GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 2

Information Technology

Subject Name: 1722308 Soft Computing (Major Elective-III)

Sr no	Course Content
1	Introduction: What is Soft computing? Necessity of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing
2	Evolutionary Computing: Basic Concepts of Genetic Algorithms (GA), Working Principle, Encoding methods, Fitness function, GA Operators- Reproduction; Crossover; Mutation, Convergence of GA, Multi-level Optimization, Real Life Problems.
3	Fuzzy Systems: Fuzzy Set theory, Fuzzy Relation, Fuzzification, Minmax Composition, Defuzzification, Fuzzy Logic, Fuzzy Rule based systems, Fuzzy Decision Making, Fuzzy Control Systems, Fuzzy Classification.
4	Neural Networks: Basic Concept of Neural Network, Overview of Learning rules and activation functions, Single layer Perceptrons and Learning, Back Propagation networks- Architecture of Back propagation(BP) Networks; Backpropagation Learning; Variation of Standard Backpropagation Neural Network, Introduction to Associative Memory, Adaptive Resonance Theory and Self Organizing Map, Recent Applications.
5	Hybrid Systems: Sequential Hybrid Systems, Auxiliarty Hybrid Systems, Embedded Hybrid Systems, Neuro-Fuzzy Hybrid Systems, Neuro-Genetic Hybrid Systems, Fuzzy-Genetic Hybrid Systems.
6	Evolutionary Design of Neural Networks: Genetic Algorithm (GA) based Back propagation Networks, GA based weight determination, Fitness function, Reproduction, Convergence, and Recent Applications.
7	Fuzzy Evolutionary Algorithms: Introduction, Fuzzy control of Evolution, Evolutionary Algorithms with Fuzzy components, GA in Fuzzy Logic Controller, Recent Applications.

8	Neural Network Based Fuzzy Systems: Neural Realization of Basic Fuzzy Logic Operators, Neural Network Based Fuzzy Logic Inference, Neural Network Driven Fuzzy Reasoning, Rule based Neural Fuzzy Modeling, Neural Fuzzy Relational Systems, NeuroFuzzy Controllers, Recent Applications.
9	Fuzzy Logic Based Neural Network Models: Fuzzy Neurons, Fuzzy Perceptrons, Fuzzy Neural Networks, Fuzzy Backpropagation (BP) Networks, Fuzzy BP architecture, Learning in Fuzzy BP, Inference by Fuzzy BP, Fuzzy ARTMAP, Fuzzy Associative Memories, Recent Applications.

Reference Books:

1. Neural Networks, Fuzzy Logic and Genetic Algorithms:Synthesis & Applications, S. Rajasekaran, G. A. Vijayalakshami, PHI.
2. Neuro-Fuzzy Systems, Chin Teng Lin, C. S. George Lee, PHI
3. Fuzzy Logic and Engineering Application, Tomthy Ross, TMH
4. Elements of Artificial Neural Network, Kishan Mehrotra,
5. Genetic Algorithms: Search and Optimization, E. Goldberg.
6. Recent Articles and Research papers