

Fuzzy Logic and Neural Networks

Discipline (s)	Semester	Group	Sub-group	Paper Code
/ EAE / OAE) ECE	7	PCE 4	ECE 411T

Marking Scheme:

1. Teachers Continuous Evaluation: 25 marks
2. Term end Theory Examinations: 75 marks

Instructions for paper setter:

1. There should be 9 questions in the term end examinations question paper.
2. The first (1st) question should be compulsory and cover the entire syllabus. This question should be objective, single line answers or short answer type question of total 15 marks.
3. Apart from question 1 which is compulsory, rest of the paper shall consist of 4 units as per the syllabus. Every unit shall have two questions covering the corresponding unit of the syllabus. However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain upto 5 sub-parts / sub-questions. Each Unit shall have a marks weightage of 15.
4. The questions are to be framed keeping in view the learning outcomes of the course / paper. The standard / level of the questions to be asked should be at the level of the prescribed textbook.
5. The requirement of (scientific) calculators / log-tables / data – tables may be specified if required.

Course Objectives :

1. Introduce students to the various neural network and fuzzy systems models.
2. Reveal different applications of these models to solve engineering and other problems.
3. Introduce the theory and applications of artificial neural network and fuzzy systems to engineering applications with emphasis on image processing and control.
4. Discuss neural networks and fuzzy systems, architectures, algorithms and applications, including Back-propagation, BAM, Hopfield network, Competitive Learning, ART, SOFM, Fuzzy inference methods and expert systems.

Course Outcomes (CO)

CO 1 Comprehend the concepts of feed forward neural networks

CO 2 Analyze the various feedback networks.

CO 3 Understand the concept of fuzziness involved in various systems and fuzzy set theory.

CO 4 Comprehend the fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.

Course Outcomes (CO) to Programme Outcomes (PO) mapping (scale 1: low, 2: Medium, 3: High)

UNIT-I

Artificial Neural Network:History, Overview Of Biological Neuro-System, Mathematical Models Of Neurons, ANN architecture, Learning Rules, Learning Paradigms-Supervised, Unsupervised and Reinforcement Learning, ANN training Algorithms-

perceptions, Training rules, , Back Propagation Algorithm, K Means clustering, Probabilistic Neural Network, Multilayer Perception Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

UNITII

Fuzzy Logic: Introduction to fuzzy logic, Classical and fuzzy sets: Overview of Classical Sets, Membership Function and Fuzzy rule Generation. Operation on Fuzzy Sets: Compliment, Intersection, Unions, Combinations Handbook of B.Tech. Programmes offered by USICT at Affiliated Institutions of the University. Applicable from Batch Admitted in Academic Session 2021-22 Onwards Page 837 of Operations, Aggregation Operations Fuzzy Arithmetic: Fuzzy numbers, Linguistic variables, arithmetic operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

UNITIII

Fuzzy Logic: Classical Logic, Multivalued logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges. Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, and Fuzziness of Fuzzy Sets.

UNIT - IV

Introduction of NeuroFuzzy Systems, Architecture of Neuro Fuzzy Networks. Application of Fuzzy Logic & Neural Networks in Intelligent Machine Design.

Textbook(s):

1. Haykins S., Neural Networks, Pearson Education, 2009
2. Yen J. & Langari R., Fuzzy Logic Intelligence Control & Information, Pearson Education Asia, 1999.

References:

1. Lee H.H., First Course on Fuzzy Theory & Application, Springer Publications, 2005.
2. Ross T.J., Fuzzy Logic with Engineering Applications, Wiley India, 2011
3. Kumar S., Neural Networks, Tata Mc GrawHill Publications, 2004.