5 **(a)** An electron enters a region of uniform magnetic field as shown in Fig. 5.1.

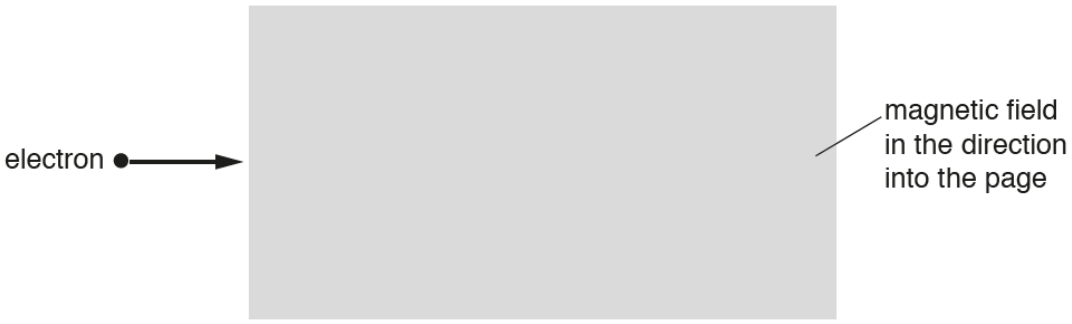

Fig. 5.1

On Fig. 5.1, draw a possible path that the electron will take in the magnetic field.

[1]

(b) A thin slice of conducting material has its faces PQRS and VWXY normal to a uniform magnetic field of flux density *B* of 0.28 T as shown in Fig. 5.2. The side PQ is 20 mm, side PS is 9.0 mm and side PV is 1.0 mm.

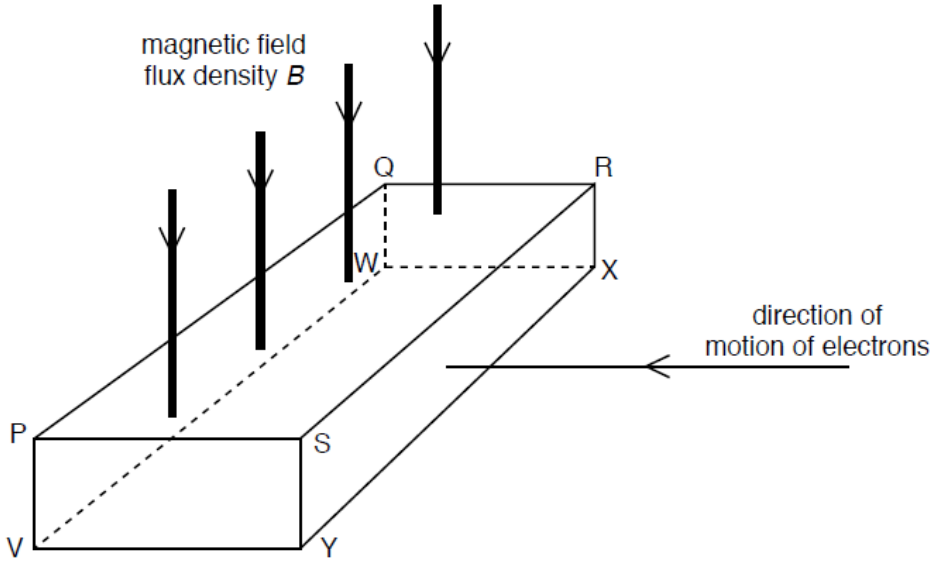

Fig. 5.2 (not to scale)

Electrons enter the slice at right-angles to face SRXY at an average speed of 56 m s^{-1}.

As the electrons flow, a potential difference is produced between two faces of the slice which increases to a steady value called the hall voltage V_H.

(i) State the face of the slice that is at a higher potential.

..... [1]

(ii) Explain why the hall voltage is produced between two faces of the slice.

……

……

……

……. [2]

(iii) Calculate V_H.

V_H = …… V [2]

(iv) State and explain how the polarity of the hall voltage will change, if any, if the charge carriers are positively charged.

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…..……..……

…..……..……

……..……..……... [2]

[Total: 8]