FACULATY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

ENEE 2101

Circuits Laboratory

Experiment.4 Prelab

Network Theorems

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Supervised by:

Dr. Jaser Sa'Ed

Teacher assistance:

Eng. Mohammed Deek

October 10, 2024

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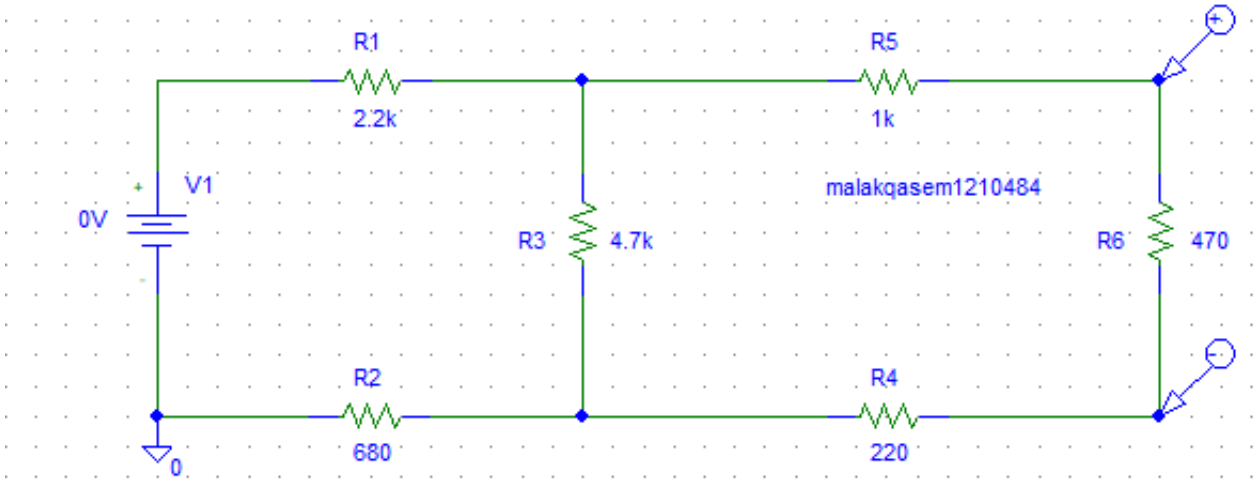
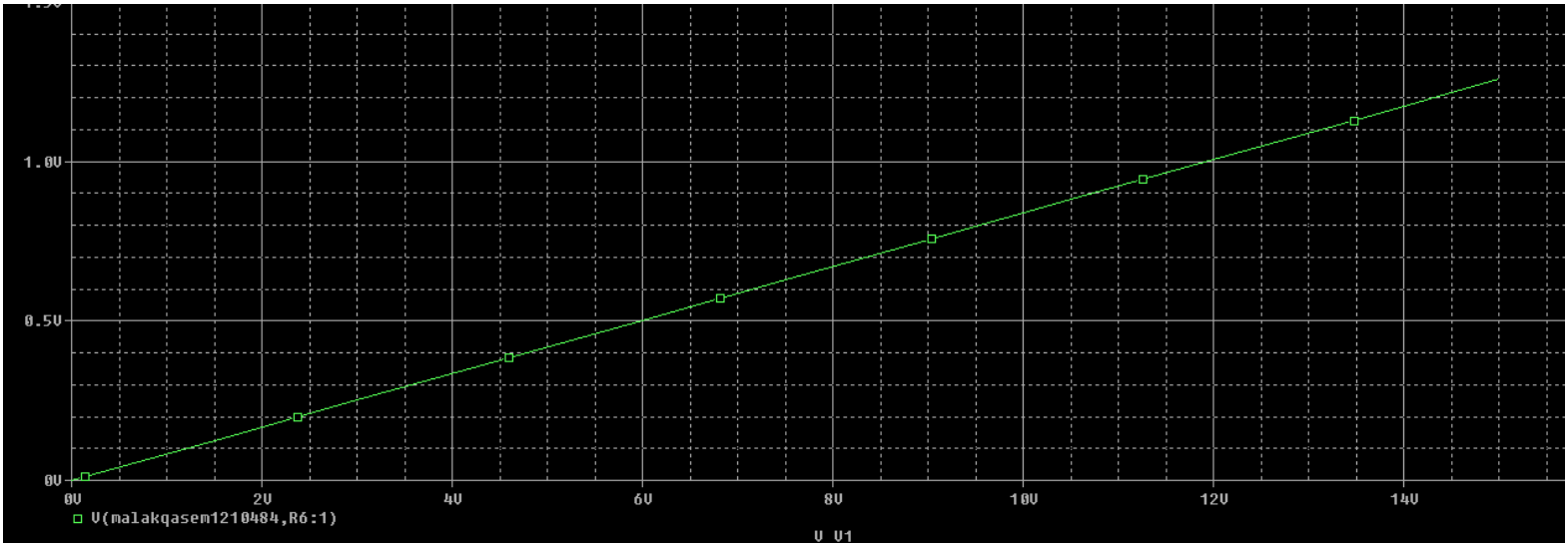
Part A: Proportionality





