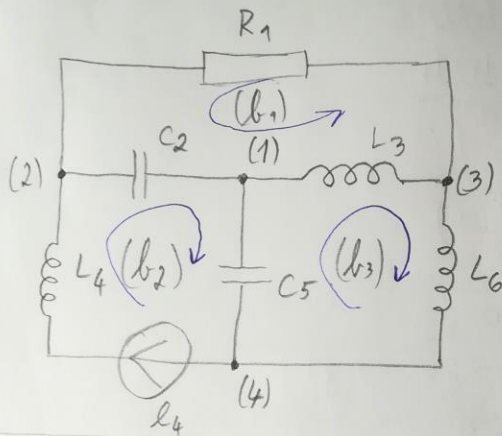


GRUPEZESCU RAREȘ 311CC



$$e_4 = 40 \sin(\omega t + \frac{3\pi}{4}) \text{ V}$$

$$R_1 = 10 \Omega$$

$$C_2 = 1000/\pi \mu\text{F}$$

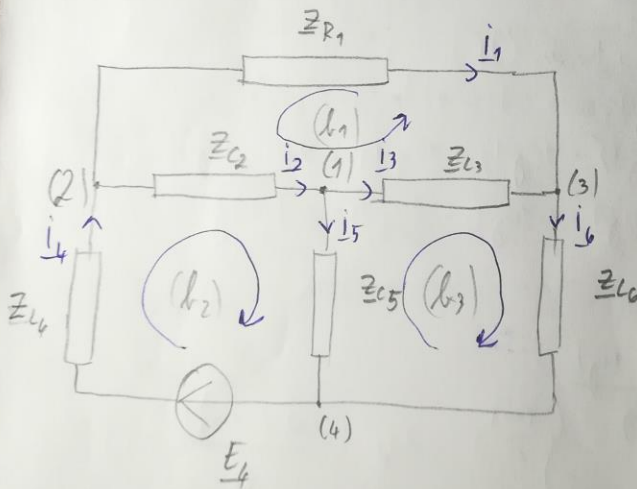
$$L_3 = 100/\pi \text{ mH}$$

$$L_4 = 100/\pi \text{ mH}$$

$$C_5 = 1000/\pi \mu\text{F}$$

$$L_6 = 100/\pi \text{ mH}$$

$$\omega = 100\pi \text{ (} f = 50 \text{ Hz)}$$



$$Z_{R_1} = 10$$

$$Z_{C_2} = \frac{-j}{100 \times \frac{1000}{\pi} \cdot 10^{-6} \text{ F}} = -10j$$

$$Z_{L_3} = j \cdot 100 \times \frac{100}{\pi} \cdot 10^{-3} \text{ H} = 10j$$

$$Z_{L_4} = j \cdot 100 \times \frac{100}{\pi} \cdot 10^{-3} \text{ H} = 10j$$

$$Z_{C_5} = \frac{-j}{100 \times \frac{1000}{\pi} \cdot 10^{-6} \text{ F}} = -10j$$

$$Z_{L_6} = j \cdot 100 \times \frac{100}{\pi} \cdot 10^{-3} \text{ H} = 10j$$

$$E_6 = 20\sqrt{2} \cdot \left(-\frac{\sqrt{2}}{2} + j\frac{\sqrt{2}}{2} \right) = 20(-1+j)$$

$$\begin{cases} (1) \ i_2 - i_3 - i_5 = 0 \\ (2) \ i_4 - i_1 - i_2 = 0 \\ (3) \ i_1 + i_3 - i_6 = 0 \end{cases} \Rightarrow \text{(I)} \begin{cases} i_5 = i_2 - i_3 \\ i_4 = i_1 + i_2 \\ i_6 = i_1 + i_3 \end{cases}$$

$$\begin{cases} (b_1) \ -i_1 z_{p1} + i_2 z_{c2} + i_3 z_{L3} = 0 \\ (b_2) \ i_4 z_{L4} + i_2 z_{c2} + i_5 z_{c5} = E_4 \\ (b_3) \ i_3 z_{L3} + i_6 z_{L6} - i_5 z_{c5} = 0 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} -10i_1 - 10j i_2 + 10j i_3 = 0 \\ \text{II.} \begin{cases} 10j i_4 - 10j i_2 - 10j i_5 = 20(-1+j) \\ 10j i_3 + 10j i_6 + 10j i_5 = 0 \end{cases} \end{cases}$$

