Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B. Tech (Sixth Semester – Regular/Supplementary) Examinations, April 2025

21BECPC36003 – Control Systems

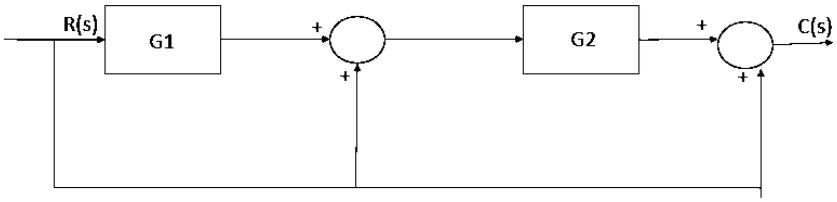
(ECE)

Time: 3 hrs Maximum: 70 Marks

Answer ALL questions

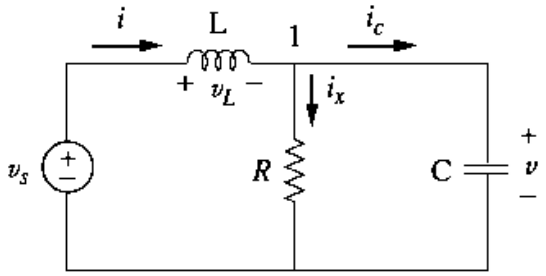
(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

		CO #	Blooms Level
Q.1.	Answer ***ALL*** questions		
a.	What are the advantages of closed loop control system?	CO1	K1
b.	The open loop system with transfer function G(s)= $\frac{K}{(s+2)(s+1)}$ is Connected with unity negative feedback configuration. Find out the closed loop system transfer function.	CO2	K2
c.	A system with transfer function G(s)= $\frac{S}{(2s+1)}$ is subjected to a sinusoidal signal cos(t). find out the value of output amplitude.	CO3	K1
d.	The expression of C(s)/R(s) of the system as shown in figure is. 	CO2	K2
e.	Draw the polar plot for the transfer function G(s)= $\frac{1}{s(s+1)}$.	CO3	K2

PART – B **(15 x 4 = 60 Marks)**

		Marks	CO #	Blooms Level
	Answer ***All*** the questions			
2. a.	Find out the expression of peak time and settling time for a second order under damped system.	8	CO2	K2
b.	How time constant of a first order system influences its output response when it is subjected to a step input explain with an example?	7	CO2	K2
	(OR)			
c.	Characteristic equation of a system is given as $s^5 + s^3 + s^2 + 1 = 0$. Find the number of poles lies on righthand side of s plane.	8	CO2	K3
d.	The open loop system with transfer function G(s)= $\frac{K}{(s+2)(s+3)(s+1)}$ is Connected with unity negative feedback configuration. Find the range of K for system stability.	7	CO2	K2
3.a.	For the RLC Circuit shown in figure develop the state space model by considering v_s as input and i_x as output.	8	CO4	K3

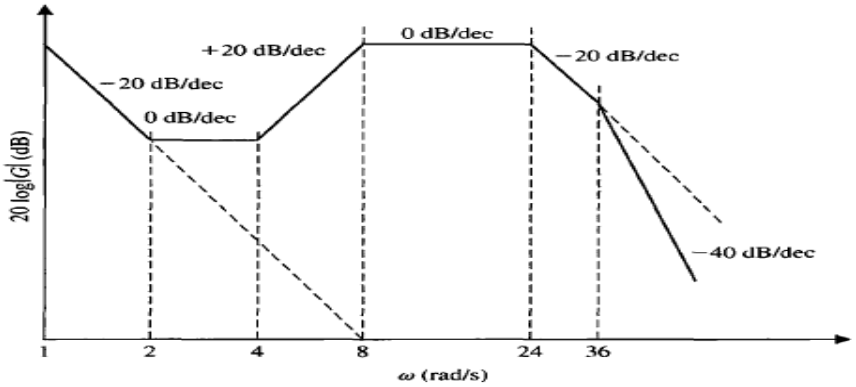


b. A system is described by the state space equation dx(t)/dt = Ax(t)+BU and the output is given by Y=C x(t). 7 CO4 K2

If A= $\begin{bmatrix}0 & 1\\ 0 & -3\end{bmatrix}$,B =$\begin{bmatrix}1\\ 0\end{bmatrix}$ and C= [1 0] then find out the transfer function of the system.

