SOFT COMPUTING TECHNIQUES

Paper Code	**CEN-807**
Course Credits	**4**
Lectures / week	**3**
Tutorial / week	**1**

Course Description

UNIT – I

Introduction to Soft Computing, various types of soft computing techniques: Neural Networks, Fuzzy Logic, Genetic algorithm, Probabilistic reasoning and Approximation. Intelligent systems, Machine Intelligence, Applications of Soft computing.

UNIT- II

Function of Neuron, Biological Neuron, Artificial Neuron, Brain vs Computer, Neural Network architectures and characteristics, Basic Model of ANN: connections, weights, bias, activation functions. McCulloch-Pitts Neuron, Hebb Training algorithm, Linear separability, XOR problem.

UNIT- III

ANN Learning, Learning Rules, Supervised learning: Perceptron, Multi-layer perceptron, ADALINE, MADALINE, Back-propogation training algorithm. Unsupervised learning: Kohonen Self-organizing feature map, Learning vector quantization. Feedback Networks: Hopfield Networks etc. Applications of ANN.

UNIT- IV

Introduction to Fuzzy logic, Fuzzy set theory, Fuzzy set vs Crisp set, Fuzzy relation & Crisp relation, Fuzzy logic operations, Tolerance & Equivalence relations, Membership functions, Features of membership functions, Membership value assignment, Basic Fuzzy arithmetic.

UNIT – V

Fuzzification, Defuzzification, Fuzzy rules, Fuzzy If-Then rule, Fuzzy rule base system, Fuzzy inference system: Models of FIS. Applications of Fuzzy logic. Introduction to Genetic algorithm: working principle, encoding, fitness function, reproduction, Inheritance, cross-over. Applications of Genetic algorithm.

References / Text Books:

- Karray and Silva, "Soft Computing & Intelligent Systems Design", Pearson Education.
- Timothy J Ross, "Fuzzy Logic with Engineering Applications", Wiley.
- Sivanandam & Deepa, "Principles of Soft Computing Techniques", Wiley Publication.
- Rajasekaran & Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications", PHI.
- David E Goldberg, "Genetic Algorithm in Search, Optimization & Machine Learning", Pearson.
- S Haykin, "Neural Networks: A Comprehensive Foundations" Pearson.

Computer Usage / Software Requires:

MATLAB 2009 or above