**2025 MAY**

**UCSE603 MACHINE LEARNING**

Full Marks: 100 Time: Three Hours

Answer **ANY FIVE** questions

| | | | |
|---|---|---|---|
| Q. 1 | a | What are the different types of Machine Learning? Describe each type briefly with one real-world application. | 10 |
| | b | Explain Bayes' Theorem using an example. | 10 |
| Q. 2 | a | What is a Naive Bayes Classifier? Discuss its basic assumption and explain how it is used for email spam detection. | 10 |
| | b | What is an Artificial Neuron? Describe its structure and role in an Artificial Neural Network (ANN). | 10 |
| Q. 3 | a | Explain the Delta Rule in the context of a Perceptron Learning Algorithm. | 10 |
| | b | What is Support Vector Machine (SVM)? Explain the concept of a hyperplane and margin with a simple diagram or example. | 10 |
| Q. 4 | a | Define a Linear Regression model. Give a real-life example and explain how the coefficients affect the output. | 10 |
| | b | What is a Decision Tree? Explain how a decision tree is constructed and used for classification. | 10 |
| Q. 5 | a | Define Clustering and mention its types. Compare K-Means and Hierarchical Clustering in terms of approach and use-case. | 10 |
| | b | What is Reinforcement Learning? Describe its key components: agent, environment, actions, rewards, and policy. | 10 |
| Q. 6 | a | What are Activation Functions in ANN? Name and explain the working of any two commonly used activation functions. | 10 |
| | b | What is the role of Gradient Descent in training neural networks? Briefly explain how weights are updated using error derivatives. | 10 |

***