5 **(a)** State what is meant by an *electric field*.

For Examiner's Use

.....

.....[1]

(b) The electric field between an earthed metal plate and two charged metal spheres is illustrated in Fig. 5.1.

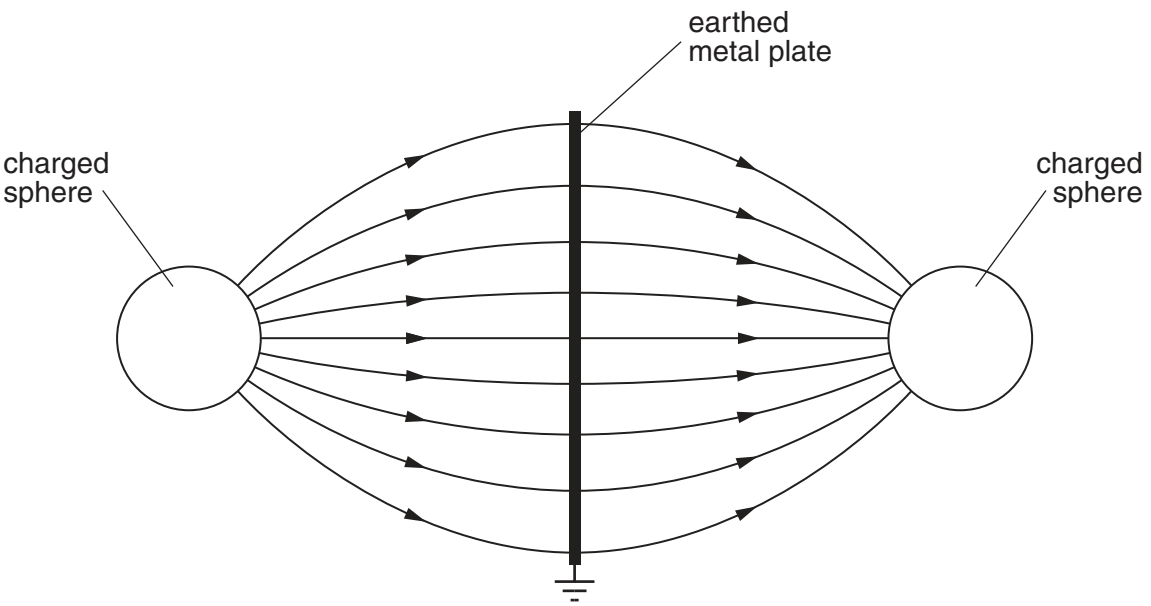

Fig. 5.1

(i) On Fig. 5.1, label each sphere with (+) or (–) to show its charge. [1]

(ii) On Fig. 5.1, mark a region where the magnitude of the electric field is

1. constant (label this region C), [1]

2. decreasing (label this region D). [1]

(c) A molecule has its centre P of positive charge situated a distance of 2.8×10^{-10} m from its centre N of negative charge, as illustrated in Fig. 5.2.

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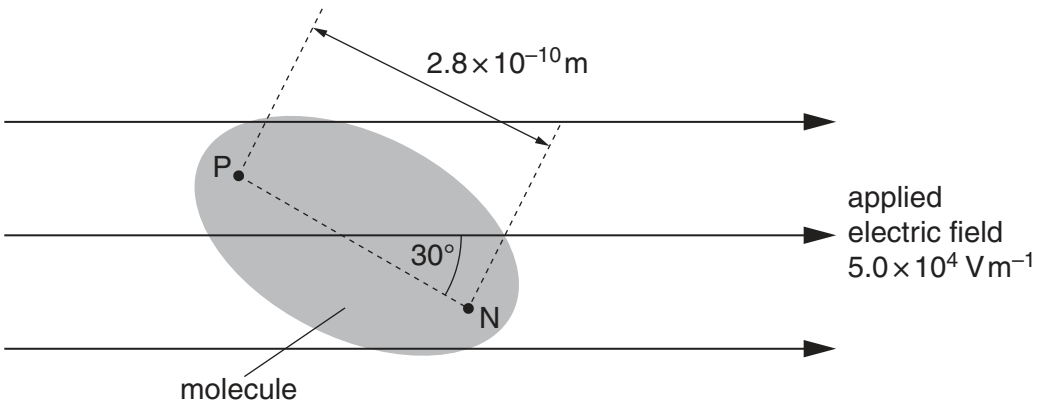

Fig. 5.2

The molecule is situated in a uniform electric field of field strength $5.0 \times 10^4 \text{V m}^{-1}$. The axis NP of the molecule is at an angle of 30° to this uniform applied electric field.
The magnitude of the charge at P and at N is 1.6×10^{-19} C.

(i) On Fig. 5.2, draw an arrow at P and an arrow at N to show the directions of the forces due to the applied electric field at each of these points. [1]

(ii) Calculate the torque on the molecule produced by the forces in **(i)**.

torque = ... N m [2]