

Q1. What is the primary function of a control system?

- ☐ To amplify signals
- ☐ To filter noise
- ☒ To provide the desired response by controlling the output
- ☐ To generate input signals

Clear selection

Q2. In a closed-loop control system, what is the role of the feedback signal?

- ☐ To amplify the input signal
- ☐ To decrease the input signal
- ☐ To provide a reference signal
- ☒ To reduce the error between the desired output and the actual output

Clear selection

Q3. What is the purpose of a controller in a control system?

- ☐ To generate the error signal
- ☐ To amplify the input signal
- ☒ To generate a control signal to manipulate the plant
- ☐ To measure the output of the plant

Clear selection

Q4: What is the practical way to determine the end of the transient period?

- ☐ Waiting for an infinite amount of time.
- ☐ Observing the system until it stops changing.
- ☒ Waiting for five times the system's time constant.
- ☐ Using a specific formula to calculate the exact time

Clear selection

Q5. What is the significance of the term "GH" in the context of feedback control systems?

- ☒ It represents the product of the open-loop gain and the feedback path gain.
- ☐ It is the transfer function of the closed-loop system.
- ☐ It is the error signal in the system.
- ☐ It is the desired output of the system

Clear selection

Q6. What is the effect of negative feedback on system stability?

- ☐ Increases system instability.
- ☒ Increases system stability.
- ☐ Does not affect system stability.
- ☐ May increase or decrease stability depending on the feedback value

Clear selection

Q7. What is the transfer function of a system?

- ☒ The ratio of the Laplace transform of the output to the Laplace transform of the input, assuming zero initial conditions.
- ☐ The time domain response of the system to a unit impulse input
- ☐ The frequency response of the system.

Clear selection

Q8. What is Control System?

- ☒ Control system is a system in which the output is controlled by varying the input
- ☐ Control system is a device that will not manage or regulate the behavior of other devices using control loops
- ☐ Control system is a feedback system that can be both positive and negative
- ☐ Control System is a system in which the input is controlled by varying the output.

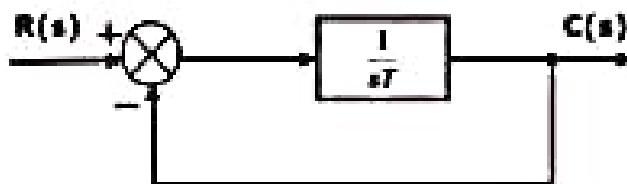
Clear selection

Q9. The overall transfer function from block diagram reduction for Parallel blocks is :

- ☒ Sum of individual gain
- ☐ Product of individual gain
- ☐ Difference of individual gain
- ☐ Division of individual gain

Clear selection

Q10. Consider a unit impulse signal applied as the input to the first-order system. What is the Laplace transform of the unit impulse response, ?



- ☐ $1/s$
- ☐ s
- ☒ $1/(sT + 1)$
- ☐ $e^{(-t/T)}$

Clear selection

Q11. What is the characteristic of the unit impulse response for positive values of t in a first order system?

- ☐ Constant value
- ☐ Sinusoidal oscillation
- ☒ Exponential decay
- ☐ Linearly increasing

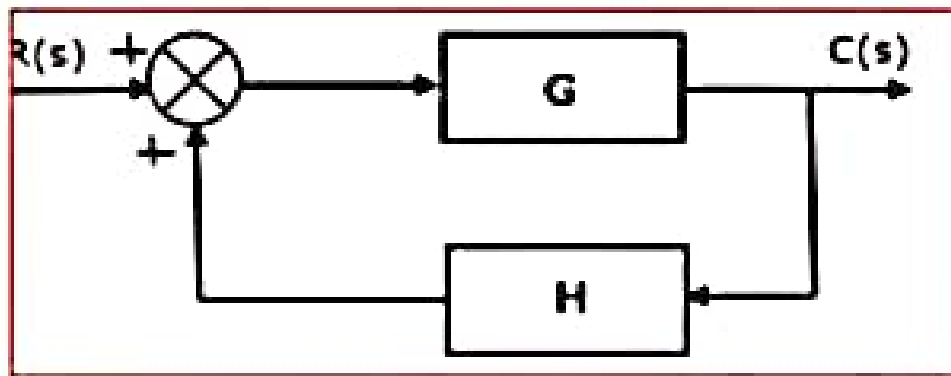
Clear selection

Q12. A system with a closed-loop transfer function having poles at $-2, -3 \pm j2$ is:

