

Experiment No. 4 (a)
Date:

VERIFICATION OF THEVENIN'S THEOREM

AIM:

This Trainer Kit is useful to demonstration of Thevenin's Theorem.

APPARATUS:

0 to +15V Variable Power Supply

- 1) Voltmeter (0 -15V)
- 2) Ammeter (0-100mA)
- 3) Required linear networks and
- 4) Different values of resistors to use as load resistors

THEORY:

THEVENIN'S THEOREM:

“Any two terminal active linear network containing energy sources (generators) and resistances can be replaced with an equivalent circuit consisting of a voltage source V_{th} in series with a resistance R_{th} . The value of V_{th} is the open-circuit voltage between the terminals of the network and R_{th} is the resistance measured between the terminals with all the energy sources eliminated (but not their internal resistances).”

CIRCUIT DIAGRAM:

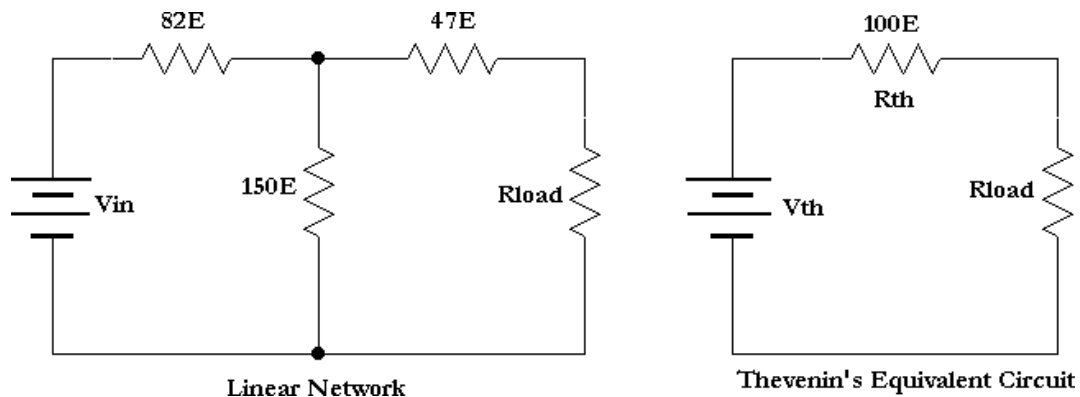


Figure 1

PROCEDURE:

- 1) Connect the circuit as shown in the figure 1.
- 2) Measure the current through the load resistor in the linear circuit.
- 3) Calculate the Thevenin's equivalent resistance of the circuit, when the source is set to Zero.

$$R_{th} = (82 \parallel 150) + 47 = 100 \text{ ohms.}$$

- 4) Calculate the open circuit voltage across the terminals A & B which is equal to the voltage across 150ohms resistor.

$$V_{th} = \frac{15 \times 150}{82 + 150} = 9.69V$$

- 5) Measure the voltage drop across 150ohms resistor after disconnecting terminals A & C.
- 6) Find it to be equal to calculated value of V_{th} .
- 7) Now set the voltage to the obtained V_{th} in the Thevenin's equivalent circuit using Variable power supply.
- 8) Measure the current through the load resistor in the Thevenin's equivalent circuit.
- 9) Note that both current measured through the load resistor in the linear circuit as well as in the equivalent circuit is same.

Repeat the above procedure for different values of resistors provided on the board.

TABULAR TEXT:

Theoretical and Practical Values

	E(V)	V _{TH} (V)	R _{TH} (\square)	I _L (mA)	
				Circuit - I	Equivalent Circuit
Theoretical	10				
Practical	10				

Model Calculations:**Precautions:**

1. Connections are given carefully.
2. Note down the readings carefully.
3. At the time of interchange the ammeter switch OFF the Supply.

Result:

Hence the Thevenin's theorem is verified both practically and theoretically.

Viva questions:

1. What is load resistance?
2. How will you calculate Thevenin's resistance R_{TH} ?
3. How will you calculate Thevenin's voltage V_{TH} ?
4. How will you calculate load current I_L ?
5. Write the applications of Thevenin's theorem.
6. Write the limitations of Thevenin's theorem

Virtual lab link:

<http://vlabs.iitkgp.ernet.in/asnm/exp3/index.html>