Total number of printed pages: **Programme UG/Semester/UECE 502**

2022

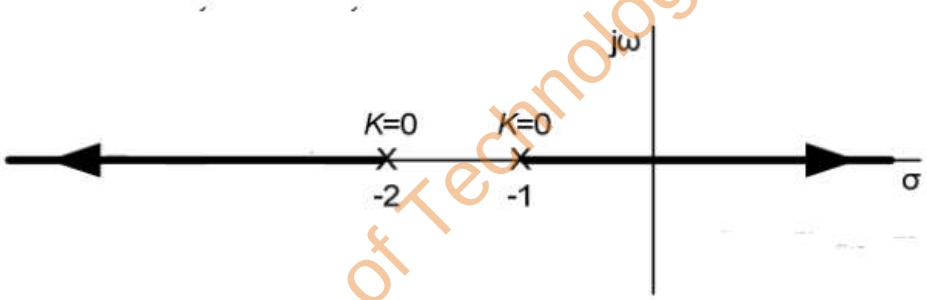
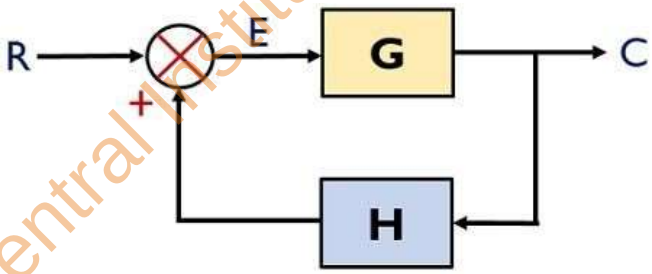
SUBJECT NAME

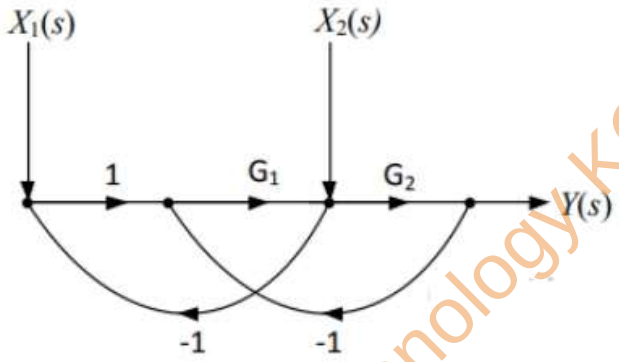
Full Marks : 100

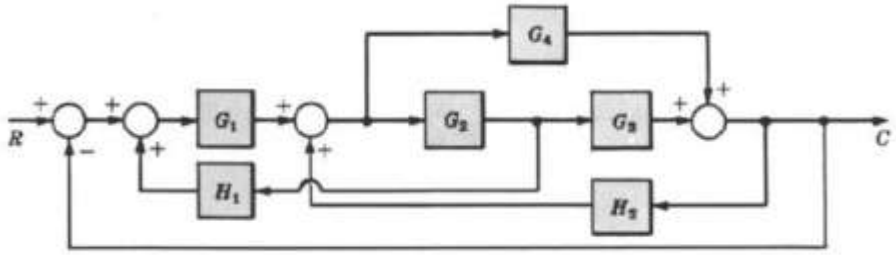
Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	Question: The root locus of the unity feedback control system is shown in the figure. Find the closed loop transfer function of the system. 	5
	b)	Question: For a control system shown in the following figure:  G=1/s and H(s)=s/(s+1). Find the following 1) Characteristic equation 2) Open loop gain 3) Closed loop transfer function 4) Open loop transfer function	5
	c)	Question: For a unity feedback control system having G(s)=1/(s+1). Draw the location of following point in G(s)H(s) plane i) s=j 0.5 , ii) s=0, iii) s=-1+j5, iv) s=2.	5

	d)	Question: With an example explain the order of a control system.	5
2.		With a circuit diagram explain the following in detail a) Phase lead compensator b) Phase lag compensator c) Phase lag-lead compensator	20
3.	a)	 Find the following in the signal flow graph shown 1) Y(s)/X(s) 2) $X_2(s)/X_1(s)$.	10
	b)	Using the polar plot examine the closed-loop stability of a system whose open loop transfer function is given by G(s)H(s)=50/((s+1)(s+2)).	10
4.	a)	A unity feedback control system has a open loop transfer function G(s)=K/(s(s+1)(s+3)). Obtain the following Break away point. Location of centroid . Angle of asymptotes. Using the data obtained draw the root locus. For what value of K damping ratio is 0.5 ?	10
	b)	The characteristic polynomial of a system is $s^7 + 9s^6 + 24s^5$+$24s^4$+$20s^3$+23s+7=0. Determine the location of roots on s-plane and hence comment on the stability of the	10

		system using Routh-Hurwitz criterion	
5.	a)	 For the block diagram shown in the figure draw the signal flow graph. After obtaining the signal flow graph using the Mason's gain formula derive the C/R.	10+10
6.	a)	Derive the time response output of the unity feedback second order control system with unit step as a input. Using the time response output derive the following quantity after defining them 1) The rise time 2) Maximum overshoot and peak time 3) The settling time	10+10