- ☐ Stable
- ☐ Unstable
- ☒ Marginally Stable
- ☐ Cannot be determined

Clear selection

Q13. The transfer function model of the following positive control system is given as



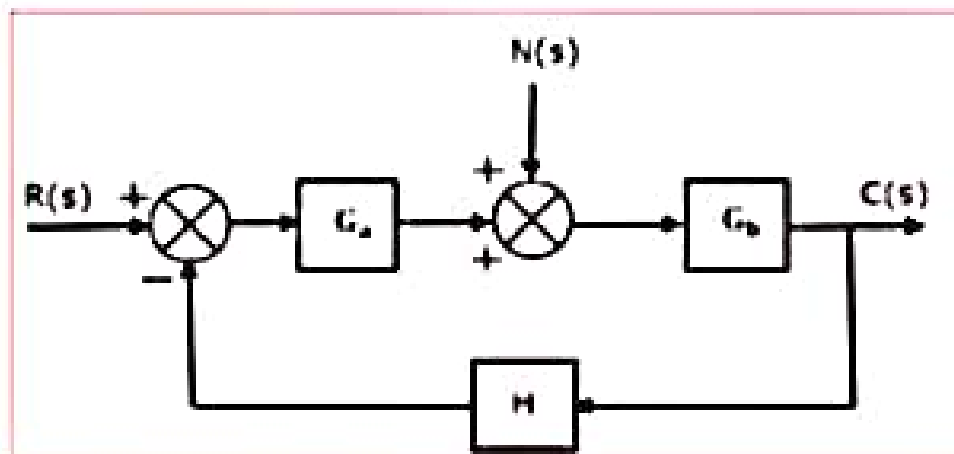
☐ $G/1+GH$

☒ $G/1-GH$

☐ $H/1+GH$

Clear selection

Q14. The ratio of $C(s)$ to $N(s)$ in the following figure is given by



☒ $C(s) / N(s) = G_b / 1+G_aG_bH$

☐ $C(s) / N(s) = G_b / 1+G_bH$

☐ $C(s) / N(s) = G_a / 1+G_aG_bH$

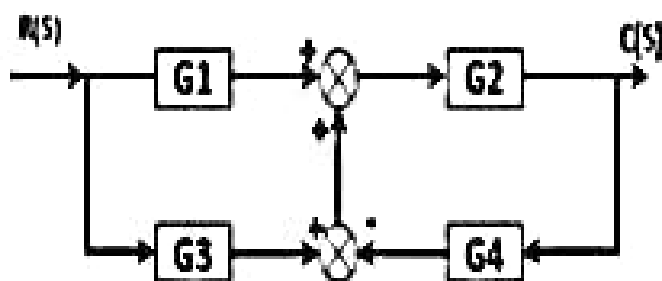
Clear selection

Q15. The output of the feedback control system must be a function of.....

- ☐ Output and feedback signal
- ☒ Input and feedback signal
- ☐ Reference input
- ☐ Reference output

Clear selection

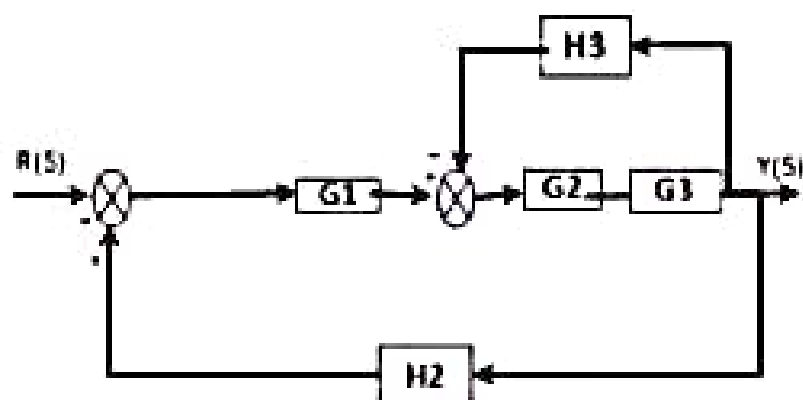
Q16. Consider the block diagram If the transfer function of the system is given by $T(s) = \frac{G_1 G_2 + G_2 G_3}{1 + X}$. Then X is:



- ☐ $G_2 G_3 G_4$
- ☒ $G_2 G_4$
- ☐ $G_1 G_2 G_4$
- ☐ $G_2 + G_2 G_4$

Clear selection

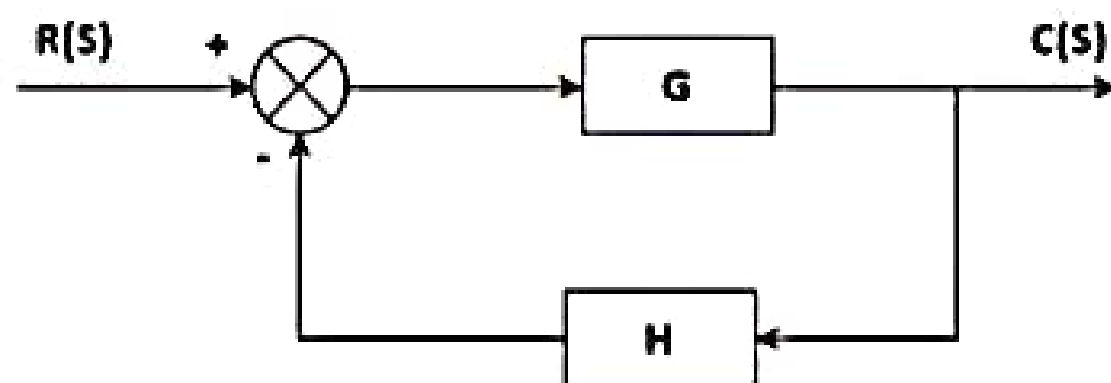
Q17. Find the transfer function of the following figure



- ☐ $G_1(G_2G_3/1+G_2G_3H_3)$
- ☒ $G_1G_2G_3/1+G_2G_3H_3-G_1G_2G_3H_2$
- ☐ $G_1G_2G_3/1+G_2G_3H_3$
- ☐ $G_2G_3/1+G_2G_3H_3H_2$

Clear selection

Q18. The following negative control system will be unstable when $GH=$



- ☒ -1
- ☐ 1
- ☐ 0

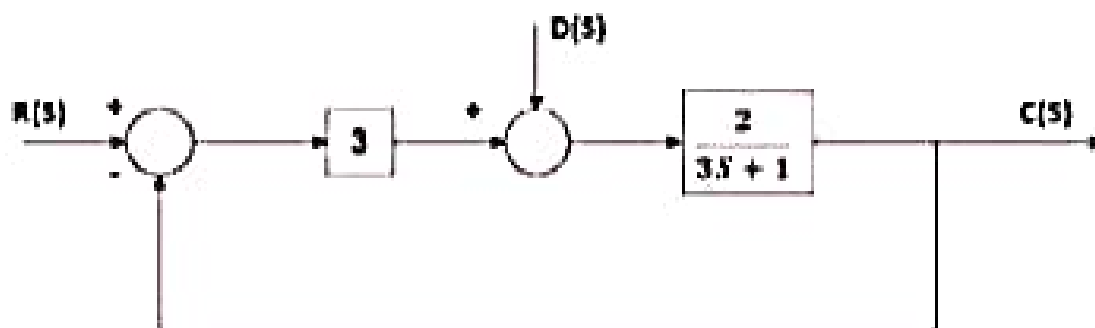
Clear selection

Q19. The overall transfer function from block diagram reduction for Cascade blocks is

- ☐ Sum of individual gain
- ☒ Product of individual gain
- ☐ Difference of individual gain
- ☐ Division of individual gain

