

EES-802: Control System-II

Credit	L	T	P
4	3	1	-

UNIT I

Fundamentals of compensator design in time and frequency domain. Cascade and Feedback Compensation – Design of Lag, Lead, Lag-Lead Compensator using Bode Diagram and Root Locus Plot. Intersection method.

Unit II

Introduction to Proportional(P) action , Integral action, PI controller for first order system, Proportional derivative integral Controllers (PID),P, PI, PD and PID controller design methodology, PID controller tuning methods, Ziegler Nichols tuning methods.

UNIT III

Introduction, Sampling theorem, Spectrum analysis of sampling process, Signal reconstruction, Pulse transformation, z- transform analysis of sampled data system, Block diagram reduction. State variable representation of digital control system, State transition equation, Solution of state equation by z- transform technique, Digital controllers, Stability of digital control system.

UNIT IV

State regulator design, output regulator design, pole placement technique, Gain matrix by Ackerman's formula, Design example. Discrete data system Pole placement design by state feedback of digital systems. Pole placement by incomplete state feedback or output feedback Design of digital control systems with state feedback. Observer design, full order observer, reduced order observer

UNIT V

Non-linear systems, Non-linear state equation, Phase plane and describing function techniques of analysis, Lyapunov's stability criteria, Methods of construction of Lyapunov's function.

TEXT/REFERENCE BOOKS

1. M. Gopal, "Control Systems (Principles and Design)", McGraw Hill Education, 4th edition, June 2012.
2. M. Gopal, "Digital control and State Variables methods", Tata McGraw-Hill Education, 4th edition, Publication, 2012.
3. Nagrath and Gopal, "Control System Engineering", 5th Edition, New Age International Publishers, June 2009.
4. K. Ogata, "Modern Control Engineering", Prentice Hall India Learning Private Limited, 5 edition 2010
5. B. C. Kuo, "Digital Control System", Oxford University Press 2nd edition, February 2012.
6. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", Prentice Hall Publisher, 2008.