TANZANIA HEADS OF ISLAMIC SCHOOLS COUNCIL

FORM SIX (6) INTER-ISLAMIC MOCK EXAMINATION

B1/3

PHYSICS 3

(MARKING GUIDE)

OF

MODERATED EXAM

1 (a)

c) Table of Results

V(ml)	t(s)	T(s)	$T^2(s^2)$
20	9.5	0.475	0.225
40	10.8	0.540	0.292
60	12.00	0.600	0.360
80	13.53	0.676	0.460
100	14.7	0.735	0.540

each row 01 mark@ Total 05 Marks

d) Mass of empty beaker = 33.33g 01/2 Mark.

f) from the graph

$$\text{Slope} = \frac{\Delta T^2(s^2)}{\Delta V(ml)}$$ 01 mark

$$\text{Slope} = \frac{0.5 - 0.325}{90 - 45}$$ 01 Mark

$$\text{Slope} = 3.88 \times 10^{-3} s^2/ml$$ 01/2 Mark

from $T = 2\pi\sqrt{M/K}$ 01 Mark

$M = m_b + M_w$

where M_b - Mass of empty beaker and
M_w - Mass of water

But Density $(\rho) = M/V$

$M_w = \rho V$

$$T = 2\pi\sqrt{\frac{M_b + \rho V}{K}}$$

$$T^2 = 4\pi^2\left(\frac{\rho V + M_b}{K}\right)$$

$$T^2 = \left(\frac{4\pi^2\rho}{K}\right)V + \frac{4\pi^2 M_b}{K}$$ 01 Mark

Compare with straight with straight line equation

$y = mx + c$

T^2-intercept $= \frac{4\pi^2 M_b}{K}$

from the graph T^2-intercept $= 0.145^2$ 01/2 Mark

$0.14 s^2 = \frac{4\pi^2 M_b}{K}$

$K = \frac{4\pi^2 M_b}{0.14} = \frac{4\pi^2 \times 33.33\,g}{0.14\,s^2}$ 1 Mark

$K = 9400\,g\,s^{-2}$ $\frac{1}{2}$ Mark

Again

from $T^2 = \left(\frac{4\pi^2 \rho}{K}\right) V + \frac{4\pi^2 M_b}{K}$

Slope $M = \frac{4\pi^2 \rho}{K}$ when compared with $y = Mx + c$ 1 Mark

$\rho = \frac{MK}{4\pi^2}$ where M from graph $= 3.88 \times 10^{-3}\,s^2/ml$

