FIGURA 1 (CAPACITORES)

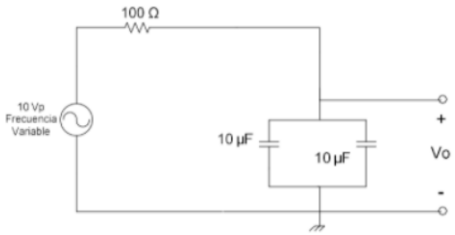

Figura 1.

$$C_T = 10 + 10 = 20_u F$$

f=0Hz

Cuando la frecuencia es 0 la impedancia es infinita por lo que la corriente tiene un valor de 0 A

f=10Hz

$$X_c = \frac{1}{2\pi fC} \rightarrow X_c = \frac{1}{2\pi(0{,}01)(20)} \rightarrow X_c = 0{,}79577 k\Omega$$

Impedancia

$$Z = R + X_c \rightarrow Z = 0{,}1 - j0{,}79577\ k\Omega$$

$$I_p = \frac{V}{Z} = \frac{10}{0{,}1 - j0{,}79577} = 12{,}468 < 82{,}83\ mA$$

Voltaje en Xc

$$V_{PXc} = I_p * X_c = 12{,}468 < 82{,}83 * (-j0{,}795577)$$

$$V_{PXc} = 9{,}844 - j1{,}238\ V \rightarrow \mathbf{9{,}92 < -7{,}17\ V}$$

Calculo del Vrms

$$V_{rms} = 0{,}707 V_{PXc} = 0{,}70(9{,}92 < -7{,}17) = \mathbf{7{,}013 < -7{,}17\ V}$$

Corriente de la resistencia

$$I_p = \frac{V}{Z} = \frac{10(0{,}707)}{0{,}1 - j0{,}79577} = \mathbf{8{,}82 < 82{,}83\ mA}$$

f=50Hz

$$X_c = \frac{1}{2\pi fC} \rightarrow X_c = \frac{1}{2\pi(0{,}05)(20)} \rightarrow X_c = 0{,}15915 k\Omega$$

Impedancia

$$Z = R + X_c \rightarrow Z = 0{,}1 - j0{,}15915\ k\Omega$$

$$I_p = \frac{V}{Z} = \frac{10}{0{,}1 - j0{,}15915} = 53{,}202 < 57{,}85\ mA$$

Voltaje en Xc

$$V_{PXc} = I_p * X_c = 53{,}202 < 57{,}85 * (-j0{,}15915)$$

$$V_{PXc} = \mathbf{8{,}46 < -32{,}15\ V}$$

Calculo del Vrms

$$V_{rms} = 0{,}707 V_{PXc} = 0{,}707 * (8{,}46 < -32{,}15) = \mathbf{5{,}98 < -32{,}15\ V}$$

Corriente de la resistencia

$$I_p = \frac{V}{Z} = \frac{10(0{,}707)}{0{,}1 - j0{,}15915} = \mathbf{37{,}61 < 57{,}86\ mA}$$

f=100Hz

$$X_c = \frac{1}{2\pi f C} \rightarrow X_c = \frac{1}{2\pi(0{,}1)(20)} \rightarrow X_c = 0{,}07957 k\Omega$$

Impedancia

$$Z = R + X_c \rightarrow Z = 0{,}1 - j0{,}0{,}7957\ k\Omega$$

$$I_p = \frac{V}{Z} = \frac{10}{0{,}1 - j0{,}07958} = 78{,}25 < 38{,}51\ mA$$

Voltaje en Xc

$$V_{PXc} = I_p * X_c = 78{,}25 < 38{,}51 * (-j0{,}07957)$$

$$V_{PXc} = \mathbf{6{,}22 < -51{,}49\ V}$$

Calculo del Vrms

$$V_{rms} = 0{,}707 V_{PXc} = 0{,}707 * (6{,}22 < -51{,}49) = \mathbf{4{,}39 < -51{,}49\ V}$$

Corriente de la resistencia

$$I_p = \frac{V}{Z} = \frac{10(0{,}707)}{0{,}1 - j0{,}07957} = \mathbf{55{,}32 < 38{,}51\ mA}$$

f=500Hz

$$X_c = \frac{1}{2\pi f C} \rightarrow X_c = \frac{1}{2\pi(0{,}5)(20)} \rightarrow X_c = 0{,}01591 k\Omega$$

