

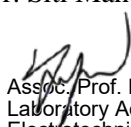

FACULTY OF ELECTRICAL ENGINEERING	
Course: ELECTRICAL ENGINEERING LABORATORY	Review : 7
Course Code: SEEE 2742	Release Date : October 2023
	Last Amendment : September 2023
	Procedure Number : PK-UTM-FKE-(O)-08



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**FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MALAYSIA**

**SEEE 2742
ELECTROTECHNICS LABORATORY
EXPERIMENT 1
SUPERPOSITION, THEVENIN
AND NORTON THEOREMS**

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I. PRELIMINARY EXERCISE (10 marks)

Important Note: Students are required to do this exercise **BEFORE** the laboratory session.

- Briefly describe Superposition, Thevenin and Norton theorems by using an example from your own circuit.
- For the circuit in **Figure 1**, by using Superposition theorem, calculate current (I_L), voltage (V_L) and active power (P_L) at variable resistances (R_L) = 20 Ω , 50 Ω and 100 Ω .
- Repeat step (ii) by using Thevenin and Norton theorems.
- Perform the circuit analysis using any simulation tools (LTSPICE, PSPICE, MATLAB, Multisim, etc.) to validate your results.
- Briefly discuss the importance of Superposition, Thevenin and Norton theorems in circuit analysis.

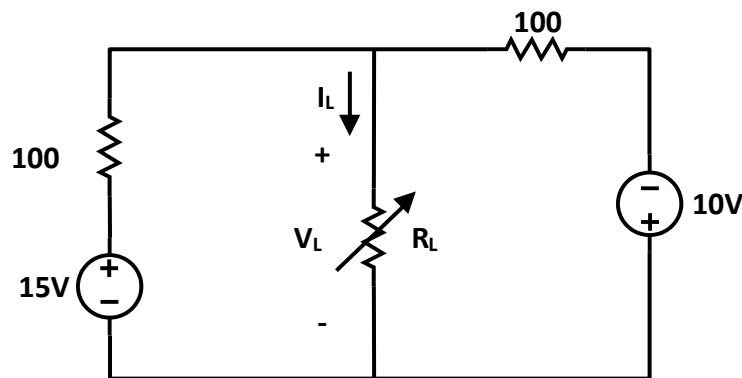


Figure 1

Important Note: Students are required to bring their laptops to **VERIFY** all simulations results.

Recommended Reference

Alexander & Sadiku, 'Fundamental of Electric Circuit 6th edition', McGraw Hill.

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II. EXPERIMENT

‘Superposition, Thevenin and Norton Theorems’

IMPORTANT: Students need to complete the **PRELIMINARY EXERCISE** before the laboratory session.

1. Aims:

To solve circuit analysis problems by using Superposition, Thevenin and Norton theorems.

2. Equipment provided:

DC power supply, ammeter, multimeter, variable resistor/rheostat

3. Instructions:

Precautions:

- *Set the supply voltage and variable resistance to the correct experimental values before connecting it to the circuit.*
- *Make sure the multimeter or ammeter are connected at the correct terminal.*
- *Do not switch on the supply until all connections have been verified by the instructor.*

Hints:

- *To obtain the desired voltage, both the voltage knob and the current knob need to be adjusted until the GREEN LED (c.v.) illuminates to indicate the voltage supply.*
- *To obtain the desired current, both the voltage knob and the current knob need to be adjusted until the RED LED (c.c.) illuminates to indicate the current supply.*

- i. Based on the circuit in Figure 1, setup an experiment to measure the current (I_L), and voltage (V_L) of the load for $R_L = 20 \Omega$, 50Ω , and 100Ω ;
 - a. based on the original circuit.
 - b. by using Superposition theorem.
 - c. by using Thevenin theorem.
 - d. by using Norton theorem.
- ii. Calculate the power absorbed by R_L from the measurement in step 3(i).

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- iii. Compare and comment on results of the three theorems against the original circuit in terms of voltage, current and power.
- iv. Compare the experimental results with the results from the preliminary exercises.
- v. Discuss the advantages and disadvantages of each theorem based on the experimental findings.