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

II B.Tech I Semester Examinations,November 2010
CONTROL SYSTEMS
Instrumentation And Control Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Sketch the Bode plots for a system
   $G(s) = \frac{15(s+5)}{s(s^2+16s+100)}$
   Hence determine the stability of the system. [16]

2. (a) Discuss the significance of state Space Analysis?
   (b) Define state variables.
   (c) Obtain the state variable representation of an armature controlled D.C Servomotor? [4+4+8]

3. (a) Explain about various test signals used in control system?
   (b) Measurement conducted on a servomechanism shows the system response to be $C(t) = 1 + 0.2e^{-60t} - 1.2e^{-10t}$, when subjected to a unit step input. Obtain the expression For closed loop T.F., the damping ratio and undamed natural frequency of oscillations? [8+8]

4. (a) Reduce the given block diagram and hence obtain the transfer function $\frac{C(s)}{R(s)}$ and draw the signal flow graph for the block diagram given 7a.

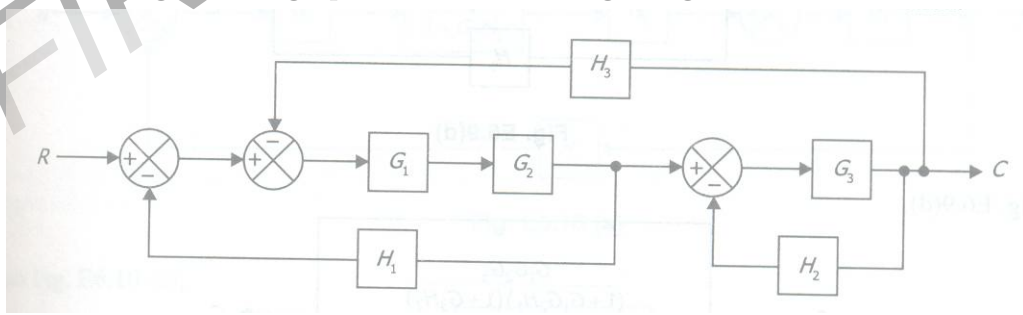

Figure 7a

   (b) Explain AC servomotor and its features. [12+4]

5. (a) Explain regenerative feedback?
   (b) Determine the sensitivity of the closed loop transfer function $T(s) = \frac{C(s)}{R(s)}$ to variations in parameter K at $\omega = 5$ rad/sec. Assume the normal value of K is 1. Shown in figure 8b. [6+10]

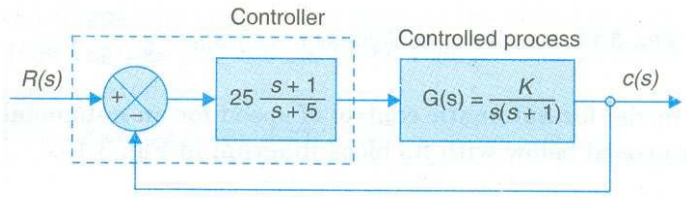

Figure 8b

6. (a) Explain the significance of auxiliary equation?

   (b) The closed loop transfer function of a system is given by $\frac{c(s)}{R(s)} = \frac{k}{s(1+sT)(1+0.5s)+50}$. Find the value of T such that the system is driven on to the verge of instability and the resulting frequency of oscillations. [3+13]

7. Design a lead compensator for unity feed back system whose open loop transfer function G(S) = $\frac{K}{S(S+1)(S+5)}$ to satisfy the following specifications.

   (a) velocity error constant $K_V \geq 50$

   (b) Phase margin $\geq 20^0$. [16]

8. (a) State & explain "principle of argument"

   (b) Given
   $G(s) = \frac{K}{s(s+2)(s+10)}$
   Sketch Nyquist plot & find range of $|K|$ for stability. [8+8]

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

II B.Tech I Semester Examinations,November 2010
CONTROL SYSTEMS
Instrumentation And Control Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. Design a lead compensator for unity feed back system whose open loop transfer function G(S) = $\frac{K}{S(S+1)(S+5)}$ to satisfy the following specifications.
   (a) velocity error constant $K_V \geq 50$
   (b) Phase margin $\geq 20^0$. [16]

2. (a) Explain about various test signals used in control system?
   (b) Measurement conducted on a servomechanism shows the system response to be $C(t) = 1 + 0.2e^{-60t} - 1.2e^{-10t}$, when subjected to a unit step input. Obtain the expression For closed loop T.F., the damping ratio and undamed natural frequency of oscillations? [8+8]

3. (a) Explain regenerative feedback?
   (b) Determine the sensitivity of the closed loop transfer function $T(s) = \frac{C(s)}{R(s)}$ to variations in parameter K at $\omega = 5$ rad/sec. Assume the normal value of K is 1. Shown in figure 8b. [6+10]

