Lab: AC Problems 3 (10pts)

Name _____ Per __

Remember that μf is 1×10^{-6} farad & ma = 1×10^{-3} amp

The formulae and symbols are to be found in your notes.

1. A 0.50 μf capacitor and a 30 Ω resistor are connected in series across a source of emf whose frequency is 8.0×10^3 hz. (a) Draw the circuit diagram. (b) Calculate the capacitive reactance. (c) Draw the impedance diagram and determine the magnitude and phase angle of the impedance. Note: If there is no inductor, $X_L = 0$.

2. The current in the circuit of Problem 1 is found to be 50 ma. (a) What is the magnitude of the voltage across the series circuit? (b) What is the phase relation of this voltage to the circuit current? (c) What is the voltage across the capacitor? (d) What is the voltage across the resistor?

3. A 60.0-hz circuit has a load consisting of resistance and inductance in series. A voltmeter, ammeter, and wattmeter, properly connected in the circuit, read respectively 117 v, 4.75 a, and 400 w. (a) Determine the power factor. (b) What is the phase angle? (c) What is the resistance of the load? (d) What is the inductive reactance of the load? (e) Determine the voltage across the resistance. (f) Determine the voltage across the inductance.

4. A coil has a resistance of 90 Ω and an inductance of 0.019 h. (a) What is the impedance at a frequency of 1.0×10^3 hz? (b) Determine the magnitude of the current when a potential difference of 6.0 v at this frequency is applied across it? (c) How much power is delivered to the coil?

5. A capacitance of 50 μf and a resistance of 60 Ω are connected in series across a 120-v, 60-hz line. (a) What is the magnitude of current in the circuit? (b) What power is dissipated? (c) What is the power factor? (d) Determine the voltage across the resistance. (e) Determine the voltage across the capacitance.

ANSWERS:

1. a. diagram b. 40 ohms c. diagram, 50 ohms @ -53°	4. a. X_L = 120 ohms b. Z = 150 ohms @ 53° c. P = 0.14 watt
2. a. 2.5 volts b. –53° V lags I c. 2.0 volts d. 1.5 volts	5. a. X_C = 53 ohms Z = 80 ohms @ -41° I = 1.5 amp b. P = 136 watt
3. a. 0.719 b. 44.0° c. 17.7 ohms d. 17.1 ohms e. 84.1 volts f. 81.2 volts	c. pf = 0.75 d. V_r = 90 volts e. V_c = 80 volts