M.Sc.(AI).II/04.24.001 Reg.No.

C

M.Sc. COMPUTER SCIENCE WITH SPECIALIZATION IN ARTIFICIAL INTELLIGENCE SECOND SEMESTER EXAMINATION APRIL 2024

23-344-0201 COMPUTING PARADIGMS

(Regular)

Time: 3 Hours **Maximum Marks :50**

Each question carries 10 Marks

No		QUESTIONS	MARKS	CO	BL	PL
1	a	What is an Agile manifesto? Describe in detail.	4	CO1	L1	1.7.1
	b	Describe Scrum process and who constitutes scrum.	6	CO1	L2	1.7.1
		OR				
2	a	Describe CI and CD in DevOps and the relevance of CI/CD pipeline.	6	CO1	L2	1.7.1
	b	Describe the Agile risk management strategies.	4	CO1	L2	1.7.1
3	a	Describe Docker and its architecture.	6	CO2	L2	1.7.1
	b	Explain the use of the following Commands i) docker-compare ii) docker pull iii) docker rm iv) docker images	4	CO2	L1	1.7.1
		OR				
4	a	What is containerisation? List out the differences between containers and virtual machines.	5	CO2	L2	1.7.1
	b	Describe microservices and their difference from monolithic applications.	5	CO2	L2	1.7.1
5	a	Explain cloud deployment models.	10	CO3	L1	1.7.1
		OR				
6	a	Explain cloud based services.	6	CO3	L1	1.7.1
	b	Describe cloud computing architecture.	4	CO3	L2	1..7.1

7	a	Describe MLOps and principles of MLOps.	10	CO4	L2	1.7.1
		OR				
8	a	Explain MLFlow and its components.	5	CO4	L1	1.7.1
	b	Describe any five data pipeline tools.	5	CO4	L2	1.7.1
9	a	Explain CUDA and formulate the workflow of CUDA programming with an example.	10	CO5	L3	1.7.1
		OR				
10	a	Describe GPU architecture.	6	CO5	L2	1.7.1
	b	Discuss about the device memory management functions in CUDA.	4	CO5	L2	1.7.1

****

M.Sc.(AI).II/04.24.002 Reg.No. | | | | | | | | | | B

M.Sc. COMPUTER SCIENCE WITH SPECIALIZATION IN ARTIFICIAL INTELLIGENCE SECOND SEMESTER EXAMINATION APRIL 2024

23-344-0203 Ethics In Artificial Intelligence

(Regular)

Time: 3 Hours **Maximum Marks :50**

Each question carries 10 Marks

No		QUESTIONS	MARKS	CO	BL	PL
1		What are the ethical issues associated with the malfunction of AI cameras that are used for detecting and penalizing traffic rule violations? Suggest measures to make the system resilient against mispredictions.	10	CO1	L3	8.3.1
		OR				
2		Discuss the ethical issues surrounding free online tools, like photo editors and PDF resizers, regarding user security, data appropriation, human dignity and manipulation.	10	CO1	L3	8.3.1
3		Identify any four practices among the social networking companies that you find unethical. Suggest ethical norms against such practices from a deontological perspective.	10	CO2	L3	8.3.1
		OR				
4		Define norms (any five) to counter the threats of propaganda toolkits and deepfakes.	10	CO2	L3	8.3.1
5		Discuss the legal responsibilities behind analytical data collection and processing as laid down by DPDP act 2023.	10	CO3	L2	8.3.1
		OR				
6		Illustrate any five **aif360** functions used for bias mitigation.	10	CO3	L3	8.3.1

7		What are the consequences of bias in AI? Write any two scenarios where AI systems malfunctioned because of bias. What, according to you, is the root cause of the bias?	10	CO4	L3	8.3.1
		OR				
8		Discuss the features of any five bias assessment tools.	10	CO4	L2	8.3.1
9		Explain how accountability and transparency help to build trust on AI enabled systems. Write case scenarios to justify your answer.	10	CO5	L3	8.3.1
		OR				
10		Discuss the challenges of putting ethics in AI into practice.	10	CO5	L2	8.3.1

****

M.Sc.(AI).II/04.24.003 Reg.No.

