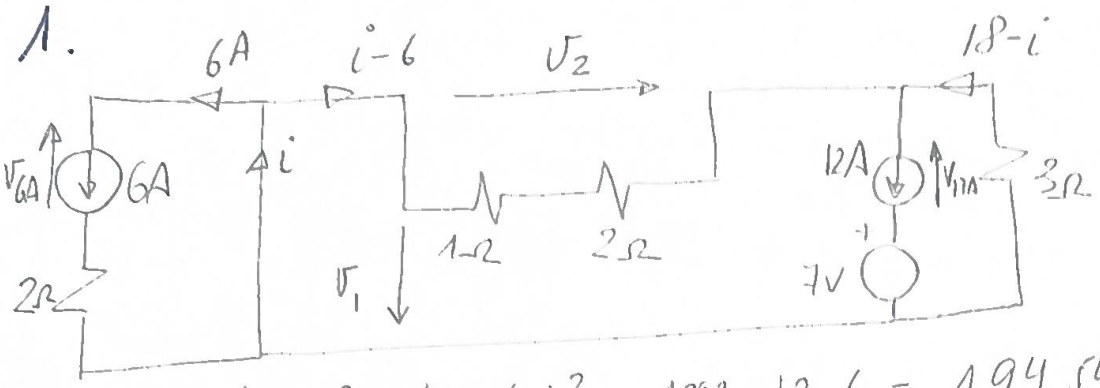
EMERO 2026

1.



$3(i-6) - 3(18-i) = 0 \Rightarrow$

$\Rightarrow 6i = 3\cdot(18+6) \Rightarrow i = 12A$

$M = K\sqrt{L_1 L_2} = 1{,}202\,mH$

$E_L = \frac{1}{2}1(6)^2 + \frac{1}{2}2(6)^2 + 1{,}202\cdot 12\cdot 6 = 194{,}544\,mJ$

$V_1 = 0 \Rightarrow E_{C1} = 0J \qquad V_2 = 3\cdot 6 = 18V. \qquad E_{C2} = \frac{1}{2}2(18)^2 = 324mJ$

$E_T = 518{,}54mJ.$

$V_{6A} = 12V \qquad P_{6A} = 12\cdot 6 = 72W\ (gen).$

$P_{7V} = 7\cdot 12 = 84W\ (con)$

$V_{12A} = 7 + 3(18-i) = 25V \qquad P_{12A} = 12\cdot 25 = 300W\ (gen)$

$V_{AB} = -3(18-i) - 5(1{,}5i) = -108V.$

2.

$P_L = 3\cdot 1\cdot (24{,}5)^2 = 1800{,}75W$

$Q_L = 3\cdot 3\cdot (24{,}5)^2 = 5402{,}25VAr$

$P_T = W_1 + W_2 = 10804{,}5W$

$Q_T = \sqrt{3}(W_1 - W_2) = 14406{,}33\,VAr$

$P_C = P_T - P_L = 9003{,}75\,W \qquad Q_C = Q_T - Q_L = 9004{,}08\,VAr$

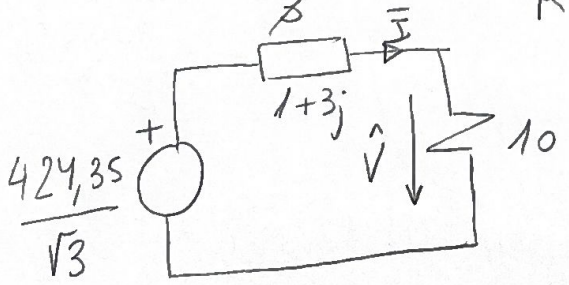
$S_C = \sqrt{P_C^2 + Q_C^2} = 12733{,}46VA = \sqrt{3}\cdot|V_2|\cdot 24{,}5 \Rightarrow |V_2| = 300{,}06V$

$S_T = \sqrt{P_T^2 + Q_T^2} = 18007{,}76VA = \sqrt{3}\cdot|V_1|\cdot 24{,}5 \Rightarrow |V_1| = 424{,}35V.$

$C^{\lambda} = \frac{P_C\cdot(tg\phi_C - 0)}{2\pi f |V_2|^2} = \frac{9004{,}08}{2\pi 50(300{,}06)^2} = 318{,}32\,\mu F \qquad C^{\Delta} = 106{,}108\,\mu F.$

Después de conectar el condensador.

