4(a) State what is meant by the electric field strength at a point [1]

……

……

(b) A potential difference is applied between two horizontal plates, each 1.0 m long and separated by 2.5 cm. A beam of α-particles enters the field horizontally mid-way between the plates at a speed of 1.5×10^7 m s^{-1}. The electric field strength between the two plates is 7.5×10^4 N C^{-1} as shown in Fig. 4.1 which is not drawn to scale.

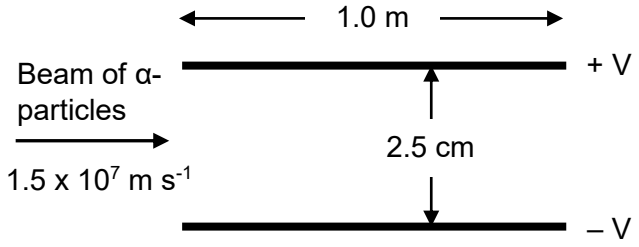

Fig. 4.1

(i) Calculate the force on each α-particle due to the electric field. [2]

Force = ……

(ii) Determine the time that each α-particle spends inside the field. [1]

Time = ……..

(iii) Show that the α-particles will not hit the plates. [2]

(iv) Sketch on Fig 4.1, the path of the α-particles between and beyond the plates. [1]