(b) Explain the Bi-directional Associative Memory (BAM) in the context of auto association in first layer followed by weight matrix mapping into second layer. 6

9. (a) What do you mean by Feed Forward Network ? Explain the difference between Synchronous and Asychronous Neural Network. 7

(b) Explain Hamming Network to calculate hamming distances between stored vector and input vectors. 6

OR

10. Explain in brief the Mathematical Foundation of continuous type Hop-field Network. 13

11. (a) Write a short note on "Self Organizing Feature Maps". 7

(b) What is ART ? Explain with suitable illustrations and mathematical formulation. 6

OR

12. Write short notes :

(i) Cluster Discovery Network 5

(ii) ANN Model 4

(iii) Application of NN in Electrical Drives. 4

Faculty of Engineering & Technology
Seventh Semester B.E. (Electrical Engg.) (C.B.S.) Examination
Elective—I : FUZZY LOGIC AND NEURAL NETWORK

Time—Three Hours] [Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Solve Question No. **1 OR** Question No. **2**.

(3) Solve Question No. **3 OR** Question No. **4**.

(4) Solve Question No. **5 OR** Question No. **6**.

(5) Solve Question No. **7 OR** Question No. **8**.

(6) Solve Question No. **9 OR** Question No. **10**.

(7) Solve Question No. **11 OR** Question No. **12**.

(8) Due credit will be given to neatness and adequate dimensions.

(9) Assume suitable data wherever necessary.

(10) Diagrams and Chemical equations should be given wherever necessary.

(11) Illustrate your answers wherever necessary with the help of neat sketches.

1. (a) Define Crisp set and Fuzzy set theory on the basis of Membership grade values specified over a physical variable. 7

(b) Explain the standard operations performed on Fuzzy set with example. 7

OR

2. (a) Explain design approaches for adaptive fuzzy controller. 7

(b) Let 'z' be a fuzzy set defined by

$$z = 0.3/x_1 + 0.8/x_2 + 0.1/x_3 + 0.5/x_4 + 0.2/x_5 + 0/x_6 + 1/x_7 + 0.7/x_8$$

List 'α' cuts and strong 'α' cuts of 'z' for value of $\alpha_1 = 0.1$ and $\alpha_2 = 0.6$ among the close interval $\alpha \in [0, 1]$. 7

3. (a) Explain 't' norms and 't' conorms. 6

(b) Explain in brief, structure of Fuzzy Knowledge Base Controller (FKBC) in support with fuzzification and defuzzication block and an interence engine. 7

OR

4. (a) Explain the Center of Gravity (COG) Defuzzification Method. 6

(b) What are the types of FKBC, explain any one in detail. 7

5. (a) Enlist and explain any one application of FLC from industrial perspective. 7

(b) Let A, B $\in$ F(X); then prove that following properties hold true for all α, β, [0, 1] :

(i) $(A \cap B)_\alpha = \alpha_A \cap \alpha_B$

(ii) $(\overline{A})_\alpha = \overline{A}(1 - \alpha) +$ 7

OR

6. (a) Determine which fuzzy set defined by the following functions are fuzzy numbers :

(i) $A(x) = \sin(x)$; For $0 \leq x \leq \pi$
$= 0$: otherwise

(ii) $B(x) = \min(1, x)$; for $x \geq 0$
$= 0$; for $x < 0$ 7

(b) Distinguish between Linear and Non-Linear System on the basis of superposition principles. 7

7. (a) Explain with suitable flowchart the steps involved in training Neural Network. 7

(b) Draw three layer feed forward ANN model. 6

OR

8. (a) What do you understand by layered neural network. Explain in short the following with suitable schematic illustrations :

(i) Acyclic N.N.

(ii) Cyclic N.N.

(iii) Feed Forward N.N.

(iv) Modular N.N. 7