Code No: 07A3EC23 **R07** **Set No. 2**

**II B.Tech I Semester Examinations,MAY 2011**
**CONTROL SYSTEMS**
**Instrumentation And Control Engineering**

**Time: 3 hours** **Max Marks: 80**

**Answer any FIVE Questions**
**All Questions carry equal marks**

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Explain the significance of generalized error series?
   (b) For a system $G(s)H(s) = \frac{K}{s^2(s+2)(s+3)}$,. Find the value of K to limit the steady state error to 10 when the input to the system is r(t)=1+10t+40/2 $t^2$.[6+10]
2. The characteristic equation of the system is given by $S^3 + 2S^2 + (K+1)S + 3K = 0$. Sketch the complete root locus? [16]
3. (a) What is compensation? What are the different types of compensators?
   (b) What is a lead compensator, obtain the transfer function of lead compensator and draw pole-zero plot?
   (c) Explain the different steps to be followed for the design of lead compensator using Bode plot? [3+3+10]
4. (a) Consider the vector matrix differential equation describe the dynamics of the system as $X = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix}$
   Determine state transition matrix ?
   (b) What are the properties of state transistion matrix? [10+6]
5. (a) Determine the transfer function $\frac{C(s)}{R(s)}$ for the following block diagram (Figure 5

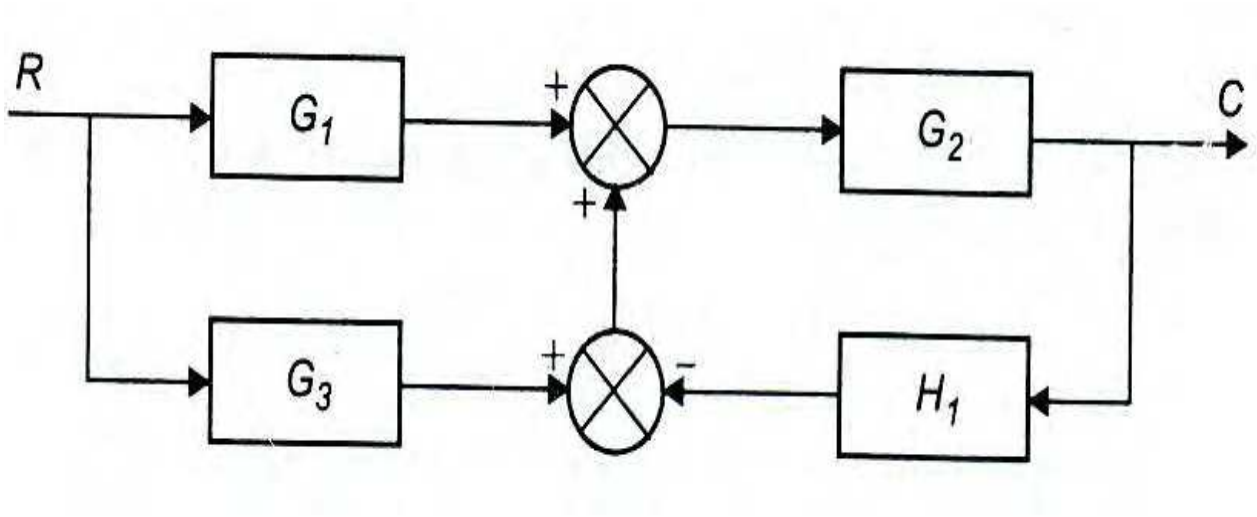


Figure 5

   (b) Explain the following terms. [10+6]

i. Input or source node
ii. Path gain
iii. Sink node
iv. Feedback path

6. (a) Explain sensitivity?
   (b) Determine the sensitivity of the closed loop system shown in figure 6 at $\omega = 1$ rad/sec w.r.t
      i. forward path transfer function
      ii. feedback path transfer function. [6+5+5]

