


Name:	
Enrolment No:	

UPES

End Semester Examination, December 2024

Programme Name : M.Tech (CSE)	Semester : 1
Course Name : Applied Machine Learning	Time : 03 hrs.
Course Code : CSAI7019	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	Give a brief history of ML.	4	CO1
Q2	Discuss linear regression by taking a suitable example of your own.	4	CO2
Q3	Give a sketch of the development of Computers, starting from first generation of Computers to the latest one.	4	CO1
Q4	Discuss and differentiate: Supervised Learning, Unsupervised Learning and Reinforcement Learning.	4	CO1
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	CO2

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	CO2
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	Write a detailed note on the “Classification” in Machine Learning. Take your own day-to-day examples to explain different types of predictive models of Classification in machine learning.	10	CO1

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SECTION C

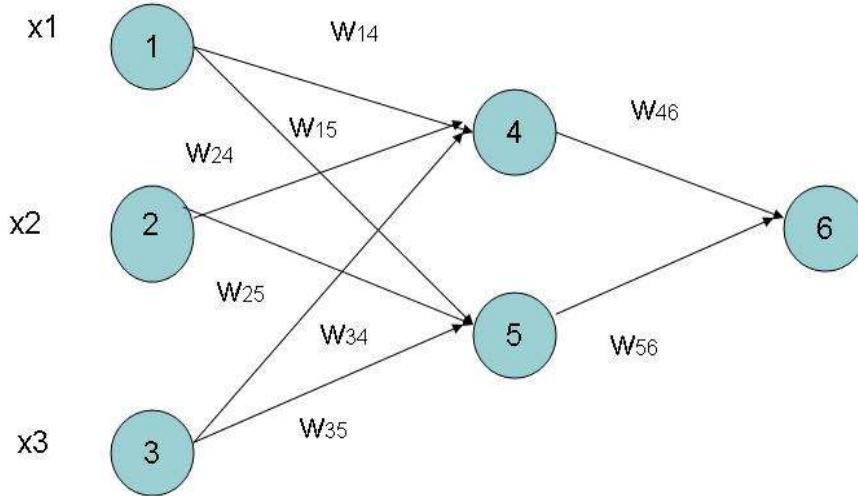
(40 Marks) 2 Questions -Each 20 Marks- One Choice-Attempt any 2 questions out of 3

Q11

Consider the following ANN:

20

CO3



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

With Bias as:

θ4	θ5	θ6
-0.4	0.2	0.1

Calculate the Net Input I_j and Output O_j . Calculate also the Error at each Node.

Q12	<p>Using the K-means algorithm with Euclidean distance, cluster the following 8 points into 3 clusters:</p> <p>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)</p> <p>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:</p> <p>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.</p>	20	CO4																																	
Q13	<p>Consider the following data set for a binary class problem.</p> <table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>Class Label</th> </tr> </thead> <tbody> <tr><td>T</td><td>F</td><td>+</td></tr> <tr><td>T</td><td>T</td><td>+</td></tr> <tr><td>T</td><td>T</td><td>+</td></tr> <tr><td>T</td><td>F</td><td>-</td></tr> <tr><td>T</td><td>T</td><td>+</td></tr> <tr><td>F</td><td>F</td><td>-</td></tr> <tr><td>F</td><td>F</td><td>-</td></tr> <tr><td>F</td><td>F</td><td>-</td></tr> <tr><td>T</td><td>T</td><td>-</td></tr> <tr><td>T</td><td>F</td><td>-</td></tr> </tbody> </table> <p>i. Calculate the Information Gain while splitting A on B. Which attribute should the decision tree induction algorithm choose?</p> <p>ii. Calculate the Gini Index while splitting A on B. Which attribute should the decision tree induction algorithm choose?</p>	A	B	Class Label	T	F	+	T	T	+	T	T	+	T	F	-	T	T	+	F	F	-	F	F	-	F	F	-	T	T	-	T	F	-	20	CO3
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