Mahindra University Hyderabad
École Centrale School of Engineering,
Minor-2 Examination
Program: B.Tech Branch: Computation & Mathematics Year: III
Semester: II
Subject: Mathematical Foundations for Machine Learning (MA3219)

Date: 15/04/2025 Start Time: 10.00 AM
Time Duration: 1.5 Hours Max. Marks: 20

Instructions:

1. All questions are compulsory. For questions 2 and 4, tables are in page 2.

Course Outcomes:

1. Understand the Fundamentals: Gain a solid foundation in machine learning concepts, including types, mathematical setups, and feasibility.
2. Master Key Techniques: Learn and apply essential machine learning techniques such as Bayesian Decision Theory, Maximum Likelihood estimation, Naïve-Bayes Classifier, EM algorithm, SVMs, Decision Trees, and Clustering.
3. Develop Analytical Skills: Analyze and evaluate the performance of various machine learning models and techniques.

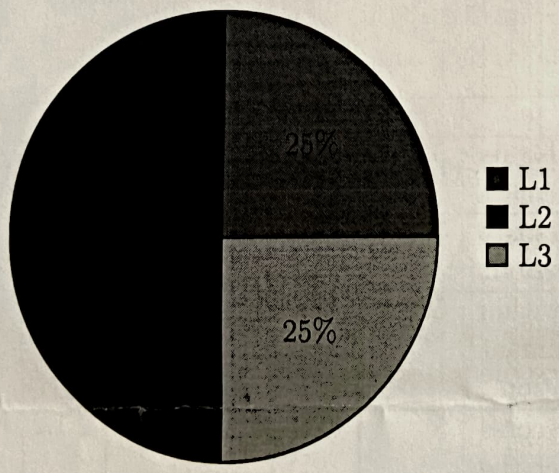
Q.No	Question	Marks	CO	BL	PO	PI
1	Find the inverse of sigmoid function and also its derivative.	5	CO1	L1	1	1.2.2
2	Consider the data in Table 1 and predict the price of a house with 1700 sq ft using linear regression.	5	CO1	L2	2	1.1.3
3	Write expressions for between class and within class scatter matrices in Linear Discriminant Analysis for binary and multi-class classification.	5	CO2	L2	1	2.1.1
4	Given the following dataset of students' scores and their admission status (Table 2), predict the probability of admission for a student with an exam score of 70.	5	CO2	L3	2	2.1.2

Size (sq ft)	Price (Rupees)
800	20,00,000
1000	25,00,000
1200	30,00,000
1500	35,00,000
1800	40,00,000

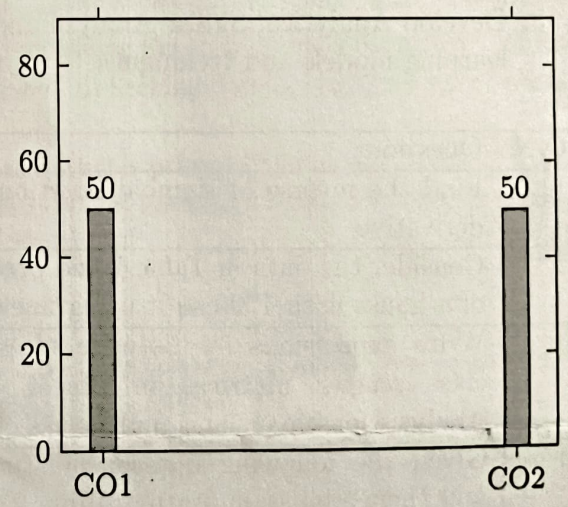
Table 1: House sizes and prices

Exam Score	Admission (1 for Yes, 0 for No)
85	1
60	0
75	1
50	0
90	1

Table 2: Students' exam scores and admission status



(a) Bloom's Level wise Marks Distribution



(b) Course Outcome wise Marks Distribution