

**BHUBANANANDA ORISSA SCHOOL OF ENGINEERING,  
CUTTACK**

**LESSON PLAN (2022-23)**

**BY: ER. PRAFULLA KUMAR PANDA**



**SUBJECT : ADVANCE CONTROL SYSTEM**

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

**BRANCH : AE & I**

# Bhubanananda Orissa School of Engineering

## Lesson Plan

<b>Discipline: AE &amp; I</b>	<b>Semester: 6<sup>th</sup></b>	<b>Name of the Teaching Faculty: PRFULLA KUMAR PANDA</b>
<b>Subject: ADV Control System</b>	<b>No of Days/per week class allotted: 5</b>	<b>Semester from 14/02/2023 to 23.05.2023</b> <b>No of weeks: 15</b>
<b>Week No. 15</b>	<b>Class Day TUE, THU, FRI, SAT-2</b>	<b>Theory Topics</b>
1 <sup>st</sup>	14/02/2023	Introduction of the Subject and Syllabus discussion.
	16/02/2023	<b>UNIT –I</b> <b>Fundamental of control system</b> 1.1 Definition of control system.
	17/02/2023	1.2 Classification of control system. (Open loop and Closed loop control system).
2 <sup>nd</sup>	21/02/2023	Cascaded and Ratio control system
	23/02/2023	1.3 Block diagram of automatic closed loop control system.
	24/02/2023	1.4 Distinguish between open loop and closed and its comparison.
	25/02/2023	1.5 Effect of feedback on control system.
	25/02/2023	1.6 Standard input signal of control system.
3 <sup>rd</sup>	28/02/2023	1.7 Examples-of electrical negative feedback control system (voltage regulator).
	02/03/2023	1.8 Principle of servo Mechanism (Non-contact type control system). <b>Chapter 1 Revision ,Previous years questions discussion.</b>
	03/03/2023	<b>UNIT –II</b> <b>Properties of control system</b> 2.1 Transfer Function (T.F) (Open loop and closed system).
	04/03/2023	2.2 Response of control system (impulse, step and Ramp).
	04/03/2023	2.3 study state Response A. under damp Response, B. Over- Damp Response, Critically damp Response
4 <sup>th</sup>	09/03/2023	2.4 Advantage and Disadvantage T.F 2.5 Identification poles and zero's of T.F.
	10/03/2023	2.7 sample of T.F Electrical system using Laplace Transform <b>Chapter 2 Revision,Previous years questions discussion.</b>
	11/03/2023	<b>UNIT –VIII</b> <b>Control system components and Mathematically modeling</b> 3.1 Components of control system with definition
	11/03/2023	3.2 Potentiometer, DC Motor, Servo motor AC Motor (Synchronous and Asynchronous).
5 <sup>th</sup>	14/03/2023	3.3 Modelling of Electrical system (R, L and C).
	16/03/2023	<b>UNIT –IV</b> <b>Block diagram and S.F.G approach</b> 4.1. Deformation of basic elements of Block diagram. 4.2. Characteristics of equation of control system.



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	17/03/2023	
	18/03/2023	4.3. General Block diagram of feedback with Disturbance. 4.4. Conical form of closed loop control system in $S^+$ Domain
6th	21/03/2023	4.5. Rule for Block Reduction
	23/03/2023	4.6 for Reduction of Block diagram
	24/03/2023	4.7. Sample problems for determine equivalent T.F of a Multi-loop control system.
	25/03/2023	4.8. Basic definition of S.F.G and properties. 4.9. Mason's gain Formula
	25/03/2023	<b>Class Test -I</b>
7th	28/03/2023	4.10. Reduction S.F.G to determine overall T.F.
	31/03/2023	4.11 Comparison between block diagram and S.F.G Approach.
	31/03/2023	4.12 sample problems for S.F.G for electrical N/W. <b>Chapter 4 Revision, Previous year's questions discussion.</b>
8th	04/04/2023	<b>UNIT -V</b> <b>Time domain analysis of control system.</b> 5.1. Basic concept of Time domain Analysis.
	06/04/2023	5.2 Distinguish between Linear Time variant and Non-Linear Time Variant. 5.3. Definition steady state Response Accuracy, Transient Response, Stability in-sensitivity and Robustness.
	08/04/2023	5.4. System Time Response.
	08/04/2023	5.5. Analysis of state steady error and Definition of various errors Co-efficient.
9th	11/04/2023	5.6 Types of input and Steady state error (Step, Ramp and Parabolic).
	13/03/2023	5.7 Parameter of Zeros order, 1st order and 2nd order system and it's T.F.
10 <sup>th</sup>	18/04/2023	5.8 Derivation of Various times and Response Specification (Terms such as Delay Time, Rise Time, Settling Time, Over shoot, peak over shoot, Harmonics, Steady state error.).
	20/04/2023	<b>UNIT -VI</b> <b>Frequency characteristics of control system.</b> 6.1 Concept of Frequency Response Analysis and its necessary in control system.
	21/04/2023	6.2. Relationship between Time Response and Frequency Response.
11th	25/04/2023	<b>Internal -I</b>
	27/04/2023	6.3 Various Method frequencies Response Analysis. 6.4 Stability through pole and zero diagram.

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	28/04/2023	6.5 Polar plot and various steps of polar plot to determine for stability.
11 <sup>th</sup>	29/04/2023	6.6 Bode plot and various steps to determine for stability.
	29/04/2023	6.7 Stability in frequency domain analysis ,Determination of G.C.F, P.C.F, G.M and P.M using Bode plot.
12 <sup>th</sup>	02/05/2023	6.8 Nyquist Plot.
	04/05/2023	Nyquist Stability Criteria
	04/05/2023	6.9 Stability Concept and Root Locus Method.
	06/05/2023	Root Locus problems
	06/05/2023	6.10. Routh Array Criteria determination stability of control system.
13 <sup>th</sup>	09/05/2023	6.11. Sample Problems determination stability of the system using various frequencies Method. <b>Chapter 5,6 Revision,Previous years questions discussion.</b>
	11/05/2023	<b>UNIT –VII</b> <b>Feedback characteristics approach</b> 7.1 Effect of various parameter on an open -Loop and Closed Loop control system.
	12/05/2023	7.2 Basic Modern of Feed - back using properties, derivation and Integral.
	13/05/2023	7.3 Effect of overall gain and Stability.
	13/05/2023	7.4 Concept of Feed forward and cascaded and Ratio types control system only through Block Diagram.
14 <sup>th</sup>	16/05/2023	<b>UNIT –VIII</b> <b>State variable approach.</b> 8.1. Concept state variable Approach
	18/05/2023	8.2 Various state variable
	20/05/2023	8.3 state model
	20/05/2023	8.4 State models for linear continuous time function.
15 <sup>th</sup>	23/05/2023	8.5 Advantage of state variable Analysis. <b>Chapter 7,8 Revision,Previous years questions discussion.</b>
		<b>. OVERALL PREVIOUS YEARS QUESTIONS DISCUSSION</b>

*prafulla kumar pande*

Signature of Faculty

HOD, AE&I

Academic Coordinator

Principal