

QUES 05:-

A magnetic field that varies in magnitude from point to point but has a constant direction (east to west) is set up in a chamber. A charged particle enters the chamber and travels undeflected along a straight path with constant speed. What can you say about the initial velocity of the particle?

Sol. The force on a charged particle moving inside the magnetic field is given by

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

The force on the charged particle will be zero (will remain undeflected), if $\vec{v} \times \vec{B}$ is equal to zero.

Therefore, either the initial velocity \vec{v} is parallel or is antiparallel to the magnetic field \vec{B} .