Electrical Quantities

Mark Scheme 6

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	Electricity and Magnetism
Sub-Topic	Electrical quantities
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 6

Time Allowed: **62 minutes**

Score: **/51**

Percentage: **/100**

Question	Answer	Mark
1(a)(i)	12 Ω	B1
(a) ((ii)	/R = 1/R_1 + 1/R_2 OR 1/R = 1/12 + 1/6 OR (R =) R_1R_2/(R_1 + R_2) OR (12 × 6)/(12 + 6) 4 Ω	C1 A1
(a)(iii)	4 + 6 = 10 Ω	B1
(b)(i)	(I = 12/10 =) 1.2 A	B1
(b)(ii)	(E =) IVt OR 1.2 × 12 × 50 OR I^2Rt OR 1.2^2 × 10 × 50 OR V^2t/R OR 12^2 × 50/10 720 J	C1 A1
		Total: 7

2 **(a) (i)** $P = IV$ OR $40 = 220 \times I$ OR $(I =) P/V$ OR $40/220$
0.18 A A1

(ii) $[3 \times 0.18(2)] = 0.54$ A OR 0.55 A B

(iii) $2/0.182 = 10.99$ OR $2/0.18 = 11.1$ C1
10 lamps OR 11 lamps A1

(b) (i) Resistance <u>increases</u> B1

(ii) Power (of lamp) decreases B1
P = IV <u>and</u> current in lamp decreases. OR $P = V^2/R$ B1

[Total: 8]

3 **(a** rheostat/<u>variable</u> resistor AND
control/vary/change/ limit the current /resistance/power/ voltage <u>across heater</u> [1]

(b) (I =) P/V any form, words or numbers [1]
(I =) 1.25 (A) seen anywhere [1]
(V =) 6.0 – 3.6 OR 2.4 seen anywhere [1]
(R =) V/I in any form words or numbers [1]
1.92 Ω (2 or 3 sig. figs.) [1]
note: credit will also be given for alternative approaches

(c) battery running down/going flat/energy <u>of battery</u> used up OR V or e.m.f. less
OR more/increasing resistance (of heater) NOT resistance of X increases [1]
use of relationship between I and V or R OR the current decreases [1]

4	**(a)**	**(i)**	$1/R = 1/R_1 + 1/R_2$ OR $R = R_1R_2/(R_1 + R_2)$ OR with numbers	C1
			$(R =)\ 500\,\Omega$	A1
		(ii)	$I = (12 \div 1000) = 0.012$ A ecf **(i)**	B1
		(iii)	$(V =)\ IR$ OR 0.012×500 OR $12 \times 500 \div 1000$	C1
			$= 6.0$ V ecf **(i)(ii)**	A1
	(b)		(more current in circuit so) current (in $500\,\Omega$ resistor) increases	B1
			resistance of parallel combination decreases OR total resistance (of circuit) decreases	B1
			[Total: 7]	
5	**(a)**	**(i)**	ammeter symbol in series with wire	B1
		(ii)	different results OR graph can be plotted OR to ensure wire does not overheat	B1
	(b)	**(i)**	$(P =)\ VI$ OR $V = IR$ OR 250×1.2 OR 300 (V)	
			$(P =)\ I^2R$ OR $250^2 \times 1.2$ OR 300×250	C1
			75 000 W OR 75 kW	
		(ii)	power loss reduced	C1
			resistance reduced	C1
			power lost decreases to a quarter OR $(P =)$ 19 kW / 18.75 kW	
			[Total: 8]	

6	**(a**	(nuclear) fusion		B1
	(b)	**(i)**	charges are moving (and current is the (rate of) flow of charge)	B1
		(ii)	$Q = It$ AND t is time	B1
	(c)	**(i)**	**1.** (they are) perpendicular OR at right angles OR at 90°	B1
			2. (they are) perpendicular OR at right angles OR at 90°	B1
		(ii)	arrow (labelled F) perpendicular to direction AND pointing towards the bottom right of the page	B1
				[Total: 6]
7	**(a**	**(i)**	diode	B1
		(ii)	**1.** 0.7 V	B1
			2. $I = V \div R$ in any form OR (I =) $V \div R$ OR 11.3÷4	C1
			2.8 A	A1
	(b)	**(i)**	**1.** (12÷8 =) 1.5 A	B
			2. (1.5 + 2.825 =) 4.3 A ecf **(a)(ii)2.** and **(b)(i)1.**	B1
		(ii)	1.5 A ecf **(b)(i)1.**	B1
				[Total: 7]