TE | Elx | sem-V | CBCGS | R-19 | C-scheme | PCS | SH-2024 11|11|2024

Duration: 3 Hours **[Maximum Marks: 80]**

QP-10065042

NOTE: 1) Question 1 is **compulsory**
2) Solve **any three** from the remaining five questions
3) Assume suitable data if necessary.
4) Figures to the right indicate full marks

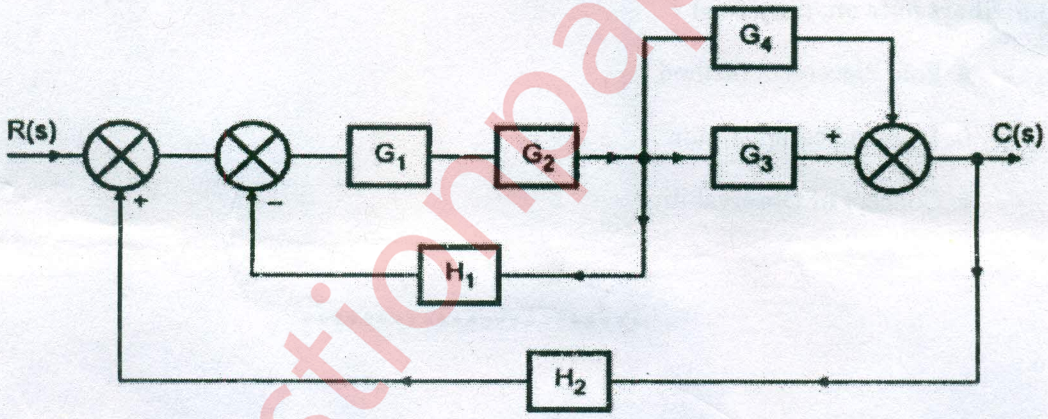
Q.1. a Give comparison between open loop and closed loop control systems **5**

b. Draw block diagram and obtain transfer function of a simple closed loop system, with a forward path gain as G(s) and feedback path gain as H(s). **5**

c. Explain Routh-Hurwitz criteria of stability with suitable example **5**

d. What is Nyquist criterion **5**

Q.2. a. Find the transfer function of the block diagram shown in figure by using block diagram reduction method. **10**



b. Find the stability of the control system having characteristic equation **10**

$S^4 + 3S^3 + 3S^2 + 2S + 1 = 0$

Q3. a. A unity feedback control system has a loop transfer function **10**

$$G(s) = \frac{10}{s\,(s+2)}.$$

Find the rise time, percentage overshoot, peak time and settling time for a unit step input.

b. Draw polar plot of $G(s)\,H(s) = \frac{K}{(s+1)\,(s+2)}$ **10**

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Q.4.a. Draw the Root locus diagram for the system and comment on stability. 10

$$G(s)\,H(s) = \frac{K\,(s+2)(s+3)}{s\,(s+1)}$$

b. List the steps involved in design of lag compensator using Bode plot. 10

Q.5. a. Draw the Nyquist plot for the given open loop transfer function and test the stability. 10

$$G(s)\,H(s) = \frac{1}{(s+2)\,(s+4)}$$

b. Obtain the state model for the system with transfer function. 10

$$\frac{Y(s)}{U(s)} = \frac{1}{s^2+s+1}$$

Q.6. Short note on. (any two) 20

a. Pole Placement method

b. Lag-lead compensator

c. Concept of Observability

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