SOFT COMPUTING
(ELECTIVE-I)

Course Code: 13IT2106   **L P C**
                                             4 0 3

Course Outcomes:

At the end of the course, a student should be able to

CO 1:   Explain soft computing techniques, artificial intelligence systems.

CO 2:   Differentiate ANN and human brain.

CO 3:   Analyse perceptron learning algorithms.

CO 4:   Compare fuzzy and crisp logic systems.

CO 5:   Discuss genetic algorithms.

Unit –I

Soft Computing: Introduction to soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.

Artificial Intelligence: Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.

Unit –II

Neural Network: Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference b/w ANN and human brain, characteristic and applications of ANN, single layer network.

Unit – III

Perceptron: Perceptron training algorithm, Linear separability , Widrow & Hebb's learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA.

Counter propagation network: architecture , functioning & characteristics of counter Propagation network, Hop field/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.

Unit – IV

Fuzzy Logic: Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions.

Fuzzy rule base system : Fuzzy propositions, formation, decomposition & aggregation of fuzzy Rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.

Unit – V

Genetic algorithm: Fundamental, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator ,Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

Text Books:

1. S.N. Sivanandam & S.N. Deepa, *Principles of Soft Computing*, Wiley Publications, 2nd Edition, 2011.
2. S, Rajasekaran & G.A. Vijayalakshmi Pai, *Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications*, PHI Publication, 1st Edition, 2009.

References:

1. N.K.Bose, Ping Liang, *Neural Network fundamental with Graph, Algorithms & Applications*, TMH, 1st Edition, 1998.
2. Bart Kosko, *Neural Network & Fuzzy System*, PHI Publication, 1st Edition, 2009.
3. Rich E, Knight K, *Artificial Intelligence*, TMH, 3rd Edition, 2012.
4. George J Klir, Bo Yuan, *Fuzzy sets & Fuzzy Logic,*Theory & Applications, PHI Publication, 1st Edition, 2009.
5. Martin T Hagen, *Neural Network Design*, Nelson Candad, 2nd Edition, 2008.

Web references:

www.myreaders.info/html/soft_computing.html