

Seat No.

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मधुर - 038

Feedback Control System (1030)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

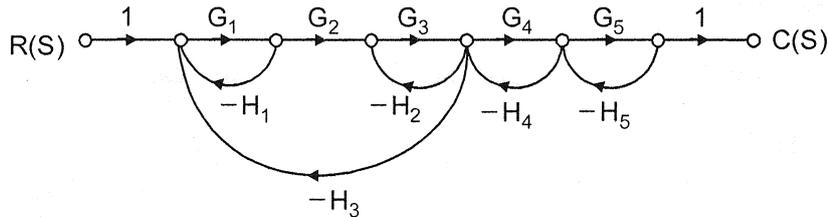
Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Use of non programmable calculator is allowed.
5. Figures to the right indicates full marks.
6. Assume suitable data if necessary.

1. Answer **any two**.

a) Compare open loop and close loop control system. Explain the block diagram of close loop control system. 10

b) Find the transfer function of SFG shown



c) Write a short note on classification of control system. 10

2. Answer **any two**.

a) What are the test signals used in control system using those signals derive equation of steady state error in terms of error coefficient. 10

b) What are the relation between damping ratio (ξ) and pole location for second order system. 10

c) Draw the transient response specifications for design considerations and define the terms : 10

- | | | |
|---------------|------------------|---------------------|
| i) Delay time | ii) Rise time | iii) Peak overshoot |
| iv) Peak time | v) Setting time. | |

3. Answer **any two**.

- a) What are the effects of addition of poles and zeros on the root locus. State the advantages of root locus. 10
- b) What are steps for solving problems on root locus. 10
- c) $G \cdot H(S) = \frac{K}{S(S+3)(S+5)}$ draw the root locus. Determine for damping ratio = 0.6
- i) Closed loop dominant poles. .
- ii) Damped natural frequency.
- iii) Gain K. 10

4. Answer **any two**.

- a) For the system having the open loop transfer function

$$G(S)H(S) = \frac{10}{S(S+1)(S+10)}$$

Determine the stability of the system by plotting the bode plot of the system. 10

- b) Sketch the nature of Nyquist plot for the system with

$$G(S) \cdot H(S) = \frac{1}{S^3(S+1)}$$

10

- c) Write short notes on constant M and constant N circles. 10

5. Answer **any two**.

- a) Define the terms :

- i) State ii) State variables
iii) State vector iv) State space 10

- b) Find the state transition matrix

$$\phi(t) \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

10

- c) Write short notes on P.I. P.D & PID controller. 10
