BPCET LIBRARY BANGALORE-A9

CBCS SCHEME

USN | | | | | | | | | | |

BCS/IS602

Sixth Semester B.E./B.Tech. Degree Examination, June/July 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.	Define Machine Learning. Explain different types of machine learning.	10	L2	CO1
	b.	Consider the following set : S = {12, 14, 19, 22, 24, 26, 28, 31, 32}. Apply various binning techniques and show the result.	6	L3	CO1
	c.	Differentiate between the four types of attributes used in data analysis. Give suitable examples.	4	L2	CO1
		OR			
Q.2	a.	Explain machine learning process model with neat diagram and list any two applications of machine learning.	10	L2	CO1
	b.	Consider the set : V = {88, 90, 92, 94}. Apply min-max procedure and map the marks to a new range 0 – 1.	6	L3	CO1
	c.	Explain any four data visualization techniques used for univariate data analysis.	4	L2	CO1
		Module – 2			
Q.3	a.	Demonstrate Find-S algorithm for finding maximally specific hypothesis on the given dataset in Table 3(a). Table 3(a) Origin | Manufacture | Color | Year | Type | Class Japan | Honda | Blue | 1980 | Economy | Yes Japan | Toyota | Green | 1970 | Sport | No Japan | Toyota | Blue | 1990 | Economy | Yes USA | Audi | Red | 1980 | Economy | No Japan | Honda | White | 1980 | Economy | Yes Japan | Toyota | Green | 1980 | Economy | Yes Japan | Honda | Red | 1980 | Economy | No	10	L3	CO2
	b.	Write steps involved in PCA (Principal Component Analysis) algorithm.	5	L2	CO2
	c.	Explain any five metrics used to evaluate the performance of machine learning model.	5	L2	CO2

OR

Q.4 **a.** Apply Candidate Elimination Algorithm (CEA) on the following dataset in Table 4(a) and determine the final version space. **10 L3 CO2**

Table 4(a)

Sl. No. Example	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

b. Explain Bivariate Statistics. Describe covariance and correlation with formulas and interpretation. **5 L2 CO2**

c. Explain Re-sampling methods for model evaluation. **5 L2 CO2**

Module – 3

Q.5 **a.** Using the K-Nearest Neighbors (KNN) algorithm with K = 3 and Euclidean distance, classify the result of student having (CGPA = 6.1, Assessment = 40, Project submitted = 5) based on dataset in Table 5(a). **10 L3 CO3**

Table 5(a)

Sl. No.	CGPA	Assessment	Project Submitted	Result
1	9.2	85	8	Pass
2	8	80	7	Pass
3	8.5	81	8	Pass
4	6	45	5	Fail
5	6.5	50	4	Fail
6	8.2	72	7	Pass
7	5.8	38	5	Fail
8	8.9	91	9	Pass

b. List and explain different types of regression methods used in machine learning. **4 L2 CO3**

c. Explain the procedure to construct a decision tree using ID_3 algorithm. **6 L2 CO3**

OR

Q.6 **a.** Explain nearest centroid classifier and classify test instance (6, 5) using dataset in Table 6(a). Show all steps involved. **10 L3 CO3**

Table 6(a)

X	Y	Class
3	1	A
5	2	A
4	3	A
7	6	B
6	7	B
8	5	B

	b.	Explain concept of logistic regression with its mathematical model and application.	4	L2	CO3
	c.	Explain how the C4.5 algorithm constructs a decision tree for dataset with discrete valued attributes.	6	L2	CO3
		Module – 4			
Q.7	a.	Explain Naive Bayes algorithm. Mention its applications and limitation.	10	L3	CO4
	b.	Explain simple model of an artificial neuron and the structure of an Artificial Neural Network (ANN). Also describe any four activation functions.	10	L2	CO4
		OR			
Q.8	a.	With a diagram of the Perceptron Model, explain the perceptron learning algorithm.	10	L3	CO4
	b.	Explain different types of Artificial Neural Network (ANNs) and list the major challenges associated with ANN.	10	L2	CO4
		Module – 5			
Q.9	a.	Explain different hierarchical clustering algorithms and describe linkage criteria used.	10	L3	CO5
	b.	Explain density based clustering with DBSCAN. Mention its advantages.	10	L2	CO5
		OR			
Q.10	a.	Explain Reinforcement Learning (RL), its characteristics and challenges.	10	L2	CO5
	b.	Explain the Q-learning algorithm with its steps and formulas.	10	L2	CO5

* * * * *

VTU-01-06-2026 01:11:25pm - EP - EP - EP