قائمة الاسئلة

تحكم تلقائي- كلية الهندسة - قسم الميكانيك - المستوى الثالث- 3ساعات - درجة هذا الاختبار (50)

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1) Which of the following is an open-loop control system?

1) - Automatic room heater.
2) + Traffic light system
3) - Air conditioner
4) - Temperature control system.

2) A mass-spring-damper system is an example of a:

1) - First-order open-loop control system
2) - First-order closed-loop control system
3) + Second-order system
4) - First-order system

3) **The closed-loop transfer function of a system with forward gain $G(s)$ and negative feedback gain $H(s)$ is:**

a) $G(s)\,H(s)$.
b) $G(s)/(1+G(s)\,H(s))$
c) $G(s)/(1-G(s)\,H(s))$
d) $G(s)+H(s)$.

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

4) **A second-order underdamped system has a damping ratio ζ:**

a) $\zeta > 1$.
b) $\zeta = 1$.
c) $0 < \zeta < 1$.
d) $\zeta = 0$

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

5) A car is moving at a constant speed of 50 km/h, which of the following is the feedback element for the driver?

1) - Clutch.
2) + Needle of the speedometer.
3) - Eyes.
4) - Steering wheel.

6) In a control system the output of the controller is given to

1) - Amplifier.
2) - Sensor.
3) + Final control element.
4) - Comparator

7) A system is stable if all the poles have:

1) - Positive real parts.
2) + Negative real parts.
3) - Zero real parts.
4) - Imaginary parts.

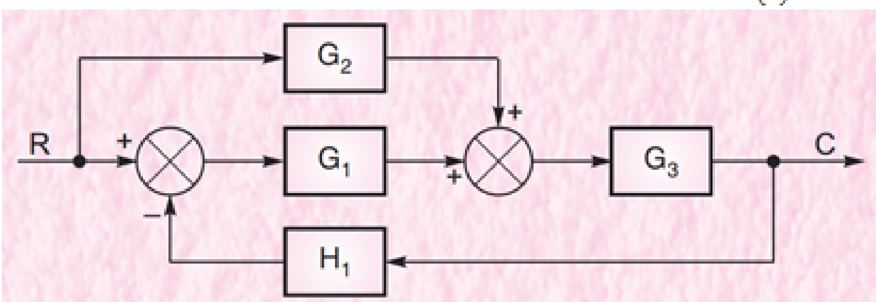
8) The transfer function of a system is given by:
1) - Input/Output in Laplace domain.
2) - Output/Input in time domain.
3) - Output – Input in Laplace domain.
4) + Output/Input in Laplace domain.

9) If a step function is applied to the input of a system and the output remains below a certain level for all the time, the system is:
1) + not necessarily stable.
2) - Stable.
3) - Unstable.
4) - always unstable.

10) A control system is generally met with the time response specifications:
1) - Damping factor.
2) - Setting time.
3) - Steady state accuracy.
4) + All of the mentioned

11) A first-order differential equation represents a:
1) + First-order system
2) - Second-order system
3) - Third-order system
4) - Static system

12) **As shown in next system When $R(s)$ is the input and $C(s)$ is the output, the block diagram is simplified to give the transfer function $\frac{C(s)}{R(s)}$ as:**



1) + $\frac{C(s)}{R(s)} = \frac{G_1G_2+G_2G_3}{1+G_1G_3H_1}$.

2) - $\frac{C(s)}{R(s)} = \frac{G_1G_2G_3}{1+G_1G_3H_1}$.

3) - $\frac{C(s)}{R(s)} = \frac{G_1G_2+G_3}{1+G_1G_3H_1}$.

4) - None of the above.

13)

Considering the following T.F. of a certain first order system,

$$\frac{C(s)}{R(s)} = G(s) = \frac{10}{(s+10)}$$

the response of the system for $r(t) = u(t)$ is:

1) - $c(t) = [1 - e^{-i10t}]$

2) + $c(t) = [1 - e^{-10t}]$.

