FACULTY OF ELECTRICAL ENGINEERING	
Course: **ELECTRONIC DESIGN LABORATORY** Course Code: **SKEE 2752**	Review : **8** Release Date : **March 2025** Last Amendment : **February 2025** Procedure Number : **PK-UTM-FKE-(O)-08**

SKEE 2752

ELECTROTECHNICS LABORATORY

EXPERIMENT 1

SUPERPOSITION, THEVENIN AND NORTON THEOREMS

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Date	: 01 March 2025	Date	: 01 March 2025

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I. PRELIMINARY EXERCISE (10 marks)

<u>Important Note:</u> Students are required to do this exercise BEFORE the laboratory session.

i. Briefly describe Superposition, Thevenin and Norton theorems by using an example from your own circuit.

ii. 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.

iii. Repeat step (ii) by using Thevenin and Norton theorems.

iv. Perform the circuit analysis using any simulation tools (LTSPICE, PSPICE, MATLAB, Multisim, etc.) to validate your results.

v. Briefly discuss the importance of Superposition, Thevenin and Norton theorems in circuit analysis.

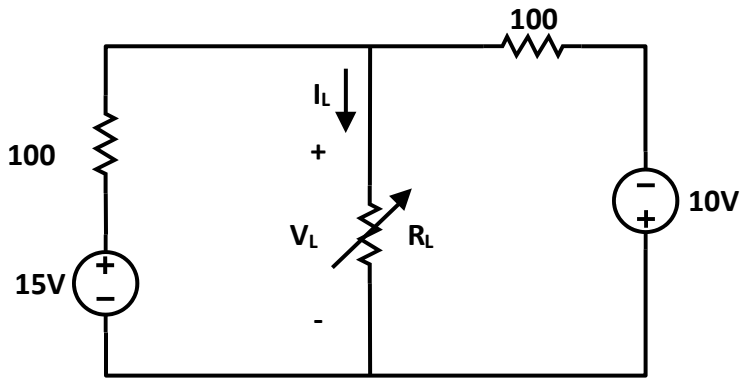

Figure 1

<u>Important Note:</u> Students are required to bring their laptops to VERIFY all simulations results.

<u>Recommended Reference</u>

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 = 50 Ω and 100 Ω;

   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.