Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic :7_ Electric Field

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Student:_____
Max. Marks : 27 Marks **Time : 27 Minutes**

Q1.

Some flowers are negatively charged and surrounded by an electric field. This helps to attract bees.
State what is meant by an electric field.

(1)

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.....

(Total for question = 1 mark)

Q2.

Sketch the electric field around a positive point charge.

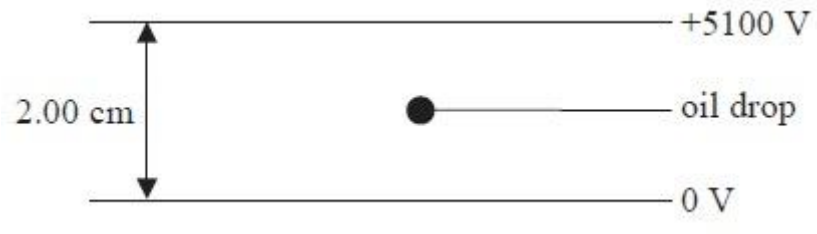
(3)

(Total for question = 3 marks)

Q3.
The charge on an electron was originally measured in an experiment called the Millikan Oil Drop experiment.

In a simplified version of this experiment, an oil drop with a small electric charge is placed between two horizontal, parallel plates with a large potential difference (p.d.) across them. The p.d. is adjusted until the oil drop is stationary.

For a particular experiment, a p.d. of 5100 V was required to hold a drop of mass 1.20×10^{-14} kg stationary.



(a) Add to the diagram to show the electric field lines between the plates.

(3)

(b) State whether the charge on the oil drop is positive or negative.

(1)

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(c) Complete the free-body force diagram to show the forces acting on the oil drop. You should ignore upthrust.

(2)

(d) (i) Calculate the magnitude of the charge on the oil drop.

(4)

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Charge = ...

(ii) Calculate the number of electrons that would have to be removed or added to a neutral oil drop for it to acquire this charge.

(2)

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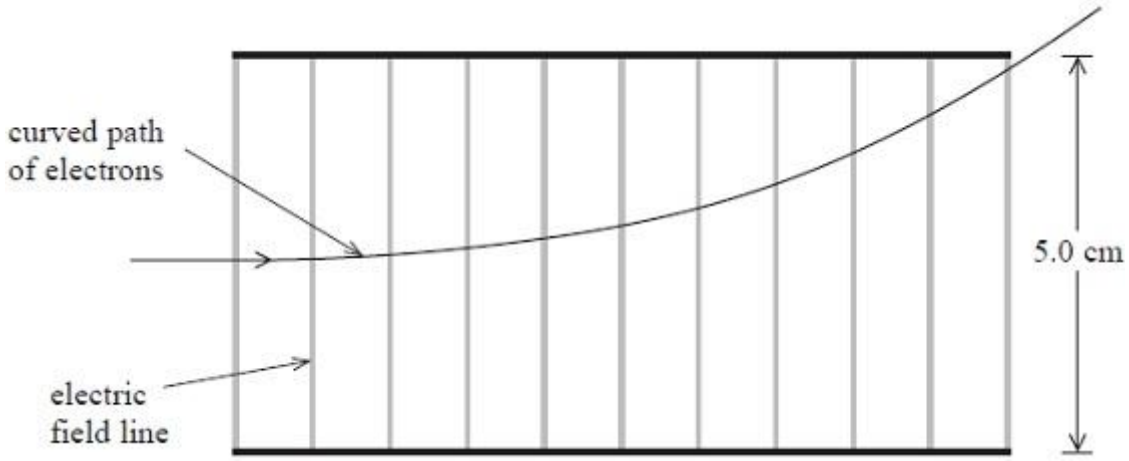
Number of electrons = ...

(Total for Question = 12 marks)

Q4.

A teacher uses an electron beam tube to demonstrate the behaviour of electrons in an electric field. The diagram shows the path of an electron in a uniform electric field between two parallel conducting plates.



(a) Mark on the diagram the direction of the electric field.

(1)

(b) The conducting plates are 5.0 cm apart and have a potential difference of 160 V across them.

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

(3)

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Force = ...

(c) Explain why the path of the electron is curved between the plates and straight when it has left the plates.

(3)

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(d) The electron was initially released from a metal by thermionic emission and then accelerated through a potential difference before entering the region of the electric field.

(i) State what is meant by thermionic emission.

(1)

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(ii) In order to be able to just leave the plates as shown, the electron must enter the electric field between the plates with a speed of 1.2×10^7 m s^{-1}.

Calculate the potential difference required to accelerate an electron from rest to this speed.

(3)

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Potential difference = ...

(Total for Question = 11 marks)