Total No. of Questions : 4]

SEAT No. : ____

PB18

[Total No. of Pages : 2

[6268] 212

S.E. (Electronics/E & TC Engineering)

(Insem) CONTROL SYSTEM

(2019 Pattern) (Semester - IV) (204192)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data, if necessary.***

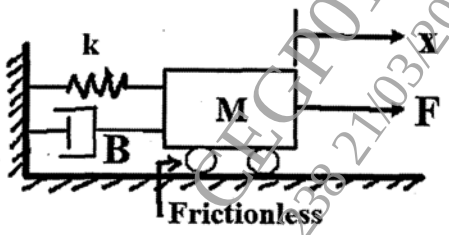
Q1) a) Explain open loop and closed loop systems with real time example. **[4]**

b) For the given mechanical system **[5]**

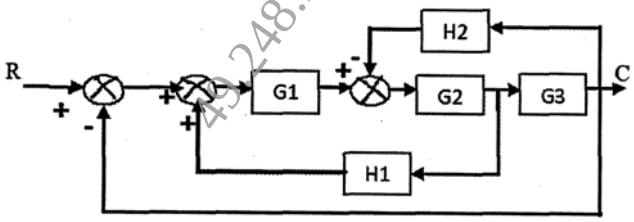
i) Draw mechanical Network,

ii) Write differential equation,

iii) Draw F-I analogous network

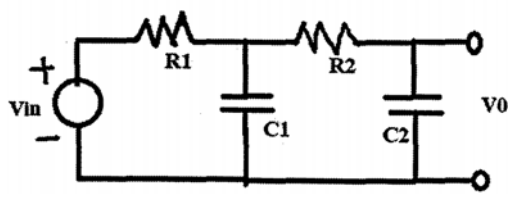


c) Reduce the following block diagram and obtain the transfer function C/R. **[6]**



OR

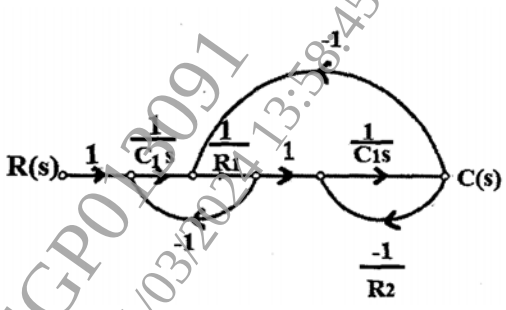
Q2) a) Determine the transfer function of $\frac{V_0}{V_{in}}$ **[5]**



P.T.O.

b) Write the features of open loop system **[4]**

c) Consider the system shown in figure obtain the closed loop transfer function C(s)/R(s) **[6]**



Q3) a) Derive the equation for generalized error and steady state error. **[4]**

b) Determine the static error, constant and steady state error for step input if the unity feedback system has open loop transfer function $G(s)=\frac{k}{s(s+2)(s+4)+20}$, $k = 10$. Also find 'k' if steady state error for step input is 0.8. **[6]**

c) Draw and sketch the transient response of second order control system and explain all the transient response specification. **[5]**

OR

Q4) a) Explain the effect of damping factor on the position of closed loop poles. **[4]**

b) Find the expression for closed loop transfer function, damping factor and undamped natural frequency of oscillations for the system $c(t) = 1 + 0.2e^{-60t} - 1.2e^{-10t}$ subjected to unit step input. **[6]**

c) For the unity feedback system having open loop transfer function $G(s)=\frac{(s+2)}{s(s^3+7s^2+12s)}$ Find type of system, error coefficients, and steady state error. **[5]**