



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ETL43	Principles of Control Systems Lab	--	--	2	--	--	1	1
		Examination Scheme						
		ISE		ESE		Total		
				Practical	Oral			
		40		--		20		60

Pre-requisite Course Codes		ET43(Principles of Control Systems)
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Examine working principle and application of given control system components.
	CO2	Develop a program using suitable programming language for time and frequency domain analysis of a given system.
	CO3	Demonstrate the dynamic behavior of the system in time domain and frequency domain.
	CO4	Experiment the effect of compensator on the performance of control system.
	CO5	Identify and demonstrate any control system for real life application.

Exp. No.	Experiment Details	Ref.	Marks
1	To plot the Synchro transmitter characteristics and Synchro transmitter and receiver as an error detector.	1	5
2	To plot Speed torque characteristic of DC servo motor.	1	5
3	To plot characteristics of Potentiometer and its loading effect for different conditions of load.	1	5
4	To determine the line and load regulation characteristics of AC servo voltage stabilizer at different line and load conditions and observe the mechanism of AC voltage stabilization as an example of closed control system.	1	5
5	Using Liner System I Trainer Kit obtain the frequency response of first order and second order system.	1	5
6	Using Liner System II Trainer Kit obtain the time response of closed loop RLC circuit with integrator circuit and study the effect of Lead, Lag Compensator on its time response. Compare these results with mathematical expressions derived for the system.	1	5
7	Some of the experiments can be combined based on the theme like i. fundamental of control system (Laplace and State Transition) ii. time response iii. stability	2,3,4	5



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	<p>a) Develop a program in Matlab/Scilab/LabVIEW to define the given closed loop transfer function of system and plot their poles & zeros on s-plane.</p> <p>b) Develop a program in Matlab/Scilab/LabVIEW to find the step response of a given second order control system and obtain its time domain parameters from this step response. Compare these results with mathematical calculations.</p> <p>c) Develop a program in Matlab/Scilab/LabVIEW for a given control system described by its state space equation to find solution in terms of state transition matrix, zero input response, zero state response, complete response.</p> <p>d) Develop a program in Matlab/Scilab/LabVIEW for a given control system described by its state space equation to find system is controllable or not, observable or not, to find rank of matrix and using rank comment on system controllability and observability</p> <p>e) Develop a program in Matlab/Scilab/LabVIEW to obtain the root locus of a system described by its Transfer Function with unity feedback, Comment on the stability of this given control system. Compare these results with mathematical calculations.</p> <p>f) Develop a program in Matlab/Scilab/LabVIEW to find gain margin and phase margin of the system described by its Transfer Function with unity feedback. Comment on the stability of this given control system. Compare these results with mathematical calculations.</p>		
8	Mini-Project: Identify the model of control system for real life application and demonstrate controlling action for the same. Use appropriate software platform.	1,2,3,4	5
Total Marks			40

References:

- [5] Lab manuals
- [6] www.mathworks.com
- [7] www.scilab.org
- [8] www.ni.com/labview