PVP 12

Code: EC4T1

II B.Tech - II Semester – Regular Examinations - JUNE 2014

CONTROL SYSTEMS
(ELECTRONICS AND COMMUNICATION ENGINEERING)

Duration: 3 hours Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. a) Define the terms
   (i) Transfer function
   (ii) Impulse Response. 5 M

   b) Write the differences between Open Loop and Closed Loop systems. 5 M

   c) Discuss the advantages of the negative feedback control systems. 4 M

2. a) Find the transfer function of the following block diagram shown in Figure 1. 10 M

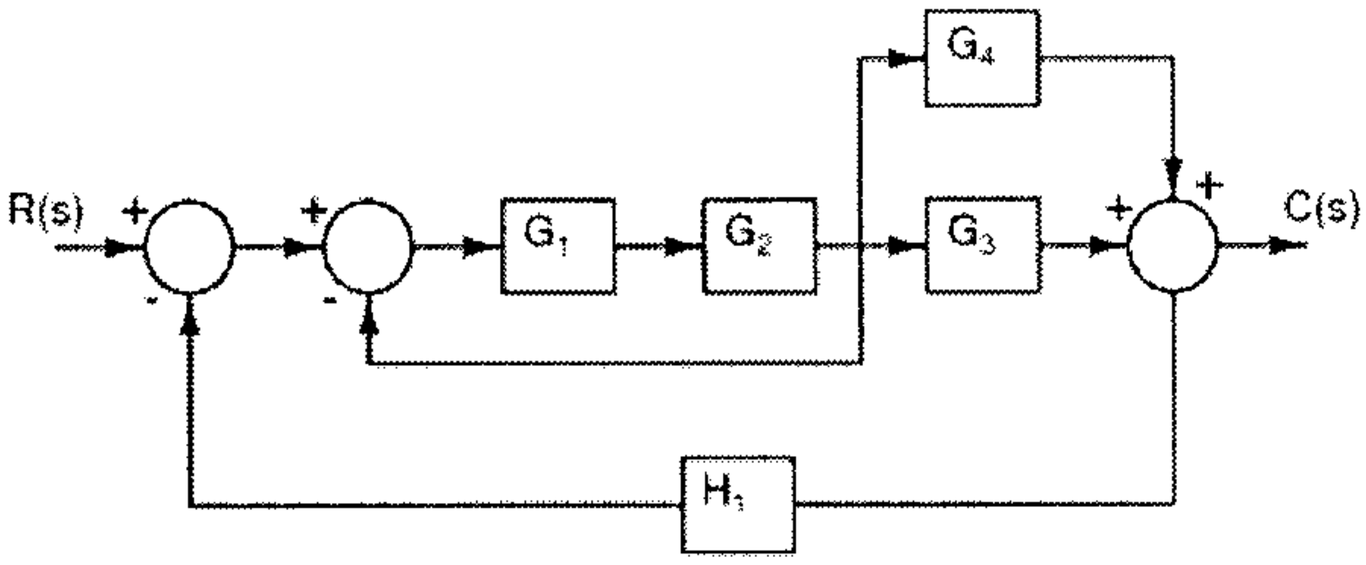

Figure 1

b) Draw the signal flow graph of the above block diagram shown Figure 1. 4 M

3. A unit step input is applied to a Second order Closed loop System whose Closed Loop Transfer function is

$$\frac{C(s)}{R(s)} = \frac{\omega_n^2}{s^2 + 2\xi\omega_n s + \omega_n^2}$$

where ξ=0.8 and ω_n=5 rad/sec then find

(i) Rise Time (ii) Peak Time

(iii) Peak Overshoot (iv) Settling Time 14 M

4. a) A unity feedback control system has an open loop transfer Function $G(s) = \frac{K}{s(s+4)(s+10)}$

Sketch the root locus plot of the system indicating the following

(i) Centroid and angles of asymptotes

(ii) Breakaway points 9 M

b) Find the range of 'K' in order to have the above system to be stable. 5 M

5. Sketch the Bode plot for the given open loop transfer function

$$G(s) = \frac{100}{s(1+0.1s)(1+0.01s)}$$

then find (i) Gain Margin (ii) Phase Margin 14 M

6. a) Using Nyquist criterion determine whether the closed loop systems having an open loop transfer function is stable or not

$$G(s)H(s)=\frac{180}{(s+1)(s+2)(s+5)}$$

9 M

b) Draw the polar plot of open loop transfer function

$$G(s)=\frac{1}{s^2}$$

5 M

7. a) What is the effect of proportional derivative controller on stability of a system, Explain it with an example. 7 M

b) Discuss about Lag compensator and Lead Compensator and show their pole zero locations. 7 M

8. a) Determine the State model of a system which has the following governing differential equation

$$\frac{d^2x}{dt^2}+5x+4=5u(t)$$

7 M

b) List out the properties of State transition matrix. 7 M