Email Id:-gpblselectricalengg@gmail.com

DEPARTMENT OF ELECTRICAL ENGINEERING

Govt. Polytechnic, Balasore

LESSON PLAN FOR ACADEMIC SESSION - 2023-24
CONTROL SYSTEM ENGINEERING

Course Code : Th-3	**Semester : 6TH**
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 : 16/01/2024	**To Date : 8/05/2024**
Name of Teaching Faculty: Er. Radha Rani Panda	

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

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

		Correlation between time response and frequency response
	2nd	Polar plots.
	3rd	Problems related to Polar plots.
	4th	Bode plots.
	5th	Tutorial (**Doubt clearing and revision class)**
12th	1st	Problems related to Bode plots
	2nd	All pass and minimum phase system.
	3rd	Computation of Gain margin and phase margin.
	4th	Problems related to computation of Gain margin and phase margin
	5th	Tutorial (**Doubt clearing and revision class)**
13th	1st	Log magnitude versus phase plot.
	2nd	Closed loop frequency response.
	3rd	**NYQUIST PLOT** Principle of argument
	4th	Nyquist stability criterion.
	5th	Tutorial (**Doubt clearing and revision class)**
14th	1st	Problems related to Niquist stability
	2nd	Niquist stability criterion applied to inverse polar plot.
	3rd	Problems related to inverse polar plot.
	4th	Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist plot
	5th	Tutorial (**Doubt clearing and revision class)**
15th	1st	Assessment of relative stability.
	2nd	Constant M circle
	3rd	Constant N circle
	4th	Nicholas chart.
	5th	Tutorial (**Doubt clearing and revision class)**