535/4

PHYSICS

Paper 4

July/August 2023

KANUNGU DISTRICT JOINT MOCK EXAMINATIONS

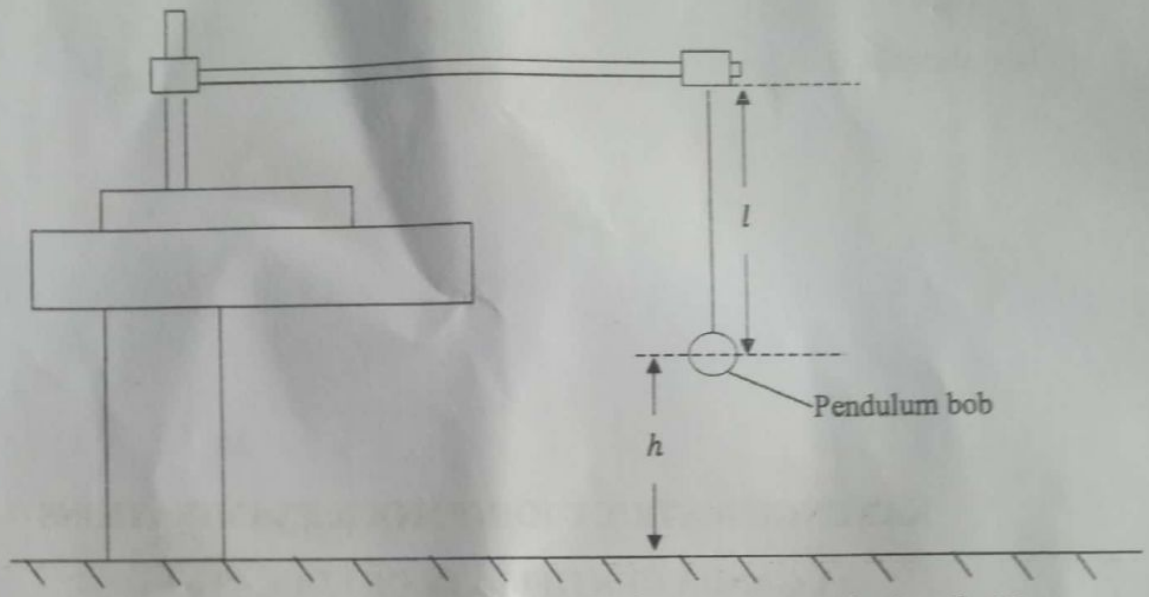
UGANDA CERTIFICATE OF EDUCATION

PHYSICS PRACTICAL

PAPER 4

1. In this experiment, you will determine the acceleration due to gravity using a pendulum bob

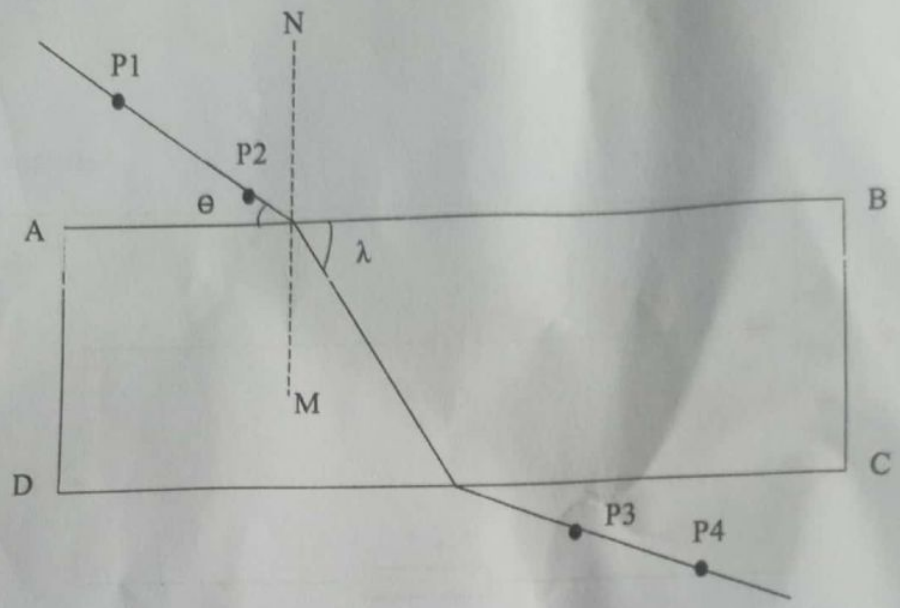
a) Arrange the apparatus as shown in the figure below as shown in the figure below such that the length, l, of the pendulum is equal to 1.000m and the height h = 0.100m



b) Set the pendulum bob into a small horizontal oscillation and measure the time for 20 oscillations.
c) Find the time, T, for one oscillation.
d) Repeat the procedures (a) to (c) for values of h=0.200, 0.300, 0.400, 0.500, and 0.600m from the ground level.
e) Tabulate your results in a suitable table including values of T, T^2 and h,
f) Plot a graph of T^2 against h
g) Find the slope s, of the graph.
h) Calculate the value of acceleration due to gravity, g, from $g = \frac{4\pi^2}{S}$ Take ($\pi = 3.14$)