Impedancia

$$Z = R + X_c \rightarrow Z = 0{,}1 - j0{,}01591\ k\Omega$$

$$I_p = \frac{V}{Z} = \frac{10}{0{,}1 - j0{,}01591} = 98{,}75 < 9{,}04\ mA$$

Voltaje en Xc

$$V_{PXc} = I_p * X_c = 98{,}75 < 9{,}04\ * (-j0{,}01591)$$

$$V_{PXc} = \mathbf{1{,}51 < -80{,}96\ V}$$

Calculo del Vrms

$$V_{rms} = 0{,}707 V_{PXc} = 0{,}707 * (1{,}51 < -80{,}96) = \mathbf{1{,}11 < -80{,}96\ V}$$

Corriente de la resistencia

$$I_p = \frac{V}{Z} = \frac{10(0{,}707)}{0{,}1 - j0{,}01591} = \mathbf{68{,}82 < 9{,}03\ mA}$$

f=1000Hz

$$X_c = \frac{1}{2\pi f C} \rightarrow X_c = \frac{1}{2\pi(1)(20)} \rightarrow X_c = 0{,}00795 k\Omega$$

Impedancia

$$Z = R + X_c \rightarrow Z = 0{,}1 - j0{,}00795\ k\Omega$$

$$I_p = \frac{V}{Z} = \frac{10}{0{,}1 - j0{,}00795} = 99{,}68 < 4{,}54\ mA$$

Voltaje en Xc

$$V_{PXc} = I_p * X_c = 99{,}68 < 4{,}54\ * (-j0{,}00795)$$

$$V_{PXc} = \mathbf{0{,}79 < -85{,}46\ V}$$

Calculo del Vrms

$$V_{rms} = 0{,}707 V_{PXc} = 0{,}707 * (0{,}79 < -85{,}46) = \mathbf{0{,}55 < -85{,}46\ V}$$

Corriente de la resistencia

$$I_p = \frac{V}{Z} = \frac{10(0{,}707)}{0{,}1 - j0{,}00795} = \mathbf{70{,}47 < 4{,}54\ mA}$$

FIGURA 2 (INDUCTORES)

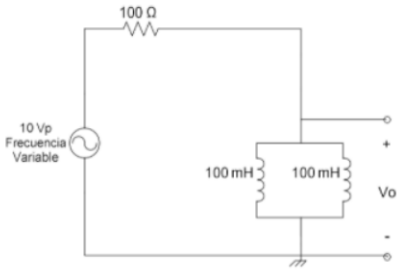

Figura 2.

$$L_T = \frac{0{,}1H}{2} = 0{,}05H$$

f=0Hz

Cuando la frecuencia es 0 la impedancia es infinita por lo que la corriente tiene un valor de 0 A

f=10Hz

$$X_L = 2\pi fL \rightarrow X_L = 2\pi(10)(0{,}05) = \pi\Omega \rightarrow X_L = 3{,}141\text{x}10^{-3}k\Omega$$

Impedancia

$$Z = R + X_c \rightarrow Z = 0{,}1 + j3{,}141x10^{-3}\ k\Omega$$

$$I_p = \frac{V}{Z} = \frac{10}{0{,}1 + j3{,}141x10^{-3}} = 99{,}95 < -1{,}79\ mA$$

Voltaje en Xc

$$V_{PXc} = I_p * X_c = 99{,}95 < -1{,}79 * (j3{,}141x10^{-3})$$

$$\boldsymbol{V_{PXc} = 0{,}31 < 88{,}21\ V}$$

Calculo del Vrms

$$V_{rms} = 0{,}707V_{PXc} = 0{,}707(0{,}31 < 88{,}21) = \boldsymbol{0{,}22 < 88{,}21V}$$

Corriente de la resistencia

$$I_p = \frac{V}{Z} = \frac{10(0{,}707)}{0{,}1 + j3{,}141x10^{-3}} = \boldsymbol{70{,}6 < -1{,}79\ mA}$$

f=50Hz

$$X_L = 2\pi fL \rightarrow X_L = 2\pi(50)(0{,}05) = 5\pi\Omega \rightarrow X_L = 0{,}01571k\Omega$$

