

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**PGDDS – SEMESTER I- EXAMINATION –WINTER-2024**

**Subject Code: 1618003****Date: 19/12/2024****Subject Name: Fundamentals of Machine Learning****Time:10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make Suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of simple calculators and non-programmable scientific calculators are permitted.

- Q.1** (a) List out the different issues in machine learning. **03**  
 (b) Differentiate Human Learning & Machine Learning. **04**  
 (c) Explain Supervised Learning in detail. **07**

- Q.2** (a) Explain the use of the candidate elimination algorithm. **03**  
 (b) Differentiate Gradient Descent and Stochastic Gradient Descent. **04**  
 (c) What is semi-supervised learning? Explain the steps of the self-training algorithm. **07**

**OR**

- (c) List out the characteristics of an artificial neural network and explain them in brief. Also discuss various problems for neural network learning. **07**

- Q.3** (a) Differentiate Pre-pruning and Post-pruning. **03**  
 (b) Explain inductive bias with a suitable example. **04**  
 (c) What is the perceptron? What is the perceptron training rule? What are its limitations and by which rule these limitations can be overcome? **07**

**OR**

- Q.3** (a) What is a use of the Cost function in ANN? **03**  
 (b) Explain Under-fitting and Over-fitting with an example. **04**  
 (c) Explain the concept of EM Algorithm. **07**

- Q.4** (a) What is threshold activation function in ANN? **03**  
 (b) Discuss application of ANN in face recognition. **04**  
 (c) Explain Decision Tree in details. **07**

**OR**

- Q.4** (a) For which type of problem characteristics, decision tree algorithm is suitable? **03**  
 (b) Briefly explain the properties of Gini impurity in a decision tree. **04**  
 (c) What is the back propagation algorithm? Explain it in detail. What are the limitations of this algorithm? **07**

- Q.5** (a) What is the Least Square Error Hypothesis? Explain it in brief. **03**  
 (b) Explain Hypothesis and Hypothesis Space Search in brief. **04**  
 (c) Describe the structure of an artificial neuron. How is it similar to a biological neuron? What are its main components? **07**

**OR**

- Q.5** (a) What is recommender system? How machine learning methods can be useful in it? **03**  
 (b) Explain Bayes Optimal classifier. **04**  
 (c) Explain Naïve Bayes classifier with an example. **07**

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