CHRISTIAN SOCIAL SERVICES COMMISSION (CSSC)

NORTHERN ZONE JOINT EXAMINATIONS SYNDICATE (NZ-JES)

FORM FOUR PRE – NATIONAL EXAMINATION AUGUST 2025

PHYSICS 2B

MARKING SCHEME

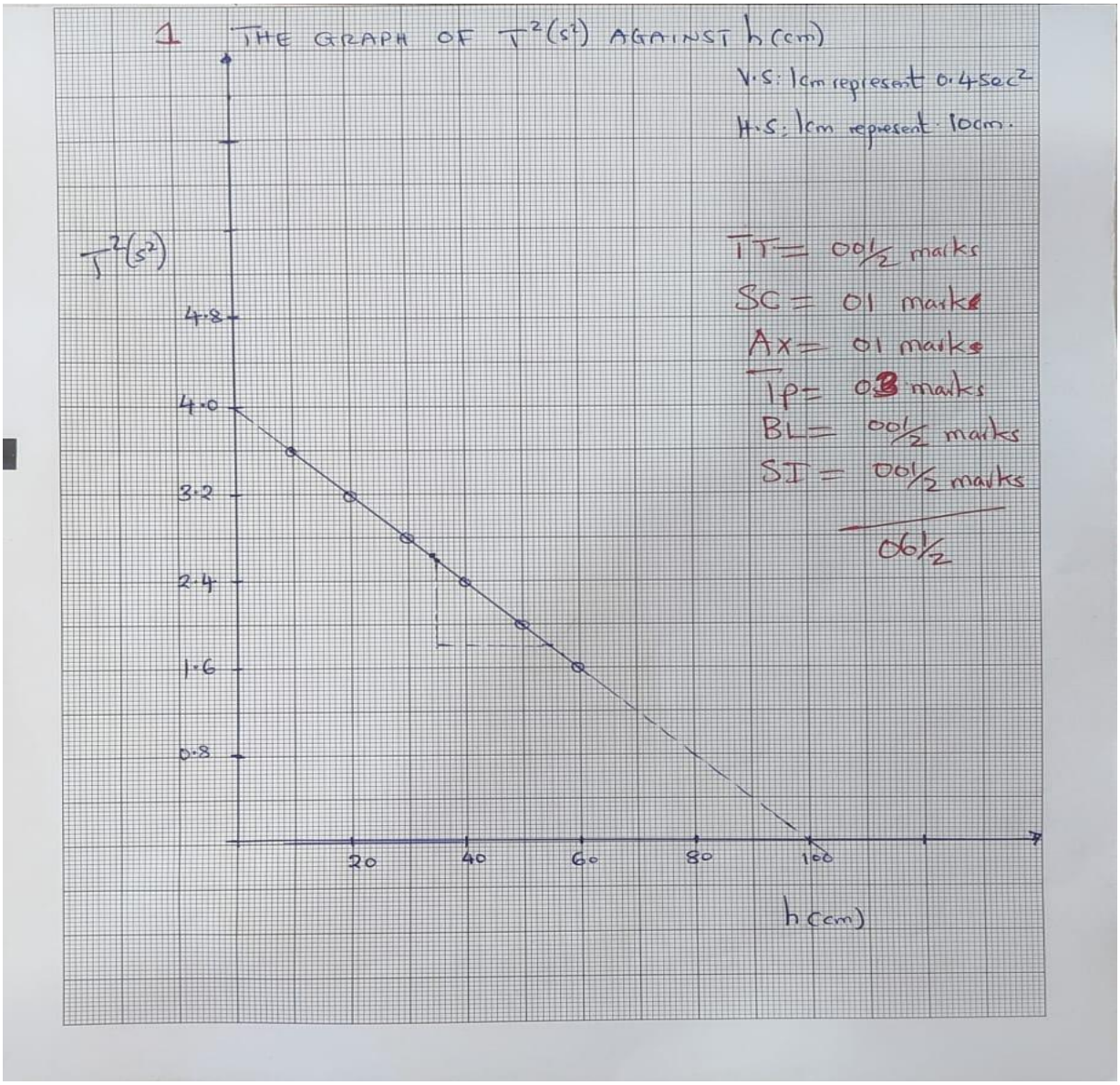
e) **Table of results (SAMPLE A EXAM)**

h (cm)	**t (s) 10 (±1)oscillation**	**T (s) (±1)**	**T (s^2) (±1)**
10	19.03	1.90	3.60
20	17.94	1.8	3.20
30	16.78	1.67	2.80
40	15.54	1.55	2.40
50	14.18	1.42	2.00
60	12.69	1.27	1.60

