United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Mid Exam: Summer 2020

Course Code: CSI 341, Course Title: Artificial Intelligence

Total Marks: 20 Duration: 1 hour

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

Any examinee found adopting unfair means will be expelled from the trimester / program as per UIU disciplinary rules.

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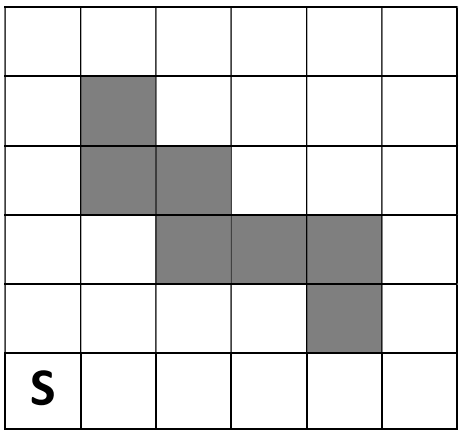
1. Consider the following Maze Problem where the allowed moves are {Left, Right, Up, Down}. Initially all the cells are colorless except for the grey cells which are bottomless pits where you cannot go. When you step on a colorless cell it turns red. You are standing in cell S. Your objective is to color all accessible cells red.



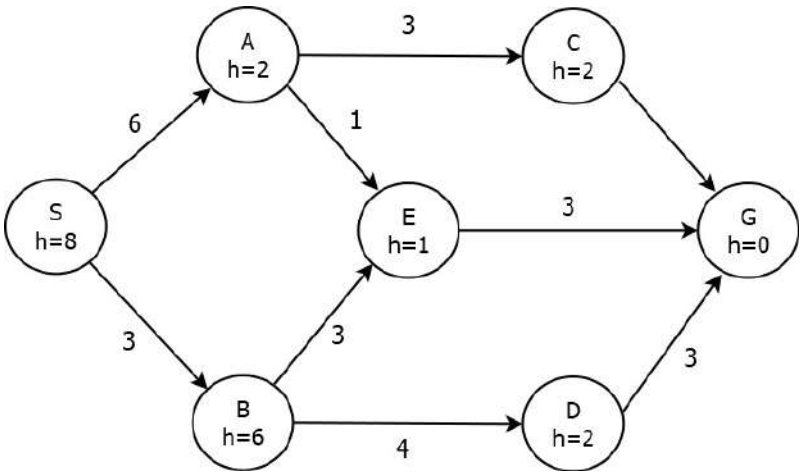
Now answer the following:

i. What variables are required to represent a state of the problem? **[1]**

ii. What is the size of the state space? **[1.5]**

iii. What is the goal test? **[0.5]**

2. Consider the state-space graph in the following figure. S is the start node and G is the goal node. Find out the solution paths and costs returned by the following search algorithms. **[1.5+1.5+2+2]**



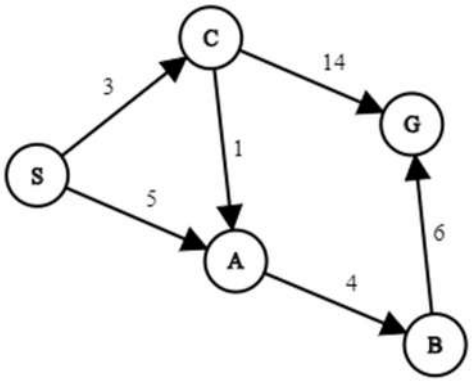
i. UCS

ii. Greedy BFS

iii. A* Tree Search

iv. A* Graph Search

3. Consider the following graph and the given values for three different heuristic functions h1, h2 and h3. Label the three functions as “inadmissible”, “admissible but inconsistent” or “admissible and consistent”. **[3]**



	S	A	B	C	G
h1	12	8	5	10	0
h2	12	11	6	12	0
h3	12	9	6	11	0

4. i. Define Random Restart Hill Climbing search algorithm. What are the advantages over the greedy version?

[2]

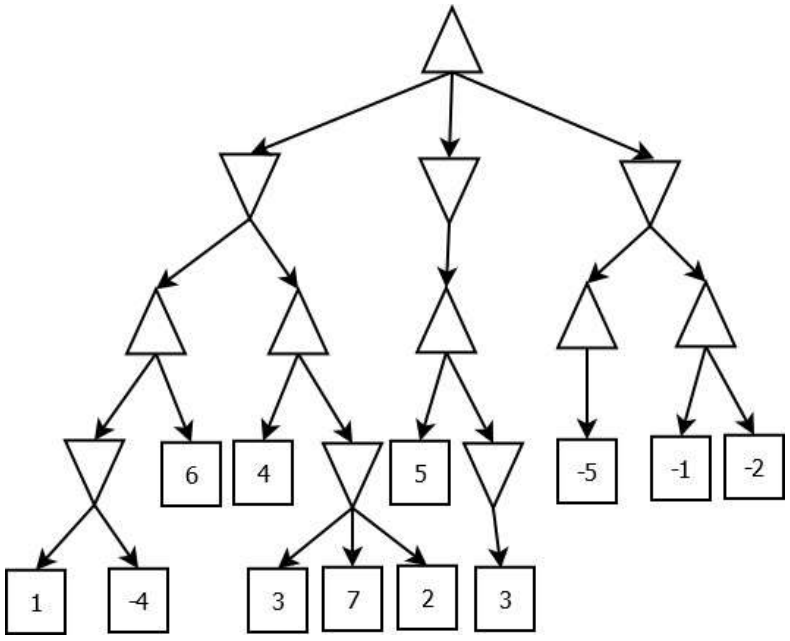
ii. Suppose you are using the following scheduling function for simulated annealing:

$$T_k = \frac{T_0}{1 + \alpha k} (\propto > 0)$$

If you have to choose between α=5 and α=50, which value will you choose and why? **[2]**

5. Consider the following game tree.

△ Max ▽ Min ▭ Terminal node



Show which nodes will be pruned if you use alpha-beta pruning with minimax search algorithm. **[3]**