Bangladesh University Of Business & Technology (BUBT)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Faculty of Engineering

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Project Report

On

Design a simplified circuit from a given circuit (which consists of two independent sources) which provides the same value of power to the load.

Submitted To

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Dedicated to

Our Parents

&

Honorable Teacher

ACKNOWLEDGEMENT

We appropriate my thankfulness and sincere thanks to my teacher Mohammad Nowshed Al Nur , Department of Electrical and Electronics Engineering for his Generous Efforts and keep following Which has Remained as a valuable asset for the successful of our project report .We Acquire knowledge how to solve Circuit . when we work for this project we have faces many problems and we discuss our teammates and course teacher. Our Project Teacher gladly help us to done this project. Then we Done this Project and achieve success.

Table of Contents

Introduction

The Thevenin’s theorem states that any linear two terminal circuit consisting of sources and resistors connected to a given load RL can be replaced by an equivalent circuit consisting a single voltage source of magnitude Vth with a series resistance & Rth across the terminal of RL.

The Thevenin’s model of two terminal network where the current through the load is same therefore, these two circuits are equivalent to each other.

Background

Load resistance is a circuit or a simply way to saying that load resistance is what through which you consume power .To calculate Thevenin's resistance and voltage we need to find the power source in the original circuit and remove them and calculating total resistance between the open connection points .Draw the Thevenin equivalent circuit, with the Thevenin voltage source in the series with the Thevenin's calculating total resistance between the open connection points. Draw the Thevenin equivalent Circuit, with the Thevenin voltage source in the series with the Thevenin's resistance. To calculate load current we need to find the total current flowing through by using the Ohm's Law, $I = V_{th}/R_{th}$.

Motivation

Thevenin's Theorem are used where the load can be Varied . So, basically these methods reduce the big linear circuit into 1 source & 1 resistor. Later we can put any kind of load & measure the variations of current & voltages across the load. The load can be a Fan, bulb, etc.

Literature Review

Thevenin's theorem provides a technique by which the fixed part of the circuit is replaced by an equivalent circuit. According to Thevenin's theorem, the linear circuit in Fig. 4.23(a) can be replaced by that in Fig. 4.23(b). (The load in Fig. 4.23 may be a single resistor or another circuit.) The circuit to the left of the ter minals in Fig. 4.23(b) is known as the Thevenin equivalent circuit; it was developed in 1883 by M. Leon Thevenin (1857–1926), a French telegraph engineer.

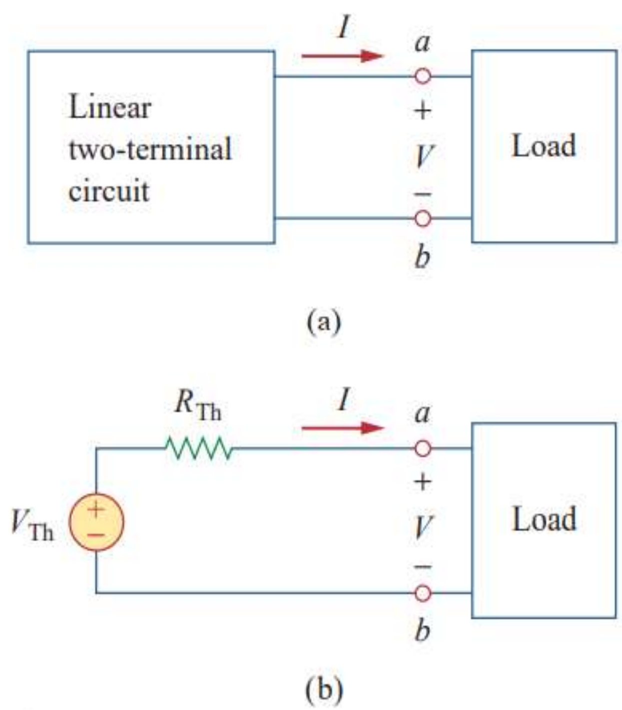


Figure 4.23

Proposed Methodology

At first , we select a Thevenin's Theorem Circuit .That has a two independent source , one is current source & another one is voltage source & also take resistance and load resistance . We Draw a circuit . At last , we get Vth and R_{th} step by step processing the calculation with Thevenin's theorem.

