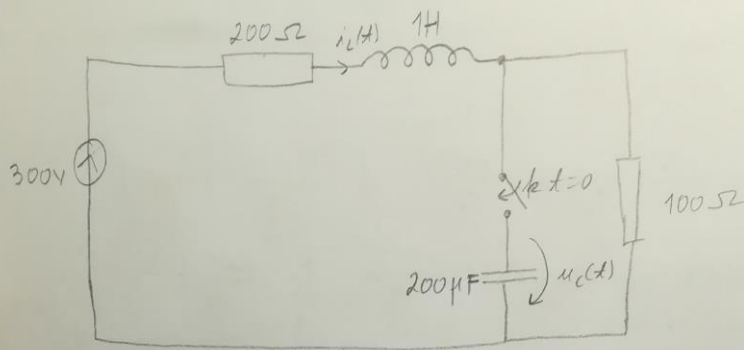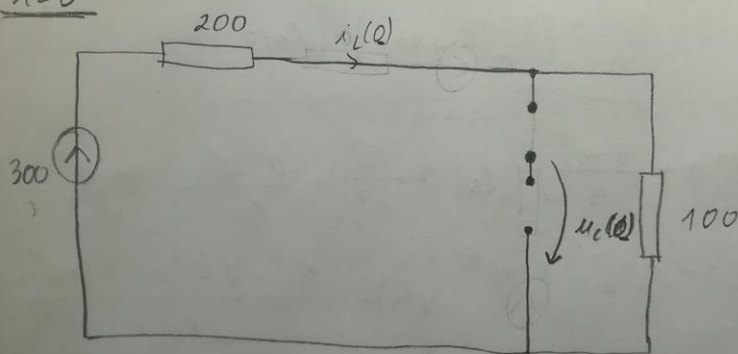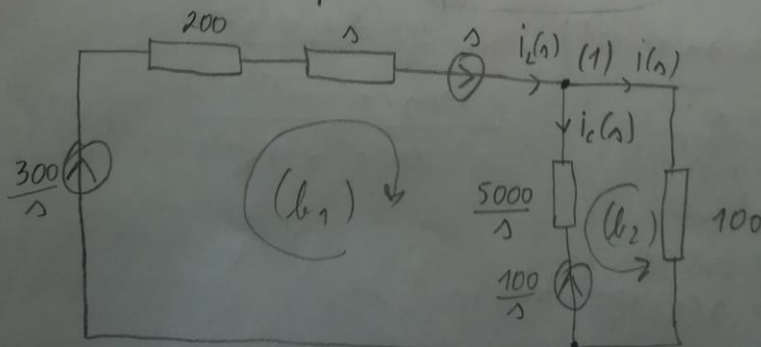GRUMEZESCU RAREŞ   311CC

$i_L(t),\ u_c(t)$

$t=0$

$(200\,\Omega + 100\,\Omega)\cdot i_L(0) = 300\,V \Rightarrow \boxed{i_L(0) = 1\,A}$

$u_c(0) = 0\ \text{pt. că pe ramura lui nu circulă curent.}$

$(9):\ i_L(\Lambda) = i(\Lambda) + i_c(\Lambda) \Longleftrightarrow i(\Lambda) = i_L(\Lambda) - i_c(\Lambda)$

$(h_1):\ (200+\Lambda)\, i_L(\Lambda) + \dfrac{5000}{\Lambda}\, i_c(\Lambda) = \dfrac{300}{\Lambda} - \dfrac{100}{\Lambda}$

$\left.\begin{array}{l}\\[4pt]\\\end{array}\right\} \Longrightarrow$

$(h_2):\ \dfrac{5000}{\Lambda}\, i_c(\Lambda) - 100\, i_L(\Lambda) = -\dfrac{100}{\Lambda}$

$$\Longrightarrow \begin{cases} (200+\Lambda)\, i_L(\Lambda) + \dfrac{5000}{\Lambda}\, i_c(\Lambda) = \dfrac{200}{\Lambda} & \Big|\cdot\left(\dfrac{5000}{\Lambda}+100\right) \\[14pt] \dfrac{5000}{\Lambda}\, i_c(\Lambda) - 100\, i_L(\Lambda) + 100\, i_c(\Lambda) = -\dfrac{100}{\Lambda} & \Big|\cdot \dfrac{5000}{\Lambda} \end{cases}$$

$$(200+\Lambda)\left(\dfrac{5000}{\Lambda}+100\right) i_L(\Lambda) + \dfrac{5000}{\Lambda}\left(\dfrac{5000}{\Lambda}+100\right)\cdot i_c(\Lambda) = \dfrac{200}{\Lambda}\left(\dfrac{5000}{\Lambda}+100\right)$$

$$\dfrac{5000}{\Lambda}(-100)\, i_L(\Lambda) + \dfrac{5000}{\Lambda}\left(\dfrac{5000}{\Lambda}+100\right)\cdot i_c(\Lambda) = \dfrac{5000}{\Lambda}\cdot\left(-\dfrac{100}{\Lambda}\right)$$