1@mark for t = 05 1@ mar for T^2=05

(10 Mark)

a) The graph of T^2 against h is on the graph paper at the back pages



The graph will be plotted by using the equation

$$\boldsymbol{H = \frac{T^2 g + 4\pi^2 h}{4\pi^2}}$$ **(01 mark)**

$$\boldsymbol{4\pi^2 H = T^2 g + 4\pi^2 h}$$

$$\boldsymbol{T^2 g = -4\pi^2 h + 4\pi^2 H}$$

$T^2 = \frac{-4\pi^2}{g} h + \frac{4\pi^2}{g} H$ **(01 mark)**

$\therefore$ The graph will have negative slope and positive y-intercept.

i. From the graph, slope is given by

$$S = \frac{\Delta T^2(s^2)}{\Delta h\ (cm)}$$ ***(0.5 Mark)***

$$S = \frac{2.6-1.2}{27-66}$$ ***(0.5 Mark)***

$$S = -\ \frac{1.4\ \ (s^2)}{39\ \ (cm)}$$

$$S = -\ 0.036\ {}^{s^2}/_{cm}$$

∴ **The slope of the graph is** $\boldsymbol{S = -\ 0.040\ {}^{s^2}/_{cm}}$ ***(01 Mark)***

ii. From the graph; the value of h-intercept is **100 cm** ***(01 Mark)***

iii. The value of h-intercept represents the **length of the string** ***(01 Mark)***

iv. From the equation above; the value of g

$$M = \frac{-4\pi^2}{g}$$ ***(0.5 Mark)***

$$g = \frac{-4\pi^2}{M} = \frac{-4\pi^2}{-0.04}$$

$$g = 986.96\ cm/s^2$$

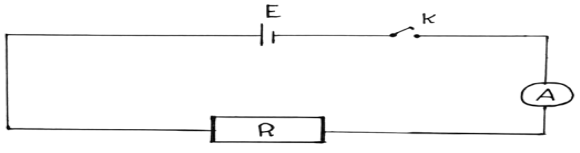
∴ **The value of** $\boldsymbol{g = 986.96\ {}^{cm}/_{s^2}}$ ***(01 Mark)***

v. Sources of error ***(01 Mark)***

- Air resistance affecting the pendulum swimming
- Inaccurate measurement of time or length

