

Code: 20AM3501, 20DS3501

III B.Tech - I Semester - Regular Examinations - NOVEMBER 2024

MACHINE LEARNING
(Common for AIML, DS)

Duration: 3 hours

Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.

2. All parts of Question must be answered in one place.

BL – Blooms Level

CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Distinguish reinforcement learning from Supervised learning along with examples.	L2	CO1	7 M
	b)	Differentiate Overfitting and Underfitting.	L2	CO1	7 M
OR					
2	a)	Describe the step by step process of End to End Machine Learning Project.	L2	CO1	7 M
	b)	Discuss the key challenges in machine learning, and how can they affect the development of models.	L2	CO1	7 M
UNIT-II					
3		You are given with some data points as shown in the table below. The points represents a linear relationship between two variables, x and y. The task is to find the best-fit line using linear regression.	L4	CO4	14 M

x	1	2	3	4	5	6	7	8	9	10
y	2	4	5	4	5	7	8	8	10	12

- i) Use linear regression to find line of best fit, $y=mx+b$
- ii) Calculate MSE
- iii) Plot best-fit line along with the data points shown in the table. Using the regression model, predict the value of y, for a new data point $x=11$.

OR

4	a)	Explain the concept of logistic regression. How does it differ from linear regression, and why is it suitable for binary classification problems?	L2	CO2	7 M
	b)	What are the key evaluation metrics used for binary classification models? Discuss their importance, how they are calculated, and in what scenarios each metric is most useful.	L2	CO2	7 M

UNIT-III

5	A small dataset contains the measurements of different fruits. The dataset includes the following features for each fruit: Weight (grams) Size (cm) Fruit Type (Label): Apple or Orange		L4	CO4	14 M
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Your task is to classify a new fruit as either an apple or an orange based on its weight and size using the K-Nearest Neighbors (KNN) algorithm. The data is given below:

Weight(grams)	Size(cm)	Fruit Type
150	7	Apple
160	7.5	Apple
170	8	Apple
180	8.5	Apple
200	9	Orange
210	9.5	Orange
220	10	Orange
230	10.5	Orange

- i) Use KNN algorithm to classify the fruit type based on Weight and Size.
- ii) Experiment with different values of K (eg: $K=1,3,5$)
- iii) Predict the type of the fruit for a new data point with weight of 190 gm and a size of 9 cm.

Explain how the choice of K effects the predictions.

OR

6	a)	What are the different types of distance metrics used in machine learning, and discuss how do they impact model performance? Discuss the scenarios in which each metric is most appropriate.	L2	CO2	7 M
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	b)	Explain the concept of margin in a Support Vector Machine (SVM), and why is it important for the performance of the model?	L2	CO2	7 M
UNIT-IV					
7		What is a perceptron in machine learning and demonstrate its working for binary classification? Explain the key components of the perceptron model and describe the training process, including the role of the learning rate.	L2	CO3	14 M
OR					
8		What is a FeedForward neural network? Describe the key components of a FeedForward neural network and demonstrate the process of forward propagation through the network.	L2	CO3	14 M
UNIT-V					
9	a)	What is ensemble learning? Briefly illustrate the advantages of ensemble methods.	L2	CO3	7 M
	b)	Illustrate how Long Short Term Memory (LSTM) addresses the limitations of traditional Recurrent Neural Networks (RNNs), particularly in handling long-term dependencies and mitigating the vanishing gradient problem.	L3	CO3	7 M
OR					
10		Demonstrate Random Forest Algorithm and how does it utilize multiple decision trees to make predictions? Explain the process of how predictions are made using a Random Forest.	L2	CO3	14 M