

PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT
ARUSHA REGION
FORM FOUR MOCK EXAMINATION
PHYSICS 2A

Code : 031

TIME: 2:30 Hours

WEDNESDAY 22ND MAY 2024

MAY 2024

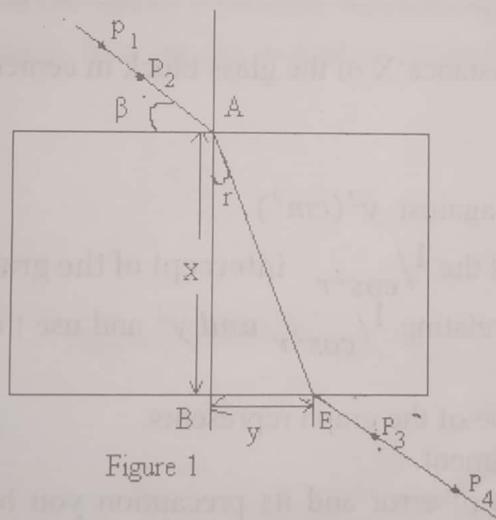
10:00 - 12:30

INSTRUCTIONS.

1. This paper consists two (2) questions
2. Answer all questions
3. Each question carries twenty five (25) marks.
4. No – programmable calculators may be used.

Questions.

1. You are provided with glass block, drawing pins soft drawing board, 4 optical pins and white paper and drawing equipment. Proceed as follow
 - i. Fix the white sheet of the paper on drawing board using drawing pin.
 - ii. Put the glass block with one of its largest surfaces top most on top of the plane paper.
 - iii. Trace the outline of the glass block on the paper by using pencil. Remove the glass block and draw a normal extending to opposite. Using a ruler join A and B as shown in figure 1



- iv. Draw a line making an angle of $B=30^\circ$. Stick two pins, P_1 and P_2 in a reasonable distance a part on the draw line.

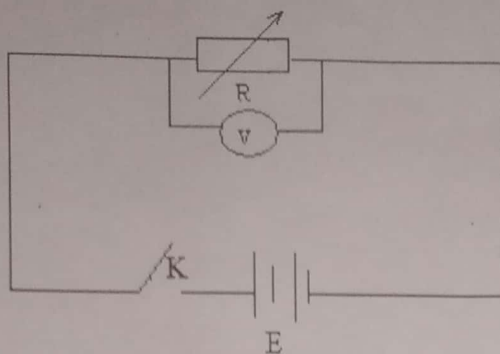
- v. Replace the glass block on the outline and stick two more pins, P₃ and P₄ at a positions which will make all pins P₁, P₂, P₃ and P₄ appear to be straight line as seen when observed through a glass block from opposite side then join point A to E
- vi. Remove the glass block and draw the complete path of the ray through the block. Measure and record the angle of refraction r and distance y in centimeter.
- vii. Repeat the procedure in (i) to (vi) for angles $B = 40^\circ, 50^\circ, 60^\circ$ and 70° and record your data as shown in the table.

$B(^\circ)$	r°	y (cm)	$\cos r$	$\cos^2 r$	$y^2(\text{cm}^2)$	$\frac{1}{\cos^2 r}$
30						
40						
50						
60						
70						

- viii. Measure and record the distance X of the glass block in centimeter.

Questions.

- Plot a graph of $\frac{1}{\cos^2 r}$ against $y^2(\text{cm}^2)$
 - Determine the slope, S and the $\frac{1}{\cos^2 r}$ intercept of the graph.
 - Deduce the equation that relating $\frac{1}{\cos^2 r}$ and y^2 and use the graph to find value of x
 - Explain what does the slope of the graph represents.
 - State the aim of this experiment.
 - State the possible sources of error and its precaution you have taken during the experiment.
2. The aim of this experiment is to determine the electromotive force (e.m.f) and internal resistance of the cells.
- Set up the circuit as shown in figure below



Connect the cell: E, key K and resistance R all in series such that the same current flows through all components when the key "K" is closed. Connect the given voltmeter V in parallel with resistance "R"

- (b) Set the resistance box to 1Ω , read and record the voltmeter (v) reading.
- (c) Repeat the above procedure with the resistance box set to 2, 3, 4 and 5 ohms respectively.
- (d) Make a table of V , $1/V$, R and $1/R$.
- (e) (i) Draw the graph of $1/V$ (vertical axis) against $1/R$ (horizontal axis)
 - (ii) Find $1/V$ intercept
 - (iii) Determine the slope M of the graph.
- (f) Deduce the equation which shows the relationship between $1/V$ and $1/R$ and then use the graph to find the electromotive force (e.m.f) and internal resistance of the cells.