

Name of the Student: _____

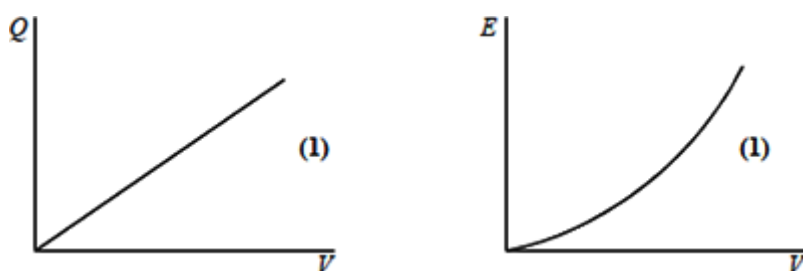
Max. Marks : 21 Marks

Time : 21 Minutes

Mark Schemes

Q1.

(a)

capacitance [or charge per volt or Q/V] (1)

(3)

(b) (i) $Q = CV (= 0.68 \times 6.0) = 4.1 \text{ C}$ (1)

(ii) $E \left(= \frac{1}{2} QV = \frac{1}{2} \times 4.1 \times 6.0 \right) = 12 \text{ J}$ (1)

(2)

[5]

Q2.

(a) (i) remains constant since connected to constant p.d. (1)

(ii) decreases because $C \propto \frac{1}{d}$ (1)(iii) decreases because $Q = CV$ and C has decreased (1)(iv) decreases because $E = \frac{1}{2} CV^2$ and C has decreased (1)

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(b) (i) $C \left(= \frac{\epsilon_0 A}{d} \right) = \frac{8.85 \times 10^{-12} \times 8.0 \times 10^6}{0.75 \times 10^3}$ (1) ($= 9.44 \times 10^{-8} \text{ F}$)

$$E \left(= \frac{1}{2} CV^2 \right) = \frac{1}{2} \times 9.44 \times 10^{-8} \times (200 \times 10^3)^2$$

$$= 1890 \text{ J} \text{ (1)}$$

$$(ii) \quad I \left(= \frac{Q}{t} \right) = \frac{9.44 \times 10^{-8} \times 200 \times 10^3}{1.2 \times 10^{-6}} \text{ use of } Q = CV \text{ (1) use of } I = \frac{Q}{t} \text{ (1)}$$

$$= 157 \text{ A (1)}$$

6
[10]

Q3.

(a) (i) $Q = 1.0 \times 10^{-3} \text{ C (1)}$

(ii) $E = 5.0 \times 10^{-2} \text{ J (1)}$

2

(b) (i) $V = 50 \text{ V (1)}$

(ii) $(E_1 = \frac{1}{2} QV = 1.25 \times 10^{-2} \text{ J}) E_2 = 2.5 \times 10^{-2} \text{ J (1)}$

(iii) current flows (when capacitors connected together) (1)
(energy lost due to) heat in wires (1)

4
[6]