BT-6/J07

Control System Engg. (2005-06)

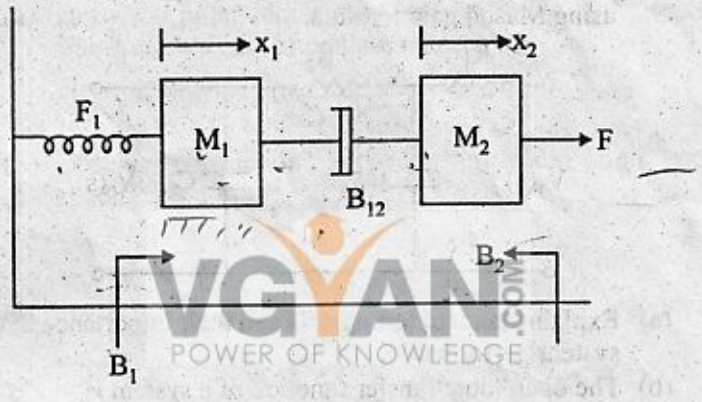
Paper : ECE-302 E

Time : Three Hours] [Maximum Marks : 100

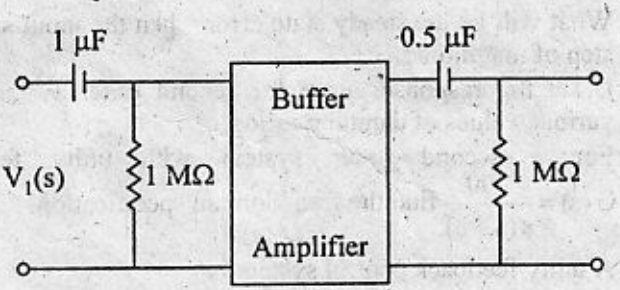
Note : Attempt any **FIVE** questions. All questions carry equal marks.

1. (a) What are open and closed loop systems ? Distinguish between them. 5

(b) Find the system equations for fig. shown below and obtain f-v analog : 8

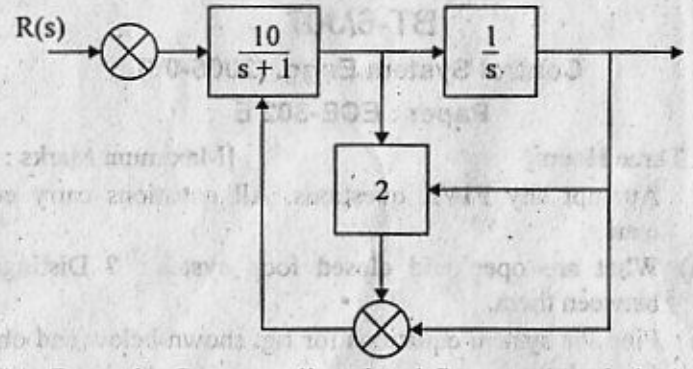


(c) Find $\frac{V_0(s)}{V_1(s)}$ for figure shown below : 7

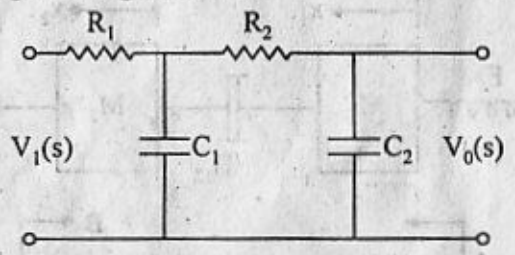


2. (a) Draw the generalised feedback control system. Explain various terms. 6

(b) The block diagram of a system is shown below. Determine the transfer function. 7



(c) Draw the Corresponding signal flow graph and obtain T.F. using Mason gain formula. 7



3. (a) Explain standard test signals and their importance in control system performance. 5

(b) The open loop transfer function of a system is

$$GH(s)=\frac{10}{s(s+2)(s+5)}.$$

What will be the steady state error when the input signal is step of magnitude. 7

(c) Draw the response curve for second order system with various values of damping ratios. 8

4. (a) For a second order system with unity feedback $G(s)=\frac{200}{s(s+8)}$ find the freq. domain specification. 10

(b) A unity feedback control system is

$$G(s)=\frac{K}{s(s^2+4s+5)(s+2)}.$$

Determine the range of K so that system is stable. 10

5. (a) Express in parallel form

$$G(s)=\frac{5(s+1)}{s(s+2)(s+10)}$$ 10

(b) Find the dynamic equation of system in matrix form

$$\frac{2d^3y}{dt^3}+\frac{3d^2y}{dt^2}+\frac{5dy}{dt}+2y=x(t).$$ 10

6. Write short notes on :
   (a) Phase lead compensation
   (b) Feedback compensation. 20

7. (a) Plot the Nyquist stability plot

$$G(s)H(s)=\frac{20}{s(1+0\cdot1s)(1+0\cdot5s)}.$$ 15

(b) Discuss the importance of gain margin and phase margin. 5

8. (a) Draw the polar plot and hence determine if the system is stable and its gain and phase margin

$$GH(s)=\frac{12}{s(s+1)(s+2)}.$$ 10

(b) Discuss correlation between time and freq. domain specification. 10