24 NOV 2025 SE EXTC (SEM-III) C SCHEME EICS QP CODE: 10095525

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]

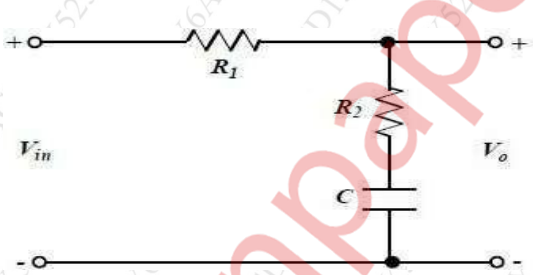
a Differentiate between closed loop control system and open loop control system . [5]

b Discuss the working principle of Kelvin Double Bridge. [5]

c What is Impulse response of a system? If Impulse response of a certain system is e-5t . Find out transfer function of this system. [5]

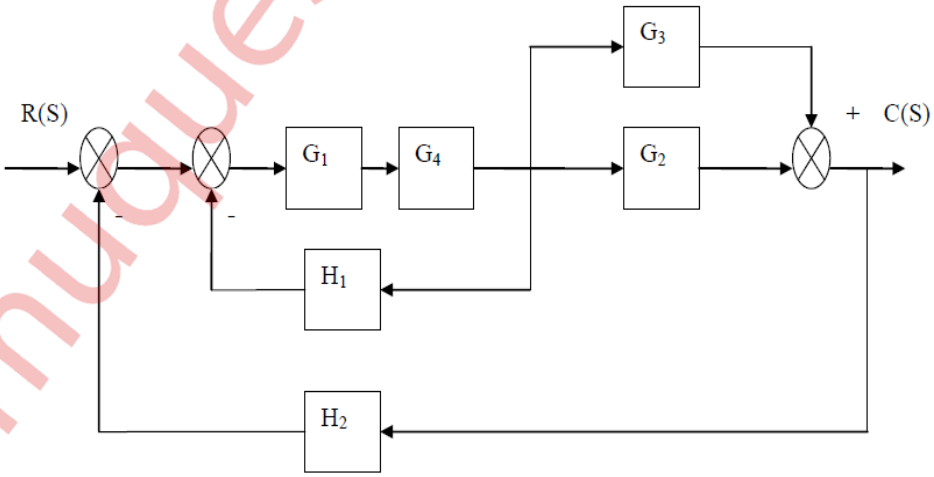
d Define rise time, peak time, maximum overshoot, Delay time, Settling time [5]

e Compute the transfer function of the given Lag network . [5]

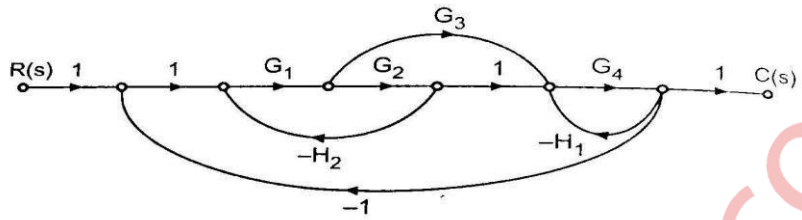


2 a Explain with neat diagram principle, construction and working of Strain gauge . Define and derive Gauge factor. [10]

b Determine the overall transfer function C(S)/R(S) for the system shown below using block diagram reduction method. [10]



3 a For the Signal flow graph shown below, determine the transfer function C(S)/R(S) using Mason's gain formula [10]



b A second order system has a unity feedback and open loop transfer function [10]

$$G(s) = \frac{500}{s(s+15)}$$

i) Calculate Tp, Mp and Ts for system output response when system is excited by unit step input

ii) Sketch transient response for unit step input

iii) If input is ramp of 0.5 rad/sec, calculate steady state error

4 a The open loop transfer function of a unity feedback control system is given by [10]

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

Determine the closed loop stability by Nyquist criterion.

b Draw the polar plot for the transfer function $G(s) = \frac{10}{(s+2)}$ [10]

5 a Plot the root locus for a unity feedback control system has an open loop transfer [10]

$$G(S)=\frac{K}{S(S+1)(S+3)(S+4)}$$

b Sketch the Bode plot for the unity feedback control system [10]

$G(S)=\frac{10}{S(S+1)(S+5)}$

Determine the gain and phase margin

6 Attempt any FOUR

a Write a short note on lag and lead compensators. [5]

b Write a short note on Hay's Bridge. [5]

c Write a short note on stability analysis using Nyquist Criteria [5]

d Use the Rouths stability criterion to determine the range of K for a unity feedback system whose open loop transfer function is [5]

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

e State and explain the rules of Block Diagram Reduction in brief. [5]