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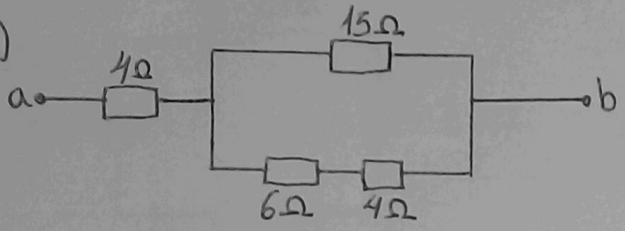
Curso: Ciência da Computação
Disciplina: Eletricidade Básica
Semestre: 2020.2
Matrícula: 20200000315
Data: 12/04/2021

Atividade IV

1. a)

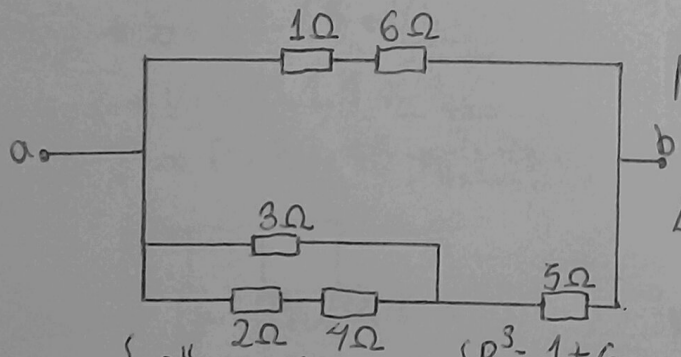


$R' = 6 + 4$
$R' = 10\Omega$

$R'' = \frac{15 \cdot 10}{15+10} \rightarrow R'' = \frac{150}{25}$
$R'' = 6\Omega$

$Req = 4 + 6$
$\boxed{Req = 10\Omega}$ //

b)



$R' = 2 + 4$
$R' = 6\Omega$

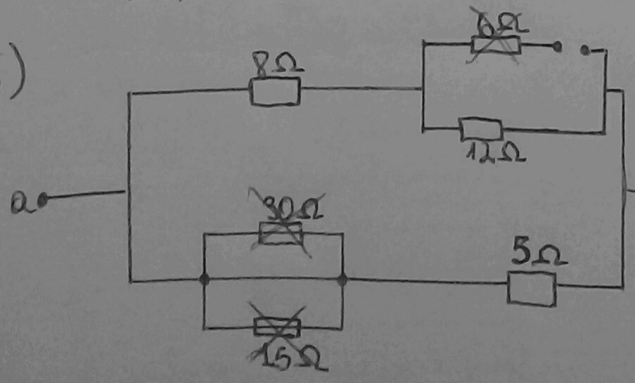
$R'' = \frac{3 \cdot 6}{3+6}$
$R'' = \frac{18}{9} \rightarrow R'' = 2\Omega$

$R^3 = 1 + 6$
$R^3 = 7\Omega$

$R^4 = 2 + 5$
$R^4 = 7\Omega$

$Req = \frac{7 \cdot 7}{7+7} \rightarrow Req = \frac{49}{14} \rightarrow \boxed{Req = 3,5\Omega}$

c)



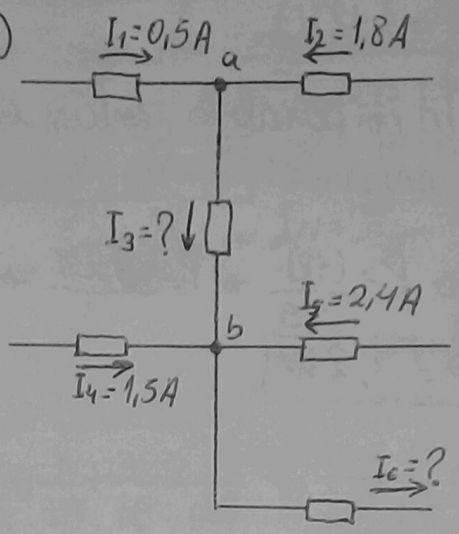
$R' = 8 + 12$
$R' = 20\Omega$

$Req = \frac{20 \cdot 5}{20+5}$

$Req = \frac{100}{25}$

$\boxed{Req = 4\Omega}$ //

2)

