

**SOFT COMPUTING TECHNIQUES**

**17ECMC1T6B**

**Credits: 4**

**Lecture: 4 periods/week**

**Internal assessment: 40 marks**  
**Semester end examination: 60 marks**

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**Course Objectives:**

- To Introduce the Ideas of Neural networks
- To Expose to Fuzzy Logic
- To Learn Genetic Programming
- To Familiarize with Soft computing Concepts

**Learning Outcomes:**

**Upon completion of the course, the student will be able to:**

- Apply various soft computing frame works.
- Design of various neural networks.
- Use fuzzy logic.
- Apply genetic programming.

**UNIT-I**

**Artificial Neural Network-I:** Introduction – Fundamental concept – Evolution of Neural Networks – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network. Supervised Learning Network: Perceptron Networks – Adaline – Multiple Adaptive Linear Neurons – Back-Propagation Network – Radial Basis Function Network.

**UNIT-II**

**Artificial Neural Network-II:** Associative Memory Networks: Training Algorithms for Pattern Association – Auto associative Memory Network – Hetero associative Memory Network – Bidirectional Associative Memory – Hopfield Networks – Iterative Auto associative Memory Networks – Temporal Associative Memory Network. Unsupervised Learning Networks: Fixed weight Competitive Nets – Kohonen Self-Organizing Feature Maps – Learning Vector Quantization – Counter propagation Networks – Adaptive Resonance Theory Networks – Special Networks.

**UNIT-III**

**Fuzzy Set Theory:** Introduction to Classical Sets and Fuzzy sets – Classical Relations and Fuzzy Relations – Tolerance and Equivalence Relations – Noninteractive Fuzzy sets – Membership Functions: Fuzzification – Methods of Membership Value Assignments – Defuzzification – Lambda-Cuts for Fuzzy sets and Fuzzy Relations – Defuzzification Methods.

**UNIT-IV**

**Genetic Algorithm:** Introduction – Basic Operators and Terminologies in GAs – Traditional Algorithm vs. Genetic Algorithm – Simple GA – General Genetic Algorithm – The Scheme Theorem – Classification of Genetic Algorithm – Holland Classifier Systems – Genetic Programming. Applications of Soft Computing: A Fusion Approach of Multispectral Images with SAR Image for Flood Area Analysis – Optimization of Travelling Salesman Problem using Genetic Algorithm Approach – Genetic Algorithm based Internet Search Technique – Soft Computing based Hybrid Fuzzy Controllers – Soft Computing based Rocket Engine – Control.

**Text Book:**

1. S.N. Sivanandan and S.N. Deepa, Principles of Soft Computing, Wiley India, 2007.  
ISBN: 10: 81-265-1075-7.

**Reference Books:**

1. S. Rajasekaran and G.A.V.Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI, 2003.
2. Timothy J.Ross, Fuzzy Logic with Engineering Applications, McGraw-Hill, 1997.
3. J.S.R.Jang, C.T.Sun and E.Mizutani, Neuro-Fuzzy and Soft Computing, PHI, 2004, Pearson Education.