

**GUJARAT TECHNOLOGICAL UNIVERSITY****M.E Sem-III Regular Examination January 2011****Subject code: 730205****Subject Name: Fuzzy Logic and Neural Networks****Date: 10 /01 /2011****Time: 02.30 pm – 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.

- Q.1** (a) Explain fuzzy (rule-based) systems with suitable example. **07**  
 (b) Describe various methods of defuzzification with suitable examples. **07**

- Q.2** (a) Explain  $\lambda$ -cut procedure in detail. Specify the importance of  $\lambda$ -cut method in fuzzy logic. **07**  
 (b) Discuss C-Means clustering with example. **07**

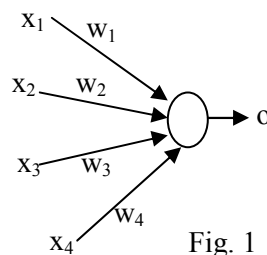
**OR**

- (b) Explain the difference between fuzzy C-Mean algorithm and traditional C-Mean with example. **07**

- Q.3** (a) Explain feature analysis and partitions of the feature space using fuzzy logic. **07**  
 (b) Explain multi-objective decision making. **07**

**OR**

- Q.3** (a) Explain the perceptron learning rule. For the network shown in Fig. 1, consider the initial weight matrix to be  $[1 \ -1 \ -1 \ 0]^T$ . The learning rate is assumed to be  $c = 0.2$ . Find out the updated weight matrix after applying following three input vectors:  $x_1 = [1 \ 2 \ -1 \ 0]^T$ ,  $x_2 = [0 \ 1 \ -1 \ 1]^T$ ,  $x_3 = [2 \ 2 \ 0 \ -1]^T$ . The teacher's desired responses for  $x_1$ ,  $x_2$ , and  $x_3$  are  $d_1 = -1$ ,  $d_2 = -1$ , and  $d_3 = 1$ , respectively. **07**

**Fig. 1**

- (b) Explain backpropagation algorithm for training multilayer neural network structure with necessary derivations. **07**

- Q.4** (a) Briefly explain the followings with reference to backpropagation networks: **02**  
 1. Frequency of weight updates **02**  
 2. Choice of learning rate **02**  
 3. Generalizability **02**  
 (b) What is Bidirectional Associative Memory (BAM)? Describe the storage and recall procedures of Kosko's BAM. **07**

**OR**

- Q.4** (a) Explain the multiple training encoding strategy as proposed by Wang in detail. **07**  
 (b) Explain the working of Hopfield network. How this network can be used to solve the problem of 'Character Recognition'? **07**
- Q.5** (a) Explain the working principle of Swarm Intelligence (SI). Enlist algorithms working based on the concepts of SI. How SI is different from traditional genetic algorithms? **07**  
 (b) Explain the principle and algorithm of self organizing networks with suitable example. **07**
- OR**
- Q.5** (a) Explain the concept of radial basis function networks. **07**  
 (b) Differentiate following terms:  
     1. Feedforward network vs. Feedback network **02**  
     2. Auto-association vs. Hetero-association **03**  
     3. Supervised learning vs. Unsupervised learning **02**

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