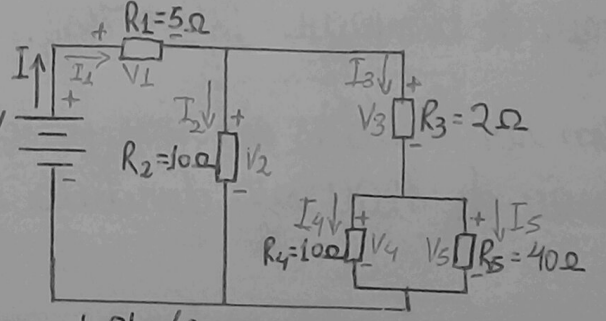


Nó a: $I_1 + I_2 = I_3$
Nó b: $I_3 + I_4 + I_5 = I_6$

Nó a: $0,5 + 1,8 = I_3$
$\boxed{I_3 = 2,3A}$ //

Nó b: $2,3 + 1,5 + 2,4 = I_6$
$\boxed{I_6 = 6,2A}$ //

4)



$I = 20A$
$I_3 = 10A$

$R' = \frac{10 \cdot 40}{10+40} \rightarrow R' = \frac{400}{50} \rightarrow R' = 8\Omega$

$R'' = R_3 + R'$
$R'' = 2 + 8$
$R'' = 10\Omega$

$R^3 = \frac{R_2 \cdot R''}{R_2 + R''} \rightarrow R^3 = \frac{10 \cdot 10}{10+10} \rightarrow R^3 = \frac{100}{20}$

$R^3 = 5\Omega$

$Req = R_1 + R^3$
$Req = 5 + 5$
$\boxed{Req = 10\Omega}$ //

$I_2 = I_1 - I_3$
$I_2 = 20 - 10$
$\boxed{I_2 = 10A}$

$V_2 = R_2 \cdot I_2$
$V_2 = 10 \cdot 10 \rightarrow \boxed{V_2 = 100V}$ //

$V_1 = R_1 \cdot I_1$
$V_1 = 5 \cdot 20$
$\boxed{V_1 = 100\,V}$ "

$V_3 = R_3 \cdot I_3$
$V_3 = 2 \cdot 10$
$\boxed{V_3 = 20\,V}$ "

$V = Req \cdot I$
$V = 10 \cdot 20$
$\boxed{V = 200\,V}$ "

$V_4 = V_1 - V_3$
$V_4 = 100 - 20$
$\boxed{V_4 = 80V}$ "

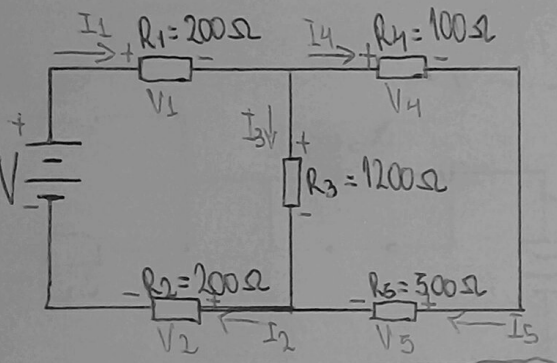
$V_4 = V_5$

$V_5 = V_1 - V_3$
$V_5 = 100 - 20$
$\boxed{V_5 = 80\,V}$ "

$I_4 = \frac{V_4}{R_4} \rightarrow I_4 = \frac{80}{10} \rightarrow \boxed{I_4 = 8A}$ "

$I_5 = \frac{V_5}{R_5} \rightarrow I_5 = \frac{80}{40} \rightarrow \boxed{I_5 = 2A}$ "

5)



$I_{total} = \frac{V}{Req} \rightarrow I_{TOTAL} = \frac{160}{800} \rightarrow \boxed{I_{total} = 0,2A}$

$R^1 = R_4 + R_5$
$R^1 = 100 + 500$
$R^1 = 600\,\Omega$

$R^2 = \frac{R_3 \cdot R^1}{R_3 \cdot R^1}$
$R^2 = \frac{1200 \cdot 600}{1200 + 600}$

$\rightarrow R^2 = \frac{720000}{1800}$
$R^2 = 400$

$Req = R_1 + R^2 + R_2 \rightarrow Req = 200 + 400 + 200$
$\boxed{Req = 800\,\Omega}$ "

$\boxed{I_1 = I_2 = I = 0,2A}$

$I_3 = \frac{V}{R_3} \rightarrow I_3 = \frac{80}{1200}$
$\boxed{I_3 = 0,0667A}$

$I_4 = I_2 - I_3$
$I_4 = 0,2 - 0,0667$
$\boxed{I_4 = 0,1333\,A} = I_5$

$V_L = \frac{R_1 \cdot V}{Req} \rightarrow V_L = \frac{200 \cdot 160}{800}$
$V_L = \frac{32000}{800} \rightarrow \boxed{V_L = 40V}$ "

