University of Asia Pacific

Department of Computer Science & Engineering

Mid-Semester Examination Fall -2022

Program: B. Sc. Engineering (4th Year/ 1st Semester)

Course Title: Artificial Intelligence and Expert Systems Course No. CSE 403

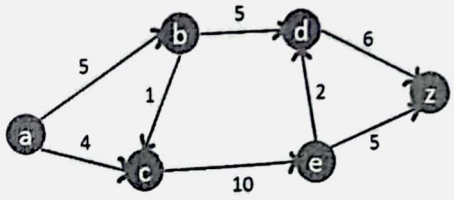
Credit: 3.00 Time: 1.00 Hour. Full Marks: 60

There are **Four** Questions. Answer any **three including questions #Q-1 and #Q-2**. All questions are of equal value. Figures in the right margin indicate full marks.

1. a) Suppose, you are developing a *"Trash Picking Robot"* to clean the UAP CSE Void Space. Specify the *PEAS* description of your intelligent agent. [10]

   b) For the above agent, characterize the environment whether it is: [10]
   i) fully observable or partially observable, ii) deterministic or stochastic, iii) episodic or sequential, iv) single agent or multi-agent. Explain your answer with your own logic.

2. Suppose, your target is to reach the goal node 'z' from start node 'a' with the most optimum cost. Simulate the following graph problem with **A* algorithm**, draw the search tree and determine the shortest path **with fringe** for **each iteration**. Assume that states with earlier alphabetical order are expanded first if two nodes have the same evaluation value. The path costs, ***g(n)*** are shown inside the graph. You can consider the heuristic values, ***h(n)*** for each of the node randomly. [20]



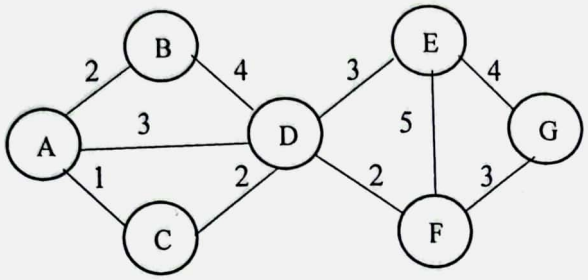
3. a) What is rational agent in artificial intelligence? State the characteristics that a rational agent should possess. [5]

   b) Generate a state space graph of 7 nodes. [3+
   Determine the sequences/orders in which the nodes of a search tree will be visited for: 6+6]
   i) Iterative Deeping Search (IDS)
   ii) Uniform Cost Search (UCS)

OR

4. a) Differentiate between machine learning (ML) and deep learning (DL) in your own words. [5]

b) Consider the following state space graph where "A" is the start state and "G" is the goal state. Suppose, you are completing the heuristic function h_2 shown below. All the values are fixed except $h_2(B)$. [15]



Node	A	B	C	D	E	F	G
h_2	8	?	6	5	3	3	0

i) Determine for which value of $h_2(B)$ makes h_2 admissible?

ii) Determine for which value of $h_2(B)$ makes h_2 consistent?

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