THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

NOVEMBER 1994

031/2

PHYSICS PAPER 2

ALTERNATIVE TO PRACTICAL

(For Both School and Private Candidates)

TIME: 3 Hours.

---

1. This paper consists of sections A, B, and C.
2. Answer ALL questions in ALL the sections in the answer book provided.
3. Wherever calculations are made, you are expected to show ALL steps involved.
4. Remember to write your Index Number on every page of your answer book provided.
5. Where necessary, make use of the following:

Acceleration due to gravity, $g = 10ms^{-2}$

$\pi = \frac{22}{7}$

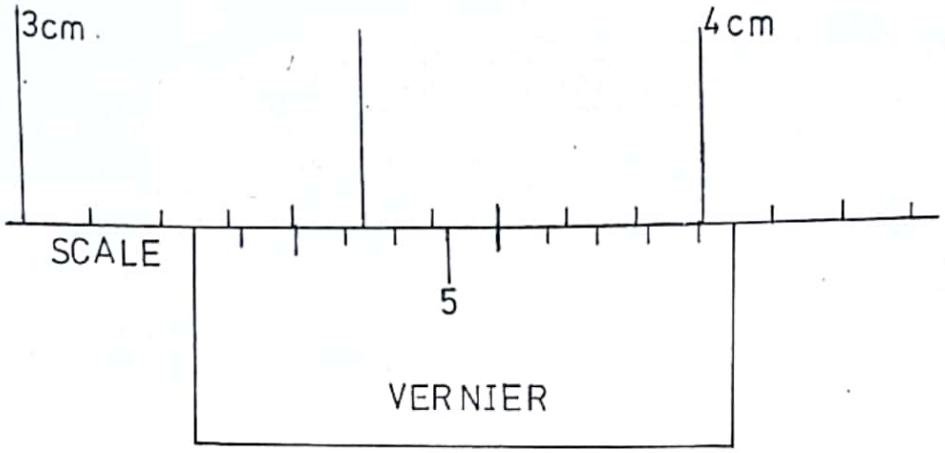
This paper consists of 5 printed pages.

Scanned with CamScanner

SECTION A

Answer ALL questions in this section.

1. (a) Record the vernier reading in figure 1 below.



(3)

Fig. 1

(b) Record the zero error (i.e. ± correction) for each of the figures 1.1 a and 1.1 b below.

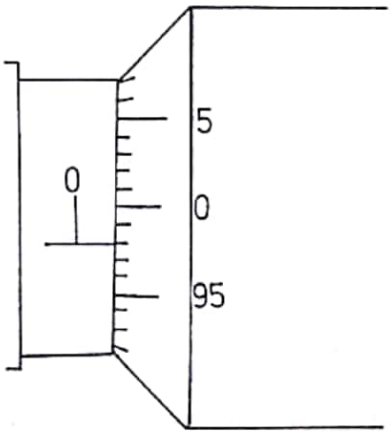


Fig. 1.1 (a)

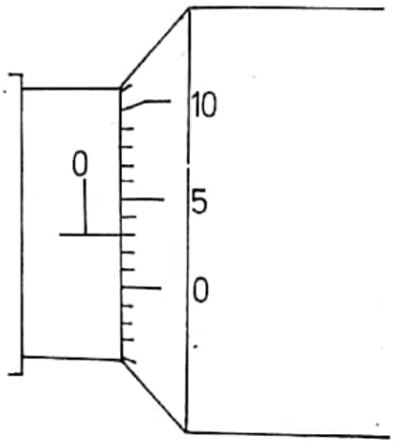


Fig. 1.1 (b)

(8)

(c) If the micrometer screw gauge of figure 1.1a in (b) above registered 2.13mm as the diameter of a wire, what was the true value of the diameter of the wire being measured ?

(3)

Scanned with CamScanner

2. Given below is a data obtained from an experiment carried out to investigate the performance of a pulley system whose velocity ratio was 2.

Load (N)	0.25	0.30	0.50	1.50	2.50	3.50	4.50	5.50	6.50
Effort (N)		0.63	0.72	1.26	1.76	2.26	2.74	3.24	3.78
Mechanical Advantage (M.A.)	0.42		0.69			1.55	1.64	1.70	1.72
Efficiency (%)	21								

(a) Complete the above table by calculating the missing corresponding values of effort, mechanical advantage and efficiency. (6)

(b) Plot a graph of Efficiency against Load. (7)

(c) Use your graph in (b) above to find the maximum efficiency of the pulley system. (2)

3. In one experiment, a small steel sphere was released from an electromagnet and fell freely under gravity until it hit a metal plate. This procedure was repeated until the total time, T for 10 falls through the same height, H was obtained.

The apparatus was then adjusted in order to obtain values of T for different heights. The readings recorded in the table below were obtained.

H (cm)	28.0	40.5	52.8	65.6	78.1	92.0
T (s)	2.40	2.87	3.28	3.67	3.99	4.33
T^2 (s^2)						

(a) (i) Complete the table above by calculating the values of T^2. (3)

(ii) Plot a graph of H against T^2. (7)

(iii) Find the slope of your graph in (a)(ii) above.

(b) If the slope of your graph in (a) (ii) above is $\frac{g}{200}$ where g is the acceleration due to gravity, calculate g. (3)

SECTION B

Answer ALL questions in this section.

