Name of the Student:_____

Max. Marks : 13 Marks **Time : 13 Minutes**

Mark Schemes

Q1.

<table>
<tr><th>Question Number</th><th>Acceptable answers</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>*</td><td>This question assesses a student's ability to show a coherent and logically structured answer with linkages and fully-sustained reasoning.

Marks are awarded for indicative content and for how the answer is structured and shows lines of reasoning.

The following table shows how the marks should be awarded for indicative content.
• Use of $R = \rho l/A$
• the wider section will be half the resistance of the narrow section
• The p.d. will be divided into 0.5V across wide section and 1.0V across the narrow section
• The potential will vary linearly along each resistance section (as R is proportional to l)
• This is because current is constant throughout length
• When the voltmeter is across the whole length it will read the p.d. across the cell/ 1.5V
Or when the voltmeter terminals are together it will read 0 V</td><td><table><tr><th>IC points</th><th>IC mark</th><th>Max linkage mark available</th><th>Max final mark</th></tr><tr><td>6</td><td>4</td><td>2</td><td>6</td></tr><tr><td>5</td><td>3</td><td>2</td><td>5</td></tr><tr><td>4</td><td>3</td><td>1</td><td>4</td></tr><tr><td>3</td><td>2</td><td>1</td><td>3</td></tr><tr><td>2</td><td>2</td><td>0</td><td>2</td></tr><tr><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr></table></td><td>6</td></tr>
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Q2.

Question Number	Acceptable Answer	Additional Guidance	Mark
(a)	• Use of R = V/I **(1)** • Use of R = ρl/A **(1)** • $\rho = 1.34 \times 10^{-6}\ \Omega m$ **(1)**	Example of calculation: $R = 1.50\ V/4.11\ A = 0.365\ \Omega$ $\rho = RA/l = 0.365\ \Omega \times \pi \times (1.82 \times 10^{-3}/2)^2\ m^2/0.707\ m$ $\rho = 1.34 \times 10^{-6}\ \Omega m$	**3**
(b)	An explanation that makes reference to: • Calculates percentage uncertainty in *l* as 0.3% and in *d* as 1% **(1)** • Calculates percentage uncertainty in resistivity by doubling that for *d* and adding that for *l* **(1)** • Calculates range of values for ρ **(1)** • Using these values the technician could not conclude whether the wire was Kanthal or Nichrome **(1)**	Example of calculation: (0.2/70.7) x 100 % = 0.3 % (0.02/1.82) x 100 % = 1 % %U in ρ = 2 x 1% + 0.3 % = 2.3 % 1.34×10^{-8} x 0.0023 = 0.003 $1.37 \times 10^{-8} > \rho > 1.31 \times 10^{-8}$ If answer to calculation is wrong, then credit can still be given for MP4 for comments consistent with the calculated value. If no calculation is completed then MP4 cannot be awarded.	**4**