

CONTROL SYSTEM ENGINEERING (Th. 03)

Date of Commencement of classes: 02.01.2024

Date of Closing of classes: 23.04.2024

CHAPTER-WISE DISTRIBUTION OF PERIODS

Sl. No.	Name of the Chapter	Periods as per Syllabus	Required period	Expected Marks
01	Fundamental of control system	04	05	05
02	Mathematical model of a system	04	05	10
03	Control system components	04	04	05
04	Block diagram algebra & Signal flow graph	08	10	15
05	Time response Analysis	10	12	15
06	Analysis of stability By Root Locus Technique	10	06	20
07	Frequency response Analysis	10	08	15
08	Nyquist Plot	10	10	15
	TOTAL	60	60	100

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LESSON PLAN

Class day	Art. No.	NAME OF THE FACULTY –SUBRAT KUMAR KABI
		Theory Topics
1 st	1.1	Chapter No.- 01(fundamental of control system) Classification of control system
2 nd	1.2	Open loop system and closed loop system and its comparison.
	1.3	Effects of feedback.
3 rd	1.4	Standard test signal (step, ramp, parabolic, impulse function)
4 th	1.5	Servomechanism.
5 th	2.1	Chapter no.-02(mathematical model of a system) Transfer function and impulse response
1 st	2.2	Properties, advantages, & Disadvantages of transfer function
2 nd	2.3	Poles and zeroes of transfer function
3 rd	2.4	Simple problems of transfer function of network
4 th	2.5	Mathematical modelling of Electrical Systems (R, L, C Analogous system)
5 th	3.1	Chapter no.-03(control system components) Component of control system
6 th	3.2	Gyroscope, Synchro's
7 th		Tachometer, DC servomotor
1 st		AC Servomotor
2 nd	4.1	Chapter no.-04(block diagram algebra and signal flow graph) Definition: Basic Elements of Block Diagram
3 rd	4.2	Canonical Form of Closed Loop Systems
1 st	4.3	Rules for Block Diagram Reduction
2 nd	4.4	Procedure for reduction of Block Diagram
1 st	4.5	Simple Problem for equivalent transfer function
2 nd	4.6	Basic Definition in signal Flow Graph and properties.
3 rd	4.7	Construction of Signal flow graph from Block Diagram
4 th		Cont.

5 th	4.8	Mason's Gain Formula
6 th	4.9	Simple problems in signal flow graph for network
1 st	5.1	Chapter no.-05(time response analysis) time response of control system.
2 nd	5.2	Standard test signal.
	5.2.1	Step signal.
	5.2.2	Ramp signal.
3 rd	5.2.3	Parabolic signal
	5.2.4	Impulse signal
4 th	5.3	Time response of first order system with;
	5.3.1	Unit step response.
5 th	5.3.2	Unit impulse response.
1 st	5.4	Time response of second order system to the unit step input.
	5.4.1	Time response specification.
2 nd	5.4.2	Derivation of expression for rise time, peak time, peak overshoot.
3 rd		Derivation of expression for settling time and -steady state error
4 th	5.4.3	Steady state error and error constants
5 th	5.5	Types of control system (steady state errors in type-0, type-1, type-2 system)
1 st	5.6	Effect of adding poles and zero to transfer function.
2 nd	5.7	Response with P, PI, PD, PID controller.
3 rd	6.1	Chapter no-6(Analysis of stability by root locus technique) Root locus concept.
4 th	6.2	Construction of root loci.
5 th	6.3	Rules for construction of the root locus.
6 th		Cont.
7 th	6.4	Effect of adding poles to $G(s)$ and $H(s)$.
1 st		Effect of adding zeros to $G(s)$ and $H(s)$.

2 nd	7.1	Chapter no-7(Frequency Response Analysis) Correlation between time response and frequency response.
3 rd	7.2	Polar plots.
4 th	7.3	Bode plots
5 th	7.4	All pass and minimum phase system.
6 th	7.5	Computation of Gain margin.
1 st		Computation of phase margin.
2 nd	7.6	Log magnitude versus phase plot.
3 rd	7.7	Closed loop frequency response.
4 th	8.1	Chapter no-08 (Nyquist plot) Principle of argument.
5 th	8.2	Nyquist stability criterion.
1 st	8.3	Nyquist stability criterion applied to inverse polar plot.
2 nd		Cont.
3 rd	8.4	. Effect of addition of poles to $G(S)$ $H(S)$ on the shape of Nyquist plot
4 th		Effect of addition of zeros to $G(S)$ $H(S)$ on the shape of Nyquist plot
5 th		Effect of addition of Poles & zeros to $G(S)$ $H(S)$ on the shape of Nyquist plot
1 st	8.5	Assessment of relative stability.
2 nd	8.6	Constant M & N Circle
3 rd	8.7	Nicholas chart.
4 th		Chapter-1 revision
5 th		Chapter-2 revision
6 th		Chapter-3 revision
1 st		Chapter-4 revision
2 nd		Chapter-5 revision
1 st		Chapter-6 revision
2 nd		Chapter-7 revision
3 rd		Chapter-8 revision
1 st		Previous year question answer discussion
2 nd		Previous year question answer discussion
3 rd		Previous year question answer discussion
4 th		Practice on above
5 th		Previous year question with answer discussion
6 th		Previous year question with answer discussion
7 th		Problem solving

Learning Resources:

Sl. No.	Name of the Book	Author Name	Publisher
01	Text Book of control system	A. Ananda Kumar	PHI
02	Text Book of control system	k. Padmanavan	IK
03	Text Book of control system engineering	I.J. Nagarath, M.Gopal	WEN
04	Text book of control system engineering	ANatrajan ,Ramesh Babu	SCIENTIFIC