2. In this experiment, you will determine the constant μ of the glass block provided.

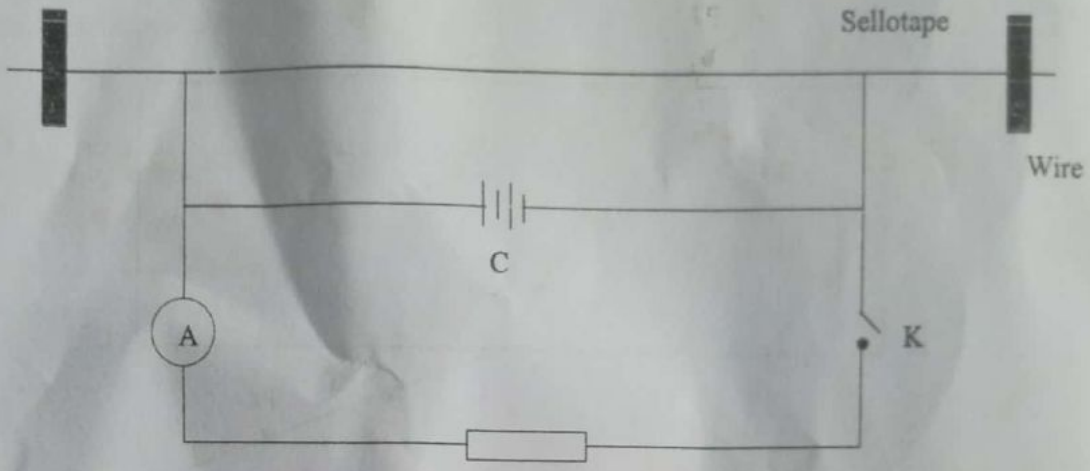
a) Fix the plain sheet on paper onto the soft board using drawing pins
b) Place the glass block on the sheet of paper so that it rests on the broader face.
c) Trace the outline ABCD of the glass block.
d) Remove the glass block.



e) Mark a point 0 on AB such that AO is about 2.0 cm from A
f) Construct a perpendicular line NM to AB at O
g) Draw a line RO at an angle $\theta = 80°$ to AB as shown in the figure above.
h) Fix pins P_1 and P_2 vertically along RO.
i) Replace the glass block on its outline.
j) Looking through side DC fix pins P_3 and P_4 in line with the images of P_1 and P_2.
k) Remove the pins and the glass block.
l) Draw a line QT through P_3 and P_4 to meet DC at T.
m) Join P to O
n) Measure angle λ
o) Repeat the procedures (g) to (n) for values of $\theta = 70°, 60°, 50°, 40°$ *and* $30°$
p) Record your results in your table including values of $\cos\theta$ and $\cos \boldsymbol{\lambda}$
q) Plot a graph of $\cos\theta$ against $\cos \boldsymbol{\lambda}$
r) Find the slope μ of your graph.

3. In this experiment you will determine the internal resistance r of the cell provided

a) Record the resistance R of the resistor R.
b) Connect the two dry cells in series across the voltmeter and record the reading V, of the voltmeter
c) Fix the bare wire P provided on the meter rule using a cello tape.



d) Connect the circuit as shown in the figure above starting with the length X= 0.200m.
e) Close switch k.
f) Record the reading I of the ammeter.
g) Open the switch k.
h) Repeat the procedures (d) to (g) for values of x = 0.300, 0.400, 0.500, 0.600, and 0.700.
i) Record your results in the suitable table including values of $\frac{1}{I}$ and $\frac{1}{X}$.
j) Plot a graph of $\frac{1}{I}$ against $\frac{1}{X}$.
k) Find the intercept C on the $\frac{1}{I}$ axis
l) Calculate the internal resistance, r, from the expression r =VC-R.

