Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NCSD513	**Soft Computing**	3	0	0	3

Course Objective:
To make familiarize with Fundamentals of Soft Computing

Learning Outcomes
• To make familiarize with Fundamentals of Soft Computing so that learner may start working for Soft Computing applications

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Artificial Neural Networks (ANN): Basics Characteristics of artificial neural networks, Comparison with biological neural networks, Advantages and disadvantages of ANNs, Synaptic dynamics, Applications of ANNs, Basic Models: Mc-Culloch Pitt's model, Single Layer and Multilayer Perceptron model of neural networks, Hebb's model	8	To make familiarize with basics and models of Artificial neurons
2	Learning Laws; Learning: Supervised, unsupervised, Reinforcement Law of learning; Differences among learning laws; LMS and Delta Learning, Gradient descent method, Multilayer Perceptron Model (MLP), Back propagation algorithm for weight updates, classification problem using MLP; Architecture for complex pattern recognition tasks;	6	To make familiarize with various learning paradigms with few ANN models
3	Genetic Algorithm: working Principle, Cross-over mutation, roulette wheel selection, tournament selection, population, binary encoding and decoding for any optimization problem, Multi objective Gas, Concepts on Non-domination, tournament selection, crowding distance operator, ranking,	6	To make familiarize with working principles of various meta-heuristic algorithms for search and optimizations
4	Fuzzy Logic: Fuzzy sets, basic operations, membership functions, Fuzzy Relations, Fuzzification, Fuzzy Inference, Fuzzy Rule Based System, Defuzzification;	6	To make familiarize with Fuzzy concepts
5	Rough Sets: basic operations, lower and upper, approximations, discernibility matrix, distinction table; Accuracy of Approximations.	6	To make familiarize with Rough Sets Theory
6	Hybridization of Soft Computing tools like Neurofuzzy, Rough fuzzy, Rough-Fuzzy-GA etc. boundary region. Applications	6	To make familiarize with Hybridizing the components for various applications
	Total	42	

Text Books:
1. Principles of Soft Computing, 2ed (WILEY) 2011, S.N. Deepa S.N. Sivanandam

Reference Books:
2. Kalyanmoy Deb, Multi-Objective Optimization using Evolutionary Algorithms Paperback – 2010, Wiley
3. GENETIC ALGORITHMS: in search, optimization and machine learning 1 Dec 2008, D. E. GOLDBERG, P

4. Artificial Neural Networks 1998 B. Yegnanarayana, PHI
5. Neural Networks: Algorithms, Applications, and Programming Techniques, 1e – 2002, James FREEMAN and David Skapura, Pearson