

CMR ENGINEERING COLLEGE: : HYDERABAD

UGC AUTONOMOUS

II-B.TECH-II-Semester End Examinations (Supply) - December- 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.

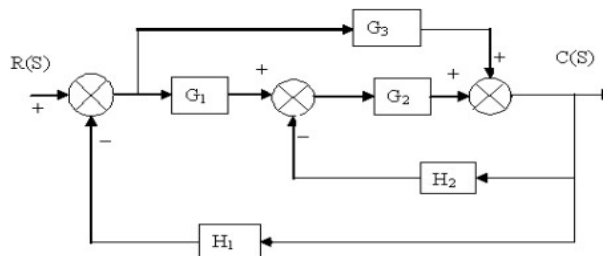
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A**(20 Marks)**

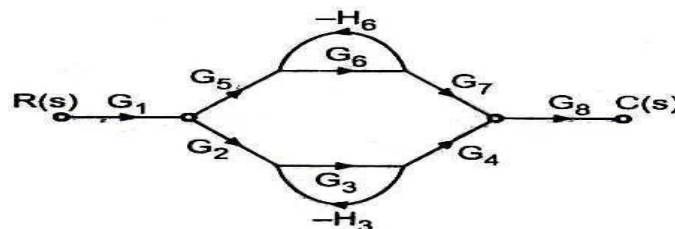
1. a) Define open loop control system. [2M]
- b) Write Masons Gain formula. [2M]
- c) Define rise, Delay time. [2M]
- d) Distinguish between type and order of a system. [2M]
- e) Define corner frequency. [2M]
- f) Define gain margin. [2M]
- g) Discuss the drawback in P-controller? [2M]
- h) Define Controller? [2M]
- i) What are the properties of state transition matrix? [2M]
- j) Define observability? [2M]

PART-B**(50 Marks)**

2. Find the overall gain of the system shown below? [10M]

**OR**

3. Obtain the overall transfer function C/R from the signal flow graph shown. [10M]



4. By means of Routh criterion, determine the stability represented by characteristic equation $s^4 + 2s^3 + 8s^2 + 4s + 3 = 0$ [10M]

OR

5. Sketch the root locus $G(S) = K/s(s^2 + 6s + 10)$, $H(S) = 1$ [10M]

6. Sketch the Bode plot for the open loop transfer function [10M]

$$G(S) = \frac{10(S + 3)}{S(S - 2)(S^2 + 4S + 100)}$$

OR

7. Draw the polar plot for open loop transfer function for unity feedback System [10M]
 $G(S) = 1/s(1 + s)(1 + 2S)$

8. Discuss about Lag Compensator in design. [10M]

OR

9. Discuss about Lead Compensator in design. [10M]

10. List out the properties of state transition matrix. Obtain the state transition matrix of [10M]

$$A = \begin{bmatrix} 2 & 0 \\ -1 & 2 \end{bmatrix}$$

OR

- 11.a) Define the following: (i) Eigen value (ii) Eigen vectors (iii) state (iv) state space [5M]
(v) state vector. [5M]

- b) Construct the state model for a system characterized by differential equation
 $d^3y/dt^3 + 6d^2y/dt^2 + 11dy/dt + 6y = u$.
