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DEPARTMENT OF ELECTRICAL ENGINEERING

Govt. Polytechnic, Balasore

LESSON PLAN FOR ACADEMIC SESSION - 2024-25 CONTROL SYSTEM ENGINEERING

Course Code : Th-3	Semester : 6 TH
Total Periods : 75(60L+15T)	Examination : 3 Hours
Theory Periods : 4 P/Week	Internal Assessment : 20 Marks
Tutorial : 1 P/Week	End Semester Examination : 80 Marks
Maximum Marks : 100	
Semester From Date : 04/02/2025	To Date : 17/05/2025
Name of Teaching Faculty: Er. Radha Rani Panda, Lect (ELECT)	

WEEK	PERIOD	TOPIC
1st	1 st	FUNDAMENTAL OF CONTROL SYSTEM Classification of Control system Open loop system & Closed loop system and its comparison
	2 nd	Effects of Feed back
	3 rd	Standard test Signals(Step, Ramp, Parabolic, Impulse Functions)
	4 th	Servomechanism
	5 th	Tutorial (Doubt clearing and revision class)
2 nd	1 st	MATHEMATICAL MODEL OF A SYSTEM Transfer Function & Impulse response, Properties, Advantages & Disadvantages of Transfer Function
	2 nd	Poles & Zeroes of transfer Function
	3 rd	Simple problems of transfer function of network.
	4 th	Mathematical modeling of Electrical Systems(R, L, C, Analogous systems)
	5 th	Tutorial (Doubt clearing and revision class)
3 rd	1 st	CONTROL SYSTEM COMPONENTS Components of Control System Gyroscope,
	2 nd	Synchros, Tachometer
	3 rd	DC servomotors
	4 th	Ac Servomotors
	5 th	Tutorial (Doubt clearing and revision class)
4 th	1 st	BLOCK DIAGRAM ALGEBRA & SIGNAL FLOW GRAPHS Definition: Basic Elements of Block Diagram Canonical Form of Closed loop Systems
	2 nd	Rules for Block diagram reduction

	3 rd	Procedure for of Reduction of Block Diagram
	4 th	Simple Problem for equivalent transfer function
	5 th	Tutorial (Doubt clearing and revision class)
5 th	1 st	Basic Definition in Signal Flow Graph & properties
	2 nd	Construction of Signal Flow graph from Block diagram
	3 rd	Mason's Gain formula
	4 th	Simple problems in Signal flow graph for network
	5 th	Tutorial (Doubt clearing and revision class)
		TIME RESPONSE ANALYSIS.
	1 st	Time response of control system. Standard Test signal. Step signal,
6 th	2 nd	Ramp Signal Parabolic Signal Impulse Signal
	3 rd	Time Response of first order system with: Unit step response Unit impulse response
	4 th	Time response of second order system to the unit step input. Time response specification. Derivation of expression for rise time
	5 th	Tutorial (Doubt clearing and revision class)
	1 st	Derivation of expression for peak time, peak overshoot, settling time and steady state error
7 th	2 nd	Steady state error and error constants
	3 rd	Types of control system.[Steady state errors in Type-0, Type-1]
	4 th	Steady state errors in Type-2 system] Effect of adding poles and zero to transfer function.
	5 th	Tutorial (Doubt clearing, Numericals and revision class)
	1 st	Response with P, PI controller
8 th	2 nd	Response with PD and PID controller
	3 rd	ANALYSIS OF STABILITY BY ROOT LOCUS TECHNIQUE. Root locus concept
	4 th	Construction of root loci.
	5 th	Tutorial (Doubt clearing, Numericals and revision class)
	1 st	Construction of root loci..
9 th	2 nd	Rules for construction of the root locus.
	3 rd	Rules for construction of the root locus.
	4 th	Problems related to Root Locus
	5 th	Tutorial (Doubt clearing and revision class)
	1 st	Problems related to Root Locus
10 th	2 nd	Effect of adding poles and zeros to G(s) and H(s).
	3 rd	Problems related to Root Locus
	4 th	Problems related to Root Locus
	5 th	Tutorial (Doubt clearing and revision class)
	1 st	FREQUENCY RESPONSE ANALYSIS. Correlation between time response and frequency response
11 th	2 nd	Polar plots.
	3 rd	Problems related to Polar plots.
	4 th	Bode plots.
	5 th	Tutorial (Doubt clearing and revision class)
12 th	1 st	Problems related to Bode plots
	2 nd	All pass and minimum phase system.

	3 rd	Computation of Gain margin and phase margin.
	4 th	Problems related to computation of Gain margin and phase margin
	5 th	Tutorial (Doubt clearing and revision class)
13 th	1 st	Log magnitude versus phase plot.
	2 nd	Closed loop frequency response.
	3 rd	NYQUIST PLOT Principle of argument
	4 th	Nyquist stability criterion.
	5 th	Tutorial (Doubt clearing and revision class)
14 th	1 st	Problems related to Niquist stability
	2 nd	Niquist stability criterion applied to inverse polar plot.
	3 rd	Problems related to inverse polar plot.
	4 th	Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist plot
	5 th	Tutorial (Doubt clearing and revision class)
15 th	1 st	Assessment of relative stability.
	2 nd	Constant M circle
	3 rd	Constant N circle
	4 th	Nicholas chart.
	5 th	Tutorial (Doubt clearing and revision class)

Panda
04/02/2025

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Teaching Faculty

B. Mall
04/02/2025

I/C HOD, Dept of EE
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