



Compensation – Question Bank

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

Consider the following statements



1. Integral controller is used to reduce the steady-state error.

2. By using a proportional controller, maximum peak overshoot decreases.

3. Type and order of system reduces by one for derivative controller.

4. Integral controller is used to reduce the steady-state error due to oscillations.

Select the correct answer from the options given below.

a) 1, 3 and 4

b) 1, 2 and 3

c) 1, 3 and 4

d) 2, 3 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. What is the primary purpose of compensation in control systems?

a) To increase the system's complexity

b) To stabilize a system and improve performance



c) To decrease the bandwidth of the system

d) To limit feedback control actions

13. Which type of compensation utilizes changes made to the output before it is disturbed by external factors?

a) Cascade Compensation

b) Feedback Compensation

c) Feed-Forward Compensation

d) Passive Compensation

14. Which controller is classified as a type of active compensation?

a) Phase-lead Controller

b) Phase-lag Controller

c) PID Controller

d) Phase lag-lead Controller

15. What is a key feature of a Proportional-Derivative (PD) controller?

a) It introduces a pole at zero

b) It does not affect system type

c) It eliminates steady-state errors

d) It decreases system bandwidth

16. Which controller improves steady-state performance by increasing the system type?

a) PD Controller

b) PID Controller

c) Phase-lag Controller



d) Phase-lead Controller

17. In the context of passive compensation controllers, which configuration typically aims to improve transient response without affecting steady-state performance?

a) Phase-lead Controller

b) Phase-lag Controller

c) Feed-Forward Compensation

d) Passive Compensation

18. What are the effects of employing a phase-lag controller in a control system?

a) Increases system stability

b) Reduces noise significantly

c) Improves the rise time of the response

d) Eliminates steady-state error in first-order systems

19. How do active compensators generally compare to passive compensators?

a) Active compensators are simpler to design

b) Active compensators respond slower to disturbances

c) Active compensators provide greater control over system dynamics

d) Active compensators are always less expensive

a)

b) To define the system's closed-loop behavior

c) To define the system's open-loop behavior



21. Which type of controller combines proportional gain with the integral of the error?

- a) PD Controller
- b) PI Controller**
- c) PID Controller
- d) Phase-Lag Controller

22. In a phase-lead compensator, what is the relationship between the zero and pole?

- a) The zero is greater than the pole**
- b) The zero is less than the pole
- c) The zero and pole are equal
- d) The pole is located at the origin

23. When designing a PD compensator, which of the following is typically the goal?

- a) To increase the steady-state error
- b) To improve the transient response of the system**
- c) To completely eliminate overshoot
- d) To decrease the system's gain

24. How do phase-lead compensators primarily affect the root locus?

- a) They shift the poles to the right
- b) They increase the damping of the system
- c) They increase the overshoot of the system
- d) They increase the settling time of the system

25. What is a key characteristic of a PID controller?

- a) It uses only proportional control



- b) It improves stability without affecting response time
- ☒ c) It combines proportional, integral, and derivative actions
- d) It has no impact on steady-state error

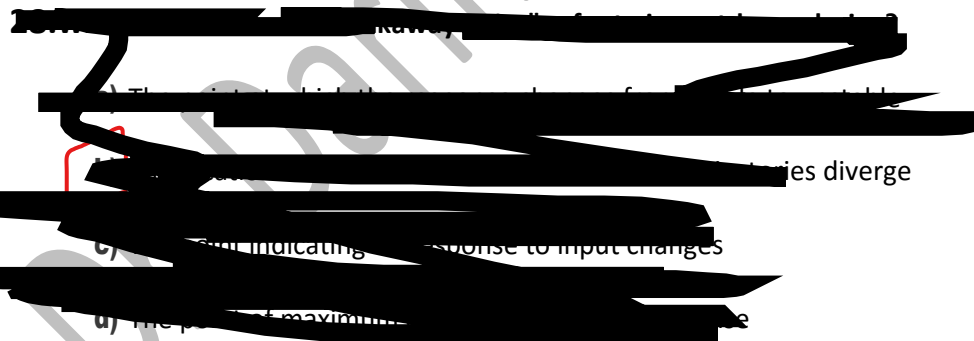
26.



27. In the design of a compensator, what does the angular criterion help determine?

- a) The speed of the response
- b) The location of poles on the real axis
- ☒ c) The positions of zeros and poles in the s-plane
- d) The steady-state error of the system

28.



