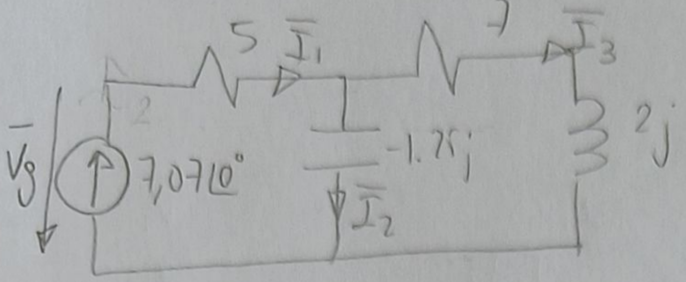
PARCIAL NOVIEMBRE 2024

• EJERCICIO 1

$i_g(t) = 10\cos 1000t \longrightarrow \bar{I}_g = 7{,}07\angle 0°$ $\quad \boxed{i_1(t=0.5) = -8{,}84A}$

$Z_{R_1} = 5\Omega \quad Z_{R_2} = 7\Omega \quad Z_L = 1000 \cdot 2 \cdot 10^{-3} j = 2j \quad Z_C = \frac{1}{10^3 \cdot 0.8 \cdot 10^{-3} j} = -1.25j$



$\bar{I}_2 = 7{,}07 \cdot \frac{7+2j}{7+2j-1{,}25j} = 7{,}203 + 1{,}248j = 7{,}31\angle 9{,}8°$

$\bar{I}_3 = 7{,}07 \frac{-1.25j}{7+2j-1.25j} = -0.134 - 1.248j = 1.26\angle -96{,}1°$

$\boxed{i_2(t=0{,}5)} = \sqrt{2} \cdot 7{,}31 \cdot \cos(1000 \cdot 0{,}5 + 9{,}8°) = \boxed{-8{,}17\,A}$

$\boxed{i_3(t=0{,}5)} = \sqrt{2} \cdot 1.25 \cos(1000 \cdot 0{,}5 - 96{,}1°) = \boxed{-0{,}65A}$

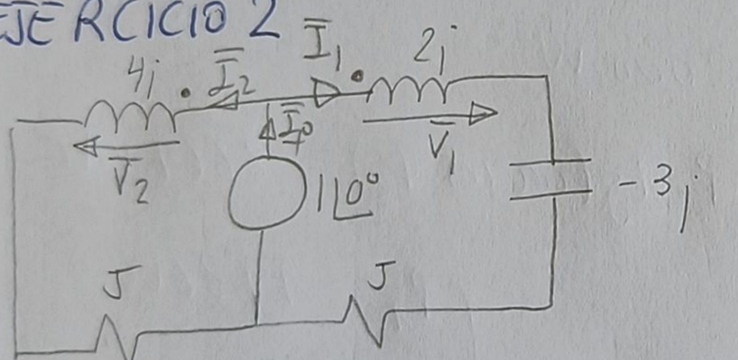
$V_g = 7{,}07 \cdot (5 + (-1.25j) \| (7+2j)) = 36{,}91 - 9j$

$S_g = V_g \bar{I}_1^* = (36{,}91 - 9j)(7{,}07\angle 0°) = 260{,}95 - 63{,}66j \longrightarrow \begin{cases} \text{genera } 260{,}95W \\ \text{consume } 63{,}66VAr \end{cases}$

$fdp = \cos(\operatorname{atg}(\frac{-63{,}66}{260{,}95})) = 0{,}9715 \text{ (cap)}$

• EJERCICIO 2

$Z_m = 0.8\sqrt{2j \cdot 4j} = 2{,}26j$



$$\begin{pmatrix} \bar{V}_1 \\ \bar{V}_2 \end{pmatrix} = \begin{pmatrix} 2j & 2{,}26j \\ 2{,}26j & 4j \end{pmatrix} \begin{pmatrix} \bar{I}_1 \\ \bar{I}_2 \end{pmatrix}$$

