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CIVIL ENGINEERING

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

Answer

Newton’s second law states that the vector sum of the forces F acting on an object is equal to the mass m of that object multiplied by the acceleration a of the object: F=am. When an electron enters the field, there is a vertical downgrade force acting on it. This is because electric forces acts in the opposite direction to an electric field and the electric field always points upwards. Since no force acts horizontally, the magnitude of the acceleration is gotten by using newton’s second law F=ma

a=F/m=G(q/m)=Gq/m

The direction of is downward just like the way force F is directed. This obeys Newton’s second law, force is directly proportional to acceleration.

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

Answer

Electric Field

An electric field is a region of space around an electrically charged particle or object in which an electric charge would feel force. The direction of electric field id outward from a positive charge and radially in toward a negative point. Electric field is not a single vector quantity but an infinite set of vector quantities, associated with each point in space, hence it is a vector field.

This can be represented mathematically as; E=F/q

Magnetic field

The magnetic field is the area around a magnet in which there is magnetic force. The magnitude of this force is proportional to the amount of charge q, the speed of the charged particle v and the magnitude of the applied magnetic field. The direction of this force is perpendicular to both the moving charged particle and the direction of the applied magnetic field. We define the magnetic field strength based on the magnetic force on a charge q moving at velocity v as the cross product of the velocity and magnetic field

F=qvBsinθ

Electric current

An 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. The moving particles are called charge carriers, which may be one of several types of particles, depending on the conductor.