APRIL 8TH, 2019

“DIVISOR DE VOLTAJE Y DE CORRIENTE”

PRACTICE 5

Cabañas Baxcajay Jesús Francisco
Hernández Velázquez Ángel
Martínez Coronel Brayan Yosafat
1CM10

INDEX

PRACTICE DEVELOPMENT

VOLTAGE DIVIDER

Set voltage font value at 10V and adjust electric current font at maximum. Then over the connection table and without energizing the font, build the circuit below. Make measures of voltage and fill the table.

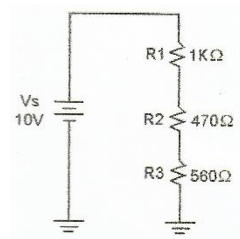
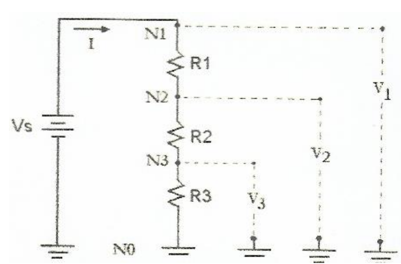


Table of Voltages Values

Voltage	Theoretical Value (V_C)	Measured Value (V_M)	ΔV or ΔI
V_{R1}	4.93 V	4.96 V	0.03 V
V_{R2}	2.31 V	2.34 V	0.03 V
V_{R3}	2.75 V	2.81 V	0.06 V
V_1	10 V	10.11 V	0.11 V
V_2	5.07 V	5.13 V	0.06 V
V_3	2.75 V	2.78 V	0.03 V
I_T	$4.92\text{x}10^{-3}$ A	$5\text{x}10^{-3}$	0.08 A

$$\Delta V = |V_M - V_C|$$

Now, using the figure, if R_1 = 1 KΩ and R_2 = 2.2 KΩ, what is the necessary value of R_3 to have a voltage value of V_3 = 5V if V_s = 10V, build the circuit and, if it is necessary, use an array of or use a potentiometer and check it. R_3 = 3.2 KΩ.



Build a voltage divider circuit as showed on the figure, with V_S = 10V and calculate voltage values from table below.

Value	R_1	R_2	R_3
V_2 = 5 V	1 K	600	400
V_3 = 3 V	1 K	600	400

ELECTRIC CURRENT DIVIDER

Set voltage font value at 10V and adjust electric current font at maximum. Then over the connection table and without energizing the font, build the circuit below. Make measures of electric current and fill the table.

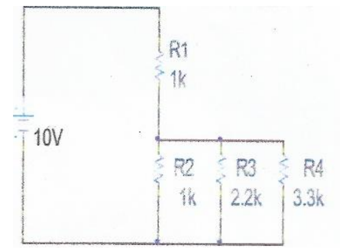


Table of Electric Current Values

Electric current	Theoretical Value (I_C)	Measured Value (I_M)	$\Delta I = \lvert I_M - I_C \rvert$
I_{R1}	6.37 $\times 10^{-3}$ A	6.46 $\times 10^{-3}$ A	0.09 $\times 10^{-3}$ A
I_{R2}	3.62 $\times 10^{-3}$ A	3.7 $\times 10^{-3}$ A	0.08 $\times 10^{-3}$ A
I_{R3}	1.64 $\times 10^{-3}$ A	1.72 $\times 10^{-3}$ A	0.08 $\times 10^{-3}$ A
I_{R4}	1.098 $\times 10^{-3}$ A	1.14 $\times 10^{-3}$ A	0.042 $\times 10^{-3}$ A
I_T	6.37 $\times 10^{-3}$ A	6.46 $\times 10^{-3}$ A	0.09 $\times 10^{-3}$ A

CUESTIONARY

WHY DOES EXIST A DIFFERENCE BETWEEN THEORETICAL VALUE AND MEASURED VALUE?

Not just in this case, we have had those situations since, and we have realized voltage font can set different values and show the same, we mean, if we put 7.09 V, it just shows 7.0 V, also, when we do calculations with Voltage Divider or Electric Current Divider, we round the values, and this is knew as accumulative error. We think that is why there is a difference between values.

WHAT IS THE UTILITY OF MAKING A VOLTAGE DIVIDER FOR ELECTRICAL CIRCUIT ANALYSIS?

