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Unit 7 - Week 5

Course outline

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Pre-requisite Assignment

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Week 2

Week 3

Week 4

Week 5

 Routh's Stability Criterion - Part 1 (unit?unit=43&lesson=44)

 Routh's Stability Criterion- Part 2 (unit?unit=43&lesson=45)

 Special Cases of Routh's Stability Criterion - Part 1 (unit?unit=43&lesson=46)

 Special Cases of Routh's Stability Criterion- Part 2 (unit?unit=43&lesson=47)

 Performance Specifications - Part 1 (unit?unit=43&lesson=48)

 Performance Specifications- Part 2 (unit?unit=43&lesson=49)

 Week 5 - Feedback: Control systems (unit?unit=43&lesson=50)

 WEEK 5 - Assignment Solution (unit?unit=43&lesson=51)

 Quiz : Assignment 5 (assessment?name=128)

Week 6

Week 7

Week 8

Week 9

Week 10

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Assignment 5

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-09-04, 23:59 IST.

1) If all roots of a polynomial lie in the left half of the complex plane, then that polynomial is called

1 point

- a Routh polynomial
 a Hurwitz polynomial
 a Bode polynomial
 a Nyquist polynomial

No, the answer is incorrect.

Score: 0

Accepted Answers:
a Hurwitz polynomial

2) The polynomial $s^2 + (K - 1)s + (K - 2)$ where K is a real valued parameter, has all its roots in the left half complex plane for all

1 point

- $K < 1$
 $K > 2$
 $K > 1$
 $K < 2$

No, the answer is incorrect.

Score: 0

Accepted Answers:
 $K > 2$

3) The polynomial $s^3 + 8s^2 + 22s + 20$ has

1 point

- all its 3 roots in the left half complex plane
 2 roots in the left half complex plane and 1 root in the right half complex plane
 1 root in the left half complex plane and 2 roots in the right half complex plane
 all its 3 roots in the right half complex plane

No, the answer is incorrect.

Score: 0

Accepted Answers:
all its 3 roots in the left half complex plane

4) The polynomial $s^3 + 5s^2 + 2s + 12$ has

1 point

- all its 3 roots in the left half complex plane
 2 roots in the left half complex plane and 1 root in the right half complex plane
 1 root in the left half complex plane and 2 roots in the right half complex plane
 all its 3 roots in the right half complex plane

No, the answer is incorrect.

Score: 0

Accepted Answers:
1 root in the left half complex plane and 2 roots in the right half complex plane

5) The polynomial $s^4 + 3s^2 + 6s^2 + 12s + 8$ has

0 points

- all its 4 roots in the left half complex plane
 2 roots on the imaginary axis
 2 roots in the right half complex plane

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- 3 roots in the right half complex plane

No, the answer is incorrect.
Score: 0

Accepted Answers:
2 roots on the imaginary axis

6) Consider a second order plant governed by $\ddot{y}(t) + 4y(t) = u(t)$ It is desired to design a unity negative feedback closed loop control system with 1 point this plant. Which ONE of the following statements is TRUE?

- The closed loop system can be stabilized with a proportional controller
 The closed loop system can be stabilized with an integral controller
 The closed loop system can be stabilized with a proportional-integral controller
 The closed loop system can be stabilized with a proportional-derivative controller

No, the answer is incorrect.
Score: 0

Accepted Answers:
The closed loop system can be stabilized with a proportional-derivative controller

7) It is desired that a closed loop system should have a settling time below 1 s. This requires that the real part of the closed loop poles be less than 1 point

- 0.5
 -2
 -4
 -1

No, the answer is incorrect.
Score: 0

Accepted Answers:
-4

8) It is desired that a closed loop system should have a maximum peak overshoot below 15 %. This requires that the damping ratio of the system be 1 point at least

- 0.456
 0.228
 0.114
 0.517

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.517

9) In problem 6, the constraints on the controller parameters of a proportional-derivative controller that would always stabilize the closed loop system 1 point are

- $K_p > -4$ and $K_d > 0$

 $K_p < 4$ and $K_d > -4$

 $K_p > 0$ and $K_d > -4$

 $K_p < 0$ and $K_d > 4$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $K_p > -4$ and $K_d > 0$

10) Consider a second order plant governed by $\ddot{y}(t) + 3\dot{y}(t) - 2y(t) = u(t)$ It is desired to design a unity negative feedback closed loop control system with this plant using a proportional controller. The closed loop system would be stable for all 1 point

- $K_p > 0$

 $K_p < 3$

 $K_p > -3$

 $K_p > 2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $K_p > 2$

11) In problem 10, the ratio of E(s) to R(s) is 1 point

- $\frac{K_p}{s^2 + 3s - 2}$

$$\frac{s^2 + 3s - 2}{s^2 + 3s + K_p - 2}$$

$$\frac{1}{s^2 + 3s + K_p - 2}$$

$$\frac{1}{s^2 + 3s + K_p}$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\frac{s^2 + 3s - 2}{s^2 + 3s + K_p - 2}$$

12) In problem 10), the steady state tracking error when the stable closed loop system is given a unit step reference input is

1 point

$$-K_p/2$$

$$2/(2 - K_p)$$

$$3/K_p$$

$$0$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$2/(2 - K_p)$$

13) In problem 10, it is now desired that the real part of all closed loop poles be less than -1. The range of the proportional gain that would satisfy this requirement is

1 point

$$K_p > 1$$

$$K_p > 3$$

$$K_p > 4$$

$$K_p > 2$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$K_p > 4$$

14) The open loop transfer function corresponding to problem 10 is of

1 point

Type 0

Type 1

Type 2

Type 3

No, the answer is incorrect.

Score: 0

Accepted Answers:

Type 0

15) The characteristic polynomial of a closed loop system is $s^3 + Ks^2 + 2s + 1$ where K is a real parameter. Then, the closed loop system is stable for all

1 point

$$K > 1$$

$$K > 2$$

$$K > 0$$

$$K > -2$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$K > 1$$

