جامعة بيرزيت

BIRZEIT UNIVERSITY

Faculty of Science كلية العلوم

Department of Physics دائرة الفيزياء

8.5

Phys111 Report

Experiment #4: DC Circuit

Name:	Ayham Nobani	ID #:	1241998
Partner:	Zaid Abukhdair	ID #:	
Section:	28		
Date:	14/10/2024		

(1) Abstract:

- **Aim of the experiment:**

To test a material and determine if it's ohmic or non-ohmic By calculate R.

- **The main results are:**

$R = (71 \pm 7)\ \Omega$

$R_s = (232 \pm 30)\ \Omega$

$R_p = (51 \pm 3)\ \Omega$

(2)Data:

Part A: One resistor circuit

	1	2	3	4	5	6
$I\ (mA)$	6	13	19	25	33	40
$V\ (volts)$	0,5	1.0	1.5	2.0	2,5	3.0

$\bar{I} = 22.7\ mA$

$\bar{V} = 1,75\ volt$

$\Delta I = 1\ mA$	$\Delta V = 0,1\ volt$

Part B: Two resistors in series

$I_s = 11\ mA$	$V_s = 2,55\ volt$
$\Delta I_s = 1\ mA$	$\Delta V_s = 0,1\ volt$

Part C: Two resistors in parallel

$I_p = 50\ mA$	$V_p = 2,55\ volt$
$\Delta I_p = 1\ mA$	$\Delta V_p = 0,1\ volt$

(3) Calculations:

Part A: One resistor circuit

From Graph	$R = 71\ \Omega$	From Color code	$R = 75\ \Omega \rightarrow R_1$
	$\Delta R = 7\ \Omega$		$\Delta R = 4\ \Omega$

Resistance form color code

A: Violet (7) B: Green (5) C: black (10) D: Gold (5%)

$R_1 = (75 \pm 4)\ \Omega$

A: brown (1) B: Green (5) C: brown (10) D: Gold (5%)

$R_2 = (150 \pm 8)\ \Omega$

Part B: Two resistors in series

From Experiment	$R_s = \frac{V_s}{I_s} = \frac{2.55}{11\times10^{-3}} = 232\ \Omega$	From Color code	$R_s = R_1 + R_2 = 225\ \Omega$
	$\Delta R_s = R_s\left(\frac{\Delta V}{V_s} + \frac{\Delta I}{I_s}\right) = 30\ \Omega$		$\Delta R_s = \Delta R_1 + \Delta R_2 = 12\ \Omega$

Part C: Two resistors in series

From Experiment	$R_p = \frac{V_p}{I_p} = \frac{255}{50\times10^{-3}} = 51\ \Omega$	From Color code	$R_p = \frac{R_1 R_2}{R_1 + R_2} = 50\ \Omega$
	$\Delta R_p = R_p\left(\frac{\Delta V}{V_p} + \frac{\Delta I}{I_p}\right) = 3\ \Omega$		$\Delta R_p = R_p^2\left(\frac{\Delta R_1}{R_1^2} + \frac{\Delta R_2}{R_2^2}\right) = 3\ \Omega$

(4) Results:

$R = (71 \pm 7)\ \Omega$

$R_s = (232 \pm 30)\ \Omega$

$R_p = (51 \pm 3)\ \Omega$

Range of R = [(R − ΔR), (R + ΔR)]

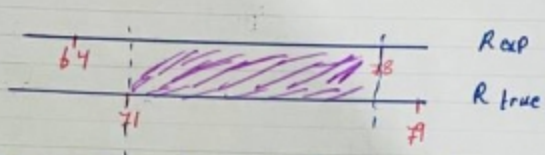
(5)Conclusions:

First, I can know the result is accept or not by range test

→ Lets start with R → My value → [(71−7), (71+7)]

→ [64, 78] Ω

True value of R → [(75−4), (75+4] → [71, 79] Ω

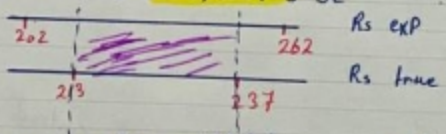


There is common area, so the result (R) is accepted.

common area → [71, 78]

Rs → My value → [202, 262] Ω

true value → [213, 237] Ω

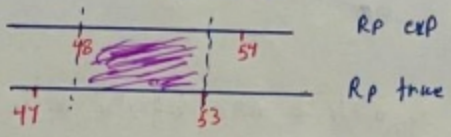


There is common area, so the result (Rs) is accepted.

