Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U5F02

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Fifth Semester

Computer Science and Design

21UCD502-FOUNDATIONS OF MACHINE LEARNING

(Regulations 2021)

Duration: Three hours | Maximum: 100 Marks

PART A - (10 x 2 = 20 Marks)

1.	Define Artificial Intelligence.	CO1- U
2.	Draw the flowchart representing the classification model steps.	CO1- U
3.	What is Laplace Correction?	CO1- U
4.	What is prior probability? Give an example.	CO1- U
5.	Distinguish between supervised learning, semi-supervised learning, and unsupervised learning.	CO1- U
6.	Calculate sensitivity and specificity for the following confusion matrix.	CO2- App

		Predicted	
		Dog	Not Dog
Actual	Dog	5	1
	Not Dog	1	3

7.	Draw the basic structure of an Artificial Neuron.	CO1- U	
8.	What is a linearly inseparable problem? What is the role of the hidden layer?	CO1- U	
9.	Define Clustering and its types.	CO1- U	
10.	What is the primary objective of unsupervised learning?	CO1- U	

PART – B (5 x 16= 80 Marks)

11.	(a)	Explain the types of search algorithms used in artificial intelligence. Describe the steps used to solve AI problems and how an AI problem is defined as state space search.	CO1- U	(16)

Or

	(b)	Explain the steps involved in evaluating the performance of the Machine Learning Model.	CO1- U	(16)
12.	(a)	In an exam, there were 20 multiple-choice questions. Each question had 44 possible options. A student knew the answer to 10 questions, but the other 10 questions were unknown to him and he chose answers randomly. If the score of the student X is equal to the total number of correct answers, then find out the PMF of X. What is P(X>15)?	CO2-App	(16)
		Or		
	(b)	There is a discrete random variable X with the PMF.	CO2-App	(16)

$$P_x(x) = \begin{cases} \frac{1}{4} when\ x = -2 \\ \frac{1}{8} when\ x = -1\frac{1}{4} when\ x = 20\ otherwisewen\ x = 0 \\ \frac{11}{84} when\ x = 1 \end{cases}$$

If we define a new random variable Y = (X + 1) then

1. Find the range of Y.
2. Find the PMF of Y.

13.	(a)	Explain the kNN Classifier in Machine Learning.	CO1-U	(16)
		Or		
	(b)	Write notes on the Decision tree Classifier algorithm.	CO1-U	(16)
14.	(a)	Write notes on McCulloch–Pitts model of neuron.	CO1-U	(16)
		Or		
	(b)	What is Artificial Neural Network (ANN)? Explain some of the salient highlights in the different architectural options for ANN.	CO1-U	(16)
15.	(a)	Briefly explain Unsupervised Machine Learning with advantages, disadvantages, and its types.	CO1-U	(16)
		Or		
	(b)	How the distance between clusters is measured in hierarchical clustering? Explain the use of this measure in deciding when to stop the iteration.	CO1-U	(16)