

Instituto Politécnico Nacional.

INGENIERÍA EN COMUNICACIONES Y ELECTRÓNICA.

LABORATORIO DE CIRCUITOS.

KIRCHHOFF

Práctica Leyes de Kirchhoff.

3CM7

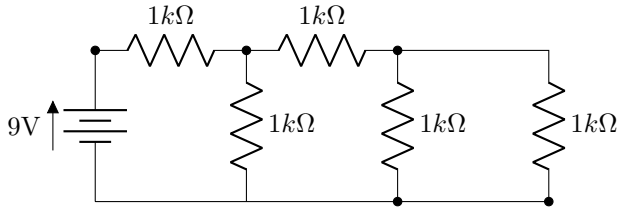
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0.1. Primera parte. Cálculos teóricos



Handwritten calculations on grid paper for the circuit analysis.

Circuit Diagram: A 9V source is in series with a $1k\Omega$ resistor. This is followed by a parallel combination of a $1k\Omega$ resistor and a series combination of two $1k\Omega$ resistors. Finally, there is a parallel combination of a $1k\Omega$ resistor and a series combination of two $1k\Omega$ resistors.

Resistor Values: $R_A = 500\Omega$, $R_B = 1500\Omega$, $R_C = 600\Omega$, $R_{eq} = 1000\Omega$

Voltages:

$$V_1 = \frac{V_{fc} R_k}{R_{eq}} \quad V_1 = 5.625V \quad V_3 = 2.25V \quad V_4 = 1.125V$$

$$V_1 = \frac{9 \cdot 1000}{1600} \quad V_3 = \frac{5.625 \cdot 1000}{2500} \quad V_4 = \frac{2.25 \cdot 500}{1000}$$

$$V_2 = \frac{9 \cdot 600}{1600} \quad V_2 = 3.375V \quad V_5 = \frac{2.25 \cdot 500}{1000} \quad V_5 = 1.125V$$

Currents:

$$I_k = \frac{I_{fc} R_{eq}}{R_k} \quad I_2 = \frac{5.625 \times 10^{-3} \cdot 600}{1000}$$

$$I_4 = \frac{5.625 \times 10^{-3} \cdot 2000}{1000} \quad I_3 = \frac{5.625 \times 10^{-3} \cdot 600}{1500}$$

$$I_5 = \frac{5.625 \times 10^{-3} \cdot 2000}{1000}$$

Mesh Equations:

$$\text{malla 1} = (V_2 + V_1 = 0)$$

$$\text{malla 2} = (-V_1 + V_3 - V_4 = 0)$$

$$\text{malla 3} = (V_4 + V_5 = 0)$$

Node Equations:

$$\text{nodo 1} = (-I_2 + I_3 + I_1 = 0) \quad \text{nodo 2} = (-I_3 - I_4 + I_5 = 0)$$

Final Results:

$$I_2 = 3.375 \text{ mA}$$

$$I_4 = 1.125 \text{ mA}$$

$$I_5 = 1.125 \text{ mA}$$

$$I_1 = 5.625 \text{ mA}$$

$$I_3 = 2.25 \text{ mA}$$

Figura 1: Cálculos

0.2. Segunda parte. Simulación

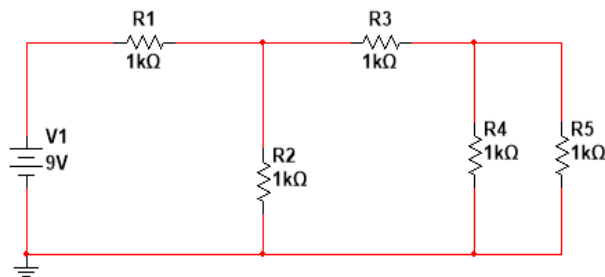


Figura 2: Circuito original.

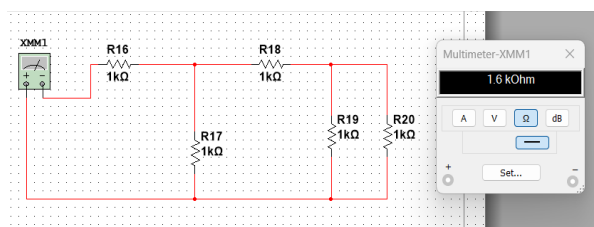


Figura 3: Resistencia equivalente.