Clear selection

Q20. Find transfer function $D(s)$ to $C(s)$:



- ☒ $2/3s+7$
- ☐ $2/3s+1$
- ☐ $6/3s+7$
- ☐ $2/3s+6$

Clear selection

Q21. An unstable system has:

- ☐ All poles in the left half-plane.
- ☒ At least one pole in the right half-plane or multiple poles on the imaginary axis.
- ☐ Only imaginary axis poles of multiplicity one.
- ☐ No poles in the right half-plane

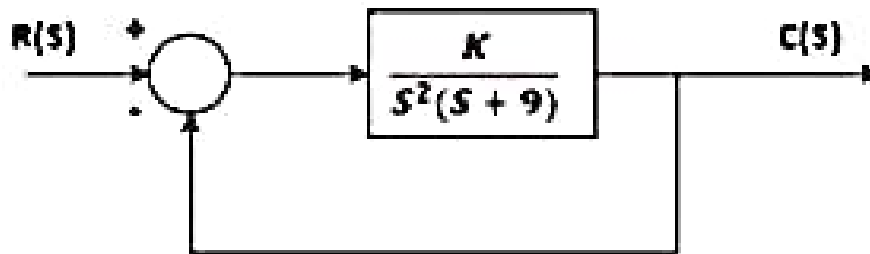
Clear selection

Q22. Which of the following statements accurately describes the difference between an open-loop control system and a closed-loop control system?

- ☐ An open-loop control system uses feedback to correct errors, while a closed-loop system does not.
- ☐ A closed-loop control system is more sensitive to external disturbances compared to an open-loop control system.
- ☒ A closed-loop control system uses feedback to correct errors, making it more accurate and stable than an open-loop control system.
- ☐ Both systems have the same level of accuracy and stability.

Clear selection

Q23. Find the type and order:



- ☒ 2, 3
- ☐ 2, 2
- ☐ 3, 3
- ☐ None of the above

Clear selection

Q24. $G(s) = 2/S(S+3)$. Obtain an expression for unit step response:

- ☐ $1 + 2e^{(-t)} + e^{(-2t)}$
- ☐ $1 + e^{(-t)} - 2e^{(-2t)}$
- ☐ $1 - e^{(-t)} + 2e^{(-2t)}$
- ☒ $1 - 2e^{(-t)} + e^{(-2t)}$

Clear selection

Q25. The characteristic equation of a system is given as: $S^3 + 18S^2 + 77S + 15 = 0$. What is the number of the roots in the right half s_plane and the imaginary axis respectively?

☐ 1, 1

☒ 0, 0

☐ 2, 1

☐ 1, 2

Clear selection

Q26. If the characteristic equation of the closed loop system is: $S^2 + 2S + 1 = 0$. Then the system is:

☐ Over damped

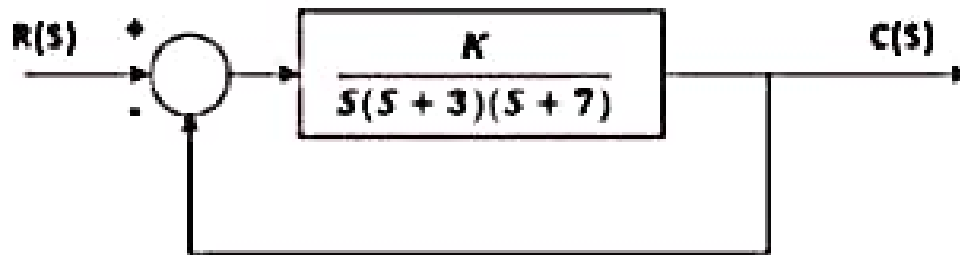
☒ Critically damped

☐ Undamped

☐ Underdamped

Clear selection

Q27. For the closed-loop system, Find the ranges of the values of K for stability:



