LAB REPORT FOR EXPERIMENT 9
KIRCHHOFF'S LAWS

Date: ----------

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Physics Section:----------

Instructor's Nam

PHYSICS LAB EXPERIMENT 9 : KIRCHHOFF'S LAWS

1. PURPOSE :

to find values of resistances and currents in network of Resistance and current entering an leaving a junction (node) by Kirchhoff's laws.

II. DATA AND DATA ANALYSIS:

A. DATA:

1. Record the measured values of V_1 , V_2 , V_{R_1} , V_{R_2} and V_{R_3} and their **polarities** on digram 1 shown bellow.

2. Record the measured values of I_1, I_2, and I_3 and and their **direction** of flow on **diagram 1.**

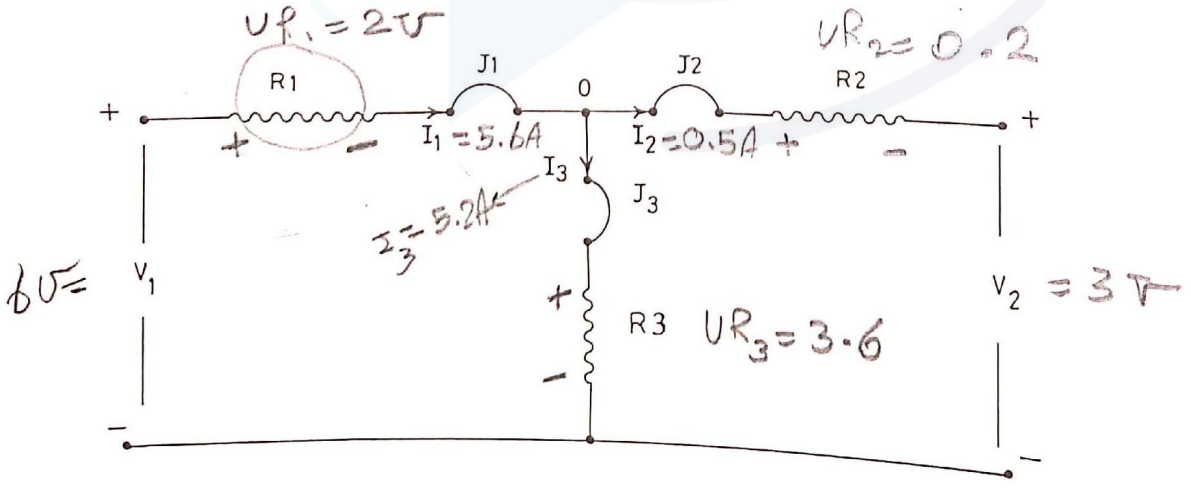
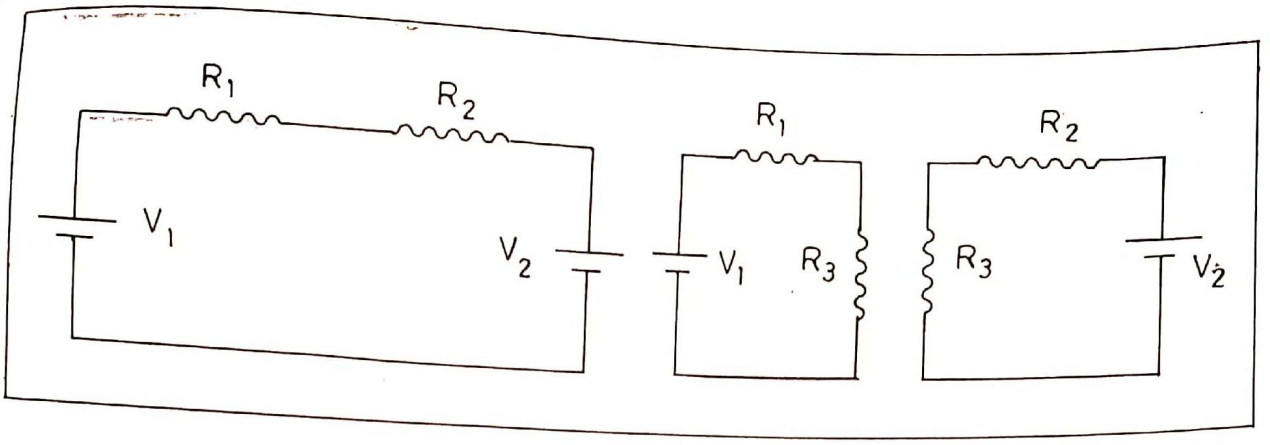


