C. U. SHAH UNIVERSITY
Wadhwan City

FACULTY OF: - Technology & Engineering
DEPARTMENT OF: -Instrumentation & Control Engineering
SEMESTER: - VIII
CODE: -   4TE08FLC1
NAME: - Fuzzy Logic Control

Teaching & Evaluation Scheme

Subject Code	Subject Name	Teaching Hours/Week				Credits	Evaluation Scheme/Semester							
							Theory				Practical			
		Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	Total Marks
							Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE08FLC1	Fuzzy Logic Control	4	0	2	6	5	30	1.5	70	3	--	20	30	**150**

OBJECTIVES

- To acquaint the students with fundamentals of Fuzzy Logic and its relevant application in the field of Instrumentation & Control

PRE-REQUISITES

Fundamentals of control engineering.

COURSE OUTLINES

Sr. No.	Course Contents	No. of Hours
1.	**Fuzzy Systems & Fuzzy Control** : Fuzzy set theory, Basic Operations, Semantics of using fuzzy logic. Possibility distribution and Uncertainty measures, knowledge representation using Hypergraphs. Fuzzy Associative Memory [FAM] and FAH Rules, Fuzzification and Defuzzication.	12
2.	**Development Tools for Fuzzy Systems** : **Software tools:** Graphic Design, Debugging Modes for Simulation, Optimization and Verification. Fuzzy Logic Description Language. **Hardware Tools**: Fuzzy Processors, Standard Processors using µP and Microcontrollers, FLSs and Fuzzy Logic on Distributed Process Control Systems.	14
3.	**Fuzzy Controllers**: Knowledge Base v/s Classical Controllers. Parameters of Fuzzy Controllers, Fuzzy Control and Derivation of Relation equation.	12
4.	**Intelligent Auto Tuning Of Pid Controlller:** Process Reaction Curve and Relay Methods Identification and PID Tuning, Introduction, Developing Simple Models from the Process Reaction , Identification Algorithm for Oscillatory Step Responses,	14

| | Identification Algorithm for Non-Oscillatory Responses Without Overshoot , Developing Simple Models from a Relay Feedback Experiment, On-line Identification of FOPDT Models , On-line Identification of SOPDT Models , Examples for the On-line Relay Feedback Procedure , Off-line Identification , An Inverse Process Model-Based Design Procedure for PID Control , Inverse Process Model-Based Controller Principles , PI/PID Controller Synthesis , Auto tuning of PID Controllers, Assessment of PI/PID Control Performance, Achievable Minimal IAE Cost and Rise Time, Assessment of PI/PID Controllers | |

Learning Outcomes

1. After studying this course the students would be able to understand the application of fuzzy logic in real time industrial applications.
2. Students will also be able to understand and implement the structure of a fuzzy PID controller and its components.

Books Recommended

1. R Kruse, J Gebhart & F Klawonn : Foundation of Fuzzy Systems, John Wiley & Sons.
2. PID Control New Identification and Design Methods by Michael A. Johnson and Mohammad H. Moradi, Springer
3. PID controllers: theory, design, and tuning *by* Karl J. Astrom and Tore Hagglund Instrument Society of America (ISA)