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**BRAINWARE UNIVERSITY**

Library
Brainware University
398, Ramkrishnapur Road, Barasat
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Term End Examination 2025-2026
Programme – M.Tech.(CSE)-2025
Course Name – Machine Learning
Course Code - MTS27503 (T)
(Semester II)

Full Marks : 40**Time : 2:0 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 10=10

1. *Choose the correct alternative from the following :*

- (i) Name the mathematical technique that is commonly used for dimensionality reduction in machine learning.
 - a) Singular Value Decomposition
 - b) Fourier Transform
 - c) Taylor Series Expansion
- (ii) Select the condition applicable to a binomial experiment.
 - a) Trials with two outcomes
 - b) Trials with continuous outcomes
 - c) Trials with infinite outcomes
 - d) Trials with non-random outcomes
- (iii) Identify the sum of all probabilities in a binomial experiment.
 - a) 0
 - b) 1
 - c) Equal to the number of trials
 - d) Greater than 1
- (iv) Select the pair of parameters that completely determine a normal distribution.
 - a) Mean and mode
 - b) Mean and standard deviation
 - c) Median and range
 - d) Variance and skewness
- (v) Identify the key difference between supervised and unsupervised learning.
 - a) Supervised uses labelled data, while Unsupervised uses unlabelled data.
 - b) Supervised learns classification, while Unsupervised learns regression
 - c) Supervised is used for prediction, while Unsupervised is used for analysis.
 - d) Supervised uses Unlabelled data, while Unsupervised uses labelled data
- (vi) Select the statement that is not true about supervised learning.
 - a) It requires labeled data for training.
 - b) It aims to learn a mapping from inputs to desired outputs.
 - c) It can be used for both classification and regression tasks
 - d) It can automatically discover hidden patterns in data.
- (vii) Identify example of an unsupervised learning task.
 - a) Predicting house prices based on square footage and neighbourhood
 - b) Grouping customers into different segments based on their purchase history

- c) Detecting fraudulent transactions in financial data d) Identifying sentiment (positive, negative) from customer reviews
- (viii) Choose the correct technique is best for identifying trends over time
- a) Scatter plot b) Line chart
- c) Box plot d) Histogram
- (ix) Use the following that is not a common data cleaning step.
- a) Handling missing values b) Removing duplicate records
- c) Encrypting the data d) Handling outliers
- (x) Use the way that is missing numerical data to be handled:
- a) Replacing with the mean/median/mode b) Dropping missing values
- c) Using predictive modeling d) All three options (A,B and C)

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Define different types of hypothesis with example. (3)
3. State and describe Central limit theorem (3)
4. Discuss Machine Learning and give examples. (3)
5. Explain the impact of max depth and min samples split on decision tree performance. (3)
6. Justify the practical application of decision trees in a healthcare or finance domain. (3)

OR

- Test the performance of a decision tree model using cross-validation and evaluate its generalization capability. (3)

Group-C

(Long Answer Type Questions)

5 x 3=15

7. Define population and sample. Describe different types of sampling techniques used in machine learning. (5)
8. Justify the selection of K-Means clustering over hierarchical clustering for large-scale datasets. (5)
9. Describe challenges of data imbalance in machine learning and illustrate techniques to handle it. (5)

OR

- Discuss the significance of model validation and deployment in machine learning and illustrate their impact on real-world applications. (5)

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