OLATUNJI TOLUWALASE BUSOLA

MECHANICAL ENGINEERING

19/ENG06/048

ENG 221

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1 Describe the magnitude and direction of the acceleration of an electron being shot horizontally into a closed space with a uniform field being directed upward using the concept of Newton's second law of motion.

Ans: ~~first of all~~ Gas of atoms are ionized by firing a beam or particle of the gas which either adds electrons to the atoms or knocks a pair of their electrons off depending on the type of particle used which gives the atom an electric charge. The ions are then send through a tube in which they are subjected to both electric and magnetic fields. The fields exert force on the ions and the strengths of the two forces causes the ions to change speed while the magnetic field bend their path. Here, the magnetic force supplies the centripetal force

$$F = \frac{mv^2}{r} \quad F = qvB$$

$$\therefore qvB = \frac{mv^2}{r}$$

$$r = \frac{mv^2}{qvB} = \frac{mv}{qB}$$

By Newton's 2nd law of MOTION, $f = ma$ rearranged so $m = f/a$ dividing the total force acting on the ions by their resulting acceleration to determine the ions mass.

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

Ans: Electric field is defined as the electric force per unit charge. $\vec{E} = \frac{\vec{F}}{q}$, 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 extend from a positive charge and radially inward 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 experience 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.

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