**NEURAL NETWORKS & FUZZY LOGIC Course Outcome:** After completion of the course the students will be able to

 Get an overview of different types of neural network models.

 Understand the functioning of single; multi layer feed forward neural networks, associative memories and their rules and algorithms.

 Understand about fundamentals of fuzzy logic, their rules and applications.

**UNIT I** Introduction to Neural Networks: Biological neuron, McCulloh-pitts neuron model, Neuron Modelling for Artificial Neural Systems, Models of Artificial Neural Networks-feedforward and feedback networks, Neural Processing, Learning as approximation, Supervised and unsupervised learning, Neural Network Learning rules- Hebbian, Perceptron, Delta, Widrow-Hoff, Correlation, Winner-Take-All learning rules.

**UNIT II** Single-Layer Neural Networks: Classification Model, Features and Decision Regions, Discriminant Functions, Linear Machine and Minimum Distance Classification, Training and Classification using Discrete Perceptron, Single-Layer Continuous Perceptron Networks, Multicategory Single-Layer Perceptron Networks, Hopfield Network – Discrete-time, Gradient type. Multi-Layer Neural Networks: Linearly Nonseparable Pattern Classification, Delta Learning Rule for Multiperceptron Layer, Generalized Delta Learning Rule, Feed forward Recall and Error Back-propagation training, Learning Factors.

**UNIT III** Associative Memories: Basic concepts, Linear Associator, Recurrent Autoassociate Memory, Performance Analysis of Recurrent Autoassociate Memory, Bidirectional Associate Memory(BAM): Memory Architecture, Association Encoding and Decoding, Stability Considerations, Memory Example and Performance Evaluation, Improved coding of memories, Multidirectional Associative Memory, Associative Memory of Spatio-Temporal Patterns.

**UNIT IV** Fuzzy Set– Introduction: Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

**UNIT V** Fuzzy Logic - Fuzzy Membership, Rules: Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications.

**Text Books:**

1. JacekM.Zurada,” Introdution to Artificial Neural Systems”,West Publishing Company

2. Timothy J.Ross, “ Euzzy Logic with Engineering Applications”, Wiley Indian 3rd Edition

**Reference Books:**

1. George J.Klir/Bo Yuan, “Fuzzy Sets and Fuzzy Logic : Theory and apllications”, Prentice-Hall Edition

2. S.N.Sivanandam, S.Sumathi, S.N.Deepa, “Introduction to Neural Networks using MATLAB 6.0”, TMH, 2006.

3. S.N.Sivanandam, S.Sumathi, S.N.Deepa, “Introduction to Fuzzy Logic using MATLAB 6.0”, TMH, 2006

4. Simon Haykins, “Neural Networks”, Pearson Education.