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Unit 6 - Week 4

Course outline

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Pre-requisite Assignment

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Week 2

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Week 4

 Second Order Systems - Part 1 (unit?unit=34&lesson=35)

 Second Order Systems- Part 2 (unit?unit=34&lesson=36)

 Controllers - Part 1 (unit?unit=34&lesson=37)

 Controllers- Part 2 (unit?unit=34&lesson=38)

 Closed Loop Control - Part 1 (unit?unit=34&lesson=39)

 Closed Loop Control- Part 2 (unit?unit=34&lesson=40)

 Week 4 - Feedback: Control systems (unit?unit=34&lesson=41)

 WEEK 4 - Assignment Solution (unit?unit=34&lesson=42)

 Quiz : Assignment 4 (assessment?name=127)

Week 5

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Assignment 4

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

Due on 2019-08-28, 23:59 IST.

1) A second order system is governed by $\ddot{y}(t) + 4\dot{y}(t) + 2y(t) = u(t)$ It is 1 point

- underdamped
 overdamped
 undamped
 critically damped

No, the answer is incorrect.

Score: 0

Accepted Answers:
overdamped

2) A second order system is governed by $\ddot{y}(t) + 3\dot{y}(t) + 9y(t) = u(t)$ Its natural frequency (in rad/s) is 1 point

- 9
 3
 1
 0.5

No, the answer is incorrect.

Score: 0

Accepted Answers:
3

3) The damping ratio of the system given in problem 2 is 1 point

- 1
 0.75
 0.5
 0.25

No, the answer is incorrect.

Score: 0

Accepted Answers:
0.5

4) The frequency (in rad/s) of oscillations in the unit step response of the system given in problem 2) is 1 point

- 1.732
 0.866
 1
 2.6

No, the answer is incorrect.

Score: 0

Accepted Answers:
2.6

5) The rise time (in s) of the system given in problem 2 is 1 point

- 2.4
 1.2
 0.8
 4.8

No, the answer is incorrect.

Score: 0

Accepted Answers:
0.8

- 6) The peak time (in s) of the system given in problem 2 is 1 point
- 1.2
 2.4
 4.8
 0.8
- No, the answer is incorrect.
Score: 0
Accepted Answers:
1.2
- 7) The maximum peak overshoot (in %) of the system given in problem 2) is 1 point
- 9.1
 8.15
 16.3
 18.2
- No, the answer is incorrect.
Score: 0
Accepted Answers:
16.3
- 8) The settling time (in s) of the system given in problem 2 is 1 point
- 1.5
 2.67
 4.5
 8
- No, the answer is incorrect.
Score: 0
Accepted Answers:
2.67
- 9) Which ONE of the following statements is TRUE about a proportional controller? 1 point
- The controller transfer function is a complex variable
 It would lead to zero steady state error for all systems while tracking a step reference input
 The control input is inversely proportional to the error
 The control input at an instant of time is dependent only on the value of the error at that instant of time
- No, the answer is incorrect.
Score: 0
Accepted Answers:
The control input at an instant of time is dependent only on the value of the error at that instant of time
- 10) Consider a second order system that is governed by $\ddot{y}(t) + \dot{y}(t) + y(t) = u(t)$. It is 1 point
- critically stable
 stable
 unstable
 marginally stable
- No, the answer is incorrect.
Score: 0
Accepted Answers:
stable
- 11) A unity negative feedback closed loop control system is designed with the above system/plant described in problem 10 using a proportional controller (with K_p being the proportional gain). The closed loop system is stable for all 1 point
- $K_p < 2$
 $K_p < 0$
 $K_p > -2$
 $K_p > -1$
- No, the answer is incorrect.
Score: 0
Accepted Answers:
 $K_p > -1$
- 12) The closed loop system designed in problem 11 is expected to track a unit step reference input. The steady state tracking error is 1 point
- $\frac{1}{(k_p + 1)}$
 $\frac{k_p}{(k_p + 1)}$

$\frac{k_p}{(k_p + 2)}$

$\frac{1}{(k_p - 1)}$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$\frac{1}{(k_p + 1)}$

13) Which ONE of the following statements is TRUE about an integral controller? **1 point**

- The controller transfer function introduces an open loop zero at 0
- It would always lead to non-zero steady state error while tracking a step reference input
- It can lead to actuator saturation
- The control input at an instant of time depends only on the current value of the error

No, the answer is incorrect.
Score: 0

Accepted Answers:

It can lead to actuator saturation

14) Which ONE of the following statements is TRUE about a derivative controller? **1 point**

- The controller transfer function introduces an open loop pole at 0
- It would provide a non-zero control input in the presence of a non-zero constant error signal
- It is anticipatory in nature
- The control input at an instant of time depends only on the past values of the error

No, the answer is incorrect.
Score: 0

Accepted Answers:

It is anticipatory in nature

15) Consider a second order system that is governed by $\ddot{y}(t) - 2y(t) = u(t)$. A unity negative feedback closed loop control system is designed for this system. The closed loop system would be stabilized by a **1 point**

- proportional controller
- integral controller
- derivative controller
- proportional-derivative controller

No, the answer is incorrect.
Score: 0

Accepted Answers:

proportional-derivative controller