Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2023

Subject Code:3160619 Date:07-12-2023

Subject Name: Soft Computing Techniques

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)**	Differentiate "Soft" computing versus "Hard" computing.	**03**
	(b)	What is fuzzy set and membership function?	**04**
	(c)	Describe characteristics of soft computing and give any two examples of soft computing in civil engineering.	**07**
Q.2	**(a)**	With the help of a figure, explain the features of fuzzy membership functions.	**03**
	(b)	Explain union and intersection operation with example.	**04**
	(c)	With the help of a block diagram, explain a fuzzy rule-based system	**07**
		OR	
	(c)	Write a note on fuzzy implications and interferences	**07**
Q.3	**(a)**	Compare the classical relation versus fuzzy relation.	**03**
	(b)	With suitable example, explain how membership function assignment is performed using intution.	**04**
	(c)	Determine a fitness value of a function f(x,y) = (x-6)2 + (y-3)2 for a string 110010,000100,100001 having string length of first 3 bits for X and remaining 3 bits are for Y.	**07**
		OR	
Q.3	**(a)**	What is defuzzification? List out various methods of defuzzification. Explain any one method of defuzzification in details.	**03**
	(b)	Write a short note on Mamdani FIS for the formation of inference rules.	**04**
	(c)	Realize the Mc-Culloch-Pitts neuron model for AND gate (take binary data).	**07**
Q.4	**(a)**	Differentiate artificial neural network and biological neural network.	**03**
	(b)	Describe biological and it's working.	**04**
	(c)	Explain crossover and mutation in detail	**07**
		OR	
Q.4	**(a)**	Explain chromosomes, gene, and allele in brief.	**03**
	(b)	Enlist the step for solving problem using GA in MATLAB.	**04**
	(c)	Explain different ANN architectures.	**07**
Q.5	**(a)**	State the importance of Genetic algorithm.	**03**
	(b)	Explain the concept of genetic-fuzzy systems	**04**
	(c)	How are data represented in genetic programming?	**07**
		OR	
Q.5	**(a)**	What are hybrid systems? List the various types of hybrid systems.	**03**
	(b)	Write a short note on fuzzy neural system.	**04**
	(c)	With the help of block diagram and flow chart, explain the one application of neural network in civil engineering.	**07**

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