PVP 12

Code: EC4T1

II B.Tech - II Semester – Regular Examinations - JUNE 2015

CONTROL SYSTEMS
(ELECTRONICS AND COMMUNICATION ENGINEERING)

Duration: 3 hours Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. Obtain the transfer function for the model shown in Figure 1 below. 14 M

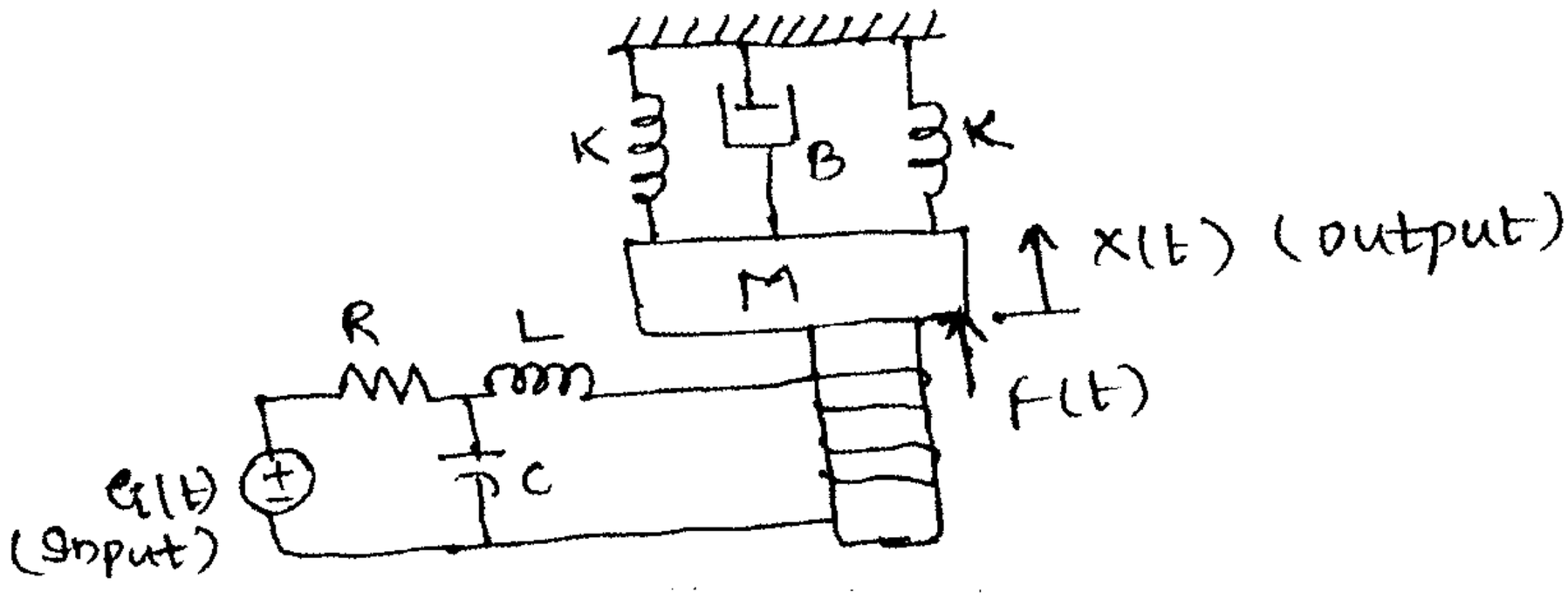

Figure 1

2. a) Reduce the given block diagram in Figure 2 and hence obtain the transfer function C/R. 7 M

