NILASAILA INSTITUTE OF SCIENCE & TECHNOLOGY
SERGARH-756060, BALASORE (ODISHA)
(Approved by AICTE& affiliated to SCTE&VT, Odisha)

LESSON PLAN

SUBJECT: TH-3 (CONTROL SYSTEM ENGINEERING)

Name Of The Faculty :- Er.SOUMYAJIT ROUT
Branch :- Electrical Engineering
Session :- 2024-25
Semester :- 6th
Examination :- 2025 (S)

CHAPTER WISE DISTRIBUTION OF PERIODS

Sl.No.	Name of the chapter as per the Syllabus	No. of Periods as per the Syllabus	No. of periods actually needed
1	Fundamental of control system	4	5
2	Mathematical model of a system	4	5
3	Control system components	4	5
4	Block diagram algebra & signal flow graphs	8	13
5	Time response analysis	10	14
6	Analysis of stability by root locus technique	10	6
7	Frequency response of system	10	14
8	Nyquist plot	10	
Total periods		60	

Sign of Faculty

Sign of H.O.D.

Discipline : EE	Semester : 6th	Name of the Teaching Faculty: Er.Soumyajit Rout
		SESSION : 2024-25 EXAMINATION : 2025 (S)
Week	**Class Day**	**Theory / Practical Topics**
1st	1st	FUNDAMENTAL OF CONTROL SYSTEM 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	1.5. Servomechanism
2nd	1st	MATHEMATICAL MODEL OF A SYSTEM 2.1. Transfer Function & Impulse response
	2nd	2.2. Properties, Advantages & Disadvantages of Transfer Function
	3rd	2.3. Poles & Zeroes of transfer Function
	4th	2.4. Simple problems of transfer function of network.
	5th	2.5. Mathematical modeling of Electrical Systems(R, L, C, Analogous systems)
3rd	1st	CONTROL SYSTEM COMPONENTS 3.1. Components of Control System
	2nd	3.1. Components of Control System
	3rd	3.2. Gyroscope, Synchros, Tachometer, DC servomotors, Ac Servomotors.
	4th	3.2. Gyroscope, Synchros, Tachometer, DC servomotors, Ac Servomotors.
	5th	3.2. Gyroscope, Synchros, Tachometer, DC servomotors, Ac Servomotors.
4th	1st	BLOCK DIAGRAM ALGEBRA & SIGNAL FLOW GRAPHS 4.1. Definition: Basic Elements of Block Diagram
	2nd	4.2. Canonical Form of Closed loop Systems
	3rd	4.2. Canonical Form of Closed loop Systems
	4th	4.3. Rules for Block diagram reduction
	5th	4.3. Rules for Block diagram reduction

:-The Week	Class Day	Theory / Practical Topics
5th	1st	4.4. Procedure for of Reduction of Block Diagram
	2nd	4.4. Procedure for of Reduction of Block Diagram
	3rd	4.5. Simple Problem for equivalent transfer function
	4th	4.6. Basic Definition in Signal Flow Graph & properties
	5th	4.7. Construction of Signal Flow graph from Block diagram
6th	1st	4.8. Mason's Gain formula
	2nd	4.9. Simple problems in Signal flow graph for network
	3rd	4.9. Simple problems in Signal flow graph for network
	4th	TIME RESPONSE ANALYSIS. 5 . 1 Time response of control system.
	5th	5 . 2 Standard Test signal. 5.2.1. Step signal, 5.2.2. Ramp Signal
7th	1st	5.2.3. Parabolic Signal 5.2.4. Impulse Signal
	2nd	5 . 3 Time Response of first order system with: 5.3.1. Unit step response 5.3.2. Unit impulse response.
	3rd	5 . 3 Time Response of first order system with: 5.3.1. Unit step response 5.3.2. Unit impulse response.
	4th	5.4.1. Time response specification.
	5th	5.4.2. Derivation of expression for rise time, peak time, peak overshoot, settling time and steady state error.
8th	1st	5.4.3. Steady state error and error constants.
	2nd	5 . 5 Types of control system.[Steady state errors in Type-0, Type-1, Type-2 system]
	3rd	5 . 5 Types of control system.[Steady state errors in Type-0, Type-1, Type-2 system]
	4th	5 . 6 Effect of adding poles and zero to transfer function.
	5th	5 . 7 Response with P, PI, PD and PID controller.

Week	Class Day	Theory / Practical Topics
9th	1st	5 . 7 Response with P, PI, PD and PID controller.
	2nd	5 . 7 Response with P, PI, PD and PID controller.
	3rd	ANALYSIS OF STABILITY BY ROOT LOCUS TECHNIQUE. 6 . 1 Root locus concept.
	4th	6 . 2 Construction of root loci.
	5th	6 . 2 Construction of root loci.
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	6 . 4 Effect of adding poles and zeros to G(s) and H(s).
	4th	FREQUENCY RESPONSE ANALYSIS. 7 . 1 Correlation between time response and frequency response.
	5th	.7 . 1 Correlation between time response and frequency response.
11th	1st	7 . 2 Polar plots.
	2nd	7 . 3 Bode plots.
	3rd	7 . 3 Bode plots.
	4th	7 . 4 All pass and minimum phase system
	5th	7 . 4 All pass and minimum phase system
12th	1st	7 . 5 Computation of Gain margin and phase margin.
	2nd	7 . 5 Computation of Gain margin and phase margin.
	3rd	7 . 6 Log magnitude versus phase plot.
	4th	7 . 6 Log magnitude versus phase plot.
	5th	7 . 7 Closed loop frequency response.
13th	1st	7 . 7 Closed loop frequency response.
	2nd	7 . 7 Closed loop frequency response.
	3rd	NYQUIST PLOT 8.1 Principle of argument.
	4th	NYQUIST PLOT 8.1 Principle of argument.
	5th	8.2 Nyquist stability criterion.

Week	Class Day	Theory / Practical Topics
14th	1st	8.2 Nyquist stability criterion.
	2nd	8.3 Niquist stability criterion applied to inverse polar plot.
	3rd	8.3 Niquist stability criterion applied to inverse polar plot.
	4th	8.4 Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist plot.
	5th	8.5 Assessment of relative stability.
15th	1st	8.5 Assessment of relative stability.
	2nd	8.6 Constant M and N circle
	3rd	8.6 Constant M and N circle
	4th	8.6 Constant M and N circle
	5th	8.7 Nicholas chart
16	1st	8.7 Nicholas chart
	2nd	8.7 Nicholas chart
	3rd	RIVISION
	4th	RIVISION

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