Printed Page:- 04

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 (2024 - 2025)

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. What is the term known as on which the machine learning algorithms build a model based on sample data?(CO1,K1) 1

(a) Data Training

(b) Training data

(c) Transfer data

(d) None of the above

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

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 option is true about k-NN algorithm? (CO3,K1) 1

(a) it can be used for classification

(b) it can be used for regression

(c) it can be used in both classification and regression

(d) not useful in ml algorithm

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. Which of the following is an application of reinforcement learning?(CO5,K1) 1

(a) Topic modeling

(b) Recommendation system

(c) Pattern recognition

(d) Image classification

2. Attempt all parts:-

2.a. What is overfitting and underfitting? (CO1,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. What are some benefits of Naive Bayes?(CO4,K2) 2

2.e. What is Deep Learning?(CO5,K2) 2

SECTION-B 30

3. Answer any five of the following:-

3-a. What is a hypothesis explain most specific and most general hypothesis?(CO1,K2) 6

3-b. Describe the Candidate Elimination Algorithm.(CO1,K2) 6

3-c. Explain linear and logistics Regression. (CO2,K2) 6

3-d. Explain Polynomial Regression.(CO2,K2) 6

3.e. Explain the steps of k-Means Clustering Algorithm. (CO3,K3) 6

3.f. write down the implementation Steps of Bagging.(CO4,K2) 6

3.g. What is Reinforcement Learning and explain Reinforcement learning problem with neat diagram.(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:-

5-a. 10

Use the ID3 algorithm, explain how you would construct a decision tree for the following dataset?(CO2,K3)

age	income	student	credit_rating	buys_computer
<=30	high	no	fair	no
<=30	high	no	excellent	no
31...40	high	no	fair	yes
>40	medium	no	fair	yes
>40	low	yes	fair	yes
>40	low	yes	excellent	no
31...40	low	yes	excellent	yes
<=30	medium	no	fair	no
<=30	low	yes	fair	yes
>40	medium	yes	fair	yes
<=30	medium	yes	excellent	yes
31...40	medium	no	excellent	yes
31...40	high	yes	fair	yes
>40	medium	no	excellent	no

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

6. Answer any <u>one</u> 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. Explain the density based clustering with suitable example.. (CO3,K2) 10

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

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

7-b. Explain the bagging technique used in Random Forest. How does this technique help improve the model's performance compared to a single decision tree?(CO4,K2) 10

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

8-a. What are the main differences between supervised learning and reinforcement learning?(CO5,K2) 10

8-b. What is Q-learning? Explain it with the help of real examples. (CO5,K3) 10