Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V (NEW) EXAMINATION – WINTER 2020

Subject Code:2151908 **Date:29/01/2021**

Subject Name:Control Engineering

Time:10:30 AM TO 12:30 PM **Total Marks: 56**

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Comparison between open and closed loop control system.	**03**
	(b)	Define:(1)Plant(2)System (3)Controller(4)Disturbances	**04**
	(c)	Explain the following terms: (1) State (2) State space (3) State variable (4) State vector. Also Explain advantages of state variable method.	**07**
Q.2	**(a)**	Write advantage and disadvantages of transfer function	**03**
	(b)	Explain mechanics of translation motion with suitable example.	**04**
	(c)	Determine the transfer function C(s)/R(s) from the block diagram shown in Figure 1.	**07**
Q.3	**(a)**	Explain steady state errors for step input.	**03**
	(b)	Write advantages of frequency response analysis.	**04**
	(c)	Explain transient response specification of second order control system with neat sketch.	**07**
Q.4	**(a)**	Explain steady state errors for parabolic input.	**03**
	(b)	Write limitations of frequency response analysis.	**04**
	(c)	Explain analysis of first order system and unit step response of first order system.	**07**
Q.5	**(a)**	Define: Bandwidth, Cut-off frequency and Cut-off rate for frequency response specification.	**03**
	(b)	Explain Routh's stability criterion.	**04**
	(c)	The open loop transfer function of a system is G(s) H(s) = $\frac{k}{s(s+2+2j)(s+2-2j)}$ Solve the complete root locus and comment on the stability of the closed loop system.	**07**
Q.6	**(a)**	Define:Resonant peak, Resonant frequency and Gain crossover frequency for frequency response specification.	**03**
	(b)	Determine the stability of system to $s^6+2s^5+8s^4+12s^3+20s^2+16s+16$ using Routh's criterion.	**04**
	(c)	Write general method for drawing root locus with suitable example.	**07**
Q.7	**(a)**	List various components used in hydraulic control system.	**03**
	(b)	Comparison between hydraulic and pneumatic control system.	**04**

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

Q.8	**(a)**	List various components used in pneumatic control system.	**03**
	(b)	Comparison between hydraulic and electric control system.	**04**
	(c)	Explain hydraulic proportional derivative controller with the help of neat sketch.	**07**

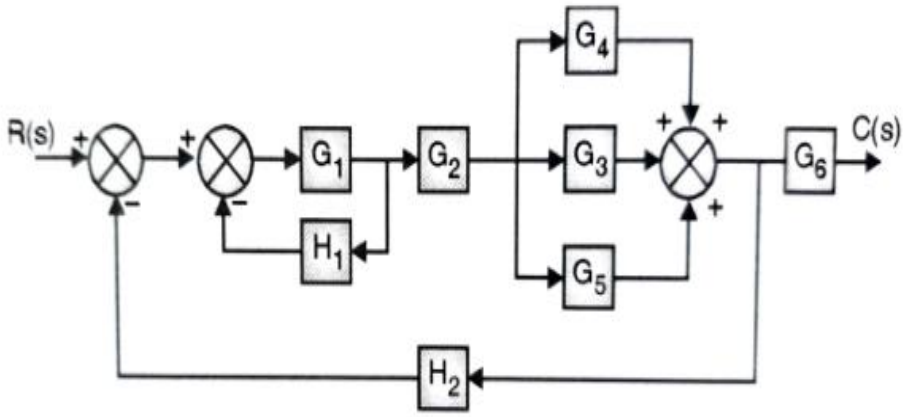

Figure 1