UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING, ROURKELA

LESSON PLAN

SESSION: 2023-2024

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT CODE: TH.2
NAME OF THE SUBJECT: CONTROL SYSTEMS & COMPONENT
BRANCH: ELECTRONICS & TELECOMMUNICATION
SEMESTER: 6TH
NUMBER OF CLASSES ALLOTED PER WEEK : 4
TOTAL PERIODS ALLOTED TO THE SUBJECT ACCORDING TO SCTEVT: 60
NAME OF THE FACULTY: KAMALA KANTA NATH

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SUBJECT CODE:	**TH.2**
NAME OF THE SUBJECT :	**CONTROL SYSTEMS & COMPONENT**
BRANCH:	**ELECTRONICS & TELECOMMUNICATION ENGG.**
SEMESTER:	**DIPLOMA 4TH SEM**
PERIODS PER WEEK:	**4 (16/01/2024 to 26/04/2024)**

Week/Date	Lecture	Topic to be covered
1st week	1st	UNIT-1:Fundamental of Control System Introduction of control system and Classification of Control system
	2nd	Open loop system & Closed loop system and its comparison. Effects of Feed back
	3rd	Standard test Signals(Step, Ramp, Parabolic, Impulse Functions)
	4th	Servomechanism
2nd week	1st	Regulators (Regulating systems)
	2nd	UNIT-2: Transfer Functions Transfer Function of a system & Impulse response,
	3rd	Properties, Advantages& Disadvantages of Transfer Function
	4th	Derivation of open loop transfer function and close loop transfer function
3rd week	1st	Poles & Zeroes of transfer Function, Representation of poles & Zero on the s-plane
	2nd	Simple problems of transfer function of network
	3rd	UNIT-3 Control system Components & mathematical modelling of physical System Components of Control System
	4th	Potentiometer, Synchros
4th week	1st	Diode modulator & demodulator
	2nd	Dc motors speed control by Armature control and Field control method
	3rd	AC Servomotors control operation
	4th	Modelling of Electrical Systems, R, L, C, Analogous systems

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5th week	1st	Examples on modelling of Mechanical system to Electrical circuit
	2nd	UNIT-4 Block Diagram & Signal Flow Graphs(SFG) Definition of Basic Elements of a Block Diagram, Canonical Form of Closed loop Systems
	3rd	Rules for Block diagram Reduction
	4th	Procedure for of Reduction of Block Diagram, Simple Problem for equivalent transfer function
	5th	Examples of Block Diagram Reduction
6th week	1st	Examples of Block Diagram Reduction
	2nd	Basic Definition in SFG & properties
	3rd	Mason's Gain formula, Steps for solving Signal flow Graph
	4th	Simple problems in Signal flow graph for network
	5th	Examples of SFG
7th week	1st	Examples of SFG
	2nd	UNIT-5 Time Domain Analysis of Control Systems Definition of Time, Stability, steady-state response, accuracy, transient accuracy, In-sensitivity and robustness.
	3rd	System Time Response
	4th	Analysis of Steady State Error
8th week	1st	Steady state Error Step signal
	2nd	Steady state Error Ramp signal
	3rd	Steady state Error Parabolic signal
	4th	Parameters of first order system & second-order systems

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Week/Date	Lecture	Topic to be covered
9th week	1st	Parameters of second-order systems
	2nd	Derivation of time response Specification (Delay time, Rise time)
	3rd	Derivation of time response Specification (Peak time, Setting time, Peak over shoot)
	4th	UNIT-6 Feedback Characteristics of Control Systems Effect of parameter variation in Open loop System & Closed loop Systems
10th week	1st	Introduction to Basic control Action& Basic modes of feedback control: proportional, integral and derivative
	2nd	Effect of feedback on overall gain, Stability
	3rd	Realisation of Controllers(P, PI) with OPAMP
	4th	Realisation of Controllers(PD,PID) with OPAMP
	5th	UNIT-7 Stability concept& Root locus Method Effect of location of poles on stability
11th week	1st	Routh Hurwitz stability criterion.
	2nd	Examples on Routh Hurwitz stability criterion.
	3rd	Steps for Root locus method
	4th	Examples on Root locus method
	5th	Examples on Root locus method
12th week	1st	UNIT-8 Frequency-response analysis&Bode Plot Frequencyresponse,Relationship between time & frequency response, Methods of Frequency response
	2nd	Polar plots & steps for polar plot
	3rd	Examples on polar plot
	4th	Examples on polar plot

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13th week	1st	Bodes plot & steps for Bode plots
	2nd	Examples on Bode plot
	3rd	Examples on Bode plot
	4th	Stability in frequency domain, Gain Margin& Phase margin
	5th	Nyquist plots. Nyquist stability criterion
14th week	1st	Examples on Nyquist plots
	2nd	
	3rd	UNIT-9 State variable Analysis Concepts of state, state variable, state model
	4th	state models for linear continuous time functions
15th Week	1st	Examples on state models
	2nd	VST