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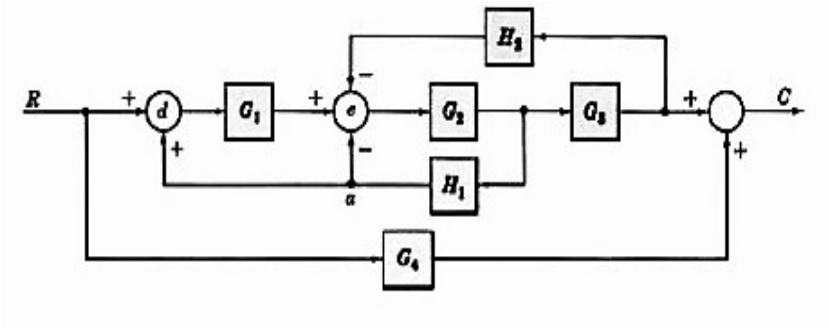
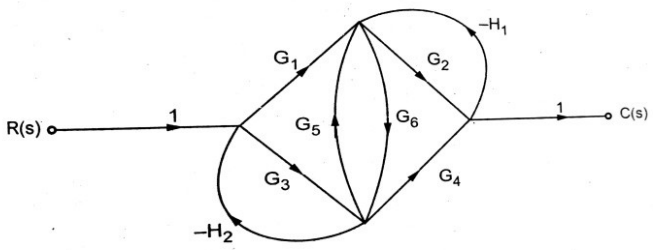
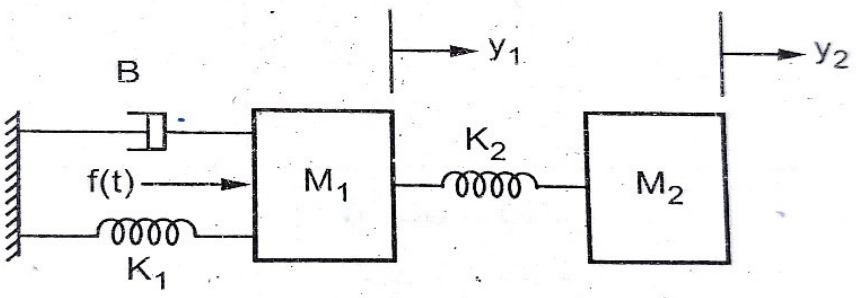
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, March 2018

Program: B.TECH (Mechatronics) **Semester: IV**
Subject (Course): Instrumentation & Control **Max. Marks: 100**
Course Code : GNEG281 **Duration : 3 Hrs.**
No. of page/s: 02

SET-A

	SECTION A		
1.	Elaborate meaning of the term "Backlash" used in instrumentation.	[4]	CO1
2.	For the given block diagram draw signal flow graph & mention total number of loops & non touching loops. 	[4]	CO4
3.	A Platinum resistance thermometer has a resistance of 140.5 & 100 ohms at 100 & 0 °C, respectively. If its resistance becomes 305.3 ohm when it is in contact with a hot gas, determine the temperature of the gas. The temperature coefficient of platinum is 0.0039 /°C	[4]	CO2
4.	For the polynomial given below comment on the stability of system using Routh's Criterion: $s^6+s^5+5s^4+s^3+2s^2-2s-8=0$	[4]	CO5
5.	Derive transfer function of AC Servomotor, specify output and input quantity.	[4]	CO3
	SECTION B		
6.	Considering the response of a second order system to a unit step input, define the following: (a) Delay Time (b) Rise Time (c) Maximum Overshoot (d) Settling Time	[10]	CO5
7.	Classify Errors in measurements & explain them by giving suitable examples.	[10]	CO1
8.	Discuss working principle of any device which is used for measurement of pressure with suitable diagram.	[10]	CO2
9.	For the signal flow graph of figure, determine the transfer function C(s)/R(s) using Mason's Gain Formula.	[10]	CO4

			
	SECTION C		
10	A unity feedback system is characterized by the open-loop transfer function $G(s) = 1/ s(0.5s + 1)(0.2s+1)$ Determine the steady-state errors for unit-step, unit-ramp and unit-acceleration inputs. Also determine the damping ratio and natural frequency of the dominant roots.	[20]	CO5
11	For the mechanical system shown in figure i. Draw the mechanical network. ii. Write all the differential equations. iii. Draw the force-voltage and force current analogous networks.  **OR** The open loop transfer function of a control system is given by G(s) = K/[s (s+2) (s^2+6s+25)] Sketch the complete root locus as K is varied from 0 to infinity.	[20]	CO3 CO5