Superposition Theorem:

The current or voltage through or across any element of a network is equal to the algebraic sum of the currents or voltages produced independently by each source.

*) When removing a voltage source from a network schematic, we replace it with a direction connection {short circuit} of zero ohm (0Ω). Any internal resistance associated with the source must remain in the network.

*) When removing a voltage source from a network schematic, replace it with an open circuit of infinite (∞) Ω.

Since the effect of each sources will be determined independently, the number of networks to be analyzed will equal the number of sources.

Mathematically,

$$I = I' + I'' + \cdots$$

$$V = V' + V'' + \cdots$$

- This theorem is used in linear circuits.

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Thevenin's Theorem:

Any two terminals DC network can be replaced by an equivalent circuit consisting solely of a voltage source and series resistor as shown in figure.

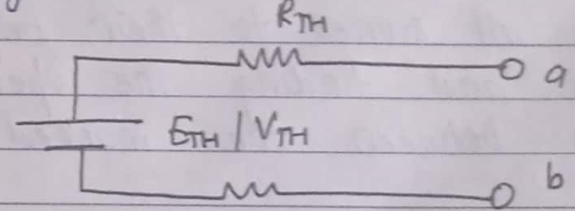

Fig. Thevenin's Equivalent Circuit.

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(*) Procedure:

(i) Remove that portion of the network except where the Thevenin's Equivalent Circuit is found.

(ii) Mark the terminal of the remaining two terminal network.

(iii): R_{TH}:
Calculate the R_{TH} by first setting all sources to zero and then finding the equivalent resistance between two marked terminals.

(iv): V_{TH}:
Calculate the V_{TH} ~~from~~ by first resulting all sources to their original position and finding the open-circuit voltage between the marked terminals.

(v): Conclusion:
Draw the Thevenin's Equivalent circuit with the position of the circuit previously removed replaced between the two terminals of equivalent circuit.

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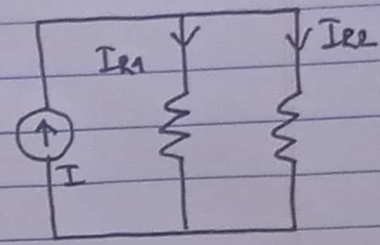
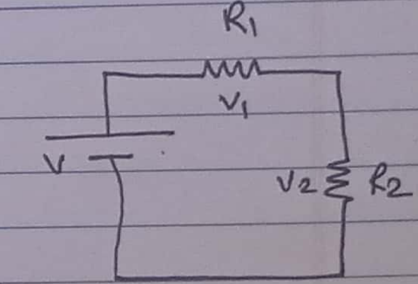
(X): Note:

(i) $$I_{R1} = \frac{I \times R_2}{(R_1 + R_2)}$$



$$I_{R2} = \frac{I \times R_1}{(R_1 + R_2)}$$

(ii) $$V_1 = \frac{V \times R_1}{(R_1 + R_2)}$$



$$V_2 = \frac{V \times R_2}{(R_1 + R_2)}$$

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