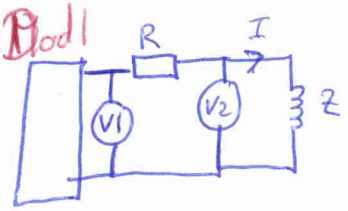
Mod 1



$\underline{I} = \frac{|V_1| \angle 0}{R + \underline{Z}}$ ← Lo impongo yo $\quad \underline{V_2} = \underline{I_2} \cdot \underline{Z}$

Solución

$$|V_2| = \frac{|V_1|}{\sqrt{R^2 + Z^2}} \cdot Z$$

Mod 2

$\underline{i_{q1}} = \underline{i_{q2}} + \underline{i}$

$i_q = r\cos(t + \varphi) \Rightarrow \underline{i_q} = \frac{r}{\sqrt{2}} \angle \varphi$ (Ángulo; $\frac{r}{\sqrt{2}}$: Valor eficaz)

$$\underline{i} = \underline{i_{q1}} - \underline{i_{q2}}$$

Solución

Mod 3

$W = -P_R = |I|^2 \cdot R(-1)$

$$|I| = \sqrt{\frac{-W}{R}}$$

Solución

Mod 4

Si es inductivo $\varphi > 0 \quad |P| = |S|\cos\varphi = |S| fdp$

Si es capacitivo $\varphi < 0 \quad |Q| = |S| \operatorname{sen}\varphi$

$$P = |S| fdp$$

Solución

$$Q = |S|\sqrt{1 - fdp^2}$$

Solución

Mod 5

$E_{g1} \angle 0 = \underline{I} \cdot R + E_{g2} \angle 60 \qquad \underline{I} = \frac{E_{g1} \angle -60}{R} \qquad P = |I|^2 \cdot R \Rightarrow$

$$P = \frac{E_{g1}^2}{R}$$

Solución

Mod 6

Supongo que $\varphi_{A2} = 0 \Rightarrow \varphi_{Vc} = -90$ y $\varphi_R = 0 \Rightarrow |E|^2 = |U_C|^2 + |U_R|^2 \qquad |U_C| = |U_R|$

$\underline{E} = \underline{U_C} + \underline{U_R}$

$P = \frac{|U_R|^2}{R} \Rightarrow$

Solución

$$R = \frac{|E|^2}{2P}$$

$|U_C| = |U_R| \Rightarrow |A_2||Z_C| = |A_2| R \Rightarrow |Z_C| = \frac{1}{\omega C} = R$

$$C = \frac{2P}{\omega |E|^2}$$

Solución

$\varphi_{Zc+R} = -45 \Rightarrow \underline{E} = |E| \angle -45 \Rightarrow \underline{I_L} = \frac{|E| \angle -135}{|Z_L|}$

$\underline{A_1} = \underline{A_2} + \underline{I_L}$ y $|A_1| = |A_2| \Rightarrow |Z_L| = \sqrt{|Z_C|^2 + R^2} \Rightarrow$

$$L = \frac{|E|^2}{P\omega\sqrt{2}}$$

Solución

Mod 7

Si $\varphi_U = \varphi_I \Rightarrow \varphi_Z = 0 \Rightarrow |Z_L| = |Z_C| \Rightarrow$

$$C = \frac{1}{\omega^2 L}$$

Solución

Mod 8

$P = I^2 R \Rightarrow$

$$I_{pico} = \sqrt{\frac{P(0)}{R}}$$

Solución

Mod 9

$Q_{eq_{ced}} = Q_{L_{abs}} + Q_{C_{abs}} \qquad Q = I^2 \cdot Z \Rightarrow$

$$Q_{eq_{ced}} = I^2\left(\omega L - \frac{1}{\omega C}\right)$$

Solución

Mod 10

$$|I| = \sqrt{\frac{W_2}{Z_{real}}}$$

$$W_1 = \frac{W_2}{Z_{real}}(Z_{real} + 1)$$

$$V = \sqrt{\frac{W_2}{Z_{real}}}\left|\left((Z_{real}+1)^2 + (Z_{complejo}+1)^2\right)\right|$$

Solución

Solución

$$|E_{eficaz}| = \sqrt{\frac{W_2}{Z_{real}}}\left|\sqrt{(Z_{real}+1)^2 + (Z_{complejo}+2)^2}\right|$$

