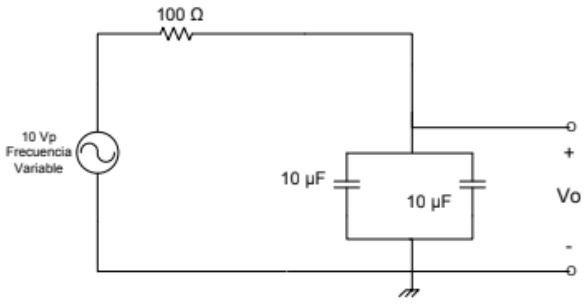
Cálculos



Calculo de la intensidad que pasa por la resistencia y del voltaje Vo

Si F=0[Hz]

$$w = 2\pi f$$

$$w = 0$$

$$v(t) = 10\text{sen}(0)$$

$$\bar{V} = 0$$

Como la fuente de voltaje es 0, el circuito no tendría corriente y por lo tanto todos los voltajes que se encuentran en el serian igual a 0.

$$V_o = 0[V]$$

$$I = 0[A]$$

Si F=10[Hz]

$$w = 2\pi f = 2\pi * 10$$

$$w = 20\pi$$

$$v(t) = 10\text{sen}(20\pi t)$$

$$\bar{V} = 5\sqrt{2}\angle 0$$

$$Z_c = -\frac{j}{wC}$$

$$Z_{c1} = -j1591{,}55\ \Omega$$

$$Z_{c2} = -j1591{,}55\ \Omega$$

$$Z_{c1c2} = -j795{,}775\ \Omega$$

$$Z_{eq} = 100 - j795{,}775\ \Omega$$

$$\bar{I} = \frac{\bar{V}}{Z_{eq}} = \frac{5\sqrt{2}\angle 0}{100 - j795{,}775} = 0{,}00109 + j0.00874$$

$$\bar{I} = 0{,}00109 + j0{,}00874 = 8{,}8 * 10^{-3}\angle 82{,}89$$

$$I_{rms} = 8{,}8\ [mA]$$

$$\bar{V_o} = \bar{I} * Z_{c1c2} = 8{,}8 * 10^{-3}\angle 82{,}89 * (-j795{,}775\ ) = 7{,}01\angle -7{,}1$$

$$V_{rms} = 7{,}01[V]$$

$$V_{pk} = 2 * V_{rms} * \sqrt{2}$$

$$V_{pk} = 19{,}83[V]$$

Si F=50[Hz]

$$w = 2\pi f = 2\pi * 50$$

$$w = 100\pi$$

$$v(t) = 10\,\mathrm{sen}(100\pi t)\ [V]$$

$$\bar{V} = 5\sqrt{2}\angle 0\ [V]$$

$$Z_c = -\frac{j}{wC}$$

$$Z_{c1} = -j318{,}31\ \Omega$$

$$Z_{c2} = -j318{,}31\ \Omega$$

$$Z_{c1c2} = -j159{,}15\ \Omega$$

$$Z_{eq} = 100 - j159{,}15\ \Omega$$

$$\bar{I} = \frac{\bar{V}}{Z_{eq}} = \frac{5\sqrt{2}\angle 0}{100 - j159{,}15} = 0{,}00109 + j0.00874$$

$$\bar{I} = 0{,}00109 + j0{,}00874 = 37{,}61 * 10^{-3}\angle 57{,}86$$

$$I_{rms} = 37{,}61\ [mA]$$

$$\bar{V_o} = \bar{I} * Z_{c1c2} = 37{,}61 * 10^{-3}\angle 57{,}86 * (-j159{,}15\ ) = 5{,}99\angle -32{,}14$$

$$V_{rms} = 5{,}99\ [V]$$

$$V_{pk} = 2 * V_{rms} * \sqrt{2}$$

$$V_{pk} = 16{,}94[V]$$

Si F=100[Hz]

