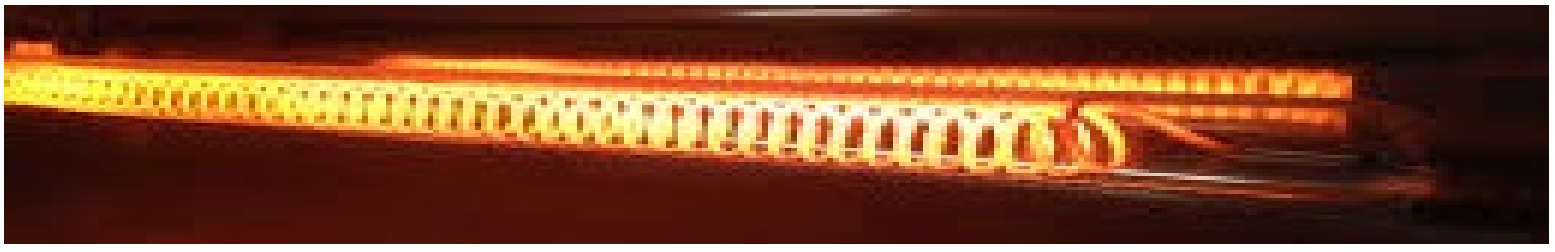
WelTec
Te Whare Wānanga o te Awakairangi

EE3103 3
Resistance, resistivity and resistors workbook

Student name

WORKSHEET 22A



Work Sheet 22A. Resistance / Resistivity / Tempco.

Show workings.

Material	Resistivity ($\mu\Omega$m at 20^0C)	Temperature Co-efficient (at 0^0C).
Brass	0.066	+0.001
Copper	0.017	+0.00427
Silver	0.016	+0.004
Nichrome	1.122	+0.00017
Aluminium	0.028	+0.00423

1. A cable is made of copper and measures 45m long, the conductor CSA is 10mm^2. Calculate the resistance of the cable.

2. Find the difference in Ohms between a bar 15m long and measuring 3mm x 10mm if it was made from Copper or Brass.

3. Find the Voltage drop that occurs on a 120mm^2 Aluminium cable, 2 km long and carrying 50 A.

4. Calc. the length of 0.75mm^2 Nichrome wire required to make an element of 12 Ohms resistance.

5. For any conductor, an increase in LENGTH, _____ resistance and a decrease in AREA. _____ resistance.

   For a conductor with a positive Tempco, resistance _____ as Temperature increases.

   For a conductor with a negative Tempco, resistance _____ as Temperature increases.

6. The working temperature of a heater element using nichrome wire is 600^0C. Find the resistance at this temperature if the resistance at 0^0C is 5 Ohms.

7. A copper cable has a resistance of 0.2 Ohms at 0^0C. When a short circuit occurs, 3 kV are dropped across the cable as 8 kA flows. Find the temperature the cable reaches during the short circuit - is this good for the insulation?? - Hint: Find the R during the short circuit using Ohms Law then apply the Resistivity formulae.

8. A special motor with silver conductors for windings, has a resistance of 2.7 Ohms at room temperature of 18^0C and when run fully loaded for 30 minutes has a resistance of 3.37 Ohms. Find the average temperature of the conductors at full load.