

H.W-3 COMPENSATORS

This set of Control Systems Multiple Choice Questions (MCQs) focuses on "Compensation".

Q.1) CHOSE THE SUTABLE ANSWER WITH EXPLANATION:

1. A phase lead compensation leads to:

- a) Increase in overshoot
- b) Reduction in bandwidth of closed loop system
- c) Reduction in rise time of closed loop system
- d) Reduction in gain margin

2. PD controller is used to compensate system. Compared to the uncompensated system, the compensated system has:

- a) A higher type number
- b) Reduced damping
- c) Higher noise amplification
- d) Large transient overshoot

3. P+D controller:

- a) Introduces offset
- b) Increases bandwidth
- c) Increases margin of stability
- d) Reduces velocity constant

4. Proportional controller:

- a) Introduces offset
- b) Increases bandwidth
- c) Increases margin of stability
- d) Reduces velocity constant

5. The transfer function of a lead controller is $1+20s/1+5s$. The high frequency magnitude of the lead controller to dB is _____

- a) 1
- b) 2
- c) 3
- d) 4

6. Controllers play the following role in control system:

- a) They amplify the signals going to the actuator

- b) They act on the error signal coming out of the summing junction and output a suitable to the actuator
- c) They try to reduce steady state error optimizes overshoot.
- d) All of the mentioned

7. The transfer function of the compensator is $s+4/s+16$. The maximum phase lead frequency and the corresponding phase is :

- a) 6 rad/sec, 36.87°
- b) 8 rad/sec, 36.87°
- c) 6 rad/sec, -36.87°
- d) 8 rad/sec, -36.87°

8. Response to error is very fast for integral controller.

- a) True
- b) False

9. Consider the following statements:

- 1. Integral controller improves steady state response
- 2. By use of proportional controller, maximum peak overshoot decreases
- 3. Type and order of system reduces by one for derivative controller
- 4. Integral controller makes the system less stable in transient state due to oscillations

Select the correct answer using the codes given below:

- a) 1,3 and 4
- b) 1,2 and 3
- c) 2,3 and 4
- d) 1,2 and 4

10. Rate mode controller is also known as _____ controller mode.

- a) Anticipatory
- b) Delay
- c) Integral
- d) Derivative

11. The input of a controller is

- a) Sensed signal
- b) Error signal
- c) Desired variable value
- d) Signal of fixed amplitude not dependent on desired variable value

12. Phase lag controller:

- a) Improvement in transient response
- b) Reduction in steady state error
- c) Reduction is settling time
- d) Increase in damping constant

13. Addition of zero at origin:

- a) Improvement in transient response
- b) Reduction in steady state error
- c) Reduction is settling time
- d) Increase in damping constant

14. Derivative output compensation:

- a) Improvement in transient response
- b) Reduction in steady state error
- c) Reduction is settling time
- d) Increase in damping constant

15. Derivative error compensation:

- a) Improvement in transient response
- b) Reduction in steady state error
- c) Reduction is settling time
- d) Increase in damping constant

16. Lag compensation leads to:

- a) Increases bandwidth
- b) Attenuation
- c) Increases damping factor
- d) Second order

17. Lead compensation leads to:

- a) Increases bandwidth
- b) Attenuation
- c) Increases damping factor
- d) Second order

18. Lag-lead compensation is a:

- a) Increases bandwidth
- b) Attenuation
- c) Increases damping factor
- d) Second order.

19. Rate compensation :

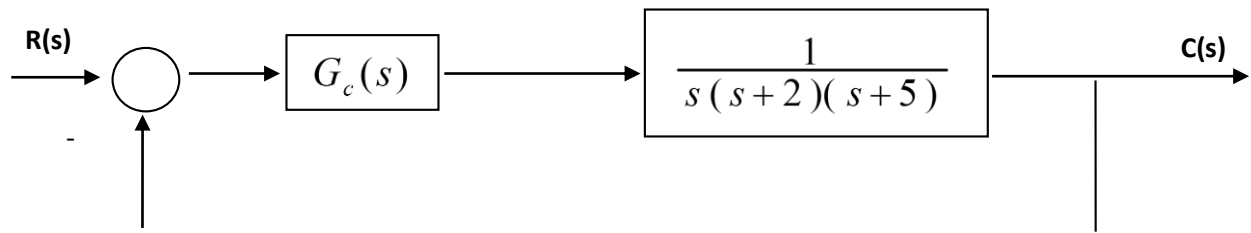
- a) Increases bandwidth
- b) Attenuation
- c) Increases damping factor
- d) Second order

20. Negative exponential term in the equation of the transfer function causes the transportation lag.

- a) True
- b) False.

Q.2) Suggest and design a suitable compensator to improve the transient response for the following time domain specifications to the control system shown below.

- Dominant poles damping ratio of 0.707.
- Dominant poles time constant of 0.5 second.



Q.3) A] Suggest a suitable compensator with all specifications to improve the steady –state response and reduce the noise at high frequency in control system.

B] Explain in details, a PID compensator specifications and operation, and the procedure for designing in control system.

Q.4) A] Define a compensation system? Explain and classify in details, with diagram and transfer function, also how can you recognize between these types.

B] Write explanatory short notes

1. The PID compensator transfer function is: -----.
2. The lead and lag compensators having several properties , explain.
3. Calculate the dominant closed loop pole S_1 location in the procedure of proportional controller.