Total No. of Questions : 4]

SEAT No. :

PB-117

[Total No. of Pages : 2

[6269]-331

T.E. (Electrical Engineering) (Insem)

CONTROL SYSTEM ENGINEERING

(2019 Pattern) (Semester - II) (303150)

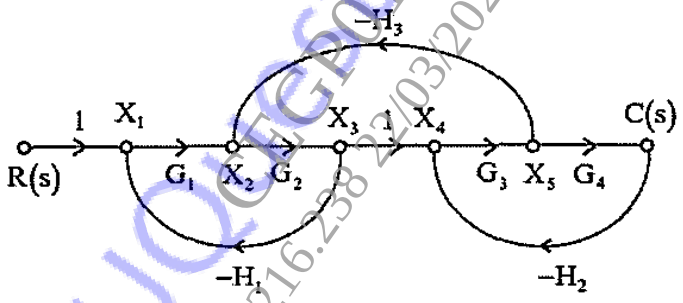
Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data, if necessary.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Compare open loop and close loop system with block diagram and illustration. **[7]**

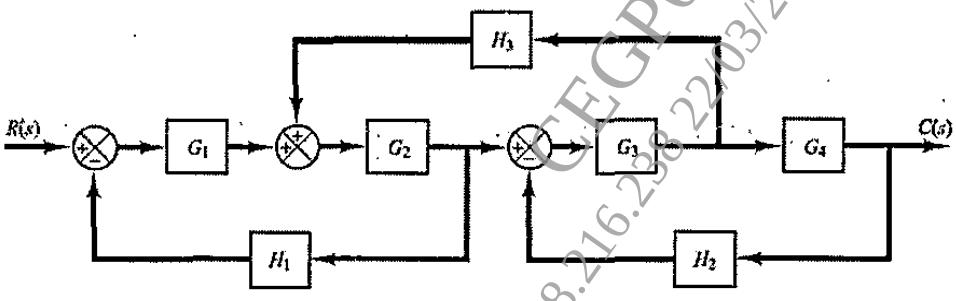
b) Find the transfer function C(S)/R(S) for following system using Mason's gain formula (Treat X_1, X_2, X_3, X_4, and X_5 as nodes). **[8]**



OR

Q2) a) Explain force voltage and force current analogy with the help of suitable diagrams. **[7]**

b) Derive C(S)/R(S) using block diagram reduction technique for following system : **[8]**



P.T.O.

Q3) a) Derive an expression for steady state error of close loop system and state the formula for steady state error for step, ramp and parabolic input in terms of static error coefficients. State any two limitations of static error coefficient method. **[7]**

b) A unity feedback control system is characterized by open loop transfer function given by $G(S) = 50/ (S^2+5S+24)$. Find un-damped natural frequency, damping ratio, damped natural frequency and settling time. Also calculate time period of oscillations related to damped natural frequency. Write an expression for output response. **[8]**

OR

Q4) a) Write transfer function of type 0, type 1 and type 2 systems in standard time constant form in terms of gain, poles and zeros. Define under damped, over damped and critically damped system and show nature of output response for unit step input. **[7]**

b) For the system with G(S)H(S) = 20000/ (1+s) (1+0.1s) (1+0.005s), find steady state error for step, ramp and parabolic input each of magnitude 1000. What will be magnitude of steady state output (Css) for given step input? **[8]**