Total No. of Questions : 6]

SEAT No. :

P516

[Total No. of Pages : 2

APR - 18/TE/Insem. - 116

T.E. (Electrical)

CONTROL SYSTEM - I

(2015 Course) (Semester - II) (303147)

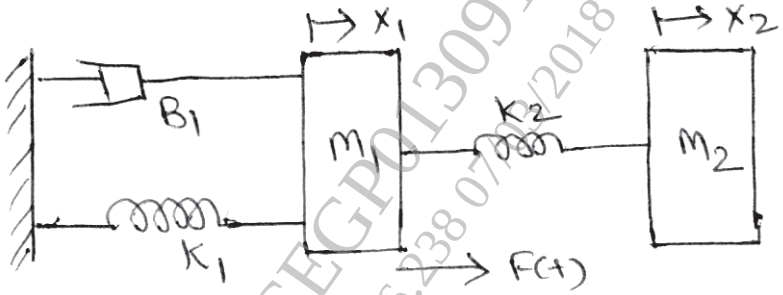
Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Compare Feedback and Feed forward control system. **[4]**

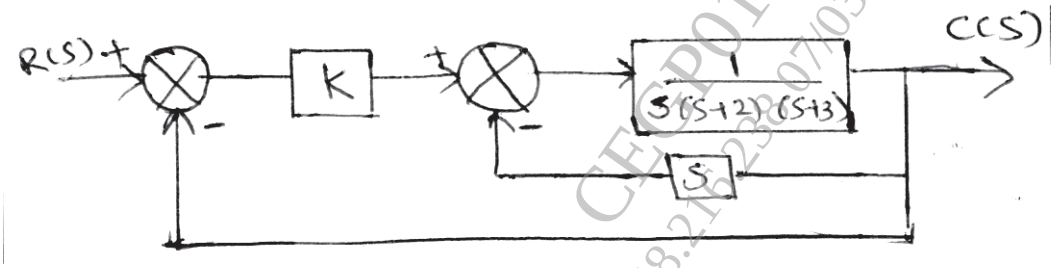
b) Determine equilibrium equations for following system using Force - Current analogy. **[6]**



OR

Q2) a) State and explain Mason's Gain formula for Signal flow graph. **[4]**

b) Obtain transfer function of the system. **[6]**



P.T.O.

Q3) a) Derive an expression of steady state error for a simple closed loop system. **[4]**

b) A unity feedback system has $G(s)=\frac{K}{s(s+1)(1+0.4s)}$ **[6]**

i) For ramp input r(t) = 4t and K = 2, find steady state error.

ii) If desired steady state error to be 0.2, Find corresponding value of K.

OR

Q4) a) Explain effect of ξ (damping factor) on locations of closed loop poles. **[4]**

b) For system having $\frac{C(s)}{R(s)}=\frac{20}{s^2+7s+25}$ **[6]**

Determine all time domain specifications.

Q5) a) How two special cases of Routh's Criterion can be solved? **[4]**

b) Determine the range of k for stability of a system having characteristic equation $s^3 + 3ks^2 + (k + 2)s + 4 = 0$. **[6]**

Find the value of k so that the system is marginally stable and find the frequency of sustained oscillations.

OR

Q6) a) Explain the terms : Centroid and Angle of asymptotes of Root locus. **[4]**

b) Determine Break away point and angle of departure for root locus of a system with open loop transfer function. **[6]**

$$G(s)H(s)=\frac{k(s+1)}{s^2+4s+13}.$$

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