TANZANIA HEAD OF ISLAMIC SCHOOLS COUNCIL

FORM SIX INTER ISLAMIC MOCK EXAMINATION.

131/3A PHYSICS 3A

ACTUAL PRACTICAL

PROPOSED MARKING GUIDE

1. (i) A table of results.
(6 marks: 1 mark @ Column)

h(cm)	h^2 (cm^2)	t(sec)	T(sec)	T^2 (sec^2)	T^2h (sec^2cm)
6	36	6.54	0.654	0.428	2.568
5	25	6.52	0.652	0.425	2.125
4	16	6.64	0.664	0.441	1.764
3	9	7.04	0.704	0.496	1.488
2	4	8.02	0.802	0.643	1.286
1	1	10.79	1.079	1.164	1.164

(ii) graph ploted on a graph paper.

(iii) Required to find the values of a and b.

Using the relation,

$$T^2h = \left(\frac{2\pi}{a}\right)^2 (b^2 + h^2)$$

$$h^2 = \left(\frac{a}{2\pi}\right)^2 T^2h - b^2$$

$$y = mx + c$$

Slope (s) $= \left(\frac{a}{2\pi}\right)^2$ . . . . . $\frac{0}{2}$ mk

and h^2-intercept $= -b^2$ . . . . . $\frac{0}{2}$ mk.

1 (iii)

From the graph,

$$\text{slope } (S) = \frac{\Delta h^2}{\Delta T^2 h}$$

$$= \frac{9.38 - 21.86}{1.5 - 2}$$

$$= 24.96 \text{ cm/s}^2 \quad \text{- } 01/2 \text{ mrk.}$$

Then.

$$S = \left(\frac{a}{2\pi}\right)^2$$

$$S = \frac{a^2}{4\pi^2}$$

$$a^2 = 4\pi^2 \times S$$

$$a = \sqrt{4\pi^2 \times S}$$

$$a = 2\pi\sqrt{S}$$

$$= 2\pi \times \sqrt{24.96}$$

$$a = 31.375 \text{ cm}^{1/2}/\text{s} \quad \text{- - 0/mrk.}$$

Again from the graph

h^2-intercept $= -28.08 \text{ cm}^2$.

Thus.

$$-b^2 = -28.08 \text{ cm}^2$$

$$b = \sqrt{28.08 \text{ cm}^2}$$

1 (iii)

$b = 5.3\,cm$ . . . . . (01mk)

(iv) Recall the given equation

$$Th^2 = \left(\frac{2\pi}{a}\right)^2 (b^2 + h^2)$$

$$T = 2\pi \sqrt{\frac{K^2 + h^2}{gh}}$$

Thus $T^2 h = \left(\frac{2\pi}{\sqrt{g}}\right)^2 (K^2 + h^2)$ 01mk

By Comparison.

$a = \sqrt{g}$ and $b^2 = K^2$

$a^2 = g$ and $b = K$

Therefore, a^2 represents acceleration due to gravity, g at a place. (01mk)

'b' represents the radius of gyration K of a circular card board provided. (01mk)

(v) Sources of errors.

- Error due to air resistance on oscillation of circular Cardboard.
- Error on starting and stopping stopwatch
- Error on locating the centre of gravity using string or plumb line.

(Any two, 0.5 mark each)

1 (v)

Precautions to be taken

- The Centre of gravity G should be perfectly located.
- A Circular Card board should oscilate through a small angle
- The graph should have the best fit line drawn through the points.

(Any two, 0.5 mark each)

(vi) Two possible aims of this experiment are:—

→ Determine the value of acceleration due to gravity g by means of oscillation of Circular Card board. 0.5mrk

→ Determination of radius of gyration K of a Circular Card board provided. 0.5mrk