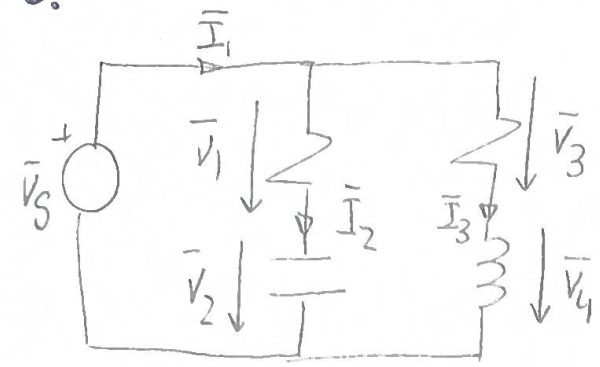
$\frac{9003{,}75}{3} = \frac{(300{,}06/\sqrt{3})^2}{R^{\lambda}} \Rightarrow R^{\lambda} = 10\Omega$

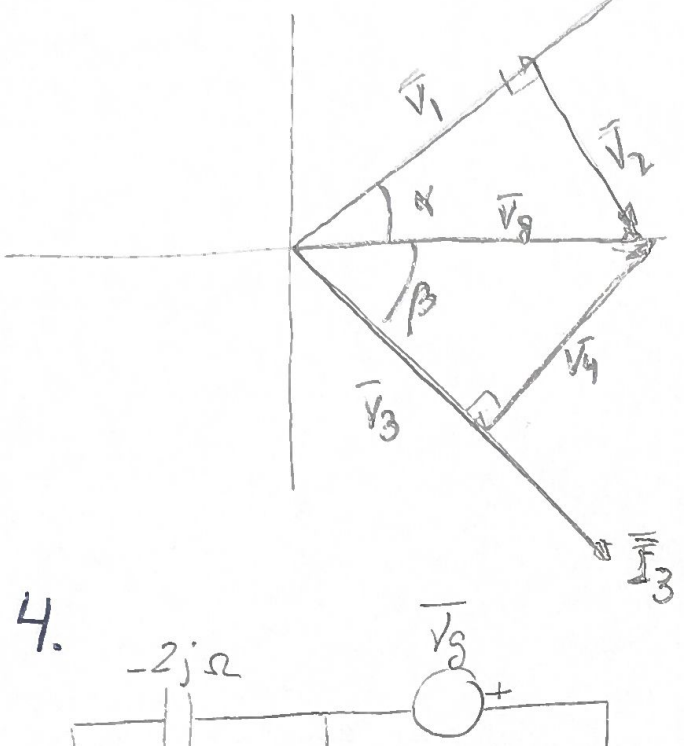


$\bar{I} = \frac{424{,}35/\sqrt{3}}{1+3j+10} = 21{,}48\angle -15{,}25 \Rightarrow A_1' = 21{,}48A$

$\hat{V} = 10\cdot\bar{I} = 214{,}8\angle -15{,}25 \qquad V_2' = \sqrt{3}\cdot 214{,}8 = 372{,}17V.$

3.





