Assignment 8 – Part 2 (50 marks)

Directions:

- Print this document.
- Answer all of the questions in the spaces provide below each question.

A. Short Answer:

1. (4 marks)
Explain what happens to a charge when it is placed in an electric field.

2. (6 marks)
Draw a sketch showing the electric field that exists around a:
a. strong positive charge b. weak negative charge.

3. (6 marks)
Draw a schematic diagram of a simple, single-loop circuit containing a battery, a switch, and two lamps. Include an appropriate meter to measure the total current in the circuit and another meter that measures the potential drop across one of the lamps.

C. Problem Solving:

1. (10 marks)
a. What is the current through a light bulb when it takes 25 s for 16 C of charge to pass through its filament?
b. A small electric motor draws a current of 0.40 A. How long will it take for 12.0 C of charge to pass through it?

c. An object with an excess of 6.25×10^{12} electrons is grounded and discharges completely in 0.025 s. Calculate the average current through the grounding wire.

2. (10 marks)
a. How much work is required to move 10.0 C of charge through a potential difference of 25.0 V?
b. If 12.5 J of work is done between two terminals of a battery while supplying a current of 20.0 mA for 2.00 minutes, determine the potential difference between the two points.
c. What is the potential difference across a refrigerator if 50.0 C of charge transfers 7.80×10^3 J of energy to the compressor motor?

3. (5 marks)
Calculate the energy stored in a 9.0 V battery that can deliver a continuous current of 5.0 mA for 2.0×10^3 s.

4. (9 marks)
A 0.0025 kg mass having a charge of 5.7×10^{-6} C is released and accelerates towards a positively charged plate. The mass moves a distance of 10.0 cm due to an electric force of 6.8×10^{-8} N. Calculate the work done by the electric force on the mass to move it 10.0 cm.

What is the potential difference between the mass's initial location and its final location?

What is the velocity of the mass after travelling the 10.0 cm?