

School of Engineering

**B.TECH Electronics and Communication Engineering in Artificial Intelligence and Machine
Mid Term Examination - May 2024**

**Duration : 90 Minutes
Max Marks : 50**

Sem VI - G2UC601T - Control System

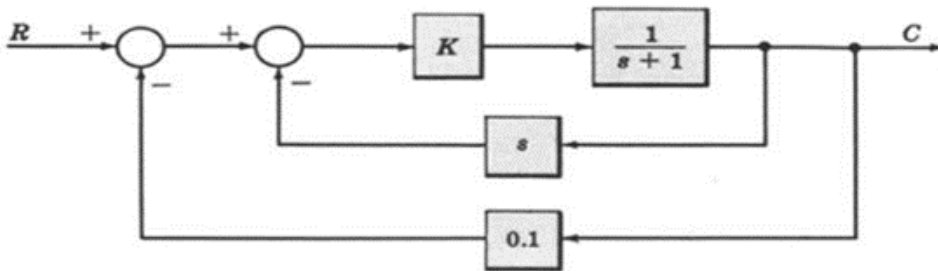
General Instructions

Answer to the specific question asked

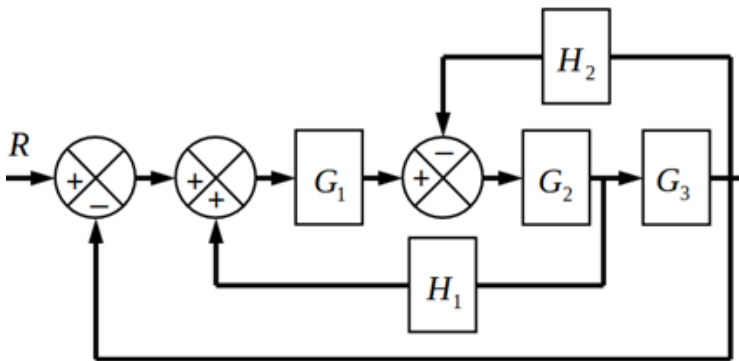
Draw neat, labelled diagrams wherever necessary

Approved data hand books are allowed subject to verification by the Invigilator

- 1) Illustrate the main components of a feedback control system. K2 (2)
- 2) Design the canonical form for the given block diagram and find open loop transfer function K1 (3)



- 3) Find the close loop transfer function and characteristics equation of the given system. K2 (4)



- 4) Construct the signal flow diagram, for the equation given in the figure. K2 (6)

$$x_1 = R + 7x_1 + 2x_2 + 5x_3$$

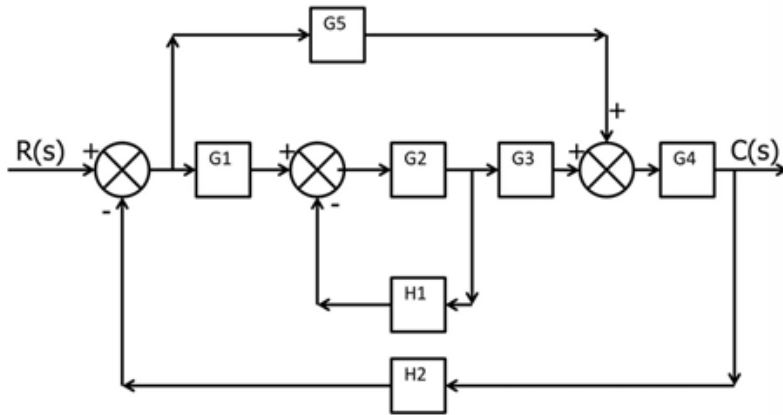
$$x_2 = -6x_1 + 4x_2 + 8x_3$$

$$x_3 = 3x_1 - 9x_2 + 6x_3$$

$$C = 2x_1 + x_2 + 3x_3$$

5) Draw the block diagram of a closed-loop control system with each block explanation K3 (6)

6) Consider a feedback control system with multiple blocks. Perform block reduction for the given system. K3 (9)



7) A control system has three blocks with transfer functions: $G_1(s) = 1/s$, $G_2(s) = 2/(s+1)$, and $G_3(s) = s/(s+2)$. Simplify the system using block reduction. K4 (8)

8) Discuss the advantages and limitations of using Mason's gain formula for solving complex control systems. K4 (12)

OR

Transform and design an parallel RLC circuit with current source into a state space model. K4 (12)