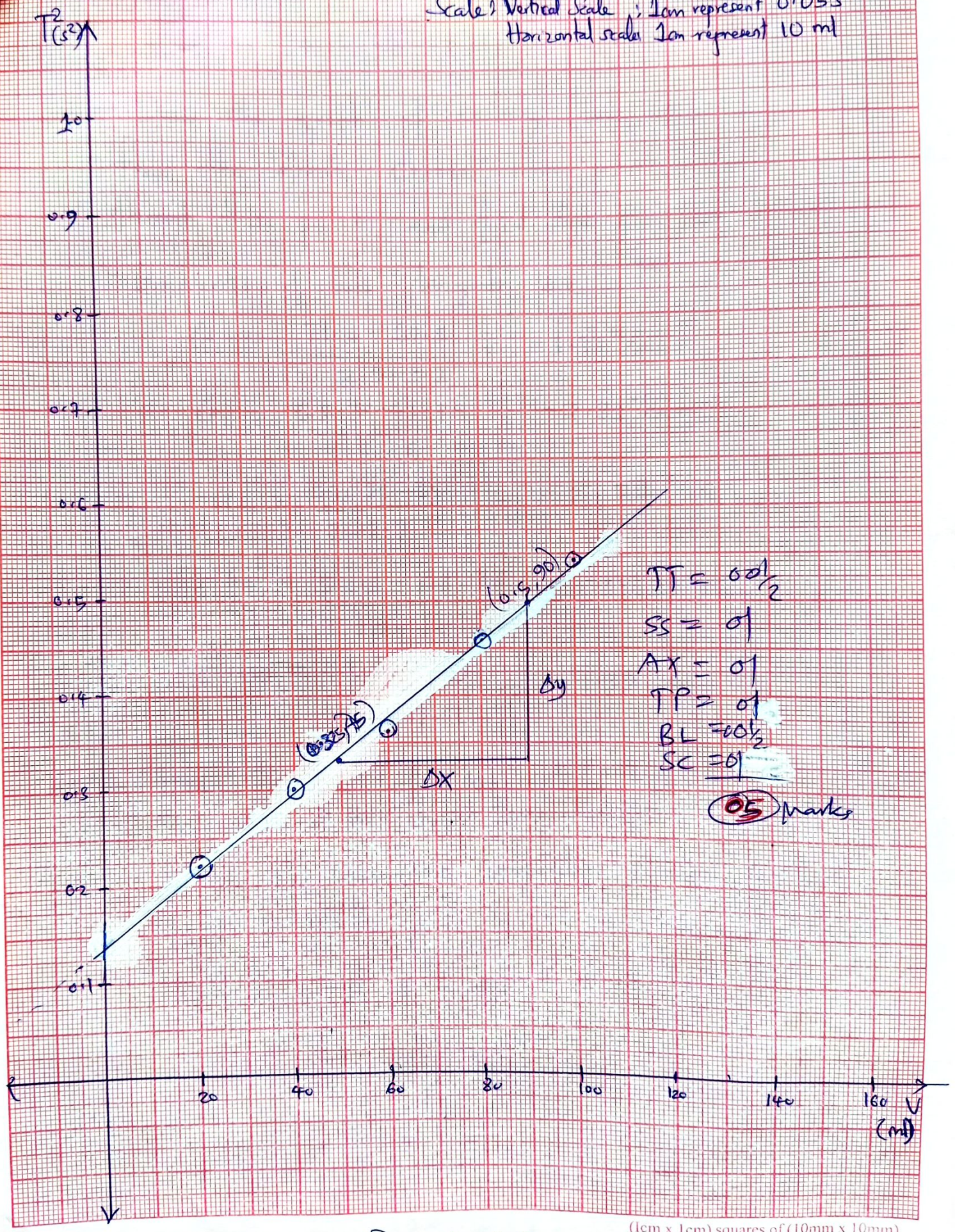
$\rho = \left(\frac{3.88 \times 10^{-3} \times 9400}{4\pi^2}\right) g/ml$ 1 Mark

$\rho = 0.95\,g/ml \approx 1\,g/ml$ or $1\,g/cm^3$

∴ The density of it is $1\,g/ml$ or $1\,g/cm^3$ 1 Mark

THE GRAPH OF T^2 (s^2) AGAINST V (ml)

Scale: Vertical Scale ; 1cm represent $0.05 s^2$
Horizontal scale 1cm represent 10 ml



TT = 01/2
SS = 01
AX = 01
TP = 01
BL = 01/2
SC = 01

05 Marks

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

Table of results

Time, t (min)	0	2	4	6	8	10	12	14	16
Temperature θ (°C)	80	73	67	62	57	53	49	46	42

04 Marks

- Draw the graph of cooling (temperature against time)
- from the graph choose some points, Draw tangents line through these point and find slope for each line tangent
- Gradients of these tangents are 01/2

$$G_1 = \frac{71.5 - 67.5}{2.5 - 3.7} = -3.33\ ^{\circ}C/min$$

$$G_2 = \frac{65.5 - 61.25}{4.5 - 6} = -2.83\ ^{\circ}C/min$$

$$G_3 = \frac{58.75 - 55}{7 - 8.7} = -2.21\ ^{\circ}C/min$$

$$G_4 = \frac{52.5 - 48.75}{10 - 12} = -1.88\ ^{\circ}C/min$$ 01½

$$G_5 = \frac{43.75 - 40}{12 - 17.3} = -1.39\ ^{\circ}C/min$$

- Draw the graph of Gradients (rate of cooling) against temperature of the chosen temperature from surrounding temperature

where θ_s sorrounding temperature (Depend on location) let be 25°C 01/2

- Table of result of G against $\theta - \theta_s$

G (°C/min)	-3.33	-2.83	-2.21	-1.88	-1.39
θ °C	68.5	63.0	56.5	57.0	42.0
$(\theta - \theta_s)$ °C	43.5	38.0	31.5	26.0	17

