Printed Page:- 04 **Subject Code:- ACSML0601**

Roll. No:

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.*

SECTION-A 20

1. Attempt all parts:-

1-a. What is machine learning? (CO1) 1

(a) A subset of artificial intelligence
(b) A type of computer programming language
(c) The study of human learning
(d) None of the above

1-b. Which of the following is NOT a type of machine learning? (CO1) 1

(a) Supervised learning
(b) Traditional programming
(c) Unsupervised learning
(d) Reinforcement learning

1-c. Regression is a supervised learning task used for: (CO2) 1

(a) Categorizing data points into classes
(b) . Predicting numerical values
(c) Grouping data points into clusters
(d) None

1-d. What type of regression can be used to model relationships with multiple independent variables? (CO2) 1

(a) Linear Regression
(b) Polynomial Regression

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(c) Multiple Linear Regression

(d) Logistic Regression

1-e. What is the primary goal of clustering in machine learning? (CO3) 1

(a) Classification

(b) Data compression

(c) Dimensionality reduction

(d) Grouping similar data points

1-f. K-Nearest Neighbor (K-NN) is primarily used for which type of machine learning task? (CO3) 1

(a) Clustering

(b) Regression

(c) Classification

(d) Dimensionality reduction

1-g. What is Bayesian Learning primarily concerned with? (CO4) 1

(a) Unsupervised learning

(b) Supervised learning

(c) Probabilistic reasoning

(d) Feature engineering

1-h. In ensemble methods like Bagging, what is the primary goal? (CO4) 1

(a) Reduce overfitting

(b) Increase bias

(c) Reduce variance

(d) Boost the accuracy of a single model

1-i. What is Reinforcement Learning? (CO5) 1

(a) A type of supervised learning

(b) A machine learning approach for making predictions

(c) A type of learning where an agent interacts with an environment and learns by receiving rewards and penalties

(d) A form of unsupervised learning

1-j. What is the core idea behind Q Learning in Reinforcement Learning? (CO5) 1

(a) It's a type of deep learning algorithm

(b) Learning to predict the expected cumulative reward for taking an action in a given state

(c) A supervised learning approach

(d) A clustering algorithm

2. Attempt all parts:-

2.a. How does machine learn from data? (CO1) 2

2.b. Differentiate linear and logistic regression in terms of task accomplished by these 2

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algorithms. (CO2)

2.c. What is the primary goal of clustering in data analysis? (CO3) 2

2.d. How does the Bayes Optimal Classifier make decisions based on probabilities? (CO4) 2

2.e. Describe the primary objective of a learning task in Reinforcement Learning. (CO5) 2

SECTION-B 30

3. Answer any five of the following:-

3-a. Discuss essential steps in designing a learning system, from data collection to model deployment. (CO1) 6

3-b. Summarize the history of machine learning, highlighting significant milestones and developments.(CO1) 6

3-c. Discuss commonly used metrices to evaluate a classification model. (CO2) 6

3-d. Discribe various types of regression algorithms. (CO2) 6

3.e. Write some real world applications of clustering. (CO3) 6

3.f. Define Bayes Optimal Classifier and provide examples to demonstrate its application. (CO4) 6

3.g. In Reinforcement Learning, what is the primary goal of a learning task, and how does it differ from supervised learning? (CO5) 6

SECTION-C 50

4. Answer any one of the following:-

4-a. Apply candidate elimination method to find consistent hypothesis on the given dataset. (CO1) 10

example	Shape	Size	Color	Surface	Thickness	Target concept
1	Circular	Large	Light	Smooth	Thick	Malignant
2	Circular	Large	Light	Irregular	Thick	Malignant
3	Oval	Large	Dark	Smooth	Thin	Benign
4	Oval	Large	Light	Irregular	Thick	Malignant
5	Circular	Small	Light	Smooth	Thick	Malignant

4-b. Define "underfitting" and "overfitting" in machine learning. Explain their causes and suggest remedies.(CO1) 10

5. Answer any one of the following:-

5-a. Explain the role of of cost function in linear regression model with the help of a suitable example.(CO2) 10

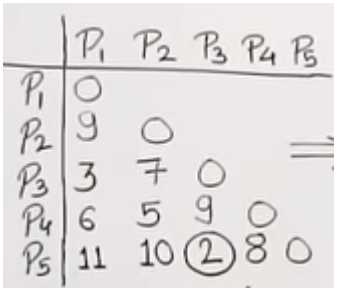
5-b. Explain the fundamental assumptions of linear regression models, and why are they important in interpretation? (CO2) 10

6. Answer any one of the following:-

6-a. How does K-means clustering work in simple terms? (CO3) 10

6-b. Apply Single agglomerative hierarchical clustering on given distance metrics. 10

(CO3)



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

7-a.	Can you briefly describe the Bayes Optimal Classifier's approach to balancing prior probabilities and evidence likelihood in classification? (CO4)	10
7-b.	What practical advantages do Bagging and boosting offer for improving model performance? (CO4)	10

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

8-a.	Discuss the various advantages and disadvantages of Reinforcement Learning. (CO5)	10
8-b.	What is the role of Q-function approximation in Reinforcement Learning? (CO5)	10

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