Thevenin’s theorem states that a linear two-terminal circuit can be replaced by an equivalent circuit consisting of a voltage source V_{th} in series with a resistor R_{th}, where V_{th} is the open-circuit voltage at the terminals and R_{th} is the input or equivalent resistance at the terminals when the independent sources are turned off.

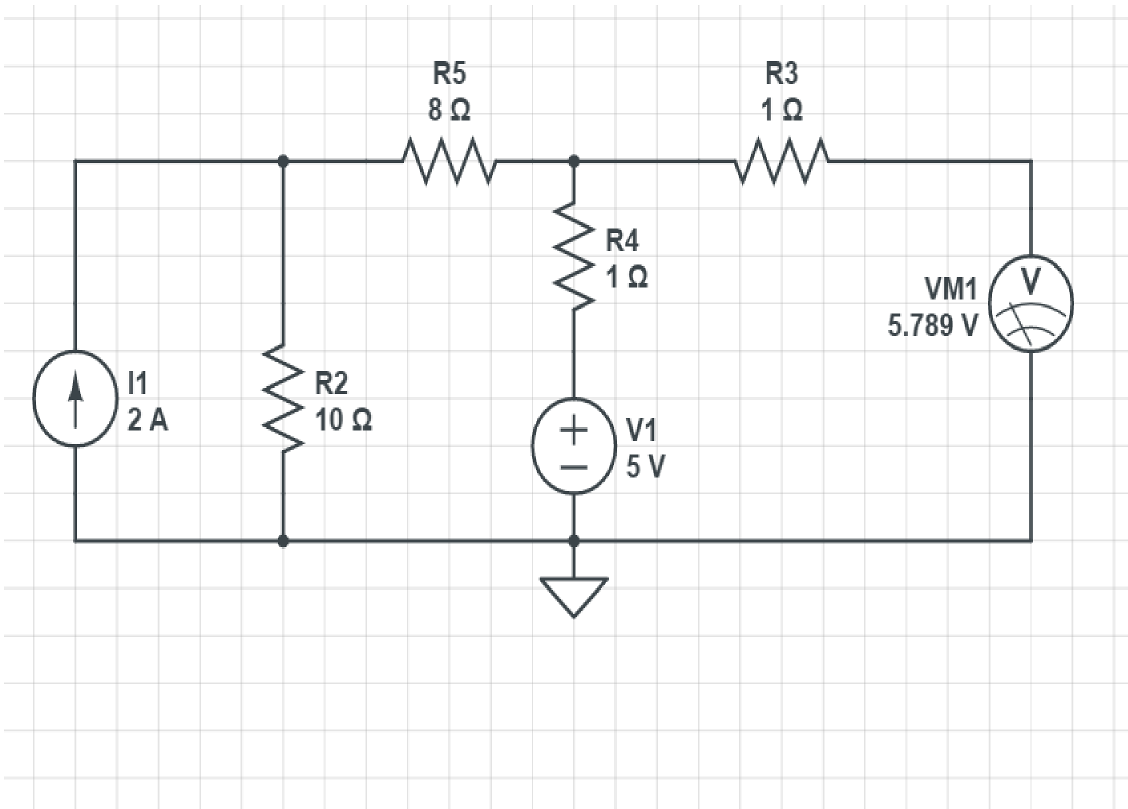
When We Calculate R_{th} we short the voltage source & current source & load resistance remove . For Vth we remove load resitance and applying KCL node 1 & node 2 . Then we get V_{th} Calculating the equation.

