Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) EXAMINATION – WINTER 2017

Subject Code: 2181710 Date: 10/11/2017

Subject Name: Soft Computing in Control(Departmental Elective - III)

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.**

			MARKS
Q.1	**(a)**	Define defuzzification process. List some of the methods to perform defuzzification process.	**03**
	(b)	Define fuzzy inference system. Draw its working diagram.	**04**
	(c)	Explain Mamdani method in detail.	**07**
Q.2	**(a)**	What are the various methods employed for the membership value assignment?	**03**
	(b)	Explain in detail Fuzzy Bayesian Decision Method	**04**
	(c)	Using the inference approach, find the membership values for the triangular shapes *(I R Q)* for a triangle with angles as 60°, 40°, 80°.	**07**
		OR	
	(c)	Discuss about the Demorgan's law for the fuzzy sets. Say whether it is similar to that of classical sets.	**07**
Q.3	**(a)**	Explain Fuzzy set Operations.	**03**
	(b)	Define uncertainty and vagueness. Also, Compare precision and impression.	**04**
	(c)	Suggest design for fuzzy control for washing machine (Define inputs, outputs, fuzzy sets and rules).	**07**
		OR	
Q.3	**(a)**	What is the necessity to convert the fuzzy quantities into crisp quantities?	**03**
	(b)	Write short note on "degree of uncertainty"	**04**
	(c)	Explain in detail implementation of fuzzy logic control in control of AC induction motor.	**07**
Q.4	**(a)**	Consider fuzzy relations:	**03**

$$\underset{\sim}{R} = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{cc} y_1 & y_2 \end{array} \\ \begin{bmatrix} 0.7 & 0.6 \\ 0.8 & 0.3 \end{bmatrix} \end{array}, \quad \underset{\sim}{S} = \begin{array}{c} \\ y_1 \\ y_2 \end{array} \begin{array}{c} \begin{array}{ccc} z_1 & z_2 & z_2 \end{array} \\ \begin{bmatrix} 0.8 & 0.5 & 0.4 \\ 0.1 & 0.6 & 0.7 \end{bmatrix} \end{array}.$$

Find the relation T = Ro Susing max–mincomposition.

	(b)	How is the polling concept adopted in rank ordering method to define the membership values?	**04**
	(c)	Describe the neuro-fuzzy architecture.	**07**
		OR	
Q.4	**(a)**	What is meant by fuzzy decision making process?	**03**
	(b)	Explain the method of generating membership function by means of genetic algorithm.	**04**
	(c)	Describe fuzzy control in plastic molding machine.	**07**

Q.5	**(a)**	State the features of membership functions.	**03**
	(b)	Compare PID control and fuzzy logic control.	**04**
	(c)	Let the fuzzy relation P be given by P= [0.1 0.5; 0.3 0.2] and the universe of discourse X=Y=[1 , 2]. Determine whether the system is stable, oscillating or unstable.	**07**

OR

Q.5	**(a)**	What is artificial neural network?	**03**
	(b)	Explain the concept of learning and state various modes of learning.	**04**
	(c)	Explain the fuzzy logic for industrial automation.	**07**

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