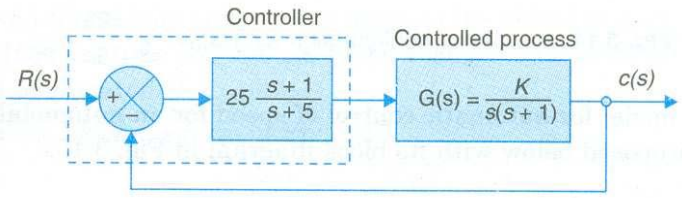

Figure 8b

4. (a) State & explain "principle of argument"
   (b) Given
   $G(s) = \frac{K}{s(s+2)(s+10)}$
   Sketch Nyquist plot & find range of $|K|$ for stability. [8+8]

5. (a) Explain the significance of auxiliary equation?
   (b) The closed loop transfer function of a system is given by $\frac{c(s)}{R(s)} = \frac{k}{s(1+sT)(1+0.5s)+50}$. Find the value of T such that the system is driven on to the verge of instability and the resulting frequency of oscillations. [3+13]

6. Sketch the Bode plots for a system
   $G(s) = \frac{15(s+5)}{s(s^2+16s+100)}$
   Hence determine the stability of the system. [16]

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

7. (a) Discuss the significance of state Space Analysis?
   (b) Define state variables.
   (c) Obtain the state variable representation of an armature controlled D.C Servomotor? [4+4+8]

8. (a) Reduce the given block diagram and hence obtain the transfer function $\frac{C(s)}{R(s)}$ and draw the signal flow graph for the block diagram given 7a.

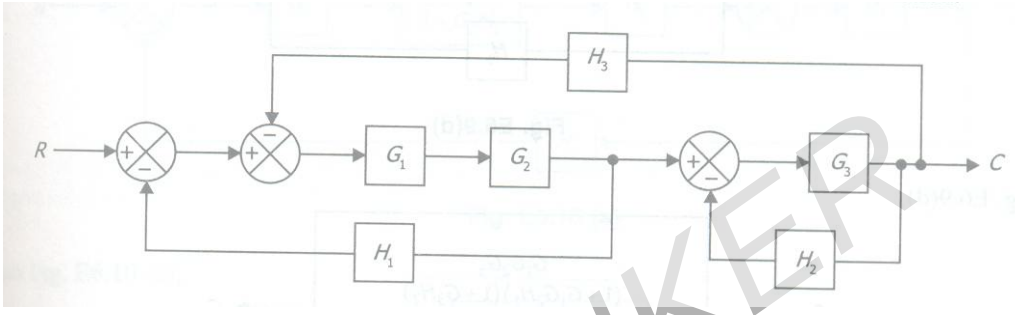

Figure 7a

   (b) Explain AC servomotor and its features. [12+4]

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

II B.Tech I Semester Examinations,November 2010
CONTROL SYSTEMS
Instrumentation And Control Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Discuss the significance of state Space Analysis?
   (b) Define state variables.
   (c) Obtain the state variable representation of an armature controlled D.C Servomotor? [4+4+8]

2. (a) Reduce the given block diagram and hence obtain the transfer function $\frac{C(s)}{R(s)}$ and draw the signal flow graph for the block diagram given 7a.

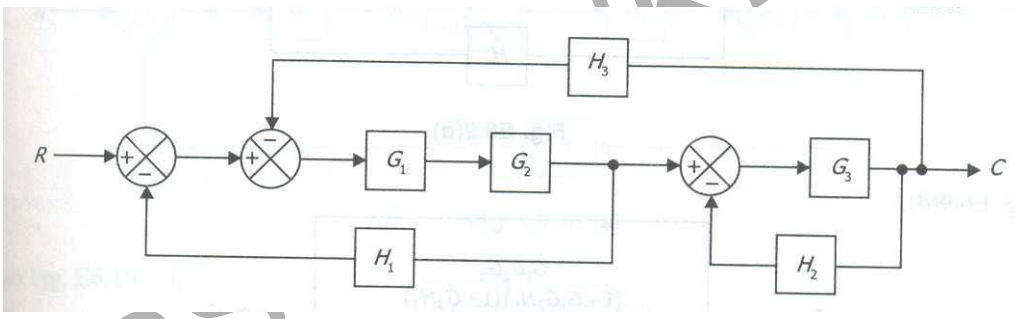

Figure 7a

   (b) Explain AC servomotor and its features. [12+4]

3. (a) State & explain "principle of argument"
   (b) Given
   $G(s) = \frac{K}{s(s+2)(s+10)}$
   Sketch Nyquist plot & find range of $|K|$ for stability. [8+8]

4. Design a lead compensator for unity feed back system whose open loop transfer function G(S) = $\frac{K}{S(S+1)(S+5)}$ to satisfy the following specifications.
   (a) velocity error constant $K_V \geq 50$
   (b) Phase margin $\geq 20^0$. [16]

5. (a) Explain about various test signals used in control system?
   (b) Measurement conducted on a servomechanism shows the system response to be $C(t) = 1 + 0.2e^{-60t} - 1.2e^{-10t}$, when subjected to a unit step input. Obtain the expression For closed loop T.F., the damping ratio and undamed natural frequency of oscillations? [8+8]

6. Sketch the Bode plots for a system
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   Hence determine the stability of the system. [16]

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

7. (a) Explain regenerative feedback?

