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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

MCA (Integrated)

SEM: VI - THEORY EXAMINATION (2025 - 2026)

Subject: Machine Learning

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

20

1. Attempt all parts:-

- (1.1) _____ learning type uses rewards? (CO1, K2) 1
- (a) Supervised Learning
- (b) Unsupervised Learning
- (c) Reinforcement Learning
- (d) Batch Learning
- (1.2) Sensitivity analysis measures _____? (CO1, K2) 1
- (a) Impact of input changes
- (b) Data size
- (c) Model type
- (d) Output format
- (1.3) Sigmoid function used in (CO2, K1) 1
- (a) Linear
- (b) Logistic
- (c) Polynomial
- (d) Tree
- (1.4) ID3 uses (CO2, K1) 1
- (a) Gini index
- (b) Entropy
- (c) Mean
- (d) Median
- (1.5) In K-means, K represents (CO3, K1) 1

- (a) Features
 - (b) Iterations
 - (c) Number of clusters
 - (d) Labels
- (1.6) Which algorithm can detect noise points? (CO3, K1) 1
- (a) PCA
 - (b) DBSCAN
 - (c) KNN
 - (d) Regression
- (1.7) In feature scaling, Min-Max scaling converts values into: (CO4, K2) 1
- (a) 0 to 1
 - (b) -1 to 1
 - (c) 1 to 10
 - (d) Any range
- (1.8) Missing values can be handled by: (CO4, K2) 1
- (a) Mean imputation
 - (b) PCA
 - (c) Bagging
 - (d) Cross-validation
- (1.9) Loan approval systems mainly use ML for _____. (CO5, K2) 1
- (a) Sorting
 - (b) Classification
 - (c) Compression
 - (d) Searching
- (1.10) Churn prediction is mainly used in _____. (CO5, K2) 1
- (a) Biology
 - (b) Agriculture
 - (c) Marketing
 - (d) Physics

2. Attempt all parts:-

- (2.1) What are the main types of Machine Learning? (CO1, K2) 2
- (2.2) Explain role of dependent and independent variables. (CO2, K2) 2
- (2.3) Evaluate the effect of outliers on K-means clustering. (CO3, K5) 2
- (2.4) Describe Random Forest as an ensemble learning method. (CO4, K2) 2
- (2.5) Mention any two applications of Machine Learning in e-commerce. (CO5, K1) 2

SECTION-B

30

Answer any one of the following:-

- (3.1) Explain semi-supervised learning and reinforcement learning. (CO1, K3) 6
- (3.2) Discuss the significance of data preprocessing. (CO1, K4) 6

Answer any one of the following:-

(3.3)	Illustrate multiple linear regression with real dataset example. (CO2, K3)	6
(3.4)	Explain the concept of cost function in machine learning. (CO2, K2)	6
Answer any one of the following:-		
(3.5)	Evaluate the DBSCAN clustering algorithm and explain how it handles noise and arbitrary-shaped clusters. (CO3, K5)	6
(3.6)	Discuss the role of autoencoders in dimensionality reduction and feature learning. (CO3, K3)	6
Answer any one of the following:-		
(3.7)	Explain the procedure of cross-validation with a neat diagram. (CO4, K3)	6
(3.8)	Explain the role of bootstrap sampling in bagging. (CO4, K3)	6
Answer any one of the following:-		
(3.9)	Explain ethical considerations in Machine Learning projects with examples. (CO5, K4)	6
(3.10)	Explain the role of ML in disease prediction and diagnosis systems. (CO5, K3)	6
SECTION-C		50
4. Answer any <u>one</u> of the following:-		
(4.1)	Compare classification and regression with suitable examples. (CO1, K5)	10
(4.2)	Evaluate the significance of optimization algorithms in Machine Learning. (CO1, K5)	10
5. Answer any <u>one</u> of the following:-		
(5.1)	Explain the concept of bias-variance tradeoff in regression models. (CO2, K2)	10
(5.2)	Define Entropy and Information Gain. Explain their role in decision tree learning and demonstrate with a numerical example how Information Gain is calculated. (CO3, K4)	10
6. Answer any <u>one</u> of the following:-		
(6.1)	Analyze hierarchical clustering and its types, and differentiate it from partitioning clustering. (CO3, K4)	10
(6.2)	How does the silhouette score help in evaluating clustering performance? Explain with an example. (CO3, K4)	10
7. Answer any <u>one</u> of the following:-		
(7.1)	Differentiate between bagging, boosting, and stacking with suitable examples. (CO4, K4)	10
(7.2)	Compare the performance of Random Forest and AdaBoost in terms of bias and variance. (CO4, K4)	10
8. Answer any <u>one</u> of the following:-		
(8.1)	Explain project execution in Machine Learning case studies. (CO5, K3)	10
(8.2)	Discuss the use of ML in cybersecurity. (CO5, K3)	10