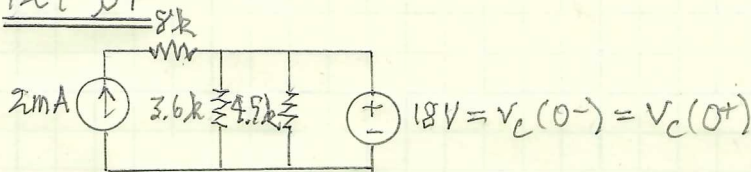


$$1) a) L_{eq} = 136 \parallel (41 + 176 \parallel ((157 + 151))) = 136 \parallel (41 + 176 \parallel 308) = 136 \parallel (41 + 112) \\ = 136 \parallel 153 = \underline{72 \text{ mH}}$$

$\oplus$ = inverse sum of inverses, $\parallel$ = add

$$b) C_{eq} = 49 \parallel (200 \oplus 40 \parallel (180 \oplus 144)) = 49 \parallel (200 \oplus 40 \parallel 80) = 49 \parallel (200 \oplus 120) \\ = 49 \parallel 75 = \underline{124 \text{ } \mu\text{F}}$$

2) At 0^+ we have



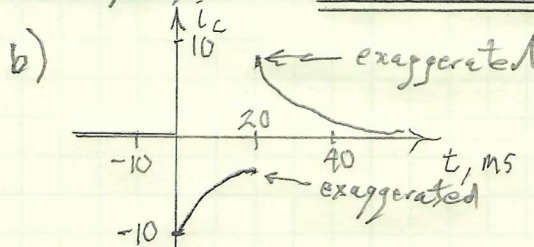
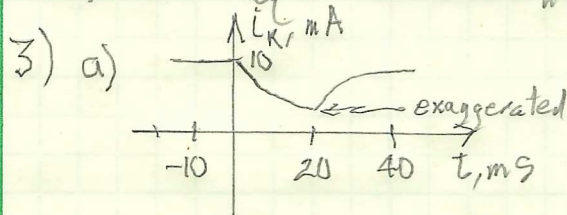
$$a) i_1(0^+) = \frac{18V}{3600\Omega} = \underline{5 \text{ mA}}$$

$$b) i_2(0^+) = \frac{18V}{4500\Omega} = \underline{4 \text{ mA}}$$

$$c) i_C(0^+) + i_1(0^+) + i_2(0^+) = 2 \text{ mA} \Rightarrow i_C(0^+) = (2 - 5 - 4) \text{ mA} = \underline{-7 \text{ mA}}$$

$$d) V_C(\infty) = 2 \text{ mA} (3.6 \text{ k}\Omega \parallel 4.5 \text{ k}\Omega) = \underline{4 \text{ V}}$$

$$e) \tau = R_{eq} C = (3.6 \text{ k}\Omega \parallel 4.5 \text{ k}\Omega) 60 \text{ } \mu\text{F} = \underline{120 \text{ ms} = 0.12 \text{ s}}$$



4) a) For $t < 0$, inductor is short and all 2.1V appears across parallel combination of 105Ω and $70\Omega \Rightarrow \underline{2.1 \text{ V}}$

$$b) \text{ For } t < 0 \quad i_L = \frac{2.1 \text{ V}}{(105 \parallel 70)\Omega} = 50 \text{ mA} = i_L(0^+).$$

$$V_R(0^+) = (105\Omega) i_L(0^+) = \underline{5.25 \text{ V}}$$

$$5) a) i_L(0^-) = \frac{5 \text{ V}}{500\Omega} = \underline{10 \text{ mA}} = i_L(0^+), \quad b) V_R(0^+) = V_C(0^+) = V_C(0^-) = (10 \text{ mA}) 50\Omega = \underline{0.5 \text{ V}}$$

$$c) i_R(0^+) = \frac{V_R(0^+)}{25\Omega} = 20 \text{ mA} \quad d) i_C = -i_L - i_R = -10 \text{ mA} - 20 \text{ mA} = \underline{-30 \text{ mA}}$$

$$e) \alpha = \frac{1}{2RC} = 5000, \quad \omega_0 = \frac{1}{\sqrt{LC}} = 5000$$

$\alpha = \omega_0 \Rightarrow \underline{\text{Critically damped.}}$