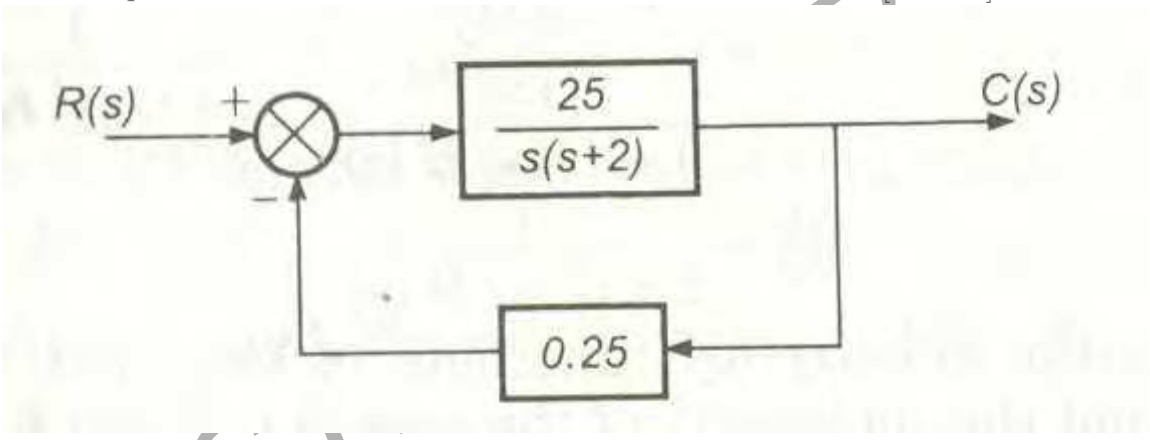


Figure 6

7. (a) What is "Nyquist Contour"?
   (b) A system is given by $G(s) = \frac{4s+1}{s^2(s+1)(2s+1)}$ Sketch the Nyquist plot & hence determine the stability of the system. [2+14]

8. (a) Derive the expressions for resonant peak & resonant frequency and hence establish the correlation between time response & frequency response.
   (b) Given $\zeta = 0.7$ & $\omega_n = 10$ r/s find resonant peak, resonant frequency & Bandwidth. [10+6]

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Code No: 07A3EC23 **R07** **Set No. 4**

**II B.Tech I Semester Examinations,MAY 2011**
**CONTROL SYSTEMS**
**Instrumentation And Control Engineering**

**Time: 3 hours** **Max Marks: 80**

**Answer any FIVE Questions**
**All Questions carry equal marks**

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Consider the vector matrix differential equation describe the dynamics of the system as $X = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix}$
   Determine state transition matrix ?
   (b) What are the properties of state transistion matrix? [10+6]
2. (a) What is "Nyquist Contour"?
   (b) A system is given by
   $G(s) = \frac{4s+1}{s^2(s+1)(2s+1)}$ Sketch the Nyquist plot & hence determine the stability of the system. [2+14]
3. (a) Explain the significance of generalized error series?
   (b) For a system $G(s)H(s) = \frac{K}{s^2(s+2)(s+3)}$,. Find the value of K to limit the steady state error to 10 when the input to the system is r(t)=1+10t+40/2 $t^2$.[6+10]
4. The characteristic equation of the system is given by $S^3 + 2S^2 + (K+1)S + 3K = 0$. Sketch the complete root locus? [16]
5. (a) Determine the transfer function $\frac{C(s)}{R(s)}$ for the following block diagram (Figure 5