$$\underline{\hspace{13cm}}$$

$$\left(\dfrac{10^6}{\Lambda} + 2\cdot10^4 + 5000 + 100\Lambda + \dfrac{5\cdot10^5}{\Lambda}\right) i_L(\Lambda) = \dfrac{10^6}{\Lambda^2} + \dfrac{2\cdot10^4}{\Lambda} + \dfrac{5\cdot10^5}{\Lambda^2}$$

$$\dfrac{10^6 + 2\cdot10^4\Lambda + 5000\Lambda + 100\Lambda^2 + 5\cdot10^5}{\Lambda}\cdot i_L(\Lambda) = \dfrac{10^6 + 2\cdot10^4\Lambda + 5\cdot10^5}{\Lambda^2}$$

$$\dfrac{100\Lambda^2 + 25000\Lambda + 15\cdot10^5}{\Lambda}\, i_L(\Lambda) = \dfrac{2\cdot10^4\Lambda + 15\cdot10^5}{\Lambda^2} \qquad \Longleftrightarrow$$

$$\Longleftrightarrow \dfrac{100}{\Lambda}\left(\Lambda^2 + 250\Lambda + 15\cdot10^3\right)\cdot i_L(\Lambda) = \dfrac{100}{\Lambda}\cdot\dfrac{2\cdot10^2\Lambda + 15\cdot10^3}{\Lambda^2}$$

$$i_L(\Lambda) = \dfrac{200\Lambda + 15\cdot10^3}{\Lambda\left(\Lambda^2 + 250\Lambda + 15\cdot10^3\right)} = \dfrac{200\Lambda + 15\cdot10^3\Lambda}{\Lambda^3 + 250\Lambda^2 + 15\cdot10^3\Lambda}$$

$\Lambda^2 + 250\Lambda + 15\cdot10^3 = 0$

$\Delta = 62500 - 60000 = 2500$

$\Lambda_{1,2} = \dfrac{-250 \pm 50}{2} \Longrightarrow \Lambda \in \{-150;\ -100\}$

<div align="right">2.</div>

$$i_c(t) = \frac{200 \cdot 0 + 15 \cdot 10^3}{3 \cdot 0 + 500 \cdot 0 + 15 \cdot 10^3} \cdot e^{0 \cdot t} + \frac{200 \cdot (-100) + 15 \cdot 10^3}{3 \cdot (-100)^2 + 500 \cdot (-100) + 15 \cdot 10^3} \cdot e^{-100t} +$$

$$+ \frac{200 \cdot (-150) + 15 \cdot 10^3}{3 \cdot (-150)^2 + 500 \cdot (-150) + 15 \cdot 10^3} \cdot e^{-150t}$$

$$i_c(t) = \frac{15 \cdot 10^3}{15 \cdot 10^3} e^{0 \cdot t} + \frac{(-2) \cdot 10^4 + 15 \cdot 10^3}{3 \cdot 10^4 - 5 \cdot 10^4 + 15 \cdot 10^3} e^{-100t} +$$

$$+ \frac{(-3) \cdot 10^4 + 15 \cdot 10^3}{7500} e^{-150t}$$

$$\boxed{i_c(t) = 1 + e^{-100t} - 2e^{-150t}} \quad [A] \qquad \begin{array}{l} t \to \infty \Rightarrow i_c(t) = 1 \ A \\ t \to 0 \Rightarrow i_c(t) = 0 \ A \end{array}$$

$(s \to \infty \ (m \Rightarrow))$

$$\frac{5000}{s} I_c(s) = \frac{200}{s} - (200 + s) \cdot \frac{200s + 15 \cdot 10^3}{s(s+100)(s+150)} \cdot$$

$$5000 i_c(s) = 200(s+100)(s+150) - (200+s)(200s + 15 \cdot 10^3)$$

$$5000 i_c(s) = 200(s^2 + 250s + 15 \cdot 10^3) - (4 \cdot 10^4 s + 3 \cdot 10^6 + 200s^2 + 15 \cdot 10^3 s)$$

$$5000 i_c(s) = 200s^2 + 5 \cdot 10^4 s + 3 \cdot 10^6 - 4 \cdot 10^4 s - 3 \cdot 10^6 - 200s^2 - 15 \cdot 10^3 s$$

$$i_c(s) = \frac{10^4 s - 15 \cdot 10^3 s}{5000} = \frac{10^4(10s - 15s)}{5000} = \frac{-5s}{5} = -s$$

$$u_c(s) = \frac{i_c(s)}{s \cdot c} + \frac{u_c(0)}{s} = \frac{-s}{s \cdot 5000} + \frac{100}{s} = \frac{100}{s} - \frac{1}{5000}$$

$$u_c(s) = \frac{5 \cdot 10^5 - s}{5000 s}$$

$$s = 0 \ pól \Rightarrow u_c(t) = \frac{5 \cdot 10^5 - 0}{5000} e^{0 \cdot t} = 100$$

$$\boxed{u_c(t) = 100} \quad [V] \qquad \begin{array}{l} t \to \infty \Rightarrow u_c(t) = 100 \ V \\ t \to 0 \Rightarrow u_c(t) = 100 \ V \end{array}$$