

# AMCO-21 AUTOMATIC CONTROL SYSTEM

## UNIT-1 INPUT/OUTPUT RELATIONSHIP

- 1.1 Introduction to open loop and closed loop control systems.
- 1.2 Mathematical representation of physical systems.
- 1.3 Transfer functions block diagram and signal flow graph. Reduction algebra, masons gain.
- 1.4 Time domain performance criterion,
- 1.5 Transient response of first order, second order & Higher Order Systems.

## UNIT-2 ERROR ANALYSIS

- 2.1 Static and Dynamic error coefficients.
- 2.2 Error criterion, frequency Domain analysis polar and inverse polar plots, bode plot,
- 2.3 Frequency domain specifications.
- 2.4 Relative stability gain margin and phase margin,
- 2.5 Correlation with time domain, W & N circles.

## UNIT-3 STABILITY THEORY

- 3.1 Concept of stability, asymptotic & Conditional stability,
- 3.2 Routh Hurwitz criterion, Nyquist stability criterion,
- 3.3 Liapunova's Direct Method, Root Locus plots.

## UNIT-4 COMPENSATION TECHNIQUES

- 4.1 Concept Lag and Lead & lag lead Networks,
- 4.2 Design of closed loop Systems Using compensation Techniques.

## UNIT-5 STATE SPACE ANALYSIS OF CONTROL SYSTEMS

- 5.1 State Space Representation, Solution to Homogeneous State Equation, State Transition Matrix,
- 5.2 Time Invariant State Equations, linear time varying systems, Controllability and Observability,
- 5.3 Vandermonde Matrix, Decomposition of Transfer Function.

## UNIT-6 NON LINEAR SYSTEMS:

- 6.1 Introduction, Some Common Types of Non-Linearities,
- 6.2 Classification of Non-Linearity, Study of Non-Linear Systems,
- 6.3 Describing Function method of Analysis, Phase Plane Analysis,
- 6.4 Stability Analysis with Describing Functions.

### Reference Books:

1. KUO B.CI Automatic control system/Pill.
2. Ogata KJ Modern Control Engineering / PHI.
3. Nagrath I.J. & Gopal, M/Control Systems Engineering/New Age International.
4. S.N. Sivanandam/Control Systems Engineering /Vikas Publishing House Pvt. Ltd