III Year II Semester: **L T P C**

Code: 20EE6645 **4 0 0 0**

ARTIFICIAL INTELLIGENCE TECHNIQUES

Preamble: This course provide exposure to artificial neural networks and fuzzy logic controller applications in field of electrical engineering

Course Objectives

1. To have knowledge on concept of neural network.
2. To know different types of neural networks and training algorithms.
3. To understand the concept of genetic algorithm and its application in optimization
4. To have the knowledge on fuzzy logic and design of fuzzy logic controllers
5. To know the applications of AI Techniques in electrical engineering

Course Outcomes

1. The students will be able to differentiate between algorithmic based methods and knowledge based methods
2. The students will be able to use appropriate AI framework for solving power system problems
3. The student will be able to design fuzzy logic controllers for power engineering applications

CO – PO & CO – PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1		2		1				1				1	2	1
CO 2	1	1	1	2	1				1				1	2	1
CO 3	1	1	1	2	1				1				1	2	1

1 – Weak, 2 – Moderate and 3 - Strong

Unit – I: Introduction

Artificial Neural Networks (ANN) – definition and fundamental concepts – Biological neural networks –Artificial neuron – activation functions – setting of weights – typical architectures – biases and thresholds– learning/training laws and algorithms. Perceptron – architectures, ADALINE and MADLINE – linear separability- XOR function.

Unit – II: ANN Paradigms

ADALINE – feed forward networks – Back Propagation algorithm- number of hidden layers – gradient decent algorithm – Radial Basis Function (RBF) network. Kohonen's self-organizing map (SOM), Learning Vector Quantization (LVQ) and its types – Functional Link Networks (FLN) – Bidirectional Associative Memory (BAM) – Hopfield Neural Network.

Unit – III: Classical and Fuzzy Sets

Introduction to classical sets- properties, Operations and relations; Fuzzy sets, Membership, Operations, Properties, Fuzzy relations, Cardinalities, Membership functions.

Unit – IV: Fuzzy Logic Controller (FLC)
Fuzzy logic system components: Fuzzification, Inference engine (development of rule base and decision making system), De-fuzzification to crisp sets- De-fuzzification methods.

Unit – V: Application of AI Techniques
Speed control of DC motors using fuzzy logic –load flow studies using back propagation algorithm, single area and two area load frequency control using fuzzy logic.

Text Books:

1. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House, 1997.
2. Fuzzy logic with Fuzzy Applications – T.J Ross – McGraw Hill Inc, 1997

Reference Books:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by S.Rajasekaran and G.A. Vijayalakshmi Pai – PHI Publication.
2. Modern power Electronics and AC Drives – B.K.Bose -Prentice Hall, 2002
3. Genetic Algorithms- David E Goldberg. Pearson publications