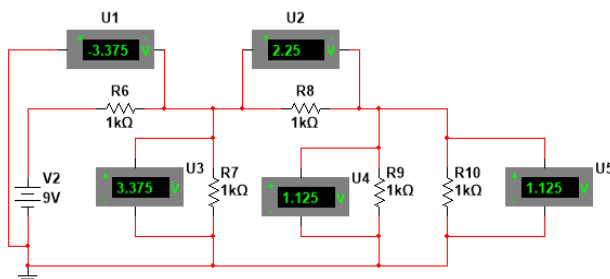


Figura 4: Voltajes de cada elemento.

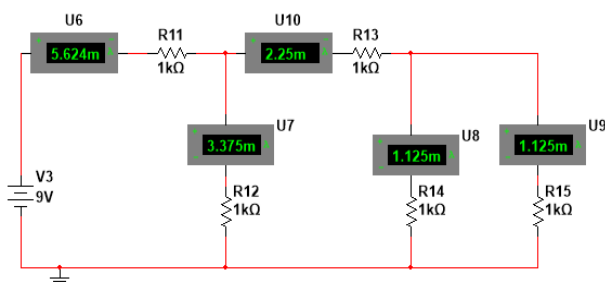


Figura 5: Corrientes de cada elemento.

0.2. Segunda parte. Simulación

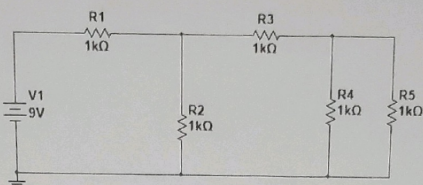


Figura 1: Circuito original.

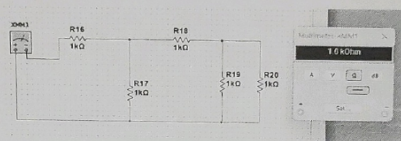


Figura 2: Resistencia equivalente.

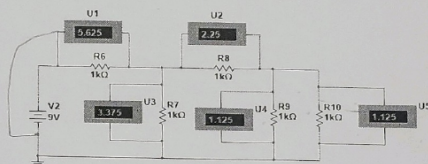


Figura 3: Voltajes de cada elemento.

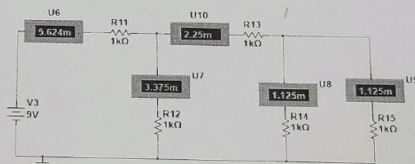


Figura 4: Corrientes de cada elemento.

Хантее
Абрис
Адриан

Figura 6: Firma del profe.

0.3. Tercera parte. Mediciones

		Mediciones en laboratorio		
	Valor de resistores en ohms	$R_{eq} = 1,6k\Omega$		
		Tensión	Corriente	Potencia
R_1	1000	5.625V	5.625mA	31.64mW
R_2	1000	3.375V	3.375mA	11.39mW
R_3	1000	2.25V	2.25mA	5.0625mW
R_4	1000	1.125V	1.125mA	1.26mW
R_5	1000	1.125V	1.125mA	1.26mW

