Answer on Question #40548, Physics, Electric Circuits

Find the current in a circuit consisting of a coil and a capacitor in series, if the applied voltage is 110V, 60Hz; The inductance of the coil is 0.8H; The resistance of the coil is 50 ohms ; and the capacitance of the capacitor is 8μF. b) find the power used in the circuit.

Solution

Reactance of a circuit is

$$X_L - X_C = 2\pi f L - \frac{1}{2\pi f C} = 2\pi \cdot 60 \cdot 0.8 - \frac{1}{2\pi \cdot 60 \cdot 8 \cdot 10^{-6}} = 301.59 - 331.59 = -30\Omega.$$

Impedance,

$$Z = R + j(X_L - X_C) = 50 - 30j = 58.3 \angle -31° \ \Omega.$$

The current in a circuit

$$I = \frac{V}{Z} = \frac{110\angle 0°}{58.3 \angle -31°} = 1.89\angle 31° \ A.$$

The real power in the circuit:

$$P = VI \cos\theta = 110 \cdot 1.89 \cdot \cos 31° = 178 \ W.$$

http://www.AssignmentExpert.com/