EET372 SOFT COMPUTING (2019 SCHEME)
Syllabus

Module 1
Introduction: Soft and Hard Computing, Evolution of soft computing, Soft computing constituents. Artificial Neural Networks: Biological foundations –ANN models - Characteristics of ANN- Types of activation function - McCulloch-Pitts neuron model, Realization of logic gates using McCulloch-Pitts neuron model - simple perceptron, Adaline and Madaline.

Module 2
Neural network architectures - single layer, multilayer, recurrent networks. Knowledge representation - Learning process - Supervised and unsupervised learning, Learning algorithms–Errorcorrection learning - Hebbian learning – Boltzmann learning – competitive learning- Backpropagation algorithm- Case study-Radial basis function networks - Hopfield network- Kohonen Self organizing maps

Module 3
Fuzzy Logic: Introduction to crisp sets and fuzzy sets, examples, Properties, Basic fuzzy set operations, examples. Fuzzy relations - Cardinality of Fuzzy relations - Operations on Fuzzy relations - Properties of Fuzzy relations. Membership functions - triangular, trapezoidal, bell shaped, Gaussian, sigmoidal. Fuzzy logic controller (Block Diagram), Fuzzification, rule base, inference engine and defuzzification - Max-membership principle, Centroid method, Weighted Average Method, Mean-Max membership, Center of Sums, and Center of Largest area, First and Last of Maxima. Simple fuzzy logic controllers with examples.

Module 4
Genetic Algorithm: Introduction - basic concepts of Genetic Algorithm, encoding, fitness function, reproduction, cross over, mutation operator, bit-wise operators, generational cycle. Hybrid Systems: Adaptive Neuro Fuzzy Inference System (ANFIS), Genetic algorithm based back propagation networks, fuzzy back propagation networks.

Module 5

Machine Learning- Machine learning model-Approaches to machine learning- Machine learning architecture- Data Clustering Algorithms -Hierarchical clustering, K-Means Clustering Support Vector Machines for Learning – Linear Learning Machines – Support Vector Classification – Support Vector Regression - Applications.

Reference Books

1. S.Rajasekharan, G.A.Vijayalakshmi Pai, Neural Network, Fuzzy Logic and Genetic Algorithms Synthesis and Applications, Prentice Hall India, 2003.

2. S.N.Sivanandam, S.N.Deepa, Principles of Soft Computing, Wiley India, 2007.

3. Simon Haykin, Neural Networks a Comprehensive foundation, Pearson Education, 1999.

4. Bart Kosko, Neural Network and Fuzzy Systems, Prentice Hall of India, 2002

5. Zurada J.M., Introduction to Artificial Neural Systems, Jaico Publishers, 2003.

6. Hassoun Mohammed H, Fundamentals of Artificial Neural Networks, Prentice Hall of India, 2002.J.-S.R.Jang, C.-T.Sun,E.Mizutani, Neuro-Fuzzy and Soft Computing, Prentice Hall, 1997.

7. Timothy J Ross, Fuzzy logic with Engineering Applications, McGraw Hill, New York.

8. Driankov D., Hellendoorn H., Reinfrank M, An Introduction to Fuzzy Control, Narosa Publications, 1993.

9. Ronald R Yager and Dimitar P Filev, Essentials of Fuzzy Modelling & Control, John Wiley & Sons, Inc, 2002.

10. SuranGoonatilake& Sukhdev Khebbal (Eds.), Intelligent Hybrid Systems, John Wiley,1995.

11. D.E.Goldberg, Genetic Algorithms in Search Optimisation and Machine Learning, Pearson Education, 1989.

12. Tom Mitchell,Machine Learning, McGraw Hill, 1997

13. Margaret H. Dunham, Data Mining- Introductory & Advanced Topics