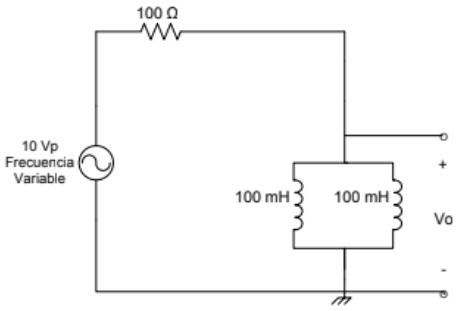
Cálculos



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]

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

$$w = 20\pi$$

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

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

$$Z_L = jwL$$

$$Z_{L1} = j2\pi\ \Omega$$

$$Z_{L2} = j2\pi\ \Omega$$

$$Z_{c1c2} = j\pi\ \Omega$$

$$Z_{eq} = 100 + j\pi\ \Omega$$

$$\bar{I} = \frac{\bar{V}}{Z_{eq}} = \frac{5\sqrt{2}\angle 0}{100 + j\pi} = 0{,}07064 - j0.00222$$

$$\bar{I} = 0{,}07065 - j0{,}00222 = 70{,}68 * 10^{-3}\angle -1{,}8$$

$$I_{rms} = 70{,}68\ [mA]$$

$$\bar{V_o} = \bar{I} * Z_{c1c2} = 70{,}68 * 10^{-3}\angle -1{,}8 * (j\pi) = 0{,}22\angle 88{,}2$$

$$V_{rms} = 0{,}22[V]$$

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

$$V_{pk} = 0{,}62[V]$$

Si F=50[Hz]

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

$$w = 100\pi$$

$$v(t) = 10\text{sen}(100\pi t)$$

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

$$Z_L = jwL$$

$$Z_{L1} = j10\pi\ \Omega$$

$$Z_{L2} = j10\pi\ \Omega$$

$$Z_{c1c2} = j5\pi\ \Omega$$

$$Z_{eq} = 100 + j5\pi\ \Omega$$

$$\bar{I} = \frac{\bar{V}}{Z_{eq}} = \frac{5\sqrt{2}\angle 0}{100 + j5\pi} = 0{,}069 - j0.01083$$

$$\bar{I} = 0{,}069 - j0{,}01083 = 69{,}84 * 10^{-3}\angle -8{,}92$$

$$I_{rms} = 69{,}84\ [mA]$$

$$\bar{V_o} = \bar{I} * Z_{c1c2} = 69{,}84 * 10^{-3}\angle -8{,}92 * (j5\pi) = 1{,}1\angle 81{,}08$$

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

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

$$V_{pk} = 3{,}11[V]$$

Si F=100[Hz]

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

$$w = 200\pi$$

$$v(t) = 10\text{sen}(200\pi t)$$

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

$$Z_L = jwL$$

$$Z_{L1} = j20\pi\ \Omega$$

$$Z_{L2} = j20\pi\ \Omega$$

$$Z_{c1c2} = j10\pi\ \Omega$$

$$Z_{eq} = 100 + j10\pi\ \Omega$$

$$\bar{I} = \frac{\bar{V}}{Z_{eq}} = \frac{5\sqrt{2}\angle 0}{100 + j10\pi} = 0{,}06436 - j0.02022$$

$$\bar{I} = 0{,}06436 - j0{,}02022 = 67{,}46 * 10^{-3}\angle -17{,}44$$

$$I_{rms} = 67{,}46\ [mA]$$

$$\bar{V_o} = \bar{I} * Z_{c1c2} = 67{,}46 * 10^{-3}\angle -17{,}44 * (j10\pi) = 2{,}12\angle 72{,}56$$

$$V_{rms} = 2{,}12[V]$$

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

$$V_{pk} = 6[V]$$

Si F=500[Hz]

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

$$w = 1000\pi$$

$$v(t) = 10\text{sen}(1000\pi t)$$

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

$$Z_L = jwL$$

$$Z_{L1} = j100\pi\ \Omega$$

$$Z_{L2} = j100\pi\ \Omega$$

$$Z_{c1c2} = j50\pi\ \Omega$$

$$Z_{eq} = 100 + j50\pi\ \Omega$$

$$\bar{I} = \frac{\bar{V}}{Z_{eq}} = \frac{5\sqrt{2}\angle 0}{100 + j50\pi} = 0{,}02039 - j0.03203$$

$$\bar{I} = 0{,}02039 - j0{,}03203 = 37{,}96 * 10^{-3}\angle -57{,}52$$

$$I_{rms} = 37{,}96\ [mA]$$

$$\bar{V_o} = \bar{I} * Z_{c1c2} = 37{,}96 * 10^{-3}\angle -57{,}52 * (j50\pi) = 5{,}96\angle 32{,}48$$

$$V_{rms} = 5{,}96[V]$$

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

$$V_{pk} = 16{,}86[V]$$

Si F=1000[Hz]

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

$$w = 2000\pi$$

$$v(t) = 10\text{sen}(2000\pi t)$$

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

$$Z_L = jwL$$

$$Z_{L1} = j200\pi\ \Omega$$

$$Z_{L2} = j200\pi\ \Omega$$

$$Z_{L1L2} = j100\pi\ \Omega$$

$$Z_{eq} = 100 + j100\pi\ \Omega$$

$$\bar{I} = \frac{\bar{V}}{Z_{eq}} = \frac{5\sqrt{2}\angle 0}{100 + j100\pi} = 0{,}00651 - j0.02043$$

$$\bar{I} = 0{,}00651 - j0{,}02043 = 21{,}44 * 10^{-3}\angle -72{,}33$$

$$I_{rms} = 21{,}44\ [mA]$$

$$\bar{V_o} = \bar{I} * Z_{c1c2} = 21{,}44 * 10^{-3}\angle -72{,}33 * (j100\pi) = 6{,}74\angle 17{,}67$$

$$V_{rms} = 6{,}74[V]$$

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

$$V_{pk} = 19{,}06[V]$$