Name ..... Index Number.....

Candidate's Signature..... Date.....

232/3
PHYSICS
Paper 3
(PRACTICAL)
MINI-MOCK 2014
2 1/4 hours

Instructions to candidates

- Write your name and index number in the spaces provided above.
- Sign and write the date of examination in the spaces provided above.
- Answer ALL the questions in the spaces provided in the question paper.
- You are supposed to spend the first 15 minutes of the 2 ¼ hours allowed for this paper reading the whole paper carefully before commencing your work.
- Marks are given for a clear record of the observations actually made, their suitability, accuracy, and the use made of them.
- Candidates are advised to record their observations as soon as they are made.
- Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

For Examiner's use only

Question 1	
Question 2	
Total	

This paper consists of 8 printed pages. Candidates should check the question paper to ascertain that all the pages are printed as indicated and no questions are missing.

Question 1

PART A

You are provided with the following apparatus

- a glass block
- a plane mirror
- 4 optical pins
- a soft board
- A cellotape (about 15cm long)
- 2 white – plain sheets of paper
- a ruler or half metre rule
- a protractor
- 4 office pins

Proceed as follows:-

(i) Using the cello tape provided fix the plane mirror to the glass block along side as shown in figure 3 below. The reflecting surface to face the glass block.

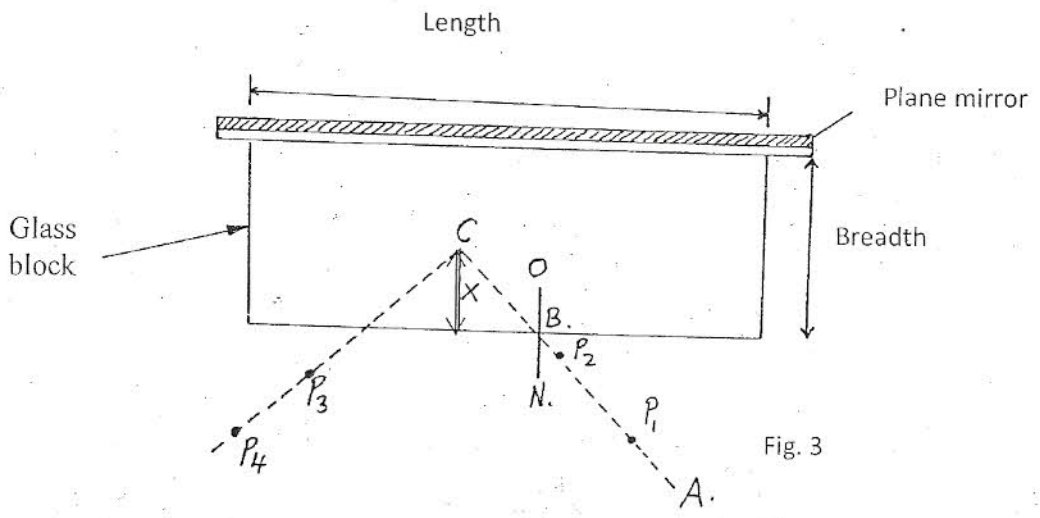


Fig. 3

(ii) With the use of the office pins, secure firmly a white plain paper on the board and place the block together with attached mirror.

(iii) Draw the outline of the glass block together with the mirror

(iv) Remove the block and the mirror and draw a normal at B somewhere a quarter- way the length of the outline you drew in (iii) above.

(v) Draw four(4) different rays AB incident at B and extended to C. The incident rays should make angles 10°, 20°, 30° and 40°.

(vi) Replace the glass block together with the attached mirror so as exactly fit the outline in(iii)

(vii) Place two object pins P_1 and P_2 along the 10° line. Locate the images of pins P_1 and P_2 as they appear by non-parallax (the images of the pins appear to be in a straight line when viewed through the glass block).

Place pins P_3 and P_4 so that the images of pins P_1 and P_2 are not seen.

(viii) Remove the glass block together with the attached mirror from the outline and produce the lines joining P_1 to P_2 and P_3 to P_4 so that the they intersect at C. Measure and record the distance x table 3 below.

NB. It may be necessary for you to draw another outline so as to avoid congestion of (construction) lines.

