

BLACK DIAMOND SCHOOL OF ENGINEERING, JHARSUGUDA**LESSON PLAN**
Session (2022-2023)

Discipline: Electrical Engg.	Semester: 6 th , Summer/2023	Name of the Faculty: Ashutosh Panda Lecturer <hr/>
Subject: Control Systems Engineering Theory-3	No. of Days/week: 05	Start Date: 13/02/2023 End Date: 23/05/2023

Week	Class Day	Theory Topics
1st	1st	Classification of Control system.
	2nd	Open loop system & Closed loop system and its comparison.
	3rd	Effects of Feedback.
	4th	Standard test Signals (Step, Ramp, Parabolic, and Impulse Functions).
	5th	Standard test Signals (Step, Ramp, Parabolic, and Impulse Functions).
2nd	1st	Servomechanism.
	2nd	Regulators (Regulating systems)
	3rd	Revision and Doubt clearing.
	4th	Transfer Function of a system.
	5th	Transfer Function of a system.
3rd	1st	Impulse response of a system.
	2nd	Properties, Advantages& Disadvantages of Transfer Function.
	3rd	Poles & Zeroes of transfer Function.
	4th	Representation of poles & Zero on the s-plane.
	5th	Representation of poles & Zero on the s-plane.
4th	1st	Simple problems of transfer function of network.

	2nd	Doubt clearing and Class test.
	3dr	Close loop transfer function.
	4th	Concept of characteristics equation
	5th	Concept of characteristics equation
5th	1st	Block Diagram reduction technique.
	2nd	Block Diagram reduction technique.
	3rd	Stability of system.
	4th	Block diagram reduction problem.
	5th	Block Diagram reduction technique
6th	1st	Modeling of Electrical Systems(R, L, C, Analogous systems).
	2nd	Revision and Doubt clearing.
	3rd	Definition of Basic Elements of a Block Diagram.
	4th	Canonical Form of Closed loop Systems.
	5th	Canonical Form of Closed loop Systems.
7th	1st	Rules for Block diagram Reduction part-I
	2nd	Rules for Block diagram Reduction part-II
	3rd	Procedure for of Reduction of Block Diagram.
	4th	Simple Problem for equivalent transfer function.
	5th	Simple Problem for equivalent transfer function.
8th	1st	Basic Definition in SFG & properties.
	2nd	Mason's Gain formula.
	3rd	Steps for solving Signal flow Graph.
	4th	Simple problems in Signal flow graph for network.
	5th	Simple problems in Signal flow graph for network.
9th	1st	Doubt clearing and Class test.
	2nd	Definition of Time, Stability, steady-state response, accuracy, transient accuracy, In-sensitivity and robustness.
	3rd	System Time Response.
	4th	Frequency response analysis.

	5th	Analysis of Steady State Error.
10th	1st	Types of Input & Steady state Error (Step, Ramp, Parabolic).
	2nd	Parameters of first order system & second-order systems.
	3rd	Derivation of time response Specification (Delay time, Rise time, Peak time, Setting time, Peak over shoot).
	4th	Revision and Doubt clearing.
	5th	Revision and Doubt clearing.
11th	1st	Effect of parameter variation in Open loop System & Closed loop Systems.
	2nd	Introduction to Basic control Action& Basic modes of feedback control: proportional, integral and derivative.
	3rd	Effect of feedback on overall gain, Stability.
	4th	Realization of Controllers (P, PI, PD, PID) with OPAMP.
	5th	Realization of Controllers (P, PI, PD, PID) with OPAMP
12th	1st	Revision and Doubt clearing.
	2nd	Effect of location of poles on stability.
	3rd	Routh-Hurwitz stability criterion.
	4th	Steps for Root locus method.
	5th	Steps for Root locus method.
13th	1st	Root locus method of design (Simple problem).
	2nd	Revision and Doubt clearing.
	3rd	Frequency response, Relationship between time & frequency response.
	4th	Methods of Frequency response.
	5th	Methods of Frequency response.
14th	1st	Polar plots & steps for polar plot.
	2nd	Bodes plot & steps for Bode plots.
	3rd	Stability in frequency domain, Gain Margin& Phase margin.
	4th	Nyquist plots. Nyquist stability criterion.
	5th	Nyquist plots. Nyquist stability criterion.
15th	1st	Simple problems as above.

2nd	Concepts of state, state variable, state model.
3rd	State models for linear continuous time functions (Simple).
4th	Doubt clearing and Class test.
5th	Doubt clearing and Class test.