QUESTION TWO

(i) Diagram for circuit **(02 marks)**

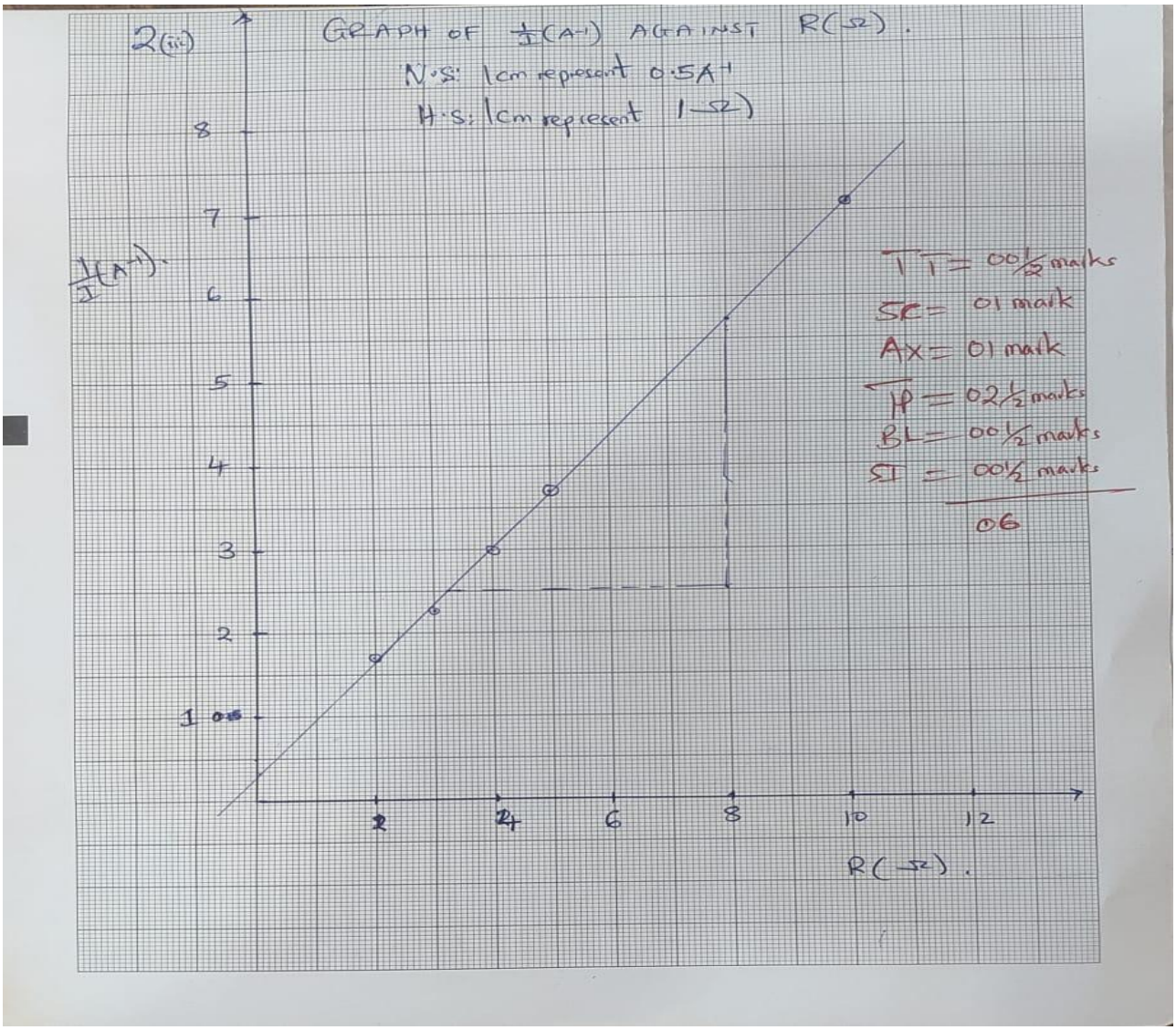


(ii) Table of results

R (Ω)	I (A) ±0.1	$\frac{1}{I}$ (A^{-1})
10	0.14	7.1
5	0.27	3.7
4	0.33	3.0
3	0.43	2.3
2	0.6	1.67

1@ mark =**05** 1@ mark =**05**

(iii) Graph



Slope = $\frac{\Delta 1/I}{\Delta R}$ (**01 mark**)

= $\frac{5.75-2.50}{8-3.2}$

= 0.677 $\Omega^{-1}A^{-1}$ (2.7- 3.4) (**01 mark)**

(v) From,

E = I(R+ r) **(0.5 mark)**

By rearranging, we have

$\frac{1}{I} = \frac{1}{E}(R) + \frac{r}{E}$ **(0.5 mark)**

By comparing with,

Y = mx + c

Slope = $\frac{1}{E}$, (**0.5** mark)

but slope = 0.677 V,

Then E = 1.48 V, range (1.35-1.7 V) **(0.5 mark)**

Intercept of a graph = $0.33A^{-1}$ **(0.5 marks)**

Intercept = $\frac{r}{E}$, **(0.5 marks)**

compare with intercept, we have r = 0.495Ω, (0.3-0.7) **(01 mark)**

(vii) increasing the value of R, the brightness of a bulb decreases.

(01 mark)