- ☐ $K < 0$
- ☐ $k > 210$
- ☒ $0 < k < 210$
- ☐ $K > 0$

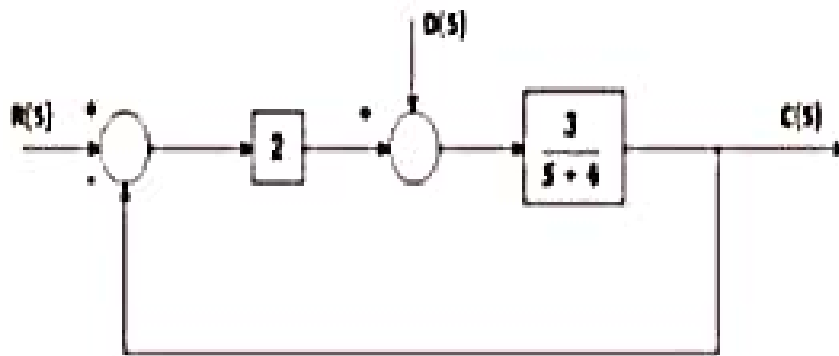
Clear selection

Q28. The roots of the characteristic equation lie in the left if of the s-plane. Then the value of the is said to be:

- ☒ $0 < A < 12$
- ☐ $5 < A < 12$
- ☐ $A > 12$
- ☐ $A < 12$

Clear selection

Q29. Find transfer function to :



☒ $3/s+10$

☐ $2/3s+1$

☐ $6/3s+7$

☐ $2/3s+6$

Clear selection

Q30. The characteristic equation of a system is given as: $3s^4 + 10s^3 + 5s^2 + 2 = 0$. This system is :

☐ Stable

☐ Marginally stable

☒ Unstable

Clear selection

Q31. The transfer function of a system is given as

$81/(s^2 + 16s + 81)$. Find the undamped natural frequency, damping ratio, and peak time for a unit step input.

☒ 9, 0.889, 0.762

☐ 9, 0.559, 0.762

☐ 9, 0.889, 0.187

Clear selection

Q32. If the characteristic equation of the closed loop system is $s^2 + 2s + 2 = 0$, then the system is:

☐ Over damped

☐ Critically damped

☒ Underdamped

Clear selection

Q33. The transfer function of the system is: $G(s) = 100/(s+1)(s+100)$. For a unit step input to the system the approximate settling time for 2% criterion is:

☐ 100 sec

☒ 4 sec

☐ 1 sec

[Clear selection](#)

Q34. For a second-order system with the closed-loop transfer function: $T(s) = 9 / (s^2 + 4s + 9)$ the settling time for 2-percernt band, in seconds, is:

☐ 1.5

☒ 2.0

☐ 3.0

[Clear selection](#)

Q35. The order of the auxiliary polynomial is always:

- ☒ Even
- ☐ Odd
- ☐ May be even or odd
- ☐ None of the mentioned

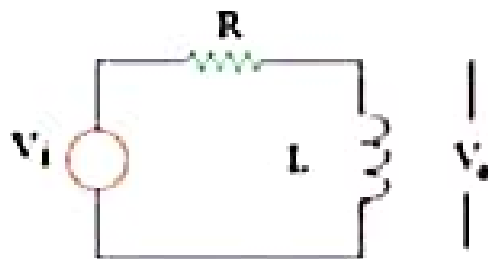
Clear selection

Q36. The error constants described are the ability to reduce the steady state errors.

- ☐ True
- ☒ False

Clear selection

Q37. Find the Transfer Function (V_o/V_i) for the two systems shown below if you know that



- ☒ $LS / R + LS$
- ☐ $(R + LS) / LS$
- ☐ $(R + LS) / R$
- ☐ $(R + LS)$

Clear selection

Q38. A second-order differential equation can be represented in the s-domain as:

- ☐ A first-order polynomial in s
- ☒ A second-order polynomial in s
- ☐ A third-order polynomial in s
- ☐ A transcendental function of

Clear selection

Q39. If the dumping factor of a control system is unity it will give

- ☐ No response
- ☒ Critically damped response
- ☐ Undamped response
- ☐ Oscillatory response

