

SE SEM III choice based R-19 'e' scheme JUNE 2025

12-6-2025

Time: 3 Hrs

Marks: 80

EXTC

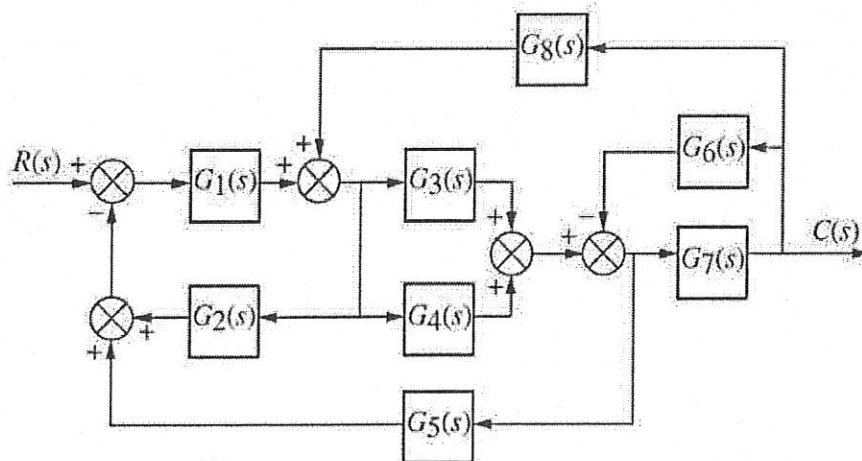
- (1) Question No. 1 is compulsory.
- (2) Attempt any three questions from the remaining five questions.
- (3) Assume suitable data if needed.

Q1. Attempt any four 20

- a. List various bridge circuits used for the measurement of resistance, inductance and capacitance along with their classification.
- b. Draw block diagram of a generalized measurement system and explain its components.
- c. What are thermocouples ? Explain their types along with their usefulness.
- d. Explain the performance specifications of a first order system in brief.
- e. What is Mason's gain formula ? Explain it in detail.
- f. Explain the need for lead-lag compensator in control system design.

Q2. Answer the following 20

- a. What are steady state errors ? Find expression for steady state errors for step, ramp and parabolic inputs to the unity feedback system having forward transfer function $G(s)$.
- b. Obtain overall transfer function $C(s)/R(s)$ of the system shown in figure:



Q3. Answer the following **20**

- a. Using Routh's stability criterion, comment on the stability of the system having characteristic equation $a(s)=s^5+3s^4+ 2s^3+6s^2+6s+9$.
- b. A unity feedback system has forward path transfer function given by $G(s)=\frac{1}{s(s+1)(s+4)}$. Draw polar plot of the system and comment on its stability.

Q4. Answer the following **20**

- a. For the given unity feedback system $G(s)H(s) = \frac{k}{s(s^2+8s+15)}$, sketch the Root Locus and comment on its stability.
- b. Explain various types of errors encountered in measurement systems.

Q5. Answer the following **20**

- a. Draw Bode plot for a unity feedback control system with open loop transfer function $G(s) = \frac{100}{s(0.5s+1)(0.01s+1)}$. Also find gain margin and phase margin.
- b. The forward path transfer function of a unity feedback control system is $G(s)=\frac{(3s+13)}{(s+3)(s+4)}$. Determine the damping ratio and natural frequency of oscillation along with transient response specifications.

Q6. Answer the following **20**

- a. Draw and explain the working of Hey's bridge along with its application.
- b. Explain the operation of LVDT with a neat diagram.
