Code No: R05312106 **R05** **Set No. 2**

III B.Tech I Semester Examinations,November 2010
CONTROL SYSTEMS
Aeronautical Engineering

Time: 3 hours Max Marks: 80

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

1. The open loop T.F. of a control system is given by $G(s)H(s) = \frac{K}{s(s+6)(s^2+4s+13)}$
   Sketch the root locus plot and determine

   (a) the break-away points

   (b) The angle of departure from complex poles

   (c) the stability condition. [16]

2. Derive the Transfer Function for a.c. servomotor. Explain about torque-speed characteristics of a.c. servomotor. [16]

3. Obtain the two differential state representation for the system with transfer function.
   $\frac{y(s)}{u(s)} = \frac{2}{S^3+6S^2+11S+6}$. [16]

4. (a) What are generalized error coefficients?

   (b) The step response of a second order system is shown in figure 3b for an input of $2u(t)$. Determine the open loop transfer function and the closed loop transfer functions? Assume unity feed-back. [3+13]
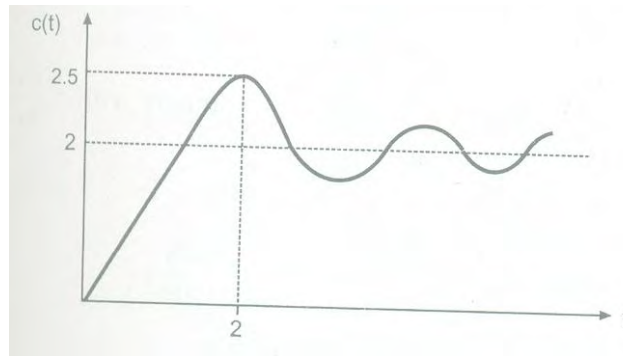

Figure 3b

5. (a) A unity feed back system has
   $G(s) = \frac{K}{s(1+sT_1)(1+sT_2)}$
   Discuss the effect on Nyquist plot when the value of $\left|K\right|$ is

   i. low (<critical value)

   ii. = critical value

   iii. high (>critical value)

   (b) Pure time delay usually deteriorates the stability. Explain with the help of Nyquist plots. [10+6]

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6. What is control system? Explain various types of control systems with examples and their advantages. [16]

7. (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]

8. (a) State the effect of 'transportation lag' term on Bode plots.

   (b) The open loop transfer function of a unity feed back system is
   $G(s) = \frac{Ke^{-0.1s}}{s(1+s)(1+0.1s)}$
   Draw the Bode plots.. [2+14]

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Code No: R05312106 **R05** **Set No. 4**

III B.Tech I Semester Examinations,November 2010
CONTROL SYSTEMS
Aeronautical Engineering

Time: 3 hours

Max Marks: 80

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

1. What is control system? Explain various types of control systems with examples and their advantages. [16]

2. (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]

3. (a) What are generalized error coefficients?

   (b) The step response of a second order system is shown in figure 3b for an input of 2u(t). Determine the open loop transfer function and the closed loop transfer functions? Assume unity feed-back. [3+13]
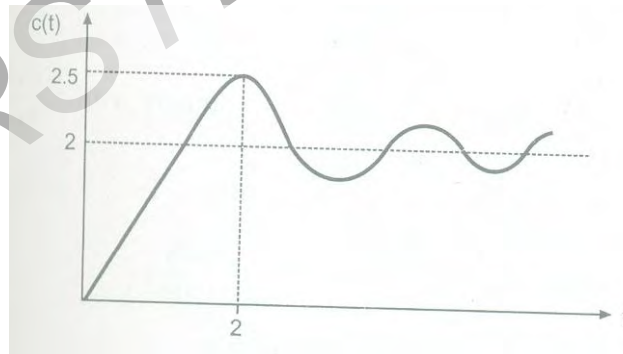

Figure 3b

4. Derive the Transfer Function for a.c. servomotor. Explain about torque-speed characteristics of a.c. servomotor. [16]

5. The open loop T.F. of a control system is given by $G(s)H(s) = \frac{K}{s(s+6)(s^2+4s+13)}$ Sketch the root locus plot and determine

   (a) the break-away points

   (b) The angle of departure from complex poles

   (c) the stability condition. [16]

6. (a) A unity feed back system has
   $G(s) = \frac{K}{s(1+sT_1)(1+sT_2)}$
   Discuss the effect on Nyquist plot when the value of $|K|$ is

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       i. low (<critical value)

      ii. = critical value

     iii. high (>critical value)

(b) Pure time delay usually deteriorates the stability. Explain with the help of Nyquist plots. [10+6]

7. Obtain the two differential state representation for the system with transfer function.
$\frac{y(s)}{u(s)} = \frac{2}{S^3+6S^2+11S+6}$. [16]

8. (a) State the effect of 'transportation lag' term on Bode plots.

