Printed Page:- 05 **Subject Code**:- **ABT0614**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VI - THEORY EXAMINATION (2022-2023 **)**

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-a. Machine learning is a field of AI consisting of learning algorithms that……(CO1) 1

(a) At executing some task

(b) Over time with experience

(c) Improve their performance

(d) All of the above

1-b. …….is a widely used and effective machine learning algorithm based on the idea of bagging. (CO1) 1

(a) Regression

(b) Classification

(c) Decision Tree

(d) Random Forest

1-c. Which of the following operations does not preserve the symmetry of a symmetric matrix? (CO2) 1

(a) Matrix addition

(b) Matrix subtraction

(c) Matrix multiplication

(d) None of the above

1-d. What is the trace of a matrix? (CO2) 1

(a) The sum of the elements on the main diagonal of the matrix

(b) The sum of all elements in the matrix

(c) The determinant of the matrix

(d) The inverse of the matrix

1-e. Which of the following is a type of ANN where the nodes are arranged in layers that are not fully connected? (CO3) 1

(a) Convolutional neural network (CNN)

(b) Recurrent neural network (RNN)

(c) Feedforward neural network (FFNN)

(d) Radial basis function neural network (RBFNN)

1-f. What is the purpose of cross validation in machine learning? (CO3) 1

(a) To estimate the generalization error of a machine learning model

(b) To increase the size of the training set

(c) To reduce the variance of the model

(d) To select the best features for the model

1-g. The cost parameter in the SVM means: (CO4) 1

(a) The number of cross-validations to be made

(b) The kernel to be used

(c) The tradeoff between misclassification and simplicity of the model

(d) None of the above

1-h. What is the exploration-exploitation tradeoff in reinforcement learning? (CO4) 1

(a) The tradeoff between taking actions that are known to be optimal and taking actions that are not known to be optimal but could lead to better rewards in the long run

(b) The tradeoff between taking actions that maximize immediate rewards and taking actions that maximize long-term rewards

(c) The tradeoff between taking actions that are easy to compute and taking actions that are computationally expensive

(d) The tradeoff between taking actions that are deterministic and taking actions that are stochastic

1-i. What is the primary goal of using machine learning in cybersecurity threat intelligence? (CO5) 1

(a) To identify potential cyber attacks and prevent them from happening

(b) To optimize pricing strategies

(c) To personalize marketing and advertising campaigns

(d) To predict customer behavior and preferences

1-j. Which of the following is an example of a real-world application of machine learning in user behavior analytics? (CO5) 1

(a) Personalizing marketing and advertising campaigns

(b) Optimizing pricing strategies

(c) Identifying and preventing insider threats

(d) Predicting customer churn

2. Attempt all parts:-

2.a. What is the main key difference between supervised and unsupervised machine learning? (CO1) 2

2.b. Compute the indicated products. 2

$$\begin{bmatrix}1\\2\\3\end{bmatrix}[2\ 3\ 4]$$ (CO2)

2.c. What is cross-validation? (CO3) 2

2.d. Explain the concept of Bayes theorem. (CO4) 2

2.e. What is the role of machine learning in customer segmentation and personalized marketing? (CO5) 2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a. Discuss with examples some useful applications of machine learning. (CO1) 6

3-b. How do you design a checkers learning problem? (CO1) 6

3-c. If $A=\begin{bmatrix}1 & 2 & -3\\5 & 0 & 2\\1 & -1 & 1\end{bmatrix}, B=\begin{bmatrix}3 & -1 & 2\\4 & 2 & 5\\2 & 0 & 3\end{bmatrix}$ and $C=\begin{bmatrix}4 & 1 & 2\\0 & 3 & 2\\1 & -2 & 3\end{bmatrix}$ 6

then compute (A + B) and (B— C). Also, verify that A+ (B − C) = (A + B) − C. (CO2)

3-d. 6

If $A=\begin{bmatrix}-1 & 2 & 3\\5 & 7 & 9\\-2 & 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}-4 & 1 & -5\\1 & 2 & 0\\1 & 3 & 1\end{bmatrix}$ then verify that (A − B) ' = A' − B' (CO2)

3.e. What is a Convolutional Neural Network? (CO3) 6

3.f. Explain the application of Reinforcement Learning. When it is used? (CO4) 6

3.g. How is machine learning used in improving customer experience in e-commerce? (CO5) 6

SECTION C **50**

4. Answer any <u>one</u> of the following:-

4-a. Can you explain the difference between classification and regression in machine learning, and provide examples of use cases for each type? (CO1) 10

4-b. How does the perceptron algorithm relate to the idea of search in machine learning? Can you explain how the search process is used to find the optimal weights for the perceptron model, and what are some common techniques used for search in machine learning? (CO1) 10

5. Answer any <u>one</u> of the following:-

5-a. If $a+b+c=0$, find the characteristic roots of the matrix 10

$$A=\begin{bmatrix} a & c & b \\ c & b & a \\ b & a & c \end{bmatrix}$$

(CO2)

5-b. Obtain the inverse of the following matrix using elementary row operations (CO2) 10

$$A=\begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}.$$

6. Answer any <u>one</u> of the following:-

6-a. What common difficulties arise during RNN training? Explain in detail. (CO3) 10

6-b. What are missing values and why are they a problem in data analysis? (CO3) 10

7. Answer any <u>one</u> of the following:-

7-a. A medical test for a rare disease is known to have a false positive rate of 5% and a false negative rate of 1%. The disease affects 0.1% of the population. If a person tests positive for the disease, what is the probability that they actually have the disease? (Assume the test is independent and conditionally dependent.) (CO4) 10

7-b. What is clustering, and how is it used in machine learning? Can you explain the difference between clustering and classification, and what are some examples of use cases for clustering algorithms? (CO4) 10

8. Answer any <u>one</u> of the following:-

8-a.	How are disease diagnosis and prognosis aided by machine learning? (CO5)	10
8-b.	What are some uses for machine learning in the energy sector? Discuss in detail. (CO5)	10