SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

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Department of Biomedical Engineering

Course Name: 23BMT201 & Circuit Analysis

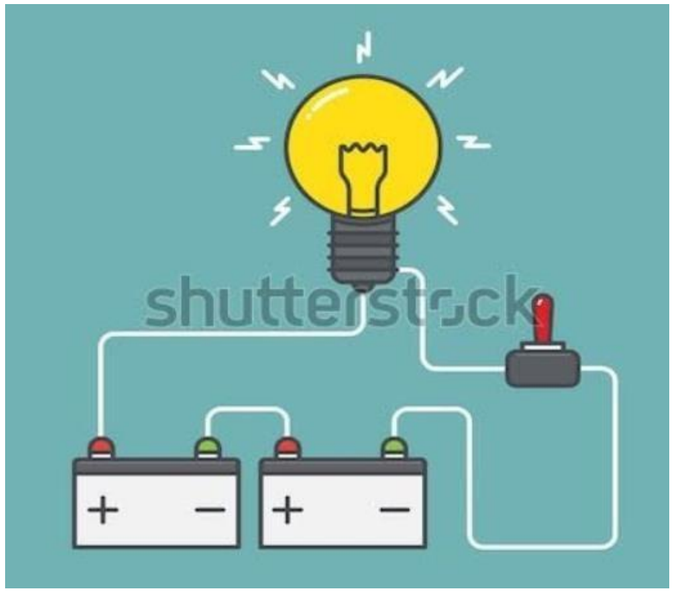
I Year : II Semester

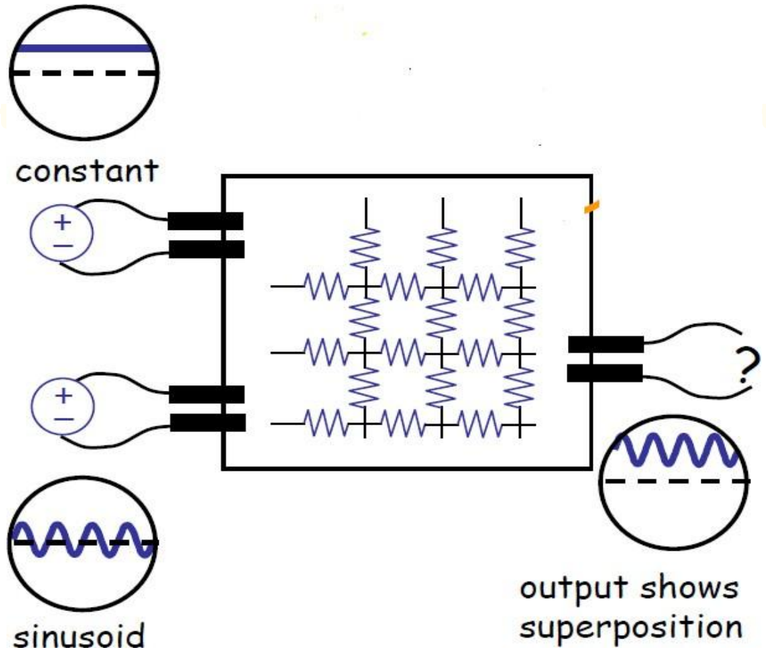
Unit I –NETWORK THEOREMS FOR DC CIRCUITS

Topic : Superposition Theorem

Superposition Theorem

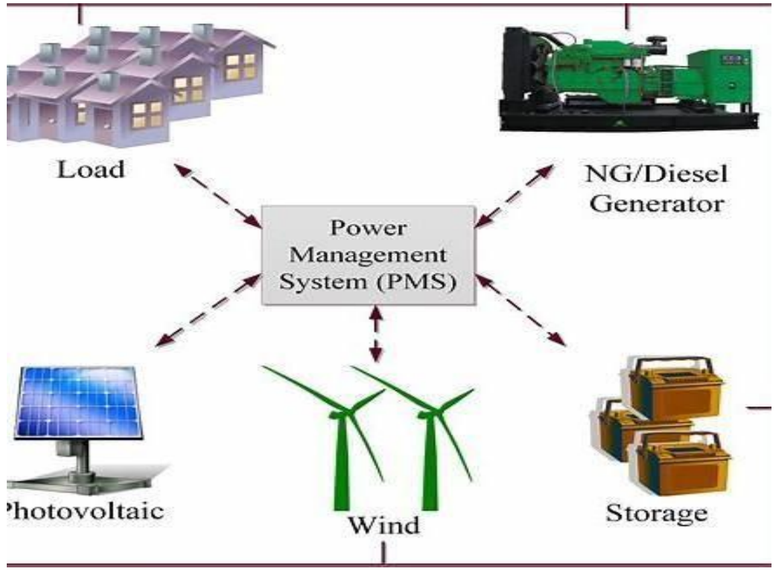
•Circuit with more than one energy/power supply units

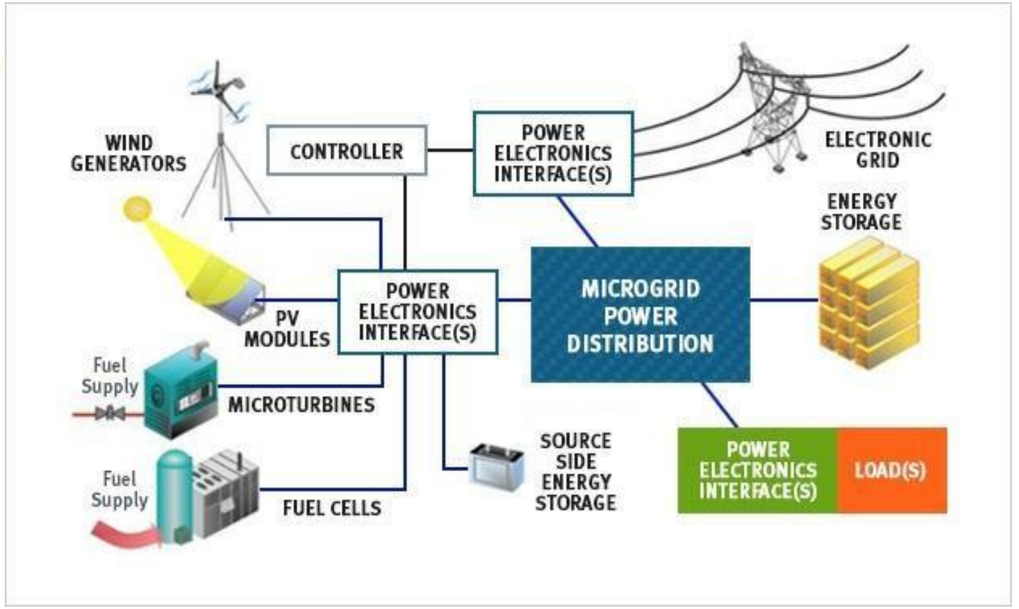




Superposition Theorem

- System with more than one energy sources





Superposition - Principle

•Helps us to analyze a linear circuit with more than one independent source.

•It is used to determine the value of some circuit variable (voltage across or current through a particular impedance)

