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Course: Basic Elect Engineering

Assignment

Question 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 upward.

Solu.

Newton's Second Law of Motion states that the acceleration of an Object as Produced by a net force is directly Proportional to the magnitude of the net force and Inversely proportional to the mass of the Object.

Therefore. On entering the field, there is a vertical downward force acting on the electron. This is because electric force acts in the opposite direction, as the electron field and the electric field is directed Upward.

The magnitude of the force is given by $(F = Eq)$, where E is the electric field strength and q is the charge of the electron. No force acts horizontally. Hence, the magnitude of acceleration is gotten using Newton 2nd Law

$F = ma$ where M = Mass, F = force, a = acceleration

$a = \frac{F}{m} = \frac{Eq}{m}$

$\Rightarrow \boxed{a = \frac{Eq}{m}}$

$\therefore \boxed{a = \frac{Eq}{m}}$

∴ The direction of a is downward just like the way force f is directed because according to Newton's 2nd Law, force is directly Proportional to acceleration.

Question 2

Describe electric field, magnetic field and electric Current with respect to Charges.

Answer

An electric field (sometimes E-field) is the physical field that surrounds each electric charge and exerts force on all other charges in the field, either attracting or repelling them. Electric fields originates from electric charges, or from time-varying magnetic fields. Electric fields and magnetic fields are both manifestations of the electromagnetic force, one of the four fundamental forces (or interactions) of nature.

If a test charge is positive the direction of electric field and electric force are the same. When the test charge is negative, the direction is opposite. An electric field exist within a conductor the field exerts a force in every charge in the conductor making the free charges to move. This explains the theory of electric current flow

∴ Electric Current is the flow of electric charge

$\frac{\vec{E} = \vec{f}}{q}$ where $\vec{E}$ = electric field

f = force

q = charge