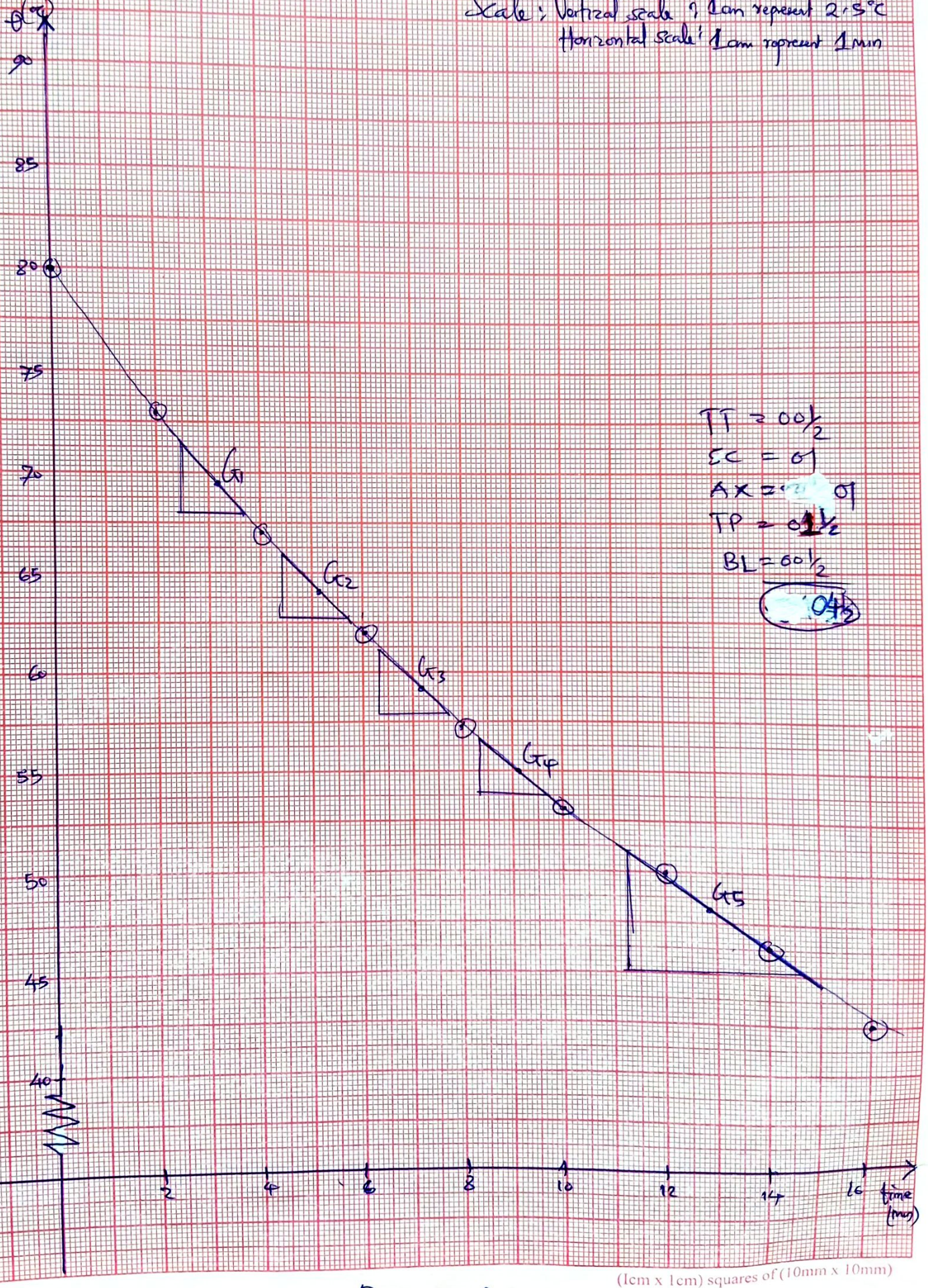
01½

- from the graph nature of G (rate of cooling) against excess temperature, that is straight line through the origin, shows that the cooling of liquid A obey Newton's law of cooling, that $\frac{d\theta}{dt} \propto (\theta - \theta_s)$

of mark

THE GRAPH OF θ(°C) AGAINST time (min)