   (b) Determine the sensitivity of the closed loop transfer function $T(s) = \frac{C(s)}{R(s)}$ to variations in parameter K at $\omega = 5$ rad/sec. Assume the normal value of K is 1. Shown in figure 8b. [6+10]

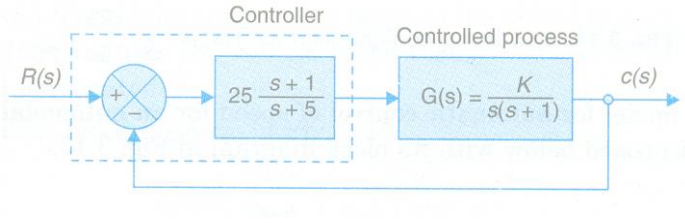

Figure 8b

8. (a) Explain the significance of auxiliary equation?

   (b) The closed loop transfer function of a system is given by $\frac{c(s)}{R(s)} = \frac{k}{s(1+sT)(1+0.5s)+50}$. Find the value of T such that the system is driven on to the verge of instability and the resulting frequency of oscillations. [3+13]

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

II B.Tech I Semester Examinations,November 2010
CONTROL SYSTEMS
Instrumentation And Control Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Discuss the significance of state Space Analysis?
   (b) Define state variables.
   (c) Obtain the state variable representation of an armature controlled D.C Servomotor? [4+4+8]

2. (a) Explain about various test signals used in control system?
   (b) Measurement conducted on a servomechanism shows the system response to be $C(t) = 1 + 0.2e^{-60t} - 1.2e^{-10t}$, when subjected to a unit step input. Obtain the expression For closed loop T.F., the damping ratio and undamed natural frequency of oscillations? [8+8]

3. (a) Explain the significance of auxiliary equation?
   (b) The closed loop transfer function of a system is given by $\frac{c(s)}{R(s)} = \frac{k}{s(1+sT)(1+0.5s)+50}$. Find the value of T such that the system is driven on to the verge of instability and the resulting frequency of oscillations. [3+13]

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5. (a) State & explain "principle of argument"
   (b) Given
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6. Design a lead compensator for unity feed back system whose open loop transfer function $G(S) = \frac{K}{S(S+1)(S+5)}$ to satisfy the following specifications.
   (a) velocity error constant $K_V \geq 50$
   (b) Phase margin $\geq 20^0$. [16]

7. (a) Reduce the given block diagram and hence obtain the transfer function $\frac{C(s)}{R(s)}$ and draw the signal flow graph for the block diagram given 7a.

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

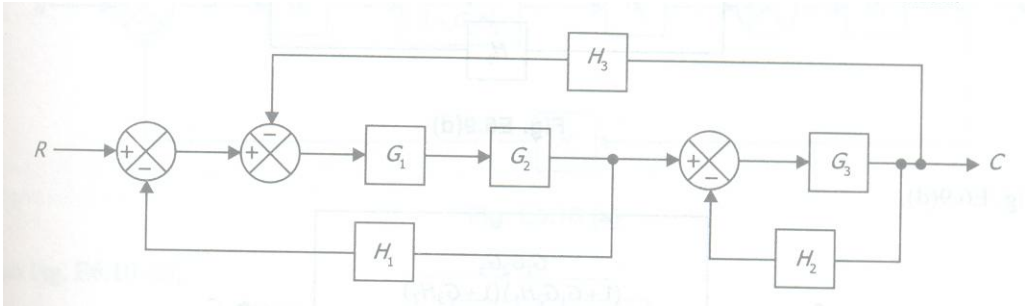

Figure 7a

(b) Explain AC servomotor and its features. [12+4]

8. (a) Explain regenerative feedback?

(b) Determine the sensitivity of the closed loop transfer function $T(s) = \frac{C(s)}{R(s)}$ to variations in parameter K at $\omega = 5$ rad/sec. Assume the normal value of K is 1. Shown in figure 8b. [6+10]

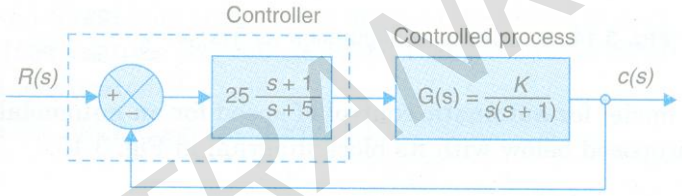

Figure 8b

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