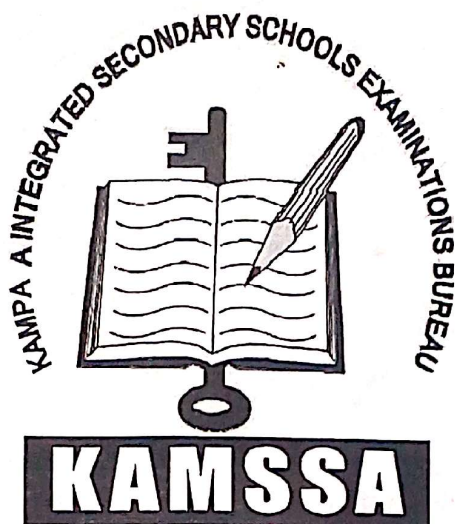


P510/3  
Physics Paper 3  
July/Aug 2025  
3 ¼ Hours



## KAMSSA JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education

PHYSICS

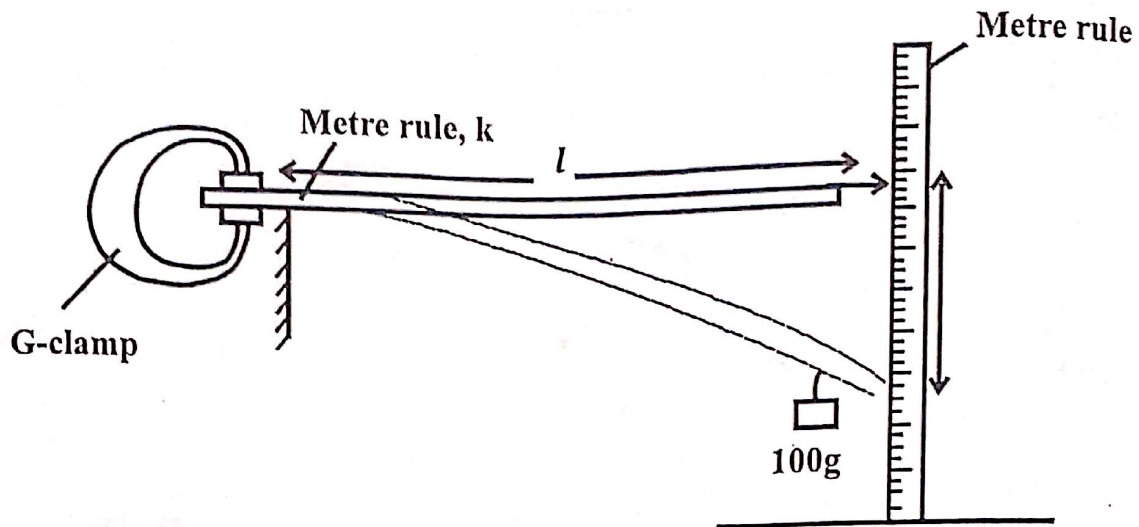
PAPER 3

3hours 15minutes

### INSTRUCTIONS TO CANDIDATES:

- Answer question 1 and one other question. You will not be allowed to start working with the apparatus for the first quarter of an hour.
- Marks are given mainly for a clear record of the observation actually made, for their suitability and accuracy and for the use made of them.
- Candidates are reminded to record their observation as soon as they are made. Whenever possible, candidates should put their observation and calculations in a suitable table drawn in advance.
- An account of the method of carrying out the experiment is not required.
- Squared paper is provided.
- Mathematical tables and silent non programmable calculator may be used

1. In this experiment you will determine Young's modulus for a metre rule using two methods.  
**METHOD 1**



- Measure and record the breadth  $b$  and thickness  $d$  of the metre rule labelled  $k$ .
- Clamp the metre rule  $k$  on the table with length  $l = 0.300\text{m}$
- Attach the pointer at the free end of the metre rule as shown in figure 1
- Suspend a mass of  $0.100\text{kg}$  at a distance  $0.200\text{m}$  from the free end of the metre rule  $k$
- Determine the depression  $y$  in metre of  $k$
- Repeat procedures (b) to (d) for values of  $l = 0.400, 0.500, 0.600, 0.700, 0.800$  and  $0.900\text{m}$ .
- Tabulate your results including values of  $\log_{10} y$  and  $\log_{10} l$
- Plot a graph of  $\log_{10} y$  against  $\log_{10} l$
- Read and record the intercept  $C$  on the  $\log_{10} y$  axis
- Calculate young's modulus  $E$  from the expression  $C = \log_{10} \left( \frac{0.4g}{Ebd^3} \right)$  where  $g = 9.81\text{ms}^{-2}$