(OR)

c. Find out the expression of transfer function from the Bode plot given below and also find out the steady state error for unit ramp input. 8 CO2 K3



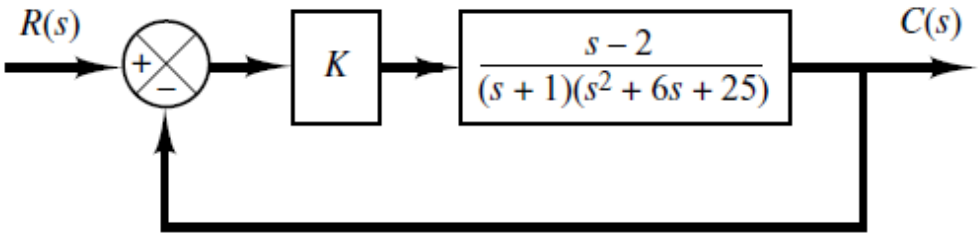
d. The open loop system with transfer function G(s)= $\frac{K}{s-1}$ is connected in unity negative feedback configuration. Draw the Nyquist plot for the above system and comment upon the stability of the system. 7 CO3 K3

4.a. The open loop system with transfer function G(s)= $\frac{K(s+4)}{(s+2)(s+1)}$ is connected in unity negative feedback configuration. Draw the root locus diagram for the above system and comment upon the range of K for which the system can behave like underdamped system. 8 CO2 K3

b. The loop gain G(s)H(s) of a system is $\frac{2(s+1)}{s2}$ find out the gain crossover frequency and phase margin and also explain how phase margin influences the stability. 7 CO2 K2

(OR)

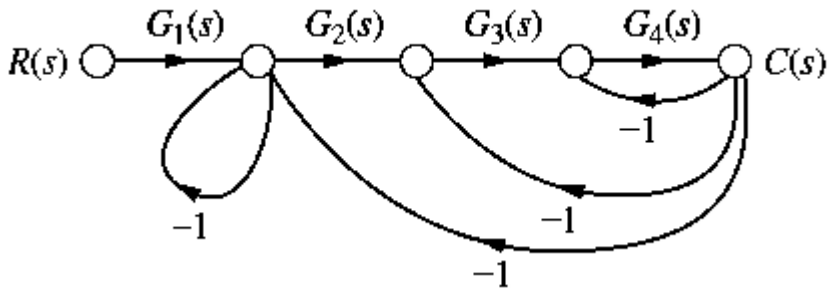
c. For the system shown in figure determine the range of K for system to be stable 8 CO3 K3



d. What are the different types of second order systems explain about them with 7 CO3 K2

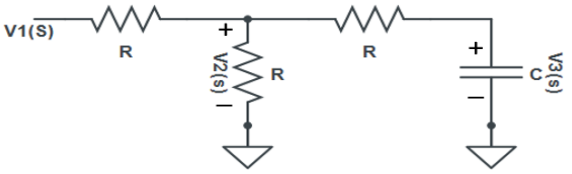
their pole locations using s plane?

5.a.	Fin the expression for resonant peak for a seconder system and comment how damping ratio influences resonant peak?	8	CO3	K2
b.	For the signal flow graph shown in figure fin out the expression of $\frac{C(s)}{R(S)}$	7	CO1	K2

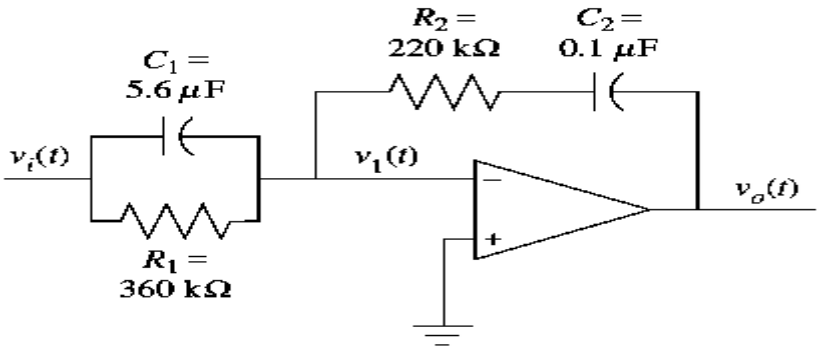


(OR)

c.	For the circuit shown in figure develop the signal flowgraph to find out / $\frac{V3(s)}{V1(s)}$ using masons gain formula.	8	CO1	K3



d.	Find the transfer function $\frac{VO(s)}{Vi(s)}$ of the circuit shown below	7	CO1	K2



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