

# LESSON PLAN

**SUB:-CONTROL SYSTEM ENGINEERING**

**BRANCH:- ELECTRICAL ENGG.**

**SEMESTER: 6<sup>TH</sup>**

**NAME OF FACULTY: UMESH KUMAR DALAI**



**GOVERNMENT POLYTECHNIC,  
BHADRAK**

**SESSION:2025-26**

*Umesh Kumar Dalai*  
HOD Electrical  
19-12-25

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*Umesh Kumar Dalai*  
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Discipline: ELECTRICAL ENGG.	Semester: 5 <sup>th</sup>	Name of the Teaching Faculty : UMESH KUMAR DALAI(LECT.IN ELECT.ENGG)
Subject: CONTROL SYSTEM ENGINEERING	No. of Days/per week class allotted:5	Semester from date: 22.12.2025 to 18.04.2026  No. of Weeks:15
Week	Class Day	Theory
1 <sup>st</sup>	1 <sup>st</sup>	Classification of Control system .
	2 <sup>nd</sup>	Open loop system & Closed loop system and its comparison & Effects of Feed back
	3 <sup>rd</sup>	Standard test Signals(Step, Ramp, Parabolic, Impulse Functions
	4 <sup>th</sup>	Servomechanism
	5 <sup>th</sup>	Question discussion & Doubt clearing
2 <sup>nd</sup>	1 <sup>st</sup>	Transfer Function & Impulse response, Properties, Advantages & Disadvantages of Transfer Function
	2 <sup>nd</sup>	Poles & Zeroes of transfer Function Simple problems of transfer function of network.
	3 <sup>rd</sup>	Mathematical modeling of Electrical Systems(R, L, C, Analogous systems)
	4 <sup>th</sup>	Mathematical modeling of Electrical Systems(R, L, C, Analogous systems)
	5 <sup>th</sup>	Question discussion & doubt clearing
3 <sup>rd</sup>	1 <sup>st</sup>	Components of Control System
	2 <sup>nd</sup>	Gyroscope, Synchronos
	3 <sup>rd</sup>	Tachometer, DC servomotors
	4 <sup>th</sup>	Ac Servomotors
	5 <sup>th</sup>	Question discussion
4 <sup>th</sup>	1 <sup>st</sup>	Definition: Basic Elements of Block Diagram & Canonical Form of Closed loop Systems
	2 <sup>nd</sup>	Rules for Block diagram reduction
	3 <sup>rd</sup>	Procedure for of Reduction of Block Diagram
	4 <sup>th</sup>	Simple Problem for equivalent transfer function.
	5 <sup>th</sup>	Question discussion
5 <sup>th</sup>	1 <sup>st</sup>	Simple Problem for equivalent transfer function
	2 <sup>nd</sup>	Basic Definition in Signal Flow Graph & properties Construction of Signal Flow graph from Block diagram
	3 <sup>rd</sup>	Mason's Gain formula & Simple problems in Signal flow graph for network
	4 <sup>th</sup>	Simple problems in Signal flow graph for network
	5 <sup>th</sup>	Question discussion & doubt clearing
6 <sup>th</sup>	1 <sup>st</sup>	Time response of control system

	2 <sup>nd</sup>	Standard Test signal <ul style="list-style-type: none"> <li>• Step signal,</li> <li>• Ramp Signal</li> <li>• Parabolic Signal</li> <li>• Impulse Signal</li> </ul>
	3 <sup>rd</sup>	Time Response of first order system with: <ul style="list-style-type: none"> <li>• Unit step response</li> <li>• Unit impulse response</li> </ul>
	4 <sup>th</sup>	Time response of second order system to the unit step input. <ul style="list-style-type: none"> <li>• Time response specification.</li> <li>• Derivation of expression for rise time, peak time, peak overshoot, settling time and steady state error.</li> </ul>
	5 <sup>th</sup>	Question discussion & doubt clearing
	7 <sup>th</sup>	1 <sup>st</sup>
	2 <sup>nd</sup>	Steady state error and error constants.
	3 <sup>rd</sup>	Types of control system.[ Steady state errors in Type-0, Type-1, Type-2 system]
	4 <sup>th</sup>	Effect of adding poles and zero to transfer function
	5 <sup>th</sup>	Question discussion & doubt clearing
	8 <sup>th</sup>	1 <sup>st</sup>
	2 <sup>nd</sup>	Response with P, PI, PD and PID controller.
	3 <sup>rd</sup>	Root locus concept.
	4 <sup>th</sup>	Construction of root loci.
	5 <sup>th</sup>	Question discussion & doubt clearing
	9 <sup>th</sup>	1 <sup>st</sup>
	2 <sup>nd</sup>	Rules for construction of the root locus.
	3 <sup>rd</sup>	Rules for construction of the root locus.
	4 <sup>th</sup>	Rules for construction of the root locus.
	5 <sup>th</sup>	Question discussion & doubt clearing
	10 <sup>th</sup>	1 <sup>st</sup>
	2 <sup>nd</sup>	Effect of adding poles and zeros to $G(s)$ and $H(s)$ .
	3 <sup>rd</sup>	Effect of adding poles and zeros to $G(s)$ and $H(s)$ .
	4 <sup>th</sup>	Effect of adding poles and zeros to $G(s)$ and $H(s)$ .
	5 <sup>th</sup>	Question discussion & doubt clearing
	11 <sup>th</sup>	1 <sup>st</sup>
	2 <sup>nd</sup>	Polar plots
	3 <sup>rd</sup>	Polar plots
	4 <sup>th</sup>	Bode plots
	5 <sup>th</sup>	Solving various types of problems
	12 <sup>th</sup>	1 <sup>st</sup>
	2 <sup>nd</sup>	All pass and minimum phase system
	3 <sup>rd</sup>	Computation of Gain margin and phase margin
	4 <sup>th</sup>	Log magnitude versus phase plot.
	5 <sup>th</sup>	Question discussion
	13 <sup>th</sup>	1 <sup>st</sup>
	2 <sup>nd</sup>	Closed loop frequency response
	3 <sup>rd</sup>	Principle of argument

14 <sup>th</sup>	4 <sup>th</sup>	Nyquist stability criterion
	5 <sup>th</sup>	Question discussion & doubt clearing
	1 <sup>st</sup>	Nyquist stability criterion.
	2 <sup>nd</sup>	Nyquist stability criterion applied to inverse polar plot
	3 <sup>rd</sup>	Effect of addition of poles and zeros to $G(S) H(S)$ on the shape of Nyquist plot
15 <sup>th</sup>	4 <sup>th</sup>	Assessment of relative stability.
	5 <sup>th</sup>	Question discussion
	1 <sup>st</sup>	Constant M and N circle
	2 <sup>nd</sup>	Constant M and N circle
	3 <sup>rd</sup>	Nicholas chart.
	4 <sup>th</sup>	Nicholas chart.
	5 <sup>th</sup>	Question discussion & doubt clearing

*llk*  
19/12/2025

Signature of faculty

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