GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC Electrical Engineering

Semester: III

Subject Name: **Control Theory**

Sr.No	Course Content
1	**Introduction to Control Systems:** Introduction, Examples of Control Systems, Closed-loop Control versus Open-Loop Control
2	**Mathematical Modeling of Dynamic Systems:** Introduction, Transfer Function and Impulse-Response Function, Automatic Control Systems, Modeling in state Space, State-Space Representation of Dynamic Systems, Transformation of Mathematical Models with MATLAB, Mechanical Systems, Electrical and Electronic Systems, Signal Flow Graphs, Linearization of Nonlinear Mathematical Models
3	**Mathematical Modeling of Fluid Systems and Thermal systems:** Introduction, Liquid-Level Systems, Thermal Systems
4	**Transient and Steady-State Response Analyses:** Introduction, First-Order Systems, Second-Order Systems, Higher-Order Systems, Transient-Response Analysis with MATLAB, Routh's Stability Criterion, Effects of Integral and Derivative Control Actions on System Performance, Steady-State Errors in Unity-Feedback Control Systems
5	**Root-Locus Analysis:** Introduction, Root-Locus Plots, General Rules for Constructing Root Loci, Root-Locus Plots with MATLAB, Positive Feedback Systems, Conditionally Stable Systems, Root Loci for Systems with Transport Lag
6	**Frequency-Response Analysis:** Introduction, Bode Diagrams, Plotting Bode Diagrams with MATLAB, Polar Plots, Drawing Nyquist Plots with MATLAB, Log-Magnitude-versus-Phase Plots, Nyquist Stability Criterion, Stability Analysis, Relative Stability, Closed-Loop Frequency Response of Unity-Feedback Systems

Reference Books:

1. Modern Control Engineering by Katsuhiko Ogata, 4th Edition, Prentice Hall of India.
2. Automatic Control Systems by Benjamin C.Kuo, 8th Edition, Farid Golnaraghi, John Wiley & Sons.