Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Mark Schemes

Q1.

Question Number	Acceptable Answers	Additional guidance	Mark
	Maximum 3 marks • There cannot be a p.d. across his body (1) • Electric field strength inside cage is zero (1) • As no potential gradient (1) • Current/electrons/charge would conduct through suit **Or** the current would not pass through body (1)	Accept reference to Faraday cage for MP2	**3max**

Q2.

Question Number	Answer		Mark
(a)	Use of $Q = CV$ $Q = 0.18$ C Example of calculation $Q = 150 \times 10^{-6}$ F $\times$ 1200 V $Q = 0.18$ C	**(1)** **(1)**	**2**
(b)	Use of $W = ½ CV^2$ **Or** of $W = ½ QV$ **Or** of $W = ½ Q^2/C$ $W = 110$ J Allow ecf from (a) if $½ QV$ or $½ Q^2/C$ used Example of calculation $W = ½ \times 150 \times 10^{-6}$ F $\times$ (1200 V)^2 $W = 108$ J	**(1)** **(1)**	**2**

(b)	Use of $W = ½ CV^2$ **Or** of $W = ½ QV$ **Or** of $W = ½ Q^2/C$ $W = 110$ J Allow ecf from (a) if $½ QV$ or $½ Q^2/C$ used Example of calculation $W = ½ \times 150 \times 10^{-6}$ F $\times (1200$ V$)^2$ $W = 108$ J	**(1)** **(1)**	**2**
(c)(i)	$R = 86$ (Ω) Example of calculation $R = V/I = 1200$ V / 14 A $R = 85.7$ Ω	**(1)**	**1**
(c)(ii)	$Q = 0.25\ Q_0$ **Or** $Q = 0.045$ C Use of RC (0.013 s) Use of $Q = Q_0\ e^{-t/RC}$ to give $t = 0.018$ s (show that value will give $t = 0.019$ s) [Use of ln 4 gives the correct answer if the − sign is ignored , scores 1 for use of RC use of ¾Q →3.7×10^{-3} s scores 1 mark] **Or** Use of RC Use of $2 \times 0.69 \times RC$ $t = 0.018$ s Example of calculation $Q = 0.25\ Q_0$ $Q = Q_0\ e^{-t/RC}$ $0.25\ Q_0 = Q_0\ e^{-t/RC}$ ln (0.25) = - t/ (86 Ω × 150 × 10^{-6} F) $t = 0.0178$ s	**(1)** **(1)** **(1)**	**3**
(c)(iii)	Same charge (flows for shorter time) **OR** (Same charge flows for) shorter time	**(1)**	**1**

Q3.

Question Number	Answer	Mark
(b)	**Diagram mark for parallel plate**: a minimum of 3 parallel equispaced lines touching plates (ignore edge effect) (1) **Diagram mark for point charge**: minimum of 4 equispaced radial lines touching charged point (1) Direction of fields correct for both diagrams consistent with charges labelled (1) Parallel plate - field strength same at all points (1) Point charge - field strength decreases with (increasing)distance from point **Or** obeys inverse square law (1)	5