Discipline: **Electrical Engg.**	Semester: 6th **Sem**	Name of the Teaching Faculty: **Er. Satish Ranjan Dhar & Satyakam Mahapatra**
Subject: Th3. Control System Engineering	No of Days/ Per week class allotted: **5Classess P/W (75)**	Semester From Date: 13/02/2023 To Date: 25/05/2023 No. Of Weeks: **15**

WEEK	CLASS DAY	THEORY/PRACTICAL TOPICS
1st	1st	**1.FUNDAMENTAL OF CONTROL SYSTEM** 1.1. Classification of Control system
	2nd	1.2. Open loop system & Closed loop system and its comparison
	3rd	Previous class continue
	4th	1.3. Effects of Feed back
	5th	Doubt clear previous class
2nd	1st	1.4. Standard test Signals(Step, Ramp, Parabolic, Impulse Functions)
	2nd	Previous class continue
	3rd	1.5. Servomechanism
	4th	**2.MATHEMATICAL MODEL OF A SYSTEM** 2.1. Transfer Function & Impulse response
	5th	Doubt clear class
3rd	1st	2.2. Properties, Advantages & Disadvantages of Transfer Function
	2nd	2.3. Poles & Zeroes of transfer Function
	3rd	Continue Previous class
	4th	2.4. Simple problems of transfer function of network.
	5th	Solve Simple problems of transfer function
4th	1st	2.5. Mathematical modeling of Electrical Systems(R, L, C, Analogous systems)
	2nd	Doubt clear class
	3rd	**3.CONTROL SYSTEM COMPONENTS** 3.1. Components of Control System
	4th	Previous class continue
	5th	Doubt clear class
5th	1st	3.2. Gyroscope, Synchros, Tachometer
	2nd	DC servomotors, Ac Servomotors
	3rd	Doubt clear class
	4th	**4.BLOCK DIAGRAM ALGEBRA & SIGNAL FLOW GRAPHS**

		4.1. Definition: Basic Elements of Block Diagram
	5th	4.2. Canonical Form of Closed loop Systems
6th	1st	Doubt clear class
	2nd	4.3. Rules for Block diagram reduction
	3rd	4.4. Procedure for of Reduction of Block Diagram
	4th	4.5. Simple Problem for equivalent transfer function
	5th	Doubt clear class with Solve problems for equivalent transfer function
7th	1st	4.6. Basic Definition in Signal Flow Graph & properties
	2nd	4.7. Construction of Signal Flow graph from Block diagram
	3rd	4.8. Mason's Gain formula
	4th	4.9. Simple problems in Signal flow graph for network
	5th	Doubt clear class with Solve problems in Signal flow graph for network
8th	1st	**5.TIME RESPONSE ANALYSIS.** 5. 1 Time response of control system.
	2nd	5. 2 Standard Test signal. 5.2.1. Step signal, 5.2.2. Ramp Signal
	3rd	5.2.3. Parabolic Signal 5.2.4. Impulse Signal
	4th	5. 3 Time Response of first order system with: 5.3.1. Unit step response 5.3.2. Unit impulse response.
	5th	Doubt clear class
9th	1st	5. 4 Time response of second order system to the unit step input. 5.4.1. Time response specification.
	2nd	5.4.2. Derivation of expression for rise time, peak time, peak overshoot, settling time and steady state error.
	3rd	5.4.3. Steady state error and error constants.
	4th	5. 5 Types of control system.[Steady state errors in Type-0, Type-1, Type-2 system
	5th	Revision class
10th	1st	5.6 Effect of adding poles and zero to transfer function.

	2nd	5.7 Response with P, PI, PD and PID controller
	3rd	Doubt clear class
	4th	**1 .ANALYSIS OF STABILITY BY ROOT LOCUS TECHNIQUE. ANALYSIS OF STABILITY BY ROOT LOCUS TECHNIQUE.** 6.1 Root locus concept.
	5th	Doubt clear class
11th	1st	6 .2 Construction of root loci.
	2nd	Previous class continue
	3rd	6 .3 Rules for construction of the root locus.
	4th	Previous class continue
	5th	Revision class
12th	1st	6 .4 Effect of adding poles and zeros to G(s) and H(s).
	2nd	Previous class continue
	3rd	Doubt clear previous class
	4th	**7. FREQUENCY RESPONSE ANALYSIS.** 7 .1 Correlation between time response and frequency response.
	5th	7 .2 Polar plots.
13th	1st	7.3 Bode plots.
	2nd	7.4 All pass and minimum phase system.
	3rd	Revision class
	4th	7.5 Computation of Gain margin and phase margin.
	5th	Previous class continue
14th	1st	7.6 Log magnitude versus phase plot.
	2nd	Doubt clear class
	3rd	7.7 Closed loop frequency response.
	4th	**8.NYQUIST PLOT** 8.1 Principle of argument.
	5th	8.2 Nyquist stability criterion.
15th	1st	8.3 Niquist stability criterion applied to inverse polar plot.
	2nd	8.4 Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist plot.

	3rd	8.5 Assessment of relative stability.
	4th	8.6 Constant M and N circle
	5th	8.7 Nicholas chart