

(Time: $2\frac{1}{2}$ hours)

[Total Marks: 60]

- N. B.: (1) All questions are compulsory.
(2) Make suitable assumptions wherever necessary and state the assumptions made.
(3) Answers to the same question must be written together.
(4) Numbers to the right indicate marks.
(5) Draw neat labeled diagrams wherever necessary.
(6) Use of Non-programmable calculator is allowed.

1. Attempt any two of the following: 12
 - a. Explain in short, about various types of soft computing techniques.
 - b. Define associative memory. Explain different operations that can be performed on it. Describe its types with neat diagrams.
 - c. Explain Adaptive Resonance Theory with its parameters and neat diagram.
 - d. Write various applications of soft computing.
2. Attempt any two of the following: 12
 - a. List and explain all activation functions used in ANN.
 - b. Write the training algorithm / flowchart of McCulloch-Pitts neuron.
 - c. Explain with neat diagram Linear separability concept in detail considering a single layer network to separate the input space into regions based on positive or negative network response.
 - d. Which function is used by Radial basis Function network? Draw and explain its architecture.
3. Attempt any two of the following: 12
 - a. With an architectural diagram, explain the probabilistic neural network.
 - b. What is Mexican hat? Draw and explain its structure.
 - c. Define Learning vectors quantization. Explain its architecture with neat diagram.
 - d. How is Convolutional Neural Networks build? What is its key advantage? How are the neurons arranged in CNN model? Explain with neat diagram
4. Attempt any two of the following: 12
 - a. How Fuzzy relations relate elements of one universe (say X) to those of another universe (say Y)? Explain with the help of matrix representation and graphical representation.
 - b. Explain Fuzzy Equivalence Relation with neat diagram.
 - c. What are various methods of membership value assignments? Explain Angular fuzzy sets in detail.
 - d. How is an interval analysis obtained in fuzzy arithmetic?
5. Attempt any two of the following: 12
 - a. Explain Fuzzy Inference Systems in detail.
 - b. Describe architecture and operation of Fuzzy Logic Control system.
 - c. Explain The schema theorem with appropriate examples.
 - d. Write a short note on Neuro – fuzzy hybrid.