Multiple Choice Questions (Marks are evenly distributed)

Q1) The controller input in typical feedback closed loop system is the:
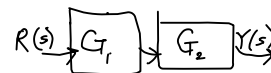a) **Feedback signal**   b) **Reference input**   c) **Output** signal   d) **Actuating Error signal**

Q2) Given the following closed loop transfer function $\frac{Y(s)}{X(s)} = \frac{4}{(s+4)}$ **the solution y(t) for a unit step input is**
a) $y(t) = 4 - e^{-4t}$ b) $y(t) = 4 - e^{-t}$ c) $y(t) = 1 - e^{-4t}$ d) $y(t) = 1 - e^{-t}$

Q3) What is the Laplace transform of   3e⁻²ᵗ   a) 0.5/(s+3)   b) 3/(s+2)   c) 2/(s+3)   d) 3(s+2)

Q4) An open loop control system with two blocks in series.

$G_1(s)= 0.5(s+2) /(s+1)$ and $G_2 (s)= 2/ [s(s+2)]$. **What is the overall transfer function   Y(s)/R(s)?**
a) 1/[s(s+2)]   b) 2.5/[(s+1)(s+2)]   c) 1/[(s+2)(s+1)]   d) 1/s(s+1)

Q5) Effect of feedback on sensitivity is:
a) **Minimum in Closed loop control system**   c) **Minimum in Open loop control system**
b) **Minimum in both Open and closed loop control systems**   d) **Has no effect**

Q6) Which of the following is not an example of a closed loop system?
a) **Respiratory system of an animal**   b) **Operational amplifier**
c) **Air conditioner unit.**   d) **Robotic systems**

Q7) Standard test signals in control system are:
a) **Impulse signal**   b) **Ramp signal**   c) **Unit step signal**   d) **All of the mentioned**

Q8) Unit step signal is the signal whose values is :
a) **One for all values of $t \geq 0$**   c) **One for only t=1**
b) **Deterministic signal changing between -1 and 1**   d) **One for all values of $-\infty \leq t \leq \infty$**

Q9) Ramp input signal
a) **denotes constant velocity**   b) **It denotes constant velocity and varies linearly with time**
c) **Value increases linearly with time**   d) **It varies exponentially with time**

Q10) The Laplace of unit impulse function δ(t) is: a) $1/s$ b) $1/s^2$ c) 1   d) $1/s + 1$

Q11) The error signal in a closed loop system is the difference between the reference input and the
a) **Disturbance signal**   b) **Command input**   c) **Controlled signal**   d) **Feedback signal**

Q12) i_L is the current passing through an Inductance (L). What is the expression of the voltage (V_L)
across the inductance :
a) $V_L = L. i_L$ b) $V_L = L. di_L/dt$ c) $V_L = i_L. (dL/dt)$ d) $V_L = L. (\dot{i_L})^2$

Q13) The order and type of the transfer function given by $G(s) = (s + 1) / (s^3 + 3s^2 + 12s)$ is of :
a) **order 0 and type 3**   b) **order 1 and type 3**   c) order 3 and type 1   d) **order 3 and type 0**

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Q14) The inverse Laplace transform of any transfer function is required for evaluating the
a) output at initial condition.   b) input in time domain
c) output in s domain   d) output in time domain

Q15) The voltage source V_c is applied across a capacitor C. The current i_c passing through the capacitor is given by the following expression
a) $i_c = (C)V_c$ b) $i_c = (C)(dv_c/dt)$ c) $i_c = V_c(dC/dt)$.   d) $i_c = (C)\int V_c\, dt$
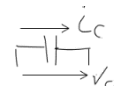
Q16) A block diagram consists of two blocks connected in parallel. The first block is $G1(s) = \frac{2}{s+2}$ and the second block is $G2(s) = \frac{1}{s+1}$. Find the overall transfer function?
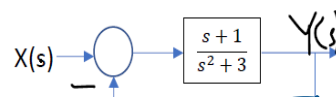a) $G(s) = \frac{3}{2s+3}$ b) $G(s) = \frac{s+3}{(s+1)(s+2)}$ c) $G(s) = \frac{3}{(s+1)(s+2)}$ d) $G(s) = \frac{3s+4}{(s+1)(s+2)}$

Q17) A block diagram consists of two blocks connected in series. The first block is $G1(s) = \frac{4}{s+3}$ and the second block is $G2(s) = \frac{s+3}{s+4}$. Find the overall transfer function?
a) $G(s) = \frac{(s+7)}{(2s+7)}$ b) $G(s) = \frac{2(s+1)}{(s+4)}$ c) $G(s) = \frac{4}{s+4}$ d) $G(s) = \frac{4s+3}{(2s+7)}$

Q18) A unity negative feedback system with transfer function G(s) as shown in Fig.2
Find $\frac{Y(s)}{X(s)}$?   a) $\frac{s+1}{s^2+4}$ b) $\frac{s+2}{s^2+3}$ c) $\frac{1}{s^2+2s+3}$ d) $\frac{s+1}{s^2+s+4}$

Q19) The Laplace of $\frac{d^2y}{dt^2} + 7\frac{dy}{dt} + 10y = 3$ is :
a) $Y(s) = \frac{3}{(s+2)(s+5)}$ b) $Y(s) = \frac{3}{s(s+2)(s+5)}$ c) $Y(s) = \frac{3s}{(s+7)(s+10)}$ d) $Y(s) = \frac{3}{s(s+7)(s+10)}$

