

**B.Tech.(Seventh Semester) Examination, Nov 2022**  
**Subject: Neural Network and Fuzzy Logic (OPEN ELECTIVE)**  
**Department of Information Technology**

**Time: Three Hours**

**Max Marks: 50**

**Note:**

- i. Attempt all UNITS, internal choice(s) are provided.
- ii. All parts of a question should be answered together.
- iii. Answer should be brief and to the point.
- iv. Figures on the right-hand side margin indicate break marks for that question.
- v. Notations have their usual meanings.
- vi. Assume default values if required.

**UNIT – I (Attempt anyone)**

1. Explain the important characteristics of biological neural network (BNN). Explain the reason of electrochemical transmission in BNN. Lists some neurotransmitters with their basic functions. [2+1+2]

OR

2. Explain the various types of training in ANN with their flowcharts. Explain Perceptron and Competitive Learning rules. [3+2]

**UNIT – II (Attempt anyone)**

1. Give the learning rules for various layers of BPN and describe the algorithm briefly. Explain significance and drawback of momentum factor. [3+2]

OR

2. Explain 'Linear separability and XOR problem' with proper illustration and example. Explain MADALINE network with its basic architecture and algorithm. [2.5 X 2.5]

**UNIT – III (Attempt any Four)**

1. Describe Kohonen's Self Organizing Feature Maps (KSOM) along with its concept, architecture, and training algorithm. [5]
2. Construct and test an LVQ with five vectors assigned to two classes. The given vectors along with the classes are as shown: (Assume  $\alpha = 0.1$ ) [5]


Vector	Class
(1 1 0 1)	1
(0 1 0 1)	2
(0 0 1 0)	2
(1 0 0 1)	1
(0 1 1 1)	2

P.T.O.

3. Consider the forward only CPN with weights between input and cluster layer  $V_{ij} = [0.3 \ 0.6; 0.1 \ 0.5]$  and weights between cluster layer to output layer  $W_{jk} = [0.2 \ 0.8; 0.4 \ 0.7]$  using input pair  $x = (1 \ 0)$ , and  $y = (1 \ 0)$  perform the training (one step-one iteration). Find the activation of the cluster layer units. Update the weights using learning rates  $\alpha=0.5$  and  $\alpha=0.1$ . [5]
4. Explain the ART fundamentals. Give the architecture & stepwise algorithm for ART 1 neural net. [1+4]
5. Explain the following:
  - i. SVM and its common Kernel
  - ii. Neo-cognitron. [2.5 X 2.5]

#### UNIT – IV (Attempt any Four)

1. Explain the significant role of Fuzzy logic to deal with the problem of uncertainty. Describe fuzzy relations with the explanation of fuzzy Cartesian product and various operations on fuzzy relation. [1+4]
2. Compare Fuzzy Sets with Classical Sets with suitable examples. Determine the implication relations
  - i. IF x is A THEN y is B
  - ii. IF x is A THEN y is B ELSE y is C.
 where  $A = \{(a, 0) (b, 0.7) (c, 0.5) (d, 1)\}$   
 $B = \{(1, 0.2) (2, 0.9) (3, 0.8) (4, 0.1)\}$   
 $C = \{(1, 0.1) (2, 0.4) (3, 0.9) (4, 0.7)\}$  [1+4]
3. Three fuzzy sets are given as follows:
  $A = \{(low, 1), (med, 0.2), (high, 0.5)\}$   
 $B = \{(positive, 0.9), (zero, 0.4), (negative, 0.9)\}$   
 $C = \{(low, 0.1), (med, 0.2), (high, 0.7)\}$ 



Find the fuzzy relations R as fuzzy Cartesian product  $A \times B$  and S as fuzzy Cartesian product  $C \times B$ .

  - i. Find  $C \circ R$  using max-min composition.
  - ii. Find  $C \circ S$  using max-min composition. [5]
4. What do you mean by Defuzzification? Illustrate and explain the different methods of defuzzification. [1+4]
5. Write short notes on :
  - a. Fuzzy Associative Memories.
  - b. Fuzzy ARTMAP. [2.5 X 2]

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