NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VI - THEORY EXAMINATION (2023 - 2024)

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.*

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SECTION A   **20**

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1. Attempt all parts:-

1-a.   Which of the following machine learning techniques helps in detecting the   1
        outliers in data? (CO1)

        (a) Classification

        (b) Clustering

        (c) Anomaly detection

        (d) All of the above

1-b.   FIND-S algorithm ignores? (CO1)   1

        (a) Positive

        (b) Negative

        (c) Both

        (d) None

1-c.   What is the diagonal of a symmetric matrix? (CO2)   1

        (a) The main diagonal of the matrix

        (b) The diagonal that connects the top-right corner to the bottom-left corner

(c) The diagonal that connects the top-left corner to the bottom-right corner

(d) None of the above

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

(a) A matrix with all elements negated elements above the main diagonal set to zero

(b) A matrix with all rows and columns swapped

(c) A matrix with all elements below the main diagonal set to zero

(d) A matrix with all

1-e.   What is bootstrapping? (CO3)   1

(a) A method for selecting the best model from a set of candidate models

(b) A method for estimating the distribution of a sample statistic by resampling the sample

(c) A method for generating synthetic data to augment a dataset

(d) A method for selecting a subset of features for a machine learning model

1-f.   Which of the following is a type of ANN commonly used for processing   1
sequential data, such as speech or text? (CO3)

(a) Convolutional neural network (CNN)

(b) Recurrent neural network (RNN)

(c) Feedforward neural network (FFNN)

(d) Radial basis function neural network (RBFNN)

1-g.   Formula for conditional probability P(AB) is _____ (CO4)   1

(a) $P(A|B) = \frac{P(A \cap B)}{P(B)}$

(b) $P(A|B) = \frac{P(A \cap B)}{P(A)}$

(c) $P(A|B) = \frac{P(A)}{P(B)}$

(d) $P(A|B) = \frac{P(B)}{P(A)}$

1-h.   What can we use in Hierarchical Clustering to find the right number of clusters   1
? (CO4)

(a) The Elbow Method

(b) Decision Trees

(c) Dendrograms

(d) Histograms

1-i.   Which of the following is an example of a real-world application of machine   1
learning in network intrusion detection? (CO5)

(a) Personalizing email marketing campaigns

(b) Detecting and preventing cyber attacks on a company's network

(c) Optimizing website layout and design

(d) Predicting inventory demand

1-j.   Which of the following industries is NOT currently utilizing machine   1
learning? (CO5)

(a) Healthcare

(b) Retail

(c) Finance

(d) Agriculture

2. Attempt all parts:-

2.a.   Discuss the perspective and issues in machine learning. (CO1)   2

2.b.   Construct a 2 × 2 matrix, = [], whose elements are given by: (CO2)   2

$$a_{ij} = \frac{i}{j}$$

2.c.   What is a Recurrent Neural Network? (CO3)   2

2.d.   What is the assumption made in the Naïve Bayes algorithm? (CO4)   2

2.e.   How is machine learning used in identifying disease-causing genetic   2
mutations? (CO5)

SECTION B   **30**

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

3-a.   Define Inductive Learning Hypothesis. (CO1)   6

3-b.   Describe in brief: Version spaces and Candidate –Elimination Algorithm. (CO1)   6

3-c.   If   6

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

3-d.   Find x, y, z and w if   6

$$\begin{bmatrix} x - y & 2x + z \\ 2x - y & 3x + w \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}.$$ (CO2)

3.e.   How do CNNs differ from other types of neural networks, such as Recurrent   6
Neural Networks and Deep Neural Networks? (CO3)

3.f.   How do you classify text using Bayes Theorem (CO4)   6

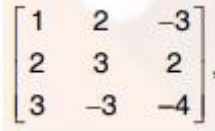3.g.   What are some applications of machine learning in natural language   6

processing? (CO5)

SECTION C   **50**

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

4-a.	How does deep learning differ from other types of machine learning, and what types of problems is it best suited for? (CO1)	10
4-b.	Can you explain the difference between batch learning and online learning in machine learning, and provide examples of use cases for each type? (CO1)	10

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

5-a.
$$A=\begin{bmatrix} 1 & 2 & -3 \\ 2 & 3 & 2 \\ 3 & -3 & -4 \end{bmatrix},$$

Find A^{-1}, Where A= hence solve the system of linear equations: (CO2)

$x + 2y - 3z = -4$
$2x + 3y + 2z = 2$
$3x - 3y - 4z = 11$ 10

5-b. Using matrix method, solve the following system of linear equations $2x - y = 4$, $2y + z = 5$, $z + 2x = 7$. (CO2)   10

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

6-a.	How does bootstrapping vary from other resampling methods, and what does it mean? (CO3)	10
6-b.	Why is cross-validation employed in machine learning? What is it? (CO3)	10

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

7-a.	explain the concept of conditional probability, and how it is used to model the relationship between the features and the classes in the Naïve Bayes algorithm? (CO4)	10
7-b.	Explain the difference between classification and clustering, and what are some examples of use cases for classification algorithms? (CO4)	10

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

8-a.	What are a few ways that machine learning is being used in personalised medicine? (CO5)	10
8-b.	What applications of machine learning are there in the automobile sector? (CO5)	10