PPPE102 SOFT COMPUTING

Module-I 12hrs

Basic tools of soft computing – Fuzzy logic, neural network , evolutionary computing.

Fuzzy Logic System:Basic of fuzzy logic theory , crisp and fuzzy sets, Basic set operation like union , interaction , complement , T-norm , T-conorm , composition of fuzzy relations, fuzzy if-then rules , fuzzy reasoning.

Fuzzy inference System: Zadeh's compositional rule of inference, defuzzification , Mamdani Fuzzy Model, Sugeno Fuzzy Model,

Introduction to type –II Fuzzy System.

Module-II 20hrs

Neural Network:

Supervised NN:Single layer network, Perception , Activation function, Adaline , Gradient descent method, least square training algorithm, Multilayer perceptron , error back propagation, generalized delta rule, Radial Basis Function Network, interpolation and approximation RBFNS, comparison between RBFN and MLP, Support Vector Machines : Optimal hypeplane for linearly separable patterns, optimal hyperplane for non-linearly separable patterns. Inverse Modeling.

Unsupervised NN and other NN:Competitive learning networks, kohonen self organizing networks, learning vector quantization, Hebbian Learning Hopfield Network: Content addressable nature, binary and continuous valued Hopfield network , simulated annealing NN. Recurrent Neural Network: NARX Model, Simple Neural Network, State – Space Model , Back Propagation Through Time (BPTT) Algorithm , Real-time Recurrent Learning (RTRL) Algorithm.

Neuro-Fuzzy Modeling: Adaptive Neuro-Fuzzy Inference System (ANFIS) , ANFIS architecture , Hybrid Learning Algorithm , modeling of a three input nonlinear function , simulation of on-line identification in control system.

Data Clustering Algorithms-k-means clustering,fuzzy c-means clustering, subtractive clustering.

Module –III 8hrs

EVOLUTIONARY AND BIO INSPIRED COMPUTING

Evolutionary computing: Genetic algorithm: Basic concept , encoding , fitness function , Reproduction , Basic genetic programming concepts , differences between GA and Traditional optimization methods , Applications, Variants of GA.

Bio Inspired optimization Techniques: Particle Swarm optimization, Ant colony optimization, Bacteria foraging method , Applications.

Text Book

1. Neuro-Fuzzy and soft computing by J S R Jang, CT Sun and E.Mizutani, PHI PVT LTD.

2. Principles of soft computing –by sivandudam and Deepa publisher –John mikey India.

Reference Book

S.haykins- Neural Networks: A comprehensive foundation.