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MATRIC NO: 19/ENG05/046

DEPT: MECHATRONICS ENGINEERING

ENG 221 (INTRODUCTION TO BASIC ELECT)

1 Using the concept of Newton's second law of motion, describe the magnitude and direction of the acceleration of an electron being shot horizontally into a closed space with a uniform field being directed upwards

Solution

Newton's second law of motion can be formally stated as the acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force, in the same direction as the net force, and inversely proportional to the mass of the object. Which can be deduced mathematically as

$F = MA$ being F = Force
M = mass
A = acceleration

Thus an object will only accelerate if there is a net force acting upon it. The existance of an unbalanced force will accelerate an object changing its direction, speed or both direction and speed. Newtons second law of motion pertains to the behaviour of objects for which all known forces are not in equilibrum. The magnitude and direction of acceleration depends directly upon the net force acting on the electron.

The force of an electron is perpendicular to the velocity, so the electron will follow a circular path or a constant speed. In the context of newtons second law with, is the charge-mass ratio of the electron. Also once the electron is shot newtons law tells us that this force will introduce an acceleration to the electron in a downward direction

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

Solution

* Electric field ÷ A region around a charged particle or object within which a force would be exerted on other charged particles.
* Magnetic field - A region around a magnetic material or a moving electric charge within which the force of magnetism acts.
* Electric current — A stream of charged particles, such as electrons or ions, moving through an electric conductor or space.

With respect to charges the field can be viewed as the combination of an electric field and magnetic field. The electric and magnetic are both field with moving charges (currents).

The way in which changes and currents interact with the electromagnetic field is described by maxwell's equation and Lolerentz force law is much stronger than the force created by a magnetic field.

* Lorentz law - The force exerted on charged particle q moving with a velocity v through an electric field E and magnetic field B.