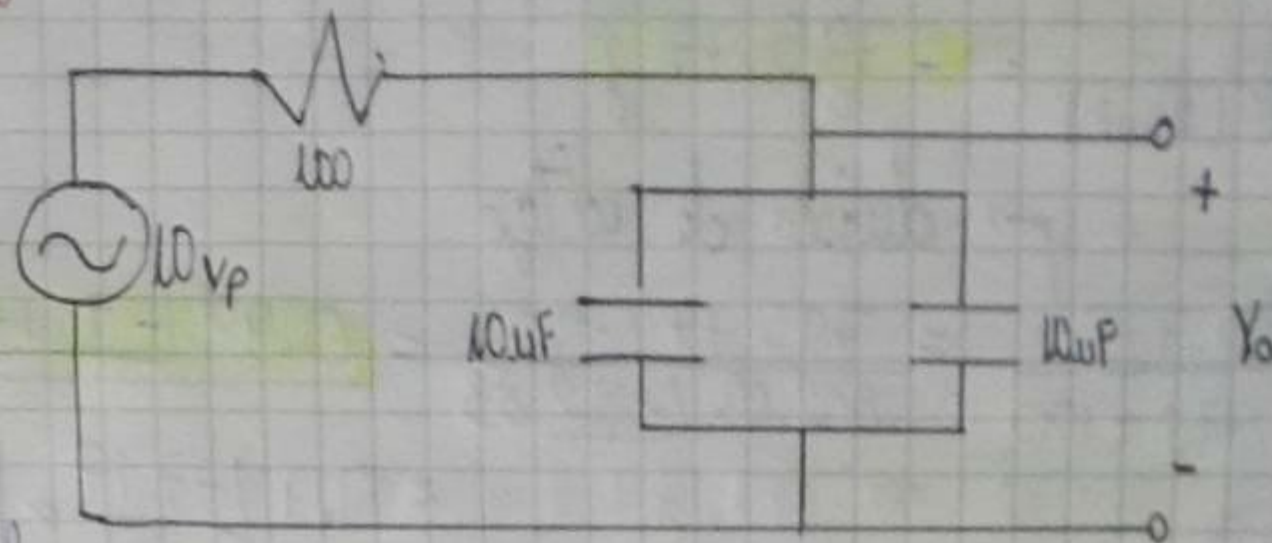


# Laboratory

Figura 1 Lab 5

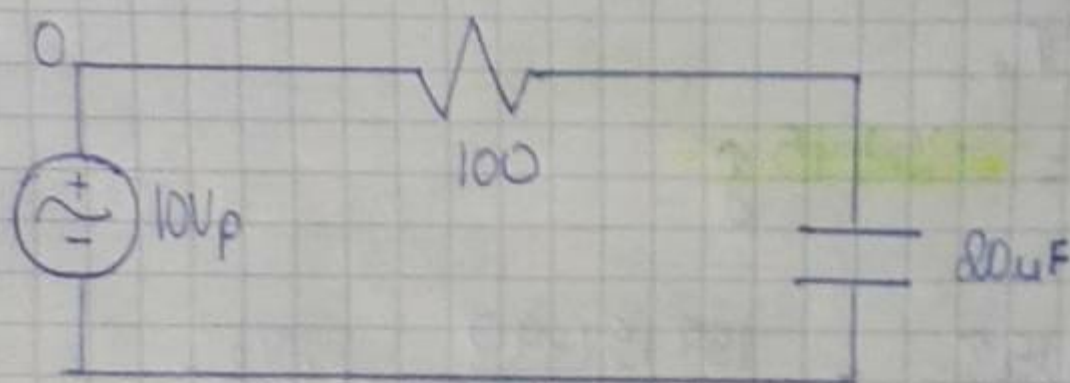


frecuencia de 0 Hz

$$R = 100 \Omega$$

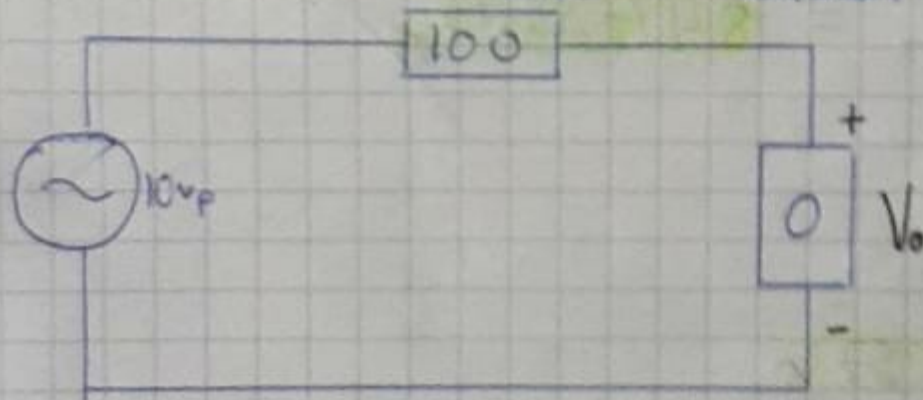
$$\omega = 2\pi(0)$$

$$\omega = 0$$



$$Z_R = 100$$

$$Z_C = \frac{-j}{\omega C} = \frac{-j}{0(10\mu F)} = 0$$



$$V_o = 10 \angle 0^\circ \cdot \frac{0}{100} = 0$$



Frecuencia 10 Hz

$$\omega = 2\pi f = 2\pi(10) = 20\pi$$

$$Z_c = \frac{-j}{\omega C} = \frac{-j}{20\pi(20\mu F)} = -795.77 j$$

→ divisor de voltaje

$$V_o = 10\angle 0^\circ \cdot \frac{-795.77j}{-795.77j + 100} = \frac{795.77\angle -90^\circ}{802.02\angle -82.83^\circ} = 0.99\angle -7.17^\circ \cdot 10\angle 0^\circ$$

$$V_o = 0.99\angle -7.17^\circ = 9.9\angle -7.17^\circ$$

Frecuencia 50 Hz

$$\omega = 2\pi(50) = 100\pi$$

$$Z_c = \frac{-j}{100\pi \cdot (20\mu F)} = -159.15 j$$

$$V_o = 10\angle 0^\circ \cdot \frac{-159.15j}{100 - 159.15j} = \frac{159.15\angle -90^\circ}{187.95\angle -57.85^\circ} \cdot 10\angle 0^\circ$$

$$V_o = 0.84\angle -32.15^\circ \cdot 10\angle 0^\circ = 8.4\angle -32.15^\circ$$

Frecuencia 100 Hz

$$\omega = 2\pi(100) = 200\pi$$

