

[This question paper contains 2 printed pages]

**Unique Paper Code:** 2513010017  
**Name of the Paper:** Advanced Machine Learning  
**Name of the Course:** B.Sc.(H) Electronics (DSE)  
**Semester:** Semester VII (Under NEP UGCF Mode)  
**Duration:** 03 Hour  
**Maximum Marks:** 90

### Instruction for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question 1 is compulsory.
3. Attempt any 5 questions including question 1.

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|----|-----|--------------------------------------------------------------------------------------|---|
| Q1 | (a) | Define supervised learning. Give one example.                                        | 3 |
|    | (b) | What is the purpose of a cost function in regression?                                | 3 |
|    | (c) | Explain the meaning of a cluster centroid in K-Means.                                | 3 |
|    | (d) | What is a Conditional Probability Table (CPT) in Bayesian Networks?                  | 3 |
|    | (e) | State the meaning of a utility function in MDPs.                                     | 3 |
|    | (f) | What is the mistake-bound model in learning theory?                                  | 3 |
| Q2 | (a) | Discuss simple linear regression and explain how the line of best fit is obtained.   | 6 |
|    | (b) | Explain the working of a Decision Tree classifier. Discuss Gini impurity.            | 6 |
|    | (c) | Describe the importance of feature scaling. Mention two scaling techniques.          | 6 |
| Q3 | (a) | Explain the working of Agglomerative Clustering with an example.                     | 6 |
|    | (b) | Describe the steps for computing principal components in PCA.                        | 6 |
|    | (c) | Compare association rule mining with clustering. Give one application for each.      | 6 |
| Q4 | (a) | What is a Bayesian Network? Explain how inference is performed.                      | 6 |
|    | (b) | Differentiate between a Simple Markov Model and a Hidden Markov Model.               | 6 |
|    | (c) | Explain value iteration and policy iteration in an MDP.                              | 6 |
| Q5 | (a) | Explain the PAC learning framework. What does "probably approximately correct" mean? | 6 |
|    | (b) | Describe the working principle of the Distance Weighted Nearest Neighbour algorithm. | 6 |
|    | (c) | Discuss factors influencing sample complexity in computational learning theory.      |   |
| Q6 | (a) | Compare regression and classification with examples.                                 | 6 |
|    | (b) | Explain how DBSCAN identifies noise points in a dataset.                             | 6 |

- (c) Describe polynomial regression and mention when it is preferred. 6
- Q7 (a) Discuss passive reinforcement learning with an example. 6
- (b) Explain the concept of transition probability in temporal models. 6
- (c) Compare Random Forest and SVM with respect to learning strategy and generalization. 6