

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NEEC508	Soft Computing Techniques	3	1	0	4

#### Course Objective

- Introduction to neural network, fuzzy logic and implementation of other classical soft computing and evolutionary algorithms in solving complex constrained electrical engineering problems.

#### Learning Outcomes

- At the end of the course, the students will be able to solve real-world complex electrical and non-electrical engineering related problems such as complex constrained problems like economic load dispatch, reactive power planning, load forecasting, process control, pattern recognition and so on using application of neural network, fuzzy logic and optimization techniques like GA, PSO etc.

Unit No.	Topics to be Covered	Lecture + Tutorial Hours	Learning Outcome
1	Introduction & Neural Network: Introduction to soft computing, mathematical model of neurons, ANN architecture; Learning rules: supervised, unsupervised and reinforced learning.	10L+2T	Understanding need of soft computing; and basics of ANN, its architecture and learning rules. Requirement of an ANN for solving engineering problems.
2	ANN Training Algorithms: Hebb's rule and Hebbian learning; perceptron model; back propagation algorithm; associative memories; Boltzman machine	10L+2T	Knowledge about training algorithms of a neural network. Application of ANN will also be discussed
3	Fuzzy Logic: Introduction to fuzzy logic, classical sets and fuzzy sets, membership function, fuzzy rule generation, operations on fuzzy sets, fuzzification, defuzzification.	10L+2T	Understanding basics of fuzzy logic and its application in design and implementation of fuzzy logic controller.
4	Modern Optimization Techniques: Genetic Algorithms, Particle swarm optimization method, Differential evolution technique, Harmony Search, Ant colony-based optimization method.	10L+2T	Knowledge about popular optimization algorithms. Their implementation and application to common engineering problems.
5	Applications of soft computing techniques for solving power system related problems.	2L+6T	Knowledge about applications of soft computing techniques for solving power system related problems.
<b>Total Contact Hours</b>		<b>42L+14T</b>	

#### Text Books

1. George Bojadziev, Maria Bojadziev "Fuzzy Sets, Fuzzy Logic, Applications: 5 (Advances In Fuzzy Systems-applications And Theory)", World Scientific Publishing Co Pvt Ltd.
2. Fuzzy Logic with Engineering Applications Timothy J. Ross (Wiley).
3. Rao, Singiresu S. "Engineering optimization: theory and practice" John Wiley & Sons, 2009.

#### Reference Books:

1. Goldberg, "Genetic algorithms" Pearson Education India; 1st edition (1 December 2008)