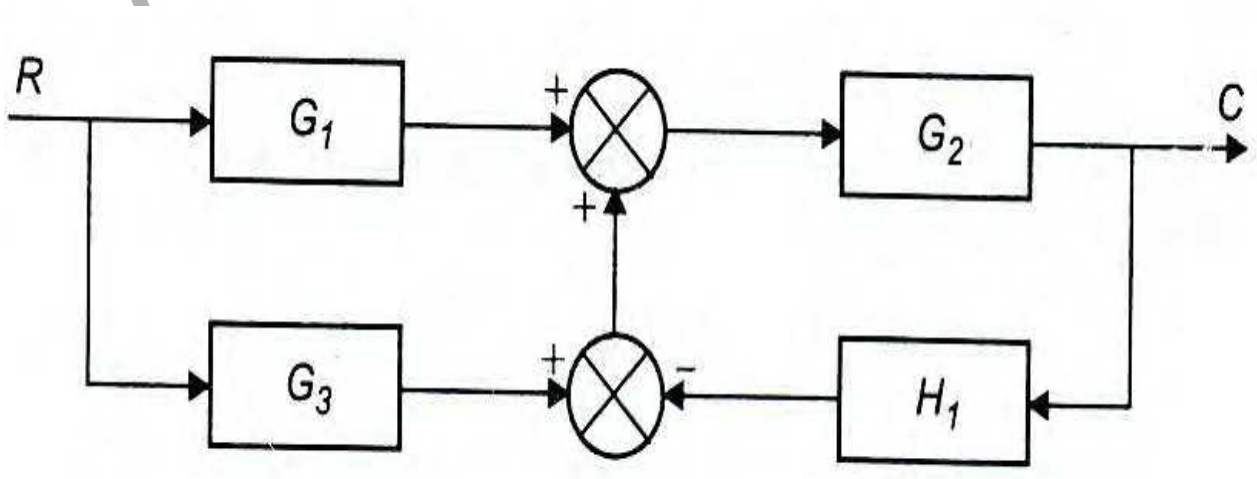


Figure 5

   (b) Explain the following terms. [10+6]
      i. Input or source node

ii. Path gain
iii. Sink node
iv. Feedback path

6. (a) Explain sensitivity?
   (b) Determine the sensitivity of the closed loop system shown in figure 6 at $\omega = 1$ rad/sec w.r.t
      i. forward path transfer function
      ii. feedback path transfer function. [6+5+5]

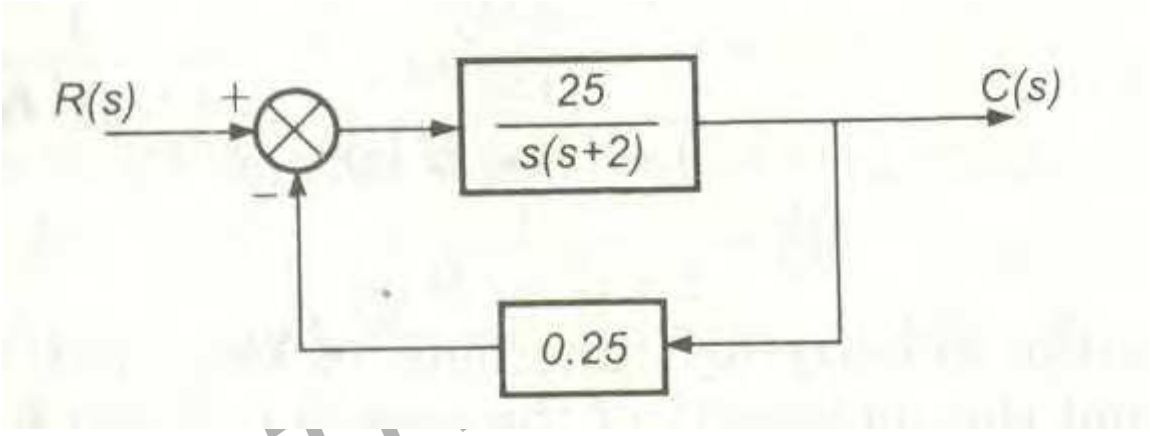


Figure 6

7. (a) Derive the expressions for resonant peak & resonant frequency and hence establish the correlation between time response & frequency response.
   (b) Given $\zeta = 0.7$ & $\omega_n = 10$ r/s find resonant peak, resonant frequency & Bandwidth. [10+6]

