**Queensborough Community College**

The City University of New York

**Department of Engineering Technology**

**ET 110 – Introduction to Circuit Analysis Laboratory**

**Lab#11**

Thevenin’s and Norton’s Theorem

**Inspector: Prof. Wu**

**Date 11/11/16**

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* **Objective**
* Understanding Thevenin’s and Noton’s Theorem
* **Components’ list**
* Power supply
* DMM
* Protoboard
* Jump wires
* Resistors: 100Ω, 330Ω, and two 220Ω
* **Experimental**
* **Tables**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| Measured | 3.49V | 15.38mA | 53.68mW |
| Table 11.1 Original Circuit Measurements | | | |

|  |  |  |
| --- | --- | --- |
| **Thevenin’s Equivalent Circuit Measurements** | | |
|  |  |  |
| **Measurements** | 7.17V | 235.76Ω |
| Table 11.2 – Thevenin Equivalent Circuit Measurements | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Load Resistance calculation using the Thevenin’s Equivalent Circuit** | | | |
|  |  |  |  |
| **Calculations** | 3.46V | 15.73mA | 54.43mA |
| Table 11.3 – Load analysis from the Thevenin’s Equivalent Circuit | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Load Resistance Analysis** | | | |
|  |  |  |  |
| **Original Circuit** | 3.49V | 15.38mA | 53.68mW |
| **Thevenin’s Equivalent** | 3.46V | 15.73mA | 54.43mA |
| **Difference %** | 0.86% | -2.26% | -1.40% |
| Table 11.4 – Load resistance analysis | | | |

**Questions**

1. Yes. The reason is Thevenin’s Theorem is useful in analyzing power systems and other circuits where one particular resistor in the network is subject to change, and re-calculation of the circuit is necessary with each trial value of load resistance, to determine voltage across it and current through it. So you will have the same result as the voltage and current as the original circuit. In other words, the Power will also be the same.

**Conclusion**

In this lab, Thevenin’s Theorem talks about that it is possible to simplify any linear circuit, no matter how complex, to an equivalent circuit with just a single voltage source and series resistance connected to a load. The qualification of “linear” is identical to that found in the Superposition Theorem, where all the underlying equations must be linear (no exponents or roots). If we’re dealing with passive components (such as resistors). The advantage in performing the “Thevenin conversion” to the simpler circuit, of course, is that it makes load voltage and load current so much easier to solve than in the original network. Calculating the equivalent Thevenin source voltage and series resistance is actually quite easy. First, the chosen load resistor is removed from the original circuit, replaced with a break (open circuit). Thevenin’s Theorem is a way to reduce a network to an equivalent circuit composed of a single voltage source, series resistance, and series load. As we are doing the lab, we use the nodal analysis or mesh analysis to simplify the original circuit to a series circuit or a parallel circuit to connect with the load resistor. Then we can using ohm’s law, CDR or VDR to get the voltage across and current through that resistor.