diagram 1

B. Using the values obtained in part A, calculate the sum of voltage drops around the three loops shown below:



$UR_1 = 2V$

$UR_3 = 3.6V$

$UR_2 = 0.2$

$V_1 + V_{R_1} + V_{R_3}$ = 6 - 2 - 3.6 = -0.4 volt

$V_2 + V_{R_2} + V_{R_3}$ = 3 + 0.2 - 3.6 = -0.4 volt

$V_1 + V_{R_1} + V_{R_2} - V_2$ = 6 - 2 - 0.2 - 3 = 0.8 volt

Are the sums shown above equal to zero?

$UR_2 = 0.4 = |-0.4| + 0.8$

$= 0.8V$

C. Using the values of currents obtained in part A, calculate the total sum of currents at the junction O

$I_1 + I_2 + I_3$ = 5.6 + -0.4 + -5.2 = 0 A

Is the sum equal to zero?

yes

$I_1 = I_2 + I_3$

$5.6 = 0.4 + 5.2$

$0 = 0$ ✱

D. Using the values of V_1 and V_2 and the values of R_1, R_2, and R_3, set up the **loop** and **branch** equations, and solve them to determine the values of I_1, I_2 and I_3 and **compare** with the values obtained **experimentally** in part A.

Loop equations:

$I_1 = I_2 + I_3$ ——— (1)

$\sum U = 0$

$U_1 - I_1 R_1 - I_3 R_3 = 0$ ——— (2)

$U_2 + I_2 R_2 - I_3 R_3 = 0$ ——— (3)

$U_1 - I_1 R_1 - I_2 R_2 - U_2 = 0$ ——— (4)

Branch equations:

$6 - I_1 (47 * 10) - I_3 (65 * 10) = 0$ ——— (2)

$3 + I_2 (36 * 10) - I_3 (65 * 10) = 0$ ——— (3)

$6 - I_1 (47 * 10) - I_2 (36 * 10) + 3 = 0$ ——— (4)

by calculator

$I_1 =$

$I_2 =$

$I_3 =$

تعويض معادلة في فرع D بالقيم التي تم ايجادها
ثم ايجاد I3, I2, I1 بالالة الحاسبة ،القيم هنا خاطئة لخطأ في اجهزة القياس.

Calculated values:

I_1 = ---------- Ampere

I_2 = ---------- Ampere

I_3 = ---------- Ampere

Experimental values:

