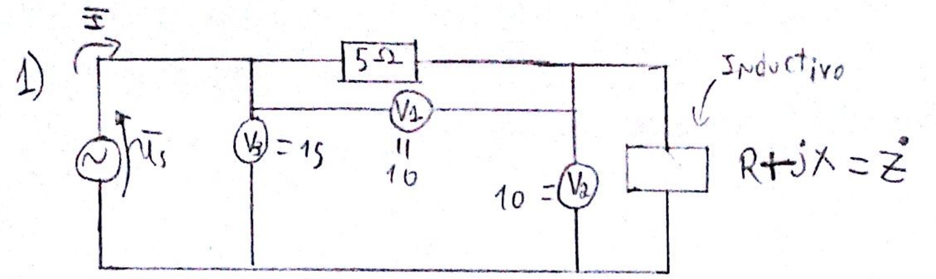
TREPA 5 JOSE SOTO 11-10406

1) 

$\overline{V_1} = 10\angle 0°$

$\overline{V_2} = 10\angle \theta_2$

$\overline{V_3} = 15\angle \theta_3$

Conseguir: θ_2, θ_3, R, X, si $w = 377$ cuanto vale L, digrama fasorial de los voltajes

$\overline{I} = \frac{\overline{V_1}}{5\Omega} = \frac{10V\angle 0°}{5\Omega} = 2A\angle 0°$

$\overline{V_2} = V_2 \angle V_2 = \overline{I} \cdot \dot{Z} \to V_2 = |\overline{I}| \cdot |\dot{Z}| = 2 \cdot \sqrt{R^2 + X^2} = 10 \to R^2 + X^2 = 5^2 = 25$

$\overline{V_3} = \overline{V_1} + \overline{V_2} \Rightarrow 15\angle\theta_3 = 10\angle 0° + 10\angle\theta_2$

$\angle\theta_2 = \angle\overline{I} \cdot \angle\dot{Z} = 0° + \angle\dot{Z} = \arctan\left(\frac{X}{R}\right)$

$15(\cos(\theta_3) + j\,\text{sen}(\theta_3)) = 10 + 10\cos(\theta_2) + j\,10\,\text{sen}(\theta_2)$

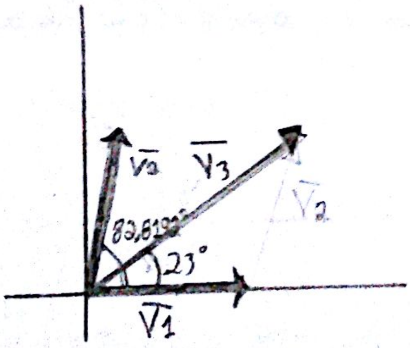
$\begin{cases} 15\cos(\theta_3) = 10 + 10\cos(\theta_2) \\ 15\,\text{sen}(\theta_3) = 10\,\text{sen}(\theta_2) \end{cases} \to$ Resolviendo $\to \begin{cases} \theta_2 = +82{,}8192° \\ \theta_3 = +23{,}0053° \end{cases}$ ✓✓

Nota: con ambos negativos cu... Pero no tiene sentido, es inductivo el circuit...

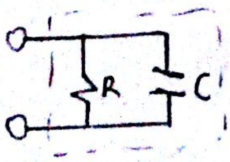
$\dot{Z} = \frac{\overline{V_2}}{\overline{I}} = \frac{10\angle +82{,}8192°}{2\angle 0°} = 5\angle +82{,}8192 = 0{,}6250 + j\,4{,}9608$

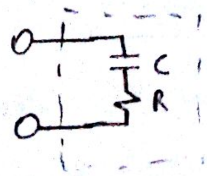
(R ✓, X ✓)

$X = Lw \to L = \frac{X}{w} = 13{,}1586\ mH$



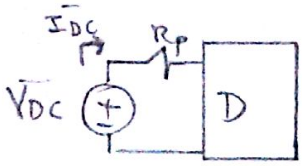
② Se tiene un dipolo D del cual se desconoce del todo el modelo, se sabe que o es tipo 1 o tipo 2:

D tipo 1 

tipo 2: 

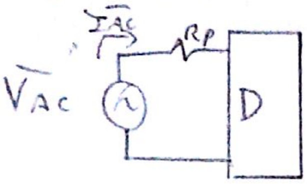
dadas las siguientes mediciones determine tipo, R y C.

