

**GOVERNMENT POLYTECHNIC KORAPUT
DEPARTMENT OF ELECTRICAL ENGINEERING**

Th3.CONTROL SYSTEM ENGINEERING

Name of the Course: Diploma in Electrical Engineering			
Faculty: S Biehiballi		Semester - 10/3/22 - 10/6/22	
Course code:	Th.3	Semester:	6 th
Total Period:	75 Periods	Examination:	3 Hrs
Theory periods:	4P / Week	Internal Assessment:	20
Tutorial:	1P	End Semester Examination:	80
Maximum marks:	100		

VISION:

To create competent & industry ready Electrical Diploma Engineers with professional and social values to meet future challenges.

MISSION:

- To prepare diploma holders through "qualitative competency based education system" to compete with national requirement along with core values.
- To produce dynamic Electrical Engineers to serve the society and industry
- To develop leadership qualities, communication skills, critical thinking and attitude for lifelong learning.

PROGRAM EDUCATIONAL OBJECTIVES:

PEO1	Apply technical knowledge and skills learned in the field of Electrical Engineering to excel in Professional and/or higher education.
PEO2	To provide students an excellent academic environment and make them aware the needs of Society and Industry to become a successful Professional/Entrepreneur.
PEO3	To engage in lifelong learning, career enhancement to adopt emerging technologies

COURSE OUTCOMES:

CO1	Understand fundamentals of control system, effect of feedback and mathematical modeling
CO2	Explain block diagram algebra and signal flow graph.
CO3	Analyze time response and frequency response of a system.
CO4	Determine stability of a system using root locus technique and Nyquist stability criteria

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TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topics	Periods
1.	Fundamental of control system	04
2.	Mathematical model of a system	04
3.	Control system components	04
4.	Block diagram algebra & signal flow graphs	08
5.	Time response analysis	10
6.	Analysis of stability by root locus technique	10
7.	Frequency response of system	10
8.	Nyquist plot	10
Total		60

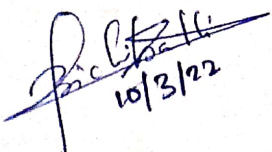
LESSON PLAN

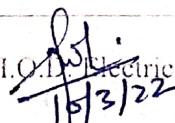
Week	Day	Theory topic
1 st	1 st	Fundamental of control system: Classification of Control system
	2 nd	Open loop system & Closed loop system and its comparison
	3 rd	Effects of Feed back
	4 th	Standard test Signals(Step, Ramp, Parabolic, Impulse Functions) Servomechanism
	5 th	Tutorial
2 nd	1 st	Mathematical model of a system: Transfer Function & Impulse response,
	2 nd	Properties, Advantages & Disadvantages of Transfer Function
	3 rd	Poles & Zeroes of transfer Function
	4 th	Simple problems of transfer function of network. Mathematical modeling of Electrical Systems(R, L, C, Analogous systems)
	5 th	Tutorial
3 rd	1 st	Control system components: Components of Control System Tachometer, DC,
	2 nd	Gyroscope, Synchros
	3 rd	servomotors
	4 th	Ac Servomotors
	5 th	Tutorial
4 th	1 st	Block diagram algebra & signal flow graphs: Definition: Basic Elements of Block Diagram, Procedure for of Reduction of Block
	2 nd	Canonical Form of Closed loop Systems
	3 rd	Rules for Block diagram reduction
	4 th	Simple Problem for equivalent transfer function
	5 th	Tutorial
5 th	1 st	Basic Definition in Signal Flow Graph & properties
	2 nd	Construction of Signal Flow graph from Block diagram
	3 rd	Mason's Gain formula
	4 th	Simple problems in Signal flow graph for network
	5 th	Tutorial
6 th	1 st	Time response analysis: Time response of control .

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	2 nd	Standard Test signal.
	3 rd	Ramp Signal
	4 th	Step signal
	5 th	Tutorial
7 th	1 st	Parabolic Signal
	2 nd	Impulse Signal
	3 rd	Time Response of first order system with:
	4 th	Unit impulse response
	5 th	Tutorial
8 th	1 st	Time response of second order system to the unit step input.
	2 nd	Derivation of expression for rise time.
	3 rd	Steady state error and error constants
	4 th	Types of control system. [Steady state errors in Type-0, Type-1, Type-2 system]
	5 th	Tutorial
9 th	1 st	Effect of adding poles and zero to transfer function
	2 nd	Time response specification
	3 rd	Response with P, PI, PD and PID controller
	4 th	peak time, peak overshoot, settling time and steady state error.
	5 th	Tutorial
10 th	1 st	Problem solving
	2 nd	Problem solving
	3 rd	Problem solving
	4 th	Analysis of stability by root locus technique: Root locus concept.
	5 th	Tutorial
11 th	1 st	Construction of root loci.
	2 nd	Rules for construction of the root locus
	3 rd	Effect of adding poles and zeros to G(s) and H(s).
	4 th	Problem solving
	5 th	Tutorial
12 th	1 st	Frequency response analysis: Correlation between time response
	2 nd	frequency response
	3 rd	Polar plots
	4 th	Bode plots
	5 th	Tutorial
13 th	1 st	Computation of Gain margin and phase margin
	2 nd	Log magnitude versus phase plot
	3 rd	Closed loop frequency response
	4 th	Problem solving
	5 th	Tutorial
14 th	1 st	Nyquist plot: Principle of argument.
	2 nd	Nyquist stability criterion
	3 rd	Nyquist stability criterion applied to inverse polar plot
	4 th	Effect of addition of poles and zeros to G(S) H(S) on the shape of Nyquist plot
	5 th	Tutorial
15 th	1 st	Assessment of relative stability.
	2 nd	Constant M and N circle
	3 rd	Nicholas chart.
	4 th	Previous year question discussion
	5 th	Tutorial

Signature of faculty concerned


10/3/22

H.O.D. Electrical

10/3/22