We can directly use it when we know values of resistors, imagine a circuit where we have lots of resistors, and if we resolve it with Kirchhoff Laws it could take us a while, but we can know every value, just using voltage divider directly.

WHAT IS THE UTILITY OF MAKING AN ELECTRIC CURRENT DIVIDER FOR ELECTRICAL CIRCUIT ANALYSIS?

As we wrote up, it is more efficient when we use current divider directly in a circuit with lots of resistors.

CAN WE USE VOLTAGE AND ELECTRIC CURRENT DIVIDER FOR MORE RESISTORS?

Of course

IF WE NEED SPECIFICALLY VALUES OF VOLTAGE FOR EVERY NODE. WHAT CAN WE DO?

We can use directly voltage divider, that is why it was discovered.

CONCLUSIONS

CABAÑAS BAXCAJAY JESÚS FRANCISCO

We studied voltage and current divisors, new kind of circuits for us, and easiest. They are very useful circuits, that divides voltage and current in a proportional way. This kind of circuits obeys Ohm Law.

HERNÁNDEZ VELÁZQUEZ ÁNGEL

The voltage and current divider are very efficient technique that allows us to obtain values more quickly due to the system of equations that are obtained. In the practical field, its advantages are not so noticeable, however, to have a previous calculation there is no doubt that it is efficient.

MARTÍNEZ CORONEL BRAYAN YOSAFAT

Some things have better ways to make them, this is one of them. Because, by knowing many ways of resolution of something, when we do, we are ready for make things faster, make thing better and with so many ways. It is not just for more knowledge; it is for better calculations.

CALCULATIONS

For point 3, we use the voltage divider formula for each resistance.

$V_{R1} = V_S (R_1/(R_1+R_2+R_3))$

Then, we substitute values of V_S = 10V, R_1 = 1kΩ, R_2=470Ω & R_3=650Ω.

V_{R1} = 4.92610837438V

V_{R2} = 2.31527093596V

V_{R3} = 2.75862068966V

And for voltages V_1, V_2 & V_3:

$V_1 = V_S$

$V_2 = V_S(R_2+R_3 / R_1+R_2+R_3)$

$V_3 = V_S(R_3 / R_1+R_2+R_3)$

Substituting

V_1 = 10V

V_2 = 5.07389162562V

V_3 = 2.75862068966V

$I = V_S / (R_1+R_2+R_3)$

I = 0.00492610837A = 4.926 mA.

For the 4th point:

$V_3 = V_S(R_3 / R_1+R_2+R_3)$

Reflecting R_3

$V_3(R_1+R_2+R_3) = V_S*R_3$

$V_3R_1+V_3R_2+V_3R_3 = V_S*R_3$

$V_3R_1+V_3R_2 = V_S*R_3 - V_3R_3$

$R_3 = (V_3R_1+V_3R_2 / V_S - V_3)$

Then

$R_3 = 3200\Omega$.

For 5th point we proposed $R_1 = 1000\Omega$, and with de same voltage divisor formula we obtain values $R_2 = 400\Omega$ & $R_3 = 600\Omega$.

Current Divisor

For this circuit we need to calculate the total resistance.

$R_T = 1/(1/R_2+1/R_3+1/R_4) + R_1$

$R_T = 1568.96551724138\Omega$.

Then, for Ohm' s Law

$I = V/R_T = 0.000625A$.

