

Total No. of Questions : 8]

SEAT No. :

P2394

[4758]-554

[Total No. of Pages : 3

T.E. (Electrical)

CONTROL SYSTEM-I

(2012 Course) (Semester - II) (303147) (End - Semester)

Time : 2.30 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) The transfer function of a system is given by

[6]

$$T(s) = \frac{K(s+2)}{s(s+4)(s^2+2s+2)}$$

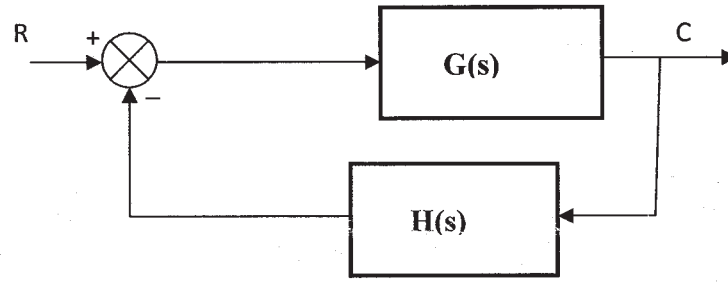
Determine

- i) poles
 - ii) zeros
 - iii) Pole zero plot in s plane
 - iv) Characteristic equation
- b) Write short note on synchro transmitter receiver. **[7]**
- c) Sketch the time response for standard second order under damped system, mark and explain different time domain specifications from that. **[7]**

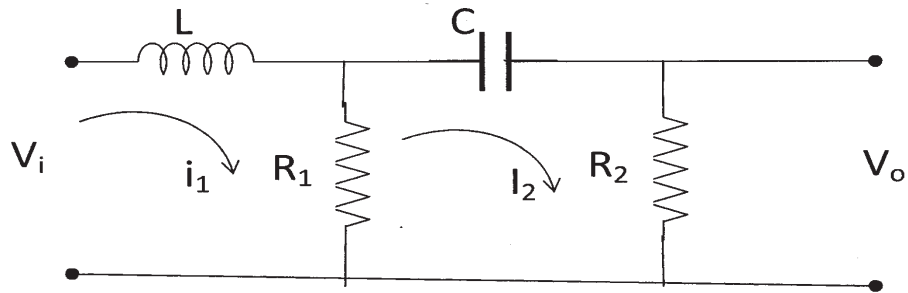
OR

P.T.O.

Q2) a) Define transfer function. Derive transfer function of following [6]



b) Determine transfer function of following electrical network. [7]



c) What is type and order of system. Explain effect of type of system on steady state error. [7]

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. $G(s) = \frac{K}{s(s+3)(s^2+2s+2)}$ [10]

OR

Q4) a) Using Routh Hurwitz criterion for the unity feedback control system with open loop transfer function $G(s) = \frac{K}{s(s+1)(s+2)(s+5)}$ [8]

- i) Find range of K for stability.
- ii) Find the value of K for marginally stable and corresponding close loop poles.

b) State magnitude criterion and angle criterion for point to be on root locus. Explain any three rules for root locus. [8]

Q5) a) Draw bode plot for following system $G(s)=\frac{40}{s(s+3)(s+12)}$ Find gain margin and phase margin comment on stability. **[12]**

b) Explain Nyquist stability criterion. **[6]**

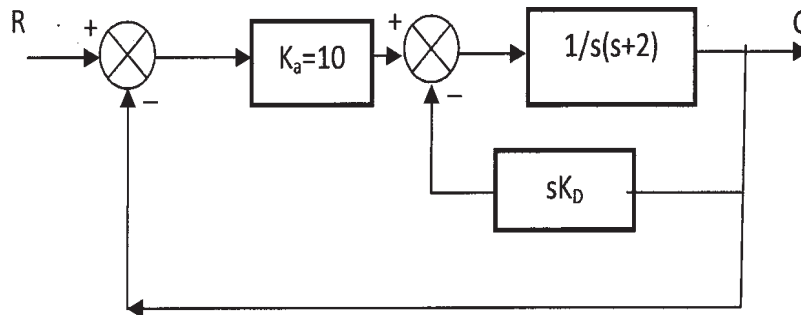
OR

Q6) a) Explain correlation between frequency domain and time domain. **[9]**

b) Draw nyquist plot for following open loop system $G(s)=\frac{50}{s(s+3)(s+6)}$ and check for stability. **[9]**

Q7) a) Explain P, PI, PID controller and their features. **[8]**

b) A feedback system which employs output rate feedback is shown. Determine the derivative feedback constant K_D which will increase the damping factor of the system to 0.6. What is the steady state error to unit ramp input. **[8]**



OR

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

b) Using Ziegler Nichols method design a PID controller for system with unity feedback and $G(s)=\frac{1}{s(s+1)(s+5)}$ **[8]**

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