29. What is the effect of increasing the controller gain in a P-controller?

- a) Increases error
- b) Increases system stability
- ☒ c) Improves transient response at the risk of overshoot



d) No effect on the system response

[REDACTED]

31. What effect does a PD controller have on overshoot in transient response?

- a) It increases overshoot
- b) It eliminates overshoot entirely
- ☒ c) It can reduce overshoot
- d) It has no effect on overshoot

32. For a control system using a PID controller, which action is responsible for eliminating steady-state error?

- a) Proportional action
- b) Derivative action
- ☒ c) Integral action
- d) None of the above

33. When designing a phase-lead compensator, what must you consider regarding the placement of the compensator pole?

- a) It must be placed at the origin
- b) It should be far from the zero to avoid instability
- ☒ c) It should satisfy the angle criterion
- d) It must be equal to the zero for stability



34. Which of the following is not a use for the graphical root locus?

a) To determine the transient response of a system

☒ b) To select points on the plane for closed-loop poles

c) To linearize nonlinear systems

d) To provide a visual representation

35. During root locus design, what does the term "dominant pole" refer to?

☒ a) Poles that are closest to the origin in the s-plane

b) Poles that are closest to the imaginary axis

c) The poles that have the greatest effect on system dynamics

d) Poles that are located in the right half of the s-plane

36. How would you describe the behavior of a system with a gain that is too high?

a) It leads to faster response times

b) It enhances stability

☒ c) It can cause instability

d) It has no effect on the system response

37. In a PID controller, adjusting which parameter first is recommended to achieve quick response?

a) Integral gain (K_I)

b) Derivative gain (K_D)

☒ c) Proportional gain (K_P)

d) All gains should be set simultaneously

38. What does the integral action of a PID controller primarily address?



- a) Transient response
- b) Overshoot
- ☒ c) Steady-state error
- d) Damping of oscillations

~~What is the role of the root locus in root-locus design?~~

- ~~a) To determine system type~~
- ~~b) To calculate magnitude gain~~
- ☒ c) To establish the phase contribution of poles and zeros
- ~~d) To plot the root locus on the s-plane~~

40. With regard to the filtering capacity the lead compensator and lag compensator are respectively:

- a) Low pass and high pass filter
- ☒ b) High pass and low pass filter
- c) Both high pass filter
- d) Both low pass filters Answer: b

41. What is the effect of phase lag compensation on the performance of a servo system?

- ☒ a) For a given relative stability, the velocity constant is increased
- b) For a given relative stability, the velocity constant is decreased
- c) The bandwidth of the system is increased
- d) The time response is made faster

42. A composite R-C network yielded the following transfer function when calculated from its components:

$T(s) = \frac{1+21s+20s^2}{1+11s+10s^2}$. This network can be used as which one of the following?



a) Phase lead compensator

b) Phase lag compensator

☒ c) Lag lead compensator

d) None of the mentioned

43. ~~Consider a unity feedback control system with the following transfer function. If the plant is represented by $G(s) = \frac{1}{s(s+1)(s+2)}$ and the controller is represented by $C(s) = \frac{s+2}{s+10}$, then the closed-loop transfer function is:~~

~~a) $\frac{10(s+2)}{(s+1)(s+2)(s+10)}$~~

~~b) $\frac{10(s+2)}{(s+1)(s+10)}$~~

~~c) $\frac{10(s+2)}{(s+1)(s+2)}$~~

~~d) $\frac{10(s+2)}{(s+1)(s+10)}$~~

44. Phase lag controller:

a) Improvement in transient response

☒ b) Reduction in steady state error

c) Reduction in settling time

d) Increase in damping constant

45. Addition of zero at origin:

☒ a) Improvement in transient response

b) Reduction in steady state error

c) Reduction in settling time

d) Increase in damping constant

46. Derivative output compensation:

☒ a) Improvement in transient response



- b) Reduction in steady state error
- c) Reduction in settling time
- d) Increase in damping constant

47. Derivative error compensation:

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

48. Lag compensation leads to:

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

49. Lead compensation leads to:

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

50. Lag-lead compensation is a:

- a) Increases bandwidth
- b) Attenuation
- ☒ c) Increases damping factor



d) Second order.

51. Rate compensation :

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

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

- ☒ a) True
- b) False.