# Answer Question #66550, Physics – Electric Circuits

If an AC generator with Vt=150sin(100πt) is connected to a series RLC circuit, where R=40 Ω, L=185 mH, and C=65 μC, as shown the Figure below, Find: the capacitive reactance, XL, the inductive reactance, Xc, the impedance, Z and the maximum current amplitude, Io

Solution. Find capacitive reactance using the formula $X_C = \frac{1}{2\pi f C} = \frac{1}{\omega C}$. According to the condition of the problem $C = 65 \cdot 10^{-6} F$, $2\pi f = 100\pi$ (according to equation voltage).

$X_C = \frac{1}{100\pi \cdot 65 \cdot 10^{-6}} = 48.97\Omega$.

Find inductive reactance using the formula $X_L = 2\pi f L = \omega L$. According to the condition of the problem $L = 0.185H$, $2\pi f = 100\pi$ (according to equation voltage).

$X_L = 100\pi \cdot 0.185 = 58.12\Omega$.

The impedance of the series connected RCL can be calculated by the formula

$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

$Z = \sqrt{40^2 + (58.12 - 48.97)^2} = 41\Omega$

The maximum current amplitude $I_0$ find using Ohm's law

$I_0 = \frac{U_0}{Z} = \frac{150}{41} \approx 3.66A$

**Answer.** $X_C = 48.97\Omega$, $X_L = 58.12\Omega$, $Z = 41\Omega$, $I_0 = 3.66A$