AMEC21 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 Ersor 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