Solución

Ejd 11

$$|U_{TH}| = |U_{AB}| = |I| \cdot |Z_c| = \frac{|E|}{\sqrt{R^2 + (\omega L + Z_c)^2}} \cdot |Z_c| \Rightarrow \boxed{V_{TH} = \frac{|E| \cdot |Z_c|}{\sqrt{R^2 + (\omega L + Z_c)^2}}}$$

Solución

$$\boxed{Z_{eq} = \frac{Z_c \cdot (R + \omega L j)}{R + \omega L j + Z_c}}$$

Z_c ya incluye la j

Ejd 12

Como el esta en seno hay que pasarlo a cos, lo que se traduce en restarle 90º al angulo original

$$\underline{e_1} + \underline{e_2} = 2\,\underline{i} \Rightarrow \boxed{|i|_{eficaz} = \left| \frac{|e_1| \angle \varphi_{e1} + |e_2| \angle \varphi_{e2} - 90}{2\sqrt{2}} \right|}$$

Solución

Ejd 13

$$\boxed{\left(\frac{1}{R} + \frac{1}{\underline{Z_L}} + \frac{1}{\underline{Z_C}}\right) \underline{U_A} = \frac{\underline{i_1} - \underline{i_2}}{\sqrt{2}}}$$

Solución

Ejd 14

$$A_2 = \frac{|U|}{\left|\frac{1}{Y_C}\right|} = A_1 \cdot |Z_T| \cdot \left|\frac{1}{Y_C}\right| = A_1 \cdot \left| \frac{Z_L \cdot \frac{1}{Y_C}}{Z_L + \frac{1}{Y_C}} \right| \cdot \left|\frac{1}{Y_C}\right| \Rightarrow \boxed{A_2 = A_1 \cdot \left| \frac{Z_L \cdot \frac{1}{Y_C}}{Z_L + \frac{1}{Y_C}} \right| \cdot \left|\frac{1}{Y_C}\right|}$$

Ejd 14

$$A_2 = \frac{|U|}{\left|\frac{1}{Y_C}\right|} = A_1 \cdot |Z_T| \cdot |Y_C| = A_1 \cdot \left| \frac{Z_L \cdot \frac{1}{Y_C}}{Z_L + \frac{1}{Y_C}} \right| \cdot |Y_C| \Rightarrow \boxed{A_2 = A_1 \left| \frac{Z_L}{Z_L + \frac{1}{Y_C}} \right|}$$

Solución

Ejd 15

$$i(t) = r\cos(t) \Rightarrow i_{eficaz} = \frac{r}{\sqrt{2}} \qquad W = i_{eficaz}^2 \cdot R \Rightarrow \boxed{W = \frac{r^2 \cdot R}{2}}$$

Solución

Ejd 16

$$P_{eq} = P_R + P_{carga} = |I|^2 \cdot R + |S| \cdot \cos\varphi = \left(\frac{|S|}{V}\right)^2 \cdot R + |S| \cos\varphi \Rightarrow \boxed{P_{eq} = \left(\frac{|S|}{V}\right)^2 \cdot R + |S| \cos\varphi}$$

Solución

Ejd 17

$$\text{tag}(\varphi_U - \varphi_I) = \frac{Z_{compleja}}{Z_{real}} = \frac{Z_L}{Z_R} = \frac{\omega L}{R} \Rightarrow \boxed{L = \frac{R}{\omega} \text{tag}(\varphi_U - \varphi_I)}$$

Solución

Ejd 18

$$i(t) = r\,\text{sen}(\omega t) \Rightarrow i_{eficaz} = \frac{r}{\sqrt{2}} \qquad P_Z = Z_{real} \cdot i_{eficaz}^2 \Rightarrow \boxed{P_Z = \frac{r^2 \cdot Z_{real}}{2}}$$

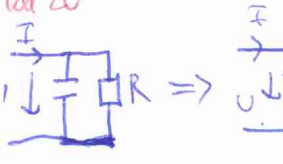
Solución

Ejd 19

$$|B| = |S| \cdot \beta dp \Rightarrow |S| = \frac{|P|}{\beta dp} = \frac{W}{\beta dp} \; ; \; |S| = |U| \cdot |I| \Rightarrow \boxed{|I| = \frac{W}{|U| \cdot \beta dp}}$$