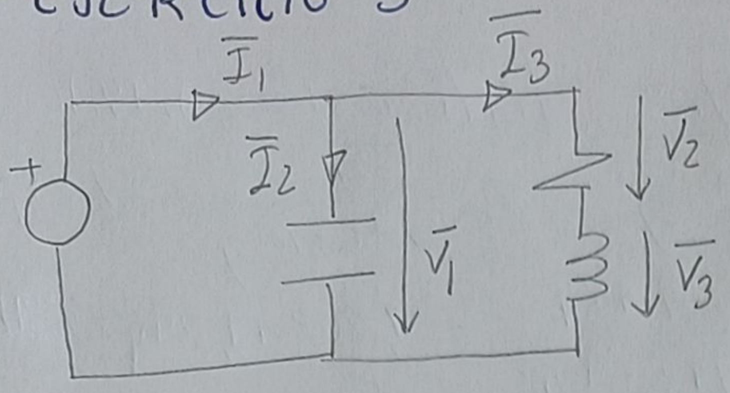
$$LKT \rightarrow \begin{cases} 1\angle 0° = 2j\bar{I}_1 + 2{,}26j\bar{I}_2 - 3j\bar{I}_1 + 5\bar{I}_1 \\ 1\angle 0° = 2{,}26j\bar{I}_1 + 4j\bar{I}_2 + 5\bar{I}_2 \end{cases} \rightarrow \begin{pmatrix} 5-j & 2{,}26j \\ 2{,}26j & 5+4j \end{pmatrix} \begin{pmatrix} \bar{I}_1 \\ \bar{I}_2 \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

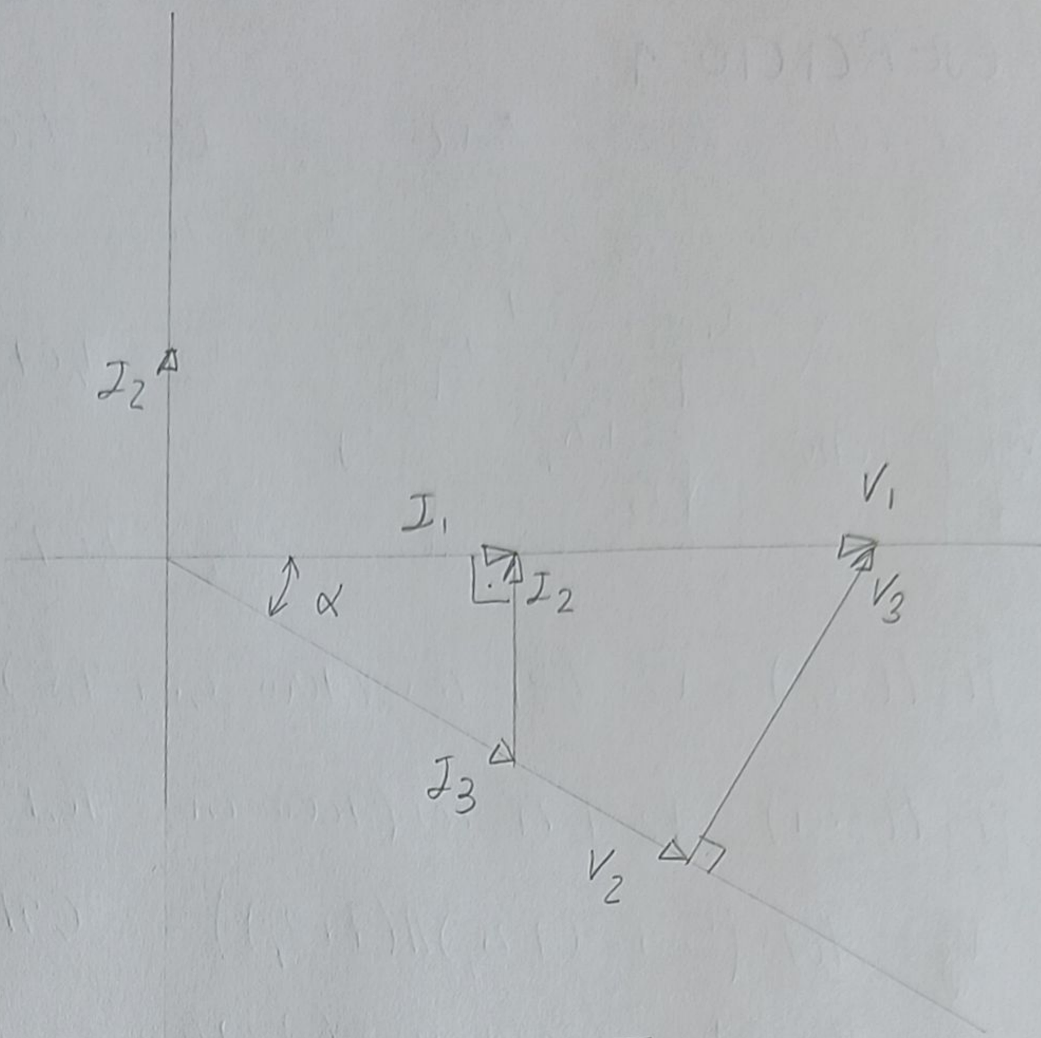
$$\left.\begin{aligned} \bar{I}_1 &= \frac{(5+4j) - (2{,}26j)}{(5-j)(5+4j) - (2{,}26j)(2{,}26j)} = 0{,}141 - 0{,}0112j \\ \bar{I}_2 &= \frac{(5-j) - (2{,}26j)}{(5-j)(5+4j) - (2{,}26j)(2{,}26j)} = 0{,}087 - 0{,}134j \end{aligned}\right\} \bar{I}_0 = \bar{I}_1 + \bar{I}_2 = 0{,}229 - 0{,}145j$$

