

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-V(NEW) EXAMINATION – SUMMER 2022

Subject Code:2151908**Date:07/06/2022****Subject Name:Control Engineering****Time:02:30 PM TO 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.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Comparison between Linear and Non-Linear control system.	03
	(b) Define: (1) Command input (2) System (3) Feedback element (4) Control.	04
	(c) Explain the concept of state, state variables and state model.	07
Q.2	(a) Write properties of transfer function.	03
	(b) Explain mechanics of rotational motion with suitable example.	04
	(c) Determine the transfer function C(s)/R(s) from the block diagram shown in Figure 1.	07
OR		
	(c) Determine the transfer function using signal flow graph for shown in Figure 2.	07
Q.3	(a) Explain steady state errors for Ramp input.	03
	(b) Write need of frequency response analysis.	04
	(c) Explain transient response specification of a second order (1) Delay time (2) Rise time (3) Peak time (4) Maximum overshoot (5) Settling time with the help of neat sketch.	07
OR		
Q.3	(a) Explain steady state errors for parabolic input.	03
	(b) Write limitations of frequency response analysis.	04
	(c) Explain Unit ramp response and Unit impulse response of first order system.	07
Q.4	(a) Define: Bandwidth, Resonant frequency and Cut-off rate for frequency response specification.	03
	(b) Explain Hurwitz stability criterion.	04
	(c) Draw the root locus diagram for system transfer function given by $G(s) H(s) = \frac{K}{s(s+5)(s+10)}$	07
OR		
Q.4	(a) Define: Resonant peak, Cut-off frequency and Gain crossover frequency for frequency response specification.	03
	(b) Explain Routh stability criterion.	04
	(c) Write general rules for drawing root locus with suitable example.	07
Q.5	(a) List various basic elements of hydraulic circuit.	03
	(b) Summarize advantages and disadvantages of hydraulic control system.	04

- (c) Explain hydraulic proportional integral derivative controller with the help of neat sketch. **07**

OR

- Q.5** (a) List various basic elements of pneumatic circuit. **03**
 (b) Summarize advantages and disadvantages of pneumatic control system. **04**
 (c) Explain pneumatic proportional plus derivative controller with the help of neat sketch. **07**

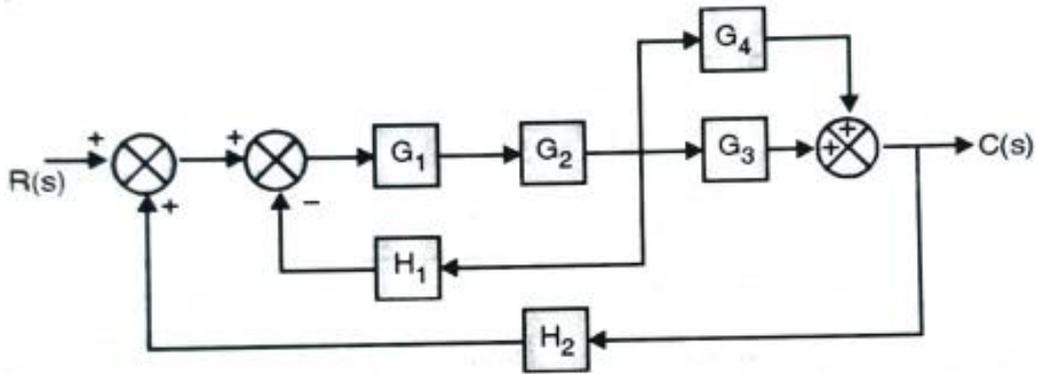


Figure 1 (Q-2(C))

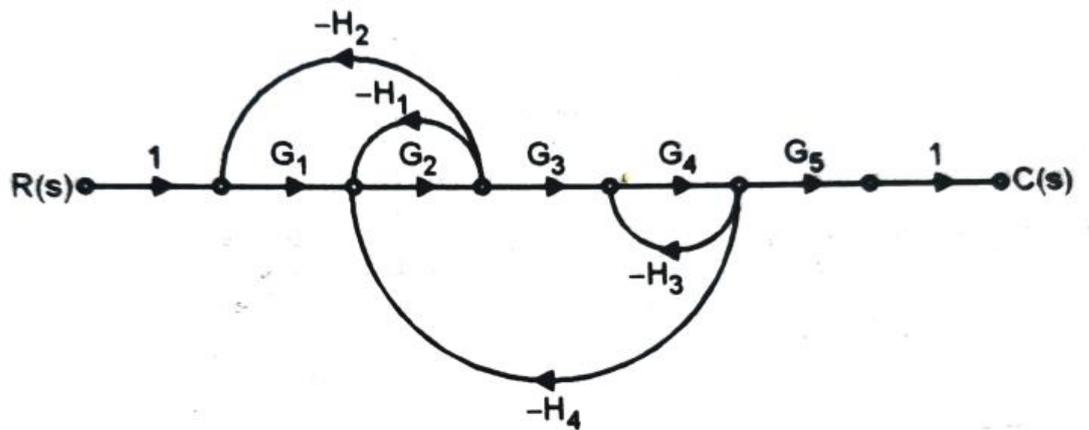


Figure 2 (OR Q-2(C))