

(Time: $2\frac{1}{2}$ hours)

[Total Marks: 60]

- N. B.: (1) **All** questions are **compulsory**.
(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of a **Non-programmable** calculator is **allowed**.

1. Attempt **any two** of the following: 12
a. Differentiate between Supervised and Unsupervised Learning.
b. Explain the Logistic regression as an important algorithm for classification.
c. Write a note on Predictive and Descriptive tasks used in machine learning models.
d. Explain the significance of feature engineering in machine learning
2. Attempt **any two** of the following: 12
a. What are errors? Explain with a suitable example.
b. Write a detailed note on the matrix used for error analysis.
c. Write a note on the Area Under the curve for error detection.
d. Explain the difference between feature extraction and feature transformation.
3. Attempt **any two** of the following: 12
a. What is dimensionality reduction in machine learning?
b. What is Maximum Likelihood Estimation?
c. Explain in detail lasso regressions used in machine learning
d. Write a note on the Support Vector Machine.
4. Attempt **any two** of the following: 12
a. Write a short note on the Market Basket Analysis using the Apriori algorithm.
b. Explain Hierarchical Clustering with a suitable example.
c. Define KNN and mention all the steps of KNN algorithm.
d. Why is a random forest algorithm used in machine learning?
5. Attempt **any two** of the following: 12
a. What is perceptron? Explain how many layers it contains.
b. Explain Bagging with a suitable example.
c. What is the ensemble machine learning model?
d. Explain Semi-Supervised and Reinforcement learning with an example.