

GUJARAT TECHNOLOGICAL UNIVERSITY

Instrumentation and Control Engineering

B. E. SEMESTER: VII

Subject Name: **Control System Design**

Subject Code: **171701**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
4	0	2	6	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	Design of Feedback Control Systems : Introduction; Approaches to System Design; Cascade Compensation Networks; Phase-Lead Design Using the Bode Diagram; Phase-Lead Design Using the Root Locus; System Design Using Integration Networks; Phase-Lag Design Using the Root Locus; Phase-Lag Design Using the Bode Diagram; Design on the Bode Diagram Using Analytical Methods; Systems with a Prefilter; Design for Deadbeat Response; Design Examples; Laboratory: System Design Using Control Design Software such as MATLAB/SIMULINK or SciLAB/SciCOS;	12
2.	Design of State Variable Feedback Systems Introduction; Controllability and Observability ; Full-State Feedback Control Design; Observer Design; Integrated Full-State Feedback and Observer; Reference Inputs; Optimal Control Systems; Internal Model Design; Design Examples; Laboratory: State Variable Design Using Control Design Software	12
3.	Robust Control Systems 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; Laboratory: Robust Control Systems Using Control Design Software	14

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; Laboratory: Digital Control Systems Using Control Design Software	14
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Reference Books:

1. Modern Control Systems by Richard C. Dorf and Robert H. Bishop , Prentice Hall
2. Discrete Time Control Systems by Katsuhiko Ogata , Pearson
3. Feedback Control of Dynamic Systems by Gene F. Franklin , J. David Powell and Abbas Emami - Naeini, Pearson