

Neural Networks & Fuzzy Systems

B.E. Sem. VIII [ETRX]

(Elective – III)

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical & Oral	–	–
Oral Exam	–	25
Term Work	–	25

SYLLABUS

- **Objective** : This course covers basic concepts of artificial neural networks, fuzzy logic systems and their applications. Its focus will be on the introduction of basic theory, algorithm formulation and ways to apply these techniques to solve real world problems.
- **Pre-requisite** : Knowledge of basic probability and statistics with the . Programming skills in one of the following would be desirable: Matlab,, C, C++ ,Java.

1. Introduction

Biological neurons, McCulloch and Pitts models of neuron, Types of activation function, Network architectures, Knowledge representation Learning process: Error-correction learning, Supervised learning, Unsupervised learning, Learning Rules.

2. Single Layer Perception

Perception convergence theorem, Method steepest descent - least mean square algorithms

3. Multilayer Perception

Derivation of the back-propagation algorithm, Learning Factors.

4. Radial Basis and Recurrent Neural Networks

RBF network structure theorem and the reparability of patterns, RBF learning strategies, K-means and LMS algorithms, comparison of RBF and MLP networks, Hopfield networks: energy function, spurious states, error performance.

5. Neuro-dynamics

Attractors, Neurodynamical model, Adaptive Resonance theory, Towards the Self Organizing Feature Map. Brain-state-in- a-box model,

6. Fuzzy logic

Fuzzy sets, Properties, Operations on fuzzy sets, Fuzzy relation Operations on fuzzy relations, The extension principle, Fuzzy mean Membership functions, Fuzzification and defuzzification methods, Fuzzy controllers.

Reference books :

1. Neural Network a - Comprehensive Foundation (*Simon Haykin*) Pearson Education
2. Introduction to Soft computing tool (*Dr.S.N.Sivanandam,Mrs S.N. Deepa*) Wiley Publication
3. Neural Networks : A classroom Approach (*Satish Kumar*) Tata McGraw-Hill
4. Introduction to Artificial Neural Systems (*Zurada J.M.*) Jaico publishers
5. Fuzz V Logic with Engineering Applications (*Thimothv J. Ross*) McGraw
6. Introduction to Applied Fuzzy Electronics (*Ahmad Ibrahim*) PHI
7. Neural Networks, Fuzzy Logic, and Genetic Algorithms (*Rajsekaran S, Vijaylakshmi Pai*) PHI
8. Neural Network Design (*Hagan, Demuth, Beale*) Thomson Learning
9. Neural Networks For Pattern Recognition (*Christopher M Bishop*) Oxford Publication
10. Machine Learning Methods in the Environmental Sciences Neural Network and Kernels (*William W Hsieh*) Cambridge Publication
11. Introduction to Neural Network Using Matlab (*Dr.S.N.Sivanandam,Dr.S.Sumathi*) Tata McGraw-Hill

