

University of Asia Pacific

Department of Computer Science & Engineering

Mid-Semester Examination Fall -2021

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

Course Title: Artificial Intelligence and Expert Systems

Course No. CSE 403

Credit: 3.00

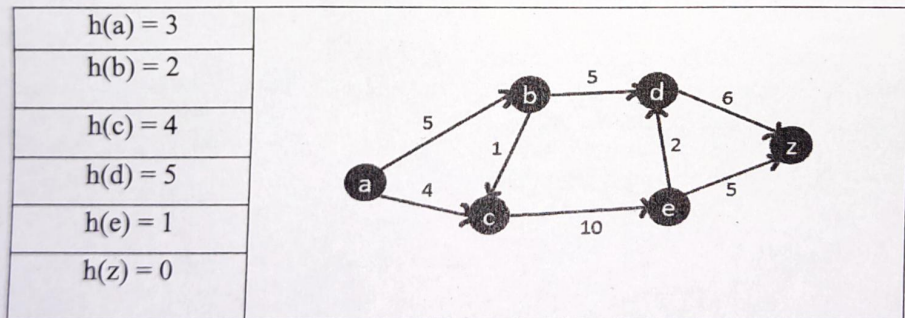
Time: 1.00 Hour.

Full Marks: 60

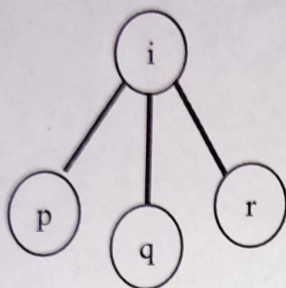
There are **Four** Questions. Answer any **three including questions #Q-1 and #Q-2**. All questions are of equal value. Figures in the right margin indicate marks.

1. a) As you know, UAP is the host of the prestigious ICPC World Final 2022. Targeting this mega event, suppose, you are developing a "Coffee Delivery Robot" for all the contestants of UAP CSE 7th floor. 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) static, dynamic, or semi-dynamic v) discrete or continuous, vi) single agent or multi-agent. Explain your answer with your own logic.

2. Your target is to reach the goal node 'z' from start node 'a' with the most optimum cost. Simulate the following 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**. The heuristic values of the 6 nodes are as follows. 20



3. a) Is AI different from machine learning (ML) and deep learning (DL)? Explain. 5
- b) Consider a state space where the start state is i and the successor function for state i return 3 states such as: p, q, r where $i = 4$. 15



$i = 4$ (Root)

$p = 2i - 1 = 2 \times 4 - 1 = 8 - 1 = 7$ (left child)

$q = 2i = 2 \times 4 = 8$ (middle child)

$r = 2i + 1 = 2 \times 4 + 1 = 8 + 1 = 9$ (right child)

Here p, q, r are the child of node i and each p, q, r node will have its own 3 child in the next level.

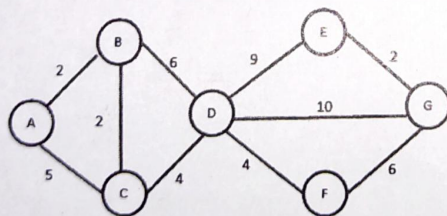
Here,

Leaf node value = $i + 26 = 30$

Goal node value = $i + 25 = 29$

- Draw a search tree from root node value i to leaf node value $(i + 26)$
- Suppose the goal state is $(i + 25)$. Find out the sequence/order in which the nodes will be visited for:
 - Breadth-First Search (BFS) and
 - Iterative Deepening Search (IDS)

4. a) "An AI agent interacts with its environment". Justify your answer with necessary diagram. 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_1 shown below. All the values are fixed except $h_1(B)$. 15



Node	h_1
A	10
B	?
C	9
D	7
E	1.5
F	4.5
G	0

- Determine what values of $h_1(B)$ make h_1 admissible?
- Determine what values of $h_1(B)$ make h_1 consistent?

$0 \leq h_1(B) \leq 10$

$0 \leq h_1(B) \leq 7$

University of Asia Pacific
Department of Computer Science & Engineering
Mid-Semester Examination Fall -2021
Program: B. Sc. Engineering

Course Title: Operating Systems Course No. 405 Credit: 3.00

Time: 1.00 Hours.

Full Mark: 60

There are **Four** Questions. Answer three questions including **Q-1 and Q-2**.

- 1.a) How can you define threads? Explain single and multithreaded processes. Show different types of multithreading models. 8
- b) What is critical section problem? Define the requirements for the critical section problem solution. Explain mutual exclusion using two-process example. 12
- 2.a) What is cooperating process? Explain process synchronization using producer-consumer example. 8
- b) How can you define context switching? Explain CPU switching from process to process with necessary diagram using two process examples. 12
- 3.a) Name and define the criteria for comparing CPU scheduling algorithms. 8
- b) Define priority scheduling. Consider the following four processes: 12

<u>Process</u>	<u>Priority</u>	<u>Burst Time</u>	<u>Arrival Time</u>
P ₁	4	8	0
P ₂	1	4	2
P ₃	2	9	3
P ₄	0	5	4

Draw the Gantt charts for the above scheduling method (both preemptive and nonpreemptive) and find the average waiting time.

OR

- 4.a) What is system call? Name and define different types of system calls. 8
- b) Write the steps which are performed by a system call using an appropriate example. 12

University of Asia Pacific
Department of Computer Science and Engineering
Mid-Semester Examination Fall-2021
Program: B.Sc. in CSE
Course Title: ICT Law, Policy and Ethics
Course No.: CSE 407, Credit: 2.00

Time: 1.00 Hour

Full Marks: 20

Answer any 2 (TWO) of the following questions.
(You MUST answer each part of a question consecutively)

1. Discuss different types of intellectual property rights. What is the punishment for infringing a copyrighted computer programme? Explain the Anton-Pillar Order?
(3+3+4)
2. Critically evaluate the scope and application of the Digital Security Act, 2018 with examples.
(10)
3. Explain the necessity of keeping public interest as a top priority by the software engineers as enshrined in the ACM-IEEE Code of Ethics for the software engineers.
(10)

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University of Asia Pacific

Department of Computer Science & Engineering

Mid-Semester Examination, Fall - 2021

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

Course Title: Mathematics for Computer Science **Course No.:** CSE 401 **Credit:** 3.0

Time: 1.00 Hours.

Full Mark: 60

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

1. (a) Define random valuable, sample point, sample space of an experiment. Suppose, two six-sided dice are rolled. What is the probability that the numbers on the two dice are same? [3*2=6+9=15]

- (b) In the die tossing example, if you supposed that all six numbers were equally likely to appear, then what you would have, explain your answer. [5]

2. (a) Consider the following Ackermann function:

$$A(m, n) = \begin{cases} n + 1, & \text{where, } m = 0 \\ A(m - 1, 1), & \text{where, } n = 0 \\ A(m - 1, A(m, n - 1)), & \text{otherwise} \end{cases}$$

Determine the value of $A(3, 8)$. [15]

- (b) Determine the expected value of getting tail from first coin toss. [5]

3. (a) Find out the Mean, Median, Mode of the given data set. [5*3=15]

Dataset	
Data 1	10
Data 2	9

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 $2^{n+2} + 3$

Data 3	15
Data 4	12
Data 5	12
Data 6	17

- (b) Identify the values of Googol and Googolplex.

[2.5*2=5]

Or,

4. (a) Suppose, we are working with the Josephus problem in which every second person is eliminated. Find out the solution for J (N) by using the general solution of Josephus problem. Where $N = 17$

[15]

- (b) Draw 5 lines in a plane to find out the maximum number of non-overlapping region.

[5]