U.S.N.										

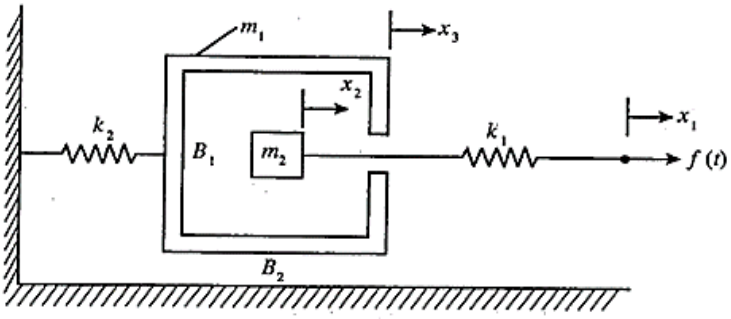
B.M.S. College of Engineering, Bengaluru-560019

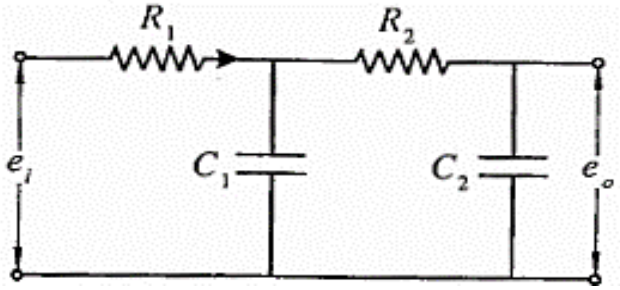
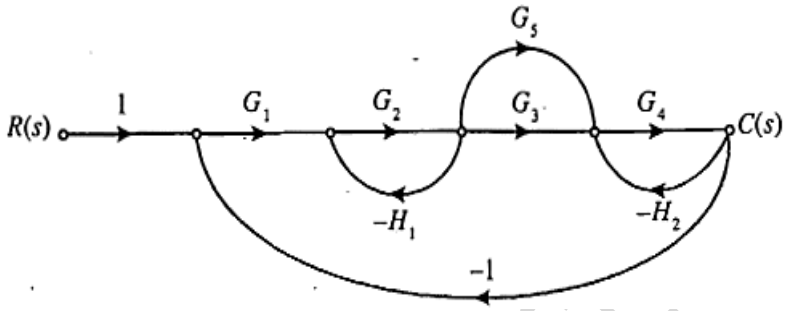
Autonomous Institute Affiliated to VTU

July 2023 Semester End Main Examinations

Programme: B.E. **Semester: VI**
Branch: Aerospace Engineering **Duration: 3 hrs.**
Course Code: 20AE6DCICT **Max Marks: 100**
Course: Introduction to Control Theory **Date: 10.07.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			CO	PO	Marks
		UNIT - I			
1	a)	Describe the working principle of missile launcher and guidance system with suitable sketches	CO1	PO1	**10**
	b)	Explain the functioning of an open loop control system by giving two examples along with suitable figures and also write down the advantages and disadvantages for the same.	CO1	PO1	**10**
		OR			
2	a)	Mention different types of controllers. Explain any two of them in detail	CO 2	PO 1	**10**
	b)	Explain the functions that automatic control systems provide for flight control	CO1	PO 1	**10**
		UNIT - II			
3	a)	For the mechanical system shown in the figure 3(a) (i) Draw the equivalent mechanical network (ii) Obtain the differential equation of equilibrium (iii) Draw the analogous electrical network based on F-V analogy  Fig : 3(a)	CO1	PO1	**12**
	b)	Explain the model of a hydraulic system with the help of its basic elements and relevant sketches	CO1	PO1	**08**
		OR			

	4	a)	Obtain the transfer function $\frac{E_o(s)}{E_i(s)}$ of the electrical circuit shown in figure 4(a)  Fig : 4(a)	*CO1*	*PO1* *PO2*	**08**
		b)	Using signal flow graph and Mason's gain formula, obtain the overall transfer function of the system shown in the figure 4(b)  Fig : 4(b)	*CO 1*	*PO 1* *PO2*	**12**
			UNIT - III			
	5	a)	Derive the steady state error for TYPE-1 and TYPE-2 unity feedback systems by using unit step, unit ramp and unit parabolic signals as input	*CO1*	*PO1* *PO2*	**12**
		b)	Explain the order and type of a control system with the help of a feedback control system	*CO2*	*PO1* *PO2*	**08**
			UNIT - IV			
	6	a)	Give the conditions for stability analysis of a system in the form of a tabular column	*CO1*	*PO1* *PO2*	**08**
		b)	Construct the root locus plots for the forward-path transfer function of a unity-feedback control system is $$G(s) = \frac{K}{s(s+1)(s+2)(s+3)}$$ For what values of K the system becomes unstable	*CO3*	*PO1* *PO2* *PO3*	**12**
			UNIT – V			
	7	a)	Describe the concept of Kalman's test of controllability and observability	*CO 1*	*PO1*	**10**
		b)	Give the state model of linear time invariant system and also give its matrix representation	*CO2*	*PO1*	**10**

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