



- Notes :
1. All questions are compulsory and carry equal marks.
  2. Draw well labeled diagrams wherever necessary.
  3. Use of calculator is allowed.

Either:

1. a) Explain the difference between crisp and fuzzy sets, give examples. 8
- b) What is defuzzification? Explain following methods of defuzzification: 8
  - i) Centroid method.
  - ii) Weighted average method.

**OR**

- c) State any four operations of fuzzy relations. Explain any two of them. 8
- d) Explain Lambda cuts for fuzzy sets. 8

Either:

2. a) Explain the graphical techniques of interface with suitable example. 8
- b) Explain a method of fuzzy classification assuming suitable data. 8

**OR**

- c) Explain the extension principle with suitable examples. 8
- d) Draw the block diagram of a fuzzy rule based system and explain. 8

Either:

3. a) List any five learning processes for the neural networks. 8
- b) Describe the back - propagation algorithm. 8  
Comment on rate of learning and the effect of momentum constant.

**OR**

- c) Describe the basic building block of artificial neural Network. 8
- d) Explain the difference between supervised and unsupervised learning's for neural networks with examples. 8

Either:

4. a) Explain the architecture of a Bidirectional Associative Memory (BAM). 8
- b) Draw architectural diagram of adaptive resonance theory (ART 1) and explain. 8

**OR**

- c) Describe the properties of self organizing feature maps. 8
- d) Describe the concept of counter – propagation network. 8

5. a) Explain the  $\lambda$ -cut method for fuzzy sets. 4
- b) Write note on fuzzy C-means clustering (FCM). 4
- c) What are the advantages of artificial neural network? 4
- d) Write a note on counter-propagation network (CPN). 4

\*\*\*\*\*