

**3EE10: CONTROL SYSTEMS LABORATORY**  
**CREDITS - 1 (LTP: 0,0,1)**

**Course Objective:**

1. To help the students to understand and analyze the control system designs by conducting various hardware experiments.
2. To do simulation of various physical systems and its analysis and their by obtain the performance evaluation using various analysis software.

**Teaching and Assessment Scheme:**

Teaching Scheme (Hours per Week)			Credits	Assessment Scheme				Total Marks
L	T	P		C	Theory Marks		Practical Marks	
			ESE		CE	ESE	CE	100
0	0	2	1	-	-	40	60	

**List of Experiments:**

Sr. No.	Suggested List of Experiments
1.	To perform and analyse control of torque speed characteristics of DC motor.
2.	To perform and analyse control of angular position of shaft of DC motor
3.	To perform and analyse speed control characteristics of DC motor
4.	To study configuration and evaluate the performance characteristics of feedback light intensity control
5.	To perform and analyze temperature control system of an oven
6.	To conduct the performance of small AC servomotor and determining transfer function
7.	To obtain the performance characteristics of synchro transmitter receiver pair
8.	To perform and analyze the ON/OFF controller
9.	Performance and analysis of open loop and closed loop systems with 1 <sup>st</sup> and 2 <sup>nd</sup> order
10.	Performance and evaluation of closed loop system with disturbance
11.	Performance and analysis of steady state error of a system
12.	Performance and analysis of Proportional(P), Integral(I) and Derivative(D) controllers
13.	Performance and analysis of performance of Proportional - Integral (PI) controller
14.	Performance and analysis of performance of Proportional-Derivative(PD) controller
15.	Performance and analysis of performance of PID controller
16.	Design, implementation of different cascade compensation networks to analyze the effects for a given system
17.	Modelling and analysis of mechanical systems in analysis software
18.	Comparison and analysis of response of electrical circuit and its equivalent transfer function with different standard inputs
19.	Analysis of Root locus technique using programing in analysis software
20.	Analysis of Bode plot technique using programing in analysis software

Sr. No.	Suggested List of Experiments
21.	Modelling and analysis of stability of linear feedback system

**List of References:**

1. Norman Nise. “ Control System Engineering”, 6<sup>th</sup> Edition, John Wiley and Sons, 2011.
2. J. Nagrath and M. Gopal, “Control Systems Engineering”, 4th Edition, New Age International, 2009
3. S. Hasan Saeed, “Automatic Control Systems with MATLAB Programs”, 9<sup>th</sup> Edition, S K Kataria and Sons, 2018.
4. Introduction to Control systems in scilab from Scilab-Xcos

**Course Outcomes (COs):**

At the end of this course students will demonstrate the ability to:

1. To perform hardware based experiments on control system of various physical systems
2. Simulate, analyze and evaluate various physical systems and its controller in software
3. Design control system for given electrical and other engineering systems.
4. Simulate and analyze the performance of various electrical systems in time and frequency domain.