Solución

Ejd 20



$$\Rightarrow \frac{\underline{I}}{\underline{U}} = \frac{1}{\underline{Z_T}} \quad \varphi = \varphi_I - \varphi_U = -\varphi_{Z_T} \quad \underline{Z_T} = \frac{1}{\omega C j} \cdot R \Rightarrow \boxed{\varphi = +\arctan(\omega RC)}$$

Solución

Ud 21

$$Z_A = \frac{Z_2 \cdot Z_3}{Z_2 + Z_3 + Z_1}$$ Solución

$$Z_B = \frac{Z_1 \cdot Z_3}{Z_1 + Z_2 + Z_3}$$ Solución

$$Z_C = \frac{Z_1 \cdot Z_2}{Z_1 + Z_2 + Z_3}$$ Solución

Nota: Piden modulo, usar calculadora para calcularlo

Ud 22

$$W = P \cdot t = A \cdot V \cdot \cos(\varphi_V - \varphi_I) \cdot t \Rightarrow W = A \cdot V \cdot t \cdot \cos(\varphi_V - \varphi_I)$$ Solución

Ud 23

$$v_g(t) = r \cos(\omega t + \varphi) \Rightarrow v_g = r \angle \varphi$$ Solución

Ud 24

$$p(t) = -UI \operatorname{sen}(\omega t + \varphi) \quad U = IZ \quad I^2 Z = r \quad I_{ef} = \sqrt{\frac{r}{Z}} \quad I_{pico} = \sqrt{2} I_{ef} \Rightarrow I_{pico} = \sqrt{\frac{2r}{Z}}$$ Solu

$$p(t) = -r \operatorname{sen}(\omega t + \varphi)$$

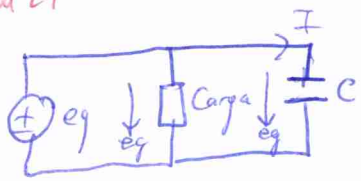
Ud 25

$$I_1 = \frac{E}{R + \omega L j} \qquad I_2 = \frac{E}{R + \frac{1}{\omega C j}} \qquad U_{AB} = R I_2 - R I_1 \Rightarrow U_{AB} = RE\left(\frac{1}{R + \frac{1}{\omega C j}} - \frac{1}{R + \omega L j}\right)$$ Solución

Ud 26

$$P_R = W_1 - W_2 = I_{ef}^2 \cdot R, \quad I_{pico} = \sqrt{2} I_{ef} \Rightarrow I_{pico} = \sqrt{\frac{2(W_1 - W_2)}{R}}$$ Solución

Ud 27



$$fdp = 1 \Rightarrow Q_{carga} = Q_C = eq\, I$$
$$Q_{carga} = S \operatorname{sen}\varphi = \frac{P}{fdp}\sqrt{1 - fdp^2}$$
$$\Rightarrow I = \frac{P}{eq \cdot fdp}\sqrt{1 - fdp^2}$$ Solución

Ud 28

$$\text{Reactancia} = Z_{\text{compleja}} = X = \frac{Q}{I^2} \Rightarrow X = \frac{Q}{I^2}$$ Solución

$$R = \frac{P}{I^2}$$ Solución

$$Z = \frac{\sqrt{P^2 + Q^2}}{I^2}$$ Solución

Ud 29

$$|S_{E1}| = |S_Z| + |S_{E2}| = |Z| \cdot |I|^2 + |S_{E2}| = |Z| \cdot \left(\frac{|S_{E2}|}{|U_2|}\right)^2 + |S_{E2}| \Rightarrow |S_{E1}| = |Z| \cdot \left(\frac{|S_{E2}|}{|U_2|}\right)^2 + |S_{E2}|$$

