SCHEME OF COURSE WORK

Course Details:

Course Title	: NEURAL NETWORKS AND FUZZY LOGIC CONTROL		
Course Code	**:** 13EC2116	**L T P C**	**:4 0 0 3**
Program:	**: M.Tech**		
Specialization:	**: Communication Engineering and Signal Processing**		
Semester	**: II**		
Prerequisites	**:**		
Courses to which it is a prerequisite	**: For all Engineering Problems**		

Course Outcomes (COs):

1	Comprehend the concepts of feed forward neural networks
2	Analyze the various feedback networks.
3	Understand the concept of fuzziness involved in various systems and fuzzy set theory.
4	Comprehend the fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
5	Analyze the application of fuzzy logic control to real time systems.

Course Outcome Vs **Program Outcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	S	S	S	S	S							S
CO-2	S	S	S	S	S							M
CO-3	S	S	S	S	S							S
CO-4	S	S	S	S	S	M						S
CO-5	S	S	S	S	S	S	M					S

S - Strongly correlated, *M - Moderately* correlated, *Blank - No correlation*

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	**UNIT-I** ARCHITECTURES: Introduction – Biological neuron-Artificial neuron-Neuron modeling, Learning rules, Single layer, Multi layer feed forward network-Back propagation, Learning factors.	CO-1	1.Sketch the biological Neuron structure and explain how it is mimicked in artificial neuron 2.Explain any one learning algorithm used for single layer feed forward Neural Network. 3.Describe the steps of Back Propagation algorithm.	▫ Lecture ▫ Discussion	(Week 1- 3)

2	**UNIT-II** NEURAL NETWORKS FOR CONTROL: Feedback networks-Discrete time hop field networks-Schemes of neuro – control, identification and control of dynamical systems-case studies (Inverted Pendulum, Articulation Control)	CO-2	1.Discuss in detail a neural network that illustrates and learns how to balance an inverted pendulum. 2.Explain the architecture steps for Hop-field Network	▫ Lecture ▫ Discussion	(Week 4-6)
3	**UNIT-III** FUZZY SYSTEMS: Classical sets-Fuzzy, sets-Fuzzy relations-Fuzzification – DefuzzificationFuzzy rules.	CO-3	1.State any type of consensus used in Fuzzy decision making. 2.With an application explain how rule can be formulated in fuzzy rule based system.	▫ Lecture ▫ Discussion ▫ NPTEL	Assignment 1 (Week 7- 8)
4	**MID-TEST 1**			▫	(Week 9)
5	**UNIT-IV** FUZZY LOGIC CONTROL: Membership function – Knowledge base-Decision – making logic – Optimizations of membership function using neural networks. Adaptive fuzzy systems. Introduction to generate to genetic algorithm.	CO-4	1.Differentiate conventional fuzzy logic control and adaptive fuzzy logic control. 2.Explain in detail the three steps involved in Genetic algorithm with the help of an example. 3.Describe the function of decision making logic for generating a single truth value.	▫ Lecture ▫ Discussion ▫ NPTEL	(Week 10 - 13)
6	**UNIT-V** APPLICATION OF FLC: Fuzzy logic control, Inverted pendulum, Image processing, Home Heating system, Blood pressure during anesthesia, Introduction to neuro fuzzy controller.	CO-5	1.Discuss briefly about the fuzzy rule base for home heating system with a fuzzy rule membership function condition. 2.Explain the operation of the fuzzy logic control with the process inference block	▫ Lecture ▫ Discussion	Assignment 2 (Week 14-18)
7	**Mid-Test 2**	CO-1 & CO-2			(Week 19)
19/20	**END EXAM**				