THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

031/2

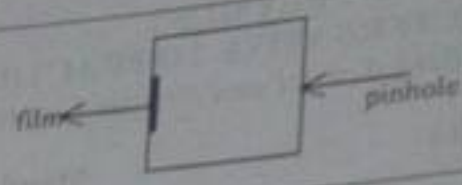
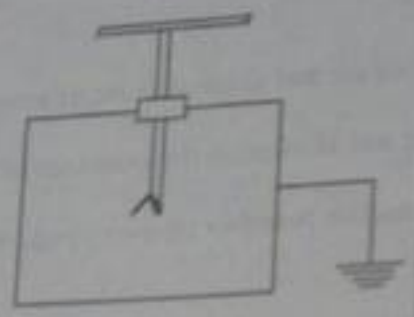
PHYSICS 3
ALTERNATIVE TO PRACTICAL
(For Both School and Private Candidates)

Time: 2 Hours 30 Minutes **Monday November 08, 2004 a.m.**

Instructions

1. This paper consists of **five** (5) questions.
2. Answer **all** questions.
3. Electronic calculators are **not** allowed in the examination room.
4. Cellular phones are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

1. *Fill in the gaps with the correct response.*

Name of device	Sketch	(i) Physical effect/principle (ii) Application (Uses)
(a)		(i) (ii)
(b) Siphon		(i) (ii)
(c)		(i) (ii)
(d) Magnetic compass		(i) (ii)
(e) Voltameter		(i) (ii)

2. *Table 1 below gives the variation of distance covered by a body sliding from rest, with time. The motion is similar to that of free fall, hence obeys the equation* $x = \frac{1}{2} t^2$. **(10 marks)**

Table 1

Distance, x (in m)	0.128	0.200	0.288	0.392	0.512
Time, t (in s)	0.8			1.4	1.6
t^2 (in s^2)		1.0	1.44		

(a) *Complete the table.* **($2^1/_2$ marks)**

(b) *Plot a graph of x against* t^2 *(x – axis).* **($5^1/_2$ marks)**

(c) *Find the slope of the graph.* **(1 mark)**

(d) *Determine the value of acceleration.* **(1 mark)**

3. Values of the current I, passing through a coil for corresponding values V of the potential difference across the coil as measured on a voltmeter are shown in table 3 below. The voltmeter has a zero error which has not been allowed for in the readings given.

Table 3

I (amperes)	0.05	0.20	0.35	0.50	0.65
V (volts)	0.85	2.80	4.75	6.70	8.65

(a) Plot a graph to show the relation between V as ordinate (y – axis) and I as abscissa (x – axis). (6 marks)

(b) Use the graph to determine the

(i) Resistance of the coil (3½ marks)

(ii) Correction which must be applied to the voltmeter readings (1 mark)

(iii) Correct value of the first p.d. (½ mark)

4. An experiment was set as shown in figure 1 below. A glass block was placed on a drawing paper. With a sharp pencil the outline of the glass block was drawn. Different paths of incident and refracted rays were drawn.

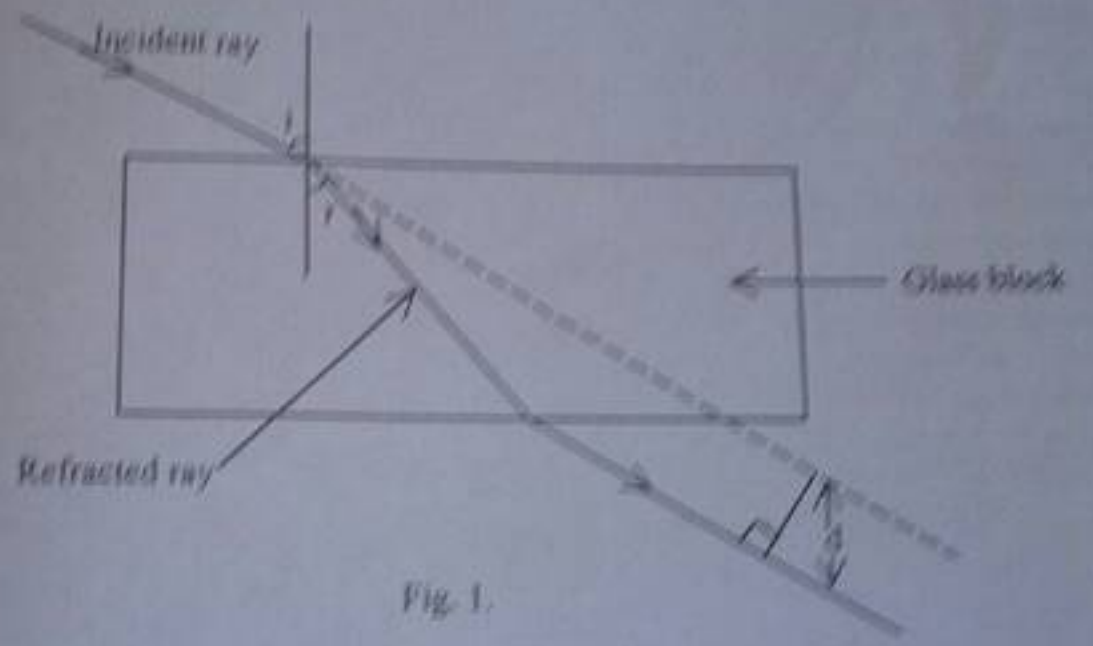


Fig. 1.

The results of the angles and the perpendicular distance 'd' measured between the incident ray and emergent ray are shown in table 3 below:

Table 3

i (deg.)	r (deg.)	d (cm)	dcos r	sin (i - r)
30	18	1.3	1.24	0.21
40	25	1.8		
50	32	2.3		
60	35	3.1		
70	38	4.2		

(a) Complete the table above. (4 marks)

(b) Plot a graph of dcos r against sin (i – r) (5 marks)

(c) Find the gradient of the graph. (1 mark)

5. Table 4 below shows the voltage across a semiconductor diode and its corresponding current.

Table 4

Voltage (V)	-2.0	-1.0	-0.5	0.0	0.7	2.0	3.5	5.0	5.5	6.0
Current, I, (mA)	-0.11	-0.09	-0.07	0.0	0.0	0.3	0.65	1.0	1.1	1.1

(a) Plot a graph of I against V (x - axis). **(7½ marks)**

(b) Give the term used to describe such a curve for a plot of I Vs V for a diode. **(1 mark)**

(c) What is the significance of negative values of voltage and current? **(1 mark)**

(d) What do positive values represent? **(1 mark)**

(e) State the use of the property of the device. **(½ mark)**