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

Name of the Student:_____
Max. Marks : 24 Marks **Time :** 24 **Minutes**

Q1.

(a) A student wishes to measure the resistivity of the material of a uniform resistance wire. The available apparatus includes a battery, a switch, a variable resistor, an ammeter and a voltmeter.

(i) Draw a circuit diagram which incorporates some or all of this apparatus and which enables the student to determine the resistivity of the material.

(ii) State the measurements which must be made to ensure that a reliable value of the resistivity is obtained.

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(iii) Explain how a value of the resistivity would be obtained from the measurements.

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(10)

(b) A wire made from tin with cross-sectional area 7.8×10^{-9} m^2, has a pd of 2.0 V across it. Calculate the minimum length of wire needed so that the current through it does not exceed 4.0 A.

resistivity of tin = 1.1×10^{-7} Ω m

(2)

(Total 12 marks)

Q2.

The circuit in **Figure 1** has a thermistor connected in series to a 200 Ω resistor and a 12 V battery of negligible internal resistance. **Figure 2** shows how the resistance, R_{th}, of the thermistor varies with temperature.

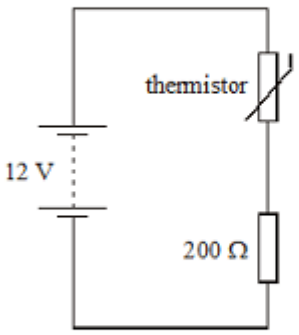

Figure 1

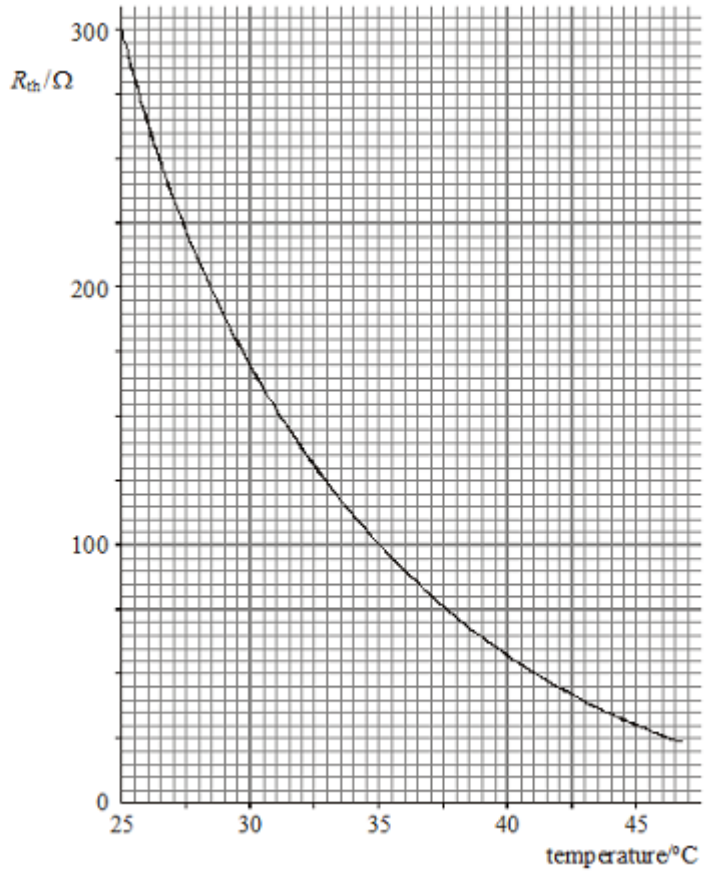

Figure 2

(a) (i) Calculate the current in the circuit when the temperature is 25°C.

(ii) Calculate the potential difference across the thermistor at 25°C.

(3)

(b) Without further calculation, explain how you would expect the potential difference across the thermistor to change as the temperature increases from 25°C.

You may be awarded marks for the quality of written communication in your answer.

(3)

(c) The circuit in **Figure 1** is modified by removing the 200 Ω resistance to give the circuit in **Figure 3**.

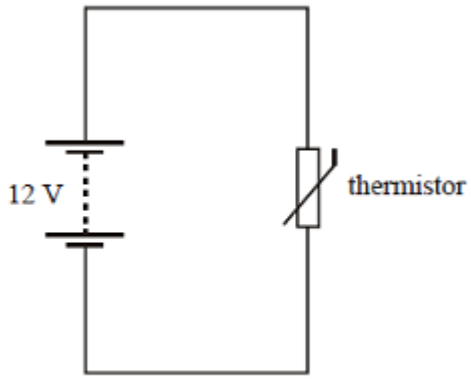

Figure 3

The temperature of the thermistor is increased at a steady rate from 25°C to 45°C in 10 minutes.

(i) Calculate the power dissipated in the thermistor at

25°C

45°C

(ii) Use the mean value of the powers determined in part (c)(i) to calculate the energy supplied by the battery during the period in which the temperature of the thermistor increases.

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(iii) State why the energy value, determined in part (c)(ii) is not an accurate value.

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(6)

(Total 12 marks)