Part B: Superposition

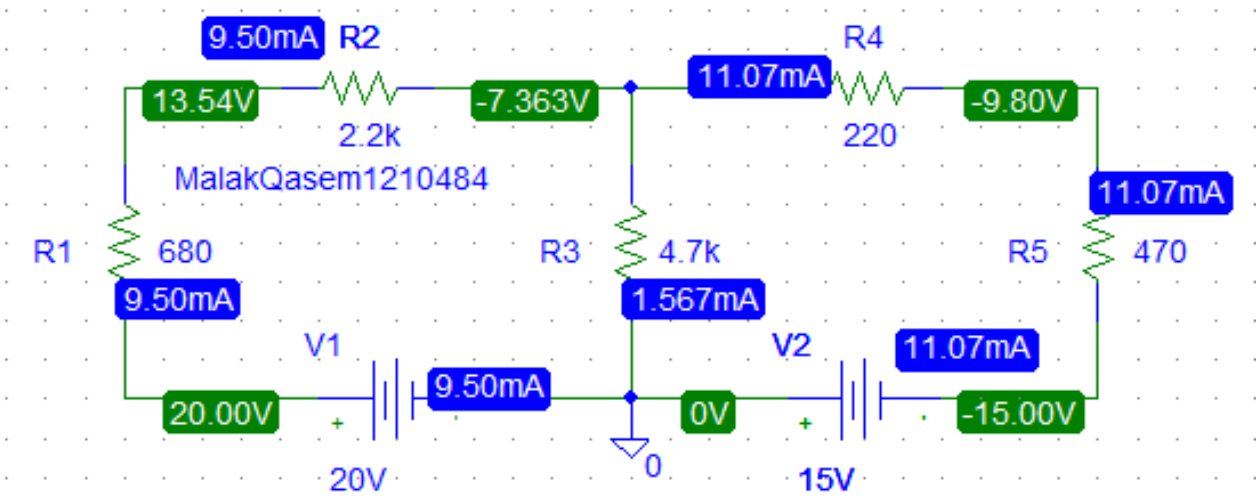


Figure 4.2

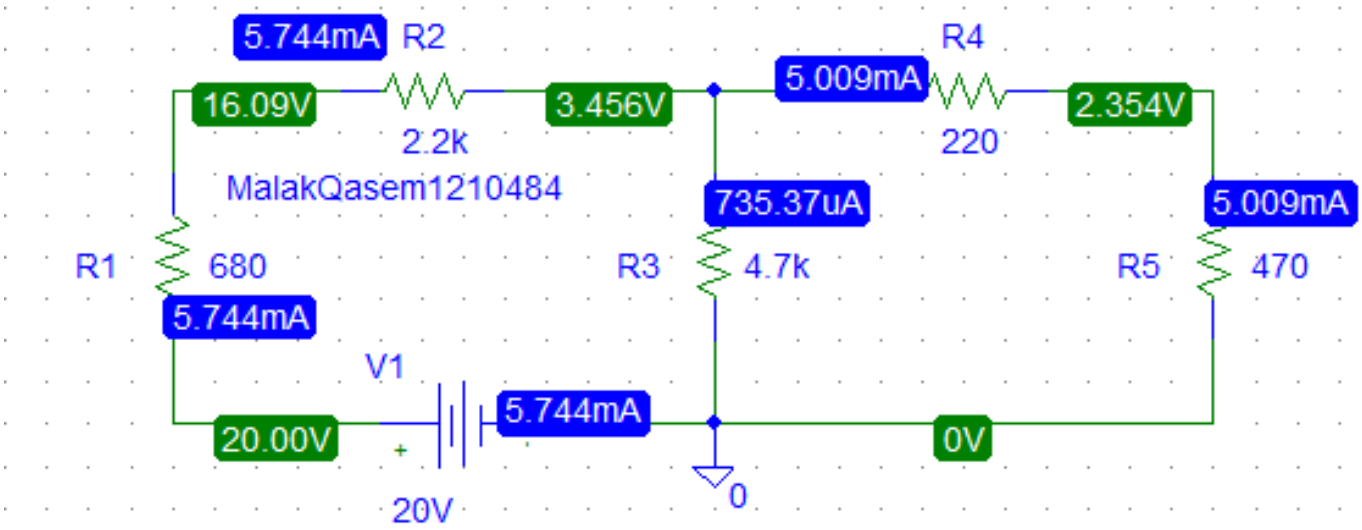


Figure 4.3

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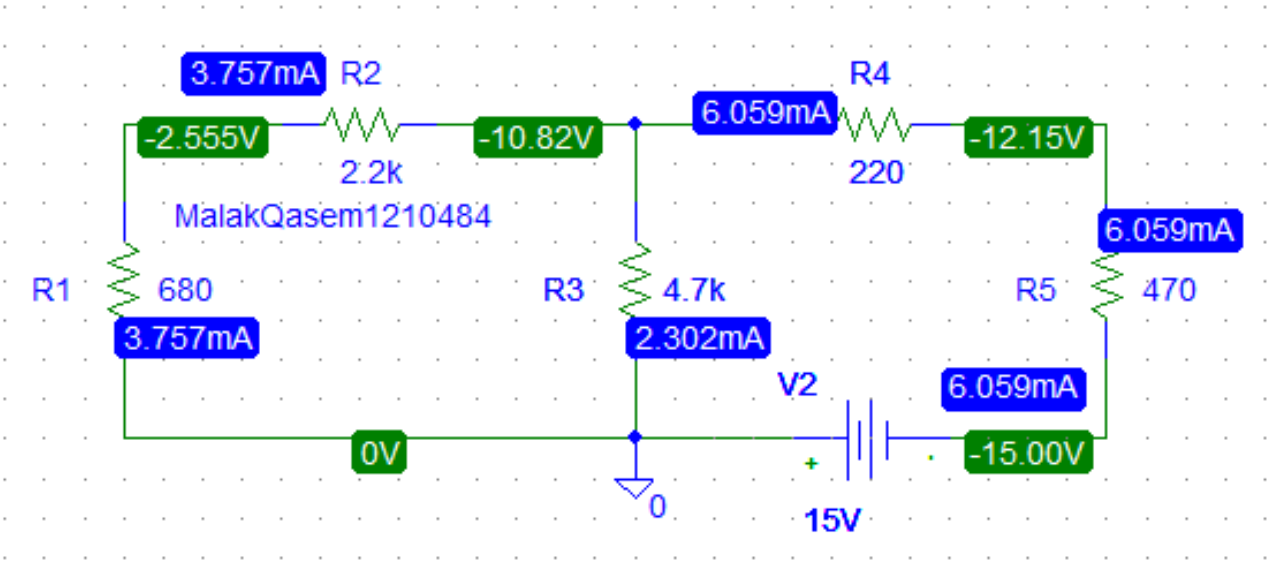
3.757mA
R2
-2.555V
2.2k
-10.82V
MalakQasem1210484
6.059mA
R4
220
-12.15V
6.059mA
R1
680
R3
4.7k
R5
470
3.757mA
2.302mA
V2
6.059mA
0V
-15.00V
0
15V

Figure 4.4

Part C: Thevenin's Theorem

1)

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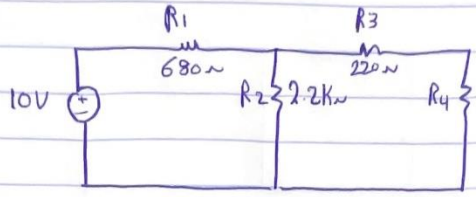


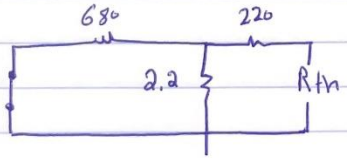
RL = 330Ω
Find Vth & Rth

- Find Vth using Voltage diVider at "2.2KΩ"

$$Vth = Vin \times \frac{R_2}{R_2 + R_1} \Rightarrow Vth = 10\,V \times \frac{2200}{2200 + 680}$$

