CBCS SCHEME

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BAI602

Sixth Semester B.E/B.Tech. Degree Examination, Dec.2025/Jan.2026
Machine Learning – I

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
1	a.	What is Machine Learning? Why machine learning has become popular specify the reasons.	5	L2	CO1
	b.	Describe the significant relationship of ML with respect to other fields.	8	L2	CO1
	c.	Explain supervised learning and its methods.	7	L2	CO1
		OR			
2	a.	Demonstrate the Big data analysis framework.	6	L	CO
	b.	Define the terms : i) Central Tendency ii) Dispersion.	6	L	CO
	c.	Explain Data Integration and Data Transformation. Apply Min-Mix procedure to the set V = {88, 90, 92, 40} and map the marks to a new range 0 – 1.	8	L	CO
		Module – 2			
3	a.	What is Bivariate Data? Define bivariate statistics with an example.	8	L1	CO2
	b.	Define the terms : i) Heatmap ii) Pairplot	4	L1	CO2
	c.	Illustrate the procedure for applying gaussion elimination and solve the following set of equations using Gaussian elimination method : $2x_1 + 4x_2 = 6$ $4x_1 + 3x_2 = 7$.	8	L3	CO2
		OR			
4	a.	What is PCA? Explain the steps of Principal Component Analysis (PCA) algorithm.	8	L2	CO2
	b.	Explain Training, Testing and validation sets with suitable diagram.	6	L2	CO2
	c.	What is Probability distributions? Specify any two continuous probability distributions.	6	L1	CO2
		Module – 3			
5	a.	Compare the difference between Instance-based and Model-based learning.	5	L2	CO3
	b.	Illustrate the steps of K-Nearest Neighbor Algorithm.	5	L2	CO3
	c.	Apply the Locally Weighted Regression (LWR) for the given example below. Assuming $\beta_0 = 4.72$, $\beta_1 = 0.62$, F = 0.4.	10	L2	CO3

Sl.No.	Salary (lakhs)	Expenditure (in thousands)
1	5	25
2	1	5
3	2	7
4	1	8

Given test instance with x = 2.

		OR			
6	a.	Demonstrate the linearity, correlation, and causation with suitable diagram.	8	L2	CO3
	b.	Consider a below dataset of the no. of house and shopping mall stays open and the sales of a product. This is tabulated in table, Q6(a). Predict the sales of the product of house 10 and 12. Using Linear Regression Approach.	8	L3	CO3

Houses (opened) X_i	Product sales (in thousands) Y_i
1	30
2	38
3	48
4	58
5	65

	c.	Classify the types of Regression Methods.	4	L2	CO3
		Module – 4			
7	a.	Explain the advantages and disadvantages of Decision Trees.	6	L2	CO4
	b.	Illustrate the procedure to construct a decision tree using ID3.	8	L2	CO4
	c.	Explain validating and pruning of decision trees.	6	L2	CO4
		OR			
8	a.	Explain the fundaments of Bayes Theorem.	4	L2	CO4
	b.	Demonstrate Bayes theorem, Maximum A Posteriori (MAP) hypothesis, h_{MAP} and Maximum Likelihood hypothesis h_{ML}.	8	L2	CO4
	c.	Illustrate the algorithm of Navie Bayes and explain the popular variants of Bayes optimal classifier.	8	L2	CO4
		Module – 5			
9	a.	Explain the different activation functions used in ANN.	6	L2	CO4
	b.	Illustrate the various types of Artificial Neural Networks.	8	L2	CO4
	c.	Explain the Perception Model and the algorithm.	6	L2	CO4
		OR			
10	a.	Illustrate the applications and challenges of clustering algorithms.	6	L2	CO5
	b.	Consider the following set of data given in the below table. Cluster it using K-means algorithm with the initial value of objects 2 and 5 with the coordinate values (4, 6) and (12, 4) as initial seeds.	10	L3	CO5

objects	X-coordinate	Y-coordinate
1	2	4
2	4	6
3	6	8
4	10	4
5	12	4

	c.	Explain the Density-Based methods.	4	L2	CO5

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