Ex. No.: 3 Date: 11/10/2021

Verification of Thevenin Theorem

Aim:

To find Thevenin current with manual calculations and an ORCAD simulation

Apparatus:

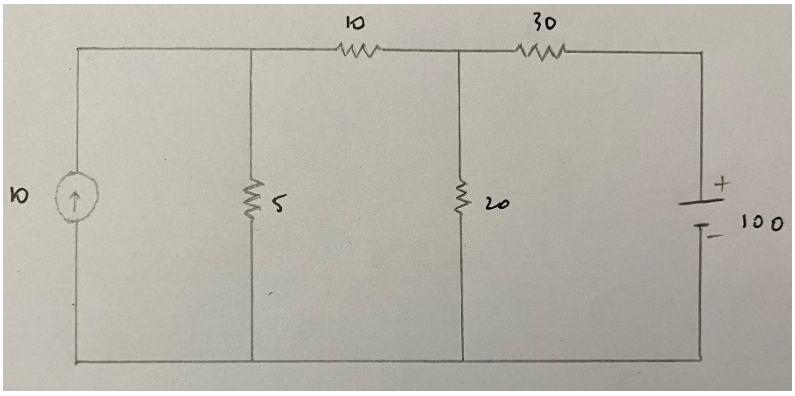
ORCAD / Capture CIS: Analog Library – R

Source Library – Vdc, Idc

Ground (GND) – 0 (zero)

Simulation Settings: Analysis Type – Bias Point

Circuit Diagram for Thevenin Theorem:

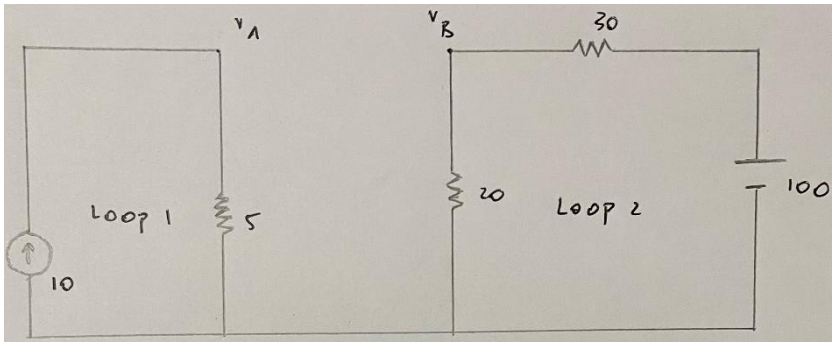


Statement:

Thevenin theorem states that it is possible to simplify any linear circuit to an equivalent circuit with a single voltage source and a series resistance connected with a load.

Manual Calculations:

Finding Thevenin Voltage (V_{th}):



