

Peak AC Problems



“Ohms” Law for each element

NOTE: Good for PEAK values only)

$$V_{gen} = I_{max} Z$$

$$V_{Resistor} = I_{max} R$$

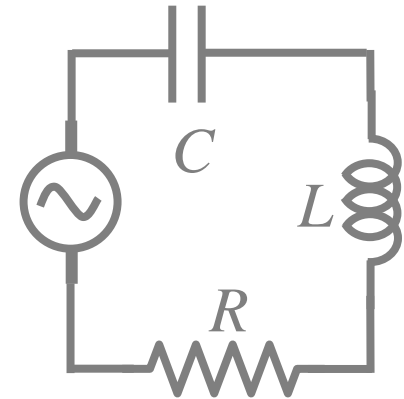
$$V_{inductor} = I_{max} X_L$$

$$V_{Capacitor} = I_{max} X_C$$

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

$$X_L = \omega L$$

$$X_C = \frac{1}{\omega C}$$



Typical Problem

A generator with peak voltage 15 volts and angular frequency 25 rad/sec is connected in series with an 8 Henry inductor, a 0.4 mF capacitor and a 50 ohm resistor. What is the peak current through the circuit?

Which element has the largest peak voltage across it?

A) Generator

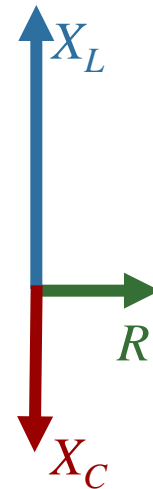
B) Inductor

C) Resistor

D) Capacitor

E) All the same.

$$V_{max} = I_{max} X$$



$$X_L = \omega L = 200 \Omega$$

$$X_C = \frac{1}{\omega C} = 100 \Omega$$

$$Z = \sqrt{R^2 + (X_L - X_C)^2} = 122 \Omega$$

$$I_{max} = \frac{V_{gen}}{Z} = 0.13 A$$