University of Asia Pacific

Department of Computer Science and Engineering

Program: B.Sc. in CSE

Mid-Semester Examination **Spring-2023** **4th year 1st Semester**

Course Code: CSE401 Course Title: Mathematics for Computer Science Credit: 3.00

Time: 1.00 Hour. Full Mark: 20

There are Three Questions. Answer all of them. Part marks are shown in the margins.

1. a.	Let $m = 2^9 5^{24} 11^7 17^{12}$ and $n = 2^3 7^{22} 11^{211} 13^1 17^9 19^2$, compute mn by using *gcd* and *lcm*.	[3]	[CO1]
b.	Let Φ be Euler's function, compute $\Phi(500)$.	[4]	[CO1]
2.	Let $A(m,n)$ be Ackermann recurrence function and m, n are nonnegative integers, calculate the value of A(1, 1), A(2, 1) and A(3, 1) by using the formulas of Ackermann's recurrence function.	[6]	[CO3]
3.	Insert the keys 79, 69, 98, 72, 14, 50 into the hash table of size 13. Identify and resolve all collisions using double hashing where first hash-function is $h1(k)=k \bmod 13$ and second hash-function is $h2(k) = 1 + (k \bmod 11)$.	[7]	[CO2]

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Program: B. Sc. in CSE

Mid Semester Examination **Spring 2023** **4th Year 1st Semester**

Course No. CSE 403 Course Title: Artificial Intelligence and Expert Systems Credit: 3.00

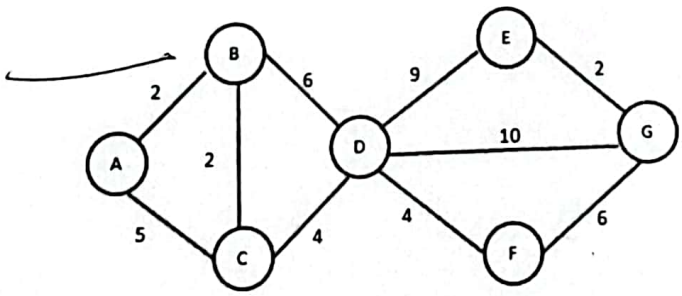
Time: 1.00 Hour. Full Marks: 20

There are **two** Questions. Answer all of them. Part marks are shown in the margins.

1. a) Explain the difference between artificial intelligence (AI), machine learning (ML) and deep learning (DL). Draw the hierarchical tree structure of AI mentioning all the sub-fields of AI. [2+2] CO1

b) Suppose two intelligent agents playing **"GO board game"**, where one of them is called **"AlphaGo"** (AI agent), and the other is called **"Lee Sedol"** (human being). Specify the **PEAS** for the agent " AlphaGo". [4] CO1

2. a) Consider the following state space graph where "A" is the start state and "G" is the goal state. Suppose, you are analyzing the heuristic function h_2 as shown below. All the values are fixed except $h_2(D)$. [5] CO2

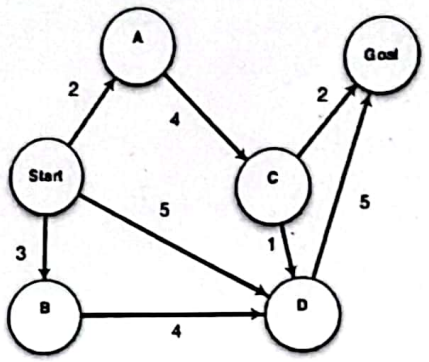


Node	A	B	C	D	E	F	G
h_2	11	9	7	?	5	5.5	0

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

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

b) Suppose, your target is to reach the goal node 'Goal' from start node 'Start' with the most optimum cost. Simulate the following graph problem with **A* algorithm**, draw the **search tree** and determine the optimal path **with fringe** for **each iteration**. Assume that states with earlier alphabetical order are expanded first if two nodes have the same evaluation values. The heuristic values, ***h(n)*** of the 6 nodes and the path costs, ***g(n)*** are given below. Here **% refers** to **mod** operation. [7] CO2

h(Start) = (Last 2 digits of id) % 3 + 5	
h(A) = (Last 2 digits of id) % 2 + 4	
h(B) = (Last 2 digits of id) % 4 + 3	
h(C) = h(a)+ 2	
h(D) = h(b)+ 3	
h(Goal) = 0	

---Good Luck---

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Program: B.Sc. in CSE

Mid-Semester Examination **Spring-2023** **4th year 1st Semester**

Course Code: 405 Course Title: Operating Systems Credit: 3

Time: 1.00 Hour. Full Mark: 20

There are Three Questions. Answer all of them. Part marks are shown in the margins.