Scale: Vertical scale: 1cm represent 2.5°C
Horizontal scale: 1cm represent 1min

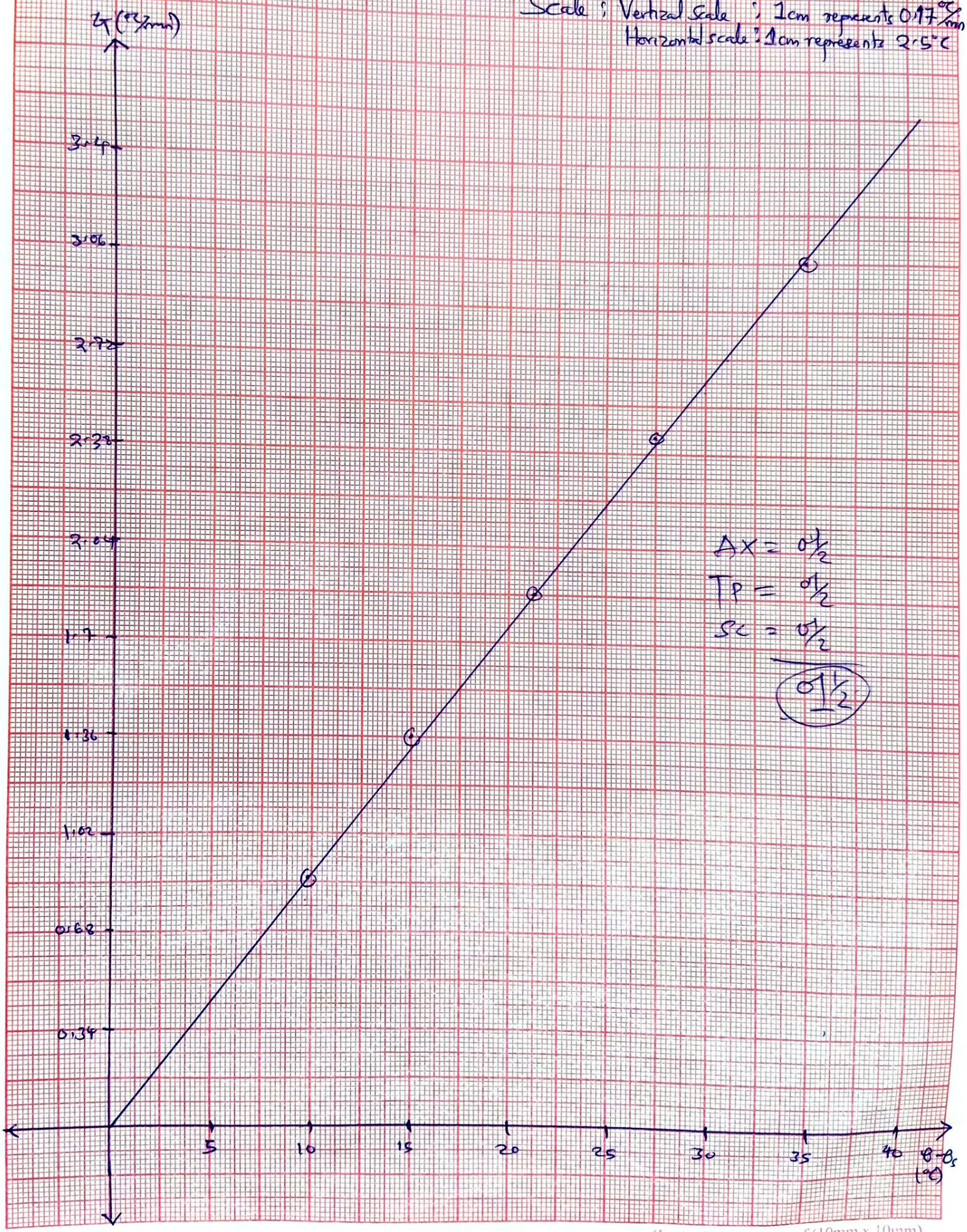


TT = 00½
EC = 01
AX = 01
TP = 01½
BL = 00½
04½

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

THE GRAPH OF G(°C/min) AGAINST (θ − θs)(°C)

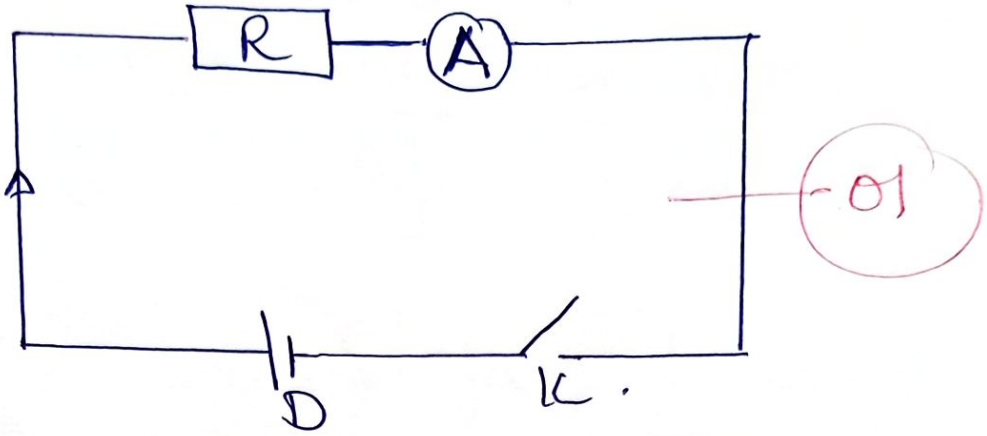
Scale: Vertical scale: 1cm represents 0.17 °C/min
Horizontal scale: 1cm represents 2.5°C



ΔX = 0½
TP = 0½
SC = 0½
0½

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

(i) Circuit diagram



(iv) TABLE OF RESULTS

R(Ω	I(A)	$\frac{1}{I}(A^{-1})$
1	1.00	1.00
2	0.60	1.67
3	0.40	2.50
4	0.30	3.33
5	0.25	4.00

05

(v) The graph of R against $\frac{1}{I}$ is drawn on graph paper.

From the Graph

$$\text{Slope} = \frac{\Delta R}{\Delta \frac{1}{I}} = \frac{3.69 - 1.32}{2.86 - 1.22}$$

