Charged Particles in Electric and Magnetic Fields

1. An α particle and a β⁻ particle both enter the same uniform magnetic field, which is perpendicular to their direction of motion. If the β⁻ particle has a speed 15 times that of the α particle, what is the value of the ratio

$$\frac{\text{magnitude of force on } \beta^- \text{ particle}}{\text{magnitude of force on } \alpha \text{ particle}} \text{?}$$

   A   3.7

   B   7.5

   C   60

   D   112.5

   (Total 2 marks)

2. (a) An electron moves parallel to, but in the opposite direction to, a uniform electric field, as shown in **Figure 1**.
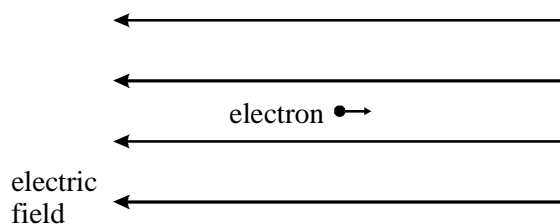

   electron ●→

   electric field

   Figure 1

   (i) State the direction of the force that acts on the electron due to the electric field.

   ....

   (ii) What is the effect of this force on the motion of the electron?

   ....

   ....

   (2)

(b) An electron, which is travelling in a horizontal path at constant speed, enters a uniform vertical electric field as shown in **Figure 2**.
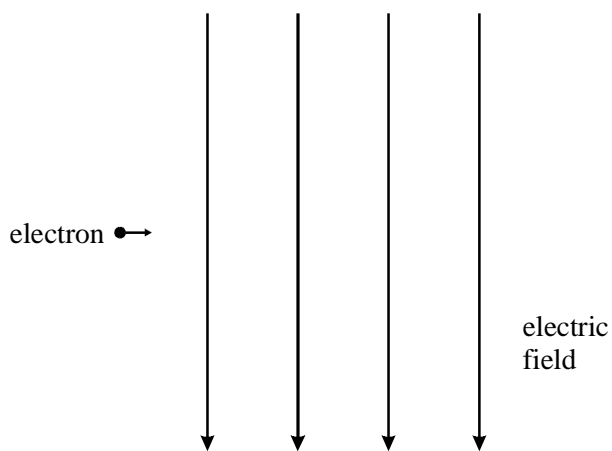
electron •→

electric field

Figure 2

(i) Sketch on **Figure 2** the path followed by the electron.

(ii) Explain the motion of the electron whilst in this field.

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(3)
(Total 5 marks)