CBCS SCHEME

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BCS602

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

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
Q.1	a.	Explain the machine learning process and its applications with a suitable diagram.	6	L2	CO1
	b.	Explain the purpose of dimensionality reduction and its importance in the domain of machine learning.	8	L2	CO1
	c.	Write short notes on the following : i) Min-Max Scaling ii) Z-score iii) Mean iv) Standard Deviation v) Median vi) Dispersion.	6	L2	CO1
		OR			
Q.2	a.	Explain the elements of Big Data, data types, and Big Data analytics in relation to Machine Learning.	6	L2	CO1
	b.	Explain data collection and data pre-processing.	8	L2	CO1
	c.	Explain the removal of noise or outlier data with a suitable example.	6	L2	CO1
		Module – 2			
Q.3	a.	Explain the Gaussian Elimination Algorithm and Solve the following problem $x + y + z = 2$ $x + 2y + 3z = 5$ $2x + 3y + 4z = 11$	10	L3	CO2
	b.	Explain the Types of Machine Learning (ML)	4	L2	CO2
	c.	Illustrate PCA, why it is important, and write the PCA Algorithm.	6	L3	CO2
		OR			
Q.4	a.	Solve the problem using the Find – S Algorithm :	10	L3	CO2

S. No	Horns	Tail	Tusks	Paws	Fur	Color	Hooves	Size	Elephant
1	No	Short	Yes	No	No	Black	No	Big	Yes
2	Yes	Short	No	No	No	Brown	Yes	Medium	No
3	No	Short	Yes	No	No	Black	No	Medium	Yes
4	No	Long	No	Yes	Yes	White	No	Medium	No
5	No	Short	Yes	Yes	Yes	Black	No	Big	Yes

			Marks	Level	CO
	b.	Write a short note on Binomial Distribution, Poisson Distribution and Bernoulli Distribution.	4	L2	CO2
	c.	Explain LU Decomposition and solve the following problem $A = \begin{bmatrix} 2 & 3 & 1 \\ 4 & 7 & 3 \\ 6 & 18 & 5 \end{bmatrix}$	6	L3	CO2

Module – 3

Q.5 a. Explain the KNN algorithm and solve the following problem :
In the KPSC exam, candidates secured the following marks. Based on those obtained marks, categorize whether the candidate is eligible for the exam or not using K-Nearest Neighbors. Given instance as follows :

- General Studies X(O1) = 07
- Computer Science Y(O2) = 6
- Language = 4
- K = 3 nearest neighbors

Note : Training data is provided, where O represents observable values.

General Studies	Computer Science	Languages	Eligible
4	3	5	Fail
6	7	8	Pass
6	8	6	Pass
5	5	4	Fail
8	8	9	Pass

(10, L3, CO3)

b. Explain the Local Weighted KNN, Logistic Regression, and Nearest centroid classifier algorithms. (10, L3, CO3)

OR

Q.6 a. Explain Linear Regression and Polynomial Regression and solve a Linear Regression problem :
Apply linear regression technique to predict the 7th week sales

Table : Sample data

X (week)	Y (Sales in Thousands)
1	1.2
2	1.8
3	2.6
4	3.2
5	3.8

(10, L3, CO3)

b. Explain ID3 algorithm and solve the following problem :

Age	Competition	Type	Profit
Old	Yes	S/W	Down
Old	No	S/W	Down
Old	No	H/W	Down
Mid	Yes	S/W	Down
Mid	Yes	H/W	Down
Mid	No	H/W	Up
Mid	No	S/W	Up
New	Yes	S/W	Up
New	No	H/W	Up
New	No	S/W	Up

(10, L3, CO3)

		Module – 4			
Q.7	a.	Explain Baye's Theorem and Bayes' optimal classifier.	8	L2	CO4
	b.	Explain the Naïve Bayes algorithm and solve the problem using the Naïve Bayes classifier. Classify using Naïve Bayes' for the new sample : (fruit = {yellow, sweet, long}) Data :	12	L3	CO4

Fruit	Yellow	Sweet	Long
Orange	350	450	0
Banana	400	300	350
Others	50	100	50

OR

Q.8	a.	Write a note on : i) Perceptron ii) Different types of Artificial Neural Network with a suitable diagram.	8	L2	CO4
	b.	Explain the ANN Node structure and all its associated activation function with suitable mathematical notations.	12	L2	CO4

Module – 5

Q.9	a.	Write a short note on Clustering and classification along with advantages and disadvantages of the clustering algorithm.	6	L2	CO5
	b.	Explain the proximity measures.	6	L2	CO5
	c.	Explain the Mean Shift Clustering Algorithm and solve the following problem. Start with point P1(1, 1) P1 = (1, 1) P2 = (2, 1) P3 = (2, 2) P4 = (8, 8) P5 = (9, 8) P6 = (8, 9) Mean shift clustering using a bandwidth (radius) of 4 units. Stopping threshold : Stop when the new center moves less than 0.01	8	L3	CO5

OR

Q.10	a.	Explain the K-Mean clustering algorithm and solve the following problem.	12	L3	CO5

Point	X	Y
A	1	1
B	1.5	2
C	3	4
D	5	7
E	3.5	5
F	4.5	5
G	3.5	4.5

Lets apply K-Means with K = 2

	b.	Short note on : Monte Carlo method, temporal difference learning, Q-learning and SARSA learning.	8	L2	CO5

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