

# GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VI

Bio – Medical Engineering

Subject Name: **Bio-Medical Control Theory**

Subject Code: **160304**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
4	0	0	4	70	30	50

Sr. No	Course Content	Total Hrs.
1	<b>Introduction to Control system :</b> Introduction, Examples of Control Systems, Closed-Loop Control versus Open-Loop Control, Design of Control Systems.	6
2	<b>Mathematical Modeling :</b> Introduction, Transfer Function and Impulse-Response Function, Block Diagrams, Modeling in State-Space, Mechanical Systems, Electrical Systems, Liquid – level Systems, Thermal Systems.	10
3	<b>Transient Response :</b> Introduction, First-Order Systems, Second-Order Systems, Transient-Response Analysis with MATLAB. An Example Problem Solved with MATLAB.	10
4	<b>Basic Control Systems:</b> Introduction, Higher-Order Systems, Routh's Stability Criterion, Steady-State Errors in Unity –Feedback Control Systems.	10
5	<b>Root Locus:</b> Introduction, Root-Locus Plots, Summary of General Rules For Constructing Root Loci, Root-Locus Plots with MATALAB, Special Cases, Root-Locus Analysis of Control Systems , Root Loci for Systems with Transport Lag, Root Contour Plots.	10

<b>6</b>	<b>Frequency Response :</b>  Introduction, Bode Diagrams, Plotting Bode Diagrams with MATALAB, Polar Plots, Drawing Nyquist Plots with MATALAB, Log-Magnitude Versus Phase Plots, Nyquist Stability Criterion, Stability Analysis, Relative Stability, Closed Loop Frequency Response, Experimental Determination of Transfer Functions	<b>10</b>
----------	---	-----------

**The Practical and Term work will be based on the topics covered in the syllabus.**

**Text Book:**

1. K.Ogata , “Modern Control Engg.” , Prentice Hall of India Pvt. Ltd. , 3<sup>rd</sup> edition.

**Reference Books:**

1. “ Control system Engineering “, by Nagrath Gopal, Wiley Eastern .
2. “ Design of feedback control system”, by Raymond t Stefani & Bahram Shahian, Oxford Publication.