GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER-IV • EXAMINATION - WINTER 2013

Subject Code: X41102 Date: 05-12-2013

Subject Name: Control Theory

Time: 02.30 pm - 05.00 pm Total Marks: 70

Instructions:

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) Explain the components of Control System with neat sketch
 (b) Discuss classification of control system
 07
 07
 07
- Q.2 (a) What is Transfer System? Explain the procedure for determining the 07 transfer function of a control system
 - **(b)** Derive transfer function of Kirchhoff's voltage and current law.

OR

07

07

- (b) Derive the transfer function of mercury in a simple glass thermometer and draw its electrical analogous circuit.
- Q.3 (a) Explain the effect of feedback on transient response 07
 - (b) Obtain the transfer function of the system shown by block diagram or reduction technique and also using signal flow graph of the following Figure 1.

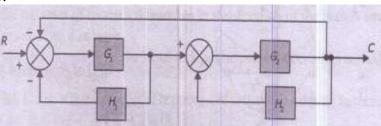


Figure 1 **OR**

- **Q.3** (a) Explain the effect of feedback on Disturbance signal.
 - (b) Find the gain of the control system represented in block diagram form as 07 in figure 2 using Mason's gain formula.

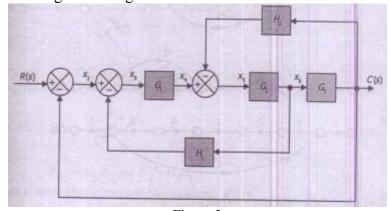


Figure 2

		temperature Θ_0 is given; write transfer function of the system.	
	(b)	Explain linearization of non linear mathematical models.	07
		OR	
Q.4	(a)	Write a transfer function of simple liquid level pressure difference system.	07
Q.4	(b)	Tabulate the analogous quantities of mechanical and electrical systems	07
		using (a) force voltage analogy and (b) force current analogy.	
Q.5	(a)	Explain root locus construction rules.	07
	(b)	Consider the characteristic equation of a system: $s^4+s^3+2s^2+2s+3=0$,	07
		What is the status of the stability of the systems?	
		OR	
Q.5	(a)	A transfer function of a unity feedback system is	07
		G(s) = K/(s(s+5)).	
		Draw the root locus plot and determine the value of K for a damping ratio of 0.707.	
	(b)	Consider the characteristic equation of a system: $S^5+4s^4+8s^3+8s^2+7s+4=0$	07
		Find the status of its stability.	
