

7. (a) Define ensemble methods in machine learning.

Discuss the benefits of ensemble learning and its relationship to learning theory. (6)

- (b) Explain the concept of support vector machines

and their use in classification tasks. (6)

(1500)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4101 H

Unique Paper Code : 2512042402

Name of the Paper : Machine Learning

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

Semester : IV

Duration : 3 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) Explain the importance of dimensionality reduction techniques. (3)

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- (b) What is the difference between artificial intelligence and machine learning? (3)
 - (c) Explain the concepts of conjunctive normal form. (3)
 - (d) Write short notes on Voronoi diagrams. (3)
2. (a) Describe classification separating hyperplanes and their significance in machine learning. (6)
- (b) Define version spaces in the context of machine learning. Explain how version spaces represent the set of all hypotheses consistent with the training data. (6)
3. (a) Explain the concept of logistic regression and how it is used for binary Classification tasks. (6)
- (b) What is an Artificial Neural Network and how does it mimic the human brain? (6)

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4. (a) Define bias and variance in the context of machine learning models. Explain how bias and variance contribute to the overall error of a model. (6)
- (b) Define Maximum Likelihood Estimation and explain its role in estimating parameters of statistical models. (6)
5. (a) Explain the backpropagation algorithm used for training artificial neural networks. (6)
- (b) Explain the KNN algorithm and how it classifies data points based on the majority vote of their K nearest neighbors. (6)
6. (a) Describe the ID3 algorithm for constructing decision trees. (6)
- (b) Write short notes on probably approximately correct (PAC) learning model: (6)

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