Fakulti:	**FAKULTI KEJURUTERAAN ELEKTRIK**	
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SKEU 3741
ELECTROTECHNIC LABORATORY

(Experiment 3)
THEVENIN AND NORTON THEOREMS

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I. PRELIMINARY EXERCISE (10 marks)

<u>Important Note:</u> You are required to do this exercise BEFORE the lab session

i. For the circuit in Fig. 1.0, calculate I_L at R_L = 0 Ω; 10 Ω; 20 Ω; 30 Ω; 50 Ω; 100 Ω and 200 Ω. *Record your results in Table 1.0 column 3.*

ii. What are the two component of a Thevenin and Norton equivalent circuit?

iii. Define Thevenin equivalent voltage, V_{TH}

iv. Define Thevenin equivalent resistance, R_{TH}

v. For the circuit in Figure 1.0, determine the Thevenin and Norton equivalent circuit as viewed from terminals A and B. hence, calculate I_L at R_L = 0 Ω; 10 Ω; 20 Ω; 30 Ω; 50 Ω; 100 Ω and 200 Ω.

vi. State the maximum power transfer theorem. Show that for maximum power transfer, $R_L = R_{TH}$.

vii. Discuss briefly the importance of Thevenin and Norton Theorems in circuit analysis.

viii. Perform the circuit analysis using PSPICE to validate your results.

<u>Recommended Reference:</u>

Alexander & Sadiku, 'Fundamental of Electric Circuit 4th edition', ***McGraw Hill.***

II. EXPERIMENT:

'Thevenin And Norton Theorems'

1. **Aims :**

   i. To obtain Thevenin and Norton equivalent circuit from a complex circuit.

   ii. To perform comparison analysis between the complex circuit and the Thevenin and Norton equivalent circuits.

   iii. To show that Thevenin and Norton theorems are the simplest method to analyze load variation in a complex circuits.

   iv. To determine the value of load resistance for which maximum power is transferred.

2. **Equipments:**

No	Equipments	Serial No.
1	Decade resistor	
2	Ampere meter	
3	Volt meter	
4	Multimeter	
5	DC power supply	
6	Connection wire	

3. **Procedures :**

Precaution:

i. Set the supply voltage value to the correct experimental value before connect it to the circuit.

ii. Make sure the multimeter or ammeters are connected at a right terminal.

iii. Do not switch on the supply until the instructor checks all connections.

<u>Experiment A</u> : Load current measurement in complex circuit.

i. Circuit connection (refer to **Figure 1.0**).

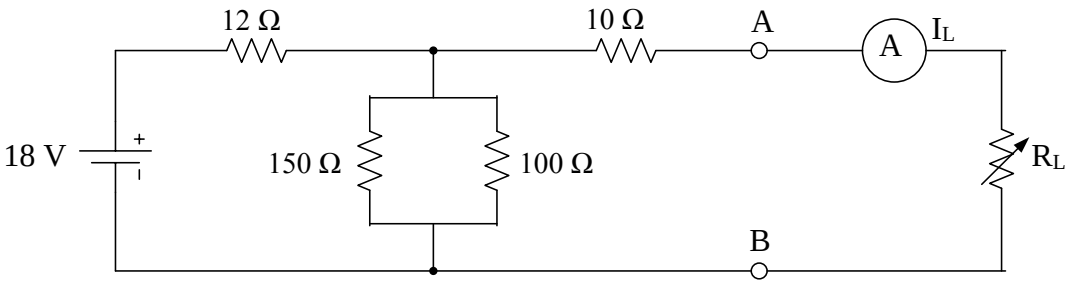

Figure 1.0

ii. Measure and record the ammeter readings for load resistance, R_L = 0 Ω; 10 Ω; 20 Ω; 30 Ω; 50 Ω; 100 Ω and 200 Ω (**Table 1.0**)

<u>Experiment B</u> : Thevenin and Norton Theorem

i. From Figure 1.0, open the terminals A and B, by using provided meters:

a. Measure the Thevenin equivalent resistance, R_{TH} at terminals A and B.

b. Measure the open circuit voltage at terminals A and B.

c. Measure the short circuit current at terminals A and B.

Record the measured values in **Table 2.0.**

ii. Use the measured value of equivalent resistance, R_{TH} and open circuit voltage, V_{TH}, connect the circuit as in Figure 2.0, measured and record ammeter reading in **Table 3.0**.

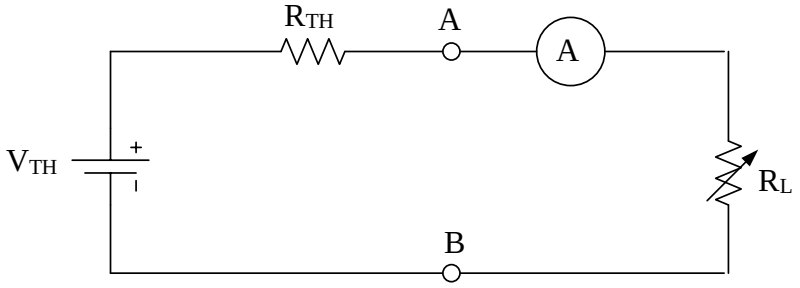

Figure 2.0

iii. Connect the circuit as shown in Figure 3.0. Turn the voltage knob anti clockwise to obtain the minimum voltage. Then adjust the voltage supply (E) to the Norton current I_N. Measure load current and record your reading in **Table 4.0**.

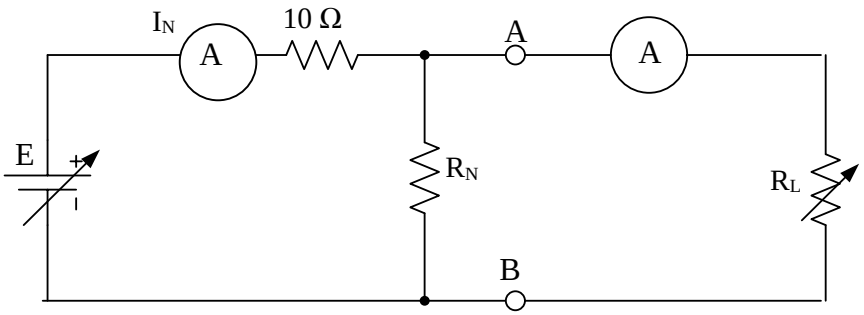

Figure 3.0