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Unit 10 - Week 8

Assignment 8

The due date for submitting this assignment has passed. **Due on 2019-09-25, 23:59 IST.**
As per our records you have not submitted this assignment.

1) The open loop transfer function of a negative feedback closed loop system is $\frac{K}{(s^2+4s)}$ where K is a non-negative real valued parameter. The closed loop system is stable for only ***1 point***

- $K > 0$
- $K > 1$
- $K > 2$
- $K > 4$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$K > 0$

2) It is desired that the closed loop system obtained in problem 1, be an underdamped second order system. This would be true for all ***1 point***

- $K > 0$
- $K > 2$
- $K > 4$
- $K < 2$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$K > 4$

3) What is TRUE about the underdamped second order closed loop system identified in problem 2? ***1 point***

- It would have a settling time less than 1 s
- It would have a settling time less than 0.5 s
- It would have a settling time less than 4 s
- It would have a settling time less than 1.5 s

No, the answer is incorrect.
Score: 0
Accepted Answers:
It would have a settling time less than 4 s

4) It is desired that the underdamped second order closed loop system identified in problem 2 have a maximum peak overshoot less than 10 %. This is true only when ***1 point***

- $11.4 > K > 4$
- $25 > K > 0$
- $25 > K > 4$
- $11.4 > K > 0$

No, the answer is incorrect.
Score: 0
Accepted Answers:
11.4 > K > 4

5) Which ONE of the following statements is TRUE about the locus of the closed loop poles of problem 1? ***1 point***

- The root locus always lies in the left half complex plane for K > 0
- The root locus lies in both the left and right half complex planes for K > 0
- The root locus lies always on the real axis for K > 0
- The root locus lies always on the imaginary axis for K > 0

No, the answer is incorrect.
Score: 0
Accepted Answers:
The root locus always lies in the left half complex plane for K > 0

6) A second order system is governed by $\ddot{y} + 5\dot{y}(t) + 6y(t) = u(t)$The number of state variables required for representing it in the state space representation is ***1 point***

- 0
- 1
- 2
- 3

No, the answer is incorrect.
Score: 0
Accepted Answers:
2

7) The state matrix for the system in problem 6) is ***1 point***

- $\begin{pmatrix} 1 & 0 \\ -6 & -5 \end{pmatrix}$
- $\begin{pmatrix} 0 & 1 \\ -6 & -5 \end{pmatrix}$
- $\begin{pmatrix} -1 & 0 \\ -6 & -5 \end{pmatrix}$
- $\begin{pmatrix} 0 & -1 \\ -6 & -5 \end{pmatrix}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\begin{pmatrix} 0 & 1 \\ -6 & -5 \end{pmatrix}$

8) The eigenvalues of the state matrix obtained in problem 7 are ***1 point***

- -2 and -3
- -5 and -6
- 5 and 6
- -1 and -6

No, the answer is incorrect.
Score: 0
Accepted Answers:
-2 and -3

9) The input vector of the state space realization of problem 6 corresponding to the state matrix obtained in problem 7 is ***1 point***

- $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$
- $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$
- $\begin{pmatrix} -1 \\ 0 \end{pmatrix}$
- $\begin{pmatrix} 0 \\ -1 \end{pmatrix}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\begin{pmatrix} 0 \\ 1 \end{pmatrix}$

10) The output vector of the state space realization of problem 6 corresponding to the state matrix obtained in problem 7 is **1 point**

- $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$
- $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$
- $\begin{pmatrix} -1 \\ 0 \end{pmatrix}$
- $\begin{pmatrix} 0 \\ -1 \end{pmatrix}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\begin{pmatrix} 1 \\ 0 \end{pmatrix}$

11) Using the relationship between the transfer function and the state space realization, the transfer function of this system can be calculated as **1 point**

- $\frac{1}{s^2+5s+6}$
- $\frac{1}{s^2+6s+5}$
- $\frac{1}{s^2-5s+6}$
- $\frac{1}{s^2-6s-5}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{1}{s^2+5s+6}$

12) Consider a stable LTI system that is provided with a sinusoidal input having a frequency of 12 Hz. Then, the corresponding steady state output would be a sinusoid having a frequency of **1 point**

- 3 Hz
- 4 Hz
- 6 Hz
- 12 Hz

No, the answer is incorrect.
Score: 0
Accepted Answers:
12 Hz

13) The transfer function of a plant is $\frac{s+2}{s+4}$ The magnitude of the sinusoidal transfer function at an angular frequency of 1 rad/s is **1 point**

- 0.5
- 0.6
- 0.54
- 0.707

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.54

14) In problem 13, the phase (in °) of the sinusoidal transfer function at an angular frequency of 1 rad/s is **1 point**

- 45
- 26.57
- 14.03
- 12.53

No, the answer is incorrect.
Score: 0

Accepted Answers:
12.53

15) In problem 13, the ratio of the magnitude of the sinusoidal transfer function at an angular frequency of 10 rad/s to that at 1 rad/s is **1 point**

- 0.4
- 0.707
- 1.36
- 1.75

No, the answer is incorrect.
Score: 0
Accepted Answers:
1.75