

ADVANCED CONTROL SYSTEMS

Module-I :

(15 Hours)

Digital Control : State Space Representations of Discrete Time Systems, Solution of Discrete Time State Equations, Discretization of Continuous Time State Equations. Controllability and observability of Linear Time Invariant Discrete Data Systems, Pole Placement, Deadbeat response, Digital Simulation.

Module -II :

(15 Hours)

Optimal Control : Performance Indices, Quadratic Optimal Regulator / Control Problems, Formulation of Algebraic Riccati Equation (ARE) for continuous and discrete time systems. Solution of Quadratic Optimal Control Problem using Lagrange Multipliers for continuous and discrete-time systems. Evaluation of the minimum performance Index, Optimal Observer, The Linear Quadratic Gaussian (LQG) Problem, Introduction to H_{∞} Control.

Module - III :

(15 Hours)

Non linear Systems : The Aizerman and Kalman Conjectures : Popov's stability criterion, the generalized circle criteria, simplified circle criteria. Simple variable structure systems, sliding mode control, feedback linearization, Model reference adaptive control, (MRAC), Self Tuning Regulator (STR).

Fuzzy Logic Control : Fuzzy sets and crispsets, Fuzzy Relations and composition of Fuzzy Relations, Introduction to Fuzzy Logic Controllers.

Books :

1. Discrete Time Control Systems, by K.Ogata, 2nd edition (2001), Pearson Education publication.
2. Digital Control Systems, by B.C. Kuo, 2nd edition (1992), Oxford University Press.
3. Digital Control and State Variable Methods, by M.Gopal, 3rd edition (2009), Tata Mc. Graw Hill Education Pvt. Ltd.
4. Systems and Control by Stanislaw H.Zak, Oxford University Press (2003).
5. Design of Feedback Control Systems by Raymond T. Stefani, B.Shalia, Clement J. Savant, Jr. Gen H. Hostetter, 4th edition (2002), Oxford University Press.
6. Introduction to Control Engineering (Modeling, Analysis and Design) by Ajit K. Mandal, New Age International (P), Ltd., Publishers (2006).
7. Non Linear Systems, by Hassan K. Khalil, 3rd edition (2002), Prentice Hall, Inc. (Pearson Education), Publications.
8. Control Theory (Multivariable and non linear Methods) by Torkel Glad & Lennart Ljung, Taylor & Francis (2009).