24PE1002 SOFT COMPUTING AND APPLICATIONS (3-0-0)

Objective:
• To expose the students to the concepts of feed forward neural networks.
• To provide adequate knowledge about feedback neural networks
• To provide adequate knowledge about fuzzy and neuro-fuuzy systems
• To provide comprehensive knowledge of fuzzy logic control to real time systems.
• To provide adequate knowledge of genetic algorithms and its application to economic dispatch and unit commitment problems.

MODULE – I
ARCHITECTURES – ANN:Introduction – Biological neuron – Artificial neuron – Neuron model – Supervised and unsupervised learning- Single layer – Multi layer feed forward network – Learning algorithm- Back propagation network.

MODULE – II
NEURAL NETWORKS FOR CONTROL: Feedback networks – Discrete time Hopfield networks – Transient response of continuous time system – Applications of artificial neural network - Process identification – Neuro controller for inverted pendulum.

MODULE – III
FUZZY SYSTEMS: Classical sets – Fuzzy sets – Fuzzy relations – Fuzzification – Defuzzification – Fuzzy rules - Membership function – Knowledge base – Decision-making logic – Introduction to neuro fuzzy system- Adaptive fuzzy system.

MODULE – IV
APPLICATION OF FUZZY LOGIC SYSTEMS: Fuzzy logic control: Home heating system - liquid level control - aircraft landing- inverted pendulum – fuzzy PID control, Fuzzy based motor control.

GENETIC ALGORITHMS: Introduction-Gradient Search – Non-gradient search – Genetic Algorithms: binary and real representation schemes, selection methods, crossover and mutation operators for binary and real coding - constraint handling methods – applications to economic dispatch and unit commitment problems.

Outcome:
• Ability to understand and apply basic science, circuit theory, Electro-magnetic field theory control theory and apply them to electrical engineering problems.
• To understand and apply computing platform and software for engineering problems.

Books Recommended:
1. Introduction to Algorithms, Thomas H.Corman, Charles E.Leiserson, Ronald L.Rivest, Second Edition, PHI 2003.
2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, PearsonEducation, 3rd Ed, 2007.
3. Online Computation and Competitive Analysis - A. Borodin and R. El-Yaniv,Cambridge Univ. Press, 1998.
4. Approximation Algorithms - Vijay V. Vazirani, Springer Verlag, 2003.
5. LauranceFausett, Englewood cliffs, N.J., 'Fundamentals of Neural Networks',Pearson Education, 1992.
6. Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', Tata McGraw Hill, 1997.
7. S.N.Sivanandam and S.N.Deepa, Principles of Soft computing, Wiley India Edition, 2nd Edition, 2013.
8. Simon Haykin, 'Neural Networks', Pearson Education, 2003.
9. John Yen & Reza Langari, 'Fuzzy Logic – Intelligence Control & Information', Pearson Education, New Delhi, 2003.

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10. M.Gen and R,Cheng, Genetic algorithms and Optimization, Wiley Series in Engineering Design and Automation, 2000.
11. Hagan, Demuth, Beale, " Neural Network Design", Cengage Learning, 2012.
12. N.P.Padhy, " Artificial Intelligence and Intelligent Systems", Oxford, 2013.
13. William S.Levine, "Control System Advanced Methods," The Control Handbook CRC Press, 2011.