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

.....

.....[1]

(b) A uniform electric field is produced by applying a potential difference of 1200V across two parallel metal plates in a vacuum, as shown in Fig. 4.1.

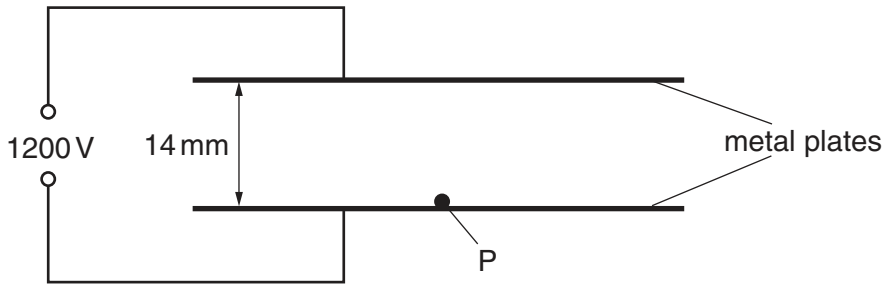

Fig. 4.1

The separation of the plates is 14 mm. A particle P with charge 3.2×10^{-19} C and mass 6.6×10^{-27} kg starts from rest at the lower plate and is moved vertically to the top plate by the electric field.

Calculate

(i) the electric field strength between the plates,

electric field strength = ... $V\,m^{-1}$ [2]

(ii) the work done on P by the electric field,

work done = ... J [2]

(iii) the gain in gravitational potential energy of P,

gain in potential energy = ... J [2]

(iv) the gain in kinetic energy of P,

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gain in kinetic energy = ... J [1]

(v) the speed of P when it reaches the top plate.

speed = ... $m\,s^{-1}$ [2]