$$Z_c = \frac{-j}{200\pi \cdot (20\mu F)} = -79.57 j$$

$$V_o = 10\angle 0^\circ \cdot \frac{-79.57j}{100 - 79.57j} = \frac{79.57\angle -90^\circ}{127.79\angle -38.5^\circ} \cdot 10\angle 0^\circ$$

$$V_o = 0.62\angle -51.5^\circ \cdot 10\angle 0^\circ = 6.2\angle -51.5^\circ$$



Frecuencia 500 Hz

$$\omega = 2\pi(500) = 1000\pi$$

$$Z_C = \frac{-j}{1000\pi \cdot 20\mu F} = \frac{-j}{1000\pi \cdot 20\mu F} = -15.91j$$

$$V_o = 10\angle 0^\circ \cdot \frac{-15.91j}{100 - 15.91j} = 10\angle 0^\circ \cdot \frac{15.91\angle -90^\circ}{101.25\angle -9.04^\circ}$$

$$V_o = 0.15\angle -80.96^\circ \cdot 10\angle 0^\circ = 1.5\angle -80.96^\circ$$

Frecuencia de 1000 Hz

$$\omega = 2\pi(1000) = 2000\pi$$

$$Z_C = \frac{-j}{2000\pi \cdot 20\mu F} = -7.95j$$

$$V_o = 10\angle 0^\circ \cdot \frac{-7.95j}{100 - 7.95j} = \frac{7.95\angle -90^\circ}{100.31\angle -4.54^\circ} \cdot 10\angle 0^\circ =$$

$$V_o = 0.08\angle -85.46^\circ \cdot 10\angle 0^\circ$$

$$V_o = 0.8\angle -85.46^\circ$$

Literal C

Frecuencia 10 Hz

$$Z_R = 100$$

$$V_p = 10V$$

$$I = \frac{V}{R} = \frac{10}{100 - 799.77} = \frac{10\angle 0^\circ}{802.02\angle -82.83^\circ}$$

