Total No. of Questions :8]

SEAT No. :

**P2880**

[Total No. of Pages :2

# [4958]-1069
# T.E. (Electrical)
# CONTROL SYSTEM - I
# (2012 Course) (303147) (Semester - II)

*Time : 2½ Hours]* *[Max. Marks :70*

***Instructions to the candidates:***

1) ***Answer all questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

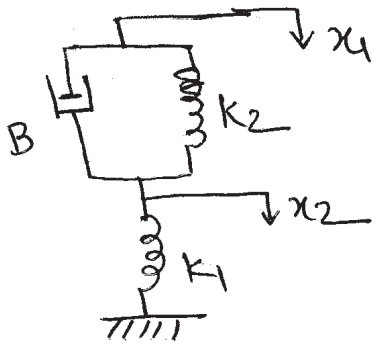
***Q1)*** a) Compare open loop system with close loop system. Give one example of each. **[6]**

b) Derive transfer function of lead network. **[7]**

c) Explain different static error coefficients and steady state error in each case. **[7]**

OR

***Q2)*** a) Explain Force - voltage analogy and find transfer function of **[7]**




b) Derive transfer function of DC servomotor. **[6]**

c) Find damping ratio, settling time and peak overshoot for system with close loop transfer function given by $T(S) = \frac{10}{s^2 + 7s + 20}$. **[7]**

***P.T.O.***

***Q3)*** a) Explain Routh Hurwitz stability criterion. **[6]**

b) Draw root locus for following system. Also find range of values of K for which system is stable. $G(S) = \frac{K}{s(s+2)(s^2+s+1)}$ **[10]**

OR

***Q4)*** a) Using Routh Harvitz criterion determine whether the given close loop system is unstable. If unstable how many poles are on right halfs plane or imaginary axis. **[8]**

$$G(S) = \frac{10}{s^5+7s^4+6s^3+42s^2+8s+56}$$

b) Explain rules for construction of root locus. **[8]**

***Q5)*** a) Draw bode plot for following system $G(S) = \frac{1000}{s(1+0.1s)(1+0.001s)}$ Find gain margin and phase margin comment on stability. **[12]**

b) Define Gain margin and phase margin. Explain how it is to be found using bode plot. **[6]**

OR

***Q6)*** a) Draw polar plot for $G(S) = \frac{10}{s(s+1)(s+4)}$. **[9]**

b) Explain Nyquist stability criterion. Explain procedure for drawing nyquist plot and how to determine stability. **[9]**

***Q7)*** a) Explain P and PI controllers. Explain their effect on damping ratio and steady state error. **[8]**

b) Design a PID controller for system with unity feedback and **[8]**

$$G(S) = \frac{K}{(s+3)(s^2+s+1)}$$

OR

***Q8)*** a) Explain Ziegler Nichols method of tuning PID controller. **[8]**

b) Explain procedure for designing PID controller using root locus. **[8]**

*EEE*