

INDIAN STATISTICAL INSTITUTE

(MS-QMS)_2025

Final-SEMESTER EXAMINATION

(Pattern Recognition)

Duration: 180 minutes

Maximum Marks: 100

Note: Answer any FIVE

Important Information: Provide sufficient descriptions and illustrations to justify your answer.

1. Differentiate among PCA, LDA, Kernel PCA and Auto encoder. [20]
2. Describe three major challenges of a clustering algorithm. What is DBSCAN clustering algorithm, and why does it stand superior from its peers? [20]
3. Compare (merits and demerits) the KNN and K-means PR algorithms. [20]
4.
 - a. What is the need for multi-layered perceptron (MLP) neural networks? Describe the complete architecture and working principle of a MLP neural network for IRIS dataset. [14]
 - b. What is the bias and variance tradeoff in a classification model? [6]
5. Describe the working principles of linear regression, multiple linear regression, polynomial regression, and logistic regression. Provide the motivations for each of the regression models. [20]
6.
 - a. What is the perceptron learning algorithm? Derive the perceptron learning algorithms for both weights and bias of the network using the sigmoid activation function. [14]
 - b. Describe the major challenges for a Bayes classification model. [6]

=====End of the Question paper=====