Examiner's Use

5 An isolated conducting sphere of radius r is placed in air. It is given a charge $+Q$. This charge may be assumed to act as a point charge situated at the centre of the sphere.

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

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..... [1]

(ii) State a formula for the electric field strength E at the surface of the sphere. Also, state the meaning of any other symbols used.

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..... [2]

(b) The maximum field strength at the surface of the sphere before electrical breakdown (sparking) occurs is 2.0×10^6 V m^{-1}. The sphere has a radius r of 0.35 m.

Calculate the maximum values of

(i) the charge that can be stored on the sphere,

charge = …….…… C [2]

(ii) the potential at the surface of the sphere.

potential = …….…… V [2]

(c) Suggest the effect of the electric field on a single atom near the sphere's surface as electrical breakdown of the air occurs.

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..... [2]