Control System Lab

A Control Systems Laboratory provides students with practical experience in analyzing and designing control systems. The laboratory uses the computational facility of the department to analyze, design and simulate the control system. The hardware lab is equipped with various experiments that help students understand the theoretical concepts of control systems by applying them to real-world scenarios. Typical experiments include:

- **Time Response Analysis**: Studying the time response of first and second-order systems to different inputs, such as step and sinusoidal, to understand system dynamics.
- **Frequency Response Analysis**: Studying frequency response of the system using Bode and Nyquist.
- **Synchro Transmitter and Receiver**: Analyzing the operation of synchro pairs, which are electromechanical devices used for transmitting angular position information.
- **Potentiometer as an Error Detector**: Study the use of potentiometer as a position error detector.
- **PID Controller**: Implementing Proportional-Integral-Derivative (PID) controllers to study their effect on system performance.

List of Experiments:

Sr. No.	Name of the Experiment	Simulation/ Hardware
1	Mathematical Modeling and Analysis of RLC Network	Simulation
2	Block Diagram Reduction	Simulation
3	Potentiometer as an error detector	Hardware
4	Synchro-transmitter- Receiver	Hardware
4	First order system analysis	Simulation
5	Second order system analysis (pole location)	Simulation
6	Second order system analysis (damping ratio and ωn)	Simulation
7	Analysis of Under-damped systems	Simulation
8	Effect of zero location	Simulation
9	Root Locus	Simulation
10	Bode Plot	Simulation
11	Nyquist Plot	Simulation
12	Introduction to PID Controller and compensators	Simulation

Software Used: MATLAB

List of Equipment in the Hardware Lab:

Sr. No	Items
1	D.C. Position Control System
2	Dc Motor Speed Controller Closed Loop System With DC Separately Excited Motor
3	PID CONTROLLER
4	STUDY OF COMPENSATING NETWORKS
5	DC Voltage Regulator As A Closed Loop System

6	AC Voltage Regulator
7	Synchro Transmitter Receiver
8	Board Models For Actuating Elements
9	Study Of Potentiometer As Error Detector
10	PROCESS SIMULATOR PANEL
11	Frequency Response Of Closed Loop Control System
12	NONLINEARITIES USING OP AMPS