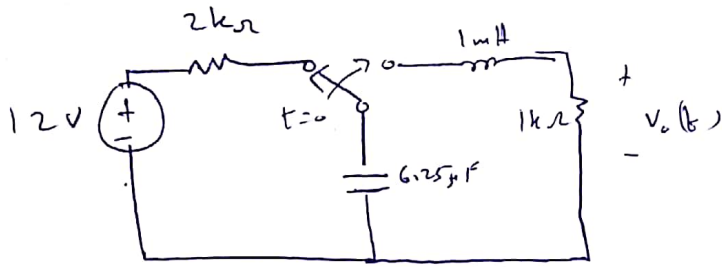
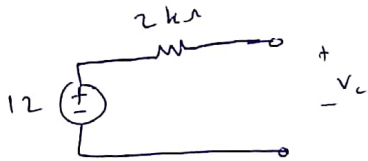


Quiz 8 Section 1

Solution



at $t=0^-$:



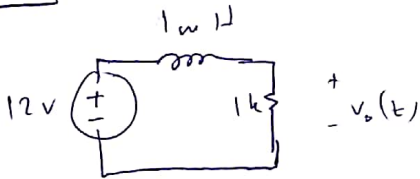
$$V_c(0^-) = V_c(0^+) = 12V$$

$$i_L(0^-) = i_L(0^+) = 0A$$

$$V_c(0^-) = V_c(0^+) = 0V$$

Initial conditions

at $t=0^+$:



For $t > 0$:

$$L \frac{di}{dt} + 1000 i + \frac{1}{C} \int i dt = 0$$

$$\frac{d^2 i}{dt^2} + 1 \times 10^6 \frac{di}{dt} + 1.6 \times 10^8 i(t) = 0$$

$$m^2 + 1 \times 10^6 m + 1.6 \times 10^8 = 0$$

$$m_1 \approx -160$$

$$m_2 \approx -1 \times 10^6$$

$$i(t) = k_1 e^{-160t} + k_2 e^{-1210^6 t}$$

$$i(0) = k_1 + k_2 = 0$$

so $\boxed{k_1 = -k_2} \quad - (1)$

$$v_c(t) = \frac{1}{C} \int i dt = -1000 k_1 e^{-160t} - 0.16 k_2 e^{-1210^6 t}$$

$$v_c(0) = -1000 k_1 - 0.16 k_2 = 12$$

$$\boxed{-1000 k_1 - 0.16 k_2 = 12} \quad - (2)$$

Solve (1) & (2) to get:

$$\boxed{k_1 = -0.012}$$

$$\boxed{k_2 = 0.012}$$

$$v_o(t) = 1000 i(t)$$

$$\boxed{v_o(t) = -12 e^{-160t} + 12 e^{-1210^6 t}}$$