1. a. Very briefly answer the following questions: **[6]** **[CO1]**
   i) Name the basic goals of an Operating System (OS).
   ii) Define the term 'Kernel' in terms of memory.
   iii) List the components of an OS.
   v) Name the functions as the services that provide by the OS.
   vi) What is system call?

   b. Explain single and multithreaded processes showing different types of multithreading models. **[2]** **[CO2]**

2. Give comparative analysis between FCFS SJFS scheduling. Consider the following four processes: **[7]** **[CO3]**

Process	Priority	Burst Time	Arrival Time
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 SJF scheduling method (both preemptive and nonpreemptive) and find the average waiting time.

3. a. Describe process states with state diagram. **[2]** **[CO2]**

   b. Explain different types of schedulers using queuing diagram of process scheduling. **[3]** **[CO3]**

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Program: B.Sc. in CSE

Mid-Semester Examination | **Spring-2023** | **4th Year 1st Semester**

Course Code: CSE-407 | Course Title: ICT Law, Policy and Ethics | Credit: 2.00

Time: 1 Hour | Full Marks: 20

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

1. Orpheus IT Ltd, a registered IT Firm of Bangladesh, is famous for its unique software services in the South Asian Region. They developed software called 'O Pie' for education management in the region. Schools and Universities using 'O Pie' can manage classes, students, results and other academic activities with ease and convenience. 'O Pie' is friendly for the users from all types of devices including phones, tabs, and laptops. Orpheus launched the system software in 2016 and ended their service due the company policy for making a new software powered with AI. [10]

   Suppose you are appointed as the chief engineer of Orpheus for implementation of the recent policy. After an initial analysis of the policy and the software you have found that the previous team who developed the software had linked the software with few companies who had access to demographic information of the students and some of those companies appeared in media headlines for targeted marketing of culturally sensitive stuff in some major cities of Bangladesh.

   Identify the rules of the ACM Code of Ethics and Professional Conduct that you should consider for taking decisions in your role.

2. a) Define 'law' with examples. [2]

   b) Explain the major organs of the state. [3]

   c) Briefly outline the structure of courts in Bangladesh. [5]

3. a) How can a Software Company obtain the license to issue digital signature certificates in Bangladesh? [4]

   b) Describe the functions of the Controller of Certifying Authorities. [6]

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Mid-Semester Examination Spring-2023

Program: B.Sc. in CSE

Course Title: Topic of Current Interests (ML) Course No. CSE 427 Credit: 3.00

Time: 1.00 Hour. Full Mark: 20

Instructions:

1. There are three (3) questions. Answer all of them. All questions are of equal value. Part marks are shown in the right margin.
2. Non-programmable calculators are allowed.

1. a. Explain the Naïve Bayes Algorithm. Why this algorithm is a popular choice for text related classification problems? [2] CO2

b. Consider the following dataset of patients – [7] CO3

Chills	Running Nose	Headache	Fever	Has Flu
Y	N	MILD	Y	N
Y	Y	NO	N	Y
Y	N	STRONG	Y	Y
N	Y	MILD	Y	Y
N	N	NO	N	N
N	Y	STRONG	Y	Y
N	Y	STRONG	N	N
Y	Y	MILD	Y	Y

Here, N means no and Y means yes. Considering the data mentioned above on a certain set of patients seen by a doctor, can the doctor conclude that a person having chills, fever, mild headache and without running nose has the flu? Solve this problem using Naïve Bayes Algorithm.

2. Normalize the following dataset - [2] CO3

X1	X2	X3
45	65	32
53	46	87
75	87	56

3. a. How the optimal centroid number can be selected for "K-Means" clustering algorithm? [2] CO2

b. Consider the following coordinate dataset – [7] CO3

A1	A2
2	10
2	5
8	4
5	8
7	5
6	4
1	2
4	9

Let us consider there are three centroids as C1 = (3,9), C2 = (4,6), and C3 = (2,3). Now assign the datapoints to their respective clusters and conduct two iterations to achieve three optimal clusters.