ACADEMIC LESSON PLAN OF SUMMER 2026

Discipline: Electrical Engg.	Semester: 4th	Name of the Teaching Faculty: Udaya Meher
Subject:TH-4 (Control System Engineering)	No. of days/per week class allotted:4p/week	Semester From: 15th Dec 2026 to 18th April 2026
Week	Class Day	Theory Topics
1st	1st	1. FUNDAMENTAL OF CONTROL SYSTEM 1.1. Classification of Control system 1.2. Open loop system & Closed loop system and its comparison
	2nd	1.3. Effects of Feed back 1.4. Standard test Signals(Step, Ramp, Parabolic, Impulse Functions)
	3rd	1.5. Servomechanism
	4th	2. MATHEMATICAL MODEL OF A SYSTEM 2.1. Transfer Function & Impulse response, 2.2. Properties, Advantages & Disadvantages of Transfer Function
2nd	1st	2.3. Poles & Zeroes of transfer Function 2.4. Simple problems of transfer function of network.
	2nd	2.5. Mathematical modeling of Electrical Systems(R, L, C, Analogous systems)
	3rd	3. CONTROL SYSTEM COMPONENTS 3.1. Components of Control System
	4th	3.2. Gyroscope, Synchros, Tachometer, DC servomotors, Ac Servomotors.(Contd)
3rd	1st	3.2. Gyroscope, Synchros, Tachometer, DC servomotors, Ac Servomotors.(Contd)
	2nd	3.2. Gyroscope, Synchros, Tachometer, DC servomotors, Ac Servomotors.
	3rd	4. BLOCK DIAGRAM ALGEBRA & SIGNAL FLOW GRAPHS 4.1. Definition: Basic Elements of Block Diagram
	4th	4.2. Canonical Form of Closed loop Systems 4.3. Rules for Block diagram reduction(Contd)
4th	1st	4.3. Rules for Block diagram reduction(Contd) 4.4. Procedure for of Reduction of Block Diagram
	2nd	4.5. Simple Problem for equivalent transfer function(Contd.)
	3rd	4.5. Simple Problem for equivalent transfer function 4.6. Basic Definition in Signal Flow Graph & properties
	4th	4.7. Construction of Signal Flow graph from Block diagram 4.8. Mason's Gain formula
5th	1st	4.9. Simple problems in Signal flow graph for network(Contd.)
	2nd	4.9. Simple problems in Signal flow graph for network.
	3rd	5. 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 5.2.3. Parabolic Signal 5.2.4. Impulse Signal 5 . 3 Time Response of first order system with: 5.3.1. Unit step response
	4th	5.3.2. Unit impulse response. 5 . 4 Time response of second order system to the unit step input. 5.4.1. Time response specification.(Contd.)

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6th	1st	5.4.1. Time response specification. 5.4.2. Derivation of expression for rise time, peak time, peak overshoot, settling time and steady state error.(Contd.)
	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(cont.)
	4th	5.4.3. Steady state error and error constants
7th	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.
	4th	5 .7 Response with P, PI, PD and PID controller(Contd.)
	5th	5 .7 Response with P, PI, PD and PID controller
8th	1st	6. ANALYSIS OF STABILITY BY ROOT LOCUS TECHNIQUE. 6.1 Root locus concept.(cont.)
	2nd	6. 1 Root locus concept.
	3rd	6. 2 Construction of root loci.(cont.)
	4th	6. 2 Construction of root loci.
9th	1st	6. 3 Rules for construction of the root locus. (cont.)
	2nd	6. 3 Rules for construction of the root locus.(cont.)
	3rd	6. 3 Rules for construction of the root locus.(cont.)
	4th	6. 3 Rules for construction of the root locus.(cont.)
10th	1st	6. 3 Rules for construction of the root locus.
	2nd	6. 4 Effect of adding poles and zeros to G(s) and H(s).
	3rd	7. FREQUENCY RESPONSE ANALYSIS. 7.1 Correlation between time response and frequency response.
	4th	7. 2 Polar plots.(cont.)
11th	1st	7. 2 Polar plots.(cont.)
	2nd	7. 2 Polar plots.(cont.)
	3rd	7. 3 Bode plots.(cont.)
	4th	7. 3 Bode plots.(cont.)
12th	1st	7. 3 Bode plots.(cont.)
	2nd	7. 4 All pass and minimum phase system. 7. 5 Computation of Gain margin and phase margin(contd,)
	3rd	7. 4 All pass and minimum phase system. 7. 5 Computation of Gain margin and phase margin
	4th	7. 6 Log magnitude versus phase plot.
13th	1st	7. 7 Closed loop frequency response.
	2nd	8. NYQUIST PLOT 8.1 Principle of argument
	3rd	8.2 Nyquist stability criterion.(cont.)
	4th	8.3 Nyquist stability criterion applied to inverse polar plot.(cont.)

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	1st	8.3 Nyquist stability criterion applied to inverse polar plot.(cont.)
	2nd	8.3 Nyquist stability criterion applied to inverse polar plot.
	3rd	8.4 Effect of addition of poles and zeros to G(S) H(S) on the shape of Nyquist plot.
	4th	8.5 Assessment of relative stability.
15th	1st	8.6 Constant M and N circle.(cont.)
	2nd	8.6 Constant M and N circle
	3rd	8.7 Nicholas chart.(contd.)
	4th	8.7 Nicholas chart. Introduction to State Space Model

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Signature of Teaching Faculty