

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, APRIL - 2026**

CONTROL ENGINEERING

[Maximum Marks: 100]

[Time: 3 Hours]

PART-A

[Maximum Marks: 10]

I. (Answer **all** questions in one or two sentences. Each question carries 2 marks)

1. Define a system.
2. Define transfer function.
3. Name any four test signals.
4. What you meant by type number of a system?
5. Define relative stability.

(5 x 2 = 10)

PART-B

[Maximum Marks: 30]

II. (Answer **any five** of the following questions. Each question carries 6 marks)

1. State and prove initial value theorem of Laplace transform.
2. Find the Laplace transform of $f(t) = e^{-at}$.
3. Obtain the transfer function of mechanical translational system.
4. Define Steady state response and Transient response.
5. Define i) rise time ii) peak time.
6. Sketch the bode plot of $G(s)=K$.
7. List the advantages and disadvantages of transfer function.

(5 x 6 = 30)

PART-C

[Maximum Marks: 60]

(Answer **one** full question from each Unit. Each full question carries 15 marks)

UNIT – I

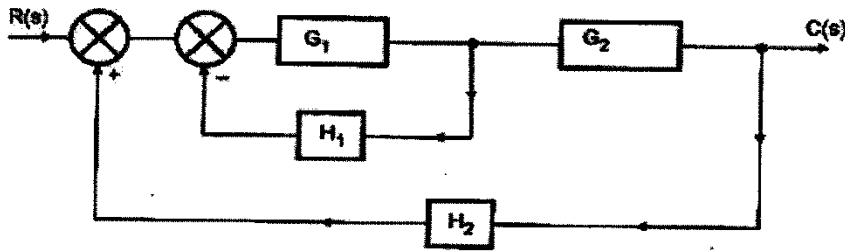
- III. a. Compare open loop system and closed loop system. (8)
- b. Find the Laplace transform of $f(t) = \cos at$. (7)

OR

- IV. a. State and prove real differentiation theorem. (8)
 b. Find the inverse Laplace transform of $F(s) = \frac{(s+2)}{s^2+2s+5}$ (7)

UNIT – II

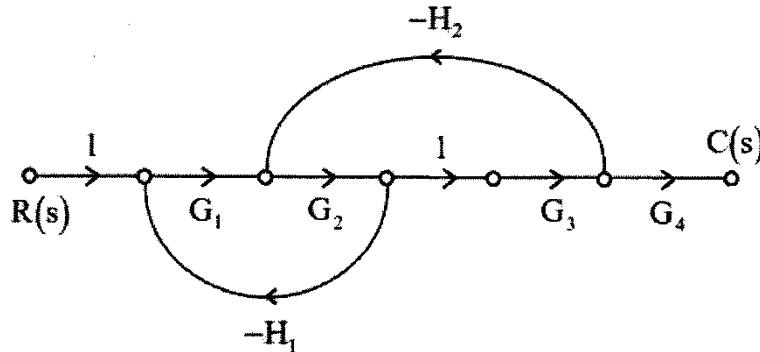
- V. a. Reduce the block diagram and find $C(s)/R(s)$.



- b. Obtain the transfer function of RLC series circuit. (7)

OR

- VI. a. Write any 7 block diagram reduction rules. (7)
 b. Find the overall gain for the signal flow graph below. (8)



UNIT- III

- VII. a. Derive the response of first order system to unit impulse signal. (8)
 b. Define i) Unit step signal ii) Unit ramp signal. (7)

OR

- VIII. a. The open loop transfer function of a unity feedback system is $G(S) = \frac{20}{s(s+6)}$. Find
 i) Damping ratio ii) Un damped natural frequency (8)
 b. Define static error constants K_p, K_v, K_a (7)

UNIT - IV

- IX. a. Using Routh array check the stability of system with characteristic equation is
 $s^3 + 6s^2 + 7s + 30 = 0$ (7)
 b. Explain procedure to construct a root locus. (8)

OR

X. a. A unity feedback system has an open loop transfer function $G(S) = \frac{(s+1.5)}{(s+1)(s+5)}$.

i) Find closed loop transfer function

ii) Find open loop poles and zeros

iii) Calculate the centroid

(9)

b. Define Phase margin and Gain margin.

(6)