∴ Vth = 7.639 Volt

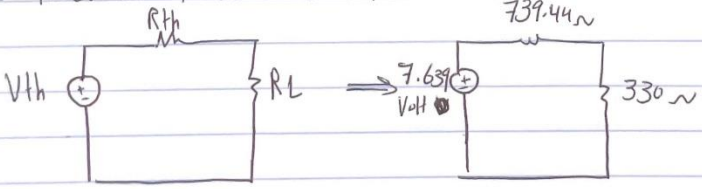
- Find Rth using "short circuit" ; but the Voltage (10V) at SC



680 // 2.2 + 220

$$\therefore Rth = 220 + \frac{680 \times 2200}{680 + 2200} \Rightarrow \therefore Rth = 739.44\,\Omega$$

∴ Thevenin equivalent Circuit:



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2)

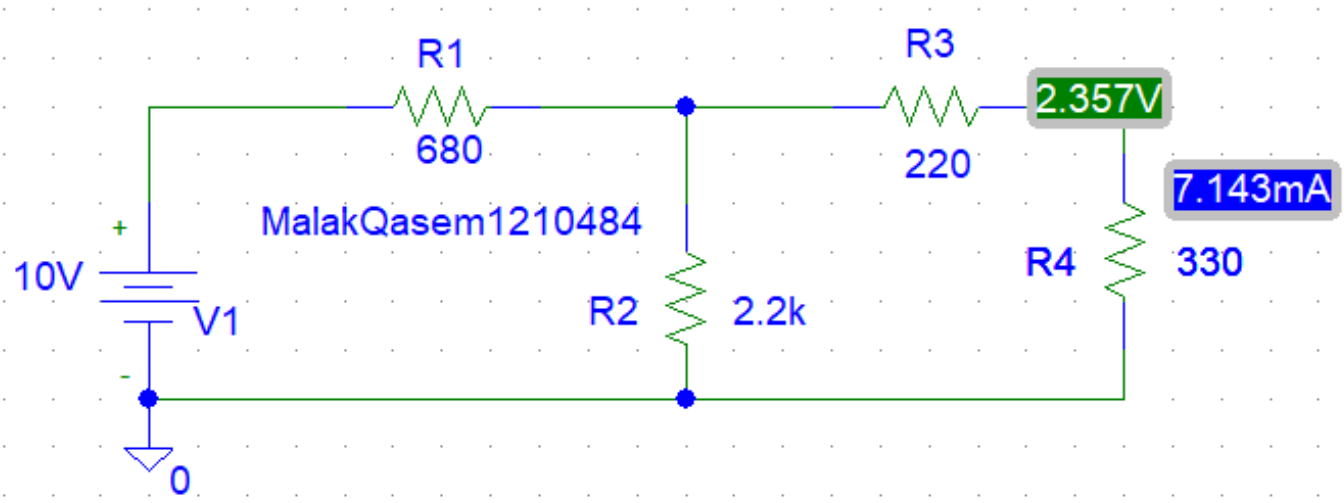

Figure 4.5

3)

