Code No.: EC405PC	R20	H.T.No.			8	R						

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–II–Semester End Examinations (Supply) -June- 2025
CONTROL SYSTEMS
(ECE)

[Time: 3 Hours] **[Max. Marks: 70]**

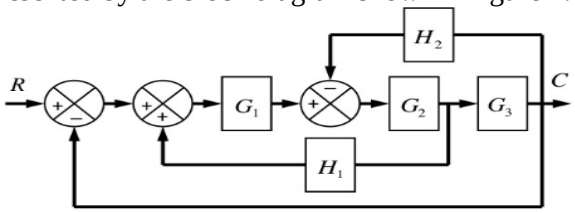
Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(20 Marks)**

1.	a)	Explain how feedback effects overall gain of the system.	[2M]
	b)	Why do you need a feedback controller? Justify your answer with an example.	[2M]
	c)	What are the applications of synchro?	[2M]
	d)	Distinguish between type and order of a system.	[2M]
	e)	What is the necessary condition that the characteristic equation of a feedback system satisfies the BIBO stability?	[2M]
	f)	What is the effect of P, PI controller on the system performance?	[2M]
	g)	What is Polar plot?	[2M]
	h)	What is the effect on polar plot if a pole is added to the transfer function?	[2M]
	i)	Explain the minimum phase system?	[2M]
	j)	What is meant by diagonalization? Explain.	[2M]

PART-B **(50 Marks)**

2. For the system represented by the block diagram shown in figure 1. Find C/R. [10M]



OR

3. With a neat closed loop block diagram explain temperature control system. [10M]

4. Find the stability of the following characteristic equation using Routh Hurwitz criterion. [10M]

$$2s^4+s^3+3s^2+5s+10=0$$

OR

5. Determine the damping ratio and natural frequency of the system, if the feedback is absent (*K0=0*) in the closed loop system, what is the steady state error resulting from unit ramp input? [10M]

$$T(s) = 4/(s^2+2s+4)$$

6. Define Root locus and explain procedure to sketch the Root-locus with an example. [10M]

OR

7. Sketch the Bode plot and determine the Gain margin and Phase margin. For the open transfer function is given, G(s) =8/[(s)(1+0.3s)(1+0.1s)] [10M]

8. Consider the open loop transfer function with unit feedback system, [10M]

G(S)= k/[(s)(s+3)(0.4s+1)].

Design the lead-lag compensator so that:

i) Velocity error constant Kv is 5 sec^{-1}

ii) Phase margin not greater than 30^0

iii) Gain margin not greater than 10 db.

OR

9. Explain the following control action with neat schematic diagram and derive its necessary equations. [10M]

i) Proportional ii) Integral

iii) Derivative iv) Proportional plus integral

10. For the system given below, obtain: [10M]

i) Zero input response

ii) Zero state response

iii) Total response.

$$A=\begin{bmatrix}1 & 4\\ -2 & -5\end{bmatrix},\ B=\begin{bmatrix}0\\ 1\end{bmatrix},\ u=1 \text{ and } \begin{matrix}x_1(0)=1\\ x_2(0)=0\end{matrix}$$

OR

11. The state variable formulation of a system is given by [10M]

$$\begin{bmatrix}\dot{x}\end{bmatrix}=\begin{bmatrix}-3 & 2\\ -1 & 0\end{bmatrix}[x]+\begin{bmatrix}0\\ 1\end{bmatrix}u \text{ and } y=\begin{bmatrix}1 & 0\end{bmatrix}[x]$$

Find Transfer function of the system.

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