



232/3 -

**PHYSICS
(PRACTICAL)**

- Paper 3

Nov. 2017 - 2½ hours

Name Index Number

Candidate's Signature Date

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 2½ 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 may be used.
- This paper consists of 8 printed pages.**
- Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
- Candidates should answer the questions in English.

For Examiner's Use Only

Question 1	a	b	c	d	e
Maximum Score	1	1	6	4	8
Candidate's Score					

Total

Question 2	a	b	c	d	e	f	g	h	i	j	k
Maximum Score	2	2	0	1	2	4	1	1	1	4	2
Candidate's Score											

Total

Grand Total



PART A

1. You are provided with the following:

- One dry cell in a cell holder
- One milliammeter
- A resistor labelled R1
- A chain of six resistors
- A switch
- Connecting wires

Proceed as follows:

(a) Set up the circuit as shown in **Figure 1**

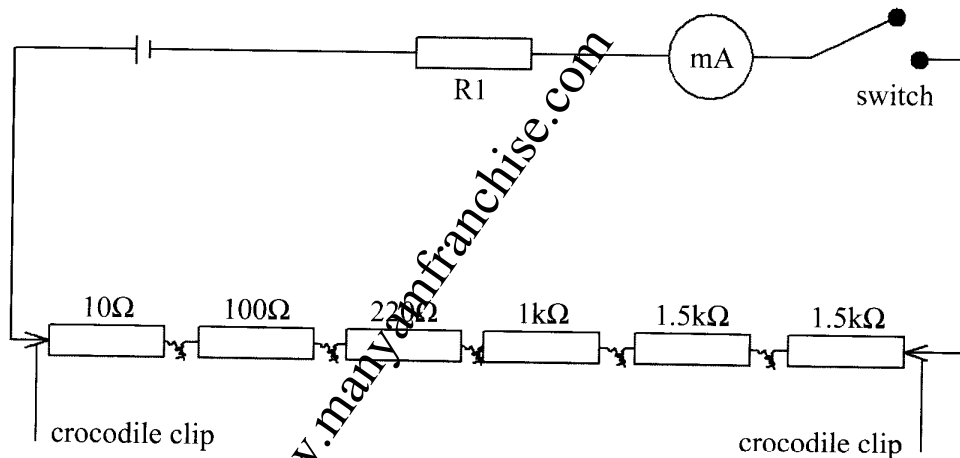


Figure 1

Switch on the circuit to obtain a positive deflection in the milliammeter. Record the reading I_1 of the milliammeter.

$I_1 = \dots\dots\dots$ mA (1 mark)

(b) Remove the crocodile clips from the ends of the chain of resistors and connect them across two resistors in the resistance chain that add up to 3.0 k Ω . Record the reading of the milliammeter I_2 .

$I_2 = \dots\dots\dots$ mA (1 mark)

(c) Repeat the procedure in (b) for other values of resistance R shown in **Table 1** and complete **Table 1**.

(Hint: The values of R may be obtained by combining two or more resistors in the chain)

