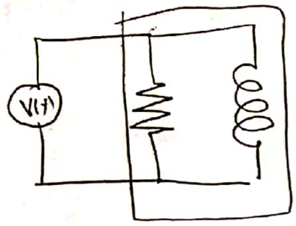
(18)

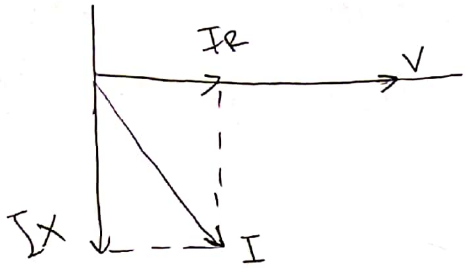


$V_{rms} = 220$ 50Hz

$I_{rms} = 80A$

$P = 10{,}56\,kW$

(a)



(b) R y X

$P = V_{rms} I_{rms} \cos(\varphi) = 10{,}56\,kW$

$17600 \cos(\varphi) = 10{,}56 \times 10^3\,W$

$\cos(\varphi) = 0{,}6 \rightarrow \varphi = 53{,}1$ → La potencia proviene solo por la resistencia

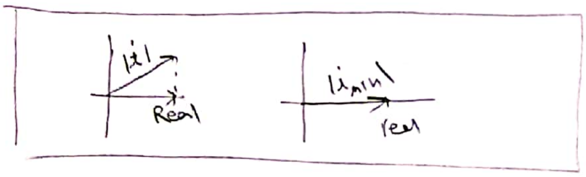
$P = V I_R \Rightarrow I_R = \frac{P}{V} = 48\,A \longrightarrow R = \frac{V}{I_R} = 4{,}58\,\Omega$

$I_X = I \sin(\varphi) = 64A \rightarrow X_A = \frac{V}{I_X} = 3{,}44\,\Omega$

(c) $Z_T = \left[\frac{1}{R} + \frac{1}{jX} + j\omega C \right]^{-1}$ → Anular parte imaginaria para que V y I esten en fase

Entonces Imin se cumpliria

$\frac{1}{jX} + j\omega C = 0 \quad \frac{1}{X} = \omega C$

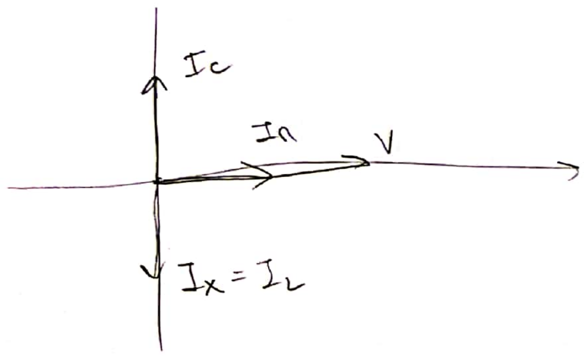


$C = \frac{1}{\omega^2 L} = 925\,\mu F$

→ como la parte que queda es la real

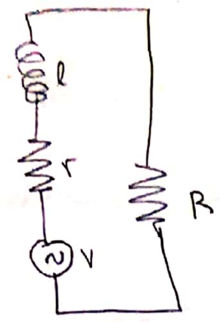
$I_{rms} = 48\,A$ → por la parte (b)

(d)



(1)

$V_0 = 300\,V$ $\quad f = 50\,Hz$ $\quad r = 5\,\Omega$ $\quad l = 0{,}1\,H$



(a) $P = \frac{1}{2} Re[V I]$

$Z = r + R + j\omega l$

$I = \frac{V_G}{Z_T} = \frac{V_G}{r + R + j\omega l}$

$P_G = \frac{1}{2} Re\left[\frac{V_G^2}{R_T - j\omega l}\right] = \frac{|V_G|^2}{2R_T\left(1 + \left(\frac{\omega l}{R_T}\right)^2\right)}$

Generador

(b) diferencia de potencial en la resistencia

$V_R = Z_R I = \frac{RV}{r + R + j\omega l} = \frac{RV\, e^{j\phi_R}}{\sqrt{R_T^2 + (\omega l)^2}}$

$v_R(t) = |V_R| \cos(\omega t + \phi)$ donde $\tan \phi_R = -\frac{\omega l}{R_T}$

$\downarrow$

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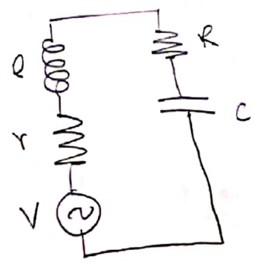
(c) $P = \frac{1}{2} Re[Z_R |I|^2] = \frac{R|V_G|^2}{2R_T^2\left(1 + \left(\frac{\omega l}{R_T}\right)^2\right)} = 374\, W$

$P_G = P_R + P_r$

(d)



$Z'_T = Z_r + Z_R + Z_l + Z_C = r + R + j\left(\omega l - \frac{1}{\omega C}\right)$

$I' = \frac{V_G}{Z'_T} = \frac{V_G}{R_T + j\left(\omega l - \frac{1}{\omega C}\right)}$

$\bar{P}'_G = \frac{1}{2} Re[V_G I^*] = \frac{|V_0|^2}{2R_T\left(1 + \frac{1}{R_T^2}\left(\omega l - \frac{1}{\omega C}\right)^2\right)}$

$C = \frac{1}{\omega^2 l} = 101\,\mu F$

(e) $P'_G = \frac{|V_0|^2}{2R_T} = 429\,W$

$\searrow$

$P'_R = P_G \frac{R}{R_T} = 409\,W$

Escaneado con CamScanner