1. (5%) Please find the inverse Laplace transform of the following function:

$$F(s) = e^{-3s} \frac{(95s + 100)}{s(s^2 + 2s + 2)}$$

2. (5%) Please find the Laplace transform of the following function:

$$f(t) = [2e^{-t}\cos 2t + 5e^{-t}\sin 2t]q(t)$$

3. (25%) A second-order circuit in Fig. 1 is assumed to be in a steady-state condition prior to switch at $t = 0$. Please use the Laplace transforms to calculate the voltage $v_o(t)$ for $t > 0$.

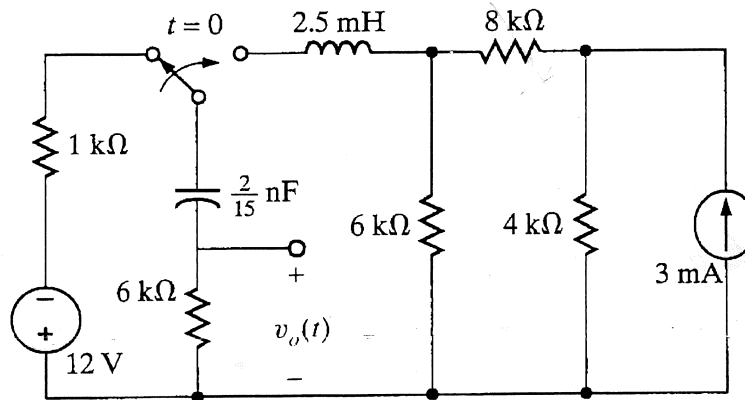

Fig. 1.

4. (15%) The switch shown in Fig. 2 moves from position 1 to position 2 at $t = 0$. Please use the Laplace transforms to find $v_o(t)$ for $t > 0$.
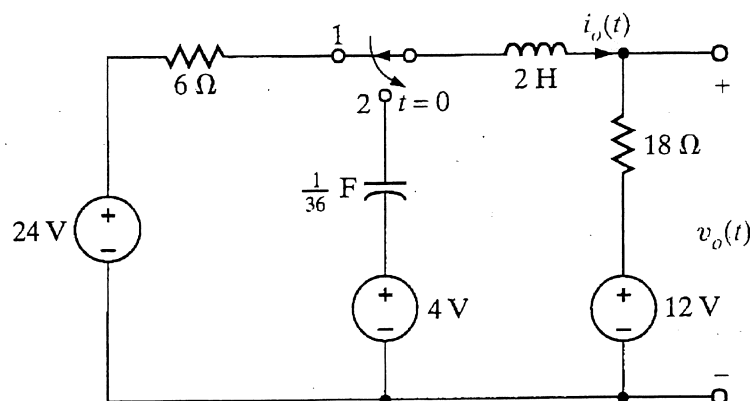

Fig. 2.

5. (25%) A second-order circuit in Fig. 3 is assumed to be in a steady-state condition prior to switch at $t = 0$. Please use Laplace transforms to the voltage $v_o(t)$ for $t > 0$.
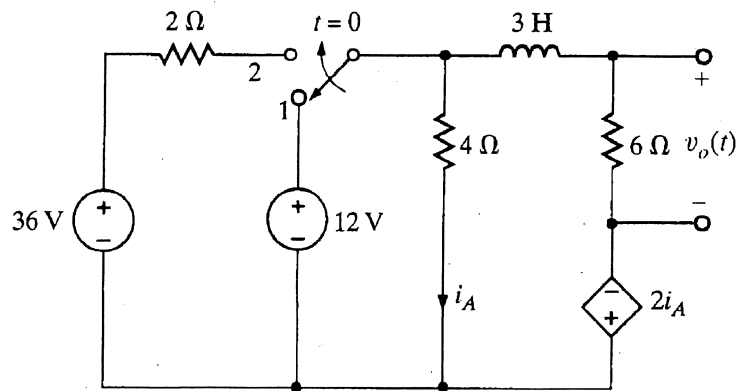

Fig. 3

6. (10%) The magnitude characteristic of a band-elimination filter is depicted in Fig. 4. Please determine the transfer function of $H(j\omega)$.
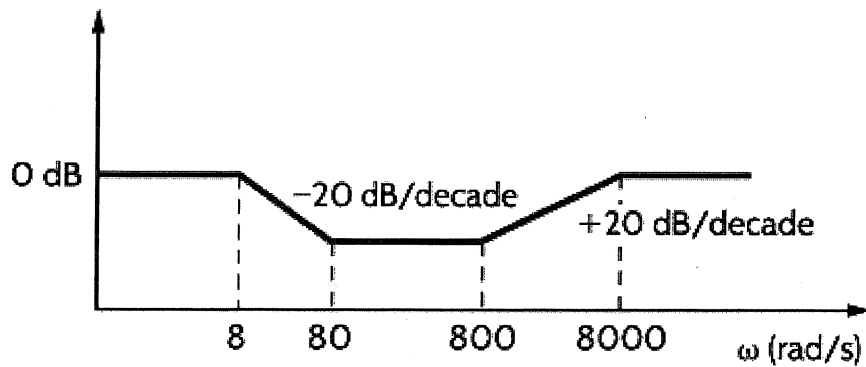

Fig. 4

7. (15%) Please sketch the magnitude characteristic of the Bode plot, labeling all critical slopes and points for the following function:

$$G(j\omega) = \frac{0.1(2j\omega + 1)}{j\omega(0.1j\omega + 1)(0.01j\omega + 1)}$$