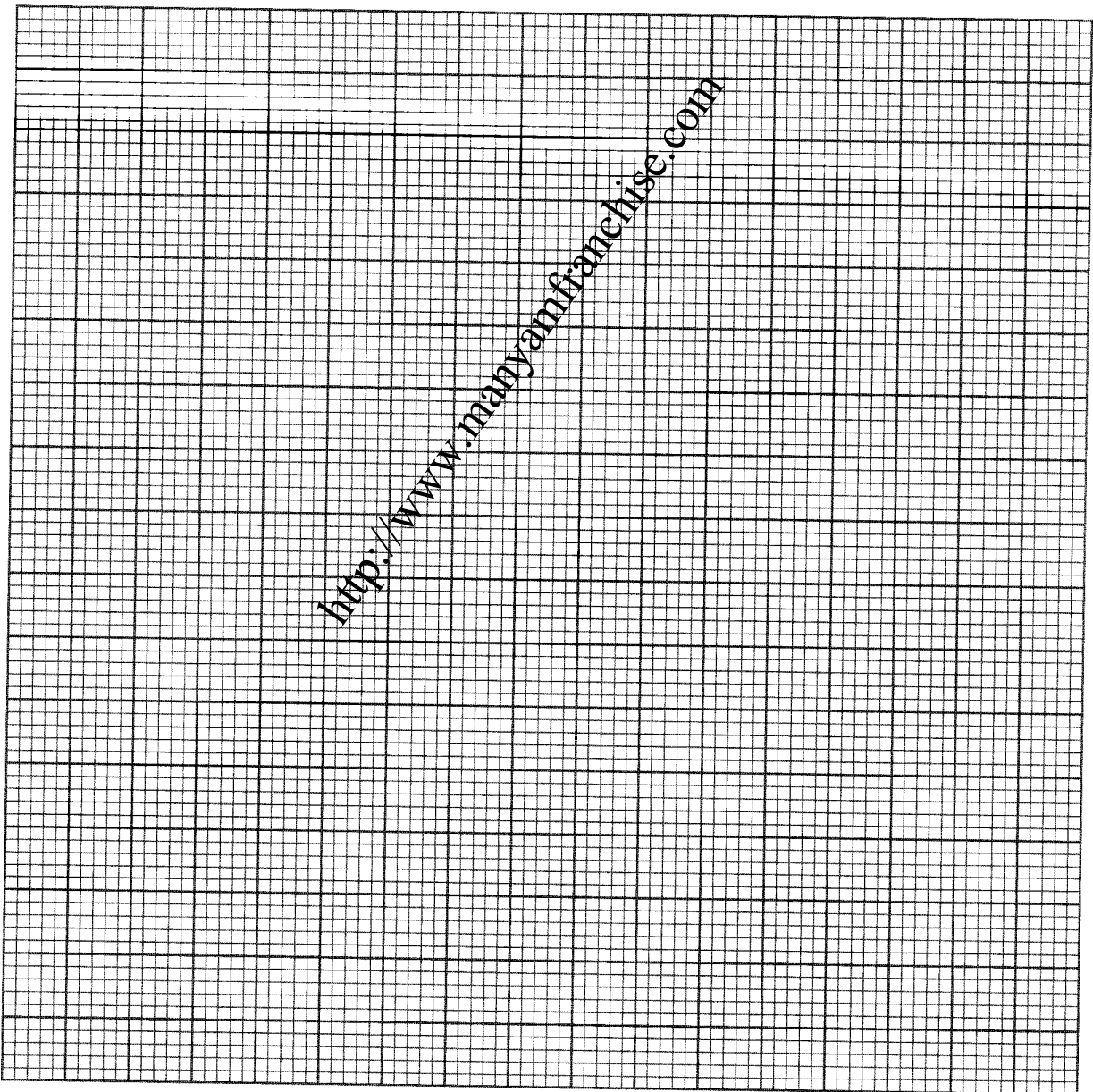
Table 1

(6 marks)

$R \times 10^3 (\Omega)$	0.330	1.0	1.33	1.5	2.5	4.0
$I (\text{mA})$						
$I (\text{A})$						
$\frac{1}{I} (\text{A}^{-1})$						

(d) Plot a graph of $\frac{1}{I}$ (y axis) against R

(4 marks)



(e) (i) Determine the slope S of the graph. (3 marks)

.....
.....
.....

(ii) Given the equation $E = I(R+R_1)$ determine the values of:

(I) E . (3 marks)

.....
.....
.....

(II) R_1 . (2 marks)

.....
.....
.....
.....

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NB: The plain sheet of paper must be submitted together with the question paper.

- (b) At a point about a thirdway along one side of the outline from angle A, draw a normal. (2 marks)
- (c) Draw a line at angle $i = 40^\circ$ to the normal. Stick two pins P_1 and P_2 vertically on this line. (see Figure 3).

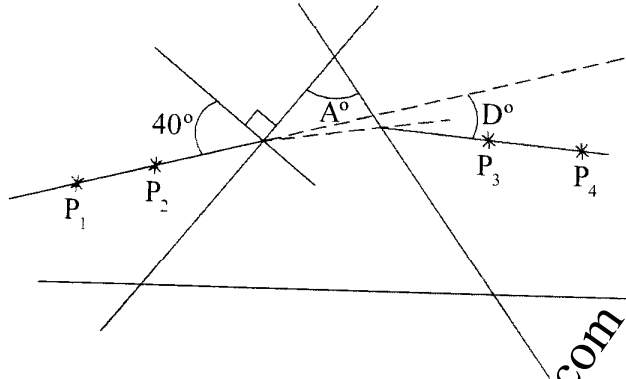


Figure 3

Place the prism accurately on the outline. By viewing through the opposite side, stick two other pins P_3 and P_4 vertically such that they are in line with the two images of pins P_1 and P_2 .

- (d) Remove the prism and the pins. Draw a line joining the marks made by P_3 and P_4 . Extend lines $P_1 P_2$ and $P_3 P_4$ to intersect. Hence measure the angle of deviation D .
 $D = \dots\dots\dots$ (1 mark)
- (e) For two other values of angle i shown in **Table 2** locate and measure the corresponding angles of deviation. Complete **Table 2**.

Table 2

(2 marks)

i	40°	50°	60°
D			

- (f) (i) Determine the average value D_m of D . (1 mark)

.....

(ii) Determine the constant K using the equation;

(3 marks)

$$k = \frac{\sin\left(\frac{A + D_m}{2}\right)}{\sin\frac{A}{2}}$$

.....

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PART B*(Read all the instructions before starting this part)*

- (g) Using the thermometer measure and record the temperature of the room
- θ
- .

 $\theta = \dots\dots\dots$ $^{\circ}\text{C}$ (1 mark)

- (h) Using the 250 ml beaker, collect 200 ml of hot water from the boiling water source. Place the thermometer into the hot water and wait until the water cools to
- 80°C
- then start the stopwatch and record the time
- t_1
- it takes the water to cool to
- 75°C
- .

 $t_1 = \dots\dots\dots$ seconds (1 mark)

- (i) Wait until the water cools to
- 70°C
- then start the stopwatch and record the time
- t_2
- it takes the water to cool to
- 65°C
- .

 $t_2 = \dots\dots\dots$ seconds (1 mark)

- (j) Determine the rate of temperature change
- X
- and
- Y
- in the two time intervals;

(I) $X = \frac{77.5 - \theta_0}{t_1}$, (2 marks)

.....
.....
.....

(II) $Y = \frac{67.5 - \theta_0}{t_2}$. (2 marks)

.....
.....
.....

- (k) State with a reason how the rate of change of temperature between
- 90°C
- to
- 85°C
- compares with
- X
- . (2 marks)

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