



COMSATS UNIVERSITY ISLAMABAD
DEPARTMENT OF COMPUTER SCIENCE
Terminal Examination, Spring 2023

Class/Section: -
Subject: -
Instructor: -

BSAI - 5A
Machine Learning Fundamentals (AIC 354)
Dr. Muhammad Usman Yaseen

Marks: - 50
Time: - 180 minutes
Dated: - June 19, 2023

Instructions:

Solve all questions
Be precise and to the point in all questions.
Perform all the necessary steps on Answer Sheets

CLO -1

Explain learning paradigms along with task and applications.

(5 marks)

Question# 01: -

You have developed a machine learning model for a binary classification problem, and the model's performance has been evaluated using a confusion matrix. Calculate the accuracy, precision, recall, and F1-score based on the given confusion matrix.

	Predicted Labels	
	Class A	Class B
Actual Labels		
Class A	80	20
Class B	15	85

(5 marks)

Question # 02: -

Design a machine learning system for a healthcare organization to predict the likelihood of a patient developing a certain medical condition. Provide a case study that illustrates the different learning paradigms in machine learning and how they can be applied to solve this problem.

CLO -2

Apply supervised learning techniques to solve classification problems.

(10 marks)

Question # 03: -

Consider a dataset that contains information about customers' purchasing behavior, including features such as age, income, and purchase history. Build a decision tree model using GINI INDEX approach to predict whether a customer will make a purchase or not. Use the following dataset for your analysis:

$$\text{Gini} = 1 - \sum (P_i)^2 \text{ for } i=1 \text{ to number of classes}$$

AGE	INCOME	PURCHASE
25	40,000	No
35	60,000	Yes
45	80,000	Yes
30	50,000	No
40	70,000	Yes
50	90,000	Yes

Make a prediction for a customer who is 33 years old, with an income of \$55,000. Trace the decision path to determine the final predicted class.