Angle i °	10	20	30	40
Distance x(cm)				

Table 1

(2marks)

(ix) Now measure the breadth b of the glass block.

b = (1mark)

(x) Calculate the average A_x of the values of x in table1above

A_x (1mark)

(xi) Determine the refractive index of the glass block using the formula.

Refractive index n of glass = $\frac{b}{A_x}$ (1 mark)

PART B

You are provided with the following:

- Two wires, one labeled T and the other S each mounted on a piece of wood.

- A dry cell and cell holder.
- A wire W mounted on a mm scale.
- A jockey.
- A centre zero galvanometer.
- Connecting wires (some with crocodile clips).
- A micrometer screw gauge (to be shared).
- A metre rule or half metre rule.
- A switch.

Proceed as follows:

a) Determine the average diameter D, of the wire labeled **T** and the average diameter **d** of the wire labeled **S** using the micrometer screw gauge provided.

D = ... mm {1 mark}

d = ... mm {1 mark}

Calculate $\frac{D}{d}$

$\frac{D}{d}$ = ... {1 mark}

b) Set up the apparatus as shown in the circuit diagram in figure 3. Use crocodile clips to fix the lengths of **T** and **S** at 50 cm each initially.

THIS LENGTH OF T WILL NOT BE CHANGED THROUGHOUT THE EXPERIMENT.

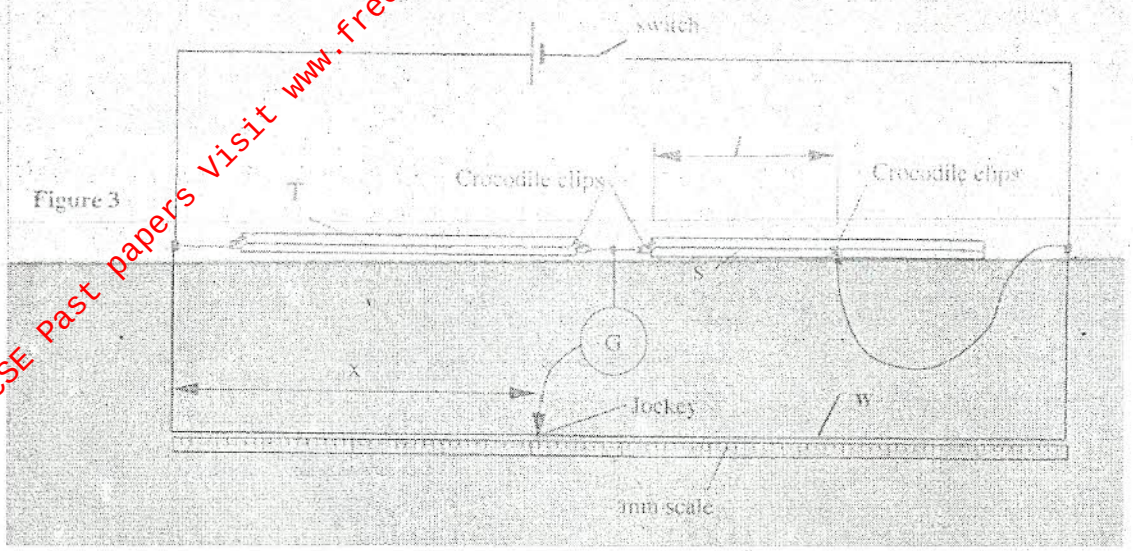


Figure 3

c) Close the switch. Use the jockey to touch one end of the wire **W** and then the other end. THE DEFLECTION OF THE GALVANOMETER SHOULD BE IN THE OPPOSITE DIRECTION IF NOT, CHECK THE CIRCUIT.

Adjust the positions of the Jockey along the wire until there is no deflection in the galvanometer. This is the balance point. Record the value of **X** in cm in the table.

