GOVERNMENT POLYTECHNIC, PURI

DEPARTMENT OF ELECTRICAL ENGINEERING

Discipline: **ELECTRICAL ENGG**	Semester:6TH	Name of the Teaching Faculty: **MR NIHAR RANJAN DIKSHIT , FACULTY IN ELECTRICAL ENGG.**
Subject: **CONTROL SYSTEM ENGINEERING**	No. of days/per week class allotted: **05**	Semester From date: **16.01.2024** To Date: **26. 04.2024** No. of weeks:15
PRE- REQUISITE	Knowledge of electrical drawing Specification of different wires, cables,accessories etc. Components used in Substations(HT,LT)	
COURSE OUTCOMES	CO1: Understand the detailed specification and numbers required of different materials. CO2: Undersatnd ton to determine the size and material of conductor and cable from electrical and mechanical consideration. CO3:Preparing and esitimating of materials required of different types wiring systems for domestic and industrial purpose. CO4: Understand the IE rules, calculation of load, calculating size of fuse wire CO5: Preparing material estimate of pole mounted and plinth mounted substation	

Week	Class Day	Theory / Practical Topics	DELIVERY METHOD
1st	1st	FUNDAMENTAL OF CONTROL SYSTEM 1.1. Classification of Control system	whiteboard
	2nd	1.2. Open loop system & Closed loop system and its comparison 1.3. Effects of Feed back	whiteboard
	3rd	1.4. Standard test Signals(Step, Ramp, Parabolic, Impulse Functions)	whiteboard
	4th	1.5. Servomechanism	whiteboard
	5th	MATHEMATICAL MODEL OF A SYSTEM 2.1. Transfer Function & Impulse response,	whiteboard
2nd	1st	2.2. Properties, Advantages & Disadvantages of Transfer Function 2.3. Poles & Zeroes of transfer Function	whiteboard
	2nd	2.4. Simple problems of transfer function of network.	whiteboard
	3rd	2.5. Mathematical modeling of Electrical Systems(R, L, C, Analogous systems)	whiteboard
	4th	CONTROL SYSTEM COMPONENTS	whiteboard
	5th	3.1. Components of Control System	whiteboard
3rd	1st	3.2. Gyroscope, Synchros, Tachometer, DC servomotors, Ac Servomotors.	whiteboard
	2nd	**Assignment & class test**	whiteboard
	3rd	BLOCK DIAGRAM ALGEBRA & SIGNAL FLOW GRAPHS	whiteboard
	4th	4.1. Definition: Basic Elements of Block Diagram	whiteboard
	5th	4.2. Canonical Form of Closed loop Systems	whiteboard
4th	1st	4.3. Rules for Block diagram reduction	whiteboard
	2nd	4.4. Procedure for of Reduction of Block Diagram	whiteboard
	3rd	4.5. Simple Problem for equivalent transfer function	whiteboard
	4th	4.6. Basic Definition in Signal Flow Graph & properties	whiteboard
	5th	4.7. Construction of Signal Flow graph from Block diagram	whiteboard
5th	1st	4.8. Mason's Gain formula	whiteboard
	2nd	4.9. Simple problems in Signal flow graph for network	whiteboard
	3rd	TIME RESPONSE ANALYSIS. 5 . 1 Time response of control system. 5 . 2 Standard Test signal. 5.2.1. Step signal, 5.2.2. Ramp Signal	whiteboard
	4th	5.2.3. Parabolic Signal 5.2.4. Impulse Signal	whiteboard
	5th	5 . 3 Time Response of first order system with: 5.3.1. Unit step response	whiteboard
6th	1st	5.3.2. Unit impulse response.	whiteboard
	2nd	5 . 4 Time response of second order system to the unit step input.	whiteboard
	3rd	5.4.1. Time response specification.	whiteboard
	4th	5.4.2. Derivation of expression for rise time, peak time, peak overshoot, settling time and steady state error.	whiteboard
	5th	5.4.3. Steady state error and error constants.	whiteboard
7th	1st	5 . 5 Types of control system.[Steady state errors in Type-0, Type-1, Type-2 system]	whiteboard
	2nd	5 . 6 Effect of adding poles and zero to transfer function.	whiteboard
	3rd	5 . 7 Response with P, PI, PD and PID controller.	whiteboard

