

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V EXAMINATION – SUMMER 2025

Subject Code:2151908

Date:28-05-2025

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) Define:(1)Plant(2)System (3)Disturbances	03
(b) Compare the open and closed loop systems giving examples.	04
(c) Explain the State space analysis and its advantages.	07
Q.2 (a) Define the resistance and capacitance of the liquid level systems.	03
(b) Explain mechanics of translation motion with suitable example.	04
(c) What is Block Diagram? Explain Block diagram reduction rules briefly.	07
OR	
(c) Obtain the transfer function for the signal flow network shown in Fig. I using Mason's Gain formula.	07
Q.3 (a) Define State space, state variables and state vectors.	03
(b) Advantage and Disadvantages of state space analysis technique.	04
(c) Explain Force-Voltage and Force-Current analogy for Mechanical systems.	07
OR	
Q.3 (a) Explain two position controllers.	03
(b) Differentiate the pneumatic systems and Hydraulic systems.	04
(c) Obtain the transfer function for pneumatic PI controller with neat sketch.	07
Q.4 (a) Define: (1) rise time (2) settling time (3) steady state error	03
(b) Plot the system response of the first order unity feedback system for unit impulse input.	04
(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.	07
OR	
Q.4 (a) Explain absolute stability and relative stability	03
(b) Comparison between hydraulic control system and pneumatic control system.	04
(c) Write general method steps for drawing root locus with suitable example.	07
Q.5 (a) Difference between transient and frequency response analysis	03
(b) State the advantages of frequency response analysis	04
(c) Explain working of Proportional-Derivative (PD) hydraulic controller with a neat diagram.	07
OR	
Q.5 (a) Enlist the sources of hydraulic power.	03
(b) Explain the hydraulic control circuit with basic elements and neat sketch.	04
(c) Discuss the hydraulic PI controller with neat sketch and necessary transfer function.	07

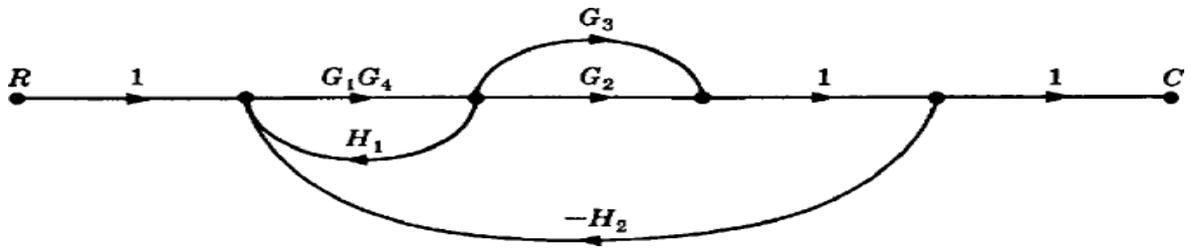


Figure I Signal Flow Graph
