

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)**

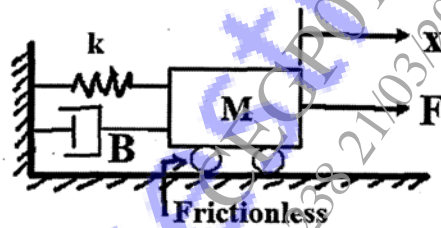
Time : 1 Hour]

[Max. Marks : 30

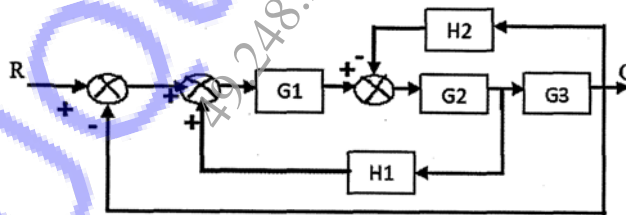
Instructions to the candidates:

- 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

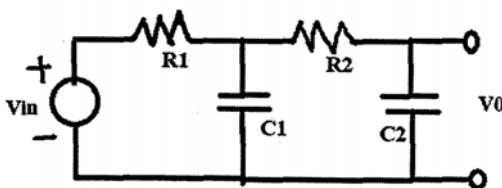


- c) Reduce the following block diagram and obtain the transfer function  $C/R$ . [6]



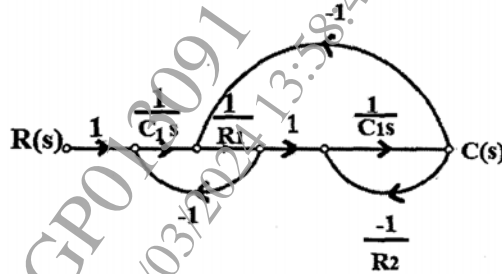
OR

- 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]

x x x