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/th	4th	assignment & class test	whiteboard
	5th	ANALYSIS OF STABILITY BY ROOT LOCUS TECHNIQUE. 6 .. 1 Root locus concept.	whiteboard
8th	1st	6 .. 1 Root locus concept.	whiteboard
	2nd	6 .. 2 Construction of root locu	whiteboard
	3rd	7 .. 2 Construction of root locu	whiteboard
	4th	8 .. 2 Construction of root locu	whiteboard
	5th	6 .. 3 Rules for construction of the root locus.	whiteboard
9th	1st	7 .. 3 Rules for construction of the root locus.	whiteboard
	2nd	8 .. 3 Rules for construction of the root locus.	whiteboard
	3rd	6 .. 4 Effect of adding poles and zeros to G(s) and H(s).	whiteboard
	4th	7 .. 4 Effect of adding poles and zeros to G(s) and H(s).	whiteboard
	5th	8 .. 4 Effect of adding poles and zeros to G(s) and H(s).	whiteboard
10th	1st	assignment & class test	whiteboard
	2nd	FREQUENCY RESPONSE ANALYSIS.	whiteboard
	3rd	7 .. 1 Correlation between time response and frequency response.	whiteboard
	4th	7 .. 2 Polar plots.	whiteboard
	5th	7 .. 3 Bode plots.	whiteboard
11th	1st	7 .. 4 All pass and minimum phase system.	whiteboard
	2nd	7 .. 5 Computation of Gain margin and phase margin.	whiteboard
	3rd	7 .. 6 Log magnitude versus phase plot.	whiteboard
	4th	7 .. 7 Closed loop frequency response.	whiteboard
	5th	Assignment & class test	whiteboard
12th	1st	Assignment & class test	whiteboard
	2nd	NYQUIST PLOT	whiteboard
	3rd	8.1 Principle of argument.	whiteboard
	4th	8.2 Nyquist stability criterion.	whiteboard
	5th	8.3 Nyquist stability criterion applied to inverse polar plot.	whiteboard
13th	1st	8.4 Effect of addition of poles and zeros to G(S) H(S) on the shape of Nyquist plot.	whiteboard
	2nd	8.5 Assessment of relative stability.	whiteboard
	3rd	8.6 Constant M and N circle	whiteboard
	4th	8.7 Nichols chart.	whiteboard
	5th	assignment & class test	whiteboard
14th	1st	Assignment & class test	whiteboard
	2nd	Revision	whiteboard
	3rd	Revision	whiteboard
	4th	Revision	whiteboard
	5th	Revision	whiteboard
15th	1st	previous year questions	whiteboard
	2nd	previous year questions	whiteboard
	3rd	previous year questions	whiteboard
	4th	previous year questions	whiteboard
	5th	previous year questions	whiteboard

LEARNING RESOURCES:

1. Control System,A. Anand Kumar,PHI
2. Control System,K. Padmanavan,IK.
3. Control system Engineering,I. J. Nagarath, M. Gopal,WEN
4. Control system Engineering,A Nagoor Kani,Ramesh Babu,Scientific

WEBSITE RESOURCES:

1.https://www.youtube.com/watch?v=CI2SuQrxfTnkdbnst=#Lp-pp0QzTEnM8--wnt5vhgHkMQTmu-2IhRK (NPTEL)
2.https://www.youtube.com/watch?v=M_ZSgEbs-Qw&list=PLnSDvd5cX5f6GzUTNAxRDkgqxK0k5UZ (NPTEL)

10-01-24
Sign. of Faculty concerned

10-1-24
Principal
G.P Puri

10/1/24
Sign. of HOD

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