

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5593

J

Unique Paper Code : 2512042402

Name of the Paper : Machine Learning

Name of the Course : **B. Sc. (H) Instrumentation (CORE)**

Semester : IV

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No. 1 is compulsory.
3. Attempt Five questions in all.
4. All Questions carry equal marks.

1. (a) Distinguish between overfitting and underfitting. How it can affect model generalization? (3)
(b) Define Boolean functions and mention their significance in machine learning. (3)
(c) What is an Artificial Neural Network? (3)
(d) What is clustering in machine learning? (3)
2. (a) Compare Maximum Likelihood Estimation and Bayesian Parameter Estimation with examples. (6)
(b) The input-output pairs for a simple linear supervised learning problem are given as follows:

P.T.O.

Input (x)	Output (y)
1	3
2	5
3	7
4	9

Assuming the relationship between x and y is linear and can be expressed as

$$y = wx + b$$

Calculate the following –

- (i) Values of w and b using the Least Squares method
 - (ii) The value of y for x = 6
 - (iii) Mean Squared Error (MSE) (6)
3. (a) Describe the CART decision tree algorithm and how it differs from C4.5. (6)
 - (b) Compare and explain Supervised, Unsupervised, and Reinforcement Learning. (6)
 4. (a) Compare and explain CNF and DNF representations with appropriate examples. (6)
 - (b) Explain with examples, How Ensemble Methods improve learning models? Provide. (6)
 5. (a) Explain the Candidate Elimination Algorithm with an appropriate example. (6)
 - (b) Describe learning search in a version space with an example. (6)
 6. (a) Define hyperplanes in classification. How do they contribute to data separation in SVM? (6)
 - (b) Explain the role of Backpropagation in training the neural networks. (6)
 7. (a) Describe Graphical Models and their applications in probabilistic modelling. (6)
 - (b) Describe Principal Component Analysis. How does it help in reducing dimensionality? (6)