

Dr. Babasaheb Ambedkar Open University
Term End Examination January – 2026

Course : MSCDS
Subject Code : MSCDS-302
Subject Name : Machine Learning

Date : 17/02/2026
Time : 03:00am to 05:15pm
Duration : 02.15 Hours
Max. Marks : 70

Section A

Answer the following (Attempt any three) (30)

1. Explain the differences between machine learning systems and traditional rule-based systems with real-life examples.
2. Explain how regression can be applied to forecast business outcomes. Illustrate using an example.
3. What is the vanishing gradient problem in deep neural networks? Suggest techniques to mitigate it.
4. What is Clustering? Explain different clustering approaches
5. Compare supervised, unsupervised, semi-supervised, and reinforcement learning. Provide real-world applications of each.

Section B

Answer the following (Attempt any four) (20)

1. Explain key components of association rules
2. Explain the working of the FP-Growth algorithm
3. Compare feedforward, convolutional, and recurrent neural networks in terms of structure and application domains.
4. Explain k-Nearest Neighbor (k-NN) classification. How does the choice of k affect performance?
5. Explain the working of a Random Forest.
6. Explain the backpropagation algorithm step-by-step

Section C

Part – A (Multiple Choice Questions)

(10)

- 1 Which of the following best defines machine learning?
A Writing explicit rules for every decision
B Programming computers to improve automatically through experience
C Storing large amounts of data without analysis
D Building fixed-function systems
- 2 In Tom Mitchell's definition of machine learning, "P" stands for:
A Prediction
B Processing power
C Performance measure
D Preprocessing
- 3 Which learning technique uses both labeled and unlabeled data?
A Semi-supervised Learning
B Unsupervised Learning
C Supervised Learning
D Reinforcement Learning
- 4 Regression is primarily used for:
A Predicting discrete categories
B Clustering similar data points
C Reducing dimensionality
D Predicting continuous outcomes

- 5 Which algorithm is used for binary classification problems?
A Linear Regression B Logistic Regression
C K-Means Clustering D PCA
- 6 Which metric is NOT typically used for evaluating classification models?
A Precision B Recall
C Mean Squared Error D F1-score
- 7 Which layer of a neural network receives raw input features?
A Input layer B Hidden layer
C Output layer D Activation layer
- 8 Which activation function suffers from the vanishing gradient problem?
A ReLU B Softmax
C Linear D Sigmoid
- 9 Principal Component Analysis (PCA) is mainly used for:
A Classification B Regression
C Feature extraction/dimensionality reduction D Reinforcement learning
- 10 Which algorithm is widely used for mining association rules?
A Apriori Algorithm B K-Means
C Gradient Boosting D Random Forest

Part B (Do as Directed)

(10)

State whether the following statements are true or false

- 1 Machine learning systems automatically improve through experience without explicit programming.
- 2 Unsupervised learning requires labeled datasets for training.
- 3 Overfitting occurs when a model performs well on training data but poorly on unseen data.
- 4 Linear regression is used for predicting categorical outcomes.
- 5 Random Forest is an ensemble of decision trees.
- 6 ReLU activation function is less prone to vanishing gradients compared to the sigmoid.
- 7 CNNs are best suited for sequential data such as text or speech.
- 8 DBSCAN can find clusters of arbitrary shapes and handle noise.
- 9 Market basket analysis is an example of supervised learning.
- 10 Model interpretability becomes more difficult with complex models such as deep neural networks.
