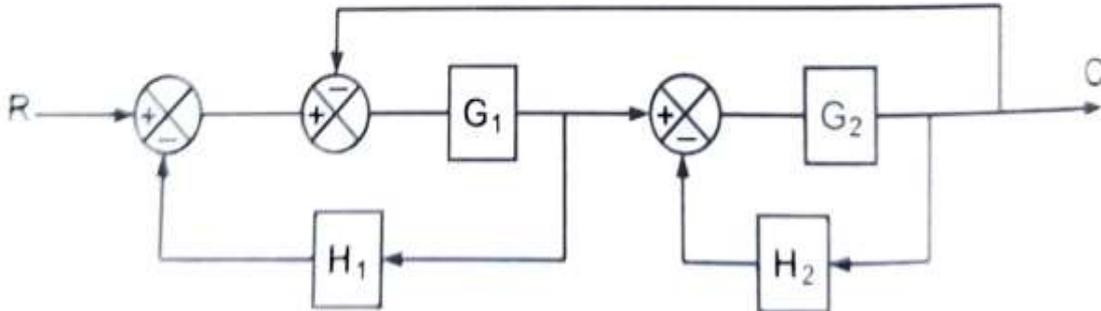


**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2022****Subject Code:2151908****Date:09-01-2023****Subject Name:Control Engineering****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

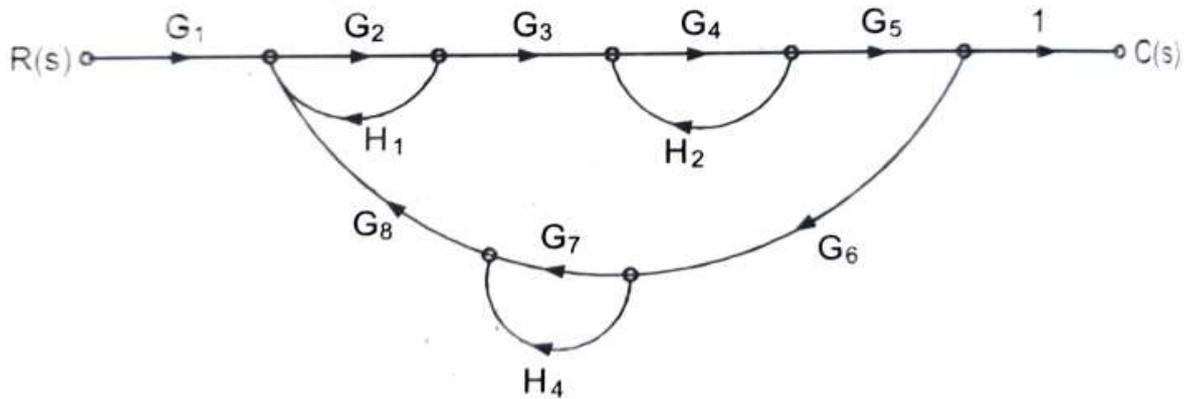
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		<b>MARKS</b>
<b>Q.1</b>	(a) Comparison between Time varying and Time -invariant system.	<b>03</b>
	(b) List the advantages and disadvantages of an open loop control system.	<b>04</b>
	(c) Explain the State space analysis and its advantages.	<b>07</b>
<b>Q.2</b>	(a) Write transfer function.	<b>03</b>
	(b) Explain any one mechanics of translational motion with suitable example.	<b>04</b>
	(c) Determine the transfer function $C(s)/R(s)$ from the block diagram shown in Figure 1.	<b>07</b>
<b>OR</b>		
	(c) Determine the transfer function using signal flow graph for shown in Figure 2.	<b>07</b>
<b>Q.3</b>	(a) Explain steady state errors for Step input.	<b>03</b>
	(b) Write need of frequency response analysis.	<b>04</b>
	(c) Explain transient response specification of a second order system.	<b>07</b>
<b>OR</b>		
<b>Q.3</b>	(a) Explain steady state errors for Ramp input.	<b>03</b>
	(b) Write methods used for frequency response analysis.	<b>04</b>
	(c) Explain time response of first order system.	<b>07</b>
<b>Q.4</b>	(a) Define: Resonant peak, Resonant frequency and Cut-off rate for frequency response specification.	<b>03</b>
	(b) Explain disadvantages of Hurwitz stability criterion.	<b>04</b>
	(c) Write general method steps for drawing root locus with suitable example.	<b>07</b>
<b>OR</b>		
<b>Q.4</b>	(a) Define: Bandwidth, Cut-off frequency and Gain crossover frequency for frequency response specification.	<b>03</b>
	(b) Explain advantages of Routh stability criterion.	<b>04</b>
	(c) Write the following terms with respect to root locus. (1) Centroid (2) asymptotes (3) breakaway points (4) angle of arrival and angle of departure.	<b>07</b>
<b>Q.5</b>	(a) List out various basic elements of hydraulic system.	<b>03</b>
	(b) Comparison between hydraulic control system and pneumatic control system.	<b>04</b>
	(c) Explain hydraulic proportional controller with the help of neat sketch.	<b>07</b>
<b>OR</b>		

- Q.5** (a) List out various basic elements of pneumatic system. **03**  
 (b) Comparison between hydraulic control system and electric control system. **04**  
 (c) Explain pneumatic proportional plus integral controller with the help of neat sketch. **07**



**Figure 1 (Q-2(C))**



**Figure 2 (OR Q-2(C))**