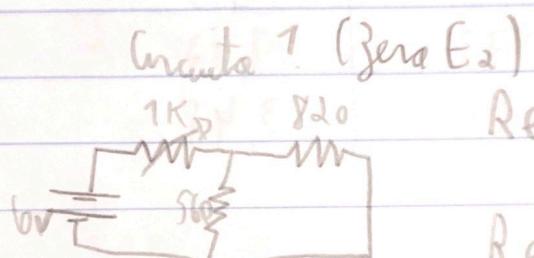
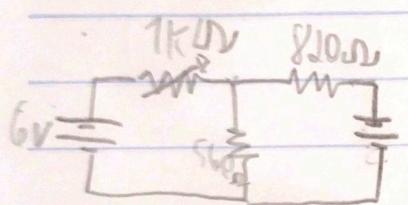


Relatório 05

José Carvalho 2270340
 Moreira Pedrosa 2150336
 Gabriel Fungo Conti 2270234

3-i

Corrente	Valor medida (A)	Teórico (A)
i_{S1}	4,56 mA	4,5 mA
i_{S2}	7,09 mA	7,12 mA
i_{S3}	3,48 mA	3,48 mA

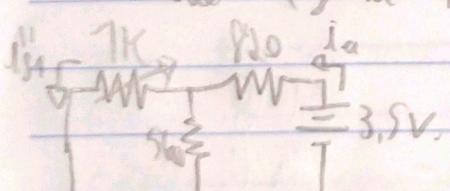


$$R_e = 1k + \left(\frac{820 \cdot 560}{960 + 820} \right) =$$

$$R_e = 1,332,75$$

$$(A)_{aviso} = \frac{6 - 3,5}{1,332,75} = 2,9 \text{ mA}$$

Circuito 2 (Resposta E₁)

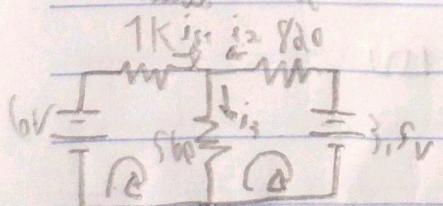


$$R_e = 820 + (1k \cdot 560) = 1,779,97$$

$$j_1 = \frac{3,5}{1,779,97} = 2,9 \text{ mA}$$

$$j''_{S1} = \frac{(3,5 - 2,9 \cdot 820 \cdot 10^{-3})}{1k} = \frac{1,722}{1k} = 1,72 \text{ mA}$$

- Circuito total



$$\begin{cases} -6 + j_{S1} \cdot 1000 + j_3 \cdot 560 = 0 \\ +3,5 - 560 j_3 - 820 j_2 = 0 \\ j_1 + j_2 - j_3 = 0 \end{cases} \Rightarrow \begin{bmatrix} 1000 & 0 & 560 & 6 \\ 0 & -560 & -820 & -3,5 \\ 1 & 1 & -1 & 0 \end{bmatrix}$$

$$\left[\begin{array}{ccc|c} 1 & 1 & -1 & 0 \\ 1000 & 0 & 1960 & 6 \\ 0 & -920 & -960 & -3,5 \end{array} \right] \Rightarrow \left[\begin{array}{ccc|c} 1 & 1 & -1 & 0 \\ 0 & -1000 & 1960 & 6 \\ 0 & -920 & -960 & -3,5 \end{array} \right] \Rightarrow \left[\begin{array}{ccc|c} 1 & 1 & -1 & 0 \\ 0 & 1 & -1960/1000 & 6/1000 \\ 0 & 0 & -18392/1000 & -3,5/1000 \end{array} \right]$$

$$i_3 = \frac{-1,42}{-18392} = 4,5 \cdot 10^{-3} A$$

$$i_2 = \frac{(6 - 1960 \cdot 4,5 \cdot 10^{-3})}{-1000} = \frac{-1,02}{-1k} = 1,02 \text{ mA}$$

$$i_{S1} = 4,5 - 1,02 = 3,48 \text{ mA}$$

iii) Tensões	Medida (V)	Teórica (V)
V_{A1}'	4,504	4,5
V_{R1}'	1,973	1,12
V_{R1}	3,426	3,48

(11)

iii) Potência = $V \cdot i = \frac{V^2}{R} = R \cdot i^2$.

