CONTROL ENGINEERING & INSTRUMENTATION LAB (ME-316)

Pre-requisite: None Credit Hours: 01 Contact Hours: 48

RECOMMENDED BOOK(S)

Lab Manual

COURSE OBJECTIVES

To gain basic understanding and implementation of various control systems To learn mathematical modeling of various systems

S. No.	CLO/PLOS MAPPING	DOMAIN	PLO
1	Manipulate MATLAB/SIMULINK to study response of different physical systems	Р3	01
2	Analyze control parameters of different physical system using MATLAB/SIMULINK	C4	02
3	Design different controllers on MATLAB/SIMULINK to optimize performance of different physical systems	P6	03
COURSE CONTENTS			

Basic concepts:

System, control system, input, output, open-loop and closed loop control systems, elements of a general control system, examples of control system.

Mathematical modeling of physical system:

Operational notation, grounded chair representation, series parallel, laws, equations of motion for spring mass damper systems, levered system, rotational system, geared system, electrical components and R. L. C circuits, electrical analogies for mechanical systems, scale factors, thermal systems and fluid system.

Transfer functions and systems response:

Review of Laplace transform, impulse, step and ramp functions, concept of transfer functions of common components, block diagram algebra, signal flow graphs, impulse, step, and ramp response of first and second order systems, characterization of response (time constant, gain, overshoot, rise time, settling time, steady state error, etc.) relation of system response to location of system poles and zeros.

Stability of control system:

Concept of stability, Routh Hurwitz criterion, root locus methods and its use in control System design, digital control.

Lab Outline:

Experiments related to the course outline mentioned above will be covered in the Lab class.