Impedancia

$$Z = R + X_c \rightarrow Z = 0{,}1 + j0{,}01571\ k\Omega$$

$$I_p = \frac{V}{Z} = \frac{10}{0{,}1 + j0{,}01571} = 98{,}78 < -8{,}93\ mA$$

Voltaje en Xc

$$V_{PXc} = I_p * X_c = 98{,}78 < -8{,}93\ * (j0{,}01571)$$

$$V_{PXc} = \mathbf{1{,}55 < 81{,}07V}$$

Calculo del Vrms

$$V_{rms} = 0{,}707 V_{PXc} = 0{,}707(1{,}55 < 81{,}07) = \mathbf{\ 1{,}1 < 81{,}07V}$$

Corriente de la resistencia

$$I_p = \frac{V}{Z} = \frac{10(0{,}707)}{0{,}1 + j0{,}01571} = \mathbf{69{,}84 < -8{,}92\ mA}$$

f=100Hz

$$X_L = 2\pi fL \rightarrow X_L = 2\pi(100)(0{,}05) = 10\pi\Omega \rightarrow X_L = 0{,}03141k\Omega$$

Impedancia

$$Z = R + X_c \rightarrow Z = 0{,}1 + j0{,}03141k\Omega$$

$$I_p = \frac{V}{Z} = \frac{10}{0{,}1 + j0{,}03141} = 95{,}4 < -17{,}43\ mA$$

Voltaje en Xc

$$V_{PXc} = I_p * X_c = 95{,}4 < -17{,}43 * (j0{,}03141)$$

$$V_{PXc} = \mathbf{3 < 72{,}57V}$$

Calculo del Vrms

$$V_{rms} = 0{,}707 V_{PXc} = 0{,}707(3 < 72{,}57) = \mathbf{\ 2{,}12 < 72{,}57V}$$

Corriente de la resistencia

$$I_p = \frac{V}{Z} = \frac{10(0{,}707)}{0{,}1 + j0{,}03141} = \mathbf{67{,}45 < -17{,}43\ mA}$$

f=500Hz

$$X_L = 2\pi fL \rightarrow X_L = 2\pi(500)(0{,}05) = 50\pi\Omega \rightarrow X_L = 0{,}1571k\Omega$$

Impedancia

$$Z = R + X_c \rightarrow Z = 0{,}1 + j0{,}1571k\Omega$$

$$I_p = \frac{V}{Z} = \frac{10}{0{,}1 + j0{,}1571} = 53{,}69 < -57{,}52mA$$

Voltaje en Xc

$$V_{PXc} = I_p * X_c = 53{,}69 < -57{,}52 * (j0{,}1571)$$

$$V_{PXc} = \mathbf{8,43 < 32,48V}$$

Calculo del Vrms

$$V_{rms} = 0{,}707V_{PXc} = 0{,}707(8{,}43 < -57{,}52) = \mathbf{5,96 < 32,48V}$$

Corriente de la resistencia

$$I_p = \frac{V}{Z} = \frac{10(0{,}707)}{0{,}1 + j0{,}1571} = \mathbf{37,96 < -57,52mA}$$

f=1000Hz

$$X_L = 2\pi fL \rightarrow X_L = 2\pi(1000)(0{,}05) = 100\pi\Omega \rightarrow X_L = 0{,}3141k\Omega$$

Impedancia

$$Z = R + X_c \rightarrow Z = 0{,}1 + j0{,}3141k\Omega$$

$$I_p = \frac{V}{Z} = \frac{10}{0{,}1 + j0{,}3141} = 30{,}33 < -72{,}34mA$$

Voltaje en Xc

$$V_{PXc} = I_p * X_c = 30{,}33 < -72{,}34 * (j0{,}3141)$$

$$V_{PXc} = \mathbf{9,52 < 17,66V}$$

Calculo del Vrms

$$V_{rms} = 0{,}707V_{PXc} = 0{,}707(9{,}52 < 17{,}66) = \mathbf{6,63 < 17,65V}$$

Corriente de la resistencia

$$I_p = \frac{V}{Z} = \frac{10(0{,}707)}{0{,}1 + j0{,}3141} = \mathbf{21,44 < -72,34mA}$$