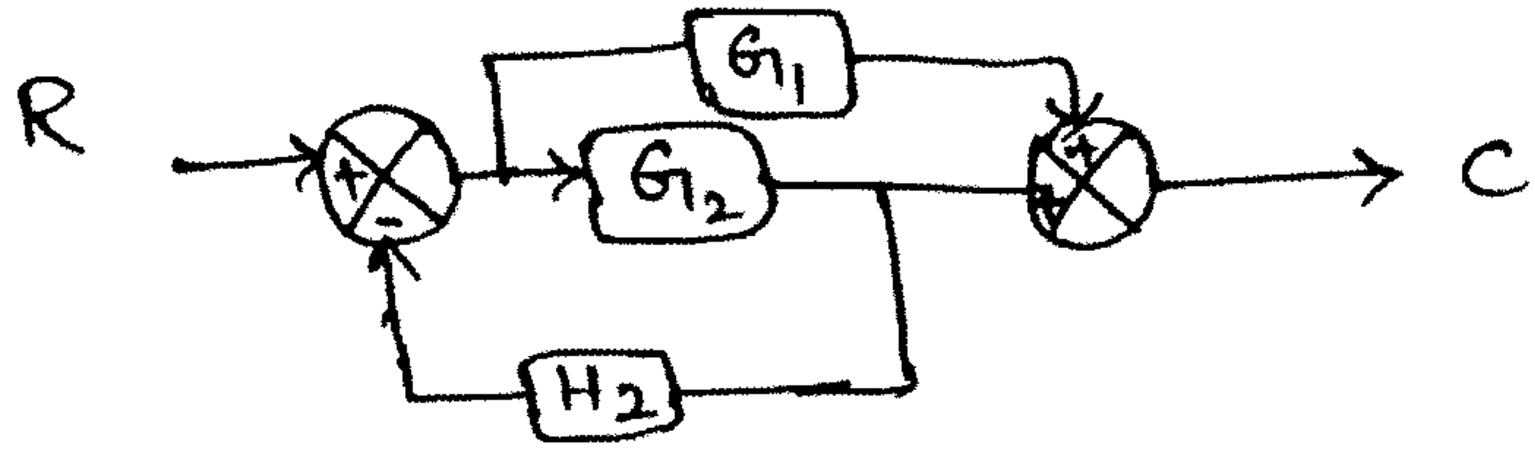

Figure 2

b) For the block diagram shown in Figure 2, Determine the transfer function using Mason's gain formula. 7 M

3. a) The system show in Figure 3(a) when subjected to a unit step input gives the output response shown in Figure 3(b). Determine the values of K and T from the response curve. 7 M

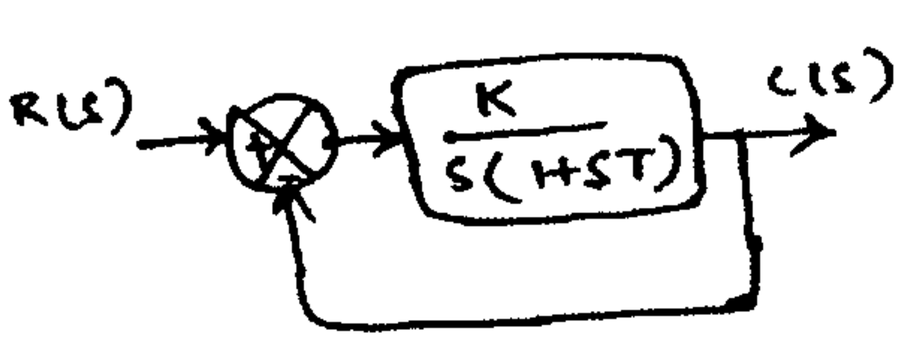

Figure 3(a)

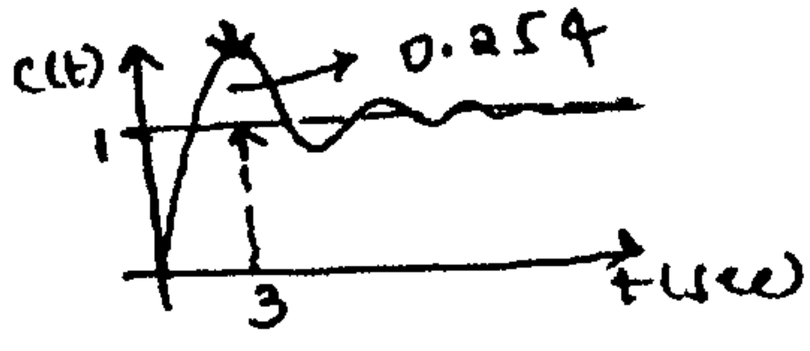

Figure 3(b)

b) Derive the expression for rise time and peak overshoot for standard second order system. 7 M

4. Show that root locus for a control system with $G(S)=\frac{K(S+1)}{S(S-1)}$, $H(S)=1$ is a circle with centre a (-1,0) & radius $\sqrt{2}$. Determine the value of K for the system to be stable for under damped System. 14 M

5. Sketch the bode plot for the given open loop transfer function $G(S)=\frac{K}{S(S+2)(S+10)}$. Determine gain margin, phase margin and the value of K for the system to be stable. 14 M

6. Determine the gain cross over frequency, phase cross over frequency, gain margin, phase margin of a system with open loop transfer function by drawing nyquist plot. Comment on the stability of the system. 14 M

$$G(S) = \frac{1}{S(1+S)(1+2S)}$$

7. Derive the transfer function and draw the pole-zero plot for the 14 M

   i) lag compensator

   ii) lead compensator

8. a) Obtain the state variable representation for the system with transfer function $\frac{10(S+4)}{S^3+3S^2+2S+1}$. 7 M

   b) For the matrix A= $\begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$. Find state transition matrix. 7 M