

University of Mumbai			
CLASS: T.E. (Electronics & Telecommunication Engineering)		Semester - VI	
Elective SUBJECT: NEURAL NETWORKS & FUZZY LOGIC			
Periods per week (Each of 60 min.)	Lecture	4	
	Practical	2	
	Tutorial	-	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	Practical examination	-	-
	Oral Examination	-	25
		Term Work	25
		Total	150

Module	Contents	Hours
Objective	This course attempts to provide a thorough understanding of neural networks and fuzzy logic that are key components of soft computing.	-
1	Fuzzy logic and Neural Networks, Approximations of Multivariate functions, Non – linear Error surface and optimization.	06
2	Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets. Basic set operations. Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Fuzzification and Defuzzification. Fuzzy logic control: Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.	09 05
3	Neural networks: Single layer networks, Perceptron. Activation functions. Adaline: its training and capabilities, weights learning, Multilayer perceptrons : error back propagation, generalized delta rule. Radial basis function networks and least square training algorithm.	06
4	Kohonen self – organizing map and learning vector quantization networks. Recurrent neural networks, Simulated annealing neural networks. Adaptive neuro-fuzzy information systems	10

	(ANFIS), Applications to control and pattern recognition.	
5	Evolutionary Computing : Genetic algorithms : Basic concepts, encoding , fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic programming concepts Applications.	09
6	Neuro-dynamics Attractors, Neurodynamical model, Hopfield Models, Brain-state-in- a-box model,	07

Theory Examination:

1. Question paper will comprise of total 7 questions, each of 20 marks.
2. Only 5 questions need to be solved.
3. Question number 1 will be compulsory and covering the all modules.
4. Remaining questions will be mixed in nature. (e.g.- suppose Q.2 has part (a) from, module 3 then part (b) will be from any module other than module 3.)
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Oral Examination:

Oral Examination will be based on any experiment/ Tutorial performed from the entire syllabus.

Term work:

Term work shall consist of minimum six experiments/ Tutorials and a written test. The distribution of marks for term work shall be as follows,
 Laboratory work (Experiments/Tutorials and Journal) : 15 marks.
 Test (at least one) : 10 marks.

The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term-work.

Recommended Books:

1. Timothy J. Ross, Fuzzy Logic with Engineering Applications, MacGraw-Hill
2. Shivanandam and Deepa, Principles of Soft Computing, Wiley
3. Jang JSR, Sun CT, Mizutani E, Neuro-Fuzzy and Soft Computing, PHI
4. Kosko, Neural Networks and Fuzzy Systems, Pearson edu
5. Simon Haykin, Neural Networks A comprehensive foundation, 2e, Pearson edu
6. Rajsekaran S, Vijaylakshmi Pai, Neural Networks, Fuzzy Logic, and Genetic Algorithms, PHI
7. Hagan, Demuth, Beale, Neural Network Design, Thomson Learning