Lab 13: Faraday's Law

Name: _____

Team members:
1._____ 2._____
3._____ 4._____
5._____ 6._____

Instructor:_____

Analysis

Note: Show all your work, including all calculations!

13.2 Relative motion

1. With the strip chart recorder oscilloscope, re-sketch on your own the voltage vs time plot. Label the axes properly and be careful about units.

2. Estimate the area under the curve of $\varepsilon(t)$.

3. The coil has 100 turns. Measure its diameter and record its value.

4. Use equation (5) and your measurements to compute the magnetic field B for the permanent magnet.

13.3 Time Varying Magnetic Field

1. Measure the peak-to-peak value and frequency of the voltage supplied to the circuit.

2. Measure the actual value of the resistor. Measure the amplitude of the voltage across the resistor using the oscilloscope. Use Ohm's Law to calculate the current across it.

3. Measure the amplitude $\mathcal{E}_0$ of the voltage induced in the pick-up coil by the solenoid's changing magnetic field. The pick-up coil has 50 turns; measure its diameter.

4. Record the number of loops in the solenoid and its length.

5. Make a sketch of the magnetic field in and around the solenoid.

6. Determine the current flowing through the solenoid. Use the value of this current and Ampere's law (eq. (6)) to obtain the theoretical value of the magnetic field B inside the ideal solenoid.

7. Use your measurements from the pick-up coil and Faraday's law (eq. (12)) to determine the amplitude of the magnetic field B_0 for the actual solenoid.

8. Compare the theoretical value of the magnetic field of the solenoid to the actual one.