NAME..MARKING SCHEME..... INDEX NO.....

232/3
PHYSICS
PAPER 3
(PRACTICAL)
MARCH/APRIL, 2023
TIME: 2½ HOURS

CANDIDATE'S SIGN.....

DATE.....

SUKELLEMO PRE-MOCKS APRIL 2023

INSTRUCTIONS TO CANDIDATES:

1. *Write your **name** and **index number** in spaces provided **above**.*
2. ***Sign** and write the date of examination in spaces provided **above**.*
3. *Answer **all** the questions in spaces provided in the question paper.*
4. *You are supposed to spend the first 15 minutes of 2½ hours allowed for this paper reading the whole paper carefully before commencing the work.*
5. *Marks are given for clear record of the observations actually made, their suitability, accuracy and the use made of them.*
6. *Candidates are advised to record their observations as soon as they are made.*
7. *Mathematical table and electronic calculators may be used.*

FOR EXAMINER'S USE ONLY

Question 1	**(i)**	**(iv)**	**(v)**	**(vi)**	**(vii)**	**(ix)**	**(x)**	
Maximum Score	1	4	5	2	4	2	2	**20**
Candidate's Score								

Question 2	**(a)**	**b(i)**	**b(ii)**	**b(iii)**	**b(iv)**	**b(v)**	**c(iv)**	**c(v)**	**c(vi)**	
Maximum Score	2	1	2	2	1	2	6	2	2	**20**
Candidate's Score										

GRAND TOTAL

Question 1

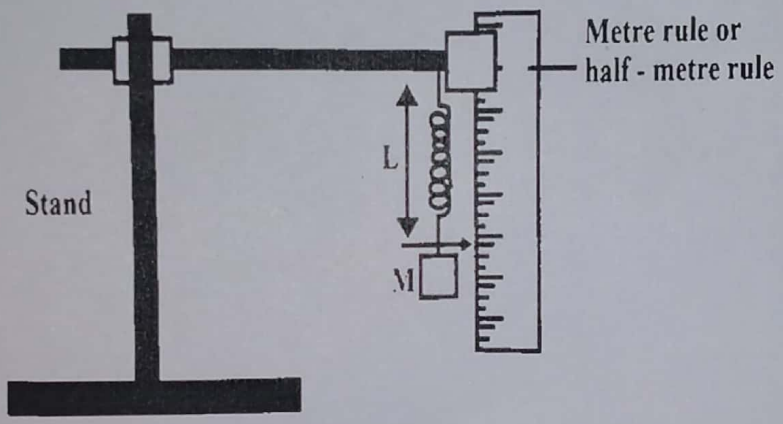
You are provided with the following,

- Helical spring with a pointer
- One clamp, one stand and a boss
- A stop watch
- A metre rule or half metre rule
- One 50g, four 20g and one 100g masses

Proceed as follows;

(i) Suspend the spring vertically alongside the clamped metre rules shown in the figure below. Measure the length L_0, of the spring before loading it.

L_0 =.....1.d.p a Mark✓ 1Mark.....cm (1 mark)



(ii) Attach a mass of 20g on the spring and measure the new length L , of the spring. Record in the table below

(iii) Calculate the change in the length , $e=L-L_0$ due to the mass of 20g and record this in the table below.

(iv) Repeat steps (ii) and (iii) using additional masses of 20g and record your results in the table below.