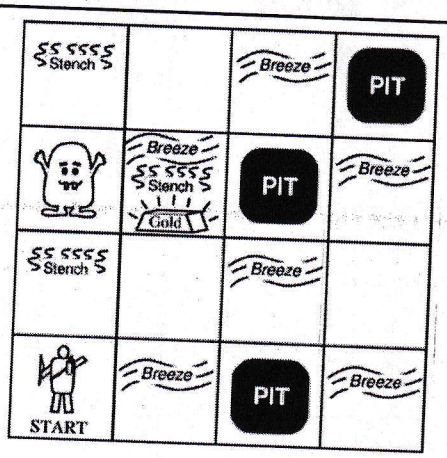
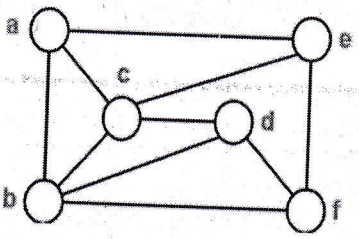
A

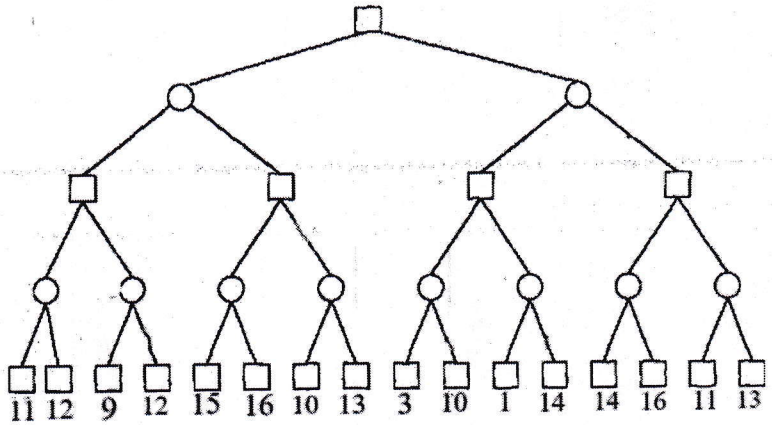
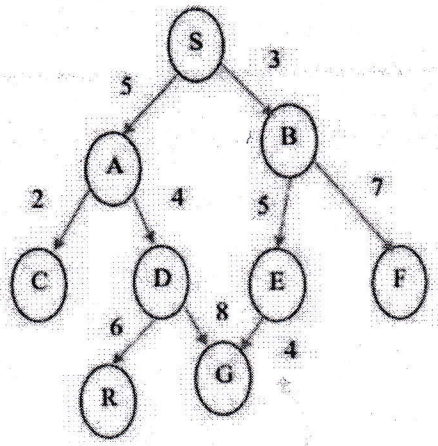
M.Sc. COMPUTER SCIENCE WITH SPECIALIZATION IN ARTIFICIAL INTELLIGENCE SECOND SEMESTER EXAMINATION APRIL 2024

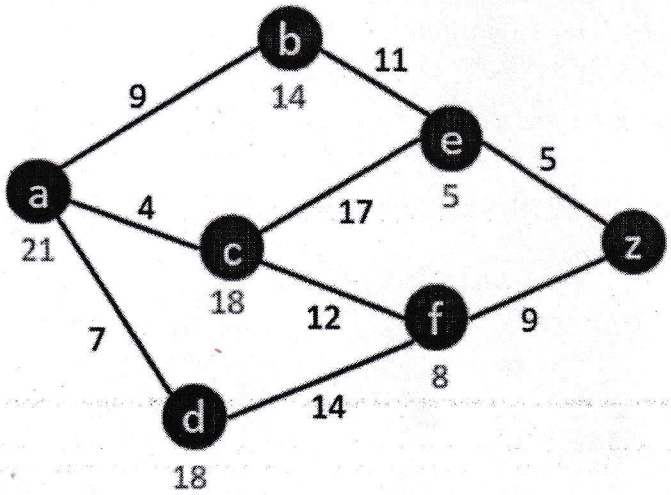
23-344-0204 Artificial Intelligence and Machine Learning
(Regular)

Time: 3 Hours **Maximum Marks :50**

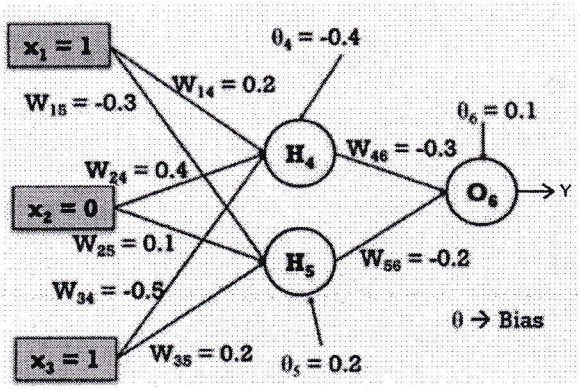
Each question carries 10 Marks

Qn No		Questions	Marks	CO	BL	PI
1	a	Solve the 8 queens problem using CSP.	4	CO1	L3	1.2.1
	b	 For the wumpus world problem, prove that the wumpus is in location (1,3) using propositional inference rules.	6	CO1	L3	1.2.1
		OR				
2	a	 Solve the above graph coloring problem using CSP with the domain (R, G, B).	4	CO2	L3	1.3.1
	b	Convert the following FOL statement to CNF: $\forall x \forall y\,(HAVE\,(x,y) \wedge CAT\,(y) \rightarrow \neg \exists z\,(HAVE(x,z) \wedge MOUSE\,(z)))$	4	CO2	L3	1.1.1