- Pela superposição:

Potência total = soma das potências

$$\frac{V_f^2}{R} = \frac{V_1^2}{R} + \frac{V_2^2}{R} \quad V_f = V_1 + V_2.$$

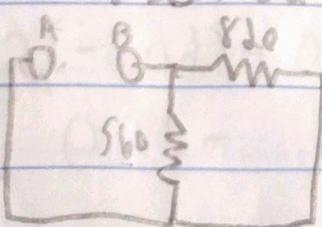
$$\frac{(V_1 + V_2)^2}{R} = \frac{V_1^2}{R} + \frac{V_2^2}{R} \Rightarrow \frac{V_1^2}{R} + \frac{2V_1 \cdot V_2}{R} + \frac{V_2^2}{R} \neq \frac{V_1^2}{R} + \frac{V_2^2}{R} \}$$
 diferente.

Potência trabalha com um elemento quadrático, não é linear.

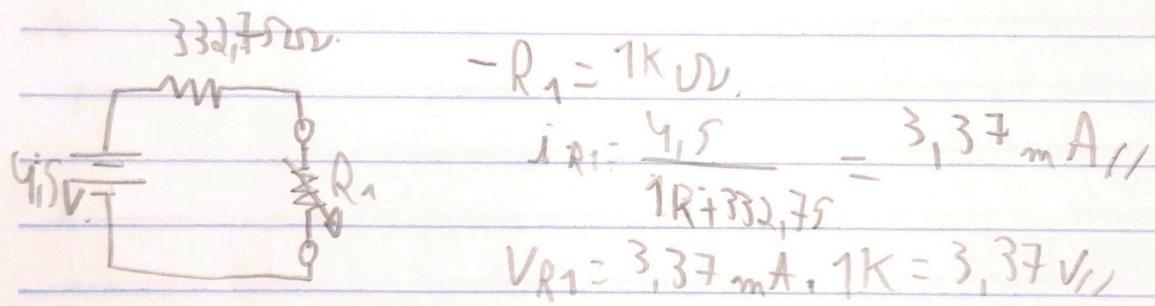
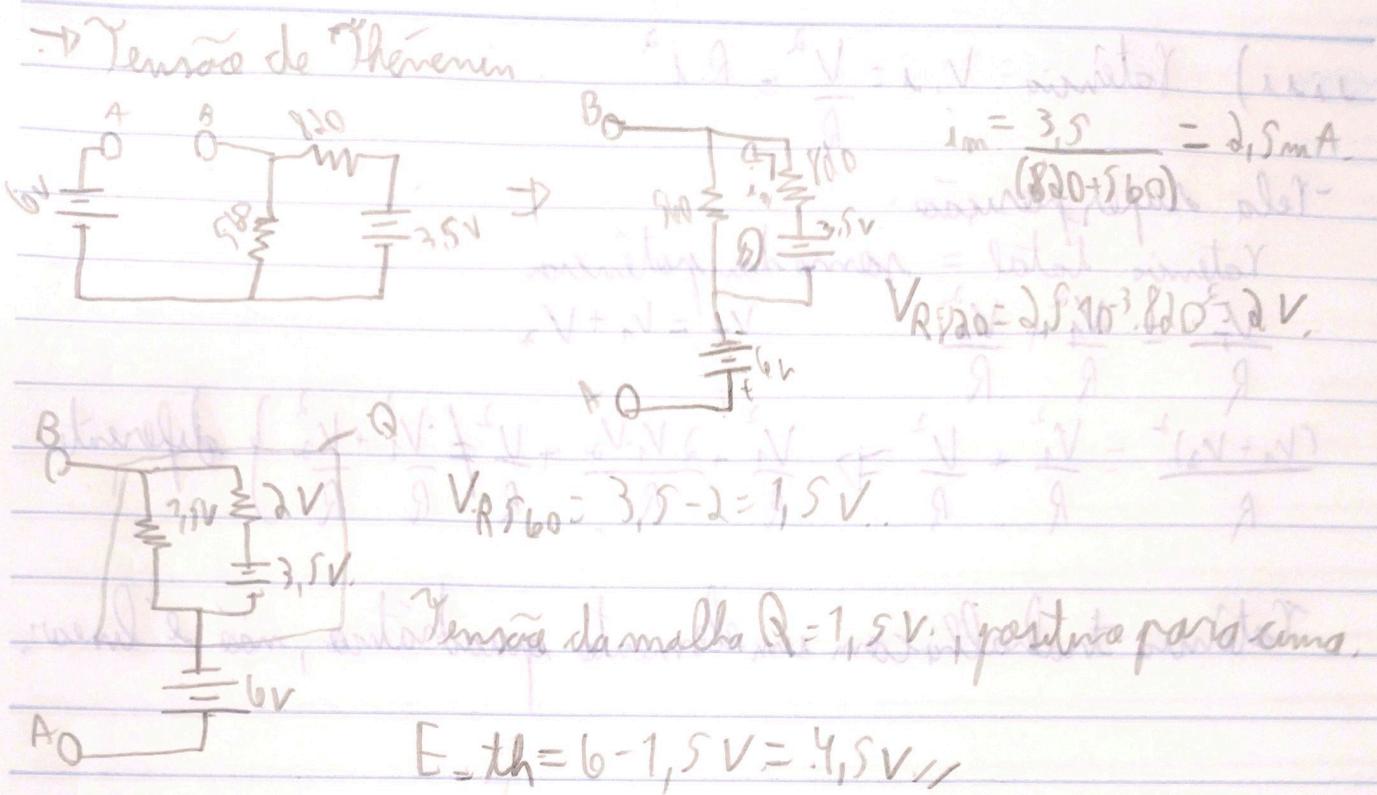
	Medido (A)	Teórica (A)
$I_{R_1} (R=1\text{ k}\Omega)$	3,48 m	3,37 mA
$I_{R_1} (R=150\text{ m}\Omega)$	9,63 m	9,32 mA
$I_{R_1} (R=550\text{ m}\Omega)$	5,17 m	5,09 mA

