C. U. SHAH UNIVERSITY
Wadhwan City

FACULTY OF: - Technology & Engineering
DEPARTMENT OF: -Instrumentation & Control Engineering
SEMESTER: - VII
CODE: - 4TE07CSD1
NAME: – Control System Design

Teaching & Evaluation Scheme

Subject Code	Subject Name	Teaching Hours/Week				Credits	Evaluation Scheme/Semester							
							Theory				Practical			
							Sessional Exam		University Exam		Internal		University	Total Marks
		Th	Tu	Pr	Total		Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE07CSD1	Control System Design	4	0	2	6	5	30	1.5	70	3	--	20	30	**150**

OBJECTIVES

- To acquaint the students with different strategy of Control System design and its compensation by selecting different performance criteria in both domain viz frequency and time

PRE-REQUISITE

- Basics of Linear Control Theory, Laplace transform, z-transform, Matrix Algebra, Root-locus and bode-plot, basics of state space technique

COURSE OUTLINES

Sr. No.	Course Contents	No. of Hours
1.	**Design of State Variable Feedback Systems** Introduction to Controllability and Observability; Kalman's test, Full-State Feedback Control Design; Observer Design; Integrated Full-State Feedback and Observer; Ackermans Formula Reference Inputs; Optimal Control Systems; Internal Model Design; Design Examples;	16
2.	**Design of Feedback Control Systems :** Introduction; Approaches to System Design; Cascade Compensation Networks; Phase-Lead Design Using the Bode Diagram; Phase-Lag Design Using the Bode Diagram; System Design Using Integration Networks; Phase-Lead Design Using the Root Locus Phase-Lag Design Using the Root Locus; Design on the Bode Diagram Using Analytical Methods; Systems with a Prefilter; Design for Deadbeat Response; Design Examples	18
3	**Robust Control Systems**	10

	Introduction; Robust Control Systems and System Sensitivity ; Analysis of Robustness; Systems with Uncertain Parameters; The Design of Robust Control Systems; The Design of Robust PID-Controlled Systems; The Robust Internal Model Control System; Design Examples; The Pseudo- Quantitative Feedback System	
4	**Digital Control Systems** Introduction; Digital Computer Control System Applications; Sampled-Data Systems; The z-Transform; Closed-Loop Feedback Sampled-Data Systems; Performance of a Sampled-Data, Second-Order System; Closed- Loop Systems with Digital Computer Compensation; The Root Locus of Digital Control Systems; Implementation of Digital Controllers; Design Examples	12

Learning Outcomes: Students would be able to design any system (both analog and sampled) on the basis of different performance criteria and analyse its robustness.

Books Recommended

1. Modern Control Systems by Richard C. Dorf and Robert H. Bishop , Prentice Hall
2. Discrete Time Control Systems by Katsuhiko Ogata , Pearson
3. Automatic Control system by B. C. Kuo, PHI Publication