5 **(a)** Define magnetic flux density

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……………………………………………………………………………………………………...

……………………………………………………………………………………………………[2]

(b) A β-particle is travelling with momentum p in a vacuum. It enters a region of uniform magnetic field of flux density B as shown in Fig. 5.1. It moves along the arc of a circle r.

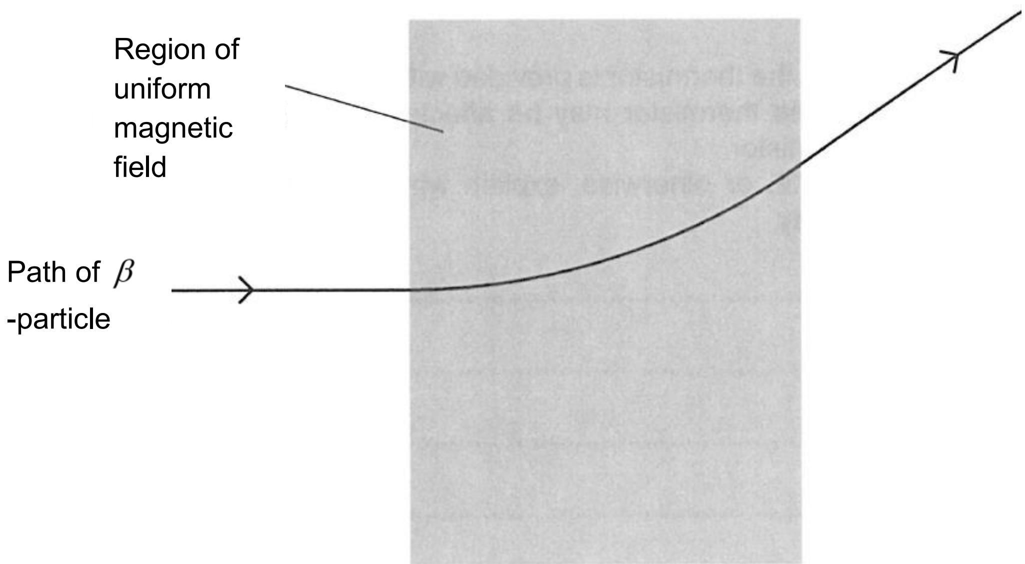


Fig. 5.1

(i) State the direction of the magnetic field

………………………………………………………………………………………… [1]

(ii) **1.** Show that the momentum p of the β -particle is given by

$$p = Ber,$$

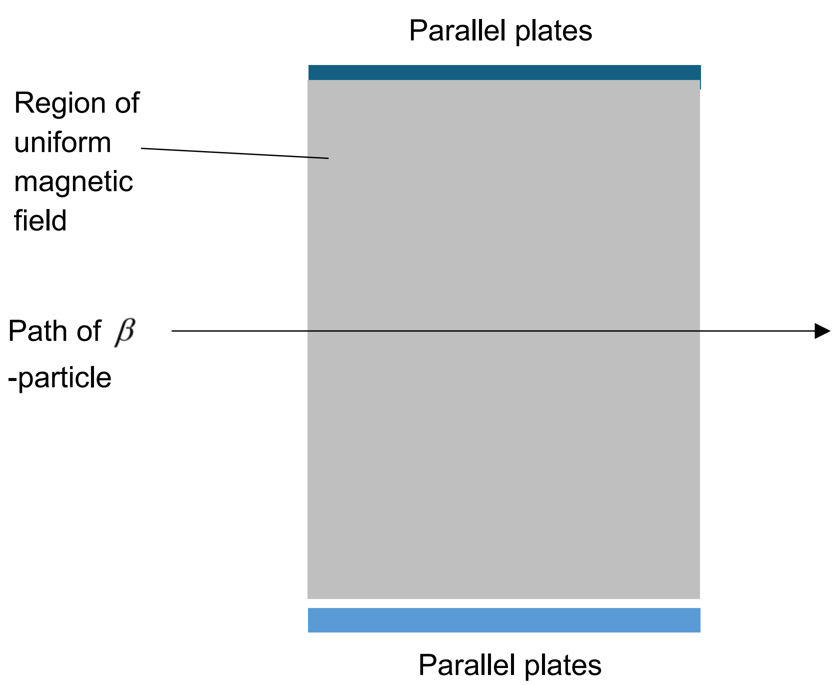
where e is the elementary charge.

[2]

2. Hence calculate the momentum p of the β -particle if the magnetic flux density B is 0.24 T and the radius of the circular path is 6.2 cm.

p = ……………………….. N s [2]

(c) A uniform electric field strength, E is then applied across the parallel plate so that the β -particle can pass through the region undeflected.



1. Indicate on Fig. 5.2, the polarity of the respective plates with a "+" or "-". [1]

2. State and explain the change, if any, to the path of the β -particle if there is an increase in its momentum.

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………………………………………………………………………………………[2]