



United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Mid Exam

Summer 2019

Course Code: CSI 341 Course Title: Artificial Intelligence

Total Marks: 30

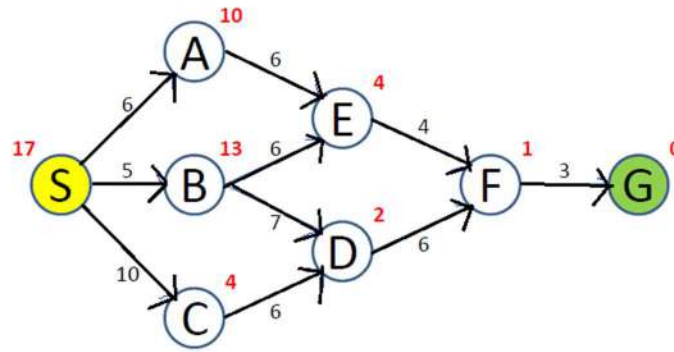
Duration: 1 hour 45 minutes

There are **7** questions. **Answer all questions.** Marks are indicated in the right side of each question.

1. Suppose you are designing a part picking robot that can pick up different machinery parts from a moving conveyor belt, categorize it and place it in its designated bin. Now answer the following questions:
 - a. Give PEAS description of the task environment of the part picking robot.[2]
 - b. Characterize the agent's environment as Fully vs. Partially Observable, Deterministic vs. Stochastic, Episodic vs. Sequential and Single vs. Multiagent.[2]
2.
 - a. Give an example where breadth first search will give optimal result.[2]
 - b. "Iterative deepening search is wasteful in terms of computational time because states are generated multiple times."---determine whether this statement is true or false and justify your answer.[1]
3.
 - a. Suppose you are designing a navigation robot to navigate a maze with six rooms in it. Your agent can move in four directions: Left:10, Right:15, Up:10 and Down:20 with the given costs. Each move takes it to an adjoining room. The agent starts from room 1 and its goal is to reach room 6. Construct a search tree and determine the optimal plan (solution path) for the robot using the Uniform-cost search algorithm. Use graph-search (avoid generating repeated nodes).[4]

1	2	3
4	5	6

- b. Suppose you want to use A* search to solve the above maze solving problem. What can be used as an admissible heuristic function? Explain your answer.[2]
4.
 - a. Solve the following problem using the tree search algorithms mentioned below:[6]
 - BFS
 - DFS
 - Greedy search
 - A* search



Here S is the start node and G is the goal node. Expand the nodes in alphabetical order in case of ties. Draw the search tree and clearly mention the solution path and cost returned by each algorithm.

- b. Will A* graph search be optimal for the above problem? Explain your answer.[2]
5. Justify the following statements as true/false with proper explanation:[4.5]
 - a. First choice hill climbing performs better for problems with high branching factor.
 - b. The mutation step of genetic algorithm increases diversification.
 - c. In simulated annealing, the temperature T is decreased rapidly for better performance.
6. The Travelling Salesperson Problem(TSP) is defined as follows: *Given a list of cities and the distances between each pair of cities, determine the shortest possible route that visits each city exactly once and returns to the origin city.* Can you solve this problem using hill climbing algorithm? If so, how can the problem be formulated? If not, choose any other search algorithm and formulate the problem accordingly. [1.5]
7. Show the nodes that will be pruned in minimax algorithm with alpha-beta pruning for the following tree. [3]

△ MAX ▽ MIN

