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GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

M.Tech. (First Semester) Regular Examinations, February – 2025

24MCSPE11011 - Machine Learning

(CSE)

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Define a learning system in the context of machine learning.	CO1	K1
b. Define 'unsupervised learning' and provide an example of an algorithm used in this type of learning.	CO1	K1
c. Write down the importance of the sigmoid function in Logistic regression	CO3	K2
d. In K-NN, what is the significance of K ? Explain	CO4	K3
e. Write down the importance of r2 in regression approach. Write the importance on it	CO1	K1

PART – B **(10 x 5=50 Marks)**

Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a. What is linear regression Explain briefly and solve the following:- Given the following dataset:			

#Hours Studied (X)	Test Score (Y)
2	81
3	85
5	86
7	90
9	92

a) Compute the slope (m) and intercept (c) of the best-fit line using the least squares method. **(b)** Predict the value of Y for X=6 using the regression line. **(c)** Calculate the Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and Mean Absolute Error (MAE) for the given data.	5	CO1	K4
b. Define Machine Learning and explain its importance in modern technology.	5	CO1	K2

(OR)

c. X_1 = [1, 2, 3, 4, 5] X_2 = [2, 3, 4, 5, 6] Y = [3, 5, 7, 9, 11] Assume the multiple regression equation is: $Y=b_0+b_1X_1+b_2X_2$ (a) Use the least squares method to compute the coefficients b_0, b_1,and b_2. (b) Predict the value of Y for X_1=6 and X_2=7 (c) Calculate the Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and Mean Absolute Error (MAE) for the given data.	5	CO1	K4
d. Differentiate between supervised, and reinforcement learning. Provide examples for each.	5	CO1	K2

3. a. Consider a dataset :
Calculate entropy, and information gain, and construct a decision tree.

Weather	Temperature	Play Tennis
Sunny	Hot	No
Sunny	Mild	Yes
Rainy	Cool	Yes
Rainy	Cool	No
Overcast	Hot	Yes

10 CO2 K4

(OR)

b. What are the advantages and disadvantages of using decision trees in machine learning? 5 CO2 K2

c. Explain the concept of pruning in decision trees. Give a suitable example to Calculate entropy, information gain 5 CO2 K3

4.a. Discuss the importance of deep learning over traditional machine learning methods 5 CO4 K2

b. Write short notes on the following:- 5 CO3 K3
1. Ada Boost 2. Gradient Boosting

(OR)

c Explain briefly how ensemble learning (Bagging and Boosting algorithm) helps to increase the performance of the machine learning model. 10 CO3 K3

5.a. What is ANN? Explain briefly 3 CO3 K3

b. Discuss the importance of cross-validation in evaluating machine learning models. What are the advantages of using k-fold cross-validation over a simple train-test split? 7 CO3 K3

(OR)

c. Explain the gradient descent algorithm for training perceptrons. How does it update the weights and biases during training? Explain briefly abut back propagation algorithms 10 CO3 K3

6.a. State and explain Bayes' theorem. How is it applied in the context of machine learning? Describe the Naive Bayes learning algorithm 5 CO4 K4

b. What is the support vector machine? Find the optimal hyperplane that separates the classes with the maximum margin. Two support vectors from each class: 5 CO4 K4
- Support Vector from Class 1: (2, 2)
- Support Vector from Class 2: (4, 4)

(OR)

c. Explain briefly about the logistic regression and compare with linear regression with suitable examples. How the lines are generated using the both 5 CO4 K4

d. Imagine we have a dataset of fruits, each characterized by its weight (in grams) and color intensity (on a scale from 1 to 10). The fruits are labeled as either 'Apple' or 'Orange'. classify a new fruit, F9, with a weight of 160 grams and a color intensity of 6, using K-NN with k=3. 5 CO4 K4

Fruit	Weight (grams)	Color Intensity	Label
F1	150	7	Apple
F2	170	6	Apple
F3	140	8	Apple
F4	130	7	Apple
F5	180	4	Orange
F6	200	5	Orange
F7	190	3	Orange
F8	210	4	Orange

End of Paper