4 **(a)** Define *electric field strength*.

....

.... [1]

(b) A potential difference is applied between two horizontal plates.

Draw, on Fig. 4.1, at least five arrows to represent the uniform electric field between the plates. [2]

metal
plate

+400 V

0 V

Fig. 4.1

(c) A beam of electrons enters the field along a horizontal path. Each electron has a velocity of $2.6 \times 10^7 \, \mathrm{m\,s^{-1}}$.

The electric field strength between the two plates is $40\,000 \, \mathrm{V\,m^{-1}}$.

Calculate the force on a single electron due to the electric field.

force = ... N [1]

(d) Sketch, on Fig. 4.2, the path of the electron beam between the plates. [2]
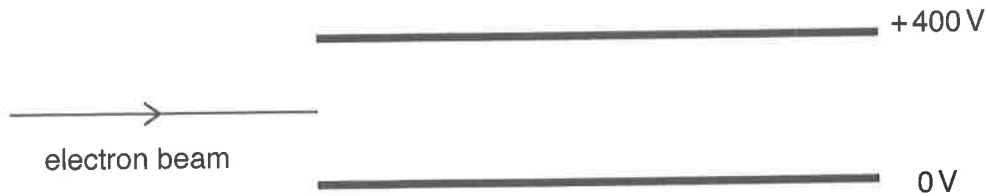
+400 V

electron beam

0 V

Fig. 4.2

(e) A uniform magnetic field is established between the two horizontal plates so that the electrons now continue in a straight horizontal line. The magnetic field is directed into the page.

Calculate the magnetic flux density of the magnetic field and give the unit.

magnetic flux density = ... unit .... [3]

[Total: 9]