ENGR 252 LAB #2 - Inductance Meter Design

Objective
Utilize the steady state response of RL circuit and Phasor analysis to develop a procedure for measuring unknown Inductors. Use the procedures to measure the value of the unknown inductor provided.

Related Principles
  ➢ Electrical Circuits by Nilsson: Chapters 7,8 & 9.

Equipment
  ➢ Digital Multi-Meter
  ➢ Oscilloscope
  ➢ Signal Generator
  ➢ Power Supply

Supplies
  ➢ Unknown Inductor
  ➢ 1K, 10K, 100K and 1M ohms resistors
  ➢ Prototype board

Experiment 1
Using the phasor concepts, identify a process to measure Inductance. Based on the selected process, develop the associated equations for finding L. Additionally, perform the required experiments and calculations to measure the actual value of L for the available unknown inductor.

Experiment 2
Repeat experiment 1 for R values 1K, 10 K and 1M while adjusting the frequency between 1 kHz, 10 kHz and 100 kHz. For your design, which of the combination of R value and frequency provides the most accurate inductance measurement? Explain the reasons for your findings.
Note: Use stated value on the unknown inductor in order to evaluate accuracy of your measurement.

Experiment 3
Identify an alternative method for measuring Inductance. Describe the process and explain advantages / disadvantages of the new method compared with method used in experiment 1.

Report Requirements
Reports must be prepared individually even if the experiments are performed as a team. All reports must be computer printed (Formulas and Diagrams may be hand drawn) and at minimum include:

For each Experiment
  a) Clear problem statement; specify items given and to be found.
  b) Identify the theory or process used.
  c) Documents resulting circuits, calculation, tables, timing diagram, schematic and other relevant results.

For the report as a whole
  a) Cover sheet with your name, class, lab, completion date and team members' names.
  b) Lessons Learned from the experiments.
  c) A new experiment and expected results which provide additional opportunity to practice the concepts in this lab.