$$I = 0.012\angle 82.83^\circ$$

$$I = 12\angle 82.83^\circ \text{ mA}$$



1) Frecuencia 50 Hz

$$\omega = R = 100$$

$$I_R = \frac{V}{R} = \frac{10 \angle 0^\circ}{187.95 \angle -57.85} = 0.053 \angle 57.85$$

$$I_R = 53 \angle 57.85 \text{ mA}$$

2) Frecuencia 100 Hz

$$Z_R + Z_C = 100 - 79.57j = 127.79 \angle -38.59$$

$$I = I_R = \frac{V}{Z} = \frac{10 \angle 0^\circ}{127.79 \angle -38.59} = 0.0782 \angle 38.59$$

$$I_R = 78.2 \angle 38.59 \text{ mA}$$

3) Frecuencia 500 Hz

$$Z_R + Z_C = 100 - 15.91j = 101.25 \angle -9.04$$

$$I = I_R = \frac{V}{Z} = \frac{10 \angle 0^\circ}{101.25 \angle -9.04} = 0.0987 \angle 9.04$$

$$I_R = 98.7 \angle 9.04 \text{ mA}$$

4) Frecuencia 1000 Hz

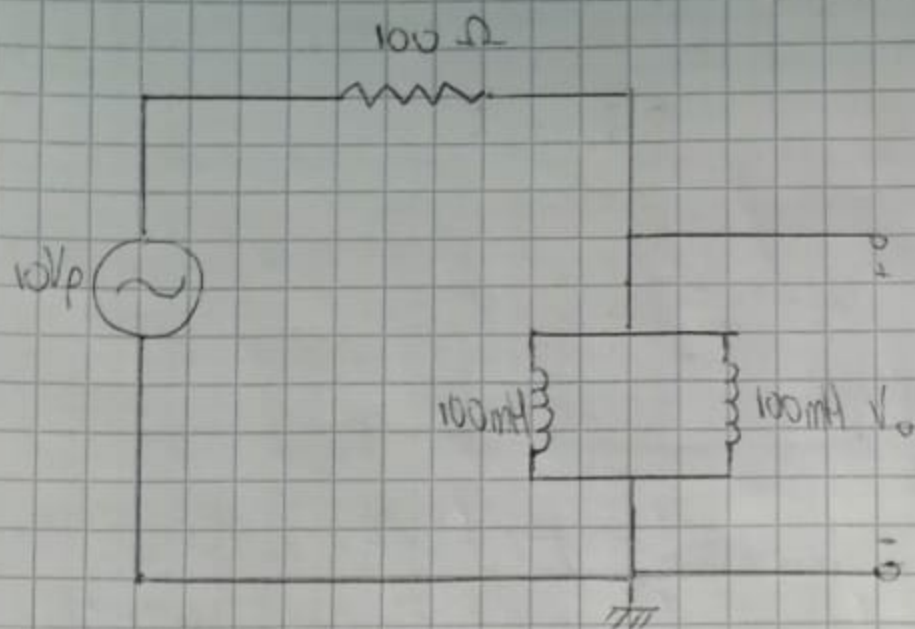
$$Z_R + Z_C = 100 - 7.95j = 100.31 \angle -4.54$$

$$I = I_R = \frac{V}{Z} = \frac{10 \angle 0^\circ}{100.31 \angle -4.54} = 0.0996 \angle 4.54$$

$$I = I_R = 99.6 \angle 4.54 \text{ mA}$$

# Laboratorio

Figura 2.

