Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER– VII EXAMINATION – SUMMER 2026

Subject Code:3170924 Date:03-06-2026

Subject Name:AI and Machine Learning

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	What is artificial intelligence? Discuss properties of AI.	**03**
	(b)	Explain any one defuzzification method in detail.	**04**
	(c)	Compare Artificial intelligence and human intelligence.	**07**
Q.2	**(a)**	Explain Biological neurons.	**03**
	(b)	Discuss basic structure of ANN with neat diagram.	**04**
	(c)	What is the significant of the activation function? Explain various activation functions used in feed forward NN.	**07**
		OR	
	(c)	Illustrate various types of learning methods in neural network.	**07**
Q.3	**(a)**	Explain Dimensionality Reduction technique.	**03**
	(b)	Define feature selection in machine learning. Enlist the steps involved.	**04**
	(c)	Differentiate simple linear regression method and multiple linear regression method used for prediction of output.	**07**
		OR	
Q.3	**(a)**	What are decision trees? Explain the meaning of decision node and leaf node.	**03**
	(b)	Interpret collaborative filtering. Why it is used in recommender systems?	**04**
	(c)	Briefly describe the working of KNN algorithm.	**07**
Q.4	**(a)**	Explain the concept of hyperplanes, support vectors and the kernel trick in SVM.	**03**
	(b)	Explain concept of support vector machine.	**04**
	(c)	Explain Logistic Regression approach in Machine Learning. Is Logistic Regression a Classification or Regression technique?	**07**
		OR	
Q.4	**(a)**	Explain benefits and limitation of fuzzy logic system.	**03**

(b) Find the crisp output Y_1 and Y_2 for the following membership functions using Centre of Area Defuzzification method. Assume $X_1=X_2=4$. **04**

$$\mu(X_1) = \left\{\frac{0.3}{0}, \frac{0.6}{2}, \frac{1}{4}, \frac{1}{6}, \frac{0.6}{8}, \frac{0.3}{10}\right\} \quad \mu(X_2) = \left\{\frac{0.3}{0}, \frac{0.6}{2}, \frac{0.6}{4}, \frac{0.6}{6}, \frac{0.6}{8}, \frac{0.3}{10}\right\}$$

(c) Brief various types of Membership Function used in fuzzy system and discuss any three MF in detail. **07**

Q.5 **(a)** Is clustering approach supervised or unsupervised method of learning? Explain with the help of appropriate example. **03**

(b) Distinguish between machine learning and deep learning. **04**

(c) Explain agglomerative hierarchical clustering in brief. **07**

OR

Q.5 **(a)** Explain genetic algorithm operator: Selection. **03**

(b) Explain any one crossover technique with an example. **04**

(c) With the help of a flowchart, explain the concept of Genetic Algorithm and importance of Mutation and Crossover for the same. **07**