PEL7J001 Control System Engineering II 3-0-3

Module I

Nonlinear Control Systems: Introduction to Nonlinear systems and their properties, Common Non-linearities, Describing functions, Phase plane method, Lyapounov's method for stability study, concept of Limit Cycle.

Optimal Control Theory: Introduction, Optimal control problems, Mathematical procedures for optimal control design: Calculus of variations, Pontryagin's optimum policy, Bang-Bang Control, Hamilton-Jacobi Principle.

Module II

z-Plane Analysis of Discrete-Time Control Systems: Introduction, Impulse sampling and data hold, Reconstructing original signal from sampled signals, concept of pulse transfer function, Realization of digital controllers.

Module III

Design of Discrete-time Control Systems: Introduction, Stability analysis of closed-loop systems in the z-plane, Transient and steady state response analysis, Design based on the rootlocus method, Design based on the frequency-response method.

Module IV

State-Space Analysis: Introduction, State-space representations of discrete-time systems, Solving discrete-time state-space equations, Pulse transfer function matrix, Discretization of continuous time state space equations, Lyapunov stability analysis, Controllability and Observability, Design via pole placement, State observer design.

Text Books / Reference Books

1. Slotine& Li, Applied Non-Linear Control, Englewood Cliffs, NJ: Prentice-Hall, (1991).

2. Bandyopadhyay, M.N., Control Engineering: Theory and Practice, Prentice-Hall of India Private Limited (2003).

3. Ogata, K., Discrete-time Control Systems, Pearson Education (2005).