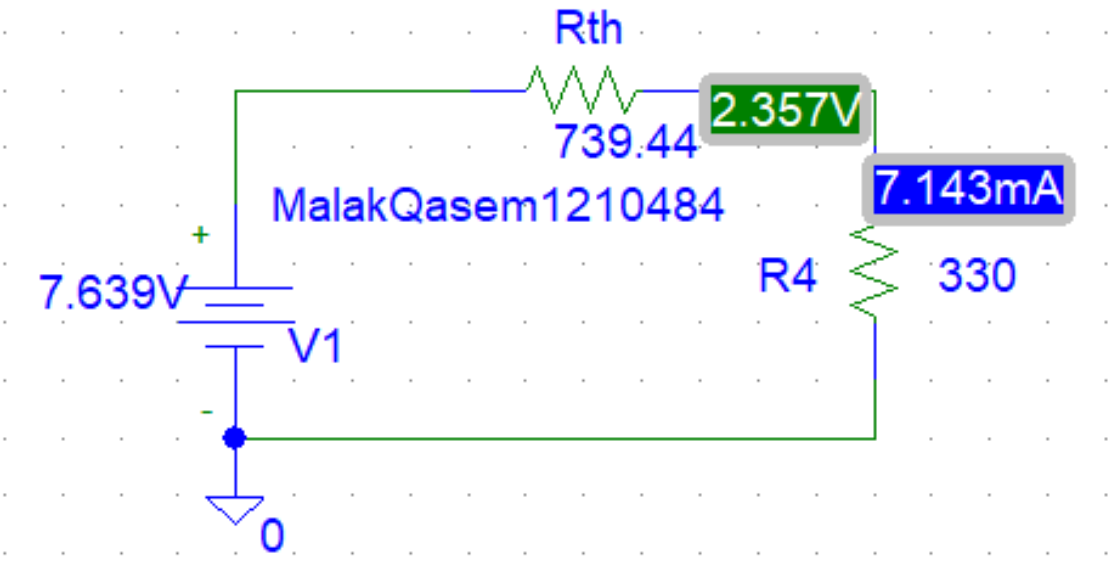

Figure 4.7

Part D: Δ-Y Transformation

1)

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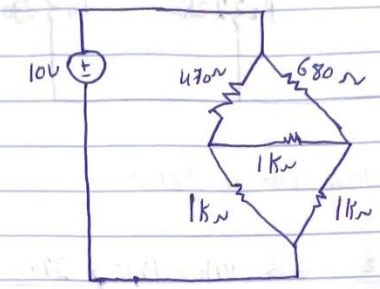


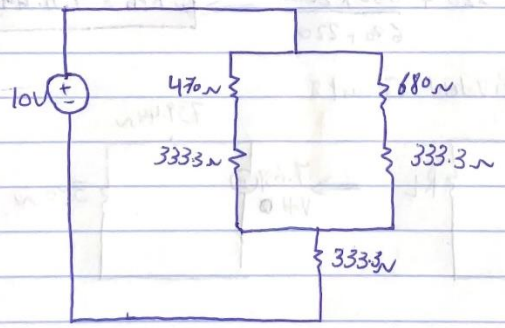
transfare Δ to y use This equation "for 1KΩ Resistors":

$$R_1 = \frac{R_A \cdot R_B}{R_A + R_B + R_C}, \quad R_2 = \frac{R_B \cdot R_C}{R_A + R_B + R_C}, \quad R_3 = \frac{R_C \cdot R_A}{R_A + R_B + R_C}$$

Knowing That $R_A = R_B = R_C = 1K\Omega$

$$\Rightarrow \text{i.e. } R_1 = R_2 = R_3 = \frac{1K\Omega \cdot 1K\Omega}{1K\Omega + 1K\Omega + 1K\Omega} = \frac{1K\Omega^2}{3K\Omega} = 333.33\Omega$$

$\Rightarrow$ The resulting circuit:



