

QUES 06:-

An electron travelling west to east enters a chamber having a uniform electrostatic field in a north to south direction. Specify the direction in which a uniform magnetic field should be set up to prevent the electron deflecting from its straight line path.

Sol. Under the action of the electrostatic field, the electron will be deflected towards the north (towards the positive plate). It will remain undeflected if the force due to the magnetic field is towards the south. As the velocity v of the electron is from west to east, the expression for the magnetic Lorentz force i.e.

$$\vec{F}_m = -e(\vec{v} \times \vec{B})$$

It tells that the magnetic field \vec{B} should be applied along the vertical and in a downward direction. The direction of the magnetic field may be found by applying Fleming's left-hand rule.