Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 7010

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – MAY / JUNE 2024

Fifth Semester

Electronics and Communication Engineering

UI9EC518 – CONTROL SYSTEMS

(Regulation 2019)

Time : Three Hours | Maximum : 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

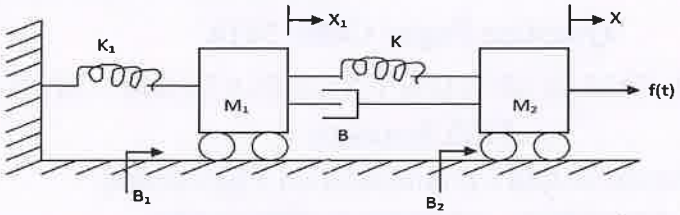
(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What is feed back? What type of feed back is preferred for control system?	2	K1	CO1
2.	Write short notes on the state space representation of continuous time systems.	2	K1	CO1
3.	How did the type number of a system is identified? Mention its significance.	2	K1	CO2
4.	Highlight the significance of test signals.	2	K2	CO2
5.	Mention the correlation between time and frequency response.	2	K3	CO3
6.	Write the expression for resonant peak, resonant frequency, Gain margin and Phase margin.	2	K1	CO3
7.	Write the necessary and sufficient condition for stability.	2	K2	CO4
8.	Give any two limitations of Routh stability criterion.	2	K1	CO4
9.	State the duality between controllability and observability.	2	K2	CO5
10.	What is sample and hold circuit?	2	K1	CO5

PART – B

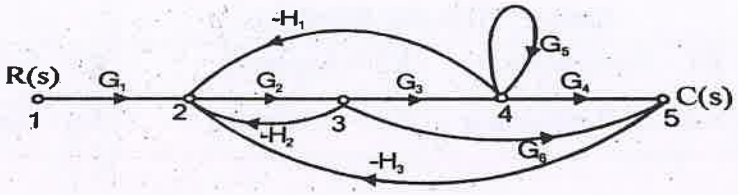
(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Write the differential equations governing the mechanical system. Also determine the transfer function.	13	K3	CO1



(OR)

	b)	Find the overall gain C(s)/R(s) for the signal flow graph shown below.	13	K3	CO1



12.	a)	Derive the expression for unit step response of under damped and critically damped second order system.	13	K1	CO2

(OR)

	b)	A unity feedback control system has a loop transfer function G(s) =10/s(s+2). Find the rise time, percentage overshoot, peak time and settling time for a step input of 12 units.	13	K3	CO2
13.	a)	Enumerate the procedure for obtaining the magnitude response and phase response from a bode plot.	13	K1	CO3

(OR)

	b)	The open loop transfer function of a unity feedback system is given by $G(s) = (1=0.2s)(1=0.025s)/s^3(1+0.005s)(1+0.001s)$. Sketch the polar plot and determine the phase margin.	13	K3	CO3
14.	a)	Construct Routh array and determine the stability of the system represented by the characteristic equation $s^5+s^4+2s^3+2s^2+3s+5=0$. Comment on the location of the roots of characteristic equation.	13	K3	CO4

(OR)

	b)	Discuss briefly about the steps to be followed to construct a root locus plot of a given transfer function.	13	K1	CO4
15.	a)	Construct a state model for the system characterized by the differential equation $(d^3y/dt^3) + 6 (d^2y/dt^2) +11(dy/dt) + 6y + u = 0$. Give the block diagram representation of the derived state space model.	13	K1	CO5

(OR)

b)	The state model of a discrete time system is given by X(k+1) =AX(k) +BU(k) Y(k)=C X(k)+D U(k) Determine its transfer function.	13	K3	CO5

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Sketch the Nyquist plot for a system with the open loop transfer function G(s)H(s)=K(1+0.5s)(1=s)/(1+10s)(s-1). Determine the range of values of K for which the system is stable.	15	K3	CO5
		(OR)			
	b)	Convert the block diagram to signal flow graph and determine the transfer function using Mason's gain formula.	15	K3	CO2