(b) The open loop transfer function of a unity feed back system is
$G(s) = \frac{Ke^{-0.1s}}{s(1+s)(1+0.1s)}$
Draw the Bode plots.. [2+14]

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R05 **Set No. 1**

III B.Tech I Semester Examinations,November 2010
CONTROL SYSTEMS
Aeronautical Engineering

Time: 3 hours Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. Obtain the two differential state representation for the system with transfer function.
   $\frac{y(s)}{u(s)} = \frac{2}{S^3+6S^2+11S+6}$. [16]

2. (a) State the effect of 'transportation lag' term on Bode plots.

   (b) The open loop transfer function of a unity feed back system is
   $G(s) = \frac{Ke^{-0.1s}}{s(1+s)(1+0.1s)}$
   Draw the Bode plots.. [2+14]

3. Derive the Transfer Function for a.c. servomotor. Explain about torque-speed characteristics of a.c. servomotor. [16]

4. (a) What are generalized error coefficients?

   (b) The step response of a second order system is shown in figure 3b for an input of $2u(t)$. Determine the open loop transfer function and the closed loop transfer functions? Assume unity feed-back. [3+13]
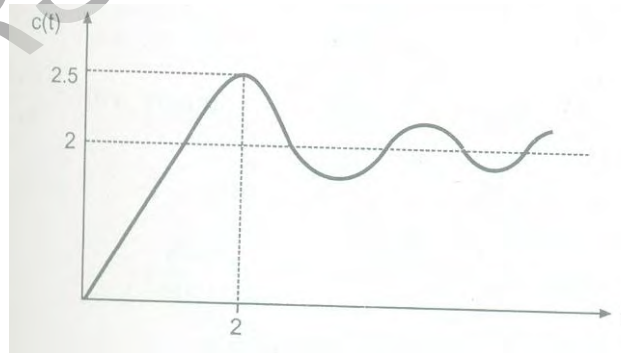

Figure 3b

5. (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]

6. What is control system? Explain various types of control systems with examples and their advantages. [16]

7. The open loop T.F. of a control system is given by $G(s)H(s) = \frac{K}{s(s+6)(s^2+4s+13)}$ Sketch the root locus plot and determine

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(a) the break-away points

(b) The angle of departure from complex poles

(c) the stability condition. [16]

8. (a) A unity feed back system has

$G(s) = \frac{K}{s(1+sT_1)(1+sT_2)}$

Discuss the effect on Nyquist plot when the value of $|K|$ is

   i. low ($<$critical value)

  ii. $=$ critical value

 iii. high ($>$critical value)

(b) Pure time delay usually deteriorates the stability. Explain with the help of Nyquist plots. [10+6]

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Code No: R05312106 | **R05** | **Set No. 3**

III B.Tech I Semester Examinations,November 2010
CONTROL SYSTEMS
Aeronautical Engineering

Time: 3 hours | Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) State the effect of 'transportation lag' term on Bode plots.

   (b) The open loop transfer function of a unity feed back system is
   $G(s) = \frac{Ke^{-0.1s}}{s(1+s)(1+0.1s)}$
   Draw the Bode plots.. [2+14]

2. The open loop T.F. of a control system is given by $G(s)H(s) = \frac{K}{s(s+6)(s^2+4s+13)}$
   Sketch the root locus plot and determine

   (a) the break-away points

   (b) The angle of departure from complex poles

   (c) the stability condition. [16]

3. (a) What are generalized error coefficients?

   (b) The step response of a second order system is shown in figure 3b for an input of $2u(t)$. Determine the open loop transfer function and the closed loop transfer functions? Assume unity feed-back. [3+13]
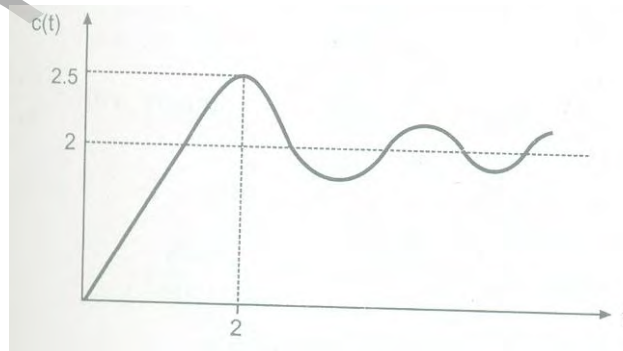

Figure 3b

4. (a) A unity feed back system has
   $G(s) = \frac{K}{s(1+sT_1)(1+sT_2)}$
   Discuss the effect on Nyquist plot when the value of $|K|$ is

      i. low (<critical value)

      ii. = critical value

      iii. high (>critical value)

   (b) Pure time delay usually deteriorates the stability. Explain with the help of Nyquist plots. [10+6]

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5. What is control system? Explain various types of control systems with examples and their advantages. [16]

6. Derive the Transfer Function for a.c. servomotor. Explain about torque-speed characteristics of a.c. servomotor. [16]

7. (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]

8. Obtain the two differential state representation for the system with transfer function.
   $\frac{y(s)}{u(s)} = \frac{2}{S^3+6S^2+11S+6}$. [16]

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