## **GUJARAT TECHNOLOGICAL UNIVERSITY** M. E. - SEMESTER – III • EXAMINATION – SUMMER • 2013

Subject code: 730205 Date: 15-05- Subject Name: Fuzzy Logic and Neural Networks			2013	
Time: 10.30 am – 01.00 pm Total Mark			: 70	
<ol> <li>Attempt all questions.</li> <li>Make suitable assumptions wherever necessary.</li> <li>Figures to the right indicate full marks.</li> </ol>				
Q.1	(a) (b)	Explain Classical Sets and Fuzzy Sets with example? Design a fuzzy system for washing machine. Also specify the membership functions and its classification.	07 07	
0.2	(a)	Explain Properties of Membership Functions.	07	
C	(b)	Describe Fuzzy Associative Memories (FAMs) with example. OR	07	
	<b>(b)</b>	Explain Fuzzy Systems Theory and Rule Reduction with example.	07	
Q.3	(a)	Explain Multi-objective Decision Making Method in detail.	07	
	(b)	Explain Gradient Method with its pros and cons.	07	
Q.3	(a)	Differentiate supervised learning, unsupervised learning and reinforced learning. List various types of neural networks and their purpose in brief. Which type of learning is followed in these networks?	07	
	(b)	Answer the followings.(i) Explain the drawbacks of perceptron. How they arein	04	
		backpropagation algorithm? (ii) What is swarm Intelligence? How it is different from genetic algorithms?	03	
Q.4	(a)	Explain generalized learning rule for training neural Describe different learning rules with their purpose in brief.	07	
	(b)	Explain following terms / parameters with respect to back propagation algorithm: (i) Choice of learning rate (ii) Momentum (iii) Frequency of weight update (iv) Number of samples	02 02 02 01	
0.4	<b>(</b> a)	What is error back propagation? Explain error back propagation with	07	
<b>x</b>	(4)	necessary derivations.	01	
Q.4	(b)	Differentiate feedback and feed forward network. Explain the basic principle, structure and working of Hopfield type neural network.	07	
Q.5	(a)	Describe winner take all strategy. Explain simple competitive learning algorithm.	07	
	(b)	What is the characteristic of Radial Basis Function (RBF)? List out various radial basis functions. Give the structure of type neural network. How incremental mode of training and batch mode of training differs for RBF net?	07	

- Q.5 (a) What is associative memory? Explain the training and retrieval 07 procedure of Kosko's discrete bidirectional associative memory.
  - (b) Consider a Self Organizing Map (SOM) network of linear topology 07 having 3 nodes A, B, and C. node B is connected to node A and node C both.

Consider the training set  $T_1=(1, 1, 0)$ ,  $T_2=(1.5, 0, 0.5)$ ,  $T_3=(0.5, 1, 1.2)$ , and initial weight vector is given as,

 $W_0 = \begin{pmatrix} W_A: 0.5 & 0.2 & 1.0 \\ W_B: 1.0 & 0.3 & 0.2 \\ W_C: 1.0 & 1.0 & 1.0 \end{pmatrix}$ 

Show your calculations for training this SOM network for two iterations. Consider initial topological distance D(t)=1 for iteration one and D(t)=0 thereafter. Also consider  $\eta(t)=0.5$  for first iteration, and  $\eta(t)=0.25$  thereafter.

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