

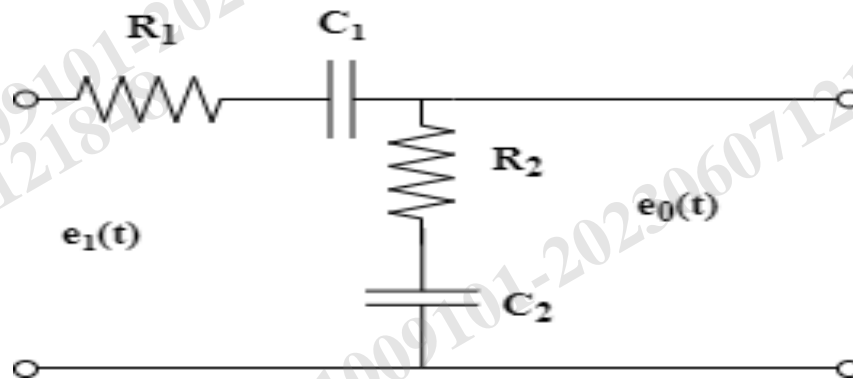
**6<sup>TH</sup> SEM ./ELECTRICAL / 2023(S)**  
**TH-3 Control System Engineering(CSE)**

Full Marks: 80

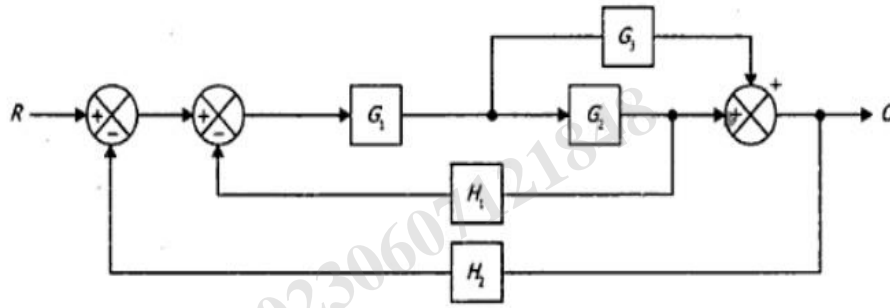
Time- 3 Hrs

Answer any five Questions including Q No.1& 2  
Figures in the right hand margin indicates marks& Use Calculator

1. Answer **All** questions 2 x 10
- a. How do you define Transfer Function?
  - b. Define Signal Flow Graph (SFG) & write two properties of SFG.
  - c. Write the effect of Negative feedback in control system.
  - d. How do you mean by **Order** and **Type** of a system?
  - e. Define unit impulse function.
  - f. What is the main objective of Root-Locus analysis Technique?
  - g. How do you define relative stability?
  - h. Write the effect of adding poles to closed loop control system.
  - i. Give two disadvantages of closed loop control over open loop control system.
  - j. Define Peak Time.
2. Answer **Any Six** Questions 6 x 5
- a. Derive the expression for peak time and setting time for the under damped second order system with unit step input.
  - b. Obtain the Transfer Function for the given electrical system

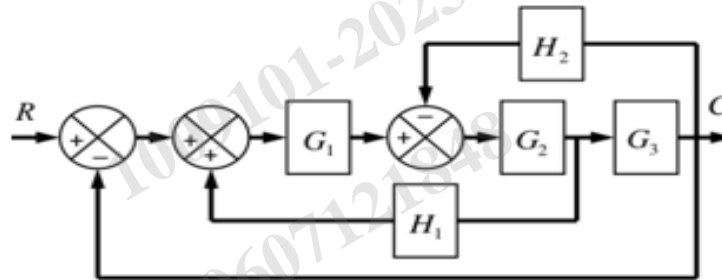


- c. Explain details of PID controller used in control system.
- d. Obtain the Transfer Function of a given system using Block Diagram Reduction Technique.



- e. Explain details of Nicholas Chart used in control system.
- f. State difference between open loop and closed loop control system.
- g. Write short note on Constant M and N circle in brief.

- 3 Describe construction and working principle of Synchros and also explain how it is used in servo application. 10
- 4 Draw the signal flow graph for the given system block diagram and obtain the closed loop transfer function of the system  $C(S)/R(S)$  using Masson's gain formula 10



- 5 Sketch the Root-Locus of the system whose transfer function is given by 10

$$G(s)H(s) = \frac{K}{s(s+2)(s+4)}$$

- 6 Describe with neat block diagram the working of armature controlled DC motor as a control system. 10

- 7 The open loop transfer function of the plant is 10

$$G(s)H(s) = \frac{80(s+5)}{s^2(s+50)}$$

Use Bode Plot, Find the Gain Margin and Phase Margin.