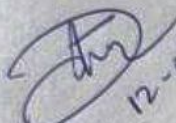


LESSON PLAN FOR CONTROL SYSTEM (Th. 3)

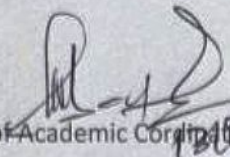
Discipline: Electrical Engineering	Semester: 6th	Name of the Teaching Faculty: CHANDRAMANI MAHAPATRA (Lect.)	
Subject: CONTROL SYSTEM	No. of days per week class allotted: 5	Semester From Date : 16-01-2024	to Date: 26-04-2024
		No. of Weeks: 15	
Week	Class Day	Theory	
1st		1. FUNDAMENTAL OF CONTROL SYSTEM	
	1st	1.1. Classification of Control system	
	2nd	1.2. Open loop system & Closed loop system and its comparison	
	3rd	1.3. Effects of Feed back	
	4th	1.4. Standard test Signals(Step, Ramp, Parabolic, Impulse Functions)	
	5th	Tutorial (1.5. Servomechanism)	
		2. MATHEMATICAL MODEL OF A SYSTEM	
2nd	1st	2.1. Transfer Function & Impulse response, 2.2. Properties, Advantages & Disadvantages of Transfer Function	
	2nd	2.3. Poles & Zeroes of transfer Function	
	3rd	2.4. Simple problems of transfer function of network.	
	4th	2.5. Mathematical modeling of Electrical Systems(R, L, C, Analogous systems)	
	5th	Tutorial	
		3. CONTROL SYSTEM COMPONENTS	
3rd	1st	3.1. Components of Control System	
	2nd	3.1. Components of Control System (Continue)	
	3rd	3.2. Gyroscope, Synchros, Tachometer, DC servomotors, Ac Servomotors.	
	4th	3.2. Gyroscope, Synchros, Tachometer, DC servomotors, Ac Servomotors. (Continue)	
	5th	Tutorial	
		4. BLOCK DIAGRAM ALGEBRA & SIGNAL FLOW GRAPHS	
4th	1st	4.1. Definition: Basic Elements of Block Diagram Canonical Form of Closed loop Systems	4.2.
	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	Tutorial	
5th	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	Tutorial	
		5. TIME RESPONSE ANALYSIS.	
6th	1st	5 . 1 Time response of control system.	
	2nd	5 . 2 Standard Test signal. 5.2.1. Step signal, 5.2.2. Ramp Signal 5.2.3. Parabolic Signal 5.2.4. Impulse Signal	

	3rd	5 . 3 Time Response of first order system with: 5.3.1. Unit step response 5.3.2. Unit impulse response.
	5th	Tutorial
7th	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	5.4.2. Derivation of expression for rise time, peak time, peak overshoot, settling time and steady state error. (continue)
	4th	5.4.3. Steady state error and error constants.
	5th	Tutorial
8th	1st	5 . 5 Types of control system.[Steady state errors in Type-0, Type-1, Type-2 system]
	2nd	5 . 6 Effect of adding poles and zero to transfer function.
	3rd	5 . 7 Response with P, PI, PD and PID controller.
	4th	5 . 7 Response with P, PI, PD and PID controller. (continue)
	5th	Tutorial
		6. ANALYSIS OF STABILITY BY ROOT LOCUS TECHNIQUE.
9th	1st	6 . 1 Root locus concept.
	2nd	6 . 2 Construction of root loci.
	3rd	6 . 2 Construction of root loci. (cont.)
	4th	6 . 2 Construction of root loci. (solve Problem)
	5th	Tutorial
10th	1st	6 . 3 Rules for construction of the root locus.
	2nd	6 . 3 Rules for construction of the root locus.(cont.)
	3rd	6 . 4 Effect of adding poles and zeros to G(s) and H(s).
	4th	6 . 4 Effect of adding poles and zeros to G(s) and H(s). (cont.)
	5th	Tutorial
		7. FREQUENCY RESPONSE ANALYSIS.
11th	1st	7 . 1 Correlation between time response and frequency response.
	2nd	7 . 2 Polar plots.
	3rd	7 . 2 Polar plots. (Solve problem)
	4th	7 . 3 Bode plots.
	5th	Tutorial
12th	1st	7 . 3 Bode plots. (cont.)
	2nd	7 . 3 Bode plots. (Solve problem)
	3rd	7 . 4 All pass and minimum phase system.
	4th	7 . 5 Computation of Gain margin and phase margin.
	5th	Tutorial
13th	1st	7 . 6 Log magnitude versus phase plot.
	2nd	7 . 7 Closed loop frequency response.
		8. NYQUIST PLOT
	3rd	8.1 Principle of argument.
	4th	8.2 Nyquist stability criterion.
	5th	Tutorial
14th	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	8.4 Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist plot. (cont.)
	4th	8.5 Assessment of relative stability.
	5th	Tutorial
15th	1st	8.6 Constant M and N circle
	2nd	8.6 Constant M and N circle (cont.)
	3rd	8.7 Nicholas chart.


4th	8.7 Nicholas chart. (cont.)
5th	Tutorial


12-01-2024

Signature of faculty


12/01/24

Signature of Academic Coordinator


12/01/24

Signature of HoD
HOD, Electrical Engineering
Government Polytechnic
Nabarangpur