$\bar{Z}_{th} = \frac{1\angle 0°}{\bar{I}_0} \Rightarrow \bar{Z}_{th} = 3{,}11 + 1{,}97j$

$R^{max} = |Z_{th}| \Rightarrow \boxed{R^{max} = 3{,}6825\,\Omega}$

• EJERCICIO 3





$\alpha = a\sin\left(V_3/V_1\right) = 36,86°$

$I_2 = tg(\alpha) \cdot I_1 = 1.125\,A$

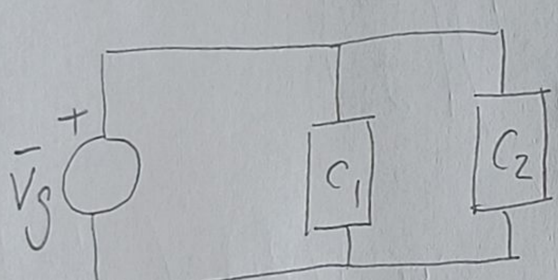
$I_3 = \sqrt{I_1^2 + I_2^2} = 1.875\,A$

$\boxed{V_2 = \sqrt{V_1^2 - V_3^2} = 80V}$

$\frac{1}{\omega C} = \frac{V_1}{I_2} \Rightarrow \boxed{C = 36,80\mu F}$

$R = \frac{V_2}{I_3} \Rightarrow \boxed{R = 42,67\Omega}$ $\quad \omega L = \frac{V_3}{I_3} \Rightarrow \boxed{L = 101,86\,mH}$

• EJERCICIO 4



$C_2 = \begin{cases} P_2 = 2000\,W \\ Q_2 = P_2\, tg(\arccos \phi_2) = 2667\,VAr \end{cases}$

$S_1 = \frac{|V|^2}{Z_1^*} = \frac{220^2}{20-10j} = 1936 + 968j \rightarrow \begin{cases} P_1 = 1936W \\ Q = 968\,VAr \end{cases}$

$\left.\begin{array}{l} P_{12} = P_1 + P_2 = 2000 + 1936 = 3936\,W \\ Q_{12} = Q_1 + Q_2 = 2667 + 968 = 3635\,VAr \end{array}\right\} \phi_{12} = a\,tg\left(\frac{Q_{12}}{P_{12}}\right) = 42,72°$

$C = \frac{P_{12}\,(tg\,\phi_{12} - tg\,\phi')}{2\pi f\, V^2} = \frac{3936\,(tg\,42,72 - tg\,11,47)}{2\pi 50\,(220)^2} \Rightarrow \boxed{C = 186,5\mu F}$

$\phi' = \arccos(0,98) = 11,47°$