232/3
PHYSICS
PAPER 3
JULY 2017
2½ HOURS

END OF TERM II EXAMINATION
MARKING SCHEME

232/1
PHYSICS
PAPER 3

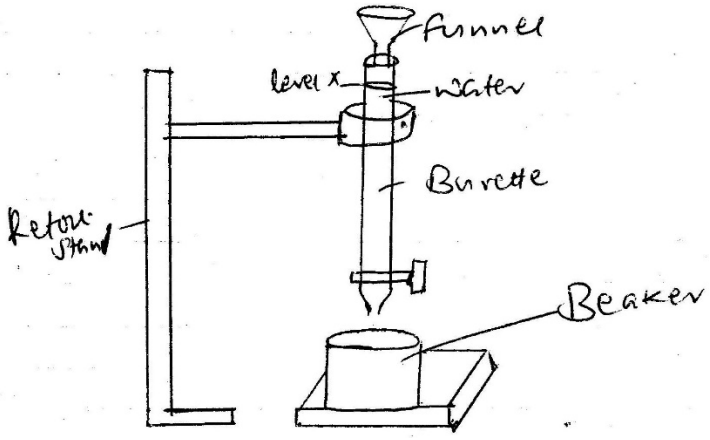
QUESTION 1

You are provided with the following apparatus

- Two beakers.
- A complete retold stand.
- Funnel.
- Cotton wool.
- Access to water.
- Stop watch.
- A burette with a tap (50cm3).
- 100ml measuring cylinder.

Proceed as follows:

a) Set the apparatus as follows:



I Support the burrete on a result as shown above

II Close the tap of the burrete and fill it with water to the brim

III Transfer the water to the 100ml measuring cylinder and record the volume of the water

Volume V_1 65cm^3 (1mk)

b) Fill the burrette with water up to the 0cm3 mark. Drain this water into 100ml measuring cylinder and record its volume V_2

V_2 53cm^3 (1mk)

The excess water above the zero mark is given by

$V_0 = V_1 - V_2$

V_0 = 65 – 53 = 12cm^3 (1mk)

(This volume should be added to the final volume of the burette reading when water has been drained)

c) Fill the burrete with water to the brim. Finally open the tap at once and start the stop watch simultaneously. Obtain the time, t taken for the level of water to reach X=10cm^3

Volume drained = (V_0+10) cm3

Refill the burette with water. Finally open the tap at once and start the stopwatch simultaneously. Obtain the time taken for the level of water to reach x = 20cm^3

Volume drained = (V_0+20) cm^3

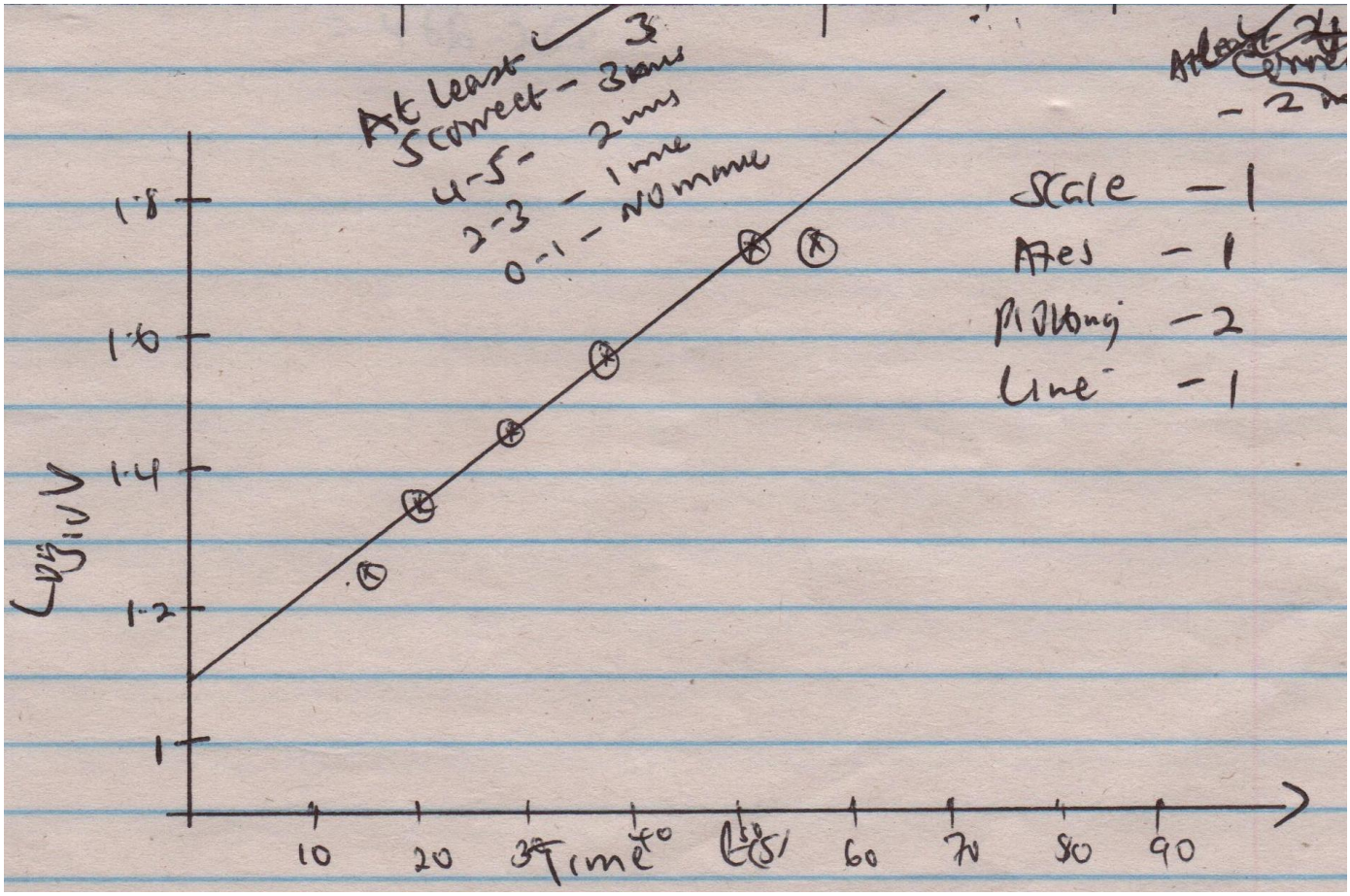
d) Repeat the procedure for other values of the burette readings.