2 Solution

(a) Mass of solid, M = 100.5g ---- (0.5mk

Mass of empty Calorimeter M_c = 34.5g (05mk

Room temperature θ_R = 30°C. (0.5mk

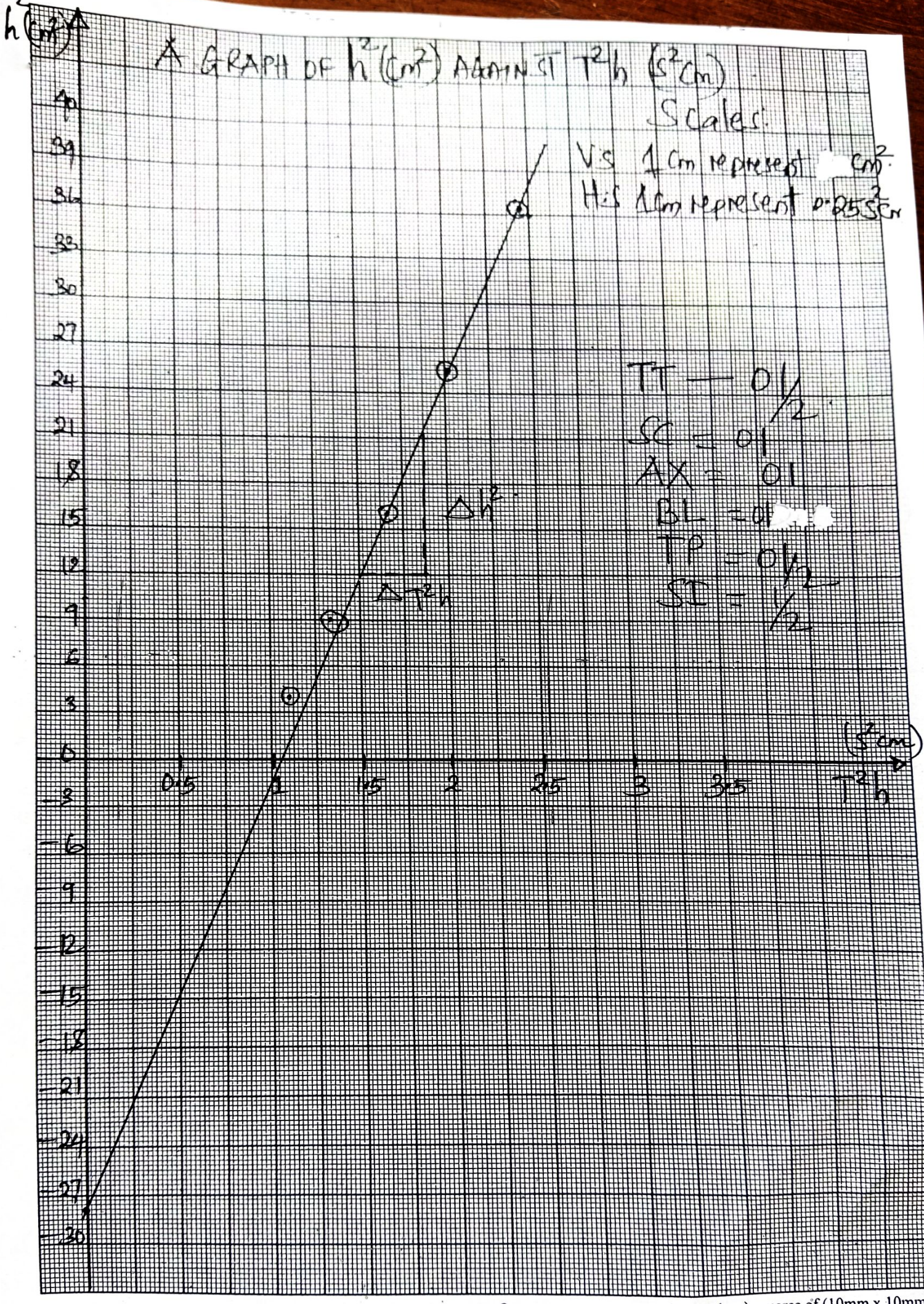
(c) Table of results ---------- (2.5mk

TIME (min)	Temperature, θ(°C)
00	80
01	72
02	68
03	64
04	60
05	57
06	54
07	51
08	49
09	47
10	46

(d) Mass of Calorimeter with hot water = 75.5g (0.5mk

Mass of water M_w = 75.5g − 34.5g.

M_w = 41g



(1cm x 1cm) squares of (10mm x 10mm)

2 (e) Table of Results. (2.5 marks)

Time (min)	Temperature θ(°C)
00	80
01	69
02	66
03	63
04	60
05	58
06	56
07	54
08	53
09	52
10	51

e (i) Cooling curves plotted on a graph paper.

(ii) From the graph.

$T_2 = 55°C$.

$T_1 = 49°C$.

$\Delta T = T_2 - T_1$

$\Delta T = (55 - 49)°C$. (0 mrk)

$\Delta T = 6°C$

e (ii)

From the given equation

$$M_c C_c \Delta T + M_w C_w \Delta T = M C \Delta T'$$

Where $\Delta T' = T_2 - \theta_R$.

