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

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–II–Semester End Examinations (Supply) - February- 2023
CONTROL SYSTEMS
(ECE)

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

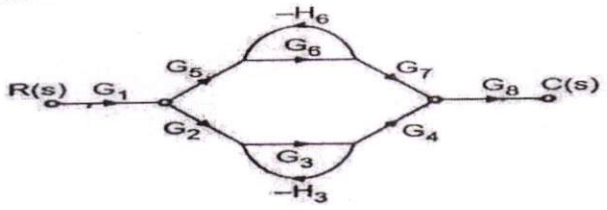
Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(20 Marks)**

1. a) Define Block diagram? [2M]
   b) Give two examples for open loop System? [2M]
   c) What is damping ratio? [2M]
   d) What is break away and break in points? [2M]
   e) Define Gain Margin? [2M]
   f) Define frequency response? [2M]
   g) Write pole zero plot of Lead compensator? [2M]
   h) What is Compensation? [2M]
   i) Define controllability? [2M]
   j) What are the properties of state transition matrix? [2M]

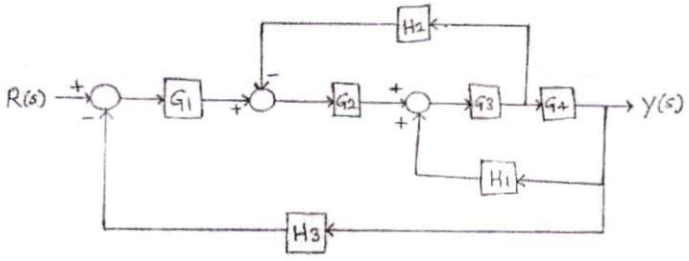
PART-B **(50 Marks)**

2. Use Mason's gain formula to find the transfer function C(s)/R(s) for the signal flow graph shown below. [10M]



OR

3. Obtain the transfer funtion Y(s)/R(s) for the following block diagram [10M]



4.a) Determine the RH stability of given characteristic equation, $S^4 + 8S^3 + 18S^2 + 16S + 5 = 0$ [7M]

b) Write the equations for time domain specifications of a standard second order system with unit step input. [3M]

OR

5. The open loop transfer function of a unity feedback system is given by ,$G(S) = \frac{K}{S(1+ST)}$ [10M]
where K and T are constants having positive values. By what factor the gain K be reduced so that the peak overshoot of unit step response is reduced from 80% to 20%.

6. Sketch the bode plot for a system with unity feedback having the transfer function and find Gain and Phase Margin. $G(S)H(S) = \frac{75}{s(s^2+16s+100)}$ [10M]

OR

7.a) Define gain margin and phase margin. [3M]

b) Explain relation between time and frequency response analysis. [7M]

8. Derive the realization of electrical network of Lag Compensator? [10M]

OR

9. What is compensation? What are the different types of compensators? Explain in brief [10M]

10. Obtain the state transition matrix for the matrix $A = \begin{vmatrix} 0 & 1 \\ -2 & -3 \end{vmatrix}$ [10M]

OR

11. Obtain the state space representation of the following differential equation, where y is the output and u is the input. $\dddot{y} + 3\ddot{y} + 12\dot{y} + y = u$. [10M]

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