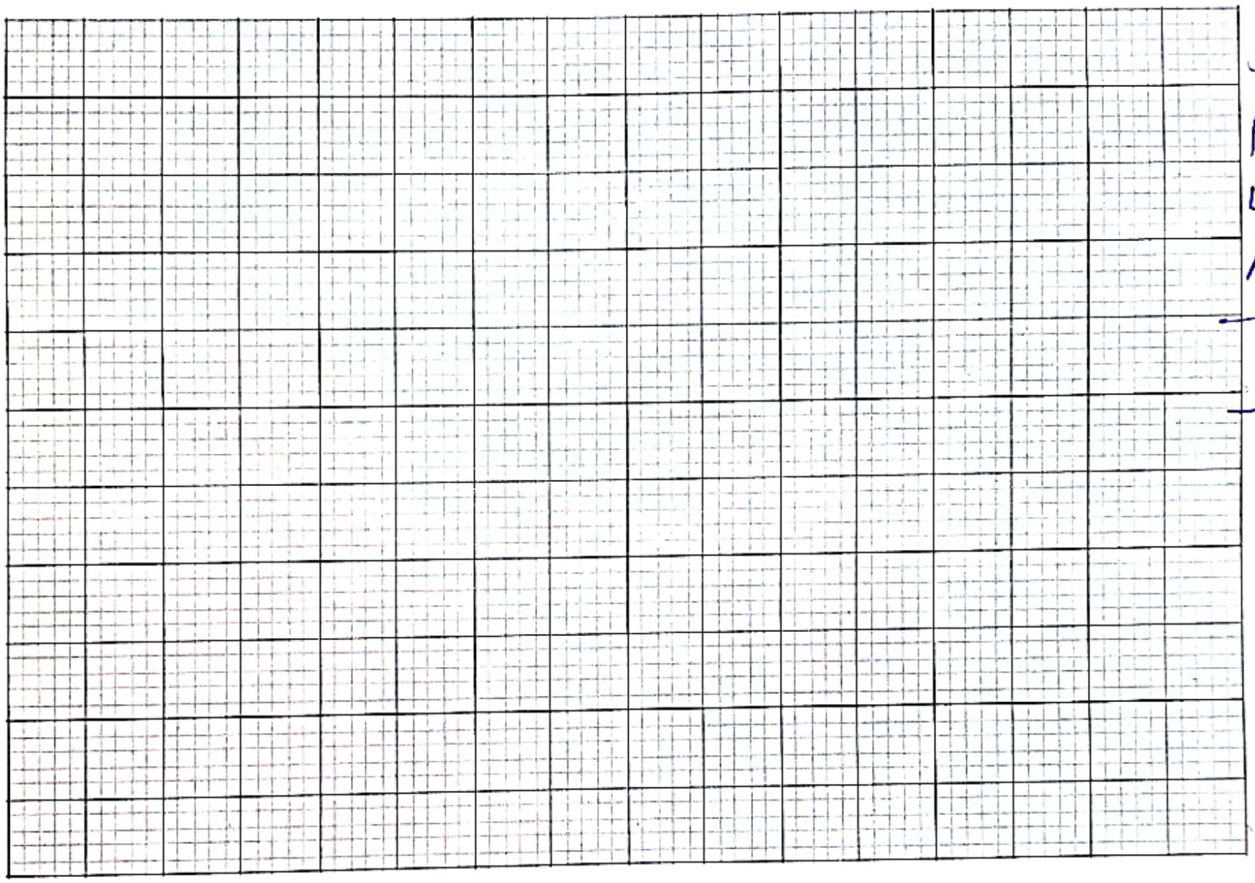
(4 marks)

Mass m (g)	20	40	60	80	100	120
L (cm)	✓½	✓½	✓½	✓½	✓½	✓½
e=L – L_0, e(cm)						

1 d.p Must

Correct sub. ✓1Mark

(v) Plot a graph of extension, **e** (cm) against the mass **m** (g) (5 marks)



S = 1
P = 2
L = 1
A_1 = 1
5

(vi) Determine the gradient **S** of the graph (2 marks)

Correctly substracted values ✓ 1mark

correct gradient with correct units ✓ 1mark

(vii) Using the same set up as in the figure above, attach the 120g mass on the spring and support it from below with your palm so that it does not oscillate.

(viii) Pull the mass a small distance vertically downwards and release it to execute Vertical oscillations. Record in the table below the time, t, for 20 complete oscillations. Repeat to obtain a total of three readings i.e., t_1, t_2 and t_3. Repeat the procedure using a mass of 150g.

(4 marks)

	Time for 20 oscillations			Average time (s)			
Mass (g)	**t_1(s)**	**t_2(s)**	**t_3(s)**	**$\frac{t_1+t_2+t_3}{3}$**	**T (s)**	**$T^2(s^2)$**	**T^2/m (S^2g^{-1})**
120	✓ ½	✓ ½					
150	✓ ½	✓ ½					

- Atleast two correct for each column ✓1mark
- 2 d.p a must
- @ two correct ✓½ Mark
- 4 s.f a Must

(ix) Find the average value of Q, given that $Q=\frac{T^2}{m}$ let this be the Q (2 marks)

Correct substitution ✓ 1mark.

Correct ans with correct units ✓ 1mark.

(x) Given that the gradient S in (v) given by $S=\frac{QK}{4\pi^2}$, determine the constant K. (2 marks)

correct substitution ✓ 1mark.

Correct answer ✓ 1mark.

Question 2

You are provided with the following.

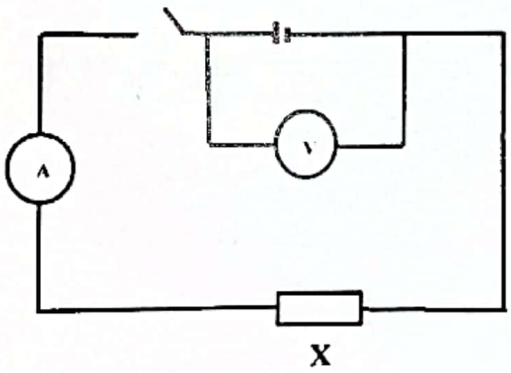
- A carbon resistor X
- Resistance wire marked R
- Micrometer screw gauge (to be shared)
- Voltmeter
- Ammeter
- Resistance wire mounted on a mm scale labelled L
- A cell and a cell-holder
- Centre – zero galvanometer
- 8 connecting wires
- Jockey

Proceed as follows.

