

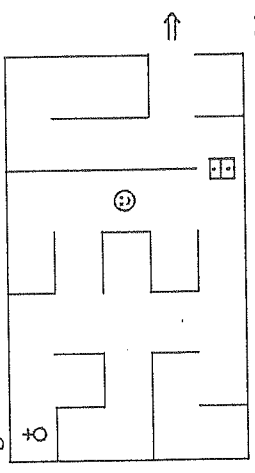
Total No. of Pages: 03
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 B.Tech. VI Semester
 Mid Sem. Exam. 2019

Subject Code: MC 312 Course Title: Artificial Intelligence
 Time: 1 Hour 30 Minutes
 Max. Marks: 30

Answer all questions. (Assume suitable missing data, if any.)

1. What is Artificial Intelligence? Discuss about 7-problem characteristics for Missionaries and Carnivals Problem. The definition of the problem is "In Missionaries and Carnivals Problem, initially there are some missionaries and some carnivals (boatman, Grass, Tiger and Goat) will be at a side of a river. They want to cross the river. But there is only one boat available to cross the river. The capacity of the boat is 2 and no one missionary or no Carnivals can cross the river together". Give state space representation and production rule to solve the problem. (2+2+4)

2. You (⊙) are trapped in a maze and needs to escape from it. Unfortunately there is a locked door between you and the exit, and you have to take the key (⊗) before you can unlock the door. You are not facing any special direction and can move one step in any direction at any time step, as long as there is no wall in the way. Alternatively you can pick up the key (if you are in the right location), or you can unlock the door (if you have the key and are in the right location). Neither the key nor the door can move around on their own. Your goal is to find a plan for escaping the maze using as few moves as possible. Assume that the grid has size $M \times N$.



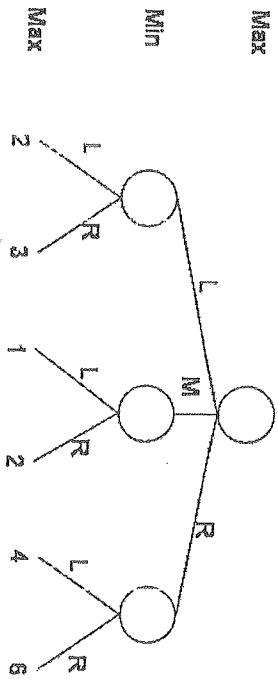
Give a suitable representation of the states in this searching problem. What is the size of the state space? (4)
 P.T.O

3. Convert the following facts into equivalent predicate (3)

- i. John likes all kinds of food.
- ii. Apples are food.
- iii. Chicken is food.
- iv. Anything anyone eats and isn't killed by is food.
- v. Bill eats peanuts and is still alive
- vi. Sue eats everything Bill eats.

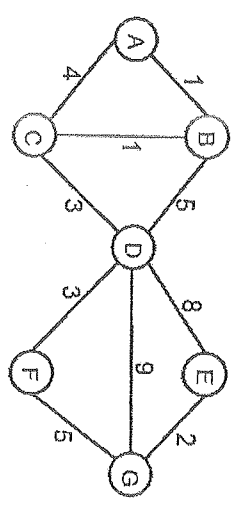
4. Consider the game tree shown below. The top node is a max node. The labels on the arcs are the moves. The numbers in the bottom layer are the values of the different outcomes of the game to the max player.

- a. What is the value of the game to the max player?
- b. What first move should the max player make?
- c. Assuming the max player makes that move, what is the best next move for the min player, assuming that this is the entire game tree?
- d. Using alpha-beta pruning, consider the nodes from right to left, which nodes are cut off? Circle the nodes that are not examined. (6)



5. Consider the state space graph shown. A is the start state and G is the goal state. The costs for each edge are shown on the graph. Each edge can be traversed in both directions. Note that the heuristic h1 is consistent but the heuristic h2 is not consistent.

P.T.O



Node	h1	h2
A	9.5	10
B	9	12
C	8	10
D	7	8
E	1.5	1
F	4	4.5
G	0	0

A. For each of the following graph search strategies (do not answer for tree search), mark which, if any, of the listed paths it could return. Note that for some search strategies the specific path returned might depend on tie-breaking behavior. In any such cases, make sure to mark all paths that could be returned under some tie-breaking scheme. (6)

Search Algorithm	A-B-D-G	A-C-D-G	A-B-C-D-F-G
Depth first search			
Breadth first search			
A* search with heuristic h1			
A* search with heuristic h2			

B. Suppose you are completing the new heuristic function h3 shown below. All the values are excepted except h3(B). What values of h3(B) will cause A* graph search to expand node A, then node C, then node B, then node D in order? (3)

Node	A	B	C	D	E	F	G
h3	10	?	9	7	1.5	4.5	0

All the best

-End-