Methodology

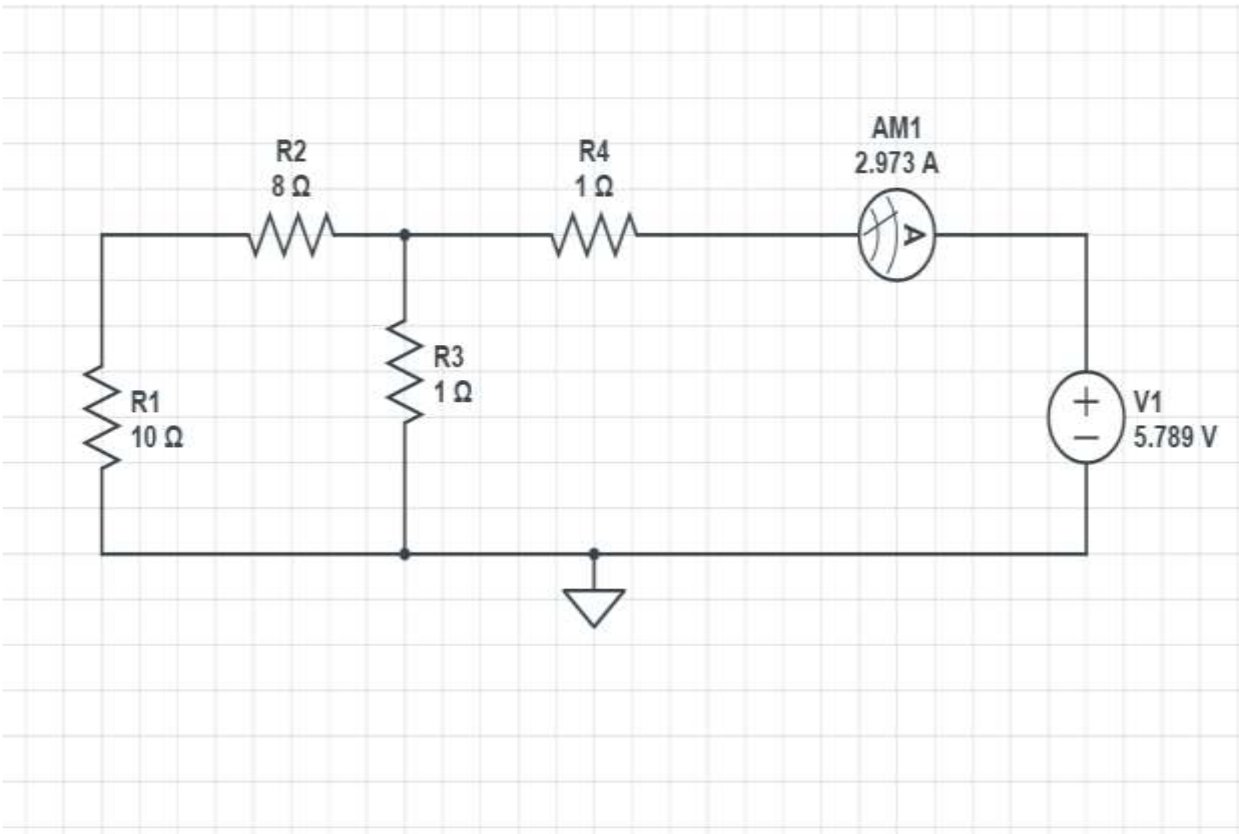
1. Connect to the circuit Diagram.
2. Measure current in R_L.
3. Connect the circuit.
4. Measure open circuit voltage V_{oc} by open circuiting terminals I, R_{th} ,V_{th}.
5. Draw the Thevenin's equivalent circuit .
6. Measure current flows .

Simulation

For V_{th} :



For R_{th} :



$R_{th} = v_{th}/i$

$=(5.789/2.973)$

$= 1.94$

Result

Circuit Diagram :