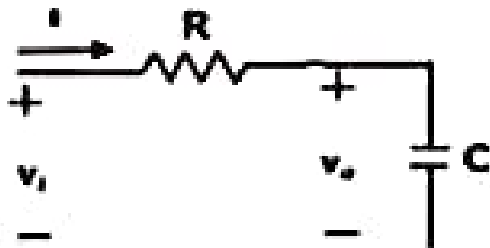
Clear selection

Q40. In an open loop control system

- ☒ Output is independent of control input
- ☐ Output is dependent on control input
- ☐ Only system parameters have effect on the control output
- ☐ None of the above

Clear selection

Q41. Find the Transfer Function (V_o/V_i) for the two systems shown below: If you know that



- ☐ $CS / R + LS$
- ☐ $(R + CS) / S$
- ☒ $1 / (RCs + 1)$
- ☐ $(R + CS)$

Clear selection

Q43. A system with a closed-loop transfer function having poles at $-4, -2, -3$ is:

- ☐ Stable
- ☒ Unstable
- ☐ Marginally Stable
- ☐ Cannot be determined

Clear selection

Q44. Find the type and order, if you know that open loop transfer function is $G(s) = 1 / (s^3 (s + 5))$:

- ☐ 2, 3
- ☐ 2, 2
- ☒ 3, 4
- ☐ None of the above

Clear selection

Q45. A stable system has:

- ☒ All poles in the left half-plane.
- ☐ At least one pole in the right half-plane or multiple poles on the imaginary axis.
- ☐ Only imaginary axis poles of multiplicity one.
- ☐ No poles in the right half-plane

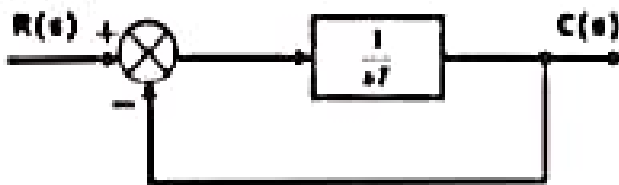
Clear selection

Q46. If the dumping factor of a control system is Zero it will give

- ☐ No response
- ☐ Critically damped response
- ☒ Undamped response
- ☐ Oscillatory response

[Clear selection](#)

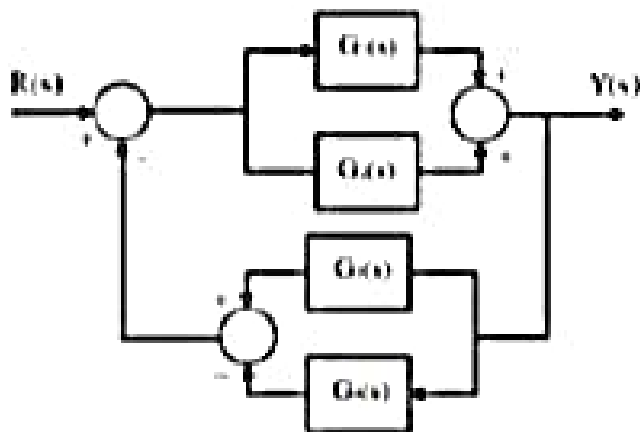
Q47. Consider a unit step signal applied as the input to the first-order system. What is $C(s)$?



- ☐ $1/s$
- ☐ s
- ☐ $1/(sT + 1)$
- ☒ $1/s(sT + 1)$

[Clear selection](#)

Q48. The overall transfer function is given by :



- ☒ $(G_1 + G_2) / (1 + (G_1 G_3 + G_1 G_4 + G_2 G_3 + G_2 G_4))$
- ☐ $(G_1 + G_2) / (1 + (G_1 G_3 + G_1 G_4 - G_2 G_3 + G_2 G_4))$
- ☐ $G' / (-(G_1 G_4 + G_2 G_3 + G_2 G_4))$

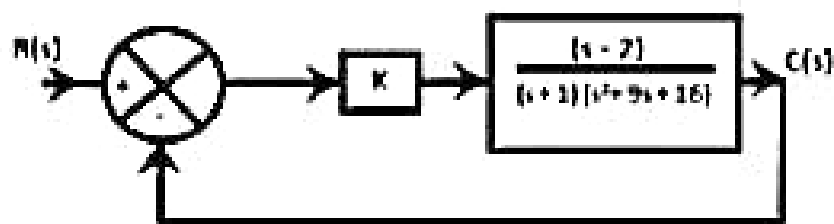
[Clear selection](#)

Q49. What is the mathematical representation of the transient response as time approaches infinity?

