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Mechatronics Engineering
19/ENG05/012
200 Level

Basic Electrical Engineering

QUESTION ONE: Using the concept of Newtons 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 upward.

As the electron is negatively charged and the electric field is pointed upward, as the electron is shot horizontally into the field, the positive side of the field which is downward since like charges repel and unlike charges attract. That is, the force is directed downward. The acceleration therefore is in a downward direction.

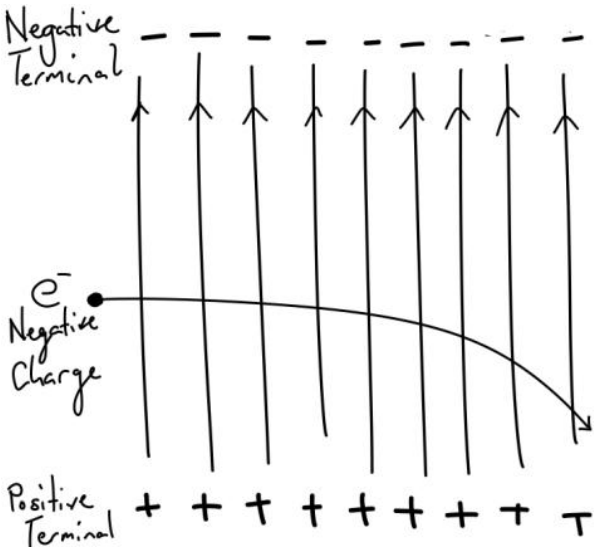
From Newton's second law of motion,

$F = ma$	where m = mass of the body a = acceleration

Since the electric field is uniform and Force,

$F = qE$	where E = electric field strength q = charge on the electron

The magnitude and direction of the electric field are constant since the electric field is uniform and the force is constant and magnitude of acceleration is constant so moves in the downward direction and is constant.



QUESTION TWO: Describe electric field, magnetic field and electric current with respect to charges.

Electric field is defined as the electric force per unit charge.

$$E = \frac{F}{q}$$

Where E = electric field, F = Force, q = charge

The direction of the field is taken to be the direction of the force it would exert on a positive test charges. The electric field goes the opposite direction if the charge is negative. Therefore, the electric field radiates outward from a positive charge and into toward a negative point charge.

A magnetic field is a vector field that describes the magnetic influence on moving electric charges. A charge that is moving in a magnetic field experiences a force perpendicular to its own velocity and to the magnetic field. Electric current flowing through a long straight wire is a simple example of magnetic field.

$$F = q(E + VB)$$

Where, q= charge E= Electric field V= velocity B= magnetic field

Electric current can be defined as the flow of one coulomb of charge per unit second. It is measured in ampere. The movement of an electron charge within a conductor is referred to as Electric Current Flow.