Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. Sem. – III - Examination –June- 2011

Subject code: 730205

Subject Name: Fuzzy Logic and Neural Networks

Date:07/06/2011 **Time: 10.30 am – 01.00 pm**

Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** List out Defuzzification methods and Explain any two in detail. **07**

(b) Explain Fuzzy (Rule-Based) Systems with example? **07**

Q.2 **(a)** Specify different techniques for Membership Value Assignments and correlate the techniques with fuzzy system? **07**

(b) Explain Gradient method in detail. **07**

OR

(b) Explain Overlapping and Non-Negative member-ship function **07**

Q.3 **(a)** i) Demonstrate recursive least squares (RLS) algorithm using training set *Z* of Table 1 **03**

ii) Modify the input membership functions centers to the following values and develop a fuzzy model for the *Z* of Table 1 using the RLS algorithm (perform two cycles). Note that the remaining rule-base parameters are the same as those used in the text, e.g., **04**

$$\sigma_j^i = 2 \quad \text{and} \quad \hat{\theta}(0) = \begin{bmatrix} 0.3647 \\ 8.1775 \end{bmatrix}$$

$$c_1^1 = 1 \quad c_1^2 = 3$$

$$c_2^1 = 3 \quad c_2^2 = 6$$

Training data set, Z = {([x1, x2], y)}

TABLE 1

X1	X2	Y
0	2	1
2	4	5
3	6	6

(b) Explain the importance of Fuzzy approach in Pattern reorganization in detail. **07**

OR

Q.3 **(a)** What is learning? Explain the Delta learning rule with necessary derivations. **07**

(b) Explain the effects of following parameters on the working and convergence of back propagation algorithm:

a) earning rate **02**

b) Momentum coefficient **01**

c) Population size **01**

d) No. of hidden layers **01**
e) No. of nodes in hidden layer **01**
f) No. of samples **01**

Q.4 **(a)** Explain the Bidirectional Associative Memory (BAM) as proposed by Wang. **07**

(b) Explain the working of Kosko's basic Bidirectional associative memory. For N=2 with patterns given as, **07**

A1 = (100001) B1=(11000)
A2 = (011000) B2=(10100)
A3 = (001011) B3=(01110)

Find the recall recall for a noisy pattern (011011).

OR

Q.4 **(a)** How this BAM can be applied to solve the problem of character recognition? **07**

(b) Enlist the characteristics of Hopfield network? What is the role of energy function? Explain the working of Continuous Hopfield networks in brief. **07**

Q.5 **(a)** Explain the working of Self Organizing Maps with suitable example. **07**

(b) Explain the working of Radial Basis Function (RBF) neural network with suitable example. **07**

OR

Q.5 **(a)** Explain various transfer functions used in neural networks? Why sigmoid type functions are of much importance for continuous type neural network? **07**

(b) Explain the working of single layer perceptron classifiers. Also explain the drawbacks of single layer perceptron classifiers. **07**

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