GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Sixth Semester Regular) Examinations, May – 2024

21BECPC36003 – Control Systems

(ECE)

Time: 3 hrs Maximum: 70 Marks

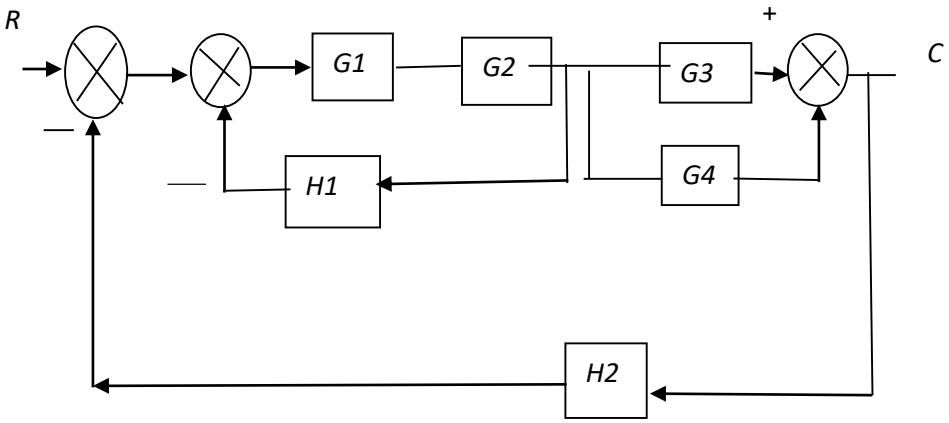
(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

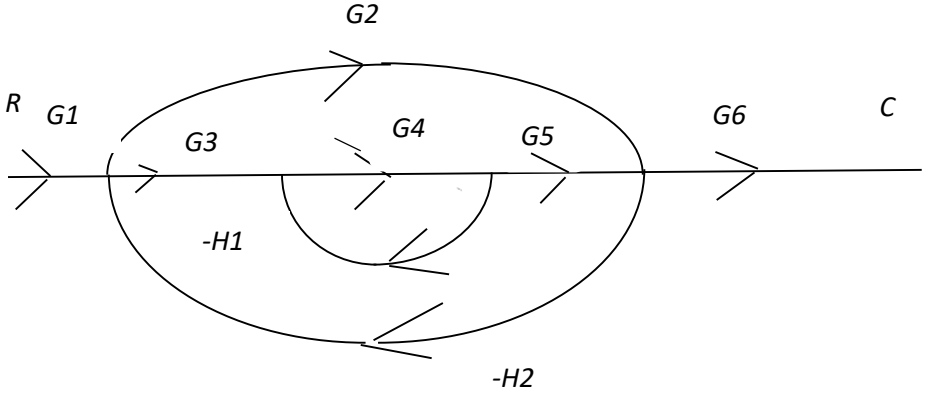
Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Write the difference between Open loop and Closed Loop system.	CO1	K1
b. What is expression for Peak time, and Settling time.	CO2	K1
c. What is Principle of Argument in Nyquist state.	CO2	K1
d. How angle of arrival is calculated.	CO2	K1
e. What is the special case of routh Hurwitz criterion for stability analysis.	CO2	K2

PART – B **(15 x 4 = 60 Marks)**

Answer ***ALL*** questions	Marks	CO #	Blooms Level
2. a. Find transfer function C/R.	7	CO2	K2



b. Find transfer function C/R. 8 CO2 K3

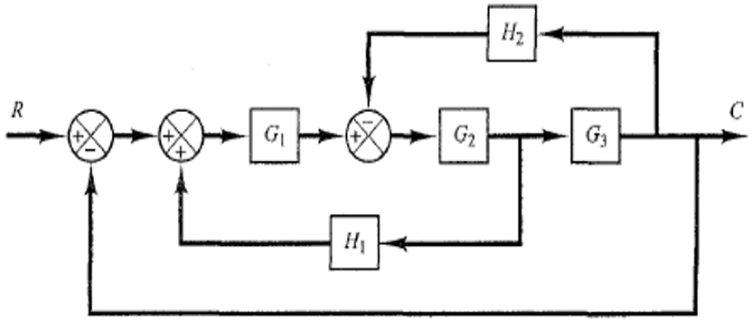


(OR)

