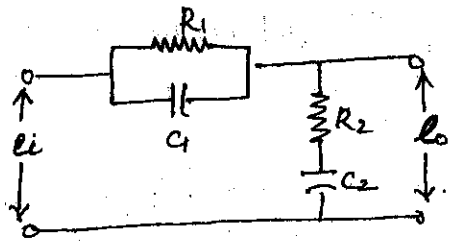
B. Tech Degree VI Semester Examination, April 2008

CS/EC/EB/EI 605 CONTROL SYSTEMS ENGINEERING

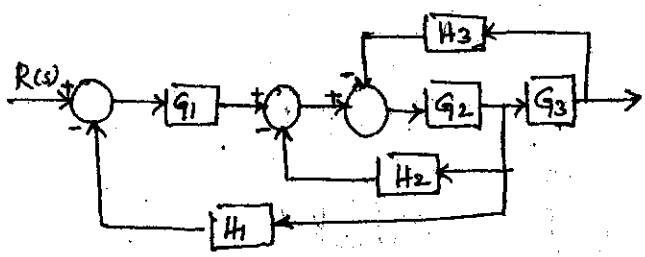
(Common for 1999 and 2002 Scheme)

Time : 3 Hours Maximum Marks : 100

I. (a) Find the transfer function of the circuit. (10)



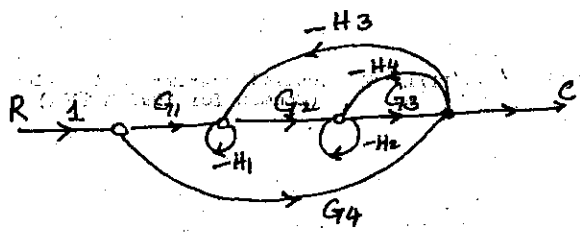
(b) Determine the closed loop transfer function for the system. (10)



OR

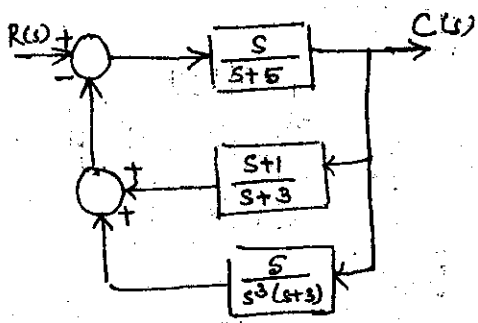
II. (a) Find the inverse Laplace transform of $F(s)=\dfrac{1}{s(s+a)^2}$. (10)

(b) Use Mason's gain formula and determine the overall transfer function of the system. (10)



III. (a) A system has unit response as $c(t)=1-e^{-0.1t}$. Determine its unit impulse and r amp response. (10)

(b) Find the error coefficients of the system. (10)

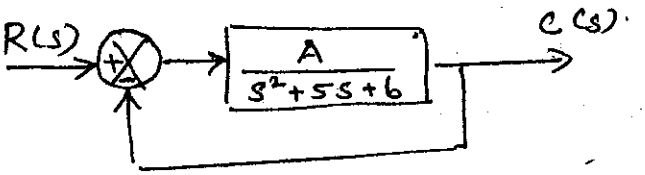


OR

(Turn Over)

IV. (a) Explain PI and PD control action and its effects on the system performance. (10)

(b) For the given system with A = 200 find the maximum overshoot, rise time and time at which peak overshoot takes place. (10)



V. (a) Explain how the roots of the characteristic equation affect the stability of the system. (8)

(b) Draw the complete Nyquist plot for the system with $G(s)H(s)=\frac{K}{s(s+1)(s+5)}$ and discuss stability. (12)

OR

VI. (a) Write brief note on Nichol's chart. (8)

(b) Draw Bode plot of the system whose open loop transfer function is given by $G(jw)H(jw)=\frac{100}{jw(5+jw)(10+jw)}$. Determine gain and phase margins and comment on the stability. (12)

VII. Design a P.I controller so that a unity feedback control system having open loop transfer function $G(s)H(s)=\frac{4}{(s+1)(s+2)}$ will have a phase margin of 50^0 at frequency of 1.7 rad/sec. (20)

OR

VIII. Explain the magnitude and angle criterion. Obtain the root locus diagram for a unity feedback system with open loop transfer function $G(s)=\frac{k}{s(s^2+6s+10)}$. (20)

IX. (a) Obtain the state transition matrix $\phi(t)$ of the following system.

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & -3 \\ -2 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}.$$ (10)

(b) Write the state space equation of a series RLC circuit. (10)

OR

X. Write note on :

(i) Servomotor

(ii) Magnetic amplifier

(iii) Principle of Adaptive Control System. (20)

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