(a) Using the micrometer screw gauge, measure and record the diameter D of the resistance wire R provided.

D =...5 d.p a Must ✓.....m (• Correct Measurement ✓ 1mrk
• Correct conversion ✓ 1mrk.) (2 marks)

(b) Set up the following circuit



(i) Record the voltmeter reading when the switch is open

E=.....1d.p a must ✓ 1mrk V (1 mark)

(ii) Close the switch and record the voltmeter and ammeter readings V and I.

V=.....1 d.p a Must ✓ 1mrk V (1 mark)

I= .....2 d.p a Must ✓ 1mrk A (1 mark)

(iii) Account for the difference of **E** and **V** (2 mark)

Due to lost voltage ✓ 1mark.

caused by internal resitance of the cell ✓ 1mrk.

(iv) Now connect the voltmeter across the carbon resistor X and record voltmeter reading V_1

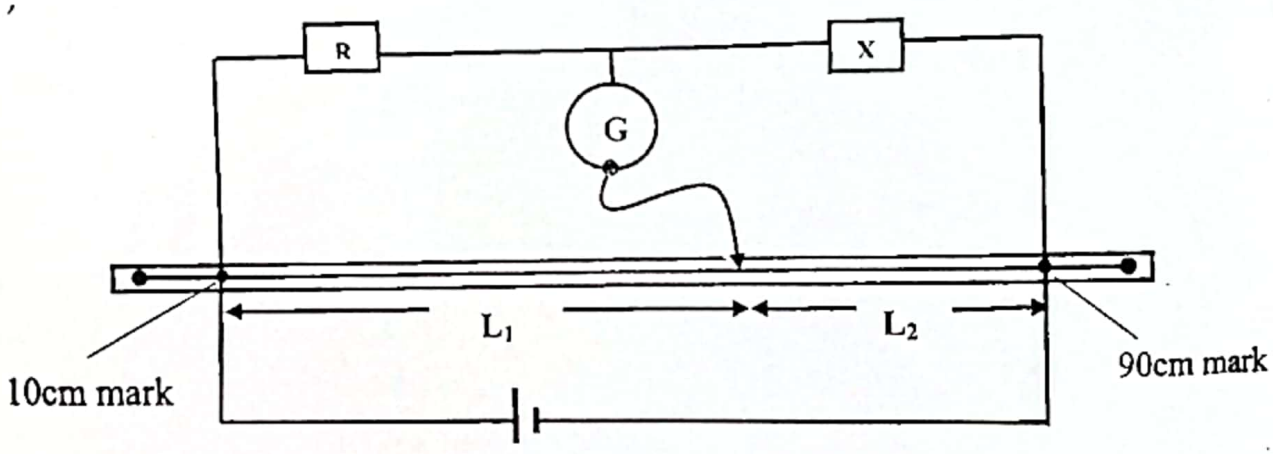
V_1= 1d.p a Must ✓ 1mark. V (1 mark)

(v) Calculate X given that X = $\frac{V_1}{I}$ (2 mark)

Correct substituation ✓ 1mark.

correct ans with correct unit ✓ 1mark.

(c) Connect another circuit as shown below



(i) Move the sliding pointer along the resistance wire until the galvanometer reading comes to zero. Record L_1 and L_2.

(ii) Obtain the value of the unknown resistance R given that; $\frac{R}{x} = \frac{L_1}{L_2}$ let it be $\mathbf{R_1}$

(iii) Interchange the positions of R and X and repeat the procedure in (i) above and calculate the value of R.

$\frac{X}{R} = \frac{L_1}{L_2}$ let it be $\mathbf{R_2}$

(iv) Complete the table below with the values of L_1, L_2, R_1 and R_2. (6 marks)

Trial 1	L_1(cm)	✓ 1mrk	R_1 = ✓ 1mrk
	L_2(cm)	✓ 1mrk	
Trial 2 (after interchanging)	L_1(cm)	✓ 1mrk	R_2 = ✓ 1mrk
	L_2(cm)	✓ 1mrk	

4 s.f & must

1.d.p & must.

(v) Calculate the average value of R (2 marks)

.....

.....Correct sub. ✓ 1mark.....

.....correct ans ✓ 1mark.....

(vi) Given that, $R = \frac{35S}{100\pi D^2}$ determine the value of S (2 marks)

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.....correct sub ✓ 1mark.....

correct ans ✓ 1mark.

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