

Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic : 3_ElectricCircuits

Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Mark Schemes

Q1.

Question Number	Acceptable Answers	Additional guidance	Mark
	Max 6 Similarities - An electron absorbs a photon Or electrons gain energy from a photon (1) - photons need a minimum amount of energy (1) - So light must be above a certain frequency (1) - increasing the light intensity increases the number of electrons (released per sec) (1) - Evidence for the particle model of light (1) Differences - In the photoelectric effect electrons are released from the surface (1) - But electrons remain within the LDR (1) - Photoelectric effect occurs in metals Or LDR is a semiconductor (1)		6

Q2.

Question Number	Acceptable Answer	Additional Guidance	Mark
(i)	- Use of $F = BQv$ and $F = EQ$ (1) - Algebra to show $v = \frac{E}{B}$ (1)		2
(ii)	- Use of $W = QV$ and $E_k = \frac{1}{2}mv^2$ (1) - Use of $v = \frac{E}{B}$ (1) $\frac{e}{m} = 1.7 \times 10^{11} \text{ C kg}^{-1}$ (1)	Example of calculation: $v = \frac{E}{B} = \frac{1.4 \times 10^4 \text{ V m}^{-1}}{1.5 \times 10^{-3} \text{ T}}$ $\frac{e}{m} = \frac{v^2}{2V}$ $\frac{e}{m} = \frac{(9.33 \times 10^6 \text{ m s}^{-1})^2}{2 \times 250 \text{ V}} = 1.74 \times 10^{11} \text{ C kg}^{-1}$	3

Q3.

Question Number	Acceptable answers	Additional guidance	Mark
(i)	$Q = CV$ Or $E_{10} = C_{10} \times C$ (1) - where $C = 0.001$ (F) (1) MP2 dependent on MP1		2
(ii)	$I = \Delta Q / \Delta t$ Or $G_{11} = F_{11} / B_{11}$ (1)		1
(iii)	- Use of $W = \frac{1}{2} CV^2$ Or (1) $W = \frac{1}{2} QV$ Or $W = \frac{1}{2} \frac{Q^2}{C}$ (1) $W = 0.0125$ J	<u>Example of calculation</u> $W = \frac{1}{2} 0.001 \text{ F} \times 5^2 \text{ V}^2 = 0.0125 \text{ J}$ $W = \frac{1}{2} 0.005 \text{ C} \times 5 \text{ V} = 0.0125 \text{ J}$	2

Q4.

Question Number	Acceptable answers	Additional guidance	Mark
	- Equates $F = Bev$ and $F = eE$ (1) - Substitutes $E = V/d$ (1) Or $F = eV/d$ seen - Replaces v with I/neA (1) - Substitute $A = d \times t$ and leads to given equation (1) Alternative: - Equates $F = BIl$ and $F = QE$ with Q identified as total charge (1) - Substitutes $E = V/d$ (1) Or $F = QV/d$ seen - Substitutes $Q = neAl$ and cancels l - Substitute $A = d \times t$ and leads to given equation	Example of derivation: $Bev = eE$ $\frac{BI}{neA} = \frac{V_H}{d}$ $V_H = \frac{BI}{net}$ Alternative: $BIl = QE$ Total charge $Q = neAl$ $BIl = neAlE$ $BI = neAV_H/d$ $V_H = BI/net$	(4)