Now.

$$C = \frac{(M_c C_c + M_w C_w)\Delta T}{M(T_2 - \theta_R)}$$

$$C = \frac{(34.5 \times 0.4 + 41 \times 4.2) \times 6}{100.5(55°C - 30°C)} \quad \text{(0/mrk)}$$

$$C = 0.444\ J/g°C$$

$$C = 444\ J/kg°C \quad \text{(0/mrk)}$$

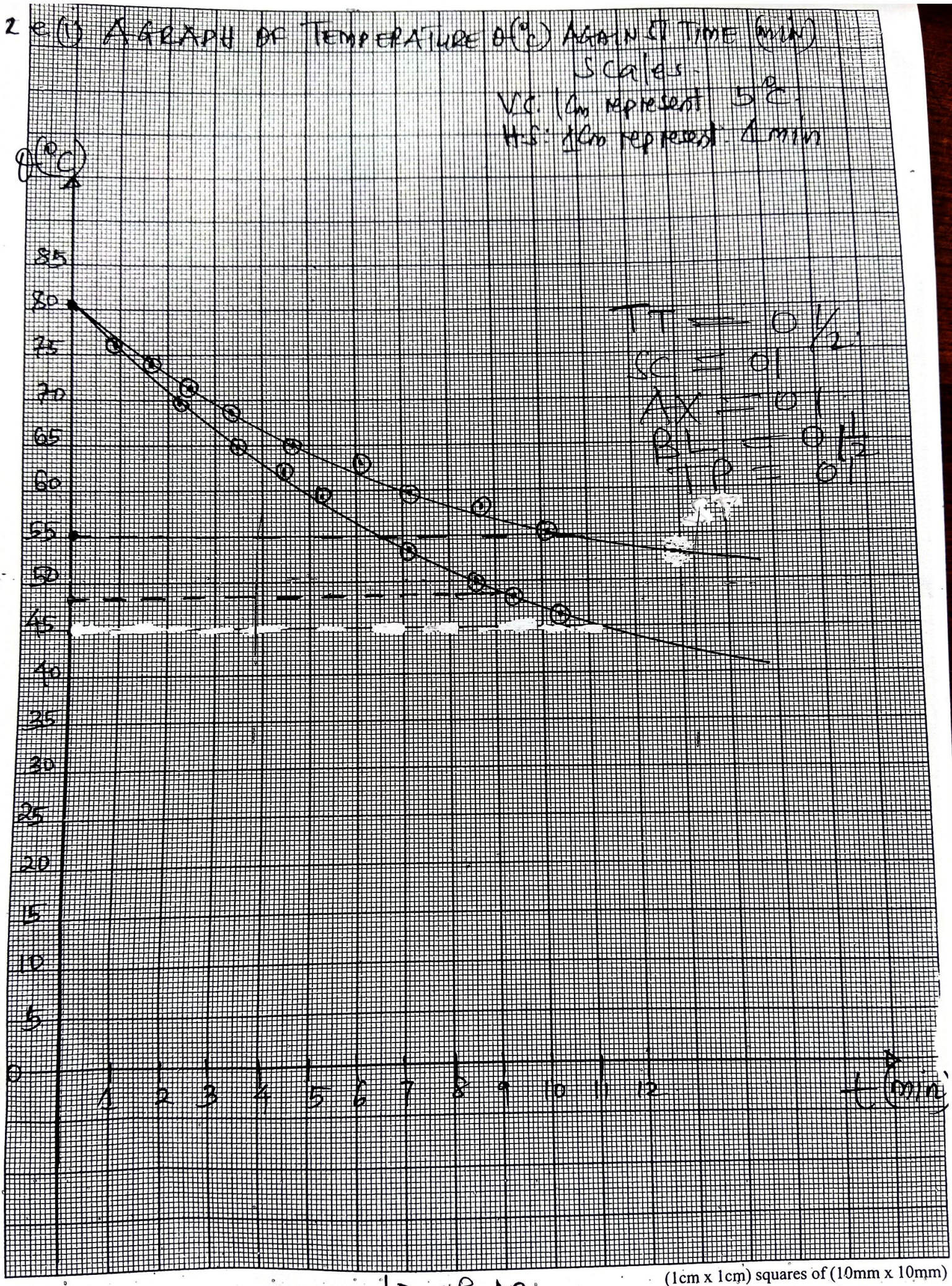
∴ Specific heat Capacity = 444 J/kg°C.

