Subject Code: 22AM501PC | SET-II | HT NO: 7 R

CMR TECHNICAL CAMPUS

UGC AUTONOMOUS

B. Tech. V Semester Regular/Supply End Examinations, November-2025

Design and Analysis of Algorithms

Common to CSM, AIML

Time: 3 Hours **Max. Marks: 60**

Note

i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

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PART-A

10 X 01= 10 Marks

			Marks	CO	BL
1.	a	List Asymptotic Notations.	1	CO1	L1
	b	What are the applications of Divide and conquer?	1	CO1	L1
	c	How does Disjoint set operations helps to improve efficiency of an algorithm.	1	CO2	L2
	d	Define Hamiltonian cycle.	1	CO2	L1
	e	What is the need of Optimal Binary Search Tree?	1	CO3	L1
	f	Differentiate feasible solution and optimal solution.	1	CO3	L2
	g	What is the time complexity of knapsack problem for all cases.	1	CO4	L1
	h	Differentiate Prims and Kruskal's algorithm.	1	CO4	L2
	i	What are non-deterministic algorithms?	1	CO5	L1
	j	List the NP-Hard problems in algorithms.	1	CO5	L1

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.	a	Write the algorithm for Quick sort and analyse its time complexity.	5	CO1	L2
	b	Explain Binary search algorithm with an example.	5	CO1	L2
		OR			
3	a	Discuss about i) constant time ii) quadratic time iii) linear time and iv) logarithmic time with examples.	5	CO1	L2
	b	Differentiate Quick sort and Merge sort with respect to optimization, time and space complexities.	5	CO1	L4

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4	a	Explain how heaps are constructed and used in priority queues.	5	CO2	L2
	b	Explain the Hamiltonian cycle problem and how backtracking can solve it.	5	CO2	L2
		OR			
5	a	Solve the sum-of-subsets problem for a given set of numbers using backtracking.	5	CO2	L3
	b	Illustrate the process of heapify operation with an example.	5	CO2	L2
6	a	Write the steps involved in solving the 0/1 knapsack problem using a dynamic programming table.	5	CO3	L2
	b	Explain the concept of single source shortest path problem with an example	5	CO3	L2
		OR			
7	a	Discuss the reliability design problem and its applications in real-world scenarios.	5	CO3	L2
	b	Describe how the traveling salesperson problem can be solved using dynamic programming.	5	CO3	L2
8	a	Describe how the breadth-first search (BFS) algorithm is used to find connected components in a graph.	5	CO4	L2
	b	Write a short note on depth-first search (DFS) and its applications in graph traversal.	5	CO4	L2
		OR			
9	a	Discuss the differences between the greedy method and dynamic programming.	5	CO4	L4
	b	Explain the greedy approach to solving the fractional knapsack problem with an example.	5	CO4	L2
10	a	Explain the difference between polynomial time and non-polynomial time algorithms.	5	CO5	L4
	b	Discuss the concept of FIFO branch and bound with an example	5	CO5	L2
		OR			
11	a	Write a short note on the LC branch-and-bound method with an example.	5	CO5	L2
	b	Discuss about P,NP, NP-Hard and NP-Complete Problems.	5	CO5	L2

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B. Tech. V Semester Regular/Supply End Examinations, November-2025
Machine Learning
Common to IT, CSM, AIML

Time: 3 Hours **Max. Marks: 60**

Note

i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

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PART-A

10 X 01= 10 Marks

			Marks	CO	BL
1.	a	What is unsupervised learning?	1	CO1	L1
	b	Explain linear separability.	1	CO1	L2
	c	State the curse of dimensionality.	1	CO2	L1
	d	What is the role of support vector machines?	1	CO2	L2
	e	Mention one use of ensemble learning.	1	CO3	L1
	f	Describe bagging in machine learning.	1	CO3	L2
	g	Define factor analysis.	1	CO4	L1
	h	How are genetic algorithms used in optimization?	1	CO4	L2
	i	What is reinforcement learning?	1	CO5	L1
	j	State the purpose of hidden Markov models.	1	CO5	L2

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.	a	Describe the types of machine learning with suitable examples	5	CO1	L2
	b	Explain the candidate elimination algorithm with an example.	5	CO1	L3
		OR			
3	a	Discuss linear regression and its use in supervised learning	5	CO1	L2
	b	What are the challenges in designing a learning system?	5	CO1	L4
4	a	Explain the curse of dimensionality and how it affects machine learning models.	5	CO2	L4

	b	Compare multilayer perceptrons (MLPs) and support vector machines (SVMs).	5	CO2	L4
		OR			
5	a	Derive the backpropagation algorithm	5	CO2	L4
	b	Discuss the importance of radial basis function networks in regression problems.	5	CO2	L3
6	a	Explain how decision trees are constructed for classification tasks.	5	CO3	L3
	b	Discuss the advantages of bagging in improving model performance.	5	CO3	L4
		OR			
7	a	Write about unsupervised learning using the K-means algorithm.	5	CO3	L3
	b	Describe the Gaussian mixture model and its applications.	5	CO3	L4
8	a	Explain dimensionality reduction using PCA.	5	CO4	L3
	b	Discuss the various genetic operators used in genetic algorithms.	5	CO4	L4
		OR			
9	a	What is Isomap? Explain its application in data visualization.	5	CO4	L4
	b	Compare PCA and factor analysis in feature extraction.	5	CO4	L4
10	a	Describe the process of reinforcement learning with an example.	5	CO5	L3
	b	Explain how graphical models are used in Bayesian networks.	5	CO5	L4
		OR			
11	a	What are Markov random fields? How are they different from Bayesian networks?	5	CO5	L3
	b	Discuss the tracking methods used in hidden Markov models	5	CO5	L4

