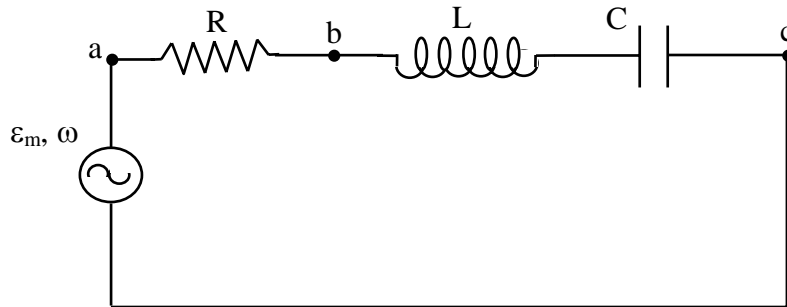


4B--AC Circuit Exercises

In this exercise the voltage and currents referred to are understood to be the rms value unless otherwise specified. Neither the capacitor nor the inductor have any resistance. With a source frequency of 100 Hz, the capacitor and the inductor each have an impedance of 10 ohms, but the resistor has an impedance of 20 ohms.



- a. If the voltage across the capacitor at this frequency is 20 volts, the voltage across the inductor is _____, the voltage across the resistor is _____, the voltage between the points b and c is _____, and the voltage of the source must be _____.
- b. The current in the circuit is _____.
- c. If the frequency is now changed to 50 Hz without changing the source voltage, the voltage across the resistor is _____, and the voltage between the points b and c is _____.
- d. The current in the circuit is now _____.
- e. The inductance of the inductor is _____.
- f. The capacitance of the capacitor is _____.
- g. The resistance of the resistor is _____.
- h. The resonant frequency for the capacitor and inductor in series is _____.
- i. As one begins to insert a rod of soft iron into the inductor, the current in the circuit _____ (increases, decreases, or is unchanged) if the frequency is 100 Hz.
As one begins to insert a rod of soft iron into the inductor, the current in the circuit _____ if the frequency is 50 Hz.
- j. Find the maximum value of the instantaneous current at 50 Hz.
- k. Draw a phasor diagram showing the current, the voltage across the resistor, the voltage across the inductor, the voltage across the capacitor, and the voltage between a and c for 50 Hz.
- l. Plot the instantaneous voltages and currents mentioned above as a function of time for one period using your phasor diagram.