BT6/M06

Control System Engineering (2005-06)

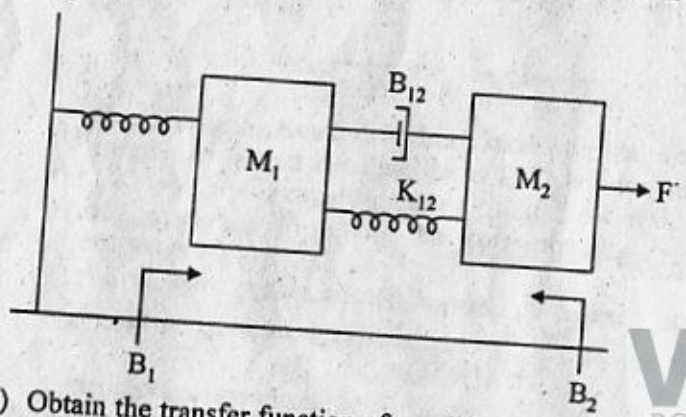
Paper : ECE-302 E

Time : Three Hours] [Maximum Marks : 100

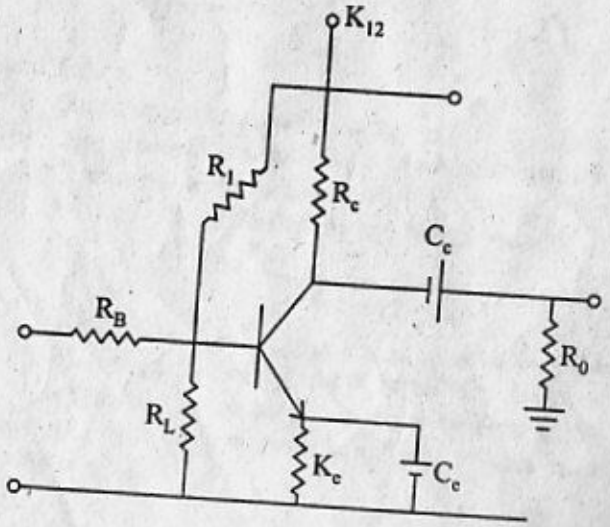
Note : Attempt any FIVE questions. All questions carry equal marks.

1. (a) Define control system. Illustrate with suitable example man made, normal and partly both man made and natural style. 5

(b) Write system equations and obtain transfer function of the system. 8

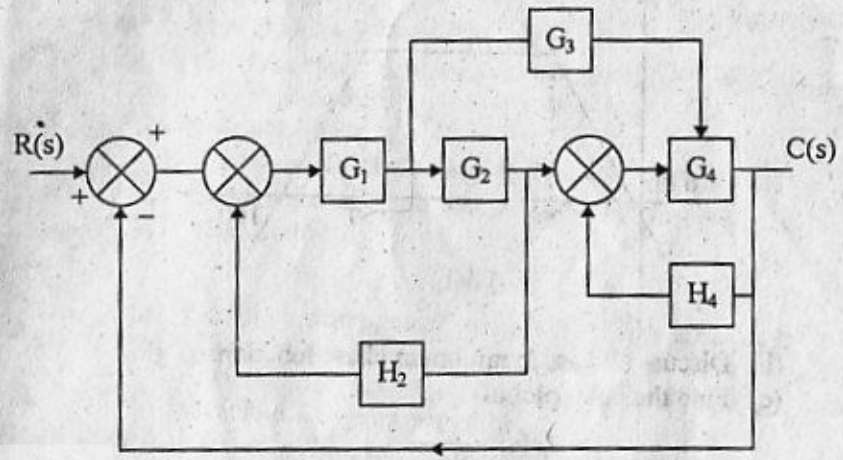


(c) Obtain the transfer function of amplifier with RC Coupling of below fig. 7

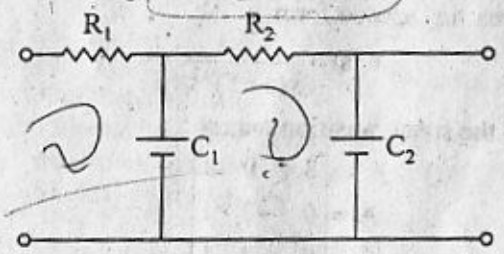


2. (a) Draw the generalised feedback control system. Explain various terms. 5

(b) Find the single block equivalent by block diagram reduction. 8



(c) Find T.F. using Mason gain formula 7



3. (a) Discuss transient response specification for second order system. 10

(b) Find time domain specification for

$$\frac{C(s)}{R(s)} = \frac{100}{s^2 + 8s + 100}$$ 10

4. (a) Discuss the correlation between time & freq. domain specifications. 10

(b) The characteristic equation of a feedback system is

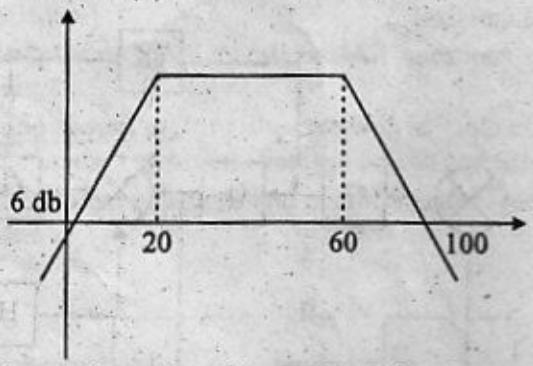
$F(s) = s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 10$

using the routh criteria, determine the stability of system. 10

5. (a) Sketch the root locus of a unity feedback control system with $u(s) = \frac{k}{s(s+1)(s+3)}$ and determine the value of K for marginal stability. 12

(b) Discuss the significance of gain and phase margin in predicting the stability of system. 8

6. (a) For the magnitude plot shown in fig. find the transfer function GH (S). 8



(b) Discuss all pass & minimum phase function. 6

(c) Find the polar plot of

$$G(s)=\frac{1}{1+as}$$ 6

7. (a) Express in cascade form

$$u(s)=\frac{1}{s(s+5)(s+3)}$$ 10

(b) Find the state transition matrix :

$$A=\begin{bmatrix}3 & 0 & 0\\ 0 & -2 & 1\\ 0 & 4 & 1\end{bmatrix}$$ 10

8. Write short note on :
   (a) Phase lead compensation
   (b) Feedback compensation 20