I_1 = 5.6 Ampere

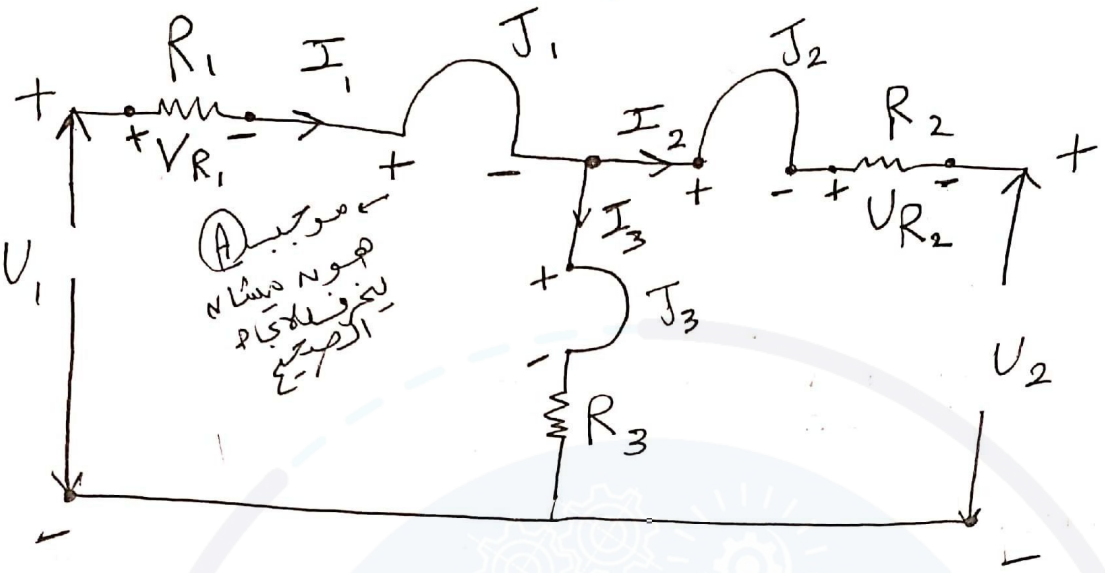
I_2 = 0.4 Ampere

I_3 = 5.2 Ampere

*Kirchoff's law

Junction نقطة تفرع

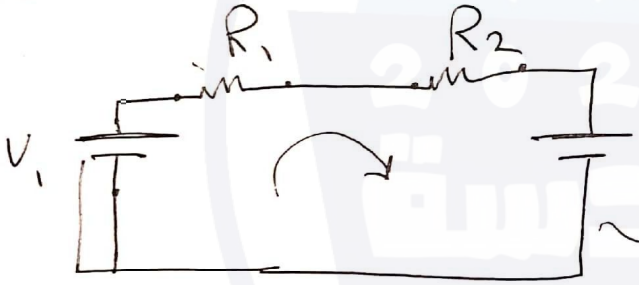
Current rule $\Sigma I_{in} = \Sigma I_{out}$



الهدف من الـ Jumper أرفعه وأشيك أضع Ammeter وبجيبلي I اللي بمر

محل الـ Jumper

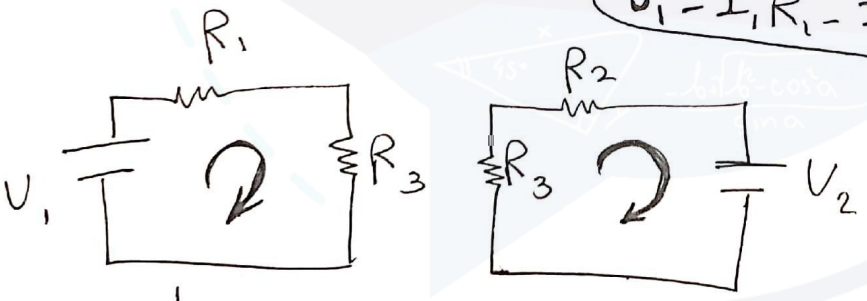
عندي 3 Circuits



بس أمشي مع التيار بحيث انخفاض V2 في الجهد

$V_1 - V_{R_1} - V_{R_2} - V_2 \stackrel{?}{=} 0$

$V_1 - I_1R_1 - I_2R_2 - V_2 = 0$ (1)



$V_1 - V_{R_1} - V_{R_3} \stackrel{?}{=} 0$

$V_1 - I_1R_1 - I_3R_3 = 0$ (2)

$I_1 \stackrel{?}{=} I_2 + I_3$

$-V_2 + V_{R_3} - V_{R_2} = 0$

$-V_2 + I_3R_3 - I_2R_2 = 0$ (3)

* انتبهي الـ Jumper إذا رفعته بيروح التيار بيظلو النقطتين شابكين ببعض. يعني يا إما أخلي الـ Jumper أو أحط أميتر محله

* الـ Jumper مجرد سلك توصيل *