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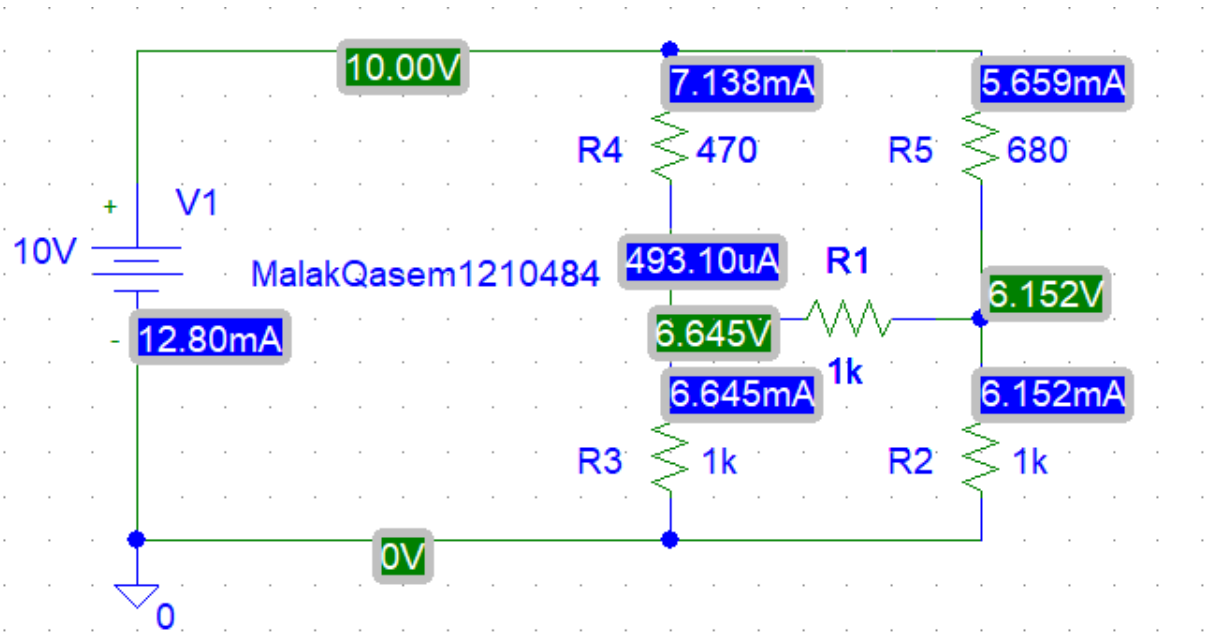
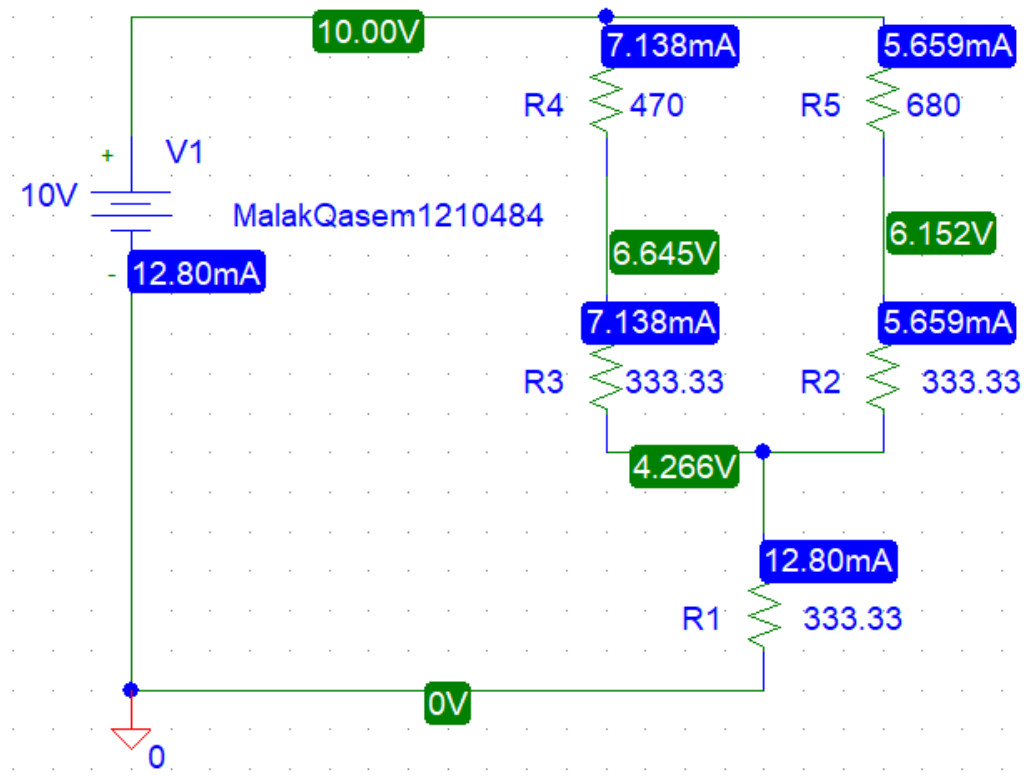
2)


10.00V
7.138mA
5.659mA
R4
470
R5
680
V1
10V
MalakQasem1210484
493.10uA
R1
6.152V
12.80mA
6.645V
1k
6.645mA
6.152mA
R3
1k
R2
1k
0V
0

3)


10.00V
7.138mA
5.659mA
R4
470
R5
680
V1
10V
MalakQasem1210484
6.645V
6.152V
12.80mA
7.138mA
5.659mA
R3
333.33
R2
333.33
4.266V
12.80mA
R1
333.33
0V
0

