

(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
- Explain in short, about various types of soft computing techniques.
 - Define associative memory. Explain different operations that can be performed on it. Describe its types with neat diagrams.
 - Explain Adaptive Resonance Theory with its parameters and neat diagram.
 - Write various applications of soft computing.
2. Attempt **any two** of the following: 12
- List and explain all activation functions used in ANN.
 - Write the training algorithm / flowchart of McCulloch-Pitts neuron.
 - 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.
 - Which function is used by Radial basis Function network? Draw and explain its architecture.
3. Attempt **any two** of the following: 12
- With an architectural diagram, explain the probabilistic neural network.
 - What is Mexican hat? Draw and explain its structure.
 - Define Learning vectors quantization. Explain its architecture with neat diagram.
 - 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
- 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.
 - Explain Fuzzy Equivalence Relation with neat diagram.
 - What are various methods of membership value assignments? Explain Angular fuzzy sets in detail.
 - How is an interval analysis obtained in fuzzy arithmetic?
5. Attempt **any two** of the following: 12
- Explain Fuzzy Inference Systems in detail.
 - Describe architecture and operation of Fuzzy Logic Control system.
 - Explain The schema theorem with appropriate examples.
 - Write a short note on Neuro – fuzzy hybrid.