4/4 B.Tech - SEVENTH SEMESTER

EC7T4C   **Artificial Neural Networks & Fuzzy Logic**   **Credits: 3**

Lecture: 3 periods/week   **Internal assessment: 30 marks**
Tutorial: 1 period /week   **Semester end examination: 70 marks**

Prerequisites: Control Systems (EC4T1)

Course Objectives:
- Biological motivation to design intelligent systems and control.
- Analysis of learning systems in conjunction with feedback control systems
- Evaluate the performance of the intelligent control systems using computer simulations.
- Exposure to the world control problems.

Learning Outcomes:

Student will be able to
- Analyze the working of biological neural network & the artificial neural networks.
- Apply the principles of artificial neural network in the fields of image processing, pattern recognition & solving optimization problems.
- Design the real time systems using fuzzy logic.
- Develop the algorithms for real time systems using ANN &FL

UNIT- I

Introduction to Artificial Neural Networks: Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison between Brain and the Computer, Comparison between Artificial and Biological Neural Networks.

UNIT- II

Fundamental Models of Artificial Neural Networks: Introduction, McCulloch – Pitts Neuron Model, Architecture, Learning Rules, Hebbian Learning Rule, Perceptron Learning Rule, Delta Learning Rule.

UNIT- III

Adaline and Madaline Networks: Introduction, Adaline Architecture, Algorithm, Applications, Madaline, Architecture, MRI Algorithm, MRII Algorithm.

UNIT- IV

Classical & Fuzzy Sets: Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT- V

Fuzzy Logic System Components: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods. **Applications:** Neural network applications: Process identification, control, fault diagnosis and load forecasting. Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

Learning Resources

Text Books:

1. Artificial Neural Networks - B. Yegnanarayana, PHI, 2006.
2. Neural and Fuzzy Systems: Foundation, Architectures and Applications, - Yadaiah and S. Bapi Raju, Pearson Education

References:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications-Rajasekharan and Rai – PHI Publication.
2. Elements of Artificial Neural Networks - KishanMehrotra, Chelkuri K. Mohan, and Sanjay Ranka, Penram International, 2001
3. Artificial Neural Network – Simon Haykin, Pearson Education, 2nd Edition.,2008
4. Fundamental of Neural Networks – LaureneFausett, Pearson, 1st Edition.,1994
5. Neural Networks and Fuzzy Logic System by Bork Kosk, PHI Publications
6. Introduction to Artificial Neural Systems - J.M.Zurada, Jaico Publishers, 3rd Edition,1992