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Printed Page:-4 **Subject Code:- ACSML0502**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: V - 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-a. Identify the kind of learning algorithm for "facial identities for facial expressions". (CO1,K1) 1

(a) Prediction
(b) Recognition Patterns
(c) Recognizing anomilies
(d) Generating patterns

1-b. Which of the following is a reinforcement learning application?(CO1,K1) 1

(a) Topic modeling
(b) Recommendation system
(c) Pattern recognition
(d) Image classification

1-c. What is Regression?(CO2,K2) 1

(a) It is a technique to predict values
(b) It is a technique to find outliers
(c) It is a technique to fix data
(d) It is a Machine Learning algorithm

1-d. For what Polynomial Regression is used?(CO2,K3) 1

(a) Handle linear and separable data
(b) Handle with non-linear and separable data
(c) Find the best linear line
(d) Classify binary data

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1-e. KNN is _____ algorithm.(CO3,K1) 1

(a) Non-parametric and Lazy Learning
(b) Parametric and Lazy Learning
(c) Parametric and Eager Learning
(d) Non-parametric and Eager Learning

1-f. Which of the following is required by K-means clustering?(CO3,K2) 1

(a) defined distance metric
(b) number of clusters
(c) initial guess as to cluster centroids
(d) all of the mentioned

1-g. . Formula for Bayes theorem is _____.(CO4,K1) 1

(a) P(A|B) = (frac{P(B|A)P(A)}{P(B)})
(b) P(A|B) = (frac{P(A)}{P(B)})
(c) P(A|B) = (frac{P(B|A)}{P(B)})
(d) P(A|B) = (frac{1}{P(B)})

1-h. Naive Baye is?(CO4,K1) 1

(a) Conditional Independence
(b) Conditional Dependence
(c) Both a and b
(d) None of the above

1-i. _____ is an area of Machine Learning in which about taking suitable action to maximize reward in a particular situation.(CO5,K1) 1

(a) Supervised learning
(b) unsupervised learning
(c) Reinforcement learning
(d) None of these

1-j. _____Reinforcement is defined as when an event, occurs due to a particular behavior. (CO5,K1) 1

(a) Negative
(b) Positive
(c) neutral
(d) None of these

2. Attempt all parts:-

2.a. Describe the process of market basket analysis.(CO2,K2) 2

2.b. State the C4.5 algorithm. how does it build decision trees? (CO2,K2) 2

2.c. Define Bayesian Learning in machine learning?(CO4,K2) 2

2.d. State the Under and Overfitting.(CO1,K1) 2

2.e. Describe the agent, environment, and reward in Reinforcement Learning.(CO5,K2) 2

SECTION-B 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i) Describe the steps involved in implementing the Find-S Algorithm and explain how each step works. (CO1,K2) 6

3.a.(ii) Describe the Candidate Elimination Algorithm.(CO1,K2) 6

3.b. Answer any one of the following:-

3.b.(i) Explain linear and logistics Regression. (CO2,K2) 6

3.b.(ii) Discuss the principles of Bayesian Learning and the working of the Bayes Optimal Classifier.(CO4,K2) 6

3.c. Answer any one of the following:-

3.c.(i) *List and explain the main steps of the K-Means Clustering Algorithm.* (CO3,K3) 6

3.c.(ii) Discuss the application of Reinforcement Learning (RL) in real-world scenarios such as robotics, healthcare, and autonomous vehicles.(CO3,K2) 6

3.d. Answer any one of the following:-

3.d.(i) Describe the step-by-step procedure to implement Bagging in machine learning.(CO4,K2) 6

3.d.(ii) Discuss the fundamental differences between Bagging and Boosting.(CO4,k2) 6

3.e. Answer any one of the following:-

3.e.(i) Define Reinforcement Learning and explain a Reinforcement Learning problem with a labeled diagram.(CO5,K2) 6

3.e.(ii) Describe in detail all the steps involved in designing a learning system.(CO5,K2) 6

SECTION-C 50

4. Answer any one of the following:-

4-a. Define FIND_S Algorithm ,finds the most specific hypothesis that fits all the positive examples(CO1,K3) 10

EXAMPLE	COLOR	TOUGHNESS	FUNGUS	APPEARANCE	POISONOUS
1.	GREEN	HARD	NO	WRINKELD	YES
2.	GREEN	HARD	YES	SMOOTH	NO
3.	BROWN	SOFT	NO	WRINKLED	NO
4.	ORANGE	HARD	NO	WRINKLED	YES
5.	GREEN	SOFT	YES	SMOOTH	YES
6.	GREEN	HARD	YES	WRINKLED	YES
7.	ORANGE	HARD	NO	WRINKLED	YES

4-b. Define Consistent Hypothesis and Version Space. With the help of suitable example explain Version Space and Representation of version Space. (CO1,K3) 10

5. Answer any one of the following:-

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5-a. Discuss an example of how association rule learning can be applied in a machine learning task, such as customer segmentation or recommendation systems.(CO2,K3) 10

5-b. Differentiate between linear regression and multiple linear regression. (CO2,K2) 10

6. Answer any one of the following:-

6-a. Discuss the KNN model . Given the following dataset with two features—Height (in cm) and Weight (in kg)—and the target variable Class (either "Tall" or "Short"), apply the k-NN algorithm to predict the class of a new data point.
Height = 167 cm, Weight = 62 kg (CO3,K3) 10

Height (cm)	Weight (kg)	Class
170	65	Tall
160	55	Short
180	75	Tall
155	50	Short
165	60	Short
175	70	Tall
185	80	Tall

6-b. Discuss the use of K-NN for classification and clustering, and explain why the choice of distance metric matters in clustering.(CO3,K2) 10

7. Answer any one of the following:-

7-a. Write down Similarities and difference Between Bagging and Boosting. (CO4,K2) 10

7-b. Discuss how the XGBoost algorithm works and why it is widely used in machine learning applications.(CO4,K3) 10

8. Answer any one of the following:-

8-a. Describe its key components, including the Q-table, action selection, and reward system. Explain the Q-learning algorithm.(CO5,K2) 10

8-b. Compare supervised learning and reinforcement learning, highlighting their main differences.(CO5,K2) 10