the goal state is as shown in the second picture in the Figure,

5	7	2
3		4
0	6	1

0	1	2
3	4	5
6	7	

Start State   Goal State

To get from a random start state to the goal state, illustrate the way in which heuristics are developed.

(50 Marks)

iv. What is the simplest method for identifying the optimal path? Explain.

(15 Marks)

4.

i. Explain a Constraint Satisfaction Problem (CSP) with suitable example.

ii. A robot that lives in an environment with three rooms (room A, room B, and room C) and with a block that he can move from room to room .The block cannot move on its own and can only be moved to a room by the robot. Draw a simple state space diagram.

iii. What are the three properties of Generate and Test.?

iv. Translate the following sentences into logical statements, using either propositional or predicate logic as appropriate:

a. I like apples and pears.

b. When I eat apples and pears, I usually like to have a walk.

c. Every apple that I have ever eaten has been delicious.

d. There exists somewhere in the world a book that lists every single person who doesn't appear in any other book.

e. If you haven't read the book that lists all other books, then you haven't read any book, unless you've read the book that lists books that do not exist, in which case you've read every book.

(4 X 25 Marks)