

- 7 Electrons are moving through a vacuum in a narrow beam. The electrons have speed v . The electrons enter a region of uniform magnetic field of flux density B . Initially, the electrons are travelling at a right-angle to the magnetic field. The path of a single electron is shown in Fig. 7.1.

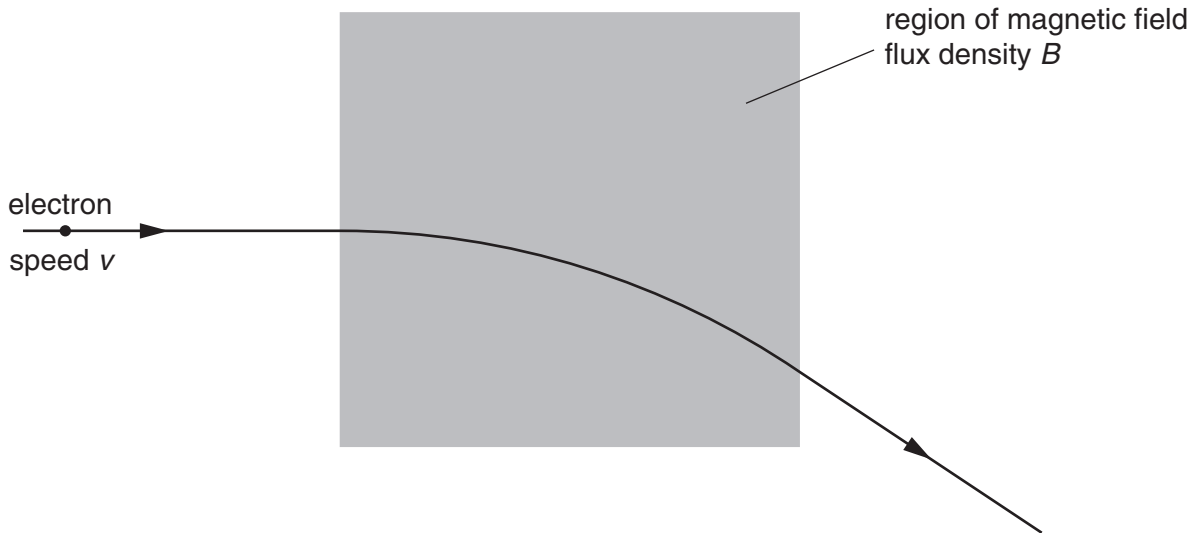


Fig. 7.1

The electrons follow a curved path in the magnetic field.

A uniform electric field of field strength E is now applied in the same region as the magnetic field.

The electrons pass undeviated through the region of the two fields. Gravitational effects may be neglected.

- (a) Derive a relation between v , E and B for the electrons not to be deflected. Explain your working.

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- (b) An α -particle has speed v and approaches the region of the two fields along the same path as the electron. Describe and explain the path of the α -particle as it passes through the region of the two fields.

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