# Experiment: To study the Thevenin's Theorem

**Objective: To verify the Thevenin's Theorem.**

**Apparatus:** Virtual using Tinkercad (www.tinkercad.com )

**Theory:**

This circuit states that the current in any bilateral circuit element ($R_L$) in a network is the same as would be obtained if that circuit element ($R_L$) is supplied with a source Voltage in series with an equivalent resistance $R_{th}$ being the open circuit voltage at the terminals from which $R_L$ has been removed and $R_{th}$ being the resistance that would be measured at these terminals after all sources have been replaced by their internal resistance respectively.According to this theorem, if resistance $R_L$ be connected between two terminals in a linear bilateral network, then resulting steady state current through resistor will be $V_{th}/(R_L+R_{th})$, where $V_{th}$ is the potential difference between points A and B after removing $R_L$ such that for network shown in figure.

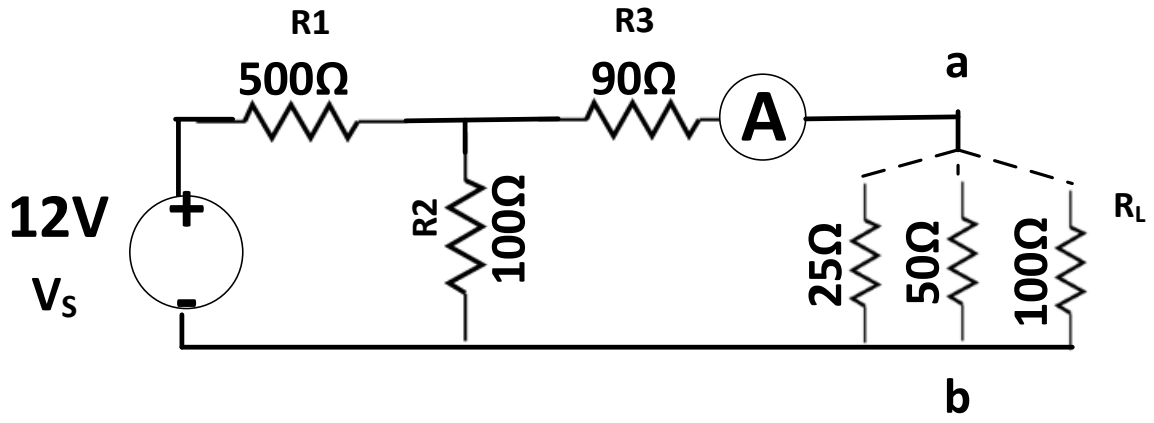


**Fig. Circuit diagram for verification of Thevenin's Theorem**

$$V_{th} = V*R_2/(R_1+R_2)$$

And Thevenin's resistance measured between terminals ab (with source removed and replaced by its internal resistance if any, otherwise replace by short circuit) is given by:

$$R_{th} = [R1*R2/R1+R2]+R3$$

Now external resistance $R_L$ is connected between terminals ab such that Thvenin's equivalent circuit for the network will be as shown in figure. Current through $R_L$ will be

$$I_l = V_{th}/ (R_{th}+R_L)$$

**Procedure:**

1. Connect the circuit as shown in the circuit diagram on tinkercad workspace. Once the circuit is made take a snapshot and paste in the manual.
2. To verify the theorem, measure Thevenin resistance by removing the load and deactivating the sources in the circuit.
3. Remove $R_L$ from the circuit and measure the open circuit voltage $\mathbf{V_{th}}$ across the end points by a DC voltmeter.
4. Once $R_{th}$ and $V_{th}$ are know, draw the Thevenin's equivalent circuit.
5. Now measure current $I_L$ by selecting the load resistance of 25, 50 and 100 Ω respectively by the multimeter.
6. Again find the Thevenin equivalent of the circuit theoretically and compare it with the simulation readings.

**Observation table:**

| S. No. | Load resistance | $V_{th}$ | $R_{th}$ | $I_L$ | Theoritical $I_L$ | % Error |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |

**Circuit diagram on Tinkercad:**

*(paste here)*

**Calculations:**

**Conclusion:**