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

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

Mark Schemes

Q1.

(a) 0.5 mm [0.05 cm, 0.0005 m] ✔
only acceptable answers

1

(b) 8.65 mm [0.865 cm, 0.00865 m] $_1$✔

the micrometer reads zero when the jaws are closed $_2$✔
only 3sf answers are acceptable for $_1$✔
accept no <u>zero</u> error for $_2$✔

2

(c) L = (403 − 289 =) 114 mm ✔

1

(d) absolute uncertainty = 1 mm $_1$✔

percentage uncertainty = $\frac{1}{114} \times 100 = 0.88\%_2$✔
accept 2 mm for ab. uncertainty $_1$✔
allow ecf for wrong L and / or wrong ΔL
accept 1.75%

2

(e) should move wire directly over / closer to scale on the ruler to avoid <u>parallax</u> error ✔
both statement and explanation required for this mark

1

(f) five values of *R*/*L* correct, recorded to 3 sf [last row to 3sf or 4sf]; accept values in Ω cm^{-1} ✔

mean based on <u>first four</u> rows only; result 9.94 Ω m^{-1} [9.94 × 10^{-2} Ω cm^{-1}] ✔

L/cm	*R/Ω*	*(R/L)Ωm^{-1}*
81.6	*8.10*	*9.93*
72.2	*7.19*	*9.96*
63.7	*6.31*	*9.91*
58.7	*5.85*	*9.97*

44.1	*4.70*	*10.66 (10.7)*

2

(g) cross-sectional area = $\frac{\pi d^2}{4}$ $_1$✔

resistivity from $\frac{R}{L} \times A$, correct substitution of result from 01.6 $_2$✔

$1.10 \times 10^{-6}3$ ✔

Ω m $_4$✔

resistivity from $\frac{R}{L} \times \frac{\pi d^2}{4}$ *earns* $_{12}$✔✔

allow $_2$✔ *if* $\frac{R}{L}$ *value is not based on mean or on a mean from all five rows of table in 01.6*

condone 1.12×10^{-6} *for* $_3$✔ *if fifth row in 01.6 was not rejected*

withhold $_3$✔ *for POT error*

4

[13]

Q2.

(a) A combination of resistors in series connected across a voltage source (to produce a required pd) ✓

Reference to splitting (not dividing) pd

1

(b) When R increases, pd across R increases ✓

Pd across R + pd across T = supply pd ✓

So pd across T / voltmeter reading decreases ✓

Alternative:

Use of $V = \frac{R_1 \times V_{tot}}{R_1 + R_2}$ ✓

V_{tot} *and* R_2 *remain constant* ✓

So V increases when R_1 *increases* ✓

3

(c) At higher temp, resistance of T is lower ✓

1

So circuit resistance is lower, so current / ammeter reading increases ✓

1

(d) Resistance of T = 2500 Ω

Current through $T = V / R = 3 / 2500 = 1.2 \times 10^{-3}$ A ✓

(Allow alternative using $V_1/R_1 = V_2/R_2$)

pd across R = 12 − 3 = 9 V

The first mark is working out the current

1

Resistance of $R = V / I = 9 / 1.2 \times 10^{-3}$ = 7500 Ω✓

The second mark is for the final answer

1

(e) Connect the alarm across R instead of across T ✓

allow: use a thermistor with a ptc instead of ntc.

1

[9]