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## Unit 14 - Week 12

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## Assignment 12

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

**Due on 2019-10-23, 23:59 IST.**

1) Which ONE of the following statements is TRUE about a lead compensator? 1 point

- It attenuates high frequency signals and worsens the transient response  
 It improves the transient response and amplifies high frequency signals  
 It worsens the transient response and amplifies high frequency signals  
 It improves the transient response and attenuates high frequency signals

No, the answer is incorrect.

Score: 0

Accepted Answers:

*It improves the transient response and amplifies high frequency signals*

2) A lead compensator introduces an open loop zero at -2 and an open loop pole at -20. Then, the corner frequencies (in rad/s) of the compensator's sinusoidal transfer function are 1 point

- 0.05 and 0.5  
 2 and 6.32  
 6.32 and 20  
 2 and 20

No, the answer is incorrect.

Score: 0

Accepted Answers:

*2 and 20*

3) In problem 2, the maximum phase lead (in °) provided by the lead compensator is 1 point

- 54.9  
 41.8  
 45  
 30

No, the answer is incorrect.

Score: 0

Accepted Answers:

*54.9*

4) In problem 2), the frequency (in rad/s) at which the maximum phase lead would be provided is 1 point

- 20  
 2  
 3.16  
 6.32

No, the answer is incorrect.

Score: 0

Accepted Answers:

*6.32*

5) In problem 2), it is desired that the low frequency magnitude value (in dB) of the compensator's sinusoidal transfer function be 0 dB. Then, the value of the parameter  $K_c$  is 1 point

- 0.5  
 1  
 10  
 0.05

No, the answer is incorrect.

Score: 0

Accepted Answers:

10

**Problems 6 to 11:** Consider a plant whose transfer function is  $\frac{1}{s(s+2)}$ . It is desired that a lead compensator is used to design a unity negative feedback closed loop system with this plant.

6) If the lead compensator needs to provide a maximum phase lead of  $45^\circ$ , then the value of  $\alpha$  is around **1 point**

- 0.217  
 0.172  
 0.104  
 0.071

No, the answer is incorrect.

Score: 0

Accepted Answers:

0.172

7) If this maximum phase lead angle should be provided at a frequency of 8 rad/s, then the value of T is around **1 point**

- 0.1  
 0.3  
 0.43  
 0.8

No, the answer is incorrect.

Score: 0

Accepted Answers:

0.3

8) It is desired that the static velocity error constant be  $5 \text{ s}^{-1}$ . Then, the value of  $K_c$  is around **1 point**

- 58.1  
 46.2  
 69.6  
 92.7

No, the answer is incorrect.

Score: 0

Accepted Answers:

58.1

9) This lead compensator introduces an open loop zero at around **1 point**

- 4  
 -1.56  
 -2.32  
 -3.33

No, the answer is incorrect.

Score: 0

Accepted Answers:

-3.33

10) This lead compensator introduces an open loop pole at around **1 point**

- 12.45  
 -19.38  
 -4  
 -1.26

No, the answer is incorrect.

Score: 0

Accepted Answers:

-19.38

11) Consider the transfer function of the lead compensator whose parameters have been determined in problems 6 to 10. The low frequency magnitude (in dB) of this compensator's frequency response transfer function would tend to around **1 point**

- 10  
 13  
 20  
 26

No, the answer is incorrect.

Score: 0

Accepted Answers:

20

12) Which ONE of the following statements is FALSE about a lag compensator? **1 point**

- It attenuates high frequency components  
 It increases the low frequency gain  
 It reduces the steady state error  
 It increases the system bandwidth

No, the answer is incorrect.

Score: 0

Accepted Answers:

*It increases the system bandwidth*

13) A lag compensator introduces an open loop zero at -20 and an open loop pole at -5. Then, the corner frequencies (in rad/s) of the compensator's sinusoidal transfer function are **1 point**

- 0.05 and 0.2
- 5 and 10
- 10 and 20
- 5 and 20

No, the answer is incorrect.

Score: 0

Accepted Answers:

*5 and 20*

14) Consider a lag-lead compensator where  $T_2 > T_1$ . Then, which ONE of the following statements is TRUE about the two open loop zeros and the two open loop poles introduced by this compensator? **1 point**

- The two open loop poles would not lie between the two open loop zeros
- The two open loop poles would lie between the two open loop zeros
- The open loop pole corresponding to the lead component would lie between the two open loop zeros
- The open loop pole corresponding to the lag component would lie between the two open loop zeros

No, the answer is incorrect.

Score: 0

Accepted Answers:

*The two open loop poles would not lie between the two open loop zeros*

15) Considering the magnitude plot of the Bode diagram of a typical lag-lead compensator, one can conclude that **1 point**

- the high frequency components are attenuated
- the low frequency components are attenuated
- an intermediate frequency band is attenuated
- an intermediate frequency band is amplified

No, the answer is incorrect.

Score: 0

Accepted Answers:

*an intermediate frequency band is attenuated*