Name: Enrolment No:	

UPES

End Semester Examination, December 2024

Programme Name: MCA **Semester : 1**
Course Name : Applied Machine Learning **Time : 03 hrs.**
Course Code : CSAI7019_4 **Max. Marks: 100**
Nos. of page(s) : 3

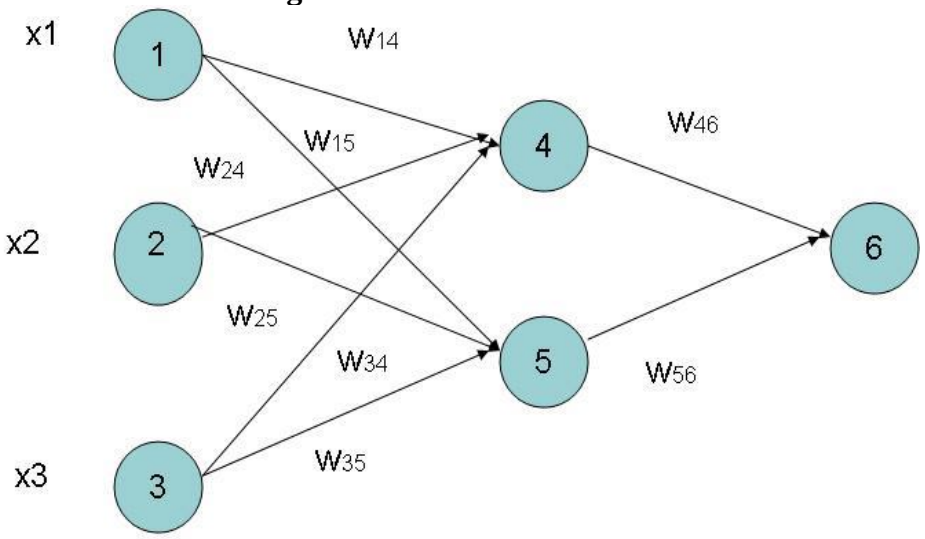
Instructions: Please attempt according to the time provided and given weightage.

SECTION A
(20 Marks) 5 Questions – Each 4 Marks-No Choice-Attempt all Questions

S.No.	Question	Marks	CO
Q1	Discuss the term Machine Learning.	4	CO1
Q2	Discuss linear regression by taking a suitable example of your own.	4	CO2
Q3	How to choose right value for K in KNN?	4	CO2
Q4	Discuss and differentiate: Supervised Leaning, Unsupervised Learning and Reinforcement Learning.	4	CO3
Q5	Define Support Vector Machines (SVM) and explain how they classify data. Discuss the importance of the kernel trick in SVM and give examples of problems where SVM is highly effective.	4	CO4
	SECTION B **(40 Marks) 5 Questions-Each 10 Marks-One Choice-Attempt any 4 questions out of 5**		
Q6	What is the Naïve Bayes Classifier, and how does it apply Bayes' Theorem in making predictions? Explain its assumptions and discuss its advantages and limitations.	10	CO4
Q7	Discuss logistic regression by taking a suitable example of your own. Support your answer with a full explanation by providing suitable Python code and taking a dataset of your own choice.	10	CO2
Q8	Explain the concept of clustering techniques and describe the various types of clustering methods. Discuss the advantages, disadvantages, and real-world applications of these techniques.	10	CO4
Q9	What is Artificial Neural Network, and how does it work? Describe the role of activation functions in neural networks and give examples of commonly used activation functions.	10	CO3
Q10	How does the random forest tree work for classification? Support your answer with a full explanation by providing suitable Python code and taking a dataset of your own choice.	10	CO1

SECTION C

(40 Marks) 2 Questions -Each 20 Marks- One Choice-Attempt any 2 questions out of 3

Q11	**Consider the following ANN:**  **With Bias as:** Calculate the Net Input Ij and Output Oj. Calculate also the Error at each Node. By taking an assumption that sigmoid activation function is used at each node and actual output is 1 at node(6).	20	CO3
Q12	Using the K-means algorithm with Euclidean distance, cluster the following 8 points into 3 clusters: P1=(2,3) P2=(1,4), P3=(5,6)P4=(7,7) P5=(3,5), P6=(8,9), P7=(6,5) and P8=(9,10) Suppose that the initial seeds (centers of each cluster) are C1=(1,2) C2=(4,5)), and C3=(7,8). Run the K-means algorithm for 1 epoch only. At the end of this epoch, show: a) The new clusters (i.e., the points assigned to each cluster). b) The updated centers of each cluster after recalculating based on the cluster assignments. c) Draw a 10 by 10 grid with all 8 points, showing the clusters after the first epoch and marking the new centroids.	20	CO4

x1	x2	x3	w14	w15	w24	w25	w34	w35	w46	w56
1	0	1	0.2	-0.3	0.4	0.1	-0.5	0.2	-0.3	-0.2

θ4	θ5	θ6
-0.4	0.2	0.1

Q13	Consider the following data set for a binary class problem. A | B | Class Label T | F | + T | T | + T | T | + T | F | − T | T | + F | F | − F | F | − F | F | − T | T | − T | F | − i. Calculate the Information Gain while splitting A on B. Which attribute would the decision tree induction algorithm should choose? ii. Calculate the Gini Index while splitting A on B. Which attribute would the decision tree induction algorithm should choose?	20	CO3