Control System
CS705C
Contracts: 3L
Credits- 3

Module - I:
a) INTRODUCTION [4L]
Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models - Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

b) TRANSFER FUNCTION REPRESENTATION [4L]
Transfer Function of linear systems, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra - Representation by Signal flow graph - Reduction using mason's gain formula.

Module - II:
a) TIME RESPONSE ANALYSIS [4L]
Standard test signals - Time response of first order systems - Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications - Steady state response - Steady state errors and error constants.

b) STABILITY ANALYSIS IN S-DOMAIN [5L]
The concept of stability - Routh's stability criterion - limitations of Routh's stability.
Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

Module - III:
a) FREQUENCY RESPONSE ANALYSIS [5L]
Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

b) STABILITY ANALYSIS IN FREQUENCY DOMAIN [4L]
Polar Plots, Nyquist Plots Stability Analysis.

Module - IV :
a) CLASSICAL CONTROL DESIGN TECHNIQUES [5L]
Compensation techniques - Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers.

b) STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS [5L]
Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties - Concepts of Controllability and Observability

TEXT BOOKS:
1. Automatic Control Systems 8th edition - by B. C. Kuo 2003 - John Wiley and son's.,
2. Control Systems Engineering - by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

REFERENCE BOOKS:
1. Modern Control Engineering - by Katsuhiko Ogata - Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems Engg. by NISE 3rd Edition - John Wiley