Ud 30

$$\begin{pmatrix} \frac{1}{Z_L} + \frac{2}{R} + Y_C & -\frac{1}{R} \\ -\frac{1}{R} & \frac{2}{R} + \frac{1}{Z_L} \end{pmatrix}$$

$$Y_{AA} = \frac{1}{Z_L} + \frac{2}{R} + Y_C$$ Solución

$$Y_{BB} = \frac{2}{R} + \frac{1}{Z_L}$$ Solución

$$Y_{AB} = -1/R = Y_{BA}$$ Solución

Ud 31

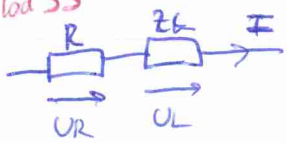
$$p(t) = UI \operatorname{sen}(\omega t + \varphi) \qquad U = \frac{I}{Y} \qquad r = Y U_{ef}^2$$
$$p(t) = r \operatorname{sen}(\omega t + \varphi) \qquad U_{pico} = \sqrt{2} U_{ef}$$

$$U_{pico} = \sqrt{\frac{2r}{Y}}$$ Solución

Ud 32

Como V_1 y V_2 son iguales y L esta en serie con C $\Rightarrow \underline{V_1} + \underline{V_2} = 0 \Rightarrow \underline{E} = \underline{I} \cdot R \Rightarrow$ $\boxed{A = \frac{|E|}{R}}$ Solución

Ud 33



$|U_R| = 2|U_L| \Rightarrow |I| \cdot R = 2|I||Z_L| \Rightarrow R = 2\omega L = 4\pi f L \Rightarrow$ $\boxed{f = \frac{R}{4\pi L}}$ Solución

Ud 34

$$\begin{pmatrix} jX_L + R & -R \\ -R & 2R + jX_C \end{pmatrix} \begin{pmatrix} \underline{I_a} \\ \underline{I_b} \end{pmatrix} = \begin{pmatrix} \underline{E_1} \\ \underline{E_2} \end{pmatrix}$$

Solución

$\boxed{|\underline{U_C}| = |\underline{I_b}| \cdot |jX_C|}$ $\boxed{|\underline{U_1}| = R\,|\underline{I_a} - \underline{I_b}|}$ Solución

$\boxed{|\underline{E_1}| = |(jX_L + R)\underline{I_a} - R\underline{I_b}|}$ Solución

$\boxed{|\underline{E_2}| = |-R\underline{I_a} + (2R + jX_C)\underline{I_b}|}$ Solución

Ud 35

$\underline{I(t)} = \frac{\underline{U(t)}}{\underline{Z}} \Rightarrow$ $\boxed{I = \frac{r}{|Z|}\ \text{sen}\left(\omega t + \varphi v \pm \frac{\pi}{180} \arctan\left(\frac{Z_{compleja}}{Z_{real}}\right)\right)}$ Solución

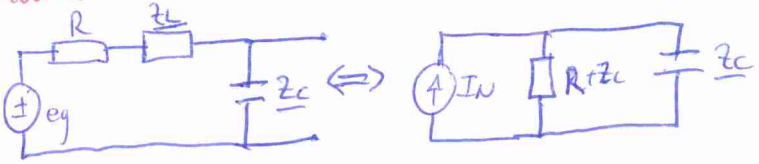
Ud 36

$P_R = W_1 - W_2 = A^2 \cdot R \Rightarrow$ $\boxed{A = \sqrt{\frac{W_1 - W_2}{R}}}$ Solución

Ud 37

$Q_{ced} = -|I|^2 \cdot (-j) = |I|^2 j = \frac{|V|^2}{\left(\left|\frac{Z_R \cdot Z_L}{Z_R + Z_L}\right|\right)^2} \Rightarrow$ $\boxed{Q_{ced} = \frac{|V|^2 |Z_R + Z_L|^2}{|Z_R \cdot Z_L|^2}}$ Solución

Ud 38



$\boxed{|I_N| = \frac{|e_q|}{|R + Z_L|}}$ Solución

$\boxed{Z_N = \frac{Z_C \cdot (R + Z_L)}{R + Z_L + Z_C}}$ Solución

Ud 39

$|S| = |I|^2 \cdot |Z_C| \Rightarrow |I| = \sqrt{|S|\omega C} = \sqrt{|S| 2\pi f C} \Rightarrow$ $\boxed{|I| = \sqrt{2\pi f C |S|}}$ Solución

Ud 40

$p(t) = \frac{1}{2} VI \cos(\varphi v - \varphi I) + \frac{1}{2} VI \cos(2\omega t + \varphi v + \varphi i)$

$p(t) = a + b\cos(\omega t + \varphi)$ $\quad K = 2\omega = 4\pi f$

$\boxed{f = \frac{K}{4\pi}}$ Solución