PE
23

AC Thevenin and Maximum Power

(*Updated 21 NOV 2008*)

A Practical Exercise Name:_____ Section: _____

I. Purpose.

1. Review the construction and analysis of AC circuits using a DMM and/or oscilloscope.
2. Introduce the determination of the Thevenin equivalent circuit for an AC circuit.
3. Introduce the Maximum Power Transfer Theorem for AC circuits.

II. Equipment.

Agilent 34401A Digital Multimeter (DMM)
Oscilloscope
Function Generator
220 Ohm resistor
47 mH inductor
Variable resistor
Variable capacitor

III. Preparation.

IV. Lab Procedure.

You must **read** and complete each step.

Step One: Impedance for maximum power.

☐ Determine the value of load impedance required so that the load receives the maximum amount of power from the circuit (Figure 1). Note: Use a DMM and a inductor / capacitor analyzer to determine actual resistance and inductance values.

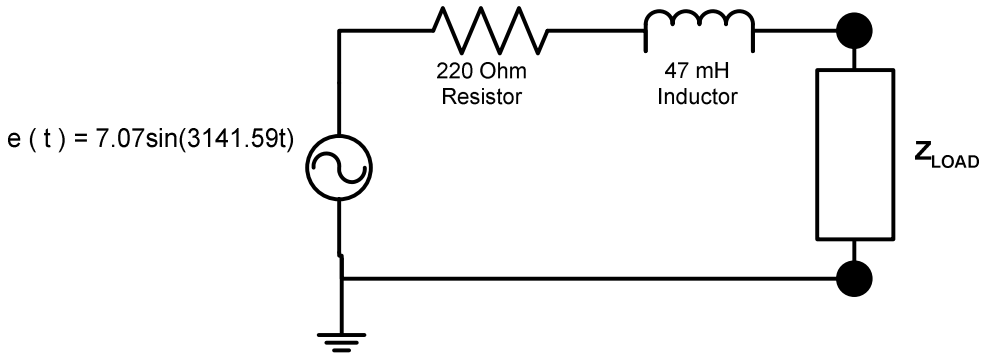

Figure 1

$\mathbf{Z_{Load}}$ = _____

☐ Determine the value of the $\mathbf{Z_{LOAD}}$ components (ohms, henries, and/or farads).

_____

_____

Step Two: Construct the AC Circuit.

☐ Construct this circuit (Figure 1) to include the components that you calculated for $\mathbf{Z_{LOAD}}$.

☐ Using any meter or scope:

- Measure the **actual** voltage output of your function generator under this circuit's load and adjust your function generator as necessary to ensure that it is providing the voltage output specified in Figure 1.

- Measure the phase relationship between the source voltage and the current.

$\Theta =$ _____

- Calculate the total current $\mathbf{I_S}$.

$\mathbf{I_S} =$ _____

- Calculate the real power P_T dissipated in the circuit.

$P_T =$ _____

- Calculate the reactive power Q_T in the circuit.

$Q_T =$ _____

- Calculate the total apparent power S_T in the circuit.

$S_T =$ _____