Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

Q1.

The image shows a battery-powered drone.

(a) The battery in the drone can store 97.5 kJ of energy.

When the drone is hovering, the power output of the battery is 65.0 W

Calculate the time for which the drone can hover.

_____

_____

_____

_____

_____

_____

Time = _____ seconds

(3)

(b) The battery powers 4 motors in the drone.

Each motor has a resistance of 1.60 Ω when the power input to each motor is 19.6 W

The 4 motors are connected in parallel with the battery.

Calculate the current through the battery.

_____

_____

_____

Current = _____ A

(4)

(Total 7 marks)

Q2.

Figure 1 shows a Van de Graaff generator that is used to investigate static electricity.

Before it is switched on, the metal dome has no net charge.

After it is switched on, the metal dome becomes positively charged.

Figure 1

(a) Explain how an uncharged object may become positively charged.

(3)

(b) **Figure 2** shows a plan view of the positively charged metal dome of a Van de Graaff generator.

Draw the electric field pattern around the metal dome when it is isolated from its surroundings.

Use arrows to show the direction of the electric field.

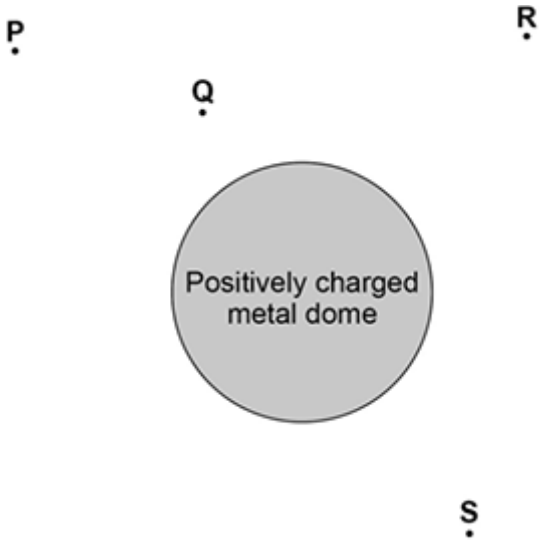
Figure 2

(2)

(c) Another positively charged object is placed in the electric field.

Look at **Figure 3**.

Figure 3



In which position would the object experience the greatest force?

Tick **one** box.

P ☐

Q ☐

R ☐

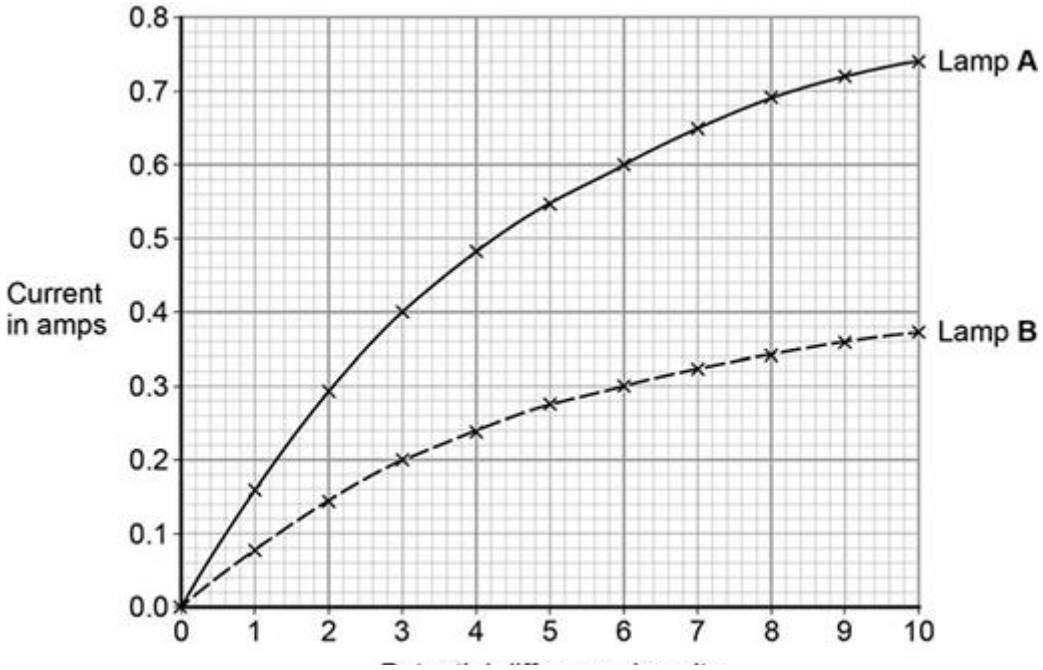
S ☐

(1)
(Total 6 marks)

Q3.

A student investigated how current varies with potential difference for two different lamps.

Her results are shown in the figure below.



(a) Complete the circuit diagram for the circuit that the student could have used to obtain the results shown in the figure above.

(3)

(b) Which lamp will be brighter at any potential difference?

Explain your answer.

Use the figure above to aid your explanation

_____

_____

_____

_____

(2)

(c) Lamp **B** has the higher resistance at any potential difference.

Explain how the figure above shows this.

_____

_____

_____

_____

(2)

(d) Both lamps behave like ohmic conductors through a range of values of potential difference.

Use the figure above to determine the range for these lamps.

Explain your answer.

_____

_____

_____

_____

_____

_____

(3)

(Total 10 marks)