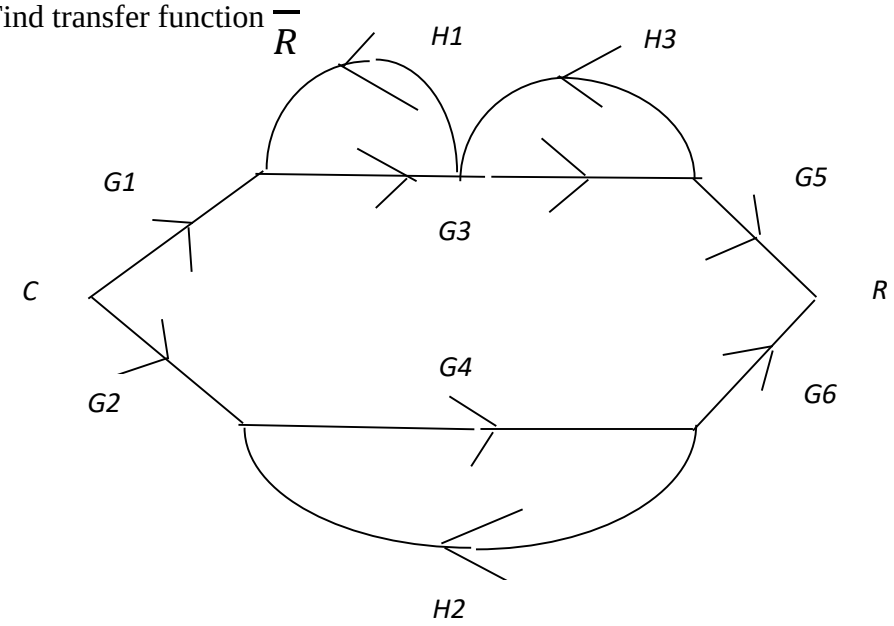
Find the Transfer Function of the. block Diagram.

		7	CO2	K2

c.



d. Find transfer function $\frac{C}{R}$



		8	CO3	K2

3.a. Derive the Unit step response of first order system, and explain the transient response. 8 CO2 K2

b. A unity feedback system $G(s)=\frac{10(s+2)(s+3)}{s(s+1)(s+4)(s+5)}$ 7 CO2 K3

Determine (i)static error coefficients
(iii)steady state error of ramp input r(t)=3+t+t^2

(OR)

c. Derive response of Second order system for undamped and underdamped Oscillation. 7 CO2 K2

d. $$\frac{C}{R}=\frac{20}{(s^2+5s+24)}$$ 8 CO2 K3

Find damping ratio, natural frequency, and output expression for unit step input.

4.a. $s^4+2s^3+(4+K)s^2+9s+25=0$, determine the range of k for stability. 7 CO2 K1

b. Examine the stability 8 CO3 K3

F(s)= $s^6+3s^5+4\,s^4+6s^3+5s^2+3s+2=0$

(OR)

c.	Sketch the Root Locus for the function G(s)H(s)= $\frac{k}{s(S+5)(S+10)}$	8	CO3	K2
d.	G(s)H(s)=$\frac{14}{s(s+1)(s+2)}$, draw the polar plot.	7	CO2	K2
5.a.	A unity Feedback Control system has G(s)= $\frac{10}{s(0.1s+1)(0.4s+1)}$ Draw the bode plot, Find G.M, P.M, an comment on stability.	8	CO3	K2
b.	Draw the Nyquist plot analysis of the G(s)H(s)= $\frac{1}{s(s+1)}$. Predict the stability.	7	CO2	K3
	(OR)			
c.	Find the State transition matrix of (i)A=$\begin{bmatrix} 0 & -1 \\ +2 & -3 \end{bmatrix}$ (ii) What are advantage of stage variable analysis, and write the sate equation, and output equation of state variable.	8	CO3	K2
d.	Find the Transfer function of a state model of a system given by $\dot{X}=\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -2 & -3 \end{bmatrix} X + \begin{bmatrix} 0 & 0 \\ 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} U1 \\ U2 \end{bmatrix}$ And $\begin{bmatrix} Y1 \\ Y2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} X$.	7	CO2	K2

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