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COMPUTER ENGINEERING

**ENG 221**

# BASIC ELECTRICAL ENGINEERING

## *QUESTION 1*

The electron is negatively charged, so it is acted upon by a force directed opposite to the electric field i.e force acted in upward direction.

Therefore, the acceleration is in upward direction

F=ma (by newton's second law of motion)

The electric field is uniform, so the magnitude and direction of the field are constant i.e force is also constant.

Therefore, acceleration's magnitude is constant and acceleration's direction is upward and constant.

## *QUESTION 2*

### *i) ELECTRIC FIELD WITH RESPECT TO CHARGES:*

Electric field is defined as the electrical force per unit charge. The magnitude of the electric field around an electric charge, considered as source of the electric field, depends on how the charge is distributed in space. 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 outward from a positive charge and radially in toward a negative point charge. For a charge concentrated nearly at a point, the electric field is directly proportional to the amount of charge, it is inversely proportional to the square of the distance radially away from the center of the source charge and depends also upon the nature of the medium. The presence of a material medium always diminishes the electric field below the value it has in a vacuum.

### *ii) MAGNETIC FIELD WITH RESPECT TO CHARGES:*

A 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 experiences a force perpendicular to its own velocity and to the magnetic field. When a moving charge is introduced in a magnetic field, the field exerts a force F on the charge. This is called the Lorentz force. The magnitude of this force is given by the formula qVB sine theta, where q is the magnitude of the charge, V

is the velocity, B is the magnitude of the magnetic field, and theta is the angle between the velocity and the magnetic field.

### *iii) ELECTRIC CURRENT WITH RESPECT TO CHARGES:*

An electric current is a flow of electric charge in a circuit. A common unit of electric current is the ampere, which is defined as a flow of one coulomb of charge per second, or 6.2 × 1018 electrons per second. The centimeter–gram–second units of current is the electrostatic unit of charge (esu) per second. One ampere equals 3 × 109 esu per second.