CON Resistencia de protecion $R_P = 7\,\Omega$



$(DC \to w=0) \to \begin{cases} V_{DC} = 10\,V \\ I_{DC} = 1\,A \end{cases}$

CON $w = 377$



$\begin{cases} V_{AC} = 135\,V \\ I_{AC} = 15\,A \end{cases}$

Respuesta:

Como $I_{DC} \neq 0$ NO es posible tipo 2, $\dot{Z}_{D_2} \simeq R - \frac{j}{0^+ C} \sim$ inf

tipo 1: $\dot{Z}_D = \dfrac{1}{\frac{1}{R} + jwC} = \dfrac{R}{1 + jwCR} = \dfrac{R(1 - jwCR)}{1 + w^2C^2R^2}$

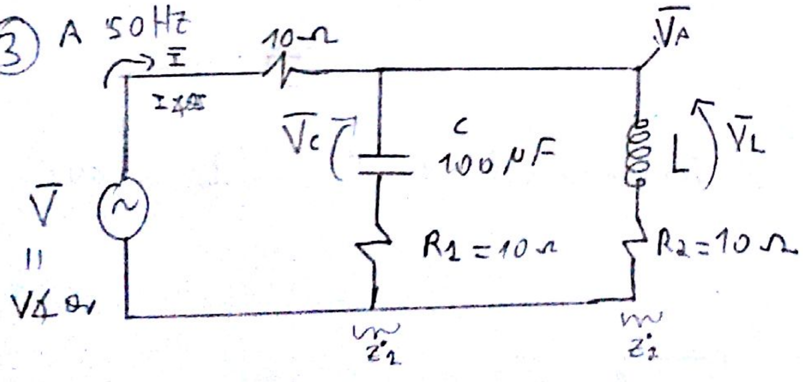
$\dot{Z}_D\Big|_{w=0} = R$ $\qquad \dfrac{V_{DC}}{I_{DC}} = \left|\dot{Z}_D\Big|_{w=0} + R_P\right| = R + 7 = \dfrac{10}{1} \Rightarrow R = 3$

$\dot{Z} = 7 + \dfrac{R(1 - jwCR)}{1 + w^2C^2R^2} = Re(\dot{Z}) + j\,Im(\dot{Z}) = A + jB$

$Z = \sqrt{A^2 + B^2} = \dfrac{V_{AC}}{I_{AC}} = 9 \to A^2 + B^2 = 81 \leftarrow$ UNA ecuación donde solo Falta C

Resolviendo : $C = 681{,}301\,\mu F$

③ A 50Hz



Determine I, L(MiNiMA) si V es referencia, $V = 200\,V$ y I esta en Fase con V

Luego el diagrama Fasorial de $\bar{V}, \bar{V}_L, \bar{V}_R$

$W = 2\pi \cdot 50Hz \simeq 314{,}159$

$\theta_V = 0° \leftarrow$ referencia

$\theta_I = \theta_V \leftarrow$ en fase

$\bar{V} = \bar{I} \cdot \dot{Z} \Rightarrow 200\angle 0° = I\angle 0° \cdot Z\angle\theta_Z \rightarrow \begin{cases} 0° = 0° + \theta_Z \rightarrow \theta_Z = 0° \\ 200 = I \cdot Z \end{cases}$

$\dot{Z} = 10 + \dot{Z}_1 // \dot{Z}_2$

Como $\theta_Z = 0° \rightarrow Z = A + 0j \rightarrow Im(\dot{Z}) = Im(\dot{Z}_1 // \dot{Z}_2) = 0$

$\dot{Z}_1 = R_1 - \frac{j}{WC} = 10 - j31{,}8310$

$\dot{Z}_2 = R_2 + jWL = 10 + jWL$

$\dot{Z}_1 // \dot{Z}_2 = \frac{\dot{Z}_1 \dot{Z}_2}{\dot{Z}_1 + \dot{Z}_2} = \frac{(10 - j31{,}831)WL - j100 - 318{,}31}{WL - 31{,}8310 - 20j}$

$Im(\dot{Z}_1 // \dot{Z}_2) = \frac{-31{,}831(WL)^2 + 1113{,}21\,WL - 3183{,}1}{\text{Denominador}} = 0$

$LW = \begin{cases} 3{,}14159 \\ 31{,}8310 \end{cases} \rightarrow L = \begin{cases} 10\ mH \\ 101{,}321\ mH \end{cases}$

$\dot{Z}_2 = 10 + j\begin{cases} 3{,}14159 \\ 31{,}8310 \end{cases}$ se puede comprobar que ambos son solución al evaluar $\dot{Z}_1 // \dot{Z}_2$

se resolverá para $L = 10\ mH \rightarrow \dot{Z}_1 // \dot{Z}_2 = 10\Omega$

$\bar{I} = \frac{\bar{V}}{\dot{Z}} = \frac{200\angle 0°}{20\angle 0°} = 10\angle 0°$ | $I = 10$ ✓

$\bar{V}_A = \bar{V} - 10\Omega \cdot \bar{I} = 100\,V\angle 0°$

$\bar{V}_L = \frac{100\angle 0° \cdot jWL}{10 + jWL} = 29{,}9717\angle 72{,}5594°$

$\bar{V}_C = \frac{100\angle 0° \cdot -j/WC}{10 - j/WC} = 95{,}4028\angle -17{,}4406°$

Diagrama