Name: Enrolment No:	

UPES
End Semester Examination, December 2024.

Course: **Machine Learning**	**Semester: V**
Program: **B.tech CSE Spl. Full Stack AI**	**Time : 03 hrs.**
Course Code: **CSAI 3013**	**Max. Marks: 100**

Instructions: 1. Attempt all the questions.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Differentiate between Bias and Variance with example.	4	CO1
Q 2	Define Activation function and dropout in neural networks. Why non-linear functions are preferred over linear ones.	4	CO1
Q 3	Write short notes on: a) Data Augmentation b) Data Normalization c) Data Preprocessing	4	CO1
Q 4	Define hypermeter tuning and its importance in machine learning. Write two methods used for hypermeter tuning.	4	CO2
Q 5	Define ANN. Write the key components of ANN with short explanation.	4	CO5

SECTION B
(4Qx10M= 40 Marks)

Q 6	Define Clustering. Explain different types of clustering with example.	10	CO4
Q 7	Explain Naïve Bayes Classifier in detail with an example.	10	CO1
Q 8	Explain the concept of perceptron, back propagation and sigmoid activation function in brief. Differentiate between classification and regression.	10	CO5
Q 9	Describe how principle component analysis is carried out to reduce the dimensionality of data sets. OR	10	CO2

	Define Out-of-Bag (OOB) Error and how is it calculated. Why OOB error particularly useful in Bagging techniques like Random Forest. Discuss.		

SECTION-C
(2Qx20M=40 Marks)

Q 10	a) For the given data, compute two clusters using K-means algorithm for clustering where initial cluster centers are (1.0, 1.0) and (5.0, 7.0). Execute two iterations and display the results.	20	CO4

Record number	A	B
R1	1.0	1.0
R2	1.5	2.0
R3	3.0	4.0
R4	5.0	7.0
R5	3.5	5.0
R6	4.5	5.0
R7	3.5	4.5

b) How does k-means clustering differ from hierarchical clustering.

Q 11	(a) Distinguish between overfitting and underfitting. How it can affect model generalization. (b) Explain the main differences between agglomerative and divisive hierarchical clustering. Also, discuss the scenarios in which one approach may be preferred over the other and explanation of linkage criteria (such as single, complete, and average linkage) and how they impact the results of agglomerative clustering. OR For the transactions shown in the below table, compute the following: (a) Entropy of the collection of transaction records of the table with respect to classification. (b) What are the Information Gain of a1 and a2 relative to the transaction of the table.	20	CO2

Instance	1	2	3	4	5	6	7	8	9
A1	T	T	T	F	F	F	F	T	F
A2	T	T	F	F	T	T	F	F	T
Target class	+	+	-	+	-	-	-	+	-