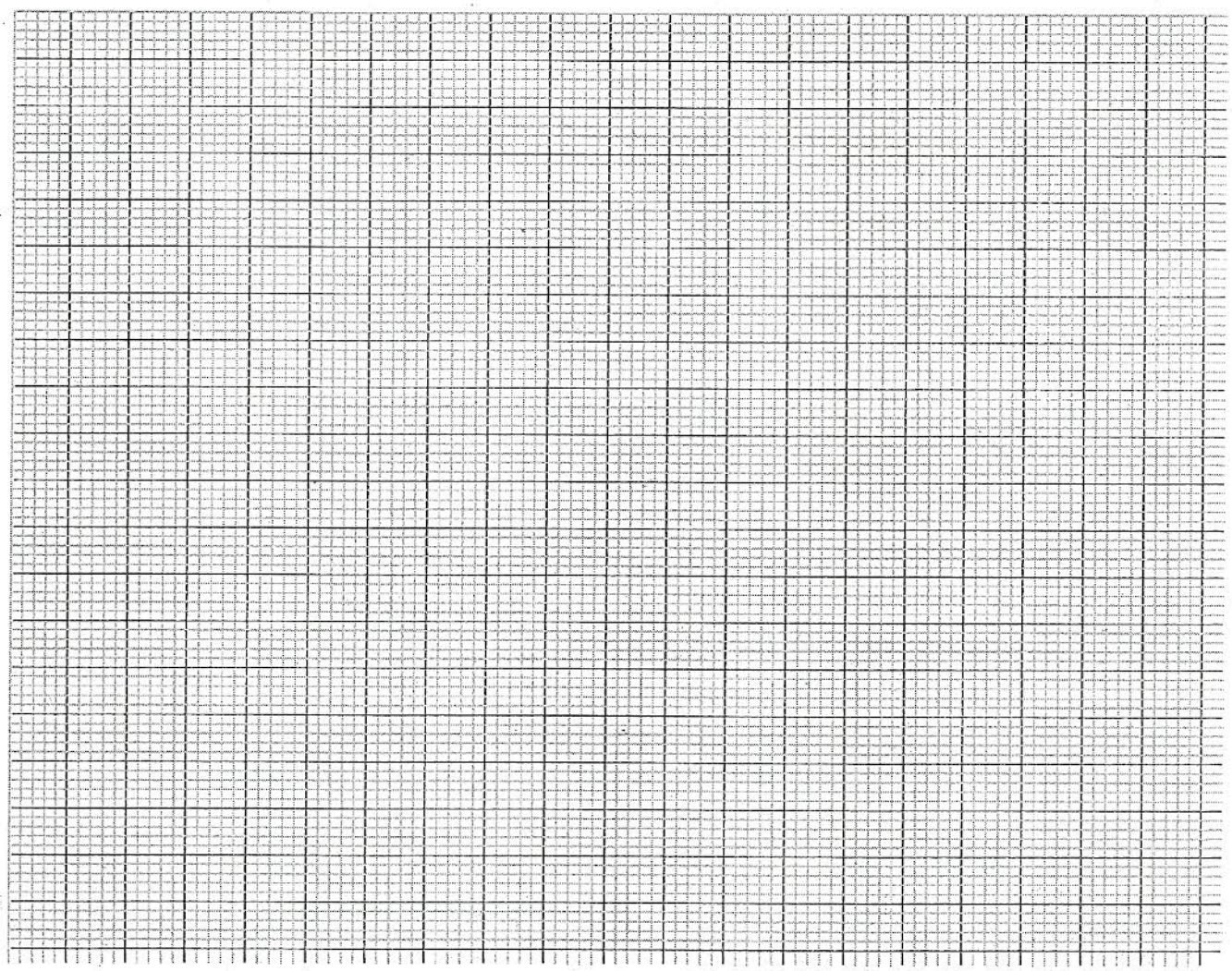
d) Adjust the length **l** of wire **S** to 45 cm. Find the balance point and record the value of X in the table. Repeat for the other values of **l** in the table.

Table 2 {4 marks}

l cm	50	45	40	35	30	25	20
X cm							

$\frac{1}{X}$ (cm^{-1})							

e) i) Plot the graph of $\frac{1}{X}$ (y – axis) against l. {4 marks}



ii) Determine the slope of the graph. {2 marks}

iii) Determine the ratio $\frac{D}{d}$ given that M = $\frac{D^2}{5000d^2}$ {2 marks}

Question 2.

