RCT-1 [EE/ECE]

Control Systems

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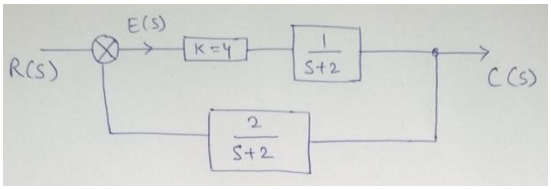
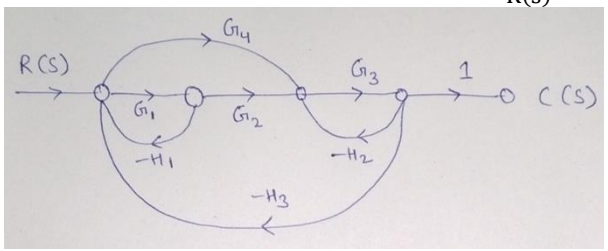
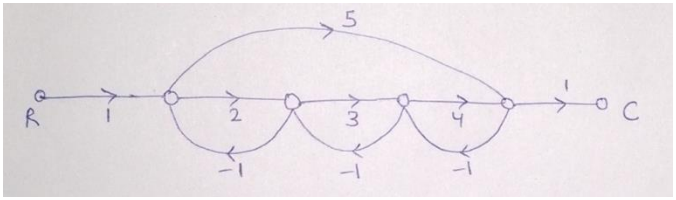
1. The damping ratio of a parallel RLC circuit can be expressed as
   (a) $\frac{R^2C}{2L}$
   (b) $\frac{2L}{R^2C}$
   (c) $\frac{1}{2R}\sqrt{\frac{L}{C}}$
   (d) $\frac{2}{R}\sqrt{\frac{L}{C}}$
2. The steady state error of the system shown in the figure for a unit step input is?



   (a) 0.333 (b) 3 (c) 0.5 (d) 5
3. The closed loop transfer function of a system is $\frac{100}{s^2+100}$. The settling time of the system is?
   (a) 10 s (c) ∞ s
   (b) 0 s (d) None of the above
4. In feedback control system with $G(s) = \frac{16}{s(s+4)}$ and $H(s) = (1 + ks)$. The damping ratio of 0.6 will be achieved for k equals to
   (a) 0.1 (b) 0.02 (c) 0.025 (d) 0.05
5. The signal flow graph is shown in figure. The transfer function $\frac{C(s)}{R(s)}$ is



   (a) $\frac{G_1G_2G_3+G_4G_3}{1+G_1H_1+G_3H_2+G_1G_2G_3H_3}$
   (b) $\frac{G_1G_2G_3+G_4G_3}{1+G_1H_1+G_3H_2+G_1G_2G_3H_3+G_1G_3H_1H_2}$
   (c) $\frac{G_1G_2G_3}{1+G_1H_1+G_3H_2+G_1G_2G_3H_3+G_1G_3H_1H_2}$
   (d) $\frac{G_1G_2G_3+G_4G_3}{1+G_1H_1+G_3H_2+G_1G_2G_3H_3-G_1G_3H_1H_2}$
6. In the signal flow graph of figure, the transfer function $\frac{C}{R}$ will be



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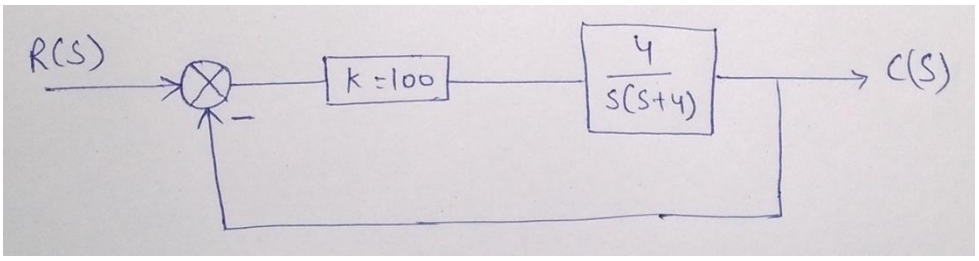
(a) $\frac{11}{9}$
(b) $\frac{22}{15}$
(c) $\frac{24}{23}$
(d) $\frac{44}{23}$

7. The system described by the differential equation $\frac{d^2y}{dt^2}(t) + y^2\frac{dy}{dt}(t) + t^2y(t) = 5$ is
   (a) A linear time varying system
   (b) A nonlinear time varying system
   (c) A time varying stochastic system
   (d) None of the above
8. The unilateral Laplace transformation of f(t) is $\frac{1}{s^2+s+1}$.Which one of the following is the unilateral Laplace transform of $g(t) = t\,f(t)$?
   (a) $\frac{-s}{(s^2+s+1)^2}$
   (b) $\frac{-(2s+1)}{(s^2+s+1)^2}$
   (c) $\frac{s}{(s^2+s+1)^2}$
   (d) $\frac{2s+1}{(s^2+s+1)^2}$
9. If the Laplace transform of f(t) is $f(s) = \frac{2(s+1)}{s^2+2s+5}$, then $f(0^+)$ and $f(\infty)$ are given by
   (a) 0, 2 respectively
   (b) 2, 0 respectively
   (c) 0, 1 respectively
   (d) $\frac{2}{5}$, 0 respectively
10. For the second order closed loop system shown in figure the damping frequency (in rad/sec) is



(a) 20
(b) 10
(c) 200
(d) 19.89

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