Q20) The Laplace of the PID control signal $[u(t) = 3e(t) + 7\frac{de(t)}{d(t)} + 2\int e(t)dt\,]$ is
a) $U(s) = (3 + 7s + \frac{2}{s})$ E(s)   b) $U(s) = (3 + \frac{7}{s} + 2s)$ E(s)
c) $U(s) = (7 + 3s + 2/s)$ E(s)   d) $U(s) = (3s + \frac{7}{s} + 2)$ E(s)

P1) For the closed loop system given by the transfer function: $\frac{Y(s)}{R(s)} = 8/[s^2 + 3.6s + 9]$ Find the following:

Q21) The undamped natural frequency ω_n :   a) 9   b)4.8   c) 3   d)8

Q22) The damping ratio ξ :   a)0.5   b)0.6   c)0.66   d) 0.75

Q23) The damped natural frequency ω_d a)1.8   b) 3.2   c)2.4   d)3.6

Q24) The closed loop poles are: a) $1.8 \pm j2.4$ b) 1.2,2.4   c) $-1.2, -2.4$ d) $-1.8 \pm j2.4$

Q25) The peak time t_p :   a) 0.1   b) 0.7   c) 1.31   d) 2.15

Q26) The overshoot OV is approximately :   a)2.35   b) 0.1   c)0.01   d)3.25

Q27) The settling time t_s for ±5% tolerance is: a)1.66s   b) 0.66s   c) 0.25s   d) 1.25s

Q28) The time constant taw τ is :   a) 0.416s   b)3.2s   c) 0.55s   d)2.4s
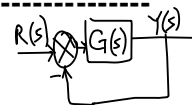
Q29) For a system, the damping ratio (ζ) is 0.6 and undamped natural frequency (ω_n) is 7.85.
Find the peak time t_p ?   a) 2s   b) 5s   c) 0.5s   d) 0.2s

Q30) A unity feedback system with $G(s) = \frac{8(s+5)}{s^2+9}$, The overall system   is
a) underdamped   b) overdamped   c) critically damped   d) un damped Oscillatory system

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Q31) The steady state error for a type-1 system with step input is
a) 1/K$_p$ b)1/[1+K$_p$]   c) Zero   d) Infinity

Q32) The characteristic equation of a linear system is given by $s^4 + 5s^3 + 2s^2 + 5s + 6 = 0$. Check, how many poles are located at the Right hand side of the S-Plane, using the Routh criterion.
a) one pole   b) two poles   c) three poles   d) no poles

Q33) A unity feedback system with $G(s) = \frac{48(s+5)}{s(s+4)(s+2)(s+3)}$, For a unit ramp input, the steady state error is :
a) 0.5   b)10   c)1   d) 0.1

Q34) If the poles of the closed loop system are located on the imaginary axis, the system is
a) Unstable   b) Stable   c) Marginally Stable   d) Conditionally stable

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Q35) A system transfer function is give by $G(s) = \frac{8}{s^2+2s+4}$, the settling time for ±2% tolerance is
a) 0.25s   b)1s   c) 4s   d) 3s

Q36) The maximum overshoot for a closed loop system given by $G(s) = \frac{36}{s^2+2s+36}$ is
a) 0.44   b) 0.587   c)0.1   d) 0.156

Q37) Find the value of K in the following system $G(s) = \frac{25}{s^2+2K\,s+25}$, Knowing that the damping ratio is 0.4 ?
a) 1   b) 9   c) 2   d) 5

**Q38)** For the system given by $\frac{Y(s)}{R(s)} = \frac{72}{s^2+2s+36}$; use the final value theorem to find the output $y(t)$ at t=infinity (steady state output) given the input is a unit step input [r(t) = 1]
a) 0   b)2   c)1   d)Infinity

Q39) Check the stability for the following system using Routh criterion

$G(s) = \frac{2}{s^3+2s^2+3s+8}$; $H(s) = (s + 3)$
a) Stable with no roots in the R.H.S of the s-plane   b)Unstable with one root in the R.H.S of the s-plane
c)Unstable with two roots in the R.H.S of the s-plane   d) Marginally stable with no roots in the R.H.S
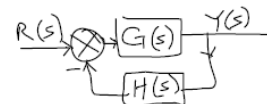
Q40) If the time response of the output has an overshot then definitely the system is
a) underdamped with $\zeta > 1$ b) overdamped with $\zeta > 1$
c) overdamped with $1> \zeta$ d) underdamped with $1 > \zeta$

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أجوبة مادة نظم السيطرة
نموذج-1

Q	Ans		Q	Ans		Q	Ans		Q	Ans
Q1	D		Q11	D		Q21	C		Q31	C
Q2	C		Q12	B		Q22	B		Q32	B
Q3	B		Q13	C		Q23	C		Q33	D
Q4	D		Q14	B		Q24	D		Q34	C
Q5	A		Q15	B		Q25	C		Q35	C
Q6	B		Q16	D		Q26	B		Q36	B
Q7	D		Q17	C		Q27	A		Q37	C
Q8	A		Q18	D		Q28	C		Q38	B
Q9	B		Q19	B		Q29	C		Q39	C
Q10	C		Q20	A		Q30	A		Q40	D

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