Name: Enrolment No:	

UPES

End Semester Examination, May 2025

Course: Artificial Intelligence and Machine Learning **Semester: VI**

Program: B.tech- BME **Time : 03 hrs.**

Course Code: CSAI3018_2 **Max. Marks: 100**

Instructions: Calculator is allowed.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Define the following: 1. K-fold cross validation 2. Bagging clustering	**4**	**CO1**
Q 2	Describe the working of Support Vector Machine algorithm for classification.	**4**	**CO2**
Q 3	Differentiate between Divisive and agglomerative clustering.	**4**	**CO3**
Q 4	Explain Decision tree algorithm.	**4**	**CO4**
Q 5	Discuss and explain the working of K-means clustering algorithm with advantages and limitations.	**4**	**CO4**
SECTION B **(4Qx10M= 40 Marks)**			
Q 6	What is the Sigmoid function? Derive and explain its role in logistic regression.	**10**	**CO2**
Q 7	Define the assumptions used in logistic regression.	**10**	**CO3**
Q 8	Differentiate between Bagging and Boosting techniques. Why is ensemble learning used?	**10**	**CO4**
Q 10	Explain the following methods: 1. Centroid based clustering 2. Density based clustering 3. Connectivity based clustering 4. Distribution based clustering	**10**	**CO4**
SECTION-C **(2Qx20M=40 Marks)**			
Q 11	Discuss confusion matrix. Explain the basis of Model Evaluation and selection. Suppose there are two models, M1 and M2.	**20**	**CO2**

<table>
<tr><td></td><td>For M1: TP=6954, FN=46, FP=412 and TN=2588
For M2: TP=6800, FN=134, FP=566 and TN=2500

Calculate Accuracy, Precision, Recall and F1-score.
Among M1 and M2 which one is preferable model?</td><td></td><td></td></tr>
<tr><td>Q 12</td><td>Apply K-nearest neighbor classifier for K = 3, to predict the diabetic patient with the given features BMI, Age. If the training examples are given below:
<table><tr><th>BMI</th><th>Age</th><th>Sugar</th></tr><tr><td>33.6</td><td>50</td><td>1</td></tr><tr><td>26.6</td><td>30</td><td>O</td></tr><tr><td>23.4</td><td>40</td><td>O</td></tr><tr><td>43.1</td><td>67</td><td>O</td></tr><tr><td>35.3</td><td>23</td><td>1</td></tr><tr><td>35.9</td><td>67</td><td>1</td></tr><tr><td>36.7</td><td>45</td><td>1</td></tr><tr><td>25.7</td><td>46</td><td>O</td></tr><tr><td>23.3</td><td>29</td><td>O</td></tr><tr><td>31</td><td>56</td><td>1</td></tr></table>
Predict Sugar of Diabetic Patient having BMI = 43.6 and Age = 40.</td><td>20</td><td>CO3</td></tr>
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