

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2021****Subject Code:3151908****Date:07/09/2021****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.

		MARKS
Q.1	(a) Define transfer function. List important characteristics of transfer function.	03
	(b) Explain closed loop control system by giving any two examples.	04
	(c) Find out transfer function of given block diagram as in fig.1 using block diagram reduction technique.	07
Q.2	(a) Explain standard test signals used in control engineering	03
	(b) Derive unit step response of first order system with usual notations.	04
	(c) Find out transfer function $I_2(s) / V(s)$ for given network as shown in fig.2	07
OR		
	(c) Explain Force-Voltage and Force-Current analogy.	07
Q.3	(a) What is a signal flow graph? State properties of signal flow graph.	03
	(b) Compare block diagram representation versus Signal flow graph representation.	04
	(c) Find out transfer function of given signal flow graph using mason's gain formula as shown in fig.3.	07
OR		
Q.3	(a) List its salient characteristics of Block Diagram. Explain the following: Summing point, takeoff point.	03
	(b) What are poles, zeros & order of transfer function?	04
	(c) Find out transfer function of given signal flow graph using mason's gain formula as shown in fig.4.	07
Q.4	(a) Explain the method of finding angle of departure from the complex pole in root locus method.	03
	(b) What's frequency response analysis? List out advantages of it.	04
	(c) A feedback control system has an open loop transfer function $G(s) = \frac{K}{s(s+3)(s^2+2s+2)}$, Draw the root locus as K varies from 0 to ∞ .	07
OR		
Q.4	(a) Enlist limitations of Routh's stability criterion.	03
	(b) Explain in brief the following frequency response specifications: 1) Resonant peak 2) Resonant frequency 3) Bandwidth.	04
	(c) Define root locus for a given transfer function $G(s) = \frac{K}{s(s+1)(s+4)}$ find the value of gain K at $S = 1 \pm j$	07
Q.5	(a) What do you mean by Controllers? List the basic types of control action.	03

(b) With the help of necessary diagram, explain Pneumatic nozzle flapper amplifier. **04**

(c) Explain pneumatic proportional plus integral control action and obtain its transfer function. **07**

OR

Q.5 (a) Explain basic hydraulic system component and draw any circuit showing at least six components **03**

(b) Write the comparison between a Pneumatic system and Hydraulic system. **04**

(c) Obtain the transfer function for hydraulic system with proportional plus integral derivative control action. **07**

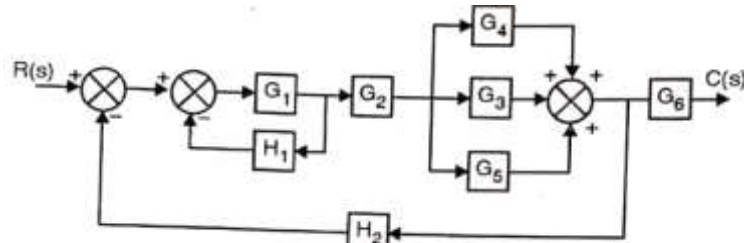


Fig.1

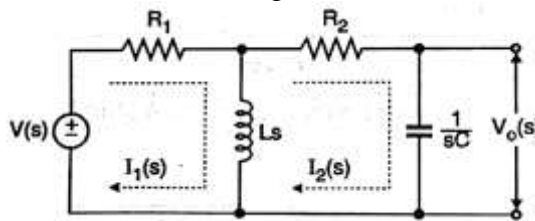


Fig.2

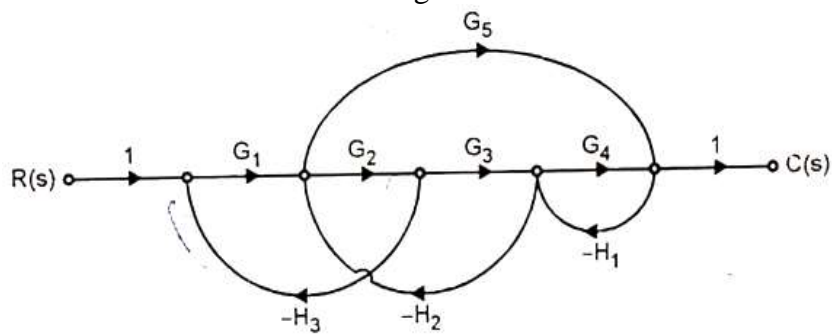


Fig.3

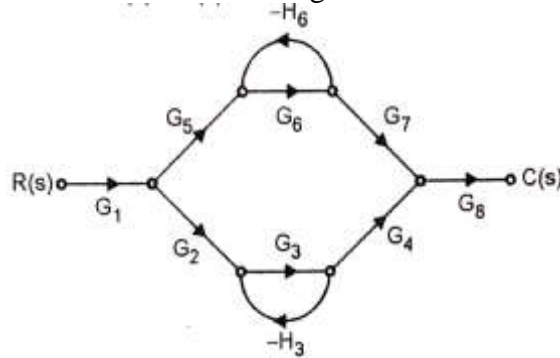


Fig.4