You are provided with the following apparatus

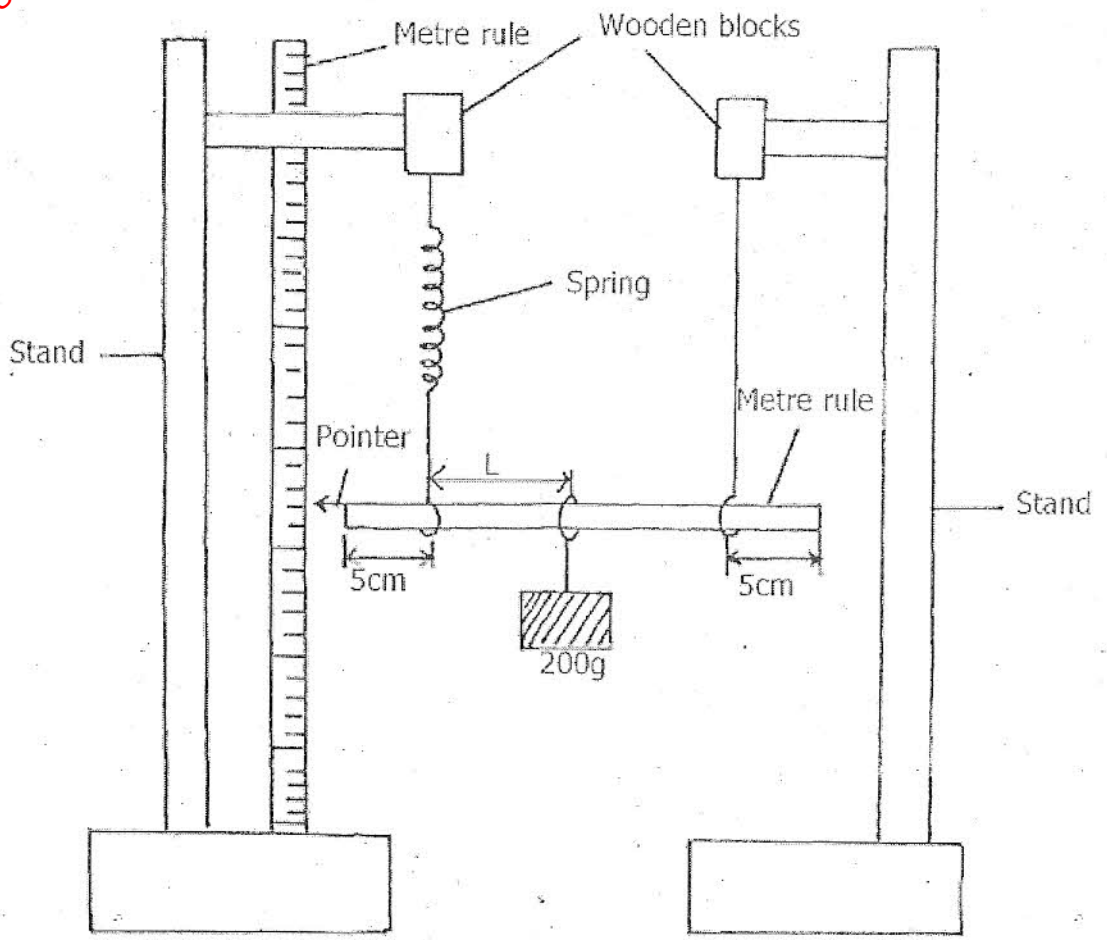
- Two metre rules (one with a pin as a pointer)
- Two retort stands with clamps and bosses
- Two pieces of thread about 30cm and 1m long
- One helical spring
- One 200g mass or two 100g masses
- A stop watch

- Four small pieces of wooden blocks

Procedure

(a) (i) Set up the apparatus as shown in figure 1 below

Fig. 1



(ii) Suspend the ends of the metre rule with spring at 5cm mark from the end so that the metre rule with the pointer is horizontal.

Read the pointer position, L_0 = ...cm. (1mk)

(iii) Hang 200g on the horizontal metre rule at a length L = 10cm from the spring. Record the extension, e, of the spring in the table below.

(iv) Displace the mass slightly downwards and release it to oscillate vertically. Time for 10 oscillations and record the results in table 1

(v) Repeat (iii) and (iv) for other positions of L of the mass

(vi) Table 1

Length, L (cm)	10	20	30	40	50
Extension, e (cm)					
Time for 10 oscilations (s)					
Periodic time, T (s)					
T^2 (5^2)					

(8mks)

(vii) Plot a graph of T^2 (y – axis) against extension 'e' (5mks)

(viii) Determine the slope of the graph (3mks)

(ix) Given that

$$T^2 = \frac{4\pi^2 e}{K} + C$$

Determine the value of K (3mks)