

Quiz 10

Phys 296: Summer, 2015

1. An LRC circuit with the resistor of 10 ohms, the capacitor of 330 uF, and the inductor of 8.2 mH is created. Calculate the resonance frequency in radian/s for the LRC circuit. (5pt)

$$\omega = \sqrt{\frac{1}{LC}}$$

2. For the same circuit; If the angular frequency of the applied AC source is 628 radian/s, calculate The impedance of the resistor, The impedance of the capacitor, and the impedance of the inductor. (5pt).

$$Z_R = R = 10 \Omega \quad Z_C = \frac{-j}{\omega C} = -j4.8253 \Omega$$

$$Z_L = j\omega L = j5.1496 \Omega$$

3. If the current is measured as $I(t) = 0.1 \cos[(628 \text{ radian/s})t]$, calculate V_r (5pt)

$$V_r = IR \quad R = 10 \Omega$$

$$V_r = \cos(628t)$$

4. In (1) you calculated the resonance frequency. What is interesting about the impedance at that frequency? How does it effect the circuit? (5pt)

at $\omega_0 = \sqrt{\frac{1}{LC}}$ The inductor and capacitor impedances are balanced so that the total impedance is Real!

$$Z_L = -Z_C \quad \text{or} \quad [Z_L + Z_C = 0]$$