	c	For each pair of atomic sentences, give the most general unifier if it exists: (1) Older (Father (y), y), Older (Father (x), John) (2) Knows (Father (y), y), Knows (x, x)	2	CO2	L3	1.1.1
3		Explain in detail the different types of agent program?	10	CO2	L2	1.7.1
		OR				
4	a	Explain the concept of rationality?	3	CO2	L2	1.7.1
	b	Explain in detail the different characteristics of task environments?	7	CO2	L2	1.3.1
5		Explain Alpha - Beta pruning with suitable algorithm. Solve the following game tree using this technique.  	10	CO2	L3	1.2.1
		OR				
6	a	Perform Uniform Cost Search (UCS) on the following graph with initial node S and goal node G. Also mention the properties of UCS?  	5	CO3	L3	1.1.2

	b	Consider the following graph. The numbers written on edges represent the distance between the nodes. The numbers written on nodes represent the heuristic value. Find the most cost-effective path to reach from start state A to final state Z using A* Algorithm. Also mention the properties of A* search?  	5	CO3	L3	1.1.2
7		Apply K-Means clustering on the following set of data points: x_1: 2, 2, 5, 4, 8, 6, 5, 5, 6, 4 x_2: 4, 6, 6, 7, 3, 6, 2, 7, 3, 4 Let K=3 and use Euclidean distance as the similarity measure. Also, assume the initial centroids as: C_1: (x_1 = 4, x_2 = 1); C_2: (x_1 = 1, x_2 = 5); C_3: (x_1 = 8, x_2 = 4)	10	CO4	L3	1.3.1
		OR				
8		Given the following data points: P1(9, 7), P2(7, 5), P3(3, 7), P4(5, 6), P5(2, 3) and P6(2, 1), use Principal Component Analysis (PCA) to reduce the dimension from 2 to 1.	10	CO4	L3	1.2.1
9		Describe the perceptron learning algorithm and why linearly separable data can benefit from it. With the initial weights set to [0, 0] and the bias set to 0, apply the perceptron learning algorithm to get the ideal weights for a perceptron that implements a two-input OR gate.	10	CO5	L3	1.2.1

OR

10		The following figure shows a Multi-Layer Perceptron. Here, θ_0, θ_1 and θ_2 corresponds to the biases associated with the hidden layer neurons and the output neuron. For the given input, compute the updates in weights and biases for the network after performing one backward pass of the backprogation algorithm. Let the learning rate be 0.9 and the actual output (Y) is 1. Also, assume that the neurons have Sigmoid Activation function. 	**10**	**CO5**	**L3**	**1.3.1**

****

M.Sc.(AI).II/04.24.004 Reg.No. | | | | | | | | | |

C

M.SC. COMPUTER SCIENCE WITH SPECIALIZATION IN ARTIFICIAL INTELLIGENCE SECOND SEMESTER EXAMINATION, APRIL 2024

23-344-0213 DIGITAL IMAGE PROCESSING
(Regular)

Time: 3 Hours **Maximum Marks :50**

Each question carries 10 Marks

No		QUESTIONS	MARKS	CO	BL	PL
1	a.	Explain the spatial convolution with example.	6	CO1	L2	1.4.1
	b.	Explain contrast stretching with example.	4			
		OR				
2	a.	Explain image sampling and quantization with suitable examples.	6	CO1	L2	1.4.1
	b.	Design a first order derivative filter for image sharpening in spatial domain.	4			
3	a.	What is Discrete Fourier Transform (DFT)? Explain the basic steps for filtering in the frequency domain with DFT.	6	CO2	L2	1.4.1
	b.	Explain image smoothing using Gaussian lowpass filter in frequency domain.	4			
		OR				
4	a.	Explain different steps in the homomorphic filtering.	6	CO2	L2	1.4.1
	b.	Describe the band filters with examples.	4			
5	a.	Explain Adaptive Median Filter. Give the advantages of Adaptive Median Filter over traditional Median Filter.	6	CO3	L2	1.4.1
	b.	Explain the following: I. Midpoint Filter II. Periodic Noise	4			
		OR				
6	a.	Describe image degradation/restoration model with a neat diagram.	5	CO3	L2	1.4.1
	b.	What is salt and pepper noise? Explain how the salt and pepper noise can be reduced?	5			
7	a.	Explain in detail the Canny Edge Detector.	7	CO4	L3	1.4.1
	b.	Give the significance of Image Gradient in detection of edges.	3		L2	