Substitua-se i_5, i_4, i_6 em (II) \Rightarrow

$$\Rightarrow \begin{cases} -10i_1 - 10j i_2 + 10j i_3 = 0 & | : (-10) \\ 10j i_1 + 10j i_2 - 10j i_2 - 10j i_2 + 10j i_3 = 20(-1+j) & | : 10j \\ 10j i_3 + 10j i_1 + 10j i_3 + 10j i_2 - 10j i_3 = 0 & | : 10j \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} i_1 + j i_2 - j i_3 = 0 \\ i_1 - i_2 + i_3 = \frac{2(-1+j)}{j} \\ i_1 + i_2 + i_3 = 0 \end{cases} \Rightarrow \begin{cases} (-) \quad -2i_2 = \frac{2(-1+j)}{j} \Rightarrow \end{cases}$$

$$\Rightarrow i_2 = \frac{1-j}{j} \Rightarrow \boxed{i_2 = -1-j}$$

$$\begin{cases} i_1 - j i_3 = j(1+j) \\ i_1 + i_3 = 1+j \end{cases}$$

$$(-j-1)i_3 = j - 1 - 1 - j = -2 \Rightarrow i_3 = \frac{1-j}{1+j} = \frac{2(1-j)}{1+1} = 1-j \quad 2.$$

$$\boxed{i_3 = 1-j}$$

$$i_1 = 1+j - i_3 = 1+j - 1+j = 2j \Rightarrow \boxed{i_1 = 2j}$$

Înlocuim în i_1, i_2, i_3 în $I =$

$$\begin{cases} i_4 = 2j - 1-j = j-1 \\ i_5 = -j-1-1+j = -2 \\ i_6 = 2j+1-j = 1+j \end{cases}$$

$$\boxed{i_4 = j-1}$$

$$\boxed{i_5 = -2}$$

$$\boxed{i_6 = 1+j}$$

Verificăm rezultatul cu Bilanțul Puterilor:

$$P_c = \sum_{k=1}^6 R_k \{Z_k\} \cdot |i_k|^2 = 10 \cdot 4 + 0 + 0 + 0 + 0 + 0 \Rightarrow P_c = 40 \text{ W}$$

$$Q_c = \sum_{k=1}^6 i_m \{Z_k\} \cdot |i_k|^2 = \cancel{(-10) \cdot 2} + 10 \cdot 2 + \cancel{10 \cdot 2} + \cancel{(-10) \cdot 4} + 10 \cdot 2 \Rightarrow$$

$$\Rightarrow Q_c = 0 \text{ VAR}$$

$$S_g = E_4 \cdot i_4^* = 20(-1+j) \cdot (-1-j) = 20(1+1) = 40$$

$$S_g = P_g + jQ_g$$

$$\Rightarrow \begin{cases} P_g = 40 \text{ W} \\ Q_g = 0 \text{ VAR} \end{cases} ; \begin{cases} P_c = 40 \text{ W} \\ Q_c = 0 \text{ VAR} \end{cases} \Rightarrow \begin{cases} P_g = P_c \\ Q_g = Q_c \end{cases}$$

$$I_1 = 2j = \sqrt{2^2 + 0^2} \cdot e^{j \arctan \frac{0}{2}} = 2 \cdot e^{j \cdot \frac{\pi}{2}}$$

$$i_1(t) = 2\sqrt{2} \sin(100\pi t + \frac{\pi}{2})$$

$$I_2 = -1 - j = \sqrt{(-1)^2 + (-1)^2} \cdot e^{j \arctan 1} = \sqrt{2} \cdot e^{j \frac{\pi}{4}}$$

$$i_2(t) = 2 \sin(100\pi t + \frac{\pi}{4})$$

$$I_3 = 1 - j = \sqrt{1^2 + (-1)^2} \cdot e^{j \arctan -1} = \sqrt{2} \cdot e^{j \cdot (-\frac{\pi}{4})}$$

$$i_3(t) = 2 \sin(100\pi t - \frac{\pi}{4})$$

$$I_4 = -1 + j = \sqrt{(-1)^2 + 1^2} \cdot e^{j \arctan -1} = \sqrt{2} \cdot e^{j(-\frac{\pi}{4})}$$

$$i_4(t) = 2 \sin(100\pi t - \frac{\pi}{4})$$

$$I_5 = -2 = \sqrt{(-2)^2 + 0^2} \cdot e^{j \arctan \frac{0}{-2}} = 2 \cdot e^{j \cdot 0}$$

$$i_5(t) = 2\sqrt{2} \sin(100\pi t)$$

$$I_6 = 1 + j = \sqrt{1^2 + 1^2} \cdot e^{j \arctan 1} = \sqrt{2} \cdot e^{j \frac{\pi}{4}}$$

$$i_6(t) = 2 \sin(100\pi t + \frac{\pi}{4})$$