Record the volume drained and the corresponding time in the table below.

Burette reading X(cm^3)	Volume of water drained v=(V_0 + x)cm^3	Time t(s)	Log_{10} V
10	22	15.90	1.3424
20	32	23.29	1.5051
30	42	33.15	1.6232
40	52	44.12	1.7160
45	57	49.50	1.7559
50	62	59.28	1.7924

(9marks)

i) Plot the graph of $log_{10}v$ (vertical axis) against time t. (5mks)



Slope = $\frac{1.88-1.3}{64-0}$

$= \frac{0.58}{64} = 0.009s^{-1}$

ii) Using your graph, calculate the value for b and n from the equation. (3mark)

$\text{Log10 } v = \frac{4.2t}{b} + n$

n= the vertical intercept
n = 1.28

$\text{Slope} = \frac{4.2}{b}$

$b = \frac{4.2}{slope}$

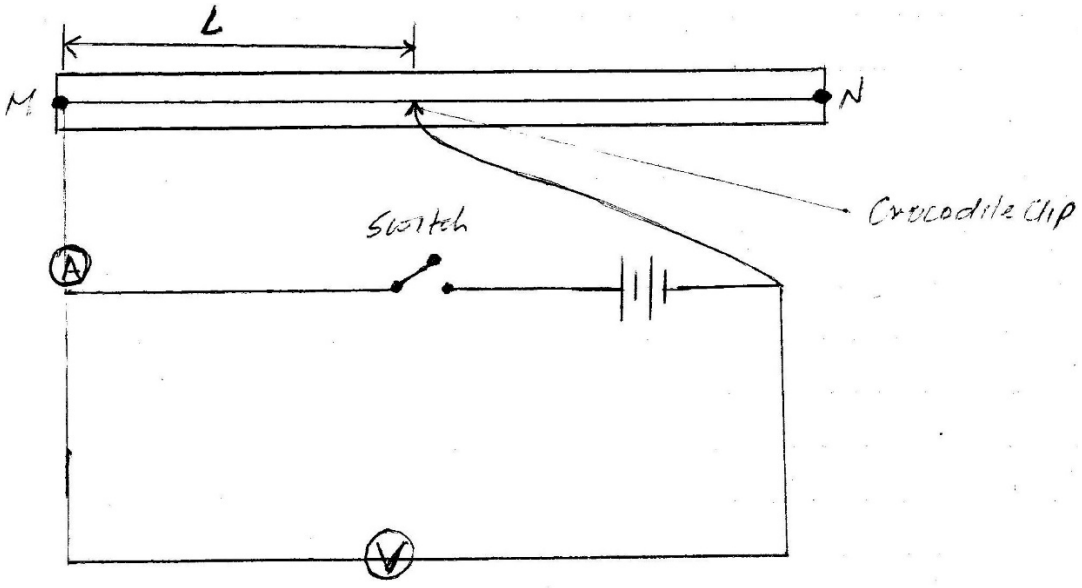
$= \frac{4.2}{0.009} = 466.755$

QUESTION 2

a) You are provided with the following apparatus:

- Resistance wire fitted on a scale labelled MN
- Switch
- Voltmeter (0.3v) or(0.5v)
- Ammeter (0.1A)
- Two dry cells
- Six connecting wires

i) Set up the apparatus as shown in the fig 1 below.



ii) Remove the crocodile clip from the resistance wire MN and close the switch. Record the voltmeter reading.

