CONTROL SYSTEM ENGINEERING (Th. 03)

Date of Commencement of classes: 14.02.2023 **Date of Closing of classes: 23.05.2023**

LIST OF WEEK/ MONTH WISE AVAILABLE DAYS/ PERIODS

Sl. No.	Month	Week-wise no. of academic days available					Total no. of academic days
		Week- 1	Week- 2	Week- 3	Week- 4	Week- 5	
1	February	--	--	4	6	3	13
2	March	2	5	4	4	6	21
3	April	5	4	4	5	2	20
4	May	3	6	5	--	--	14
Total		**10**	**15**	**12**	**15**	**11**	**68**

NO. OF AVAILABLE CLASSES PER WEEK/ MONTH

Sl. No.	Month	Week-wise no. of academic periods available					Total no. of academic periods
		Week- 1	Week- 2	Week- 3	Week- 4	Week- 5	
1	February	--	--	5	7	3	15
2	March	2	6	5	5	7	25
3	May	6	5	5	6	2	24
4	June	3	7	6	--	--	16
Total		**11**	**18**	**15**	**18**	**12**	**80**

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**

Sign of Lect. **Sign of HOD.** **Sign of AIC** **Sign of Principal**

LESSON PLAN

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

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

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

Coverage of Chapters up to the internal assessment (2nd week of May 2023)**: 1, 2, 3,4,5,6 &7**

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