4. The table below gives data which were obtained from a saturated vapour pressure (SVP) of a certain substance at various temperatures. Using the information from the data and giving reasons, determine between which two temperatures the boiling point of the substance lies under standard atmospheric pressure.

Temp. (^oC)	30	40	50	55	60	65
S.V.P. (mmHg)	260	380	365	670	800	1000

(14)

Scanned with CamScanner

5. An experiment was carried out in order to estimate the width of a rectangula glass slab. The angles of incidence, i and the corresponding angles of refraction, r were measured and recorded as shown below.

i (°)	r (°)	d(cm)	d cos r	sin (i - r)
20	12	0.75		
40	26	1.35		
50	30	2.10		
60	35.5	2.70		
70	42	3.20		

(a) Complete the table above. (4)

(b) Plot a graph of d cos r against sin (i - r). (7)

(c) Find the gradient of your graph in (b) above. (3)

(NB: d(cm) is the perpendicular distance measured between the incident ray produced and the emergent ray).

SECTION C

Answer ALL questions in this section.

6. Given below are experimental results obtained during the study of the variation of current, I passing through a coil of potential difference (pd), V across it using the Ammeter - Voltmeter method. The voltmeter had a zero error which was not allowed for in the readings given hereunder.

I (amps)	0.05	0.20	0.35	0.50	0.65
V (volts)	0.85	2.80	4.74	6.70	8.65

(a) Plot a graph of V against I. (7)

(b) Use your graph in (a) above to determine

(i) the resistance of the coil (3)

(ii) the correction which must be applied to voltmeter readings and give the correct value of the first potential difference. (4)

Scanned with CamScanner

7.

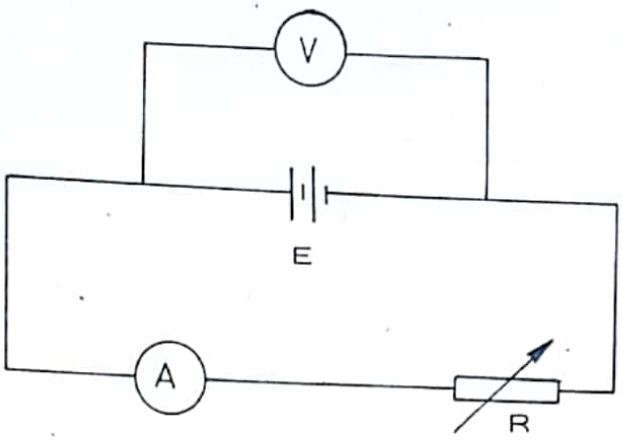


Fig. 7.a

In figure 7.a above, an ammeter, A and variable resistance, R are connected in series with battery E.

A high resistance voltmeter, V is connected across the battery. The variable resistance is adjusted to give a suitable reading, I of the ammeter and a reading, V of the voltmeter is also observed. Further adjustments of the variable resistance are made to give a series of values of I and V.

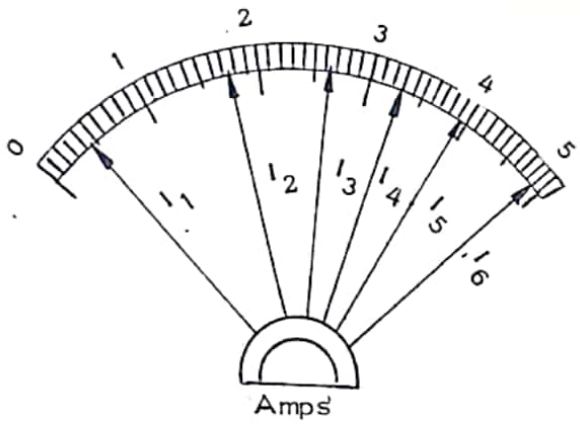


Figure 7.b

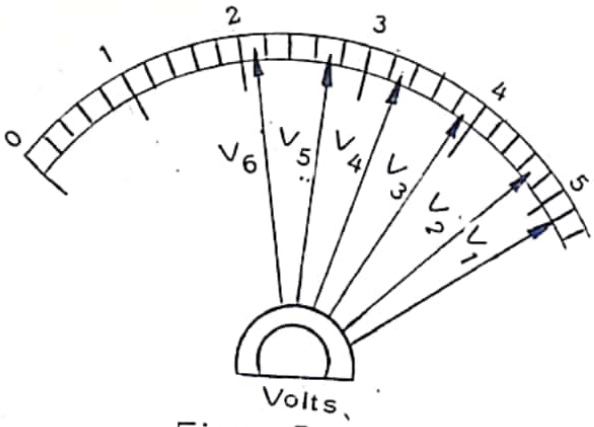


Figure 7.c

Figures 7.b and 7.c above indicate the readings of the current I_1, I_2, ... I_6 and the voltage V_1, V_2, ... V_6 respectively.

(a) Record the readings of I and V in a tabular form. (3)

(b) Plot a graph of I against V. (7)

(c) Use your graph in (b) above to obtain the value of

(i) I when V = 30 volts

(ii) V when I = 0 amperes

(iii) I when V = 0 volts. (3)

(d) Calculate the internal resistance, r of the battery if $r = \frac{Vo}{Io}$

Scanned with CamScanner