

LESSON PLAN

**SUBJECT:- LINEAR CONTROL
SYSTEM**

BRANCH:- ELECTRICAL ENGG.

SEMESTER: 4th

NAME OF FACULTY: - ABHIPSA DUTTA



**GOVERNMENT POLYTECHNIC,
BHADRAK**

SESSION:2025-26

Hod Electrical

HOD (ELECT.)
G.P.BHADRAK

Academic Co-ordinator

Academic Co-ordinator

Principal

Govt. Polytechnic Bhadrak

Principal
Govt. Polytechnic
Bhadrak

EARNING OUTCOMES:

After completion of the course, the students will be able to

- Express the basic elements and structures of feedback control systems
- Correlate the pole-zero configurations of transfer functions and their time-domain response.
- Apply Routh-Hurwitz criterion, Root Locus, Bode Plot and Nyquist Plot to determine the stability of LTI systems.
- Determine the steady-state response, errors of stable control systems.
- Design compensators to achieve the desired performance.

Discipline: Electrical Engg.	Semester: 4 th	Name of the Teaching Faculty : ABHIPSA DUTTA
Subject: DC machines and transformers	No. of Days/per week class allotted: 3	Semester from date: 22.12.2025 To Date: 15.11.2025 No. of Weeks: 15
Week	Class Day	Topic/Sub-Topic

Unit-I

Introduction to Laplace Transform

Open loop and closed loop control systems: Feedback principle

2nd

Open loop and closed loop control systems: Feedback principle

3rd

Transfer function of LTI systems-Mechanical and Electromechanical systems

1st

Transfer function of LTI systems-Mechanical and Electromechanical systems

2nd

Force voltage and force current analogy

3rd

Block diagram reduction(Contd...)

1st

Block diagram reduction Problems

2nd

Signal flow graph - Mason's gain formula

3rd

Characteristic equation.

Unit-II

Control system components

1st

DC and AC servo motors

2nd

Synchro - gyroscope

3rd

Stepper motor - Tacho generator

1st

Time domain analysis of control systems: Transient and steady state responses

2nd

Time domain analysis of control systems: Transient and steady state responses

3rd

Time domain specifications - first order systems step responses

1st

Time domain specifications second order systems step responses (Contd...)

2nd

Time domain specifications second order systems step responses

3rd

Tutorials

1st

Unit-III

Error analysis:

Steady-state error analysis -. Routh's stability criterion

7 th	2 nd	Static error coefficient of type 0, 1 systems
	3 rd	Static error coefficient of type 2 systems
8 th	1 st	Dynamic error coefficients
	2 nd	Concept of stability, Time response for various pole locations
	3 rd	Stability of feedback system
9 th	1 st	Various problems on error calculations
	2 nd	Routh's stability criterion
	3 rd	Problem solving on RH Criteria
10 th	1 st	Unit-IV
		<u>Root locus and Polar plot:</u>
		General rules for constructing Root loci
	2 nd	stability from root loci
	3 rd	effect of addition of poles and zeros
11 th	1 st	Lag, Lead and Lead-Lag compensators
	2 nd	Lag, Lead and Lead-Lag compensators
	3 rd	Nyquist stability criterion
12 th	1 st	Nichols chart
	2 nd	Non-minimum phase system
	3 rd	transportation lag.
	1 st	Various examples of root locus
		Unit-V
	2 nd	<u>Frequency domain analysis:</u>
		Baics of Laplace transform
	3 rd	Frequency domain specifications

14 th	1 st	Analysis based on Bode plot
	2 nd	Log magnitude vs. phase plot
	3 rd	State space model
15 th	1 st	State Transition matrix
	2 nd	Revision and doubt clearing classes
	3 rd	Revision and doubt clearing classes

faculty

Aditya
18/12/25

Signature of the

Lect. in Elect. Engg.
Govt. Poly. Bhadrak