Reg. No.:

Name :

VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test – I – January 2023

Programme	: B.Tech (ECE)	Semester	: Winter 2022-23
Course	: Control Systems	Code	: BECE3021.
Faculty	: Prof. Ralph Samuel Thangaraj Dr. Ashis Tripathy Dr. Mangal Das Dr. Sunil Kumar Pradhan Dr. Vipul Dixit	Slot	: C1+TC1
		Class Nbr(s)	: CH2022235000487 CH2022235000489 CH2022235000492 CH2022235000494 CH2022235000496
Time	: 90 Minutes	Max. Marks	: 50

Answer ALL the questions

Q.No.	Sub. Sec.	Question Description	Marks
1	(a)	Open loop systems are considered inherently stable according to classical control theory. Adding feedback converts such system in to close loop system which is prone to instability. Still, it is widely accepted design practice to convert open loop system to close loop system by adding feedback. Please explain the reason for such design practice.	[5]
	(b)	Sensitivity of the system is defined as: $$S_G^M = \frac{\partial M/M}{\partial G/G} = \frac{Percentage\ change\ in\ M}{Percentage\ change\ in\ G} = \frac{1}{1+GH}$$ GH is open loop gain. Overall system gain M. Please discuss the effect of injection of high frequency sensor noise on system. How to nullify the effect of this high frequency noise injection in a system.	[5]
2		For the given circuit in Fig. 1, find the transfer function if the output voltage is $V_{out}(t)$.	[10]

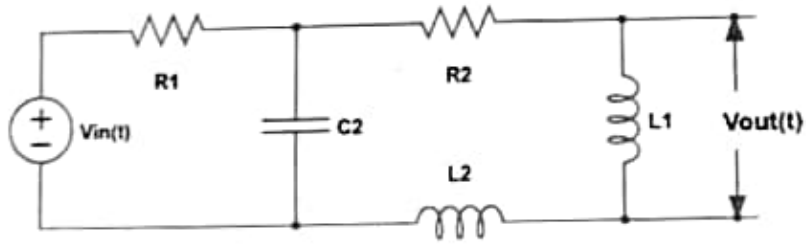

Fig. 1

3 Obtain the closed loop transfer function C(s)/R(s) for the block diagram shown in Fig. 2. **[10]**

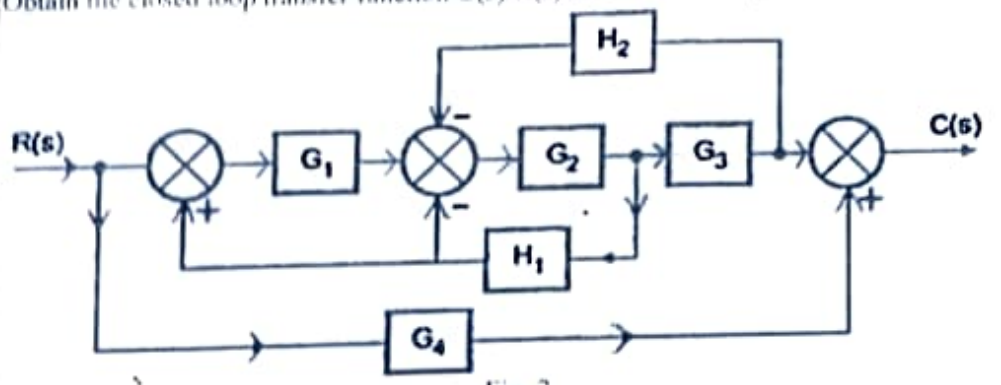

Fig. 2

4 Using Mason's gain formula, find the transfer function Y(s)/X(s) of the signal flow graph shown in Fig. 3. **[10]**

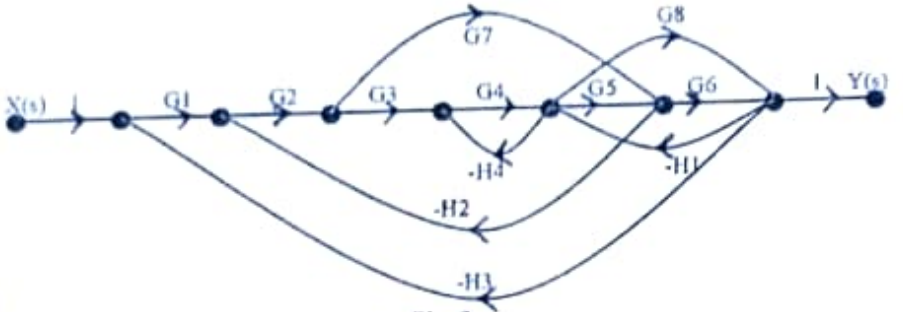

Fig. 3

5 Consider a first order system with unity feedback, where the forward path transfer function is given by G(s) = 1/2s. **[10]**

(a) Draw the block diagram of the first order system, taken into consideration of negative feedback. **[2 Marks]**

(b) Obtain the transfer function of the first order system with block diagram. **[2 Marks]**

(c) Find out the the response (in time domain) of this first order system with unit step input. **[3 Marks]**

(d) Draw the curve of the response in time domain and find out the slope of the curve at time (t) = 0. **[3 Marks]**

Total Marks **[50]**

⇔⇔⇔