[213, 237]

Rp → My value → [48, 54] Ω

true value → [47, 53] Ω



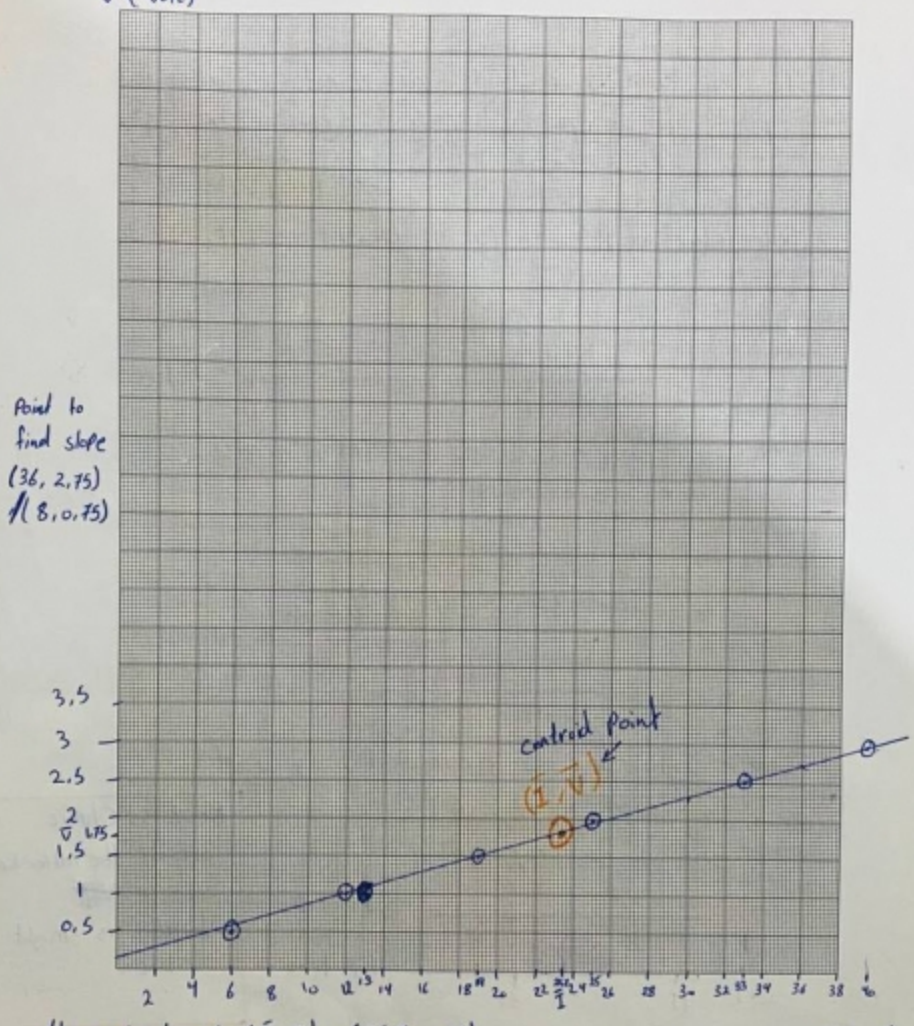
There is common area, so the result of (Rp) is accepted.

[48, 53]

My 3 result is accepted.

R is Ohmic because the relationship between V and I is straight Line.

$(V_{(Volts)}$ VS $I_{(mA)})$



the centroid point = $(\bar{I}, \bar{V}) = (22,7 , 1,75)$.

$R = \text{slope} = \frac{\Delta V_{(volts)}}{\Delta I_{(mA)}} = \frac{(2,75 - 0,75)}{(36 - 8)*10^{-3}} \approx 71\ \Omega$

$\Delta R = \left(\frac{\Delta V}{\bar{V}} + \frac{\Delta I}{\bar{I}}\right) * R = \left(\frac{0,1}{1,75} + \frac{1}{22,7}\right) * 71 \simeq 7\ \Omega$