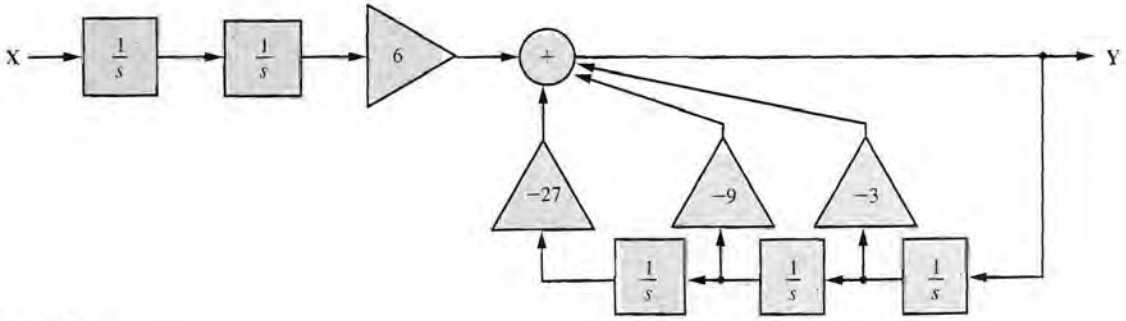

Fig. P5.54

5.60 Find the Laplace transform of (a) $\sin(\beta t - \phi)u(t)$, (b) $\cos(\beta t - \phi)u(t)$, (c) $e^{-\alpha t}\sin(\beta t - \phi)u(t)$, and (d) $e^{-\alpha t}\cos(\beta t - \phi)u(t)$.

5.61 Find the inverse Laplace transform of each of the following functions:

(a) $\dfrac{600}{s(s + 10)(s + 30)}$ (b) $\dfrac{60(s + 4)}{s(s + 2)(s + 12)}$

5.62 Find the inverse Laplace transform of each of the following functions:

(a) $\dfrac{12s}{(s + 3)(s^2 + 9)}$ (b) $\dfrac{4(s^2 + 1)}{s(s^2 + 4)}$

5.63 Find the inverse Laplace transform of each of the following functions:

(a) $\dfrac{(s + 2)(s + 3)}{s(s + 1)^2}$ (b) $\dfrac{10s + 80}{s^2 + 8s + 20}$

5.64 Find the solution to the differential equation

$$\frac{d^2x(t)}{dt^2} + 7\frac{dx(t)}{dt} + 6x(t) = 36u(t)$$

subject to the initial conditions $dx(0)/dt = 0$ and $x(0) = -4$.

5.65 Find the solution to the differential equation

$$\frac{d^2x(t)}{dt^2} + 3\frac{dx(t)}{dt} + 2x(t) = 20\cos 2t\, u(t)$$

subject to the zero initial conditions $dx(0)/dt = x(0) = 0$.

5.66 For the series RC circuit shown in Fig. P5.66, suppose that $R = 5\ \Omega$ and $C = 0.1$ F. Find the step responses $v(t)$ and $i(t)$ when $v_s(t) = 20u(t)$ V.

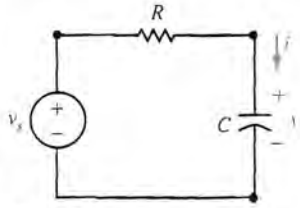

Fig. P5.66

5.67 For the series RC circuit shown in Fig. P5.66, suppose that $R = 2\ \Omega$ and $C = 2$ F. Find $v(t)$ and $i(t)$ when $v_s(t) = 12e^{-t/2}u(t)$ V.

5.68 For the series RC circuit shown in Fig. P5.66, suppose that $R = 2\ \Omega$ and $C = 2$ F. Find $v(t)$ and $i(t)$ when $v_s(t) = 12e^{-t/4}u(t)$ V.

5.69 For the series RL circuit shown in Fig. P5.69, suppose that $R = 5\ \Omega$ and $L = 5$ H. Find the step responses $i(t)$ and $v(t)$ when $v_s(t) = 20u(t)$ V.

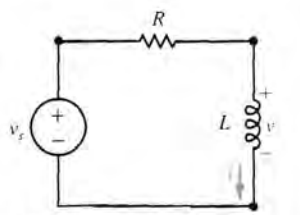

Fig. P5.69