6 **(a)** A uniform magnetic field has constant flux density *B*. A straight wire of fixed length carries a current *I* at an angle θ to the magnetic field, as shown in Fig. 6.1.

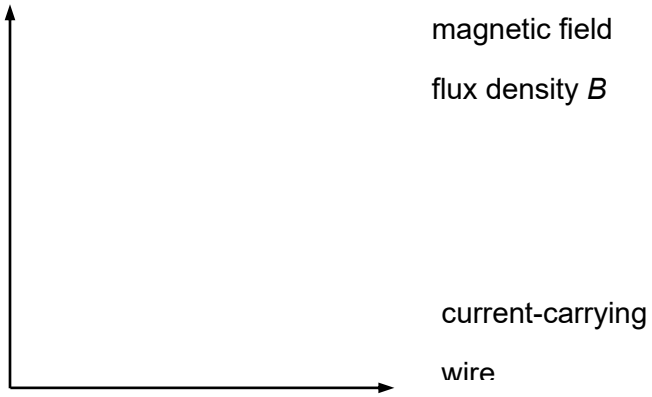

Fig. 6.1

(i) The current *I* in the wire is changed, keeping the angle θ constant.

On Fig. 6.2, sketch a graph to show the variation with current *I* of the force *F* on the wire.

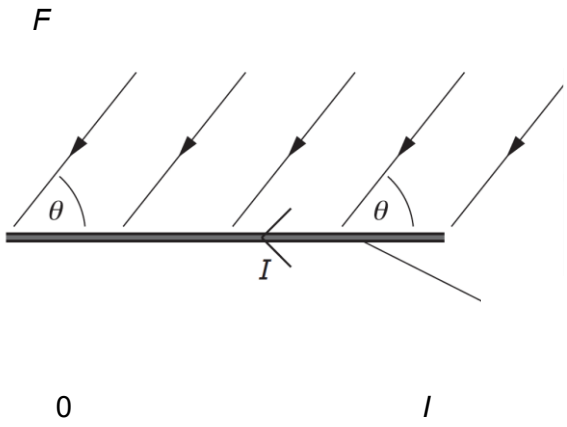

Fig. 6.2

[2]

(ii) The angle θ between the wire and the magnetic field is now varied. The current *I* is kept constant.

On Fig. 6.3, sketch a graph to show the variation with angle θ of the force *F* on the wire. F_{max} is the maximum force acting on the wire.

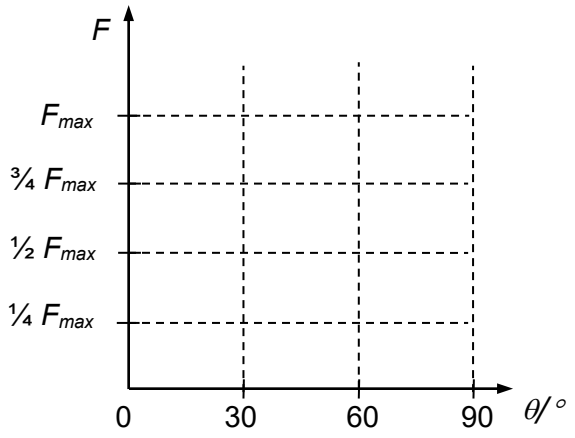

Fig. 6.3

[3]

(b) A uniform magnetic field is directed at right-angles to the rectangular surface PQRS of a slice of a conducting material, as shown in Fig. 6.4.

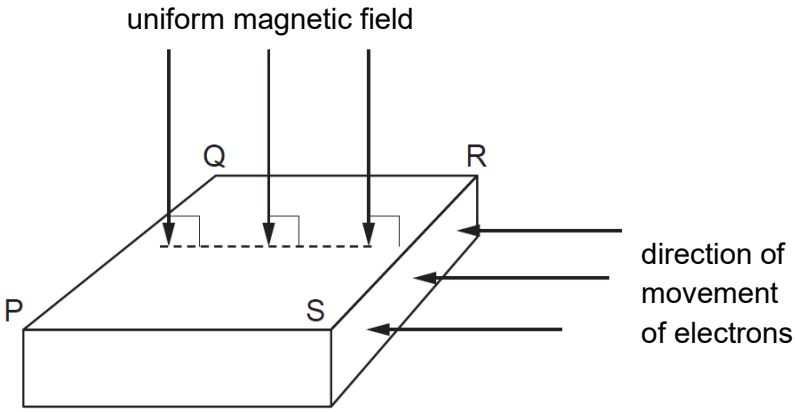

Fig. 6.4

Electrons, moving towards the side SR, enter the slice of conducting material. The electrons enter the slice at right-angles to side SR.

(i) The electrons initially do not travel in straight lines across the slice from side SR to side PQ.

State and explain to which side, PS or QR, the electrons tend to move.

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……..... [2]

(ii) Subsequent electrons travel undeflected in straight lines across the slice from side SR to side PQ.

Explain why this happens.

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…….....

……..... [2]

[Total 9]