$$|V_S| = \sqrt{|V_1|^2 + |V_2|^2} = 125V$$

$$|V_4| = \sqrt{|V_S|^2 - |V_3|^2} = 100\,V$$

$$\alpha = \arctg \frac{|V_2|}{|V_1|} = 73{,}74°$$

$$\beta = \arctg \frac{|V_4|}{|V_3|} = 53{,}13°$$

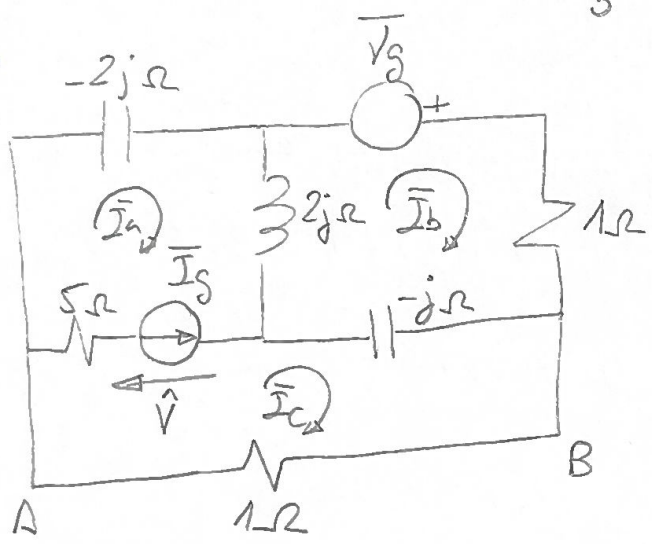
$$\bar{I}_1 = 5\angle 73{,}74 + 3\angle -53{,}13 = 4\angle 36{,}87\ A$$

$$|I_1| = 4\,A.$$

$$\bar{S}_g = \bar{V}_S\,\bar{I}_1^* = 125\angle 0°\ 4\angle -36{,}87 = 400 - 300j \begin{cases} \text{genera } 400W \\ \text{consume } 300Vr \end{cases}$$

$$\bar{S}_I = 900 - 400j = \hat{V}\cdot \bar{I}_g^* \Rightarrow \hat{V} = \frac{900-400j}{10} = 90 - 40j$$

4.



$$\bar{I}_S = 10\angle 0°$$

$$\begin{pmatrix} 5 & -2j & -5 \\ -2j & 1+j & j \\ -5 & j & 6-j \end{pmatrix} \begin{pmatrix} \bar{I}_a \\ \bar{I}_b \\ \bar{I}_c \end{pmatrix} = \begin{pmatrix} -90+40j \\ \bar{V}_S \\ 90-40j \end{pmatrix} \begin{matrix} (1) \\ (2) \\ (3) \end{matrix}$$

$$\bar{I}_C - \bar{I}_a = 10 \Rightarrow \bar{I}_C = 10 + \bar{I}_a$$

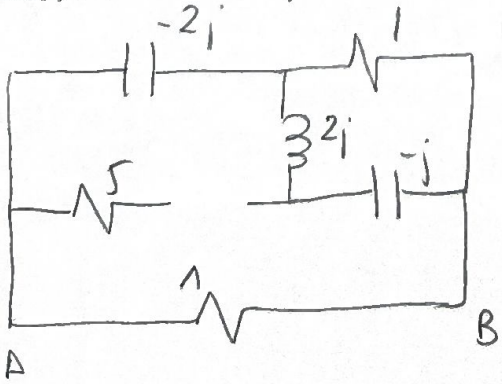
$$(1) \rightarrow 5\bar{I}_a - 2j\bar{I}_b - 5(\bar{I}_a + 10) = -90+40j \Rightarrow -2j\,\bar{I}_b = -40+40j \Rightarrow \bar{I}_b = -20-20j$$

$$(3) \rightarrow -5\bar{I}_a + j\bar{I}_b + (6-j)(10+\bar{I}_a) = 90+40j \Rightarrow \bar{I}_a = 10\angle 0° \qquad \bar{I}_C = 20\angle 0°$$

$$(2) \rightarrow \bar{V}_S = -2j(10) + (1+j)(-20-20j) + j20 \Rightarrow \bar{V}_S = -40j = 40\angle -90° \Rightarrow \begin{cases} V = 40\,V \\ \varphi = -90° \end{cases}$$

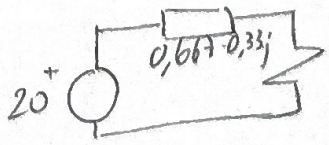
$$\bar{S}_V = \bar{V}_S \cdot \bar{I}_b^* = -40j\,(-20+20j) = 800 + 800j \begin{cases} \text{genera } 800W \\ \text{genera } 800Vr \end{cases}$$

Pasivamos fuentes y calculamos $\bar{Z}_{th}$



$$Z_{th} = [(2j - j) \| 1 - 2j] \| 1 = 0{,}667 - 0{,}33j$$

$$R^{max} = |Z_{th}| = 0{,}745\,\Omega \qquad V_{th} = 1 \cdot \bar{I}_C = 20\angle 0°\,V$$



$$P^{max} = 0{,}745 \cdot (13{,}79)^2 = 141{,}72W$$