6 An electron travelling horizontally in a vacuum enters the region between two horizontal metal plates, as shown in Fig. 6.1.
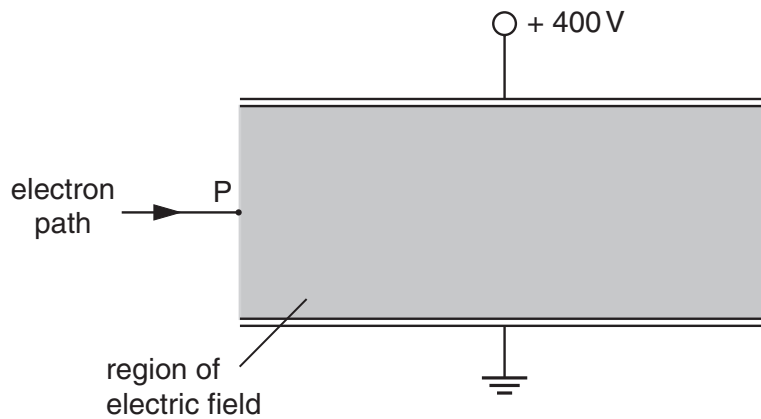

Fig. 6.1

The lower plate is earthed and the upper plate is at a potential of + 400 V. The separation of the plates is 0.80 cm.

The electric field between the plates may be assumed to be uniform and outside the plates to be zero.

(a) On Fig. 6.1,

    (i) draw an arrow at P to show the direction of the force on the electron due to the electric field between the plates,

    (ii) sketch the path of the electron as it passes between the plates and beyond them.

                                                  [3]

(b) Determine the electric field strength E between the plates.

E = ... V m^{-1} [2]

(c) Calculate, for the electron between the plates, the magnitude of

    (i) the force on the electron,

force = …………………………….. N

    (ii) its acceleration.

acceleration = ……………………………… $m\,s^{-2}$

[4]

(d) State and explain the effect, if any, of this electric field on the horizontal component of the motion of the electron.

....

....

....[2]

[Turn over