8. (a) What is compensation? What are the different types of compensators?
   (b) What is a lead compensator, obtain the transfer function of lead compensator and draw pole-zero plot?
   (c) Explain the different steps to be followed for the design of lead compensator using Bode plot? [3+3+10]

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Code No: 07A3EC23 **R07** **Set No. 1**

**II B.Tech I Semester Examinations,MAY 2011**
**CONTROL SYSTEMS**
**Instrumentation And Control Engineering**

**Time: 3 hours** **Max Marks: 80**

**Answer any FIVE Questions**
**All Questions carry equal marks**

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Consider the vector matrix differential equation describe the dynamics of the system as $X = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix}$
   Determine state transition matrix ?
   (b) What are the properties of state transistion matrix? [10+6]
2. (a) Derive the expressions for resonant peak & resonant frequency and hence establish the correlation between time response & frequency response.
   (b) Given $\zeta = 0.7$ & $\omega_n = 10$ r/s find resonant peak, resonant frequency & Bandwidth. [10+6]
3. (a) Explain sensitivity?
   (b) Determine the sensitivity of the closed loop system shown in figure 3 at $\omega = 1$ rad/sec w.r.t
      i. forward path transfer function
      ii. feedback path transfer function. [6+5+5]

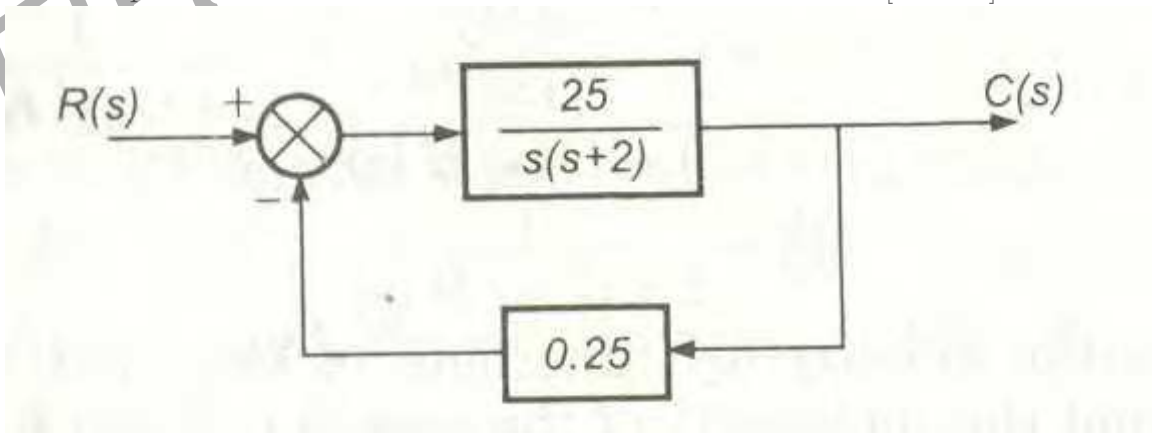


Figure 3

4. The characteristic equation of the system is given by $S^3 + 2S^2 + (K+1)S + 3K = 0$. Sketch the complete root locus? [16]
5. (a) Explain the significance of generalized error series?
   (b) For a system $G(s)H(s) = \frac{K}{s^2(s+2)(s+3)}$,. Find the value of K to limit the steady state error to 10 when the input to the system is r(t)=1+10t+40/2 $t^2$.[6+10]

6. (a) Determine the transfer function $\frac{C(s)}{R(s)}$ for the following block diagram (Figure 6

