

- (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 Asynchronous 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 defuzzification block and an inference 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 $\alpha, \beta, [0, 1]$:
 - (i) $(A \cap B)_\alpha = \alpha_A \cap \alpha_B$
 - (ii) $(\bar{A})_\alpha = \bar{A}(1 - \alpha)$ 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