2 c (i) A GRAPH OF TEMPERATURE θ(°C) AGAINST TIME (min)

Scales:

V.S: 1cm represent 5°C

H.S: 1cm represent 1 min



TT — 01½

SC — 01

AX — 01

BL — 01½

TP — 01

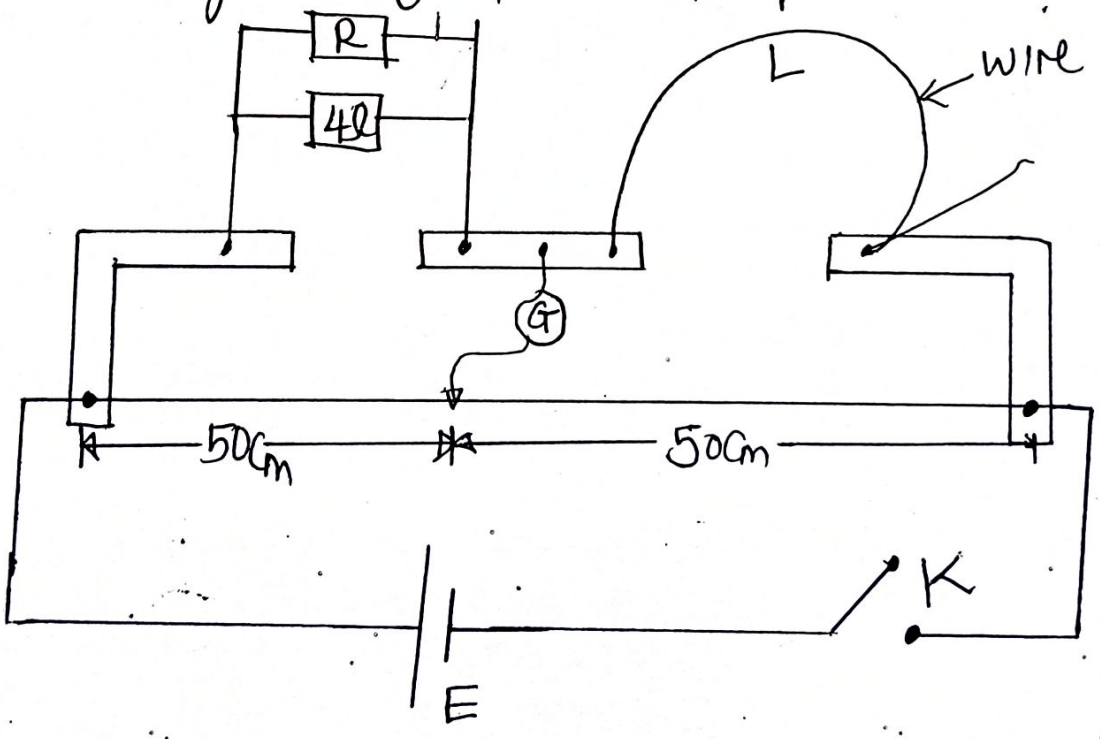
(1cm x 1cm) squares of (10mm x 10mm)

3. Solution

(i) Table of Results. (4marks: 1mark@Column)

R(Ω)	L(Cm)	1/R (Ω^{-1})	1/L (Cm^{-1})
40	79.8	0.025	0.0125
20	73.2	0.050	0.0137
10	62.7	0.100	0.0159
2	29.3	0.500	0.0341
1	17.6	1.000	0.0568

(ii) To draw a well labelled circuit diagram of the set up.



(02mrks)

3 (iii) According to Measurement, diameter of the wire, $d = 0.37mm$. (0.5mrk)

(iv) A graph plotted on a graph paper.

(v) from the given relation

$$\frac{1}{R} = \left(\frac{A}{\rho}\right)\frac{1}{L} \quad -1/4$$

$$y = mx + c.$$

$$\text{slope} = A/\rho. \quad - - - - - \quad (01\text{mrk}/2)$$

From the graph.

$$\text{Slope} = \frac{A(1/R)}{A(1/L)}$$

$$= \frac{0.604 - 0.20}{0.04 - 0.022}$$

$$\text{Slope} = 22.44\,\Omega^{-1}\,m \quad (02\text{mrks})$$

Now

$$\rho = \frac{A}{\text{slope}}$$

$$= \frac{\pi d^2/4}{\text{Slope}}$$

$$= \frac{3.14 \times (0.37 \times 10^{-3})^2/4}{22.44}$$

$$\rho = 4.79 \times 10^{-7}\,\Omega m \quad (01\text{mrk})$$