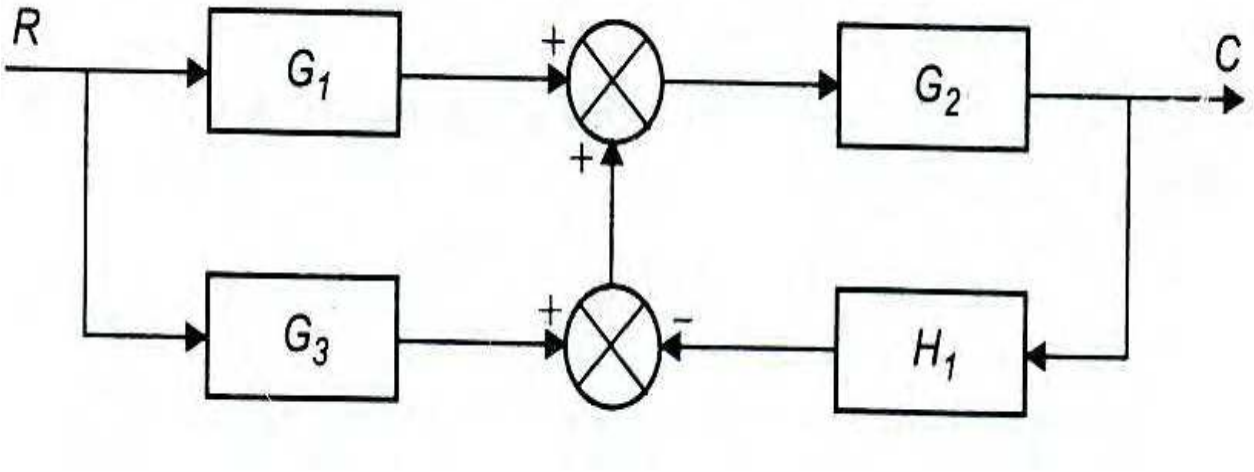


Figure 6

(b) Explain the following terms. [10+6]

i. Input or source node
ii. Path gain
iii. Sink node
iv. Feedback path

7. (a) What is "Nyquist Contour"?

(b) A system is given by $G(s) = \frac{4s+1}{s^2(s+1)(2s+1)}$ Sketch the Nyquist plot & hence determine the stability of the system. [2+14]

8. (a) What is compensation? What are the different types of compensators?

(b) What is a lead compensator, obtain the transfer function of lead compensator and draw pole-zero plot?

(c) Explain the different steps to be followed for the design of lead compensator using Bode plot? [3+3+10]

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Code No: 07A3EC23 **R07** **Set No. 3**

**II B.Tech I Semester Examinations,MAY 2011**
**CONTROL SYSTEMS**
**Instrumentation And Control Engineering**

**Time: 3 hours** **Max Marks: 80**

**Answer any FIVE Questions**
**All Questions carry equal marks**

⋆ ⋆ ⋆ ⋆ ⋆

1. The characteristic equation of the system is given by $S^3 + 2S^2 + (K+1)S + 3K = 0$. Sketch the complete root locus? [16]

2. (a) Explain sensitivity?
   (b) Determine the sensitivity of the closed loop system shown in figure 2 at $\omega = 1$ rad/sec w.r.t
      i. forward path transfer function
      ii. feedback path transfer function. [6+5+5]

