CONTROL ENGINEERING & INSTRUMENTATION THEORY (ME-316)

Pre-requisite: None
Credit Hours: 02
Contact Hours: 32

RECOMMENDED BOOK(S)

Automatic Control Systems, By B. C. Kuo, F. Golnaraghi, John Wiley & Sons.
Modern Control System, By Richard C. Dorf, Prentice Hall.
Automatic Control, By J. J. Distofano et al.
Automatic Control, By Francis H. Raven.

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	**Make** mathematical models of different physical systems	P4	03
2	**Analyze** complex engineering systems to examine different characteristics/properties of the systems	C4	02
3	**Develop** a controller to achieve desired system response.	C5	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.