Part E: Reciprocity Theorem

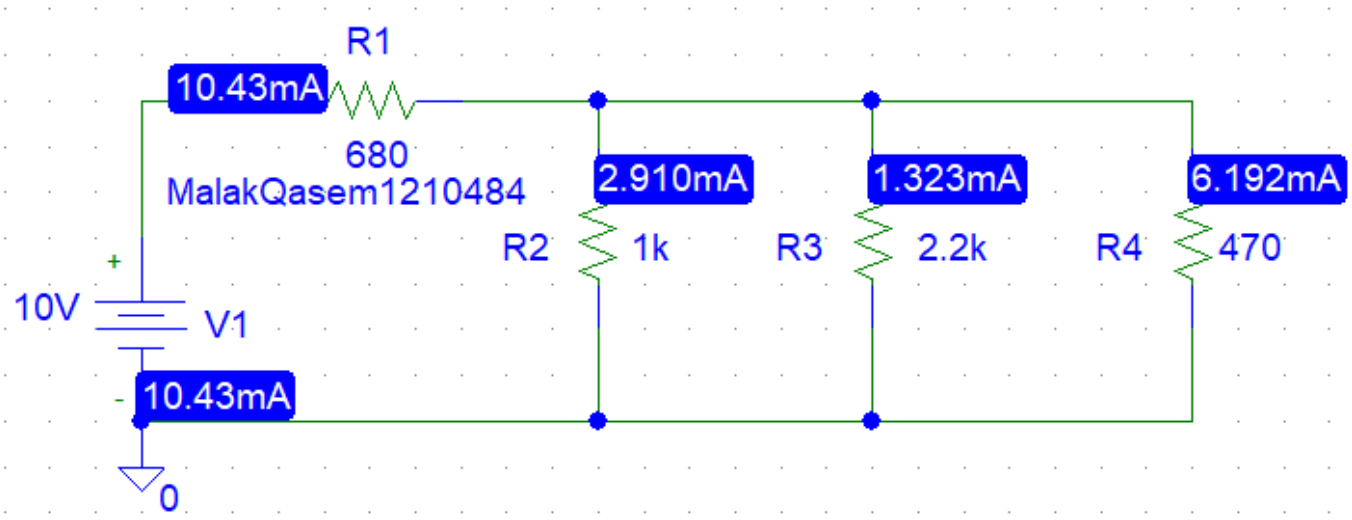


Figure 4.8

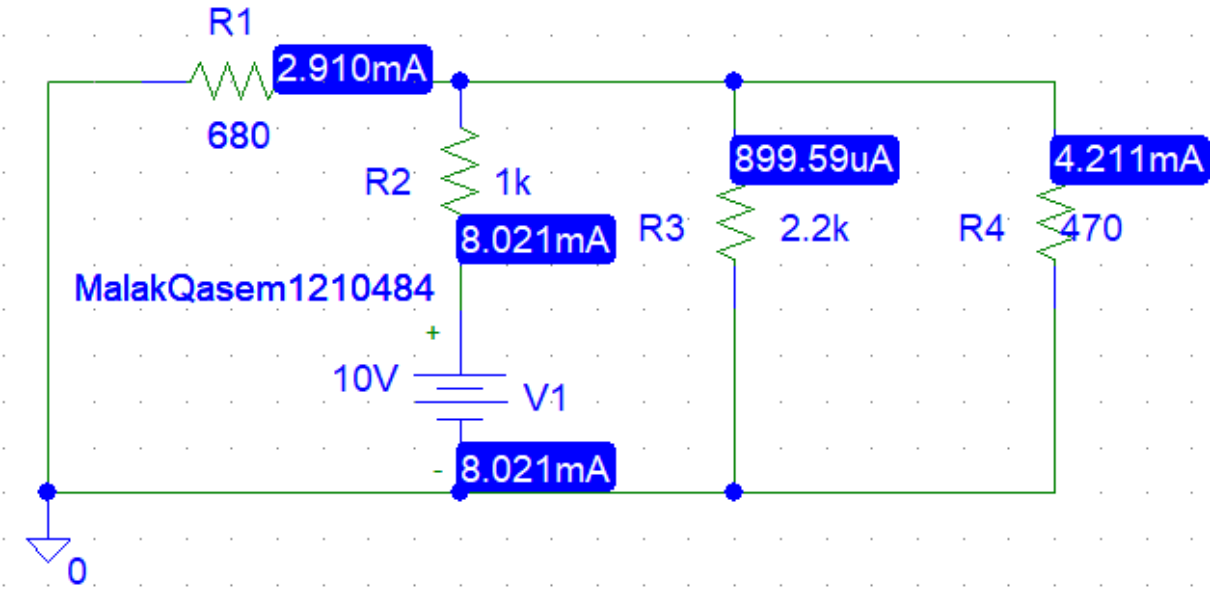


Figure 4.9

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