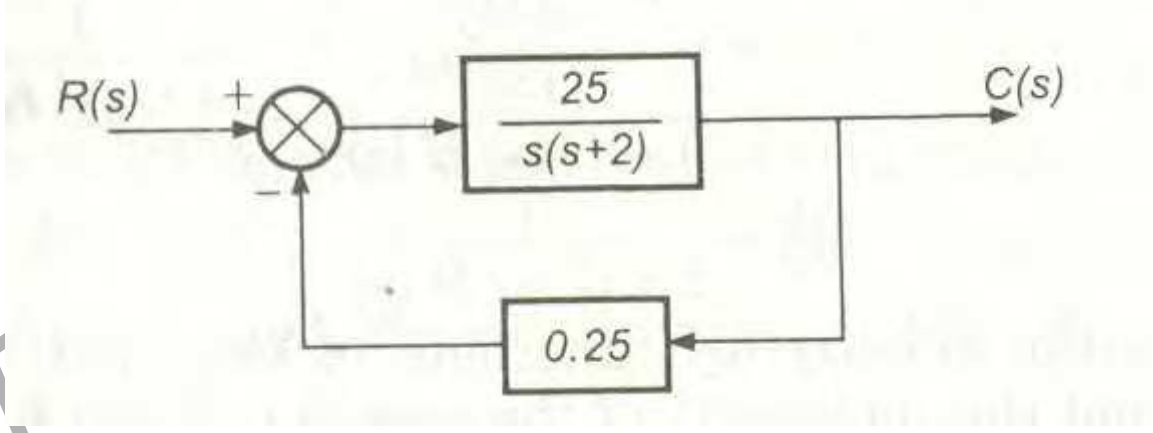


Figure 2

3. (a) What is compensation? What are the different types of compensators?
   (b) What is a lead compensator, obtain the transfer function of lead compensator and draw pole-zero plot?
   (c) Explain the different steps to be followed for the design of lead compensator using Bode plot? [3+3+10]

4. (a) Explain the significance of generalized error series?
   (b) For a system $G(s)H(s) = \frac{K}{s^2(s+2)(s+3)}$,. Find the value of K to limit the steady state error to 10 when the input to the system is r(t)=1+10t+40/2 $t^2$.[6+10]

5. (a) Consider the vector matrix differential equation describe the dynamics of the system as $X = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix}$
   Determine state transition matrix ?
   (b) What are the properties of state transistion matrix? [10+6]

6. (a) Derive the expressions for resonant peak & resonant frequency and hence establish the correlation between time response & frequency response.

   (b) Given $\zeta = 0.7$ & $\omega_n = 10$ r/s find resonant peak, resonant frequency & Bandwidth. [10+6]

7. (a) What is "Nyquist Contour"?

   (b) A system is given by
   $G(s) = \frac{4s+1}{s^2(s+1)(2s+1)}$ Sketch the Nyquist plot & hence determine the stability of the system. [2+14]

8. (a) Determine the transfer function $\frac{C(s)}{R(s)}$ for the following block diagram (Figure 8

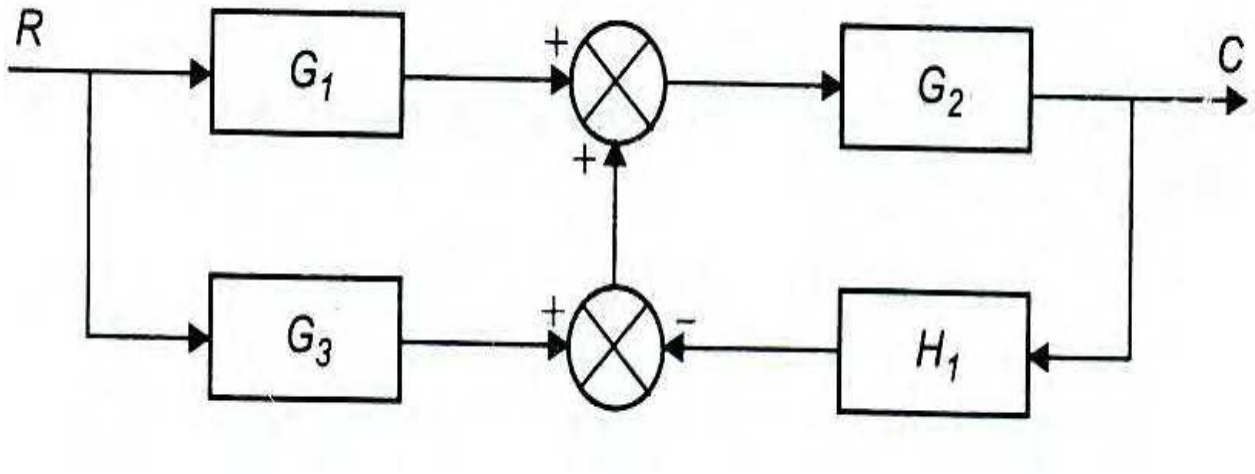


Figure 8

   (b) Explain the following terms. [10+6]

   i. Input or source node
   ii. Path gain
   iii. Sink node
   iv. Feedback path

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