

M.E. (Electronics and Communication Engineering)  
Third Semester  
ECE-1301: Neural Network and Fuzzy Logic

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** Attempt five questions in all, including Question No. 1 (Section-A) which is compulsory and selecting two questions each from Section B -C

x-x-x

**Section -A**

- Q 1(a) Describe the sigmoid function. (10)
- (b) What is function approximation?
- (c) What are bidirectional associative memories?
- (d) What is Dilation operation on Fuzzy sets?
- (e) List different de-fuzzification methods.

**Section -B**

- Q2 (a) Illustrate role of activation function in ANN? Compare and Contrast different activation functions and their usage in different applications. (7)
- (b) What is softmax function? (3)
- Q3 (a) Discuss the Implementation of Logistic regression using a single layer neural network. (5)
- (b) Describe the role of learning rate in gradient descent? What is the effect of high and low value of learning rate. (5)
- Q 4 (a) What are radial basis function? Explain the different parameters and their effect using a plot. (5)
- (b) How weights are updated in back propagation algorithm? How weights are initialized? (5)

**Section -C**

- Q5 Illustrate the architecture of self-organizing maps? Describe the different stages of operation. How winning weights are chosen? (10)
- Q6 What are Hopfield networks? Create Discrete Hopfield Network with bipolar representation of input vector as  $[1 \ 1 \ 1 \ -1]$  or  $[1 \ 1 \ 1 \ 0]$  (in case of binary representation) is stored in the network. Test the hopfield network with missing entries in the first and second component of the stored vector (i.e.  $[0 \ 0 \ 1 \ 0]$ ) (10)
- Q7 (a) How fuzzy sets are different from crisp sets? Explain the approximate reasoning process using the Fuzzy logic. (6)
- (b) Show that the inference rule  $[(P \rightarrow Q) \wedge (Q \rightarrow R)] \rightarrow (P \rightarrow R)$  is a quasi-tautology for fuzzy sets. (4)

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