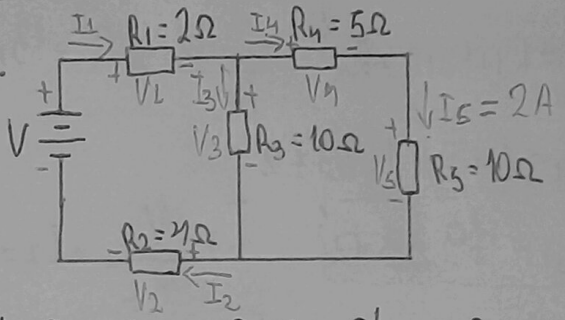
$V_2 = \frac{R_2 \cdot V}{Req} \rightarrow V_2 = \frac{200}{800} \cdot 160 \rightarrow V_2 = \frac{32000}{800}$
$\boxed{V_2 = 40V}$ "

$V_3 = I \cdot R^2$
$V_3 = 0,2 \cdot 400$
$\boxed{V_3 = 80V}$ "

$V_5 = R_5 \cdot I_5$
$V_5 = 500 \cdot 0,1333$
$\boxed{V_5 = 66,67\,V}$

$V_4 = R_4 \cdot I_4$
$V_4 = 100 \cdot 0,1333$
$\boxed{V_4 = 13,33\,V}$ "

6.



$R^1 = R_4 + R_5$
$R^1 = 5 + 10$
$R^1 = 15\,\Omega$ "

$R^2 = \frac{R_3 \cdot R^1}{R_3 + R^1} \rightarrow R^2 = \frac{10 \cdot 15}{10 + 15}$
$R^2 = \frac{150}{25} \rightarrow R^2 = 6\,\Omega$ "

$Req_{total} = R_1 + R^2 + R_2 \rightarrow Req_{total} = 2 + 6 + 4$
$\boxed{Req\,total = 12\,\Omega}$ "

$V_5 = R_5 \cdot I_5$
$V_5 = 10 \cdot 2$
$\boxed{V_5 = 20V}$

$I_4 = I_5 = 2A$
$V_4 = R_4 \cdot I_4$
$V_4 = 5 \cdot 2$
$\boxed{V_4 = 10V}$

$V_3 = V_4 + V_5$
$V_3 = 10 + 20$
$\boxed{V_3 = 30V}$

$I_3 = \frac{V_3}{R_3}$
$I_3 = \frac{30}{10}$
$\boxed{I_3 = 3A}$ "

$I_1 = I_4 + I_3$
$I_1 = 2 + 3$
$I_1 = 5A$ "

$I_2 = I_3 + I_5$
$I_2 = 3 + 2$
$I_2 = 5A$ "

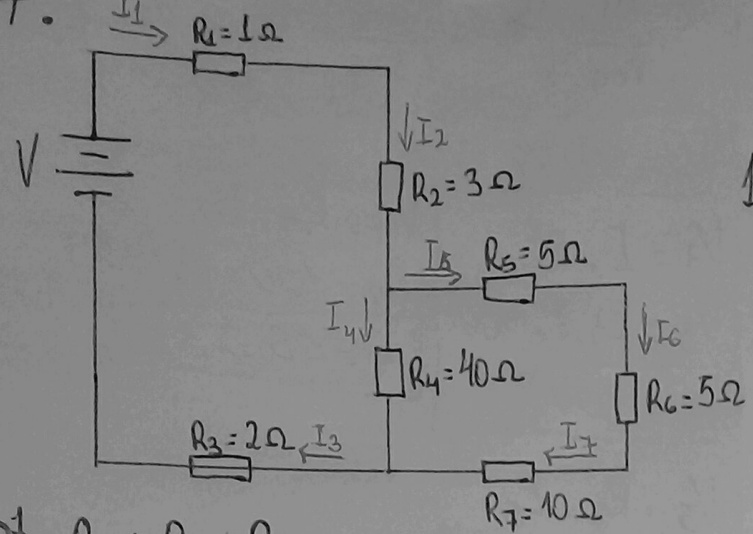
$V_L = R_1 \cdot I_1$
$V_L = 2 \cdot 5$
$\boxed{V_1 = 10V}$

$V_2 = R_2 \cdot I_2$
$V_2 = 4 \cdot 5$
$\boxed{V_2 = 20V}$

$P = V \cdot I \rightarrow P = 60 \cdot 5$
$\boxed{P = 300\,W}$

$V = Req \cdot I \rightarrow V = 12 \cdot 5 \rightarrow \boxed{V = 60V}$ "

7.