3) - $c(t) = [1 + e^{-i10t}]$

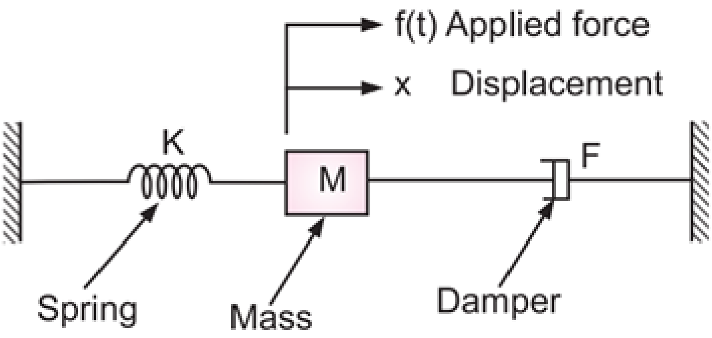
4) - $c(t) = [1 + e^{10t}]$

14) Considering the following T.F. of a certain first order system, the Time delay equal:

$$\frac{C(s)}{R(s)} = G(s) = \frac{10}{(s+10)}$$

1) - 0.693 s
2) - 0.0963 s
3) + 0.0693 s.
4) - 0.0363 s

15) As following control system for the transfer function $G(s) = \frac{X(s)}{F(s)}$ if the $f(t) = 25\ N$, with Mass $(M = 1\ kg)$, Spring Constant $(K = 25\ N/m)$ and Damping Coefficient $(F = 5\ N.s/m)$ the ω_n and ζ respectively are:



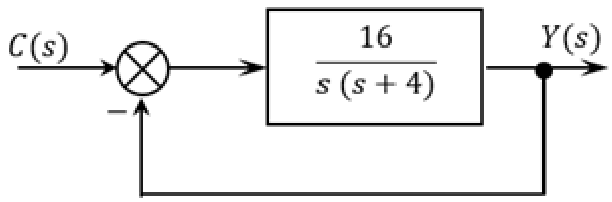
1) - $\omega_n = 2.5$ and $\zeta = 0.5$

2) - $\omega_n = 5$ and $\zeta = 1$

3) - $\omega_n = 2.5$ and $\zeta = 0$

4) + $\omega_n = 5$ and $\zeta = 0.5$.

16) **As following certain unity negative feedback control system the for input $C(s) = u(t)$ and transfer function $G(s) = \frac{Y(s)}{C(s)}$ the M_p and $\%M_p$ respectively are:**



1) + $M_p = 1.1629$ and $\%M_p = 16.29\%$.

2) - $M_p = 11.629$ and $\%M_p = 16.29\%$

3) - $M_p = 1.1629$ and $\%M_p = 0.1629\%$

4) - $M_p = 11.629$ and $\%M_p = 1.629\%$

17) ***A closed-loop control system has the characteristic equation given by:***

$$F(s) = s^3 + 4.5s^2 + 3.5s + 1.5$$

Investigation of the stability using Routh-Hurwitz criterion shows:

1) - System is un-stable
2) + System is stable.
3) - System is marginally stable.
4) - None of the above.

18) **in systems type 0 and type 1 with input $c(t) = u(t)$ with steady state error formula $\frac{1}{1+K_p}$ the Static error constant K_p for both systems respectively are:**

1) - K_p = constant and K_p =0;

2) - $K_p = \infty$ and K_p =0;

3) - $K_p = \infty$ and K_p =0;

4) + K_p = constant and $K_p = \infty$

19)

In the closed loop transfer function $G(s) = \frac{C(s)}{R(s)}$ and the characteristic equation is $1 + H(s)\ G(s) = 0$, and $H(s)\ G(s) = \frac{K}{(s+2)\ (s+4)}$ the breakaway point is:

1)	-	- 2.5
2)	+	-3
3)	-	3
4)	-	-3.5