

Name of the Student: _____

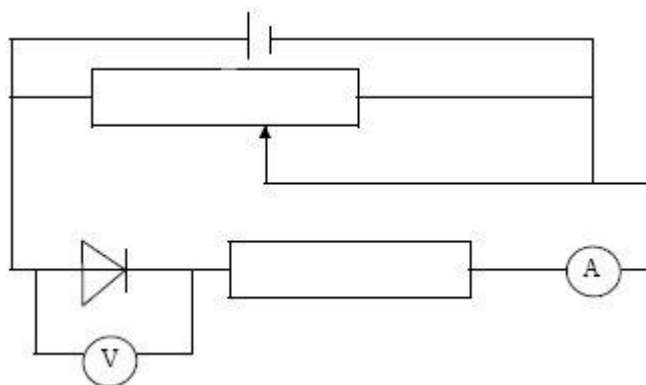
Max. Marks : 24 Marks

Time : 24 Minutes

Mark Schemes

Q1.

(a) (i)



suitable variable input (variable power supply or variable resistor) **(1)**

protective resistor **and** diode **forward** biased **(1)**

correct current **and** pd measuring devices **(1)**

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(ii) the mark scheme for this part of the question includes an overall assessment for the Quality of Written Communication

QWC	descriptor	mark range
good-excellent	Uses accurately appropriate grammar, spelling, punctuation and legibility. Uses the most appropriate form and style of writing to give an explanation or to present an argument in a well structured piece of extended writing. [May include bullet points and/or formulae or equations]. Answer refers to at least 5 of the relevant points listed below.	5-6
modest-adequate	Only a few errors. Some structure to answer, style acceptable, arguments or explanations partially supported by evidence or examples. Answer refers to at least 3 of the relevant points listed below.	3-4
poor-	Several significant errors.	1-2

limited	Answer lacking structure, arguments not supported by evidence and contains limited information. Answer refers to no more than 2 of the relevant points.	
incorrect, inappropriate or no response	No answer at all or answer refers to unrelated, incorrect or inappropriate physics.	0

The explanation expected in a competent answer should include a coherent selection of the following physics ideas.

connect circuit up **(1)**

measure current (I) and pd/voltage (V) **(1)**

vary resistance/voltage **(1)**

obtain a range of results **(1)**

reverse connections to power supply (and repeat) **(1)**

plot a graph (of pd against current) **(1)**

mention of significance of 0.6V **or** disconnect between readings **or** change range on meters when doing reverse bias **(1)**

(b) (i) (use of $I = V/R$)

$$I = 12/8 \text{ (1)} = 1.5\text{A (1)}$$

(ii) $I = (12 - 0.65 \text{ (1)})/4 = 2.8 \text{ A (1) sig figs (1)}$

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[14]

Q2.

(a) (for lamp and resistor) $18(\Omega) + 12(\Omega) = 30(\Omega) \text{ (1)}$

(in parallel) $\frac{1}{30} + \frac{1}{15} = \frac{3}{30} \text{ (1) (gives } R = 10(\Omega))$
(allow C.E. for wrong value in first step)

total resistance = $\frac{30}{3} + 10 \text{ (1)}$
(= 20 Ω)

3

(b) (i) (use of $V = IR$ gives) $I = \left(\frac{30}{20}\right) = 1.5 \text{ A (1)}$

(ii) $\text{pd}_{AB} = 30 - (10 \times 1.5) \text{ (1)}$
 $= 15\text{V (1)}$
[or alternative method]

(allow C.E. for value of I from (i))

(iii) $I_{\text{lamp}} = \frac{6}{12} = 0.5 \text{ A}$ **(1)**

[or alternative method] (allow C.E. for value of pd_{AB} from (ii))

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(c) (i) (lamp power) $(= I^2 R) = 0.5^2 \times 12 = 3.0 \text{ (W)}$ **(1)**
(allow C.E. for value of I_{lamp} from (b) (iii))

(ii) power from battery $= 30 \times 1.5 = 45 \text{ (W)}$ **(1)**
(allow C.E. for value of I from (b) (i))

$\% = \frac{3 \times 100}{45} = 6.7(\%)$ **(1)**

(allow C.E. for power in lamp and/or battery in (i))

3

[10]