$V_7 = 20V$

$R^1 = R_5 + R_6 + R_7$

$R^1 = 5 + 5 + 10$

$R^1 = 20\Omega$

$R^2 = \frac{R^1 \cdot R_4}{R^1 + R_4} \rightarrow R^2 = \frac{20 \cdot 40}{20+40}$

$R^2 = \frac{800}{60} \Rightarrow R^2 = 13,33$

$Req_{Total} = R_1 + R_2 + R^2 + R_3$

$Req_{Total} = 1 + 3 + 13,33 + 2$

$\boxed{Req_{Total} = 19,33\Omega}$

$I_7 = \frac{V_7}{R_7} \rightarrow I_7 = \frac{20}{10}$

$\boxed{I_7 = 2A}$

$I_5 = I_6 = I_7$

$I_1 = I_2 = I_3$

$V_6 = R_6 \cdot I_6$

$V_6 = 5 \cdot 2$

$\boxed{V_6 = 10V}$

$V_5 = R_5 \cdot I_5$

$V_5 = 5 \cdot 2$

$\boxed{V_5 = 10V}$

$V_4 = V_5 + V_6 + V_7$

$V_4 = 10 + 10 + 20$

$\boxed{V_4 = 40V}$

$I_1 = I_2 = I_5 + I_4$

$= 2 + 1$

$I_1 = I_2 = 3A$,,

$I = 3A$,,

$I_3 = I_4 + I_7$

$I_3 = 1 + 2 \rightarrow I_3 = 3A$,,

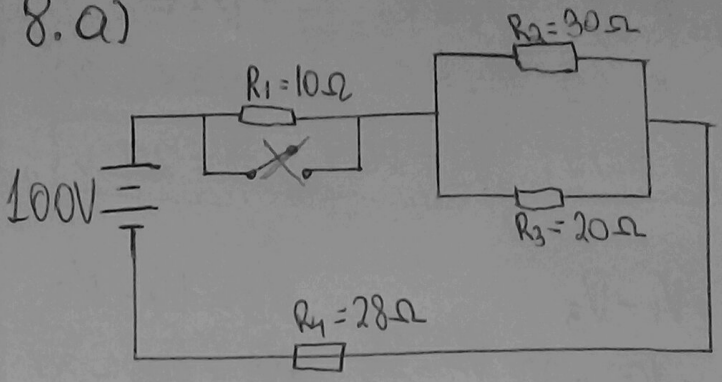
$I_4 = \frac{V_4}{R_4} \rightarrow I_4 = \frac{40}{40} \rightarrow I_4 = 1A$

$V = Req \cdot I$

$V = 19,33 \cdot 3$

$\boxed{V = 58V}$

8. a)



$R^1 = \frac{R_2 \cdot R_3}{R_2 + R_3} \rightarrow R^1 = \frac{30 \cdot 20}{30+20} \rightarrow R^1 = \frac{600}{50}$

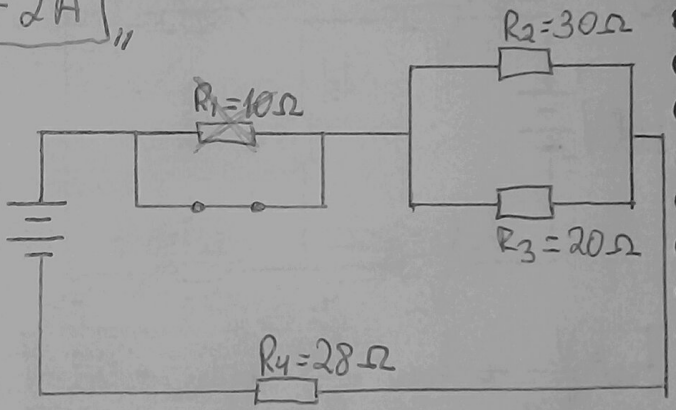
$R^1 = 12\Omega$,, $Req_{Total} = R_1 + R^1 + R_4$

$I = \frac{V}{Req}$ $Req_{Total} = 10 + 12 + 28$

$I = \frac{100}{50}$ $\boxed{Req_{Total} = 50\Omega}$

$\boxed{I = 2A}$,,

b)



$R^1 = \frac{R_2 \cdot R_3}{R_2 + R_3} \rightarrow R^1 = \frac{30 \cdot 20}{30+20} \rightarrow R^1 = \frac{600}{50}$

$\boxed{R^1 = 12\Omega}$ $Req_{Total} = R_4 + R^1$

$I = \frac{V}{Req_{Total}}$ $Req_{Total} = 28 + 12$

$\boxed{Req_{Total} = 40\Omega}$

$I = \frac{100}{40} \rightarrow \boxed{I = 2,5A}$,,