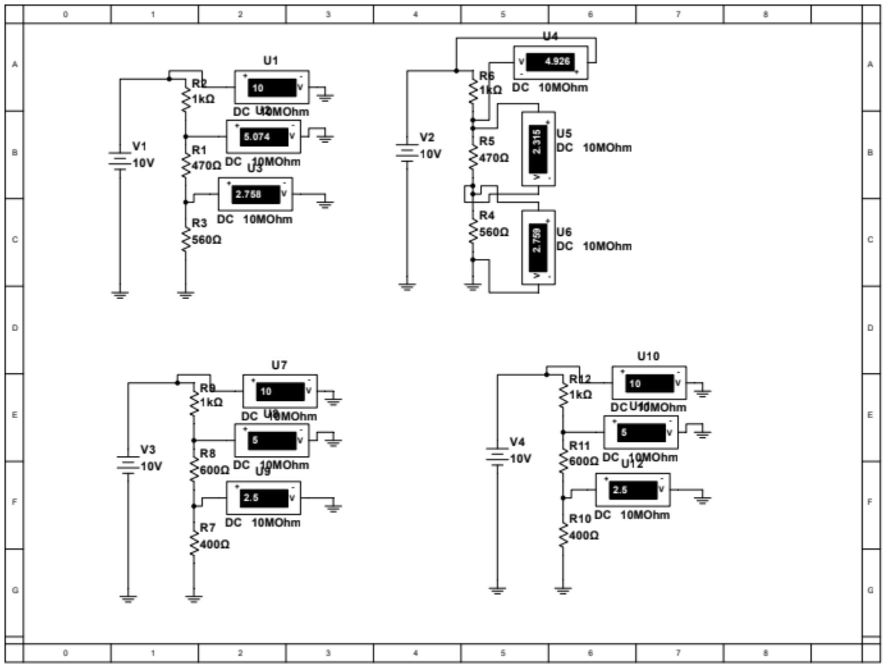
Then for I_{R2}, I_{R3} & I_{R4} we use current divisor formula.

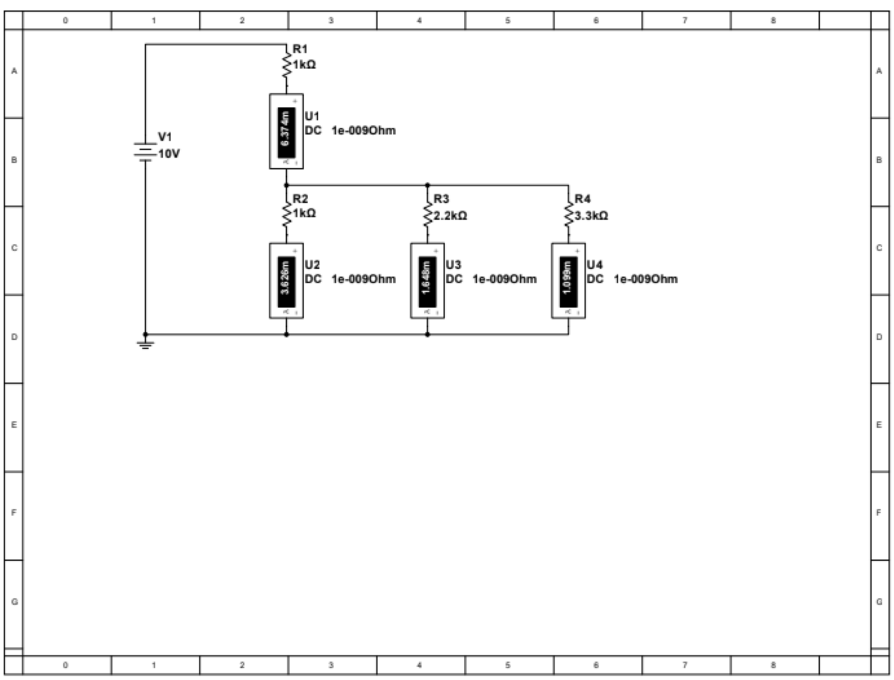
$I_{R2} = (R_2/R_T)/I = 3.62 x10-3 A$

$I_{R3} = (R_3/R_T)/I = 1.64 x10-3 A$

$I_{R4} = (R_4/R_T)/I = 1.098 x10-3 A$

SIMULATIONS





INSTITUTO POLITÉCNICO NACIONAL

ESCUELA SUPERIOR DE CÓMPUTO

LABORATORIO DE ANÁLISIS FUNDAMENTAL DE CIRCUITOS

PRÁCTICA No. 5

"DIVISOR DE VOLTAJE Y DE CORRIENTE"

GRUPO: 1CM10

EQUIPO: 10

M. en C. Alberto J. Alcántara Méndez
01 ABR 2019
REVISADO

INTEGRANTES:
Cabañas Barcajay Jesús Francisco
Hernandez Velazquez Ángel
Martinez Coronel Brayan Yoscfat

PROFESOR:
ALBERTO JESÚS ALCÁNTARA MÉNDEZ

FECHA DE REALIZACIÓN: 1/Abril/2019

FECHA DE ENTREGA: ____________________

COMENTARIOS:
____
____
____