

University of Asia Pacific

Department of Computer Science & Engineering

Mid-Semester Examination Spring -2020

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

Course Title: Artificial Intelligence & Expert Systems. Course No. CSE 403/CSE 407 (Backlog)

Credit: 3.00

Time: 1.00 Hour.

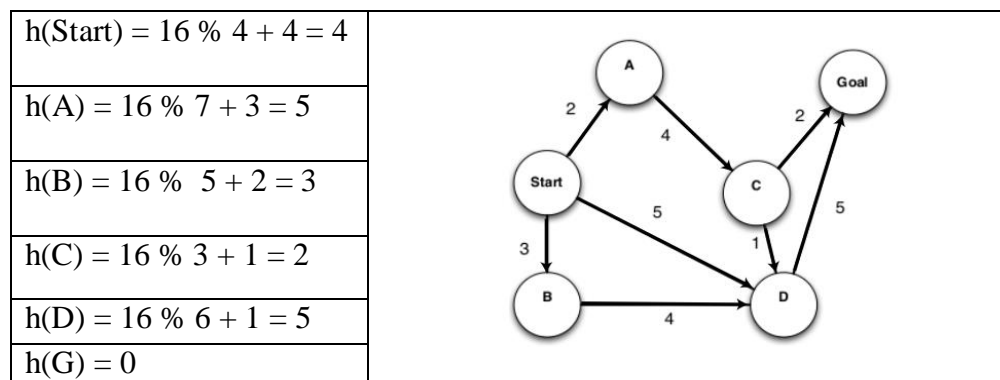
Full Marks: 60

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

- 1.a) “**Infravision**”, a medical company is using artificial intelligence to Diagnose COVID-19 Patients in a faster way. “Infravision” decreasing the CT diagnosis speed for each case so that suspected Coronavirus patients can be immediately removed further diagnosis and isolation. Suppose, you are developing an **expert system** for “Infravision”. What are the **main building blocks** you will be needed in your expert system? Draw the block diagram of your expert system with proper naming. 10
- b) Robots can’t get COVID-19, so they are the obvious choice for sterilizing hospitals and other essential places so that people get less infected by Coronavirus. You are planning to develop an intelligent robot (**Hospital Sterilize Robot**) to *autonomously* kill *bacteria* and *viruses* in hospitals with *ultraviolet light*. The robots tell humans to *leave the room*, *close the door* and then *start disinfection*. Give the **PEAS** description of your intelligent robot. 10
2. Your target is to reach the goal node ‘G’ from start node ‘Start’ with the optimum cost. Simulate the following problem with **A* algorithm** and show the shortest path with fringe for each iteration. The heuristic values of the 6 nodes are as follows: 20

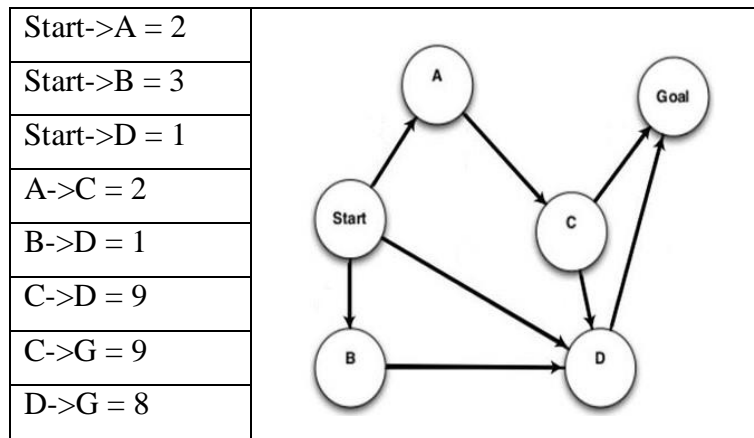
$h(\text{Start}) = (\text{Last 2 digits of your id}) \% 4 + 4$	$h(A) = (\text{Last 2 digits of your id}) \% 7 + 3$
$h(B) = (\text{Last 2 digits of your id}) \% 5 + 2$	$h(C) = (\text{Last 2 digits of your id}) \% 3 + 1$
$h(D) = (\text{Last 2 digits of your id}) \% 6 + 2$	$h(G) = 0$

Here % refers to **mod** operation. For example, if the last two digits of someone’s id is 16 then



3.a) Artificial Intelligence (AI) is different from machine learning (ML) and deep learning (DL). Do you agree? Justify your answer with your own logic. 5

b) Your target is to reach the Goal node from the Start node with the optimum cost. Simulate the following problem with **UCS algorithm** and show the shortest path with fringe for each iteration. Assume that states with earlier alphabetical order are expanded first. There are 8 edges/paths in the graph, where the value of each path costs will be consider from your 8 digits birthdate. **For example**, if someone's birthdate is **23.12.1998**, then the path costs are as follows: 15



If someone's birthdate includes a "zero" element, then he/she will use "2" instead of "zero". For example, if someone's birthdate is **10.1.1998**, then the path cost from Start->A is 1, the path cost from **Start->B** is **2** and so on respectively.

4.a) Can we differentiate between intelligent agent and rational agent? State your own answer. 5

b) Your goal is to navigate a robot out of a maze. The robot starts in the center of the maze. Facing *north*. You can turn the robot to face *north*, *east*, *south*, or *west*. You can direct the robot to move forward a *certain distance*, although it will stop before hitting a wall. 15

- i. Formulate the problem.
- ii. Which uninformed search strategy do you think is best for the problem and why? Which data structure you will use to implement the fringe of your algorithm?