Loop 1

$V = IR$

$\Rightarrow V = 10 \times 5$

$\Rightarrow V_A = 50\ V$

Loop 2

$I = \frac{V}{R}$

$\Rightarrow I = \frac{100}{20 + 30}$

$\Rightarrow I = 2\ A$

$V = IR$

$\Rightarrow V_B = +100 - 2 \times 30$

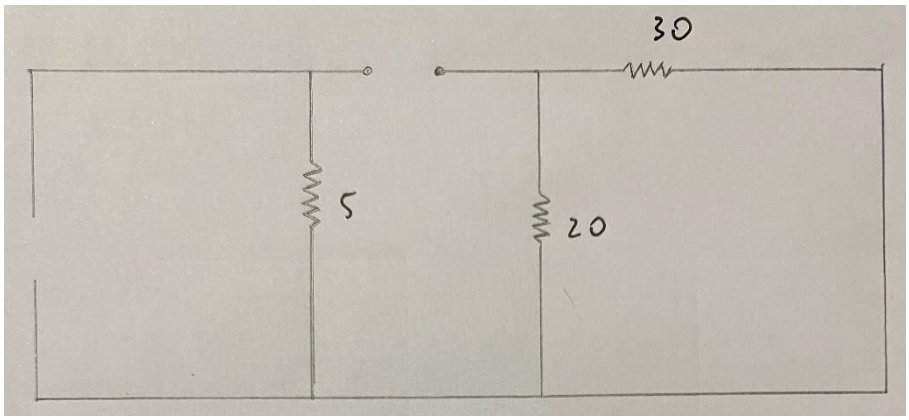
$\Rightarrow V_B = 100 - 60$

$\Rightarrow V_B = 40$

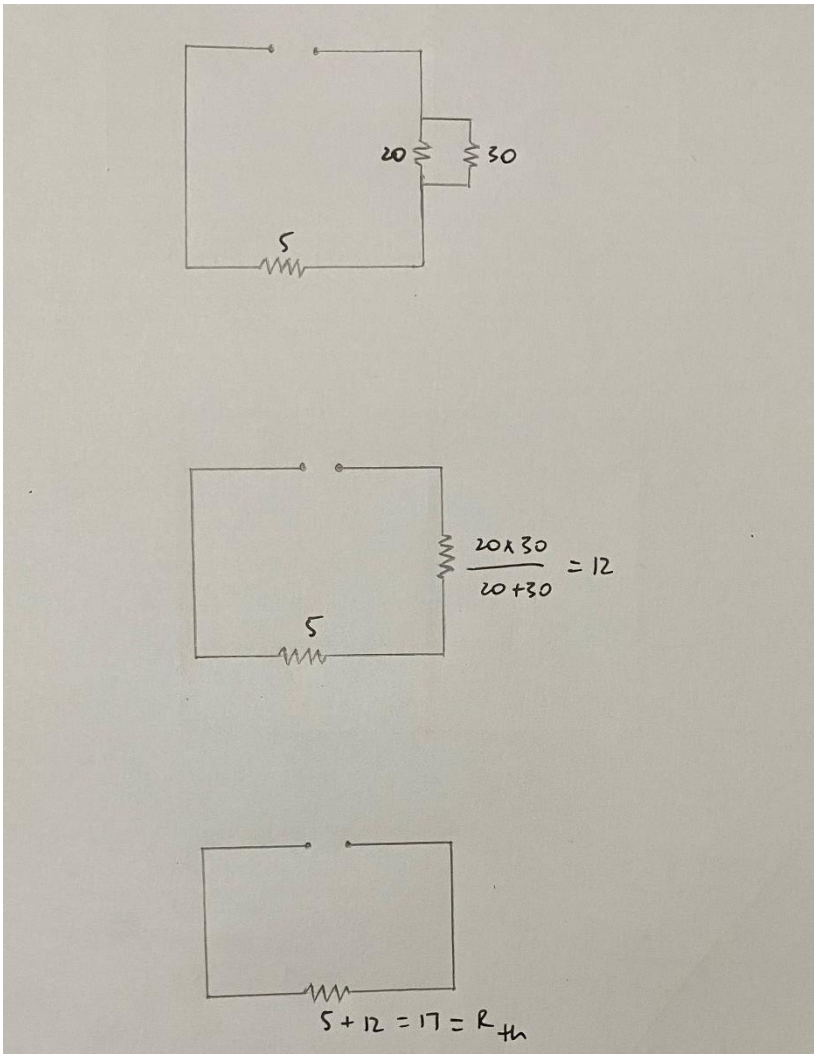
$V_{th} = V_A - V_B$

$= 10\ V$

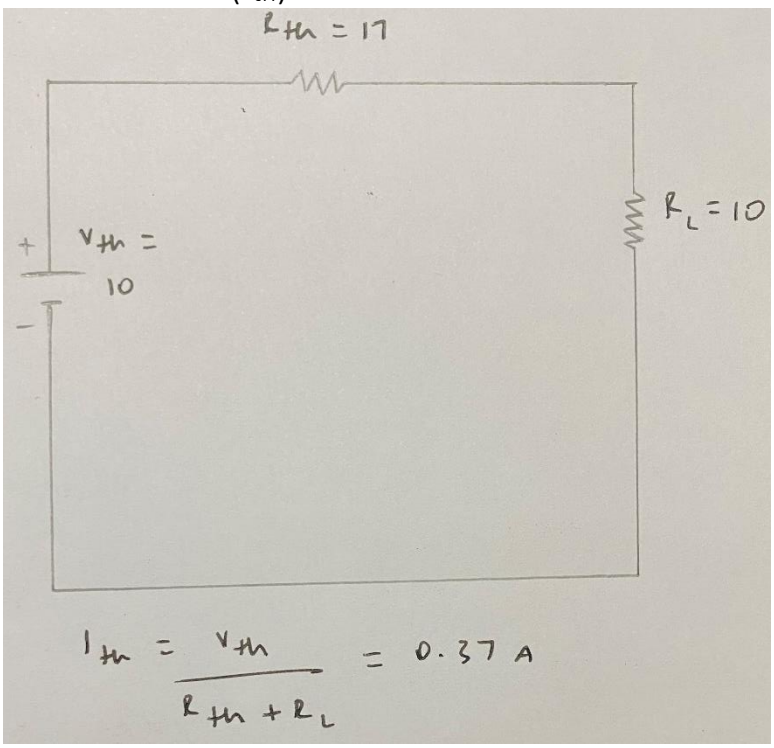
Finding Thevenin Resistance (R_{th}):



