Duration: 3hrs   **[Max Marks:80]**

N.B.:   **(1) Question No 1 is Compulsory.**
        (2) Attempt any three questions out of the remaining five.
        (3) All questions carry equal marks.
        (4) Assume suitable data, if required and state it clearly.

1   Attempt any **FOUR**   [20]

   a   Define accuracy and precision with suitable examples.   [5]

   b   Explain working of Mega-ohm bridge for measurement of resistance of order of mega   [5]
ohm.

   c   List name of bridges for RLC measurement with proper classification.   [5]

   d   Discuss steps for construction of root locus.   [5]

   e   Compare NTC and PTC thermistors.   [5]

2 a   Explain the construction & working of LVDT. List the Advantages & Disadvantages of   [10]
LVDT.

   b   Determine the overall transfer function C(S)/R(S) for the system shown below using   [10]
block diagram reduction method.
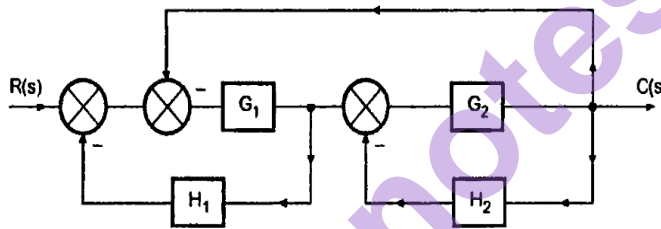
3 a   For the Signal flow graph shown below, determine the transfer function C(S)/R(S) using   [10]
Mason's gain formula.
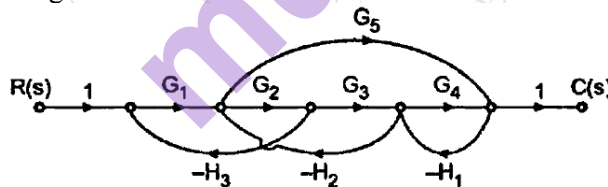
   b   For a unity feedback control system, the open loop transfer function $G(s) = \frac{100(S+1)}{S^2(S+2)(S+10)}$ [10]
Determine (i) Type of system (ii) Error coefficients (iii) Steady state error if input is

$$1 + 4t + \frac{t^2}{2}$$

4 a   Use the Rouths stability criterion to check the stability of system whose characteristic   [10]
equation is given by $S^6 + 2S^5 + 8S^4 + 12S^3 + 20S^2 + 16S + 16 = 0$

   b   The open loop transfer function of system $G(s)H(s) = \frac{50}{(S+1)(S+2)}$. Using Nyquist criterion
examine closed loop stability of system.

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5 a Plot the root locus for a unity feedback control system has an open loop transfer [10]
$G(s) = \frac{K}{S(S^2+6S+25)}$

b Sketch the Bode plot for the unity feedback control system $G(s) = \frac{100}{S(S+1)(S+2)}$ [10]

Determine the gain and phase margin.

6 Attempt any **FOUR**

a Write a short note on requirements of good control system. [5]

b List various types of temperature transducers and write application of each transducer. [5]

c Explain advantages and limitations of Routh Hurwitz stability criterion. [5]

d Write a short note on steady state errors in feedback control system. [5]

e For a unity feedback system $G(s) = \frac{9}{S(S+4)}$. Determine resonant peak and resonant [5]
frequency.