

# 作业纸

课程名称: \_\_\_\_\_

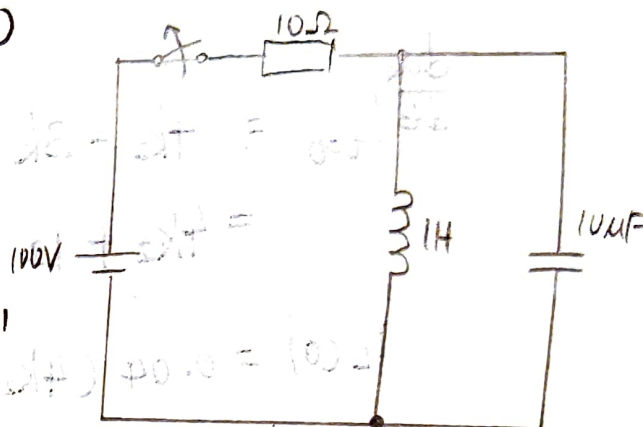
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$$\begin{aligned} 7-2: i_L(0_+) &= i_L(0_-) \\ &= \frac{100}{10} \\ &= 10 \text{ A} \end{aligned}$$

打开开关后  $R=0$ ,  $\omega_0 = \frac{1}{\sqrt{LC}} = \frac{1}{\sqrt{10 \cdot 5}} = 316 \text{ rad/s}$

$$\therefore i_L(t) = I_0 \cos \omega_0 t = 10 \cos(316t) \text{ A}$$

$$v_C(t) = \frac{1}{\omega_0 C} \sin \omega_0 t = 3160 \sin(316t) \text{ V}$$



7-5: RLC 串联电路方程:  $LC \frac{d^2 u_C}{dt^2} + RC \frac{du_C}{dt} + u_C = 0$

$$v_C(0) = -4 \text{ V}$$

$$i_L(0) = 4 \text{ A}$$

特征方程:  $0.04s^2 + 0.24s + 1 = 0$

$$s = \frac{-0.24 \pm \sqrt{(0.24)^2 - 4 \cdot 0.04}}{2 \times 0.04}$$

$$= -3 \pm 4j$$

得  $v_C(t) = e^{-3t} [k_1 \cos 4t + k_2 \sin 4t]$

$$\therefore v_C(0) = -4 = k_1$$

$$\therefore k_1 = -4$$

$$i_L = i_C = C \frac{du_C}{dt}, \quad i_L(0) = C \frac{du_C}{dt} \Big|_{t=0}$$

$$\frac{du_C}{dt} = e^{-3t} [4k_1 \sin 4t + 4k_2 \cos 4t] - 3e^{-3t} [k_1 \cos(4t) + k_2 (\sin 4t)]$$

$$\frac{du_C}{dt} \Big|_{t=0} = 4k_2 - 3k_1 = 4k_2 + 12$$

$$i_L(0) = 0.04 (4k_2 + 12) = 0$$

$$k_2 = -22$$

$$\therefore u_C(t) = e^{-3t} [22 \sin(4t) - 4 \cos(4t)] \text{ V}$$

$$i_C(t) = e^{-3t} [4 \cos(4t) - 2 \sin(4t)] \text{ A}$$

$$7-7: s = \pm j$$

$$\omega_0 = 1 \text{ rads}^{-1}$$

$$\therefore u_C(t) = k_1 \cos t + k_2 \sin t + 1$$

$$u_C(0) = k_1 + 1 = -1$$

$$\therefore k_1 = -2$$

$$\frac{du_C(t)}{dt} \Big|_{t=0} = k_2 = 0$$

$$\therefore u_C(t) = (1 - 2 \cos t) \text{ V}$$

$$i(t) = i_C(t) = C \frac{du_C(t)}{dt} = 2 \sin t \text{ A} \quad t \geq 0$$

