CONCEPTOS:

1) Teorema de Rosen
2) Lectura de Osciloscopio
3) Teorema de Superposición
4) Permanente de Continua
5) Permanente de Alterna (números complejos)
6) Teorema de Boucherot

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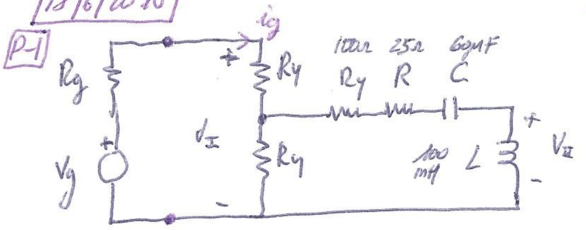
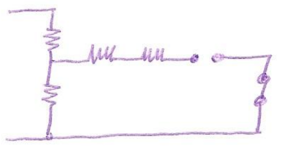


a) $R_\Delta = 3\,R_Y = 300\,\Omega$

b) $V_I(t) = 2 + 4\,\mathrm{sen}(100\pi t + \pi)$

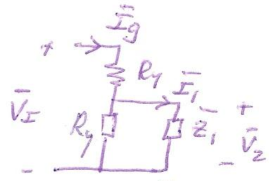
c) DC



$V_{II_{DC}} = 0$

AC

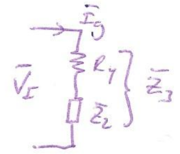
$\bar{Z}_C = -jX_C = -j\dfrac{1}{C\omega} = -j\dfrac{1}{60\,10^{-6}\cdot 100\pi} = -j53'05\,\Omega$



$\bar{Z}_L = jX_L = jL\omega = j\,100\,10^{-3}\cdot 100\pi = j\,31'42\,\Omega$

$\bar{Z}_1 = R_Y + R + \bar{Z}_C + \bar{Z}_L = 125 + j31'42 - j53'05 = (125 - j21'63)\,\Omega$

$\bar{Z}_2$ = paralelo de R_Y con $\bar{Z}_1 \Rightarrow \bar{Z}_2 = \dfrac{R_Y \bar{Z}_1}{R_Y + \bar{Z}_1} = 56'12\,\underline{|-4'33}\,\Omega$



$\bar{Z}_3$ = serie de R_Y con $\bar{Z}_2 \Rightarrow \bar{Z}_3 = 156'02\,\underline{|-1'55}\,\Omega$.

$\bar{I}_g = \dfrac{\bar{V}_I}{\bar{Z}_3} = \dfrac{\frac{4}{\sqrt{2}}\,\underline{|180}}{156'02\,\underline{|-1'55}} = 0'02\,\underline{|-178'45}\ \mathrm{A}$

181'55

$\bar{V}_2 = \bar{Z}_2 \bar{I}_g = 56'12\,\underline{|-4'33}\cdot 0'02\,\underline{|-178'45} = 1'12\,\underline{|177'22}\ \mathrm{V}$

$\bar{I}_1 = \dfrac{\bar{V}_2}{\bar{Z}_1} = \dfrac{1'12\,\underline{|177'22}}{(125 - j21'63)} = 0'0088\,\underline{|-172'96}\ \mathrm{A}$

$\bar{V}_{II} = \bar{Z}_L\,\bar{I}_1 = j31'42\cdot\left(0'0088\,\underline{|-172'96}\right) = 0'278\,\underline{|-82'96}\ \mathrm{V} = 0'28\,\underline{|-82'96}\,\mathrm{V}$

$$\boxed{V_{II}(t) = 0'28\sqrt{2}\,\mathrm{sen}\,(100\pi t - 82'96^\circ)\ \mathrm{V}}$$

d) $Q = 0$ entre terminales $\Rightarrow$ como las R no consumen Q debemos conseguir que $Q_L + Q_C = 0 \Rightarrow$ como están en serie:

$X_L I^2 - X_C I^2 = 0 \rightarrow X_L = X_C \Rightarrow L\omega = \dfrac{1}{C\omega}$

como $\omega = 120\pi$ rad/s
$L = 100$ mH.

$100\,10^{-3}\cdot(120\pi)^2 = \dfrac{1}{C} \rightarrow \left[C = 70'36\cdot 10^{-6}\,F = 70'36\,\mu F\right]$

$V_g(t) = 6\cos(120\pi t)$