

Elective - I : Fuzzy Logic and Neural Networks

P. Pages : 2

Time : Three Hours



NKT/KS/17/7455

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Illustrate your answers whenever necessary with the help of neat sketches.

1. State and explain seven different network learning rules. **14**

OR

2. a) What are different type of artificial neural network models? Explain in detail. **6**

b) Define synaptic weight, activation function, threshold and bias with respect to artificial neural network. **4**

c) Write short note on biological neural network. **4**

3. a) How learning is dependent on various factors? State the factors for the same. **6**

b) Explain delta learning rule for multi-perceptron layer with expression. **7**

OR

4. Explain feed forward recall and error back propagation with neat block diagram. Also write error back propagation training algorithm. **13**

5. a) Write down mathematical foundation of gradient type Hopfield networks. **7**

b) State and explain washing machine as a control system application using neural networks. **6**

OR

6. a) Explain signal processing application i.e. ECG and EMG using neural network. **8**

b) Explain the concept of dynamical systems in detail. **5**

7. a) For following fuzzy sets \tilde{A} and \tilde{B} 7
- $$\tilde{A} = \left\{ \frac{0.5}{2} + \frac{0.8}{3} + \frac{0.2}{4} + \frac{0.1}{5} + \frac{0.2}{6} \right\}$$
- $$\tilde{B} = \left\{ \frac{0.6}{2} + \frac{0.8}{3} + \frac{0.4}{4} + \frac{0.5}{5} + \frac{0.3}{6} \right\} .$$

Perform union, intersection, difference and complement operation.

- b) What do you mean by classical relations? Explain operation performed on them. Also state properties for same. 7

OR

8. a) For given classical sets $A = \{9,5,6,8,10\}$ $B = \{1,2,3,7,9\}$ $C = \{1,0\}$ defined on universe X of all natural number. Prove the properties of associativity and distributivity. 4

- b) Explain tolerance and equivalence relation with respect to fuzzy logic. 5

- c) What is compositivity property? Explain it with reference to fuzzy relations. 5

9. a) Write short note on interval analysis. 4

- b) What do you mean by fuzzy mapping? Explain in detail. 4

- c) What is de-fuzzification? State methods for same. 5

OR

10. a) Explain the concept of membership function with neat diagram. Also write its features. 6

- b) Design and explain steps used in fuzzy logic controller. 7

11. a) What is a genetic fuzzy controller? Design a genetic fuzzy controller and explain it with help of an example. 8

- b) How temperature of a plant can be controlled using fuzzy logic. 5

OR

12. Explain the concept of image and signal processing using fuzzy logic in detail with example of each. 13