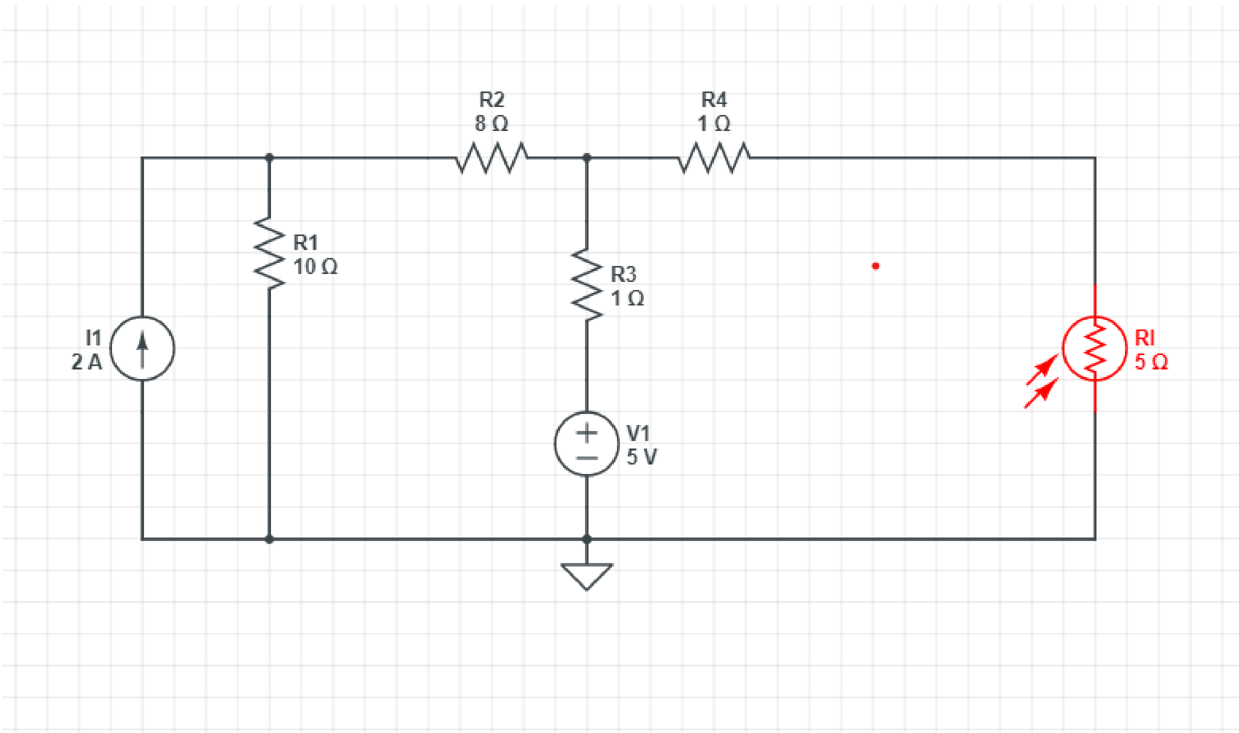


Figure – 01

Finding R_{th} :

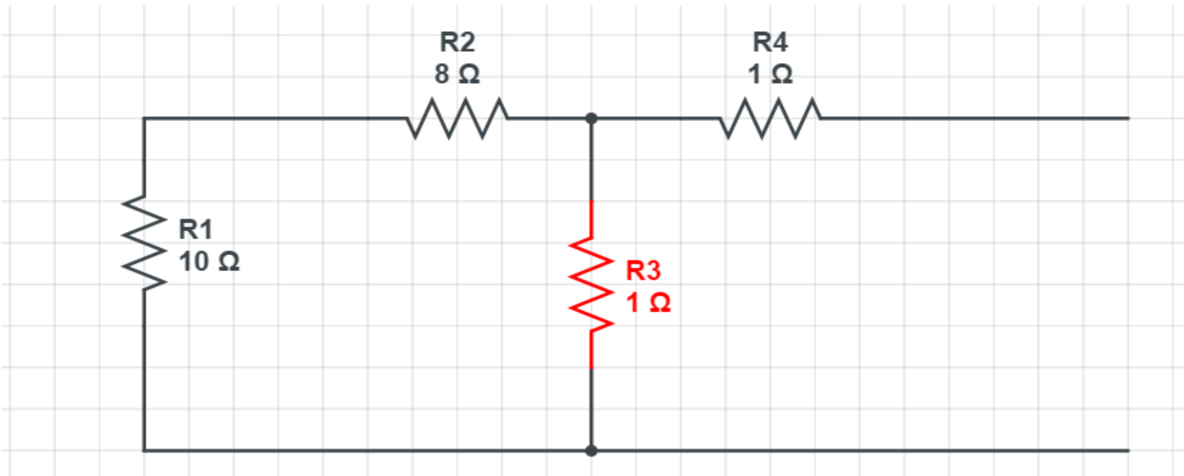


Figure -02

$R = (R1+R2) = (10+8)\ \Omega$

$= 18\ \Omega$

$R' = (R \parallel R3) = 18*1/18+1 \quad = 18/19\ \Omega$

$R'' = (R'+R4) = 18/19 + 1 = 1.94\ \Omega$

Finding V_{th} :