### METHOD 2

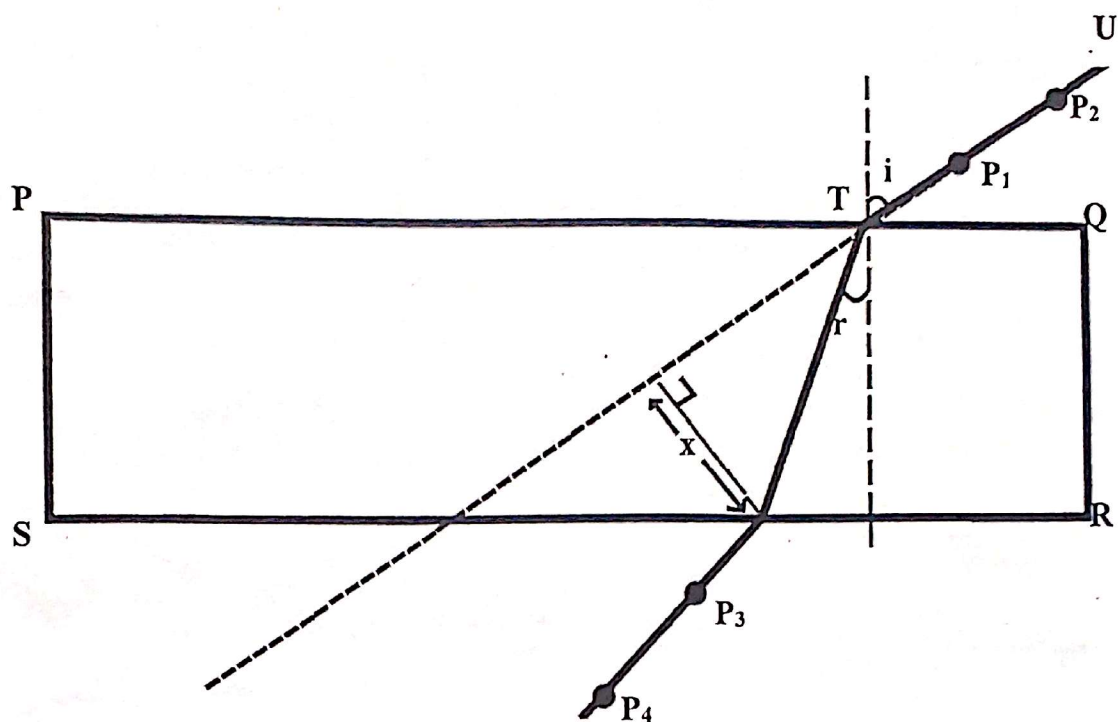
- Using the arrangement in figure 1 above, adjust the length  $l$  to  $0.900\text{m}$
- Set the metre rule into vertical vibration
- Measure the time,  $t$  for 20 oscillations.
- Calculate period,  $T$
- Calculate young's modulus  $E$  from the expression.

$$E = \frac{16\pi^2 l^3}{10T^2 b d^3}$$

2. In this experiment, you will determine the constant  $\phi$  of the glass block provided.

(a) Fix the white sheet of paper on the soft board provided.

