NAME: RABIU ABDULAZEEZ OLAMILEKAN
DEPARTMENT: PETROLEUM ENGINEERING
MATRIC No.: 19/ENG07/019
COURSE: ENGR 221 (BASIC ELECTRICAL ENGINEERING I)

1. Describe the magnitude and direction of the acceleration ~~of being~~ of an electron being shot horizontally into a closed space with a uniform field being directed upward.

Solution

The Mass Spectrometer experiment applies both the knowledge of electric and magnetic field to find the mass of an atom.
Firstly, a gas is ionized by firing a beam of particles at the gas, which either adds electrons to the atoms or it knocks a few of their electrons off depending on the type of particle beam used during the process. This gives the gives the atoms, now known as "ions", a net negative or positive electric charge.
The ions are then sent through a tube in which they're subjected to electric and magnetic fields. Both fields exert a force on the ion and the strengths of the two forces are proportional to the ions charge. The electric force causes the ions to change speed, while always perpendicular to velocity, so that does not work on the charged particle. Here, the magnetic force supplies the centripetal force.

$F_c = mv^2/r$, noting that $\sin\theta = 1$, we see that $F = qvB$ because the magnetic force (F) supplies the centripetal force
Then we have $qvB = \frac{mv^2}{r}$

Solving for r yields

$$r = mv/qB$$

By Newton's 2nd law of motion, $F = ma$ rewritten to solve for m as $m = F/a$, dividing the total force acting on the ions by their resulting acceleration to determine the ion's mass.

2. Describe electric field, magnetic field and electric current with respect.

Solution

Electric Field can be defined as the electric force per unit charge, or a region around a charge ~~a charge~~ particle or object within which a force would be exerted on either charged particles or objects. $\bar{E} = \frac{\bar{F}}{q}$, The direction of the field is taken to be the direction of the force it would exert on a positive test charge. The electric field is radially outward from a positive charge and radially in forward a negative point charge.

Magnetic Field is a vector field that describes the magnetic influence on moving electric charges, electric currents and magnetized materials. A charge that is moving in a magnetic field experiences a force perpendicular to its own velocity and to the magnetic field.

Electric current is a stream of charged particles, such as electrons or ions, moving through an electrical conductor or space. It is measured as the net rate of flow of electric charge past a region.

$$I = \frac{V}{R}, \quad I = \frac{Q}{t}$$