	Medido (V)	Teórica (V)
$V_{R_1} (R=1\text{ k}\Omega)$	3,426	3,37 V
$V_{R_1} (R=150\text{ m}\Omega)$	7,407	7,39 V
$V_{R_1} (R=550\text{ m}\Omega)$	2,874	2,79 V

→ Resistência de Thévenin



$$R_{Th} = \left(\frac{820 \cdot 560}{560 + 820} \right) = 332,75 \text{ m}\Omega$$



$$R_1 = 150\Omega$$

$$i_{R1} = \frac{4.5}{(150 + 332.75)} = 9.32mA_{th}, \quad V_{R1} = 9.32mA \cdot 150 = 1.39V_{th}$$

$$R_1 = 550\Omega$$

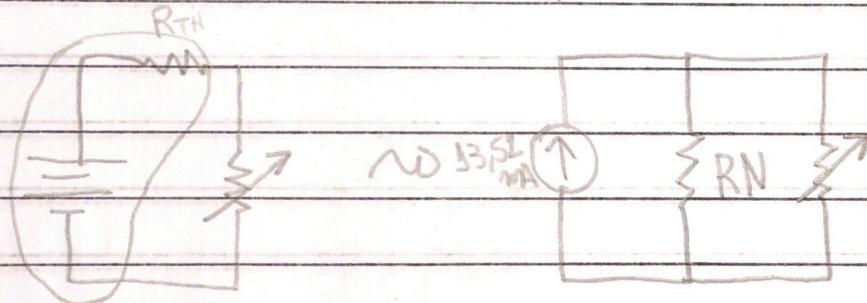
$$i_{R1} = \frac{4.5}{(550 + 332.75)} = 5.09mA \quad V_{R1} = 5.09mA \cdot 550\Omega = 2.79V_{th}$$

	Corrente	Medido (A)	Teorico (A)
I_{RL} (5 kΩ)		3,18 m	3,38 m
I_{RL}'' (550 Ω)		9,63 m	9,32 m
I_{RL}''' (550 Ω)		5,17 m	5,5 m

	Tensão	Medido (V)	Teorico (V)
V_{RL} (5 kΩ)		3,126	3,38
V_{RL} (550 Ω)		5,107	5,5
V_{RL} (550 Ω)		2,879	2,81

$$R_N = R_{TH} \quad I_N = \frac{V_{TH}}{R_{TH}} = \frac{4,5}{332,75} = 13,52 \text{ mA}$$

$$R_N = 332,75$$



$$I_RL' = \frac{4,49878}{550 + 332,75} = 3,38 \text{ mA}$$

$$V_{RL}' = I_{RL}' \cdot 550 = 3,38 \text{ V}$$

$$I_{RL}'' = \frac{4,49878}{550 + 332,75} = 9,32 \text{ mA}$$

$$V_{RL}'' = I_{RL}'' \cdot 550 = 5,107 \text{ V}$$

$$I_{RL}''' = \frac{4,49878}{550 + 332,75} = 5,5 \text{ mA}$$