BT-6/J08

Control System Engg.

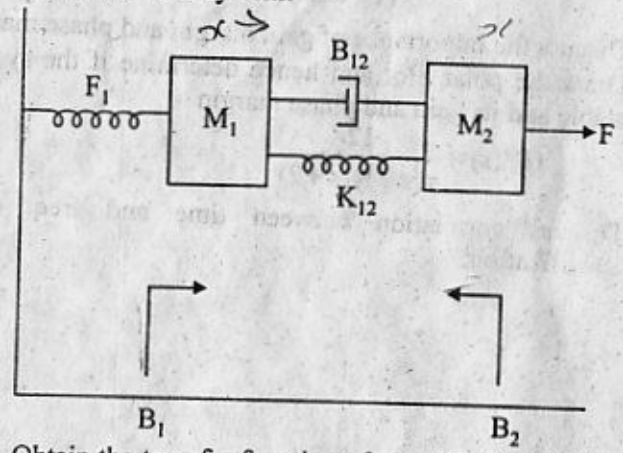
Paper : ECE-302 E

Time : Three Hours] [Maximum Marks : 100

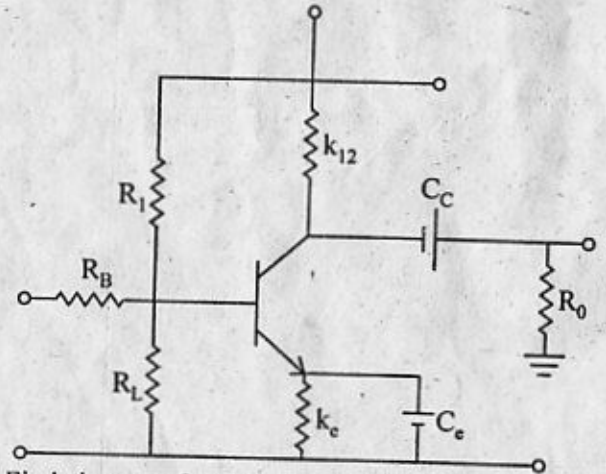
Note : Attempt any **FIVE** questions.

1. (a) Define Control System. Give comparison between open and control loop system. 5

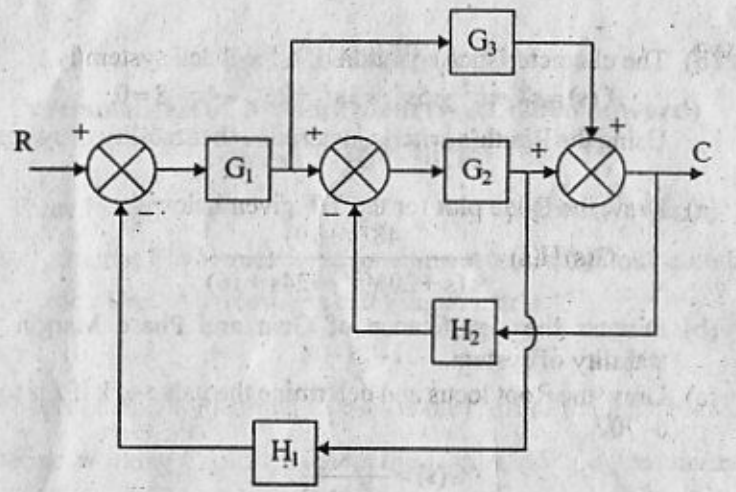
   (b) Find the system equation for Fig. shown and obtain transfer function of the system. 8



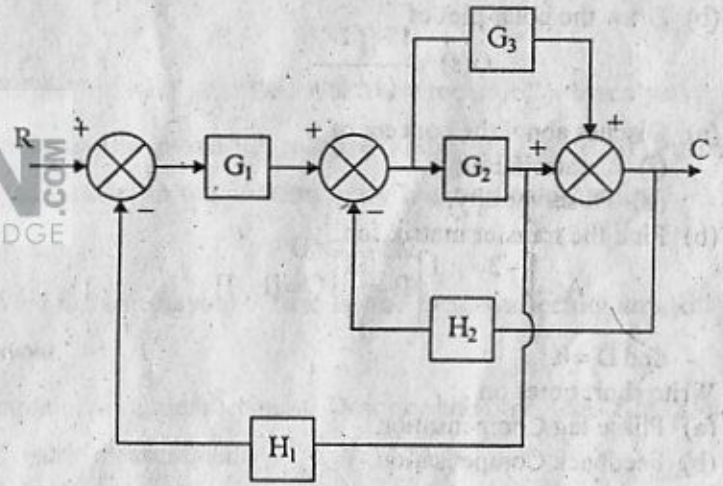
   (c) Obtain the transfer function of Amplifier with RC coupling of below figure. 7



2. (a) Find the transfer function of the shown figure by Block Diagram Reduction method. 10



   (b) Find Transfer Function using Mason's gain formula : 10



3. (a) Explain the following terms :
   (i) The rise rinfe
   (ii) Maximum overshoot
   (iii) Peak time
   (iv) Settling time, t_s. 10

   (b) Find time domain specification for :

$$\frac{C(s)}{R(s)} = \frac{200}{s^2 + 6s + 50}.$$

   10

4. (a) Discuss the correlation between Time and Frequency Domain specification. 10

(b) The characteristics equation of a feedback system is

$$f(s) = s^6 + s^5 + 5s^4 + 3s^3 + 2s^2 - 4s - 8 = 0.$$

Using the Routh's criteria, determine the stability of system. 10

5. (a) Draw the Bode plot for the T/F given below :

$$G(s)H(s) = \frac{48(s+10)}{s(s+20)(s^2+24s+16)}.$$ 10

(b) Discuss the significance of Gain and Phase Margin for stability of system. 10

6. (a) Draw the Root locus and determine the value of k if z is to be 0·707

$$G(s) = \frac{k}{s(s+4)}.$$ 10

(b) Draw the polar plot of

$$G(s) = \frac{1}{s(1+6s)}.$$ 10

7. (a) Discuss about the concept of :
(i) Controllability
(ii) Observability. 10

(b) Find the transfer matrix for :

$$A = \begin{bmatrix} -3 & 1 \\ 0 & -1 \end{bmatrix} \quad B = \begin{bmatrix} 1 \\ 1 \end{bmatrix} \quad C = [1 \quad 1]$$

and $D = 0$. 10

8. Write short notes on :
(a) Phase lag Compensation 10
(b) Feedback Compensation. 10