- ☐ $\lim(t \rightarrow \infty) \text{ctr}(t) = \infty$
- ☐ $\lim(t \rightarrow 0) \text{ctr}(t) = \infty$
- ☐ $\lim(t \rightarrow 0) \text{ctr}(t) = 0$
- ☒ $\lim(t \rightarrow \infty) \text{ctr}(t) = 0$

[Clear selection](#)

Q50. For the given closed-loop system, the ranges of the values of K for stability is:

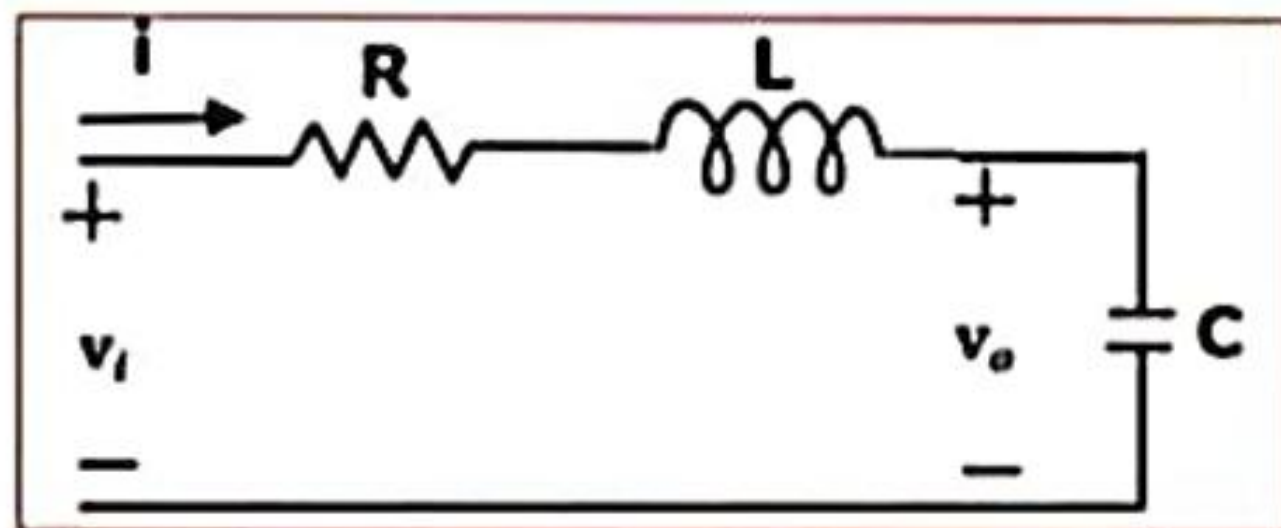


- ☐ $K > -19.5$
- ☐ $K > 8$
- ☒ $-19.5 < K < 8$

Clear selection

Q11. The transfer function model of the electrical circuit is given by

1 point

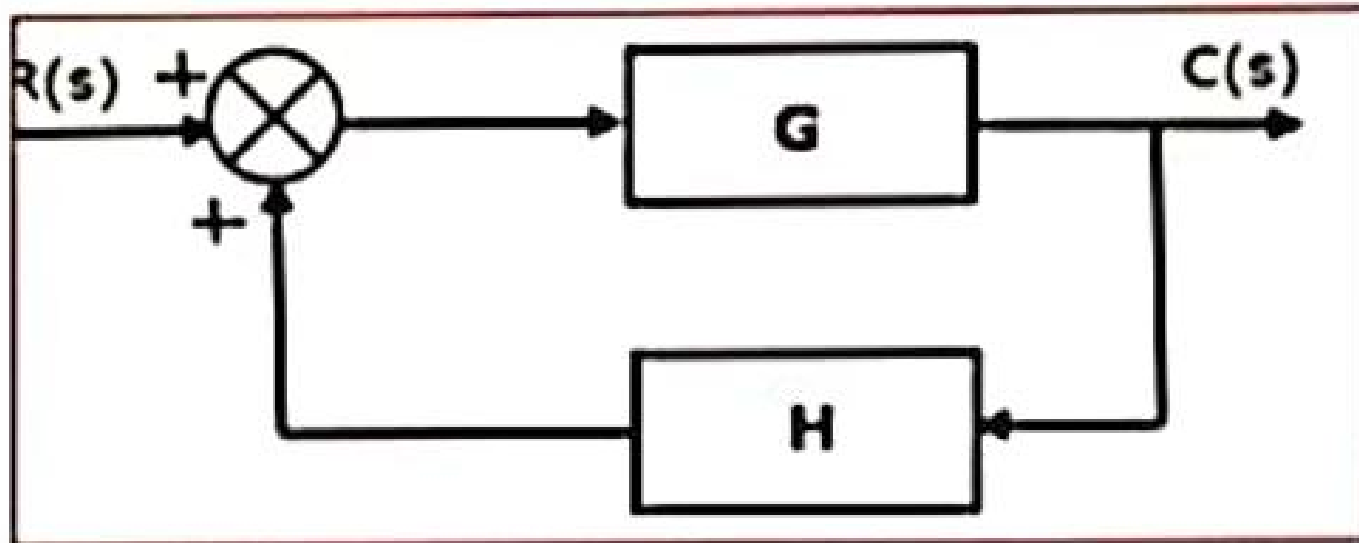


- ☒ $V_o(s) / V_i(s) = (1/LC) / S^2 + (R/L)S + (1/LC)$
- ☐ $V_o(s) / V_i(s) = 1 / S^2 + (R/L)S + (1/LC)$
- ☐ $V_o(s) / V_i(s) = (1/LC) / (R/L)S + (1/LC)$

Clear selection

Q14. The following positive control system will be unstable when

1 point



- ☐ $GH = -1$
- ☒ $GH = 1$
- ☐ $GH = 0$

Clear selection

1. Routh Hurwitz criterion gives:

- a) Number of roots in the right half of the s-plane.
- b) Value of the roots.
- c) Number of roots in the left half of the s-plane.
- d) Number of roots in the top half of the s-plane.

3. determine if the closed-loop system described by the following characteristic equation is stable: C/S Eq. $= s^3 - 4s^2 + s + 6$?