(b) Place the glass block on the piece of paper and trace its outline PQRS



(c) Remove the glass block and draw a normal at T

(d) Fix pins  $p_1$  and  $p_2$  on line Tu at angle  $i = 15^\circ$

(e) By looking through the glass block from side SR, fix pins,  $p_3$  and  $p_4$  such that they appear to be in line with the images of  $p_1$  and  $p_2$

(f) Remove the glass block and the pins

(g) Draw a line through  $p_3$  and  $p_4$  to meet SR

(h) Measure and record angle  $r$  and the distance  $x$

(i) Repeat the procedures for values of  $i = 20^\circ, 30^\circ, 40^\circ, 50^\circ$  and  $60^\circ$

(j) Tabulate your results including values of  $x \cos r$  and  $\sin(i - r)$

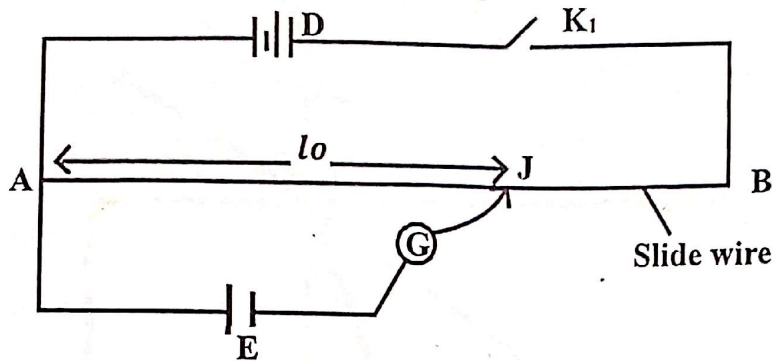
(k) Plot a graph of  $x \cos r$  against  $\sin(i - r)$

(l) Find the slope  $\phi$  of the graph

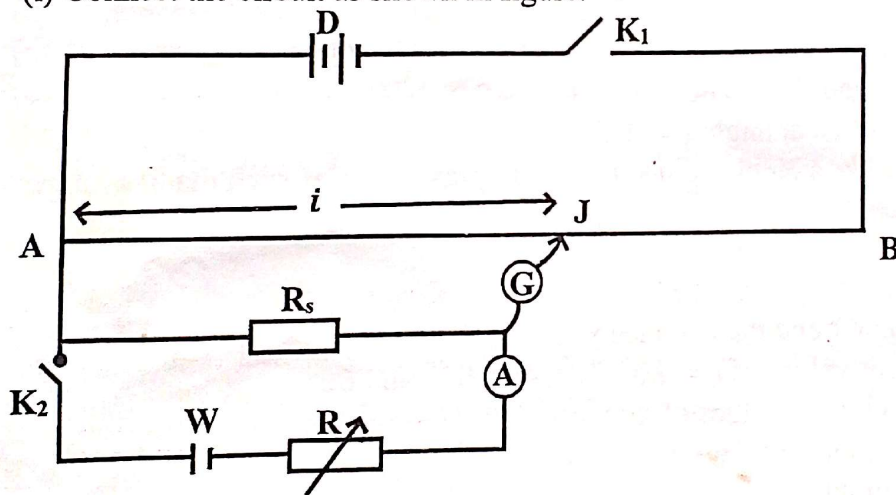
Attach your tracing paper on your answer scripts.

3. In this experiment, you will check the calibration of an ammeter using a slide wire potentiometre

- Connect the voltmeter provided across the terminals of the cell marked E
- Read and record the voltmeter reading  $E_0$
- Connect the circuit as shown in figure.



- Close switch,  $k$ ,
- Move the sliding contact J along the slide wire AB to locate a point on it for which G shows no deflection.
- Measure and record the balance length  $l_0$
- Open switch  $K_1$
- Calculate the value of  $k$  from the expression  $K = \frac{E_0}{l_0 \times R_S}$  where  $R_S = 1\Omega$
- Connect the circuit as shown in figure.



- Close switch  $k_2$
- Adjust the Rheostat  $t$ ,  $R$ , until the ammeter A reads  $I = 0.15A$
- Close switch  $k_1$
- Move the sliding contact J along the slide wire to locate a point on it for which G shows no deflection.
- Measure and record the balance length  $l$
- Open switch  $k_1$
- Repeat procedure (k) to (o) for ammeter reading  $I = 0.20, 0.25, 0.30, 0.45, \text{ and } 0.50A$ .
- Tabulate your results including the values of  $x = kl$
- Plot a graph of  $x$  against  $I$
- Find the slope,  $S$  of the graph.
- Comment on the value of the slope.