Seat No: ..... **Enrollment No: .....**

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech/Int. B.Tech, Summer 2024-25 Examination

Semester: VI / X **Date: 16-04-2025**
Subject Code: 303105353 **Time: 2.00 pm to 4.30 pm**
Subject Name: Machine Learning (Semester 6,10) **Total Marks: 60**

Instructions:

1. This question paper comprises of two sections. Write answer of both the sections in separate answer books.
2. From Section A, **Q.1** is compulsory, From Section B, **Q.1** is compulsory.
3. Figures to the right indicate full marks
4. Draw neat and clean drawings & Make suitable assumptions wherever necessary.
5. Start new question on new page.
6. BT- Blooms Taxonomy Levels – Remember-1, Understand -2, Apply-3, Analyse-4, Evaluate-5, Create-6

SECTION - A

Q.1	Answer the following questions.	**Marks**	**CO**	**BT**
	A. Attempt the following questions: (a) Define the sample complexity in PAC learning. (b) What is Bayes' Theorem, and why is it important in probability theory? (c) How does version space work?	06	CO1	BT1
	B. Attempt the following questions: (a) What is the importance of model selection in machine learning? (b) Why it is necessary to set up the environment before training a model? (c) Name two common techniques used to evaluate machine learning models.	06	CO1	BT2
Q.2	A. What are the common challenges in setting up a Machine Learning environment?	04	CO1	BT2
	B. Define a perceptron. How does it function in classification tasks?	05	CO1	BT2
	OR			
	B. Differentiate between linear and non-linear classification.	05	CO1	BT5
Q.3	A. What is the significance of "overlapping clusters" in fuzzy clustering?	04	CO2	BT4
	B. How does backpropagation work in a multi-layer perceptron?	05	CO2	BT5
	OR			
	B. Explain the working of Multilinear Regression with an example.	05	CO4	BT1

SECTION - B

Q.1	Answer the following questions.	**Marks**	**CO**	**BT**
	A. Attempt the following questions: (a) What is cross-validation in Machine Learning? (b) How does cross-validation help in reducing model overfitting? (c) Which cross-validation technique is commonly used to ensure a balanced error estimation?	06	CO3, CO4	BT2
	B. Attempt the following questions: (a) What is the basic assumption behind the Naïve Bayes Classifier?	06	CO1	BT3

	(b) Which probability theorem is the foundation of the Naïve Bayes algorithm? (c) Name one common application of the Naïve Bayes Classifier.			
Q.2	A. What are "rewards" in RL?	04	CO2	BT2
	B. Discuss the importance of preprocessing in Machine Learning.	05	CO1	BT1
	OR			
	B. How does the perceptron learning rule adjust weights in a classification problem?	05	CO1	BT2
Q.3	A. In simple words, describe what a "partition" means in the context of clustering.	04	CO2	BT1
	B. What is McNemar’s test, and in what scenarios is it used for classifier evaluation?	05	CO1	BT2
	OR			
	B. Why is the perceptron algorithm unable to learn from non-linearly separable data?	05	CO1	BT2