GUJARAT TECHNOLOGICAL UNIVERSITY M. E. - SEMESTER – III • EXAMINATION – WINTER 2012

Subject code: 730205 Date: 26/12/201 Subject Name: Fuzzy Logic and Neural Networks			
Time: 10.30 am – 01.00 pm Total Marks: 70 Instructions:			
	1. 2. 3.	Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks.	
Q.1	(a) (b)	Explain Fuzzy <i>c</i> -Means Algorithm with example? Explain Fuzzy (Rule-Based) Systems with example?	07 07
Q.2	(a) (b)	Demonstrate Defuzzification to Crisp Sets using suitable case study? Explain the process of classification of membership functions? Which are the techniques used for this process?	07 07
	(b)	OR Explain any three Properties of Fuzzy Relations with example?	07
Q.3	(a) (b)	List out Defuzzification techniques and explain any four in detail? Design a fuzzy system for Air Conditioning system and explain with their membership functions?	07 07
		OR	
Q.3	(a)	Explain the algorithm of discrete perceptron learning algorithm. How is it different from continuous perceptron learning algorithm?	07
	(b)	Explain Hebbian Learning rule. Assume a network having single node three inputs with initial weight vector as $[-0.5 \ 1 \ -1]^{T}$. Train this network with input vectors $[2 \ 1 \ -1]^{T}$, $[1.5 \ -0.5 \ 0]^{T}$, and $[0 \ 1 \ 0.5]^{T}$.	07
Q.4	(a)	Explain the working of backpropagation learning algorithm with necessary derivations	07
	(b)	Consider the famous IRIS classification data set with four attributes – sepal length, sepal width, petal length, petal width, and three classes – Verginica, Versicolor, Satosa. Design a neural netwok i.e. structure, number of input/output/hidden nodes, type of learning, learning algorithm, and activation function. Give justification for your selection. OR	07
Q.4	(a)	Demonstrate the working of following feed-forward network with backpropagation learning algorithm for the given input and desired output as	07



Q.4 (b) Consider following terms:

shown in the following figure.

Learning rate, Weight initialization, Momentum, Number of layers, Number of neurons in hidden layer, Over fitting, Weight update mechanisms.

07

Briefly describe the role/effect of the above terms during the learning of error back-propagation algorithm.

- Q.5 (a) Describe the properties of Hopfield neural network. Prove that the Hopfield 07 network converge to one of the stored pattern which is local minima of energy function.
 - (b) Differentiate auto-association and hetero association. List methods for hetero 07 association. Explain any one method in brief.

OR

Q.5	(a)	Explain the followings in brief.	
		(i) Swarm Intelligence	03
		(ii) Radial Basis Function Network	04
	(b)	Explain the concept and algorithm for Self Organizing Feature Map.	07