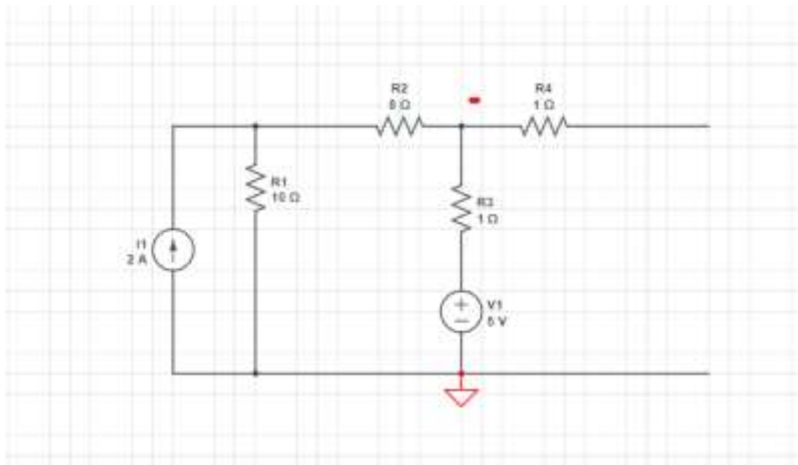


Figure -03

Applying KCL At Node 1,

2 = (v1-v3)/10 + (v1-v2)/8

2 = (v1-0)/10 + (v1-v2)/8

20 = v1+1.25v1-1.25v2

20 = 2.25v1-1.25v2 --(1)

Applying KCL At node 2,

(v1-v2)/8 = (v2-5)/1

V1 –v2 = 8v2 -40

V1-9v2=-40 ---(2)

Form Equation (1) &(2) Calculating,

V1= 12.105 V

V2=5.789 V

We Know Vth = V2.

So, Vth = V2 = 5.789 V

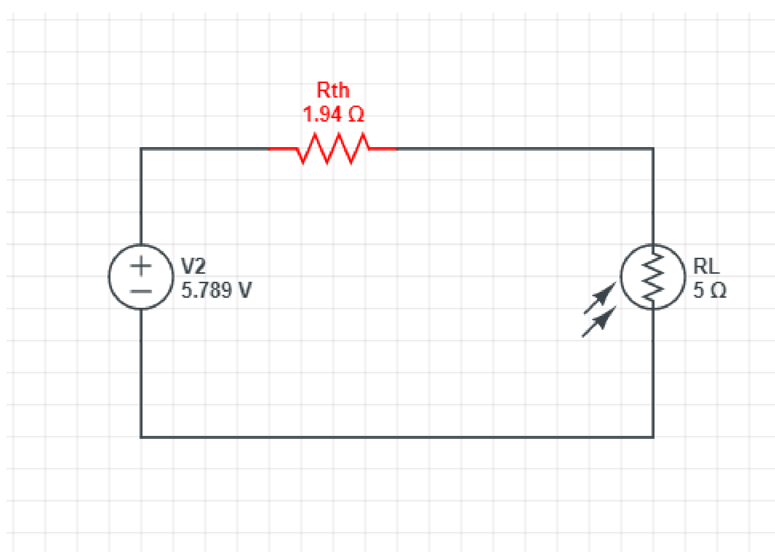


Figure - 04

Finding IL = Vth/Rth =5.789/1.94 =2.98

Conclusion

First we are afraid & Nervous about the project topic Thevenin's theorem method. But when we discuss our teammates & also helping our course teacher. Our course teacher cordially help us to solve this project. We discussing this project to our teammates so that this is too much easy to solve this project. when we solve the Circuit we get V_{th} & R_{th} Final value. Using Simulation we get V_{th} and R_{th} and this value is same then our teammates get satisfaction. In Next time any Thevenin's theorem circuit we can easily solve**.**

Thank You

<u>Refrences</u>

Fundamentals of Electric Circuit ,Fourth Edition, Matthew N.O.Sadiku , Charles Alexander ,page-139