$$\text{Slope} = 1.45\Omega A \quad (01)$$

vii) From the equation

$$E = I(R + r)$$

$$\frac{E}{I} = R + r$$

$$R = E \cdot \frac{1}{I} - r \quad (01)$$

$$E = \text{slope} = 1.45\Omega \simeq 1.5\Omega.$$

Internal resistance = R intercept

$$r = 0.15\Omega. \quad (00\frac{1}{2})$$

Sources of errors

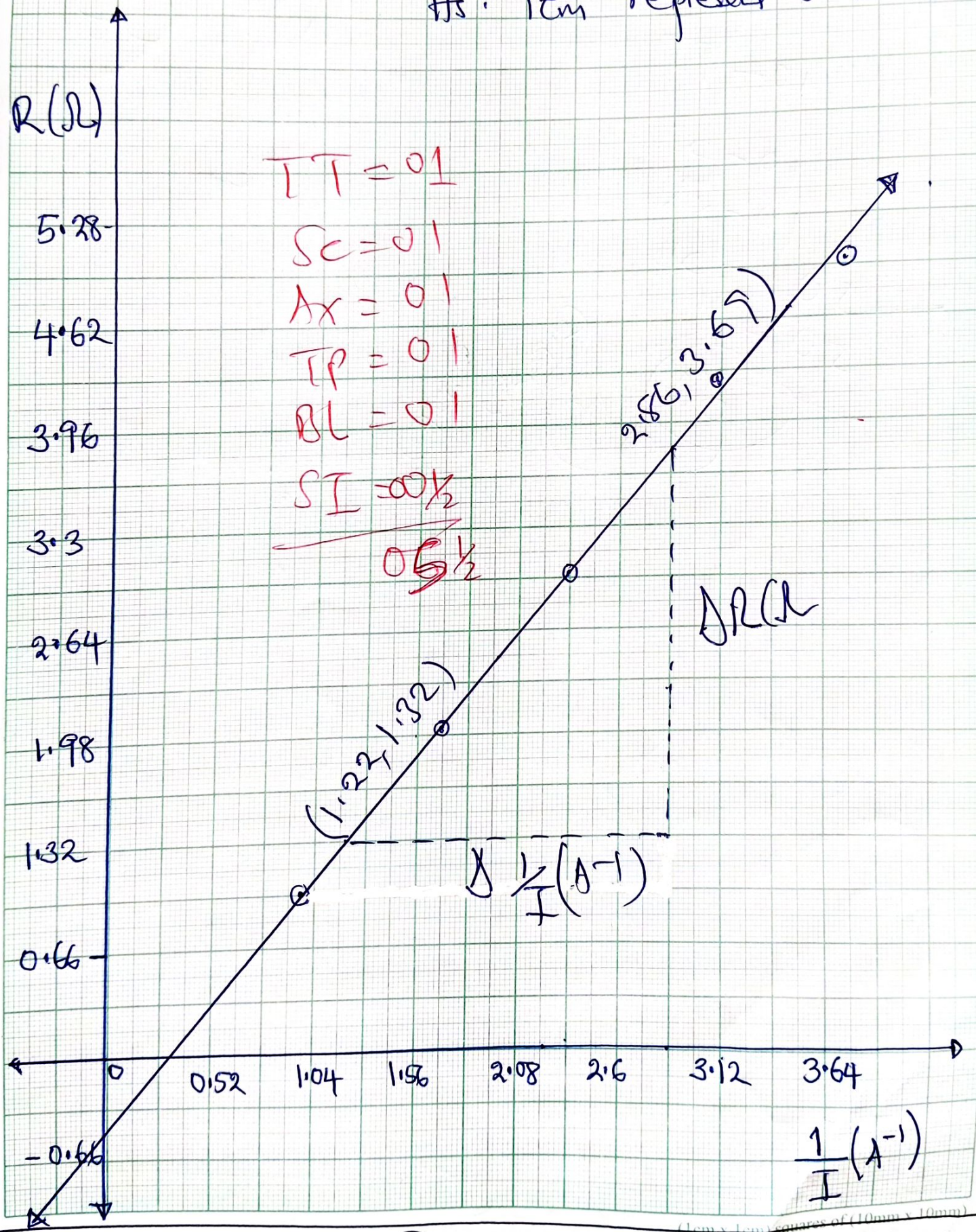
- Parallax error in reading the ammeter — 01/2
- Potential drop in the dry cell

Precautions

- Make sure that you disconnect the circuit after every reading
- Read perpendicular to the pointer — 01 1/2

THE GRAPH OF R(Ω) AGAINST $\frac{1}{I}(A^{-1})$

Vs. 1cm represent 0.33Ω.
Hs. 1cm represent $0.26A^{-1}$



TT = 01
Sc = 01
Ax = 01
TP = 01
BL = 01
SI = 00½
05½

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