

Chapter 31 Examples, A.C. Circuits

1) A 10.0 microFarad capacitor and a 2.00 Henry inductor are connected in series with a 60 Hz source whose rms output is 100 V. Find

- (a) the rms current in the circuit
- (b) the voltage drop across the inductor
- (c) the voltage drop across the capacitor
- (d) the phase angle for the circuit.
- (e) Sketch the phasor diagram for this circuit.

2) The output of an ac generator is $\mathcal{E} = \mathcal{E}_m \sin \omega t$ with $\mathcal{E}_m = 25$ Volts and $\omega = 377$ rad/s. It is connected to a 12.7 H inductor.

- (a) What is the maximum value of the current?
- (b) When the current is a maximum, what is the emf of the generator?
- (c) When the emf of the generator is -12.5 V and increasing in magnitude, what is the current?
- (d) For the conditions of part (c), is the generator supplying energy to or taking energy from the rest of the circuit?

Ch 31 Examples (continued)

3) A resistor ($R = 900$ ohms), a capacitor ($C = 0.25$ microFarad) and an inductor ($L = 2.5$ H) are connected in series across a 240 Hz ac source for which $\mathcal{E}_m = 140$ V.

- (a) Calculate the impedance of the circuit
- (b) Calculate the amplitude current delivered by the source
- (c) Calculate the phase angle between current and voltage across all three components.
- (d) Is the circuit behaving capacitively or inductively? Is the current leading or lagging behind the voltage?
- (e) Sketch the phasor diagram for this circuit. (It will show V_L , V_C , V_R , \mathcal{E}_m and I.)