III/IV B. TECH. FIRST SEMESTER
SOFT COMPUTING(Required)

Course Code : CS 5T4   **Credits: 3**
Lecture: 3 periods/ week   **Internal assessment: 30 Marks**
Tutorial: 1period/week   **Semester end examination: 70 Marks**

Prerequisites: NIL

Course Objectives:

1. Soft computing refers to principle components like fuzzy logic, neural networks and genetic algorithm, which have their roots in Artificial Intelligence.

2. Healthy integration of all these techniques has resulted in extending the capabilities of the technologies to more effective and efficient problem solving methodologies

Course Outcomes:

At the end of this course student will:

CO1) Demonstrate Fuzzy set theory

CO2) Interpret fuzzy systems

CO3) Apply ANN Back propagation algorithm for classification

CO4) Apply ANN training algorithms for solving real world problems

CO5) Explain fundamentals and operators of Genetic Algorithm.

Syllabus:

UNIT 1

Fuzzy Set Theory: Fuzzy Versus Crisp, Crisp Sets, Fuzzy Sets, Crisp Relations, Fuzzy Relations

UNIT 2

Fuzzy Systems: Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule Based Systems, Defuzzification Methods, Applications.
UNIT 3
Fundamentals of Neural Networks: Basic Concepts of Neural Networks, Human Brain, Model of an Artificial Neuron, Neural Network Architectures, Characteristics of Neural Networks, Learning Methods, Taxonomy of Neural Network Architectures. Back Propagation Networks: Architecture of a Back Propagation Network, Back Propagation Learning, Illustration, Applications (Classification of Soil only).

UNIT 4

Associative Memory: Autocorrelations, Heterocorrelators,   Associative
Memory for Real-Coded Pattern Pairs, Applications (Recognition of Characters only).

Adaptive Resonance Theory: Introduction, ART1, ART2, Applications (Recognition of
Characters only), Sensitives of Ordering of Data.

UNIT 5

Fundamentals of Genetic Algorithms: Genetic Algorithms: History, Basic Concepts, Creation of
Offsprings, Working Principle, Encoding, Fitness Function, Reproduction.

Genetic Modeling: Inheritance Operators, Cross Over, Inversion, And Deletion, Mutation
Operator, Bit-Wise Operators, Bit-Wise Operators used in GA, Generational Cycle, Convergence
of Genetic Algorithms, Hybrid Systems(10.1), NN & FL & GA Hybrids(10.2)

Learning Resource

Text Books

1. S.Rajasekaran, G.A. Vijayalakshmi Pai, Neural Networks, fuzzy logic, and genetic
   algorithms - Genetic Algorithm, PHI Learning Private Limited- 2010.
2. S.N.Sivanandam, S.N.Deepa Wiley India , Principles of SOFT COMPUTING,
   Second Edition 2011.

References

1. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
2. Siman Haykin,"Neural Netowrks"Prentice Hall of India.
3. Kumar Satish, "Neural Networks" Tata Mc Graw Hill