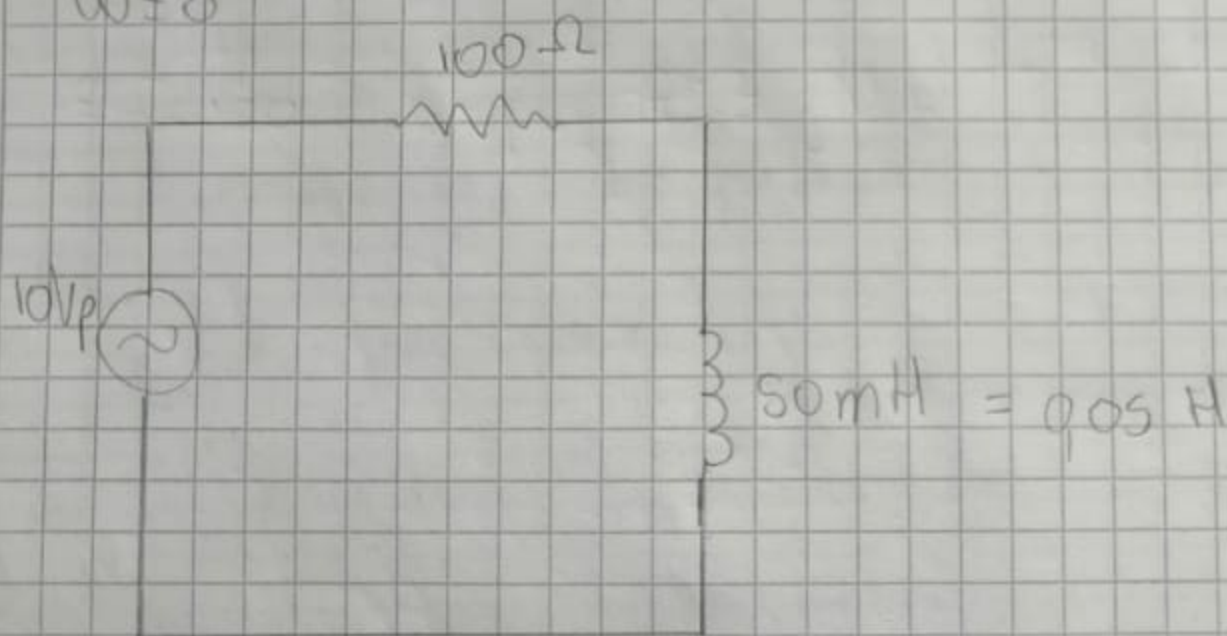


Frecuencia 0 Hz

$R = 100 \Omega$

$$\omega = 2\pi(0)$$

$$\omega = 0$$



$$Z_R = 100$$

$$Z_i = j\omega L = j(0)(0.05) = 0$$

$$V_0 = 10 \angle 0^\circ \cdot \frac{0}{100} = 0 \text{ V}$$



Frecuencia 10 Hz

$$\omega = 2\pi(10) = 20\pi$$

$$Z_i = j\omega L = j(20\pi)(0,05) = j\pi$$

$$V_o = 10 \angle 0^\circ \cdot \frac{j\pi}{j\pi - 100} = 0,31 \angle -88,80^\circ \text{ V} //$$

$$I = \frac{V}{R} = \frac{10}{100 - j\pi} = 0,09 \angle 1,79^\circ \text{ A} //$$

Frecuencia de 50 Hz

$$\omega = 2\pi(50) = 100\pi$$

$$Z_i = j\omega L = j(100\pi)(0,05) = j5\pi$$

$$V_o = 10 \angle 0^\circ \cdot \frac{j5\pi}{100 - j5\pi} = 1,55 \angle 98,93^\circ \text{ V} //$$

$$I = \frac{V}{R} = \frac{10}{100 - j5\pi} = 0,09 \angle 8,93^\circ \text{ A} //$$

Frecuencia 100 Hz

$$\omega = 2\pi(100) = 200\pi$$

$$Z_i = j\omega L = j(200\pi)(0,05) = j10\pi$$

$$V_o = 10 \angle 0^\circ \cdot \frac{j10\pi}{100 - j10\pi} = 2,99 \angle 107,44^\circ \text{ V} //$$

$$I = \frac{V}{R} = \frac{10}{100 - j10\pi} = 0,09 \angle 17,44^\circ //$$

Frecuencia 500 Hz

$$\omega = 2\pi(500) = 1000\pi$$

$$Z_1 = j\omega L = j(1000\pi)(0,05) = j50\pi$$

$$V_0 = 10 \angle 0^\circ \cdot \frac{j50\pi}{100 - j50\pi} = 8,44 \angle 147,52^\circ \text{ V} //$$

$$I = \frac{V}{R} = \frac{10}{100 - j50\pi} = 0,05 \angle 57,52^\circ \text{ A} //$$

Frecuencia 1000 Hz

$$\omega = 2\pi(1000) = 2000\pi$$

$$Z_1 = j\omega L = j(2000\pi)(0,05) = j100\pi$$

$$V_0 = 10 \angle 0^\circ \cdot \frac{j100\pi}{100 - j100\pi} = 9,58 \angle 162,34^\circ \text{ V} //$$

$$I = \frac{V}{R} = \frac{10}{100 - j100\pi} = 0,03 \angle 72,34^\circ \text{ A} //$$