Discipline: **EE**	Semester: **6th**	Name of the Teaching Faculty: **MANMATHA BEHERA**
Subject: **CONTRL SYSTEM ENGINEERING**	No. of Days/per week class allotted: **05**	Semester From Date:**16-01-2024** To Date**: 07-05-2024** No. of Weeks : **15**
Week	**Class Day**	**Theory Topics**
1st	01	**Unit 1: FUNDAMENTAL OF CONTROL SYSTEM** Classification of Control system Open loop system & Closed loop system and its comparison
	02	Effects of Feed back
	03	Standard test Signals(Step, Ramp, Parabolic, Impulse Functions)
	04	Servomechanism
	05	Tutorial
2nd	01	**Unit 2:MATHEMATICAL MODEL OF A SYSTEM** Transfer Function & Impulse response
	02	Properties, Advantages & Disadvantages of Transfer Function Poles & Zeroes of transfer Function
	03	Simple problems of transfer function of network.
	04	Mathematical modeling of Electrical Systems(R, L, C, Analogous systems)
	05	Tutorial
3rd	01	**Unit 3:CONTROL SYSTEM COMPONENTS** Components of Control System
	02	Gyroscope, Synchros
	03	Tachometer, DC servomotors
	04	Ac Servomotors
	05	Tutorial
4th	01	**Unit 4:BLOCK DIAGRAM ALGEBRA & SIGNAL FLOW GRAPHS** Definition: Basic Elements of Block Diagram Canonical Form of Closed loop Systems
	02	Rules for Block diagram reduction
	03	Procedure for of Reduction of Block Diagram
	04	Simple Problem for equivalent transfer function
	05	Tutorial
5th	01	Basic Definition in Signal Flow Graph & properties
	02	Construction of Signal Flow graph from Block diagram
	03	Mason‘s Gain formula
	04	Simple problems in Signal flow graph for network
	05	Tutorial
6th	01	**Unit 5:TIME RESPONSE ANALYSIS** Time response of control system Standard Test signal 1. Step signal
	02	Standard Test signal 2. Ramp Signal 3. Parabolic Signal
	03	Standard Test signal. 4. Impulse Signal
	04	Tutorial
	05	Time Response of first order system with: 1. Unit step response 2. Unit impulse response.
7th	01	Time response specification.
	02	Derivation of expression for rise time, peak time

	03	Derivation of expression for peak overshoot, settling time and steady state error
	04	Steady state error and error constants.
	05	Tutorial
8th	01	Types of control system.[Steady state errors in Type-0, Type-1, Type-2 system],Effect of adding poles and zero to transfer function
	02	Response with P, PI, PD and PID controller
	03	Tutorial
	04	**Unit 6:ANALYSIS OF STABILITY BY ROOT LOCUS TECHNIQUE** Root locus concept-1
	05	Root locus concept-2
9th	01	Construction of root loci-1
	02	Construction of root loci-2
	03	Tutorial
	04	Rules for construction of the root locus-1
	05	Rules for construction of the root locus-2
10th	01	Rules for construction of the root locus-3
	02	Rules for construction of the root locus-4
	03	Tutorial
	04	Effect of adding poles and zeros to G(s) and H(s)-1
	05	Effect of adding poles and zeros to G(s) and H(s)-2
11th	01	**Unit 7: FREQUENCY RESPONSE ANALYSIS** Correlation between time response and frequency respons
	02	Polar plots-1
	03	Polar plots-2
	04	Tutorial
	05	Bode plots-1
12th	01	Bode plots-2
	02	Bode plots-3
	03	Tutorial
	04	All pass and minimum phase system.
	05	Computation of Gain margin and phase margin.
13th	01	Log magnitude versus phase plot.
	02	Closed loop frequency response.
	03	Tutorial
	04	**Unit 8:NYQUIST PLOT** Principle of argument
	05	Nyquist stability criterion-1
14th	01	Nyquist stability criterion-2
	02	Nyquist stability criterion applied to inverse polar plot
	03	Effect of addition of poles and zeros to G(S) H(S) on the shape of Nyquist plot.
	04	Tutorial
	05	Effect of addition of poles and zeros to G(S) H(S) on the shape of Nyquist plot.
15th	01	Assessment of relative stability.
	02	Constant M and N circle
	03	Nicholas chart
	04	Tutorial
	05	Brief revision