

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VI Aeronautical Engineering

Subject Name: **Basic Control Theory**

Subject Code: **160104**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
3	0	2	5	70	30	50

Sr. NO.	Course Contents	Total Hrs
1.	Introduction Concept, Natural & Man made control systems Open Loop & Closed Loop systems	03
2.	Mathematical models of systems Modeling of mechanical systems Modeling of electrical systems	02
3.	Block Diagrams & Signal Flow Properties of block diagrams, Block diagram reductions, Construction of SFG Mason's Gain Formula	09
4.	Time Domain Performance Analysis Excitation functions, First Order, Second Order and Higher Order Systems Transient response Steady State Error, Error constants s- plane root location and transient response Time response of second order system	06
5.	Stability Analysis of Control Systems Introduction Bode's Plot Polar plots, Hurwitz Criterion, Routh-Hurwitz criterion, Nyquist Plot, Nyquist Stability Criterion, Stability analysis Relative Stability, Closed Loop Frequency response of Unity feed Back System	07

6.	Root Locus Method Introduction, Root Locus plots Rules for construction of root loci, Feedback systems Stability Conditions	05
7.	State Space Analysis Introduction, Comparison between modern control theory and conventional control theory, concepts of State, State Variables and State models, State Space Equations Linear time-Invariant systems, State model for single input single output linear system, State space representation,	07
8.	Frequency response Analysis Introduction, Correlation between Time and Frequency Response, Second order System, Higher Order system	03
9.	Introduction to MATLAB Introduction & Tool Boxes in MATLAB Programming with MATLAB Response curve plotting – Root Locus, Bode Plot, Polar plots	03

Text Books:

1. Control Systems By A. Anand Kumar
2. Control Theory By U. A. Bakshi & V. U. Bakshi

Reference Books:

1. Control Systems By Rao V Dukkupati
2. Automatic Control Systems By Prof B. S. Manke