

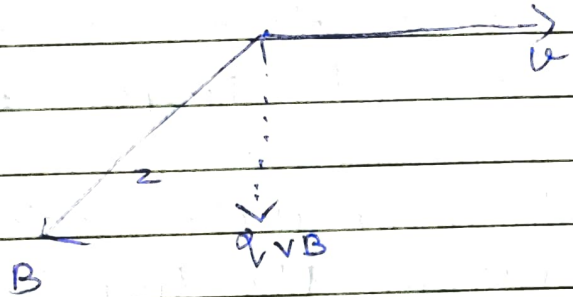
→ Force on moving charge in uniform magnetic and electric field :-

→ Home Assignment :-

Q1) a) Velocity v of the beam

$$v = \frac{E}{B} = \frac{100 \times 1000}{50 \times 10^{-3}}$$

$$= \boxed{2 \times 10^6 \text{ m/s}}$$



b) The beam strikes the target with a constant velocity so force exerted on the target is zero. However if proton beam comes to rest it exerts a force on the target to rate of change of linear momentum of the beam.

Q2) By Fleming's left hand rule magnetic field must be along negative z -axis.

Q3) One test is the magnetic field in which a charge of 1C moving with a velocity of 1ms^{-1} normal to the magnetic field, experiences a force of

$$\rightarrow B = \frac{F}{qv \sin \theta}$$

$$\text{If } F = 1\text{N}, q = 1\text{C}, v = 1\text{ms}^{-1}, \theta = 90^\circ$$

$$\text{S.I units of } B = \frac{1\text{N}}{1\text{C} \cdot 1\text{ms}^{-1} \cdot \sin 90^\circ} = 1\text{NA}^{-1}\text{m}^{-1} = \boxed{1 \text{ Tesla}}$$

04) Mass of electron is low as compared to proton. Hence when both enter into the uniform magnetic region, the electron will move in a circular path with higher frequency on the opposite direction to the current.

05) When an electron enters normal to the field direction the trajectory is circular.

→ When an electron enters 30° to the field direction the trajectory is helical.