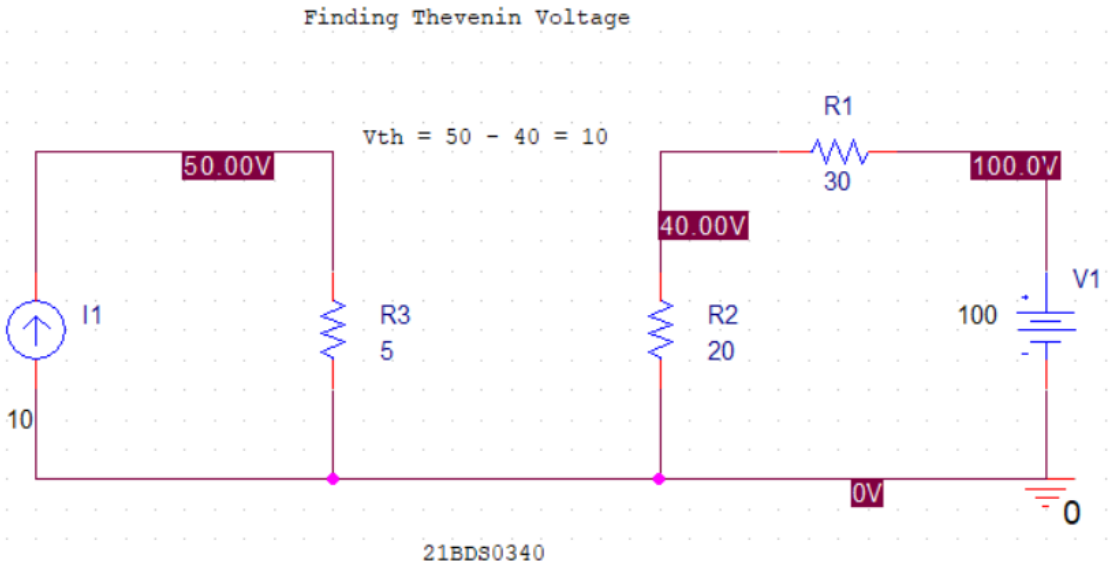
Can be reduced as:

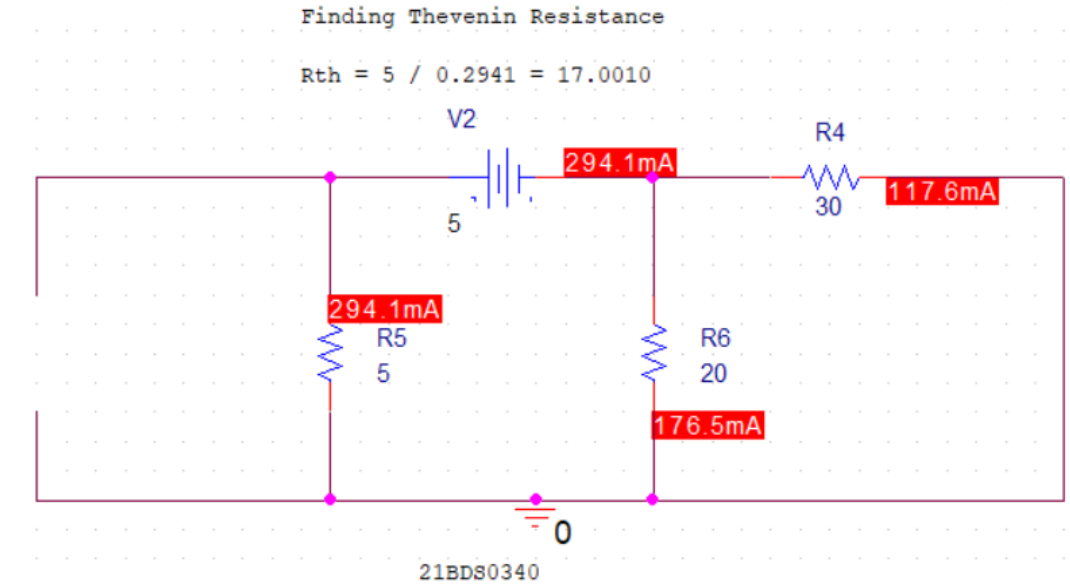


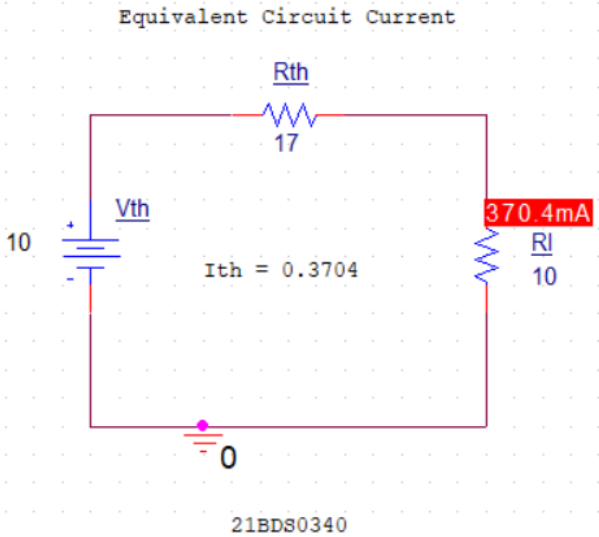
Finding Thevenin Current (I_{th}):



