JOINT UNIVERSITIES PRELIMINARY EXAMINATIONS BOARD

JUNE 2020 EXAMINATIONS

JUPEB/017P

PHYSICS PRACTICAL **SCI – J155** **Time Allowed: 2½ Hours**

Answer ALL Questions.

1. **APPARATUS:** 500 cm^3 beaker, water, thermometer, 100 g mass, stirrer, measuring cylinder (100 cm^3), pair of tongs and Bunsen burner.

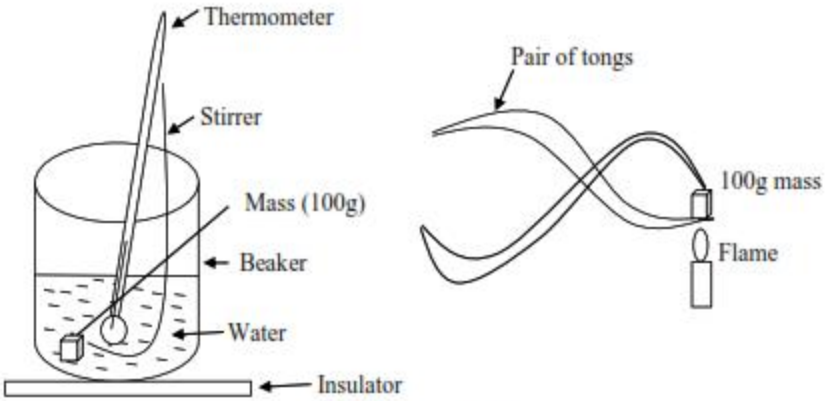

Figure 1

PROCEDURE

Using a measuring cylinder, measure 100cm^3 of water into the beaker. Record this volume as V. Measure and record the initial temperature of the water t. Calculate the mass of the water M using the formula: Mass = density × volume. Where density of water = 1gcm^{-3}. Using a pair of tongs, hold the 100g mass in the flame of a Bunsen burner for 4 minutes. Quickly transfer the hot 100g mass into the beaker of water. Stir gently and record the highest temperature t_1.

Evaluate $T=t_1 - t$.

Empty the content of the beaker and repeat the procedure above for values of V = 150cm^3, 200cm^3, 250cm^3 and 300cm^3. Tabulate your readings.

(i) Plot a graph with M on the vertical axis and T on the horizontal axis.

(ii) Determine the slope S of the graph.

(iii) Evaluate $K = \frac{50}{S}$

(b) (i) When the bulb of a thermometer is placed in a beaker of hot water, the level of mercury first falls and then rises gradually. Explain this observation.

(ii) A solid of mass 100g at a temperature of 90°c is placed in 100g of water at 20°c in a container of negligible heat capacity, if the final steady temperature is 60°,

calculate the specific heat capacity of the solid. (Specific heat capacity of water = $4.2\times10^{3}Jkg^{-1}k^{-1}$)

[Total = 10 marks]

2. **APPARATUS**: Length of resistance wire **AB,** power source (3.0 V), key, ammeter, voltmeter and jockey.

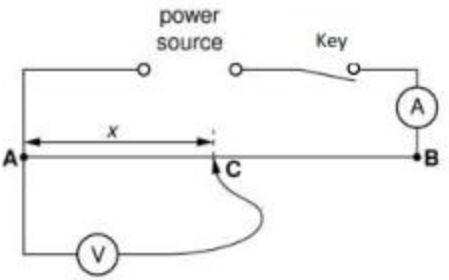

Figure 2

PROCEDURE

(a) Place the sliding contact C on the resistance wire AB at a distance x from A, where $x = 0.100$ m.

(b) Record the value of x as in the Table below.

(c) Switch on. Using the voltmeter, measure the potential difference (V) across the wire between A and C. Record the value of V.

(d) Using the ammeter, measure the current I in the wire. Record the value of I.

(e) Take the sliding contact away from the wire AB and switch off.

(f) Calculate the resistance R of the section AC of the wire using the equation $R = \frac{V}{I}$

(g) Record R in the table.

x/m	V/V	R/Ω

(h) Repeat steps (a) to (g) with the sliding contact at distances of $x = 0.300$ m, 0.500 m, 0.700 m and 0.900 m from A.

(i) Plot a graph of R / Ω (y-axis) against x / m (x-axis).

(j) Within the limits of experimental accuracy, what do you conclude about the variation of resistance with distance along the wire? Justify your conclusion with reference to your graph.

(k) Using your graph, determine a value for the resistance R when the length $x = 0.750$ m. Show clearly on your graph how you obtained the necessary information.

[Total = 10 marks]