

PEL4I102 CONTROL SYSTEM ENGINEERING-I

Module-I:

(9 Hours)

University Portion (80%):

Introduction to Control Systems: Basic Concepts of Control Systems, Open loop and closed loop systems, Servo Mechanism/Tracking System. (Text Book-1-Ch1)

Mathematical Models of Physical Systems: Differential Equations of Physical Systems, Transfer functions, Block Diagram Algebra, Signal flow Graphs. (Text Book-1-Ch 2.1, 2.2, 2.4 2.5 2.6)

Feedback characteristics of Control Systems: Feedback and Non-feedback System, Reduction of parameter variation by use of feedback, control over System Dynamics by use of feedback, Control of the Effects of disturbance signals by use of feedback, linearizing effect of feedback, regenerative feedback, Regenerative feedback.(Text Book-1-Ch 3.1 to 3.7)

College/Institute Portion (20%): Control System and Components: Modeling of Stepper motor, AC & DC Servomotor, Synchros, AC Tachometer with selected problems.](Text Book-1-Ch 4.3, 4.4) Or any related topic as decided by the concerned faculty member teaching the subject.

Module-II:

(9 Hours)

University Portion (80%):

Time response Analysis: Standard Test Signals, Time response of first order systems, Time Response of Second order systems, Steady State Errors and Static Error Constants of different types of systems, Effect of adding a zero to a system, Design specification of second order system, Performance indices.

(Text Book-1-Ch- 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.9)

Concepts of Stability: The concept of stability, Necessary conditions for stability, Hurwitz Stability Criterion, Routh Stability Criterion, Relative Stability Analysis, More on Routh Stability Criterion.

(Text Book-1 Ch-6.2, 6.3, 6.4, 6.5, 6.6)

The Root locus Technique: Introduction, Root locus Concepts, Construction of Root locus, Routh Contours, Systems with transportation lag. (Text Book-1-Ch- 7.1, 7.2, 7.3, 7.4, 7.5)

College/Institute Portion (20%):

Sensitivity of the Roots of the Characteristics Equation (Text Book-1-Ch- 7.6)] Or any related topic as decided by the concerned faculty member teaching the subject.

Module-III:

(9 Hours)

University Portion (80%):

Frequency Response Analysis: Correlation between Time and Frequency Response, Polar plots, Bode plots, All Pass and Minimum- Phase Systems. (Text Book-1-Ch- 8.2, 8.3, 8.4 8.5)

Stability in Frequency Domain: Mathematical Preliminaries, Nyquist Stability Criterion, Assessment of Relative stability using Nyquist Criterion, Closed loop Frequency Response, Sensitivity Analysis in Frequency Domain. (Text Book-1-Ch- 9.2, 9.3, 9.4, 9.5, 9.6)

College/Institute Portion (20%):

Closed loop frequency response: Constant M circles, Constant N-Circles, Nichol's chart. (Text Book-2-Ch-)] Or any related topic as decided by the concerned faculty member teaching the subject.