$$w = 2\pi f = 2\pi * 100$$

$$w = 200\pi$$

$$v(t) = 10\,\mathrm{sen}(200\pi t)\ [V]$$

$$\bar{V} = 5\sqrt{2}\angle 0\ [V]$$

$$Z_c = -\frac{j}{wC}$$

$$Z_{c1} = -j159{,}15\ \Omega$$

$$Z_{c2} = -j159{,}15\ \Omega$$

$$Z_{c1c2} = -j79{,}58\ \Omega$$

$$Z_{eq} = 100 - j79{,}58\ \Omega$$

$$\bar{I} = \frac{\bar{V}}{Z_{eq}} = \frac{5\sqrt{2}\angle 0}{100 - j79{,}58} = 0{,}04329 + j0.03445$$

$$\bar{I} = 0{,}04329 + j0{,}03445 = 55{,}32 * 10^{-3}\angle 38{,}51$$

$$I_{rms} = 55{,}32\ [mA]$$

$$\bar{V_o} = \bar{I} * Z_{c1c2} = 55{,}32 * 10^{-3}\angle 38{,}51 * (-j79{,}58\ ) = 4{,}4\angle -51{,}49$$

$$V_{rms} = 4{,}4\ [V]$$

$$V_{pk} = 2 * V_{rms} * \sqrt{2}$$

$$V_{pk} = 12{,}45[V]$$

Si F=500[Hz]

$$w = 2\pi f = 2\pi * 500$$

$$w = 1000\pi$$

$$v(t) = 10\,\mathrm{sen}(1000\pi t)\ [V]$$

$$\bar{V} = 5\sqrt{2}\angle 0\ [V]$$

$$Z_c = -\frac{j}{wC}$$

$$Z_{c1} = -j31{,}83\ \Omega$$

$$Z_{c2} = -j31{,}83\ \Omega$$

$$Z_{c1c2} = -j15{,}92\ \Omega$$

$$Z_{eq} = 100 - j15{,}92\ \Omega$$

$$\bar{I} = \frac{\bar{V}}{Z_{eq}} = \frac{5\sqrt{2}\angle 0}{100 - j15{,}92} = 0{,}06896 + j0.01097$$

$$\bar{I} = 0{,}06896 + j0{,}01097 = 69{,}83 * 10^{-3}\angle 9{,}04$$

$$I_{rms} = 69{,}83\ [mA]$$

$$\bar{V_o} = \bar{I} * Z_{c1c2} = 69{,}83 * 10^{-3}\angle 9{,}04 * (-j15{,}92\ ) = 1{,}11\angle -80{,}96$$

$$V_{rms} = 1{,}11[V]$$

$$V_{pk} = 2 * V_{rms} * \sqrt{2}$$

$$V_{pk} = 3{,}14[V]$$

Si F=1000[Hz]

$$w = 2\pi f = 2\pi * 1000$$

$$w = 2000\pi$$

$$v(t) = 10\,\mathrm{sen}(2000\pi t)\,[V]$$

$$\bar{V} = 5\sqrt{2}\angle 0\,[V]$$

$$Z_c = -\frac{j}{wC}$$

$$Z_{c1} = -j15{,}92\ \Omega$$

$$Z_{c2} = -j15{,}92\ \Omega$$

$$Z_{c1c2} = -j7{,}96\ \Omega$$

$$Z_{eq} = 100 - j7{,}96\ \Omega$$

$$\bar{I} = \frac{\bar{V}}{Z_{eq}} = \frac{5\sqrt{2}\angle 0}{100 - j7{,}96} = 0{,}07026 + j0.00559$$

$$\bar{I} = 0{,}07026 + j0{,}00559 = 70{,}48 * 10^{-3}\angle 4{,}55$$

$$I_{rms} = 70{,}48\ [mA]$$

$$\bar{V_o} = \bar{I} * Z_{c1c2} = 70{,}48 * 10^{-3}\angle 4{,}55 * (-j7{,}96\ ) = 0{,}56\angle -85{,}45$$

$$V_{rms} = 0{,}56\ [V]$$

$$V_{pk} = 2 * V_{rms} * \sqrt{2}$$

$$V_{pk} = 1{,}58[V]$$