END

KANUNGU DISTRICT JOINT MOCK
PHYSICS PRACTICAL PAPER 4 Tr. OBRS.
MARKING GUIDE. 01 Qv.21

CODE 101

MAR

R_1 – Recording the value of t when h = 0.100m an unit {Value = 1, unit(s) = ½} h = {420-460} 01½ u

T_1 – Design of the table of results with atleast 4-columns, h-column labelled with unit {h(m)} and all h values entered. 01 mk

T_2 – Label of the rest of the columns and unit; t(s), T(s), $T^2(s^2)$ 03 mks

h(M)	t(s)	T(s)	$T^2(s^2)$
0.100	420 ~~460~~	2.10	
0.200	410-450	2.05	
0.300	390-430	1.95	
0.400	370-410	1.85	
0.500	345-385	1.73	
0.600	320-360	1.60	

T_3 – Recording 5 more values of t 05 mks

– Recording 6 values of T correctly calculated 03 mks

– Recording 6 values of T^2 correctly calculated 03 mks

16½

G_1 – Title of the graph, A graph of T^2 against h 01 mk

G_2 – The label for each axis with unit 02 mks

G_3 – ~~The~~ Suitable and convenient scale 02 mks

G_4 – 6 correctly plotted points 03 mks

G_5 – The best straight line to fit the plotted points. (-ve) slope 01 mk

G_6 – The method of finding the slope 01 mk

This gives a negative slope

10 mks

C_1 – Calculation of the slope S

* Correct Substitute = ½
* Arithmetic = ½
* Unit = ½

01½ mk

C_2 — Calculation of acceleration due to gravity 'g'.

* Correct Substitution = ½
* Arithmetic = ½
* Accuracy = ½
* unit = ½

02mks

03½

Total 30mks

		MARK
D_1	Tracing the outline ABCD of the glass block, marking a point about 2cm from A and drawing a perpendicular line NM.	01 mk
D_2	Drawing a line RO at an angle $\theta = 80°$ to AB, fixing pins of P_1 and P_2 along RO and fixing pins of P_3 and P_4 in line with the images of P_1 and P_2	01 mk
D_3	Drawing a line QT through pin marks P_3 and P_4 to meet DC at T and joining to O	01 mk
		03 mk
R_1	Recording angle λ to 0dp when $\theta = 80°$ and unit Range: $\lambda = (82 - 85)°$	01½ mk
T_1	Design of the table of results with at least 4-columns, θ-column labelled with unit $\{\theta(°)\}$ and all its values entered in stated order	01 mk
T_2	Labelling the rest of the columns	03 mk

$\theta(°)$	$\lambda(°)$	$\cos\theta$	$\cos\lambda$
80	82-86	-0.174	-0.174
70	76-80	-0.242	-0.342
60	70-74	-0.342	-0.500
50	63-67	-0.454	-0.643
40	58-62	-0.530	-0.766
30	52-56	-0.866	-0.866

T_3	Recording 5 more values of λ decreasing to 0dp	05 mks
	Recording 6 values of $\cos\theta$ correctly calculated 3dp	03 mks
	Recording 6 values of $\cos\lambda$ correctly calculated 3dp	03 mks
		16½

G_1	Title of the graph "A Graph of cost against cost"	01
G_2	Drawing and labelling axes with unit.	02
G_3	Suitable and convenient Scale	02
G_4	Correctly plotted 6 points @ $\frac{1}{2}$	03
G_5	The best straight line to fit the plotted points	$01\frac{1}{2}$
G_6	The method of Calculating the slope	$01\frac{1}{2}$
		09
C_1	Calculation of the Slope μ.	
	* Correct Substitution. $= \frac{1}{2}$	
	* Arithmetic $= \frac{1}{2}$	
	* Accuracy, Range; $\mu = (1.4 - 1.7)$ $= \frac{1}{2}$	$01\frac{1}{2}$
	Total	30 mks

NO3

MARK

R_1 – Recording the value of R_s to 0dp and unit — 01½m

R_2 Recording the value of I when x = 0.200m and unit I = ( ) A — 01½

T_1 – Design of the table of values with 4 columns, x-column labelled with unit {x(m)} and all x-values entered — 01mk

T_2 – Label of the rest of the columns and units — 03mks

x(m)	I(A)	$\frac{1}{I}(A^{-1})$	$\frac{1}{x}(m^{-1})$
0.200			
0.300			
0.400			
0.500			
0.600			
0.700			

T_3 – Recording 5 values of I decreasing Range; (0.40 – 0.54)(A) — 05mks

– Recording 6 values of $\frac{1}{I}$ correctly calculated to 1dp — 03mks

– Recording 6 values of $\frac{1}{x}$ correctly calculated to 2dp — 03mks

Sub-total | 18

G_1 – Title of the graph 'A graph of $\frac{1}{I}$ against $\frac{1}{x}$'. 01mk

G_2 – label the axes with units @ 1 02mks

G_3 – Suitable and convenient scale 02mks

G_4 – 6 correctly plotted points 03mks

G_5 – the best straight line to fit the plotted points 01mk

IV – correctly read value of the intercept on the vertical axis with unit 01mk

C_1 – Calculation of the internal resistance

* correct Substitution $= \frac{1}{2}$
* Arithmetic $= \frac{1}{2}$
* ~~Accurate~~ Accuracy $= \frac{1}{2}$
* unit (Ω) $= \frac{1}{2}$

02

12mks

Total	30mks