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Unit 6 - Week 4

Assignment 4

The due date for submitting this assignment has passed. **Due on 2019-08-28, 23:59 IST.**
As per our records you have not submitted this assignment.

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 Kp 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