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KAMALA INSTITUTE OF TECHNOLOGY & SCIENCE, SINGAPUR
23AM28PC503

III.B. Tech. I. Semester Regular Examinations, November- 2025

MACHINE LEARNING

(Common to IT, AIML)

Time: 3 Hours

Max. Marks: 60

Note: Question paper consists of Part-A & Part-B.

i) **Part-A** for 10M, ii) **Part-B** for 50marks

- **Part A** is compulsory, consists of 10 sub questions from all units carrying equal marks.
- **Part-B** consists of **10 questions** (numbered from 2 to 11) carrying **10marks** each. From each unit there are 2 questions and the students should answer one of them. Hence the student should answer **5 questions** from **Part-B**.

PART-A		(10Marks)	
Q. No	Questions	Marks	BTL
1.a)	Define machine learning	1	1
1.b)	What is reinforcement learning?	1	1
1.c)	What is a Multi-Layer Perceptron (MLP)?	1	1
1.d)	What is meant by gradient descent?	1	2
1.e)	Define Information Gain.	1	1
1.f)	What is Gini Index?	1	1
1.g)	What is dimensionality reduction?	1	2
1.h)	What is covariance matrix in PCA?	1	2
1.i)	What are the main components of reinforcement learning?	1	2
1.j)	What is meant by exploration and exploitation?	1	2
PART-B		(50Marks)	
Q.No.	Questions	Marks	BTL
2. a)	Explain the different types of machine learning with suitable examples.	5M	2
b)	What is linear separability? Illustrate with an example.	5M	2
OR			
3.	Describe the Candidate Elimination Algorithm and explain its working with an example dataset.	10M	3
4.	What is meant by exploration and exploitation?	10M	2
OR			
5. a)	Compare Multi-Layer Perceptron (MLP) and Radial Basis Function (RBF) networks.	5M	3
b)	Illustrate the working of a Support Vector Machine (SVM) for linear classification with a neat diagram.	5M	3
6. a)	Define a Decision Tree. Explain its basic components and structure with an example.	5M	2
b)	Differentiate between Classification Trees and Regression Trees with examples.	5M	3

OR			
7. a)	Explain the AdaBoost algorithm with an example.	5M	3
b)	Explain the Expectation-Maximization (EM) algorithm used in Gaussian Mixture Models.	5M	3
8. a)	Describe the working principle of Linear Discriminant Analysis (LDA).	5M	2
b)	What is Principal Component Analysis (PCA)? Explain the steps involved in PCA.	5M	2
OR			
9. a)	Differentiate between crossover and mutation in Genetic Algorithms.	5M	3
b)	Describe how fitness function affects the performance of Genetic Algorithms.	5M	3
10.a)	Explain the difference between supervised, unsupervised, and reinforcement learning.	4M	3
b)	What is the purpose of Markov Chain Monte Carlo (MCMC) methods?	6M	3
OR			
11.	Discuss how Reinforcement Learning algorithms can be integrated with Markov Decision Processes (MDPs).	10M	3

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