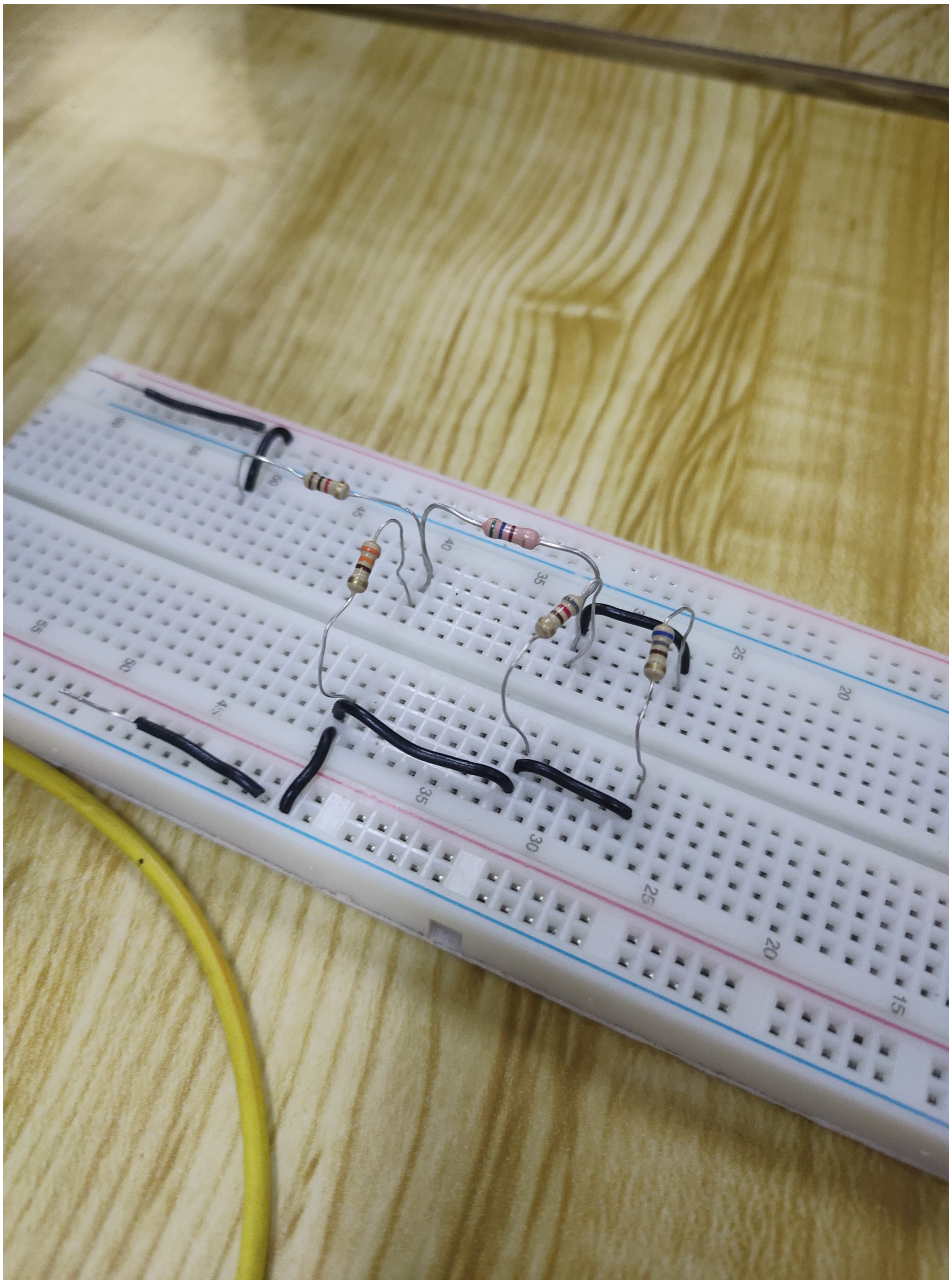


Figura 7: Firma del profe.

1. Tablas

1.0.1. Primera parte. Cálculos teóricos

		Teoría		
	Valor de resistores en ohms	$R_{eq} = 1,6k\Omega$		
		Tensión	Corriente	Potencia
R_1	1000	5.625V	5.625mA	31.64mW
R_2	1000	3.375V	3.375mA	11.39mW
R_3	1000	2.25V	2.25mA	5.0625mW
R_4	1000	1.125V	1.125mA	1.26mW
R_5	1000	1.125V	1.125mA	1.26mW

1.0.2. Segunda parte. Simulación

		Simulación		
	Valor de resistores en ohms	$R_{eq} = 1,6k\Omega$		
		Tensión	Corriente	Potencia
R_1	1000	5.625V	5.625mA	31.64mW
R_2	1000	3.375V	3.375mA	11.39mW
R_3	1000	2.25V	2.25mA	5.06mW
R_4	1000	1.125V	1.125mA	1.40mW
R_5	1000	1.125V	1.125mA	1.40mW