4/4 B.Tech. EIGHTH SEMESTER
ARTIFICIAL INTELLIGENCE TECHNIQUES IN ELECTRICAL ENGG.

EE8T4C **Credits: 3**
Lecture: 3 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period/week **Semester end examination: 70 marks**

Course Objective:
This course covers artificial intelligence (Artificial Neural Network and Fuzzy systems, Genetic algorithm) basic principles and the concepts along with the application of these tools in the power systems areas. It emphasizes on real world power system problems like load forecasting, economic load dispatch using GA.

Course Outcomes:
At the end of the course the student will be able to:
1. Differentiate between Algorithmic based methods and knowledge based methods.
2. Understand back propagation networks and associative memory concepts.
3. Use appropriate Fuzzy set framework for solving power system problems
4. Apply GA to power system optimization problems.
5. Apply AI Techniques to solve problems in electrical engineering.

UNIT I
Fundamentals of Neural networks
Introduction: Human brain, model of artificial neuron, neural network architectures, characteristics of neural networks, learning methods, Rosenblatt's perceptron model, ADALINE network, MADALINE network

UNIT II
Back propagation networks and associative memory:
Back prorogation learning, algorithm, auto corelator, hetero corelator, Wang et al's multiple training encoding strategy, exponential BAM, associative memory for real coded pattern pairs

UNIT III
Fuzzy Set theory and fuzzy systems
Fuzzy Vs Crisp, operation, properties of crisp sets, fuzzy sets, membership functions, properties, operations, relations of fuzzy set, fuzzy Cartesian product
Fuzzy systems: Crisp Logic, predicate logic, fuzzy logic, and fuzzy rule based system, defuzzification methods

UNIT IV
Genetic Algorithms and Genetic modeling
Introduction – creation of off spring, working principle, encoding – fitness function – reproduction operators

Genetic Modeling: Inheritance operators – cross over, inversion and deletion, mutation operator, bit wise operator, – convergence of genetic algorithm, differences and similarities between GA and other traditional methods, advances in GA

UNIT V
Application of AI techniques
Electrical Load forecasting, economic load dispatch, reactive power control, speed control of ac and dc motors.

Learning Resources

Text Books:
1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by S. Rajasekaran and G. A. Vijayalakshmi Pai – PHI Publication, 2003.
2. Introduction to Artificial Neural Systems – Jacek M. Zuarda, Jaico Publishing House, 1997.

Reference Books:
1. Neural Networks, Algorithms, Applications and Programming Techniques by James A. Freeman, David M. Skapura. Pearson Education, 1991.
2. Introduction to Neural Networks using MATLAB 6.0 by S N Sivanandam, S Sumathi, S N Deepa. Tata McGraw-Hill Education ,2006.