2.10 30301 ELECTRICAL CONTROL SYSTEM

UNIT-1 INTRODUCTION:
The control system-open loop & closed loop, servomechanism, stepper Motor.

UNIT-2 MATHEMATICAL MODELS OF PHYSICAL SYSTEMS:
Differential equation of physical Systems, transfer function, blocks diagram algebra, signal flow-graphs, Mason's formula & its Application.

UNIT-3 FEEDBACK CHARACTERISTICS OF CONTROL SYSTEMS:
Feedback and non-feedback Systems, Effects of feedback on sensitivity (to parameter variations), stability, overall gain etc.

UNIT-4 TIME RESPONSE ANALYSIS:
Standard test signals, time response of first order and second Order systems, steady-state errors and error constants, design specification of second-order systems.

UNIT-5 STABILITY:
The concept of stability necessary conditions for stability, Hurwitz stability criterion, Routh stability criterion, Relative stability analysis.

UNIT-6 THE ROOT LOCUS TECHNIQUE:
The Root locus concept, construction /development of root loci for various systems, stability considerations.

UNIT-7 FREQUENCY RESPONSE & STABILITY ANALYSIS:
Correlation between time and frequency response, Polar Plots, Nyquist plots, Bode Plots, Nyquist stability criterion, Gain margin& Phase margin, relative stability using Nyquist Criterion, frequency response specifications.

UNIT-8 COMPENSATION OF CONTROL SYSTEMS:
Necessity of compensation, Phase lag compensation, phases lead compensation, phase lag lead compensation, feedback compensation.

UNIT-9 STATE VARIABLE ANALYSIS:
Concept of state, state variable and state model, state models for linear continuous time systems, diagonalization solution of state equations, concept of Controllability and observability.

Reference Book:

1. Control Systems Engineering by I J Nagrath and M Gopal
2. Automatic Control Systems by B C Kuo