U.S.N.										

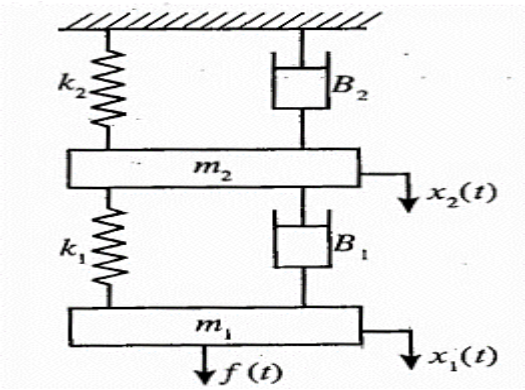
B.M.S. College of Engineering, Bengaluru-560019

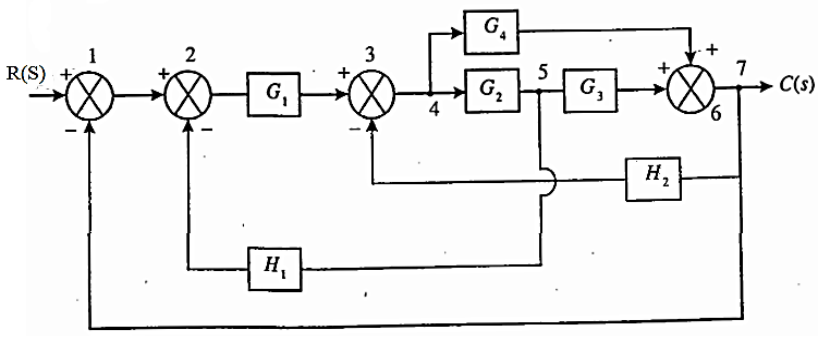
Autonomous Institute Affiliated to VTU

August 2024 Supplementary Examinations

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

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

			UNIT - I	CO	PO	Marks
1	a)		Write short notes on application of controls in aerospace engineering	CO1	PO 1	**10**
	b)		What are the design consideration of a control system? Also write down the requirements of an ideal control system.	CO1	PO1	**10**
			OR			
2	a)		Derive the state model equation in its general form for both time invariant system and time variant system.	CO 2	PO1 PO2	**10**
	b)		Explain the concept of automatic control system by giving two examples along with the neat diagram.	CO1	PO1	**10**
			UNIT - II			
3	a)		For the mechanical system shown in the figure 3(a) Draw the mechanical network Write the differential equation of the system Draw the analogous electrical network based on F-V and F-I analogy  Fig : 3(a)	CO1	PO1	**10**
	b)		What do you mean by mechanical translational system and rotational system? Explain about its basic elements with suitable sketches.	CO1	PO1	**10**

			OR			
	4	a)	Reduce the block diagram shown in the figure 4(a) to its simplest possible form and find its closed loop transfer function  Fig : 4 (a)	*CO1*	*PO1* *PO2*	**12**
		b)	Derive the transfer function of a closed loop system	*CO 1*	*PO1* *PO2*	**08**
			UNIT - III			
	5	a)	What do you mean by steady state error? Derive the expression for error constant and steady state error.	*CO1*	*PO1* *PO2*	**10**
		b)	Explain the order and type of a control system with the help of a feedback control system	*CO2*	*PO1* *PO2*	**08**
			UNIT - IV		*PO1* *PO2*	
	6	a)	What do you mean by stability of the system? Explain its concept by giving suitable example	*CO1*	*PO1*	**08**
		b)	Construct the root locus plots for the forward-path transfer function of a unity-feedback control system is $G(s) = \frac{K}{s(s+2)(s+4)(s+6)}$ For what values of K the system becomes unstable	*CO3*	*PO1* *PO2* *PO3*	**12**
			UNIT - V			
	7	a)	Illustrate the concept of controllability and observability by giving suitable example	*CO 1*	*PO 1*	**10**
		b)	Derive the state-space representation of scalar differential equation systems	*CO2*	*PO1* *PO2*	**10**

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