Y 2.7 V (1mk)

iii) Attach the crocodile clip to the resistance wire such that L=10cm.

iv) Record the voltmeter and ammeter reading in the table below.

v) Repeat the procedure in (iii) and (iv) for L= 20 cm, 30 cm, 40 cm, 50cm, 60 cm, 70cm and 80 cm.

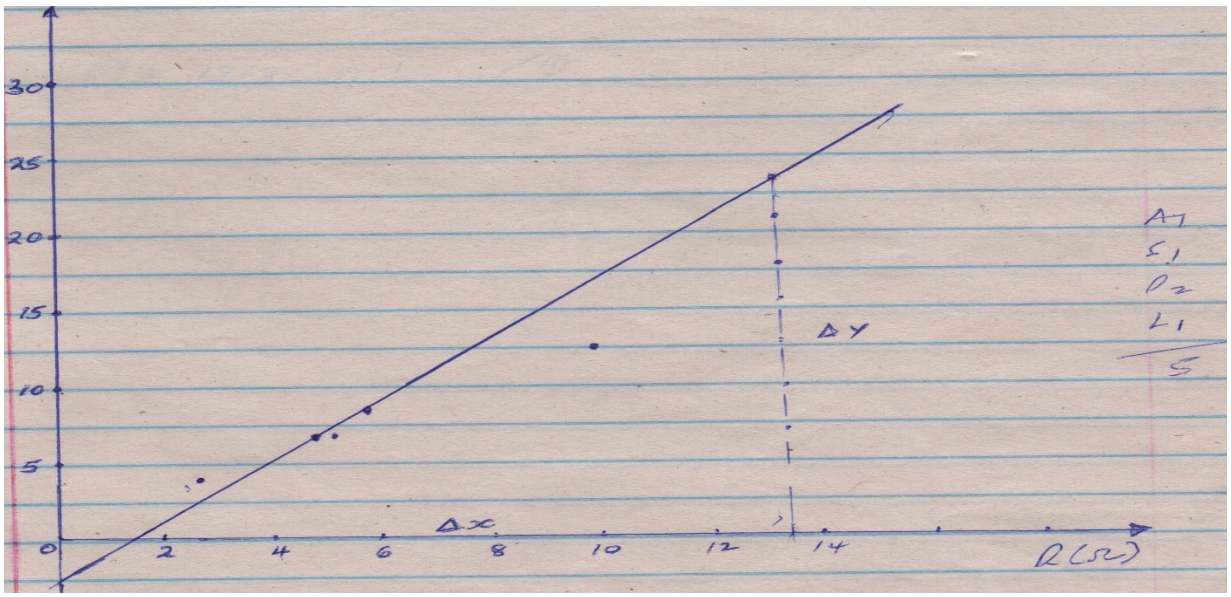
vi) Complete the table below.

Length L(cm)	10	20	30	50	80
Current I(A)	0.86	0.48	0.43	0.255	0.205
p.d V(V)	2.1	2.3	2.4	2.5	2.6
y-v	0.6	0.4	0.3	0.2	0.1
$\frac{V}{Y-V}$	3.5	5.75	8.0	12.5	26
$\frac{V}{I}$= R (Ω)	2.4419	4.7917	5.5814	9.8039	12.6829

(9mks)

- At least 3 correct readings row 1 and 2 - (2mks)
- 4-5 correct reading row 1 & 2 – (3 mks)
- Row 3 & 4 all correct - (1mk)

vii) a) Plot the graph of $\frac{V}{Y-V}$, vertical axis against R (5mks)



b) Determine the slope, m of the graph (2mks)

Slope = $\frac{d\frac{V}{Y-V}}{dR}$

= $\frac{26-0}{12.8-2.6}$

Slope = 2.55 Ω^{-1}

c) The graph is given by the equation

$$\frac{V}{Y-V} = \frac{MR}{5} + d$$

Determine the value of m and d (3mks)

d = -2.55

$\frac{m}{5}$ = Gradient + slope

$\frac{m}{5}$= 2.55

M = 2.55 x 5

m = 12.75 Ω^{-1}