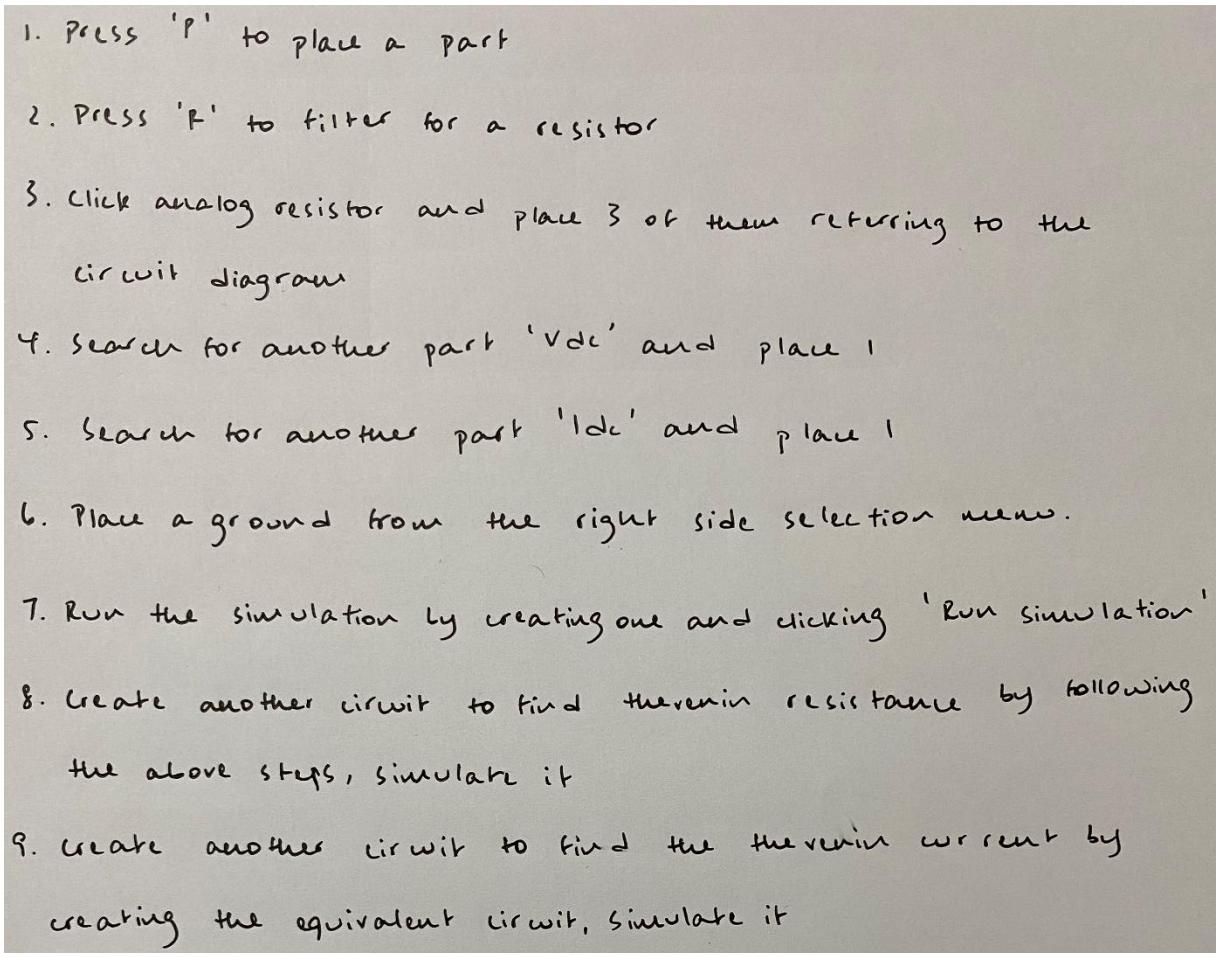
Simulation Circuits:







Procedure:



Result:

Thevenin Theorem

NOTATION	MANUAL CALCULATIONS	SIMULATED RESULT
V_{TH}	10	10
R_{TH}	17	17
I_{TH}	0.37	0.37

Inference:

By finding thevenin current manually and with ORCAD, the values match, showing that our equivalent circuit with just 1 voltage and resistance with the load can be formed.

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