

Seat No.

OCT-NOV 2025 WINTER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Control Engineering

Sub. Code: 66241/80753/81007

Day and Date: Friday ,12-12-2025

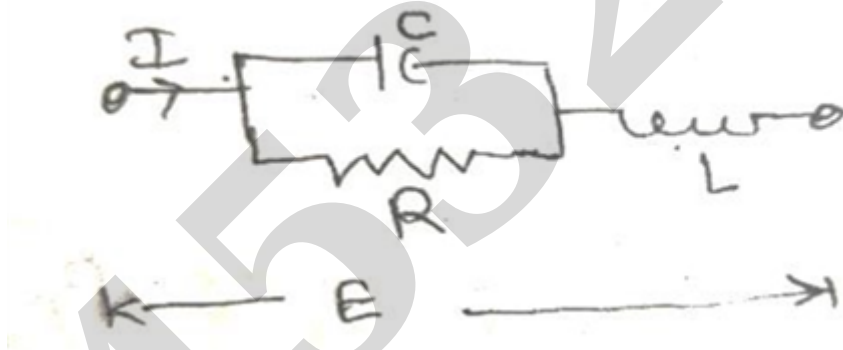
Total Marks: 70

Time: 02:30 PM To 05:00 PM

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks
 4. Use of Scientific calculator is allowed

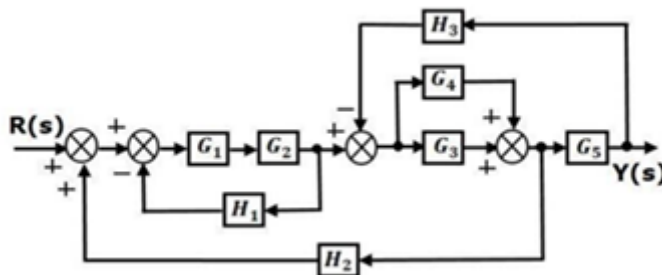
Q1) Solve the Following **[10]**

- A.** Explain Mathematical model of mechanical system. **[5]**
- B.** For the electrical system shown in fig. below , construct mechanical system which is in direct analogy **[5]**



Q2) Solve the Following **[12]**

- A.** Explain linear approximation. **[4]**
- B.** Reduce block diagram and find transfer function. **[6]**



C. **OR** **[8]**

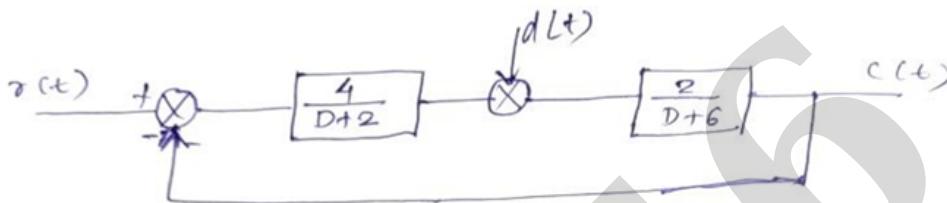
Head loss for liquid flowing through pipe is given by $H = \frac{4fLV^2}{2gD}$ where

coefficient f and acceleration due to gravity g are constants. Determine the linear approximation for the head loss. For $V_i=10$, $D_i=20$, Determine change in head loss due to increase in V by 2, decrease in D by 5 and increase in L by 0.1. Take Reference value of $L_i = 100$.

Q3) Solve Any Two

[12]

- A. A DC position control system is as shown in figure. Determine the response when $r(t) = 5u(t)$, $d(t)=0$ [6]

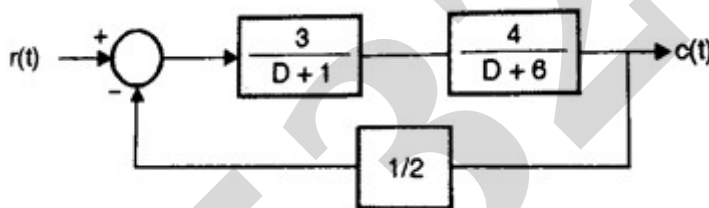


B.

OR

[6]

A system for controlling the temp. of modern office building as shown in fig. Determine the response $c(t)$ for following case - $r(t)=0$ and $C(0)= 1$, $C'(0)=-2$



- C. Find all the peak time domain specification for a unity feedback control system whose open loop transfer function is given by $G(S) = \frac{K}{s(s+1)(s+5)}$. [6]

Q4) Solve the Following

[12]

- A. Draw the root locus of the control system having open loop transfer [8]

$$G(s)H(s) = \frac{K}{s(s+1)(s+5)}$$

- B. Find the stability of the system represented by characteristic equation as, [4]

$$s^4 + 8s^3 + 18s^2 + 16s + 5 = 0$$

Q5) Solve the Following

[12]

- A. Draw the Bode magnitude and phase plot of the following open-loop transfer function and determine gain margin, phase margin and absolute stability? [8]

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

B. Define phase margin? What is phase and gain cross over frequency? [4]

Q6) Solve the Following [12]

A. Determine state space representation & computer diagram by using series programming method [6]

$$y(t) = \frac{2(D+5)}{(D+2)(D+3)(D+4)} f(t)$$

OR

B. Determine state space representation and computer diagram of the system [6] given by the transfer function.

$$Y(S) = \frac{2S + 9}{S^3 + 8S^2 + 12S + 10} U(S)$$

C. Determine state space representation & computer diagram by using direct programming method. [6]

$$y(t) = \frac{1}{(D+2)(D+3)} f(t)$$

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (101) Bachelor of Engineering (81007) Control Engineering Part 3 SEM 5
- 2] (101) Bachelor of Engineering (66241) Control Engineering Part 3 SEM 5
- 3] (1154) B.Tech. CBCS (80753) Control Engineering Part 3 SEM 5