- a) Stable
- b) Unstable

الحل:

3-b

$$s^3 - 4s^2 + s + 6 = 0$$

s^3	1	1	0
s^2	-4	6	0
s^1	25	0	
s^0	6	-	

6. if the characteristic equation of a system is $S^2 + 2 = 0$ then the system is:

- a) Over damped
- b) Critically damped
- c) Undamped
- d) Underdamped

الحل:

$$b) \quad \zeta^2 + 2 = 0$$

$$\zeta^2 + 2\delta\omega_n + \omega_n^2 = 0$$

$$\omega_n^2 = 2 \Rightarrow \omega_n = \sqrt{2}$$

$$2\sqrt{2}\delta = 0 \Rightarrow \delta = \frac{0}{2\sqrt{2}}$$

$$\delta = 0$$

8. If: $S^3 + 3S^2 + 4S + A = 0$. The roots of the characteristic equation lie in the left if of the s-plane. Then the value of the A is said to be:

- a) $0 < A < 12$
- b) $5 < A < 12$
- c) $A > 12$
- d) $A < 12$

الحل:

8) a

$$s^3 + 3s^2 + 4s + A = 0$$

s^3	1	4	0
s^2	3	A	0
s^1	$\underline{12-A}$	0	
s^0	A		

$$12 - A > 0$$

$$12 > A$$

$$A < 12$$

$$0 < A < 12$$

19. The necessary condition for the stability of the linear system is that all the coefficients of characteristic equation $1+G(s)H(s) = 0$, be real and have the :

- a) Positive sign
 - b) Negative sign
 - c) Same sign
 - d) Both positive and negative
-