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CMR TECHNICAL CAMPUS

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B. Tech. V Semester Regular/Supply End Examinations, November-2025

Computer Networks

Common to CSE, CSM, CSD, AIML

Time: 3 Hours **Max. Marks: 60**

Note

i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

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PART-A

10 X 01= 10 Marks

			Marks	CO	BL
1.	a	Name any two guided transmission media.	1	CO1	L1
	b	What is the function of the physical layer?	1	CO1	L2
	c	What does a Sliding Window Protocol do?	1	CO2	L2
	d	Give one example of a data link protocol.	1	CO2	L1
	e	What is the difference between broadcast and multicast?	1	CO3	L2
	f	What is Quality of Service (QoS)?	1	CO3	L1
	g	Name two transport protocols.	1	CO4	L1
	h	What does **UDP** stand for?	1	CO4	L1
	i	What does SNMP stand for?	1	CO5	L1
	j	Name one example of streaming live media.	1	CO5	L2

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.	a	Explain how wireless transmission works at the physical layer.	5	CO1	L2
	b	Analyze the impact of coaxial cable vs wireless transmission for network reliability.	5	CO1	L4

OR

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3	a	Illustrate the hardware components of a network with real-world examples.	5	CO1	L3
	b	Assess the importance of guided vs unguided media for modern internet networks.	5	CO1	L5
4	a	Discuss the differences between Stop-and-Wait and Sliding Window protocols.	5	CO2	L4
	b	Describe Carrier Sense Multiple Access (CSMA) and its variants.	5	CO2	L2
		OR			
5	a	Apply the concept of ALOHA in a real-world wireless communication scenario.	5	CO2	L3
	b	Assess the role of data link layer switching in reducing network congestion.	5	CO2	L5
6	a	Analyze the significance of hierarchical routing in large-scale networks.	5	CO3	L4
	b	Evaluate the impact of multicasting on network performance.	5	CO3	L5
		OR			
7	a	Illustrate the use of QoS techniques in managing internet traffic.	5	CO3	L3
	b	Discuss the role of the network layer in the internet and its challenges.	5	CO3	L5
8	a	Evaluate performance issues in transport layer design.	5	CO4	L5
	b	Apply multiplexing techniques to a practical network setup.	5	CO4	L3
		OR			
9	a	Illustrate the significance of addressing in transport services.	5	CO4	L2
	b	Assess how transport protocols ensure reliability in real-world systems.	5	CO4	L5
10	a	Evaluate the role of **SNMP** in network management.	5	CO5	L5
	b	Apply the concept of real-time conferences in modern communication systems.	5	CO5	L3
		OR			
11	a	Illustrate the working of digital audio and video in streaming applications.	5	CO5	L3
	b	Assess the challenges faced in **real-time media streaming**.	5	CO5	L5

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B. Tech. V Semester Regular/Supply End Examinations, November-2025

INTRODUCTION TO DATA SCIENCE

Common to CSM, AIML

Time: 3 Hours **Max. Marks: 60**

Note

i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

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PART-A

10 X 01 = 10 Marks

			Marks	CO	BL
1.	a	Define Data Science.	1	CO1	1
	b	What is Overfitting?	1	CO1	1
	c	Define Asymmetric Binary Attribute.	1	CO2	1
	d	What is Range of a dataset?	1	CO2	1
	e	Define an Ordered Factor and give an example.	1	CO3	1
	f	What is meant by Matrix Class in R?	1	CO3	1
	g	Write the syntax of a while loop in R.	1	CO4	2
	h	What are Logical Operators?	1	CO4	1
	i	Define Scatter Plot.	1	CO5	1
	j	What is the purpose of the R^2 metric in regression?	1	CO5	2

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.	a	Explain how overfitting can cause wrong or misleading decisions in data science.	5	CO1	4
	b	How do probability distributions help us choose a suitable statistical model?	5	CO1	2
		OR			
3	a	What is Statistical Modelling? Why is it important?	5	CO1	2
	b	Explain how Big Data makes traditional statistical methods difficult.	5	CO1	5
4	a	Explain different types of attributes with suitable examples.	5	CO2	2

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	b	Explain in detail the different measures of how spread out the data is (dispersion).	5	CO2	2
		OR			
5	a	A dataset contains salaries, age groups, and city categories. Identify the type of each attribute and explain how they should be pre-processed.	5	CO2	4
	b	Explain different graphical methods used to describe data.	5	CO2	2
6	a	Explain Vector Arithmetic in R with examples	5	CO3	2
	b	Create a sample data frame and show how to sort it, filter (subset) it, and add new data to it.	5	CO3	6
		OR			
7	a	Write short notes on Lists in R and how to work with them.	5	CO3	2
	b	Explain the different ways to extract specific parts of a matrix in R.	5	CO3	2
8	a	Write an R program that uses if-conditions and loops to simulate 50 coin tosses and calculate simple probabilities.	5	CO4	3
	b	Explain how to loop through the elements of a list in R.	5	CO4	2
		OR			
9	a	Explain the concept of Function Scoping and Recursion in R.	5	CO4	2
	b	Write steps to load and use an R package.	5	CO4	3
10	a	Explain Bar Plots, Histograms and Density Plots with examples.	5	CO5	2
	b	Describe Multiple Linear Regression.	5	CO5	2
		OR			
11	a	Explain Annotations and Drawing on a Subplot.	5	CO5	2
	b	Explain how to save a plot as a file in R or Python.	5	CO5	2

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