Integrated M.Tech-PhD (Dual degree course) in Computer Science & Engineering

Elective- Semester II

CSMT-251 **SOFT COMPUTING** Credits: 3(3-1-0)

Unit-1

Fundamental Concepts And Models Of Ann: Biological Neurons Mc-Culloch-Pitts Neuron Model, Models Of Artificial Neural Networks(Feedforward, Feedback Network), Neural Processing, Learning And Adaptation, Neural Network Learning Rules (Hebbian Learning Rule, Perceptron Learning Rule, Delta Learning Rule, Widrow-Hoff Learning Rule, Correlation Learning Rule, Winner-Take-All Learning Rule). Single Layer Perceptron Classifiers, Multilayer Feedforward Networks, Single Layer Feedback Network.

Unit-2

Associative Memory: Basic Concepts, Linear Associator, Basic Concepts of Recurrent Auto Associative Memory, Performance Analysis of Recurrent Auto Associative Memory, Bidirectional Associative Memory, Associative Memory of Spatiotemporal Patterns. **Matching And Self-Organizing Networks:** Hamming Net And MAXNET, Unsupervised Learning of Clusters, Counter Propagation Network, Feature Mapping, Self-Organizing Feature Maps, Cluster Discovery Network (ART1).

Unit-3

Fuzzy Logic, Sets, Relations, Membership Functions: Introduction to Fuzzy Logic, Classical Set (Crisp sets) , Fuzzy Set, Cartesian Production of Relation , Classical Relation , Fuzzy Relations , Tolerance And Equivalence Relations, Membership Functions & Features, Fuzzification, Methods of Membership Value Assignments .

Unit-4

Defuzzification: Introduction, Lambda-Cuts For Fuzzy Sets (Alpha-Cuts), Lambda-Cuts For Fuzzy Relations, Defuzzification Methods (Max-Membership Principle, Centroid Method, Weighted Average Method, Mean-Max Membership, Center of Sums, Center of Largest Area, First of Maxima (Last of Maxima)), **Fuzzy Rule Base And Approximate Reasoning:** Truth Values And Tables In Fuzzy Logic, Fuzzy Propositions, Formation of Rules, Decomposition of Rules (Compound Rules), Aggregation of Fuzzy Rules, Fuzzy Reasoning (Approximate Reasoning), Fuzzy Inference Systems (FIS)

Unit-5

Genetic Algorithm: Introduction, Biological Background, Traditional Optimization And Search Techniques, Genetic Algorithm And Search Space, Genetic Algorithm Vs Traditional Algorithm, Basic Terminologies in Genetic Algorithm, Simple GA, General Genetic Algorithm, Operator In Genetic Algorithm, Stopping Condition For Genetic Algorithm Flow, Constraints Genetic Algorithm, Problem Solving Using Genetic Algorithm, Classification of Genetic Algorithm, Holland Classifier System, Optimization of Travelling Salesman Problem Using Genetic Algorithm Approach.

Books:

1. Neural Networks, Fuzzy Logic And Genetic Algorithm: Synthesis And Applications By S. Rajsekaran & G.A. Vijayalakshmi Pai , Prentice Hall Of India.

2. Principles Of Soft Computing By S.N. Sivanandam & Sn Deepa, Wiley India Pvt. Ltd.

3. Introduction to Artificial Neural Systems, By Jacek M. Zurada, Jaico Publishing House.

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