Practice Question Set For A-Level
Subject : Physics
Paper-2 Topic: Fields And Their Consequences (Capacitance)

Merit Minds
www.merit-minds.com
Exam Preparation and Free Resources

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

Mark Schemes

Q1.

(a) the capacitor stores 120 μC of charge for each one volt of pd between the plates ✔

1

(b) $Q = C\,\Delta V = 120 \times 10^{-6} \times 4.2 = 5.0 \times 10^{-4}$ C ✔

1

(c) $I = \frac{V}{R}$ so maximum current = $\frac{9.6}{1300}$ = 7.4 ± 0.2 × 10^{-3} (A)✔

Allow ecf for incorrect read off in 01.2

1

(d) use of $E = \frac{1}{2}CV^2$ using V = 9.6V, 5.4V or 4.2V✔

Correct value of E at 9.6V or 5.4V (5.5 (3) × 10^{-3} J or 1.7(5) × 10^{-3} J✔

Both correct and subtraction 3.7(8) × 10^{-3} J ✔

Condone incorrect powers of 10
Allow 3.7 × 10^{-3}J

3

(e) Graph same shape up to point where capacitor stops discharging✔

current falls to zero at time when capacitor stops discharging✔

Scale on current axis with Initial and final currents correct

7.4 mA and 4.2 mA at the instant when foil breaks

(Allow ±0.1 mA) ✔

must show curvature during discharge time

3

(f) use of $V = V_0\,e^{-t/RC}$ Allow substitution of manipulation to *(discharge time)* $t = RC\ln(V_0/V)$✔

t = 0.156(0.16) × ln (9.6/5.4) ✔

= 0.090 or 0.092 s ✔

v = s/t = 0.12/their time (1.3 m s^{-1})✔

Downloaded from www.merit-minds.com

correct substitutions for V, condone incorrect powers of 10 in substitution

Allow ecf for incorrect readoff for V in in Question ***(b)***

4

(g) There are resistive forces on the ball / the ball will decelerate ✔

The foil is unlikely to break at the instant the ball reaches it✔

2

[15]

Q2.

(a) $d = \frac{8.9\times10^{-12}\times2.3\times250\times10^{-4}}{370\times10^{-12}}$ ✓

1.4×10^{-3} m (1.4 (1.38) mm)✓

Data substitution – condone incorrect powers of 10 for C *and* A ✓

2

(b) New capacitance = 161 pF✓

New V = 0.13 nC / 161pF = 81 V✓

2

(c) Energy stored = ½ × 161 × 10^{-12} × 81^2 ✓

0.53 μJ✓

2

(d) Energy increases because:

In the polar dielectric molecules align in the field with positive charged end toward the negative plate (or WTTE).✓

Work is done on the capacitor separating the positively charged surface of the dielectric from the negatively charged plate (or vice versa).✓

2

[8]

Downloaded from www.merit-minds.com