Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Mark Schemes

Q1.

Question number	Answer	Additional guidance	Mark
(i)	recall and substitution (1) V = 0.20 x 15 evaluation (1) 3 (V)	 7(V) gains 1 mark (use of 15 + 20) award full marks for the correct answer without working	(2)

Question number	Answer	Additional guidance	Mark
(ii)	addition and substitution (1) (P=) 0.20^2 x 35 evaluation (1) 1.4 (W)	 award full marks for the correct answer without working	(2)

Q2.

Question Number	Answer	Additional guidance	Mark
(i)	recall and substitution into $P = I^2 \times R$ (1) $130 = 14^2 \times R$ rearrangement (1) $R = \frac{130}{14^2}$ evaluation to **2 sig fig** (1) (R =) 0.66 (Ω)	substitution and rearrangement may be in either order alternative route: $\mathbf{V}\ (= \frac{P}{I}) = \frac{130}{14}$ OR 9.3 V (1) $R\ (= \frac{V}{I}) = \frac{9.3}{14}$ (1) award full marks for the correct answer without working award 2 marks for 0.663.. or 0.67	(3)

Question Number	Answer	Additional guidance	Mark
(ii)		accept reverse arguments	(2)
	rate of flow of charge in the immersion heater is greater than in the kettle / heating element (1)	more charge per second in the immersion heater allow (in this context) faster (rate of) flow in immersion heater 14 coulombs per sec in immersion heater and 8.3 coulombs per sec in kettle / heating element	
	the direction of the flow of charge in the kettle / heating element keeps changing (whereas it remains in the same direction in the immersion heater) (1)	flows both ways in the kettle / heating element (one way in the heater) simply referring to alternating current and direct current is not enough	

Q3.

Question number	Answer	Additional guidance	Mark
(i)	Substitution and evaluation (1) 15 (Ω)		**(1)** **AO2.1**

Question number	Answer	Additional guidance	Mark
(ii)	select / recall (1) (power =) V x I or (power =) I^2 x R or (power =) $\frac{V^2}{R}$ substitution and evaluation (1) (power =) 1.4 (W)	 (power =) 4.5 x 0.3 0.3^2 x 15 $\frac{4.5^2}{15}$ allow 1.3(5) (W) award full marks for the correct answer without working	**(2)** **AO2.2**

Q4.

Question number	Answer	Additional guidance	Mark
	substitution (1) 1.56 = 0.45 x R rearrangment and evaluation (1) (R =) 3.5 (ohms)	alternative method rearrangement (1) (R =) $\frac{V}{I}$ **or** (R=) $\frac{1.56}{0.45}$ (substitution and) evaluation (1) (R =) 3.5 (ohms) allow values that round to 3.5 e.g. 3.46(666) 3.47 etc award full marks for the correct answer without working	**(2)** **AO2**

Q5.

Question Number	Answer	Additional guidance	Mark
(i)	recall and substitution into V = IR (1) $5.0 = 0.26 \times R$ rearrangement (1) (R=) $\frac{5.0}{0.26}$ evaluation (1) 19 (Ω)	accept substitution and rearrangement in either order (R=) $\frac{V}{I}$ $\frac{5.0}{0.26}$ scores 2 marks accept answers that round to 19 (Ω) (e.g. 19.23) accept answer written table if not written on answer line. award full marks for the correct answer without working	**(3)**

Question Number	Answer	Additional guidance	Mark
(ii)	a comment that includes the following points idea that resistance increases with potential difference (1) idea that doubling the potential difference does not result in doubling of resistance (1) **OR** V = constant × R is not supported by this data (1) correct processing of data from the table to support either of the above mark points (1)	idea that equal increments of potential difference do not cause equal increments of resistance reverse argument e.g. if student was correct then equal increments of p.d. would cause equal increment of resistance if student was correct then current would be constant ignore simple quoting of data for this mark	(3)

Question Number	Answer	Additional guidance	Mark
(iii)	A description that includes add a variable resistor (1) **with** in series (with the lamp / power supply) (1) **OR** add a potential divider (1) **with** in parallel with power supply (1)	marks may be obtained from a circuit diagram rheostat accept between / before / after for in series potentiometer across the power supply ignore replacing power supply / using fixed resistor(s) / LDR / thermistor in both cases, second mark conditional on first mark	**(2)**