		OR				
8	**a.** **b.**	Explain segmentation using K-Means clustering. Explain the following: I. Edge Models II. Thresholding	**6** **4**	**CO4**	**L3** **L2**	**1.4.1**
9		Explain in detail the Huffman Coding with example.	**10**	**CO5**	**L3**	**1.4.1**
		OR				
10		Explain in detail the Golomb Coding with example.	**10**	**CO5**	**L3**	**1.4.1**

****

M.Sc. (AI).II/04.24.005 Reg.No. | | | | | | | | | |

B

M.Sc. COMPUTER SCIENCE WITH SPECIALIZATION IN

ARTIFICIAL INTELLIGENCE SECOND SEMESTER EXAMINATION, APRIL 2024

23-344-0202 ADVANCED DATABASE TECHNOLOGIES

(Regular)

Time: 3 Hours **Maximum Marks :50**

Each question carries 10 Marks

No		QUESTIONS	MARKS	CO	BL	PL
1	a.	What are the key points and differences between sharding and partitioning in a distributed database system?	5	CO1	L2	1.7.1
	b.	Discuss the concept of sharding in relational databases, including the challenges of data distribution, data consistency, and handling shard failures.	5	CO1	L2	1.7.1
		OR				
2		What are the main differences between parallel and distributed database architectures, and when would you choose one over the other?	10	CO1	L2	1.7.1
3		Using MongoDB shell, write MongoDB commands to do the following : I. Insert a new document into the `products` collection with fields: name - "Laptop", price - 1200, and category - "Electronics". II. Update the price of the product with name "Smartphone" in the products collection to 800. III. Delete all documents from the orders collection where the status is "cancelled". IV. Find all documents in the customers collection where the age is greater than 30 and sort them in descending order of their age.	10	CO2	L3	1.7.1
		OR				
4		In a MongoDB collection named employees, each document represents an employee with fields: name (string), age (integer), department (string), and isManager	10	CO2	L3	1.7.1

		(boolean). Write MongoDB commands to perform the following operations: I. Create an index on the name field for efficient querying. II. Update all employees in the "IT" department who are not managers to set their age to 35 and remove the isManager field using the unset operator. III. Find employees who are either managers or aged 40 or above in the "Sales" department, selecting only the name and department fields. IV. Check if any employee exists with the name "John Doe" and is aged 30.				
5	a.	Explain XML date format in detail. Describe the structure of XML data with suitable examples.	4	CO3	L3	1.7.1
	b.	For the given XML representation : *Uni = (setof(Dept), setof(Course), setof(Teaches), setof(Instructor),)* *Dept = ept_name, building, budget* *Course = title, credit, course_id, dept_name* *Teaches = IID, course_id* *Instructor = IID, name, dept_name* Write XQuery to; I. Display details of all courses along with details of instructors who teach them. II. Display names of all departments along with the sum of salaries of instructors in that department. III. Find names of those courses which have the same credit value.	6	CO3	L3	1.7.1
		OR				
6	a.	What is JSON ? Explain how JSON can be used in python with suitable examples.	5	CO3	L3	1.7.1
	b.	Explain in detail how XML is stored in databases.	5	CO3	L2	1.7.1
7	a.	Imagine creating a web application using Firebase for students of a class to upload their details and a photo of their aadhar card. Explain in detail all steps required to create this application. Use at least 4 firebase services and explain how these services can be incorporated / modified to suit your application.	10	CO4	L3	1.7.1
		OR				

8	a.	What are the different authentication methods in Firebase?	5	CO4	L1	1.7.1
	b.	Explain Firebase security rules, its key capabilities and Firebase security rule language in detail.	5	CO4	L1	1.7.1
9	a.	Explain map- reduce architecture. Consider a problem to count the number of occurrences of each word in a paragraph. Explain how map reduce can be used to solve above problem.	10	CO5	L3	1.7.1
		OR				
10	a.	Describe Hive workflow in detail.	5	CO5	L2	1.7.1
	b.	Explain HDFS architecture.	5	CO5	L1	1.7.1

****