INT508:SOFT COMPUTING

Course Outcomes: Through this course students should be able to

CO1 :: describe soft computing techniques and their roles in building intelligent machines.

CO2 :: explain different neural networks for classification and clustering problems.

CO3 :: use fuzzy logic and reasoning to handle uncertainty and solve engineering problems

CO4 :: compare genetic algorithms and swarm intelligence for optimization problems.

CO5 :: evaluate the performance and time complexity of hybrid systems.

CO6 :: develop the optimal solutions using available soft computing tools to solve real world problems.

Unit I

Introduction : Artificial intelligence, Artificial neural networks, Genetic algorithm, Swarm intelligent systems, Expert systems

Neural Network Concepts : Introduction to neural networks, biological neural networks to artificial neural networks, Classification of ANNs, McCulloch-Pitts neuron model, learning rules-Hebbian, Delta, Perceptron network

Unit II

Neural Networks : Backpropagation neural networks, Kohonen neural network, Learning vector quantization, Adaptive resonance theory neural networks, Radial basis function neural networks, Support vector machines

Unit III

Fuzzy Systems : Basic definition and terminology, set-theoretic operations, Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference system, Fuzzy Expert Syatems

Unit IV

Genetic Algorithms : Introduction to Genetic algorithms(GA), Representation, Genetic algorithm operators-Methods of selection, crossover and mutation, Working of GA, Application of GA

Unit V

Hybrid Systems : Hybrid systems, Genetic algorithm based Backpropagation network, Fuzzy Backpropagation network, Neuro-fuzzy systems, Fuzzy genetic algorithms

Unit VI

Swarm Intelligence : swarm intelligence, Cuckoo search, flocks of birds, ant colony optimization, swarm intelligence in bees, shoals of fish

Text Books:

1. SOFT COMPUTING WITH MATLAB PROGRAMMING by N.P. PADHY , S. P. SIMON, OXFORD UNIVERSITY PRESS

References:

1. PRINCIPLES OF SOFT COMPUTING by S. N. SIVANANDAM, S.N. DEEPA, WILEY

2. NEURAL NETWORKS,FUZZY LOGIC, AND GENETIC ALGORITHM SYNTHESIS AND APPLICATIONS by RAJASEKARAN, S., PAI, G. A. VIJAYALAKSHMI, PRENTICE HALL