Code: 13A02605 **R13**

B.Tech IV Year I Semester (R13) Supplementary Examinations June 2017

NEURAL NETWORK & FUZZY LOGIC

(Electronics & Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) What are the advantages of neural networks over conventional computers?
(b) Distinguish between Mccullochpitts, perceptron and ADALINE neural models.
(c) Distinguish between supervised and unsupervised learning, linear separability & non-separability.
(d) What is a spatio temporal pattern?
(e) Distinguish between a feed forward network and a recurrent network.
(f) List the applications of neural networks.
(g) Compare and contrast operations of classical set theory and fuzzy set theory.
(h) Show that a multilayer network with linear discriminate function is equivalent to single layer network.
(i) Define fuzzification.
(j) Explain Fuzzy Logic.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Draw the structure of biological neuron and explain its function in detail.
(b) Explain about Correlation Learning and winner takes all learning with examples.

OR

3 (a) Explain about neuron modeling for artificial neuron systems and common activation functions in detail.
(b) What is neural learning? Explain in detail about delta learning rule.

UNIT – II

4 (a) What is Ex-OR problem? How is it solved?
(b) What is Hopfield model? Describe energy function for Hopfield network and explain how it can be minimized.

OR

5 (a) Draw the architecture of multilayer perceptron and explain the training algorithm along with expressions.
(b) Differentiate between local minima and global minima? What is the significance of momentum term in back propagation learning?

UNIT – III

6 (a) Explain in detail recurrent associative memory.
(b) Construct a BAM with 4 nodes in the first layer and 2 nodes in the second layer and symmetric weights. Establish the following three associations.
(+1, +1, -1, -1) -> (+1, +1)
(+1, +1, +1, +1) -> (+1, -1)
(-1, -1, +1, +1) -> (-1, +1)

OR

7 (a) Explain about Bidirectional Associate Memory (BAM) and its mathematical model.
(b) Explain about improved coding of memories.

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UNIT – IV

8 (a) Explain relations between fuzzy and crisp sets and also its conversion.

(b) Consider two fuzzy subsets of the set X, X = {a, b, c, d, e} referred to as A and B.

A = {1/a, 0.3/b, 0.2/c 0.8/d, 0/e) and B = {0.6/a, 0.9/b, 0.1/c, 0.3/d, 0.2/e}

Find: (i) Support. (ii) Core. (iii) Cardinality. (iv) Complement. (v) Union. (vi) Intersection. (vii) a-cut for each set where a = 0.5 and a = 0.3

OR

9 (a) Explain the basic concept of fuzzy sets and properties of fuzzy sets.

(b) Explain about classical set theory and its operation with properties in detail.

UNIT – V

10 (a) For the given fuzzy set:

$$A^{\sim} = \left\{\frac{1}{1.0} + \frac{0.65}{1.5} + \frac{0.4}{2.0} + \frac{0.35}{2.5} + \frac{0}{3.0}\right\},$$

$$B^{\sim} = \left\{\frac{0}{1.0} + \frac{0.25}{1.5} + \frac{0.6}{2.0} + \frac{0.25}{2.5} + \frac{1}{3.0}\right\}$$

$$C^{\sim} = \left\{\frac{0.5}{1.0} + \frac{0.25}{1.5} + \frac{0}{2.0} + \frac{0.25}{2.5} + \frac{0.5}{3.0}\right\}$$

Solve the following: (i) $A^{\sim} \cap B^{\sim}$. (ii) $A^{\sim} \cup B^{\sim}$. (iii) $A^{\sim c}$. (iv) $B^{\sim c}$. (iv) $A^{\sim c} \cup B^{\sim c}$.

(b) Explain in detail about fuzzy membership functions and features.

OR

11 (a) Explain the processes of fuzzification and defuzzification in detail.

(b) Two fuzzy sets A and B both defined on X are as follows:

$\mu(X_i)$	x_1	x_2	x_3	x_4	x_5	x_6
$A^{\sim}$	0.1	0.7	0.8	1.0	0.9	0.1
$B^{\sim}$	1.0	0.9	0.5	0.2	0.1	0

Express the following cut set using Zadeh notation:

(i) $(A^{\sim})_{0.7}$ (ii) $(B^{\sim})_{0.5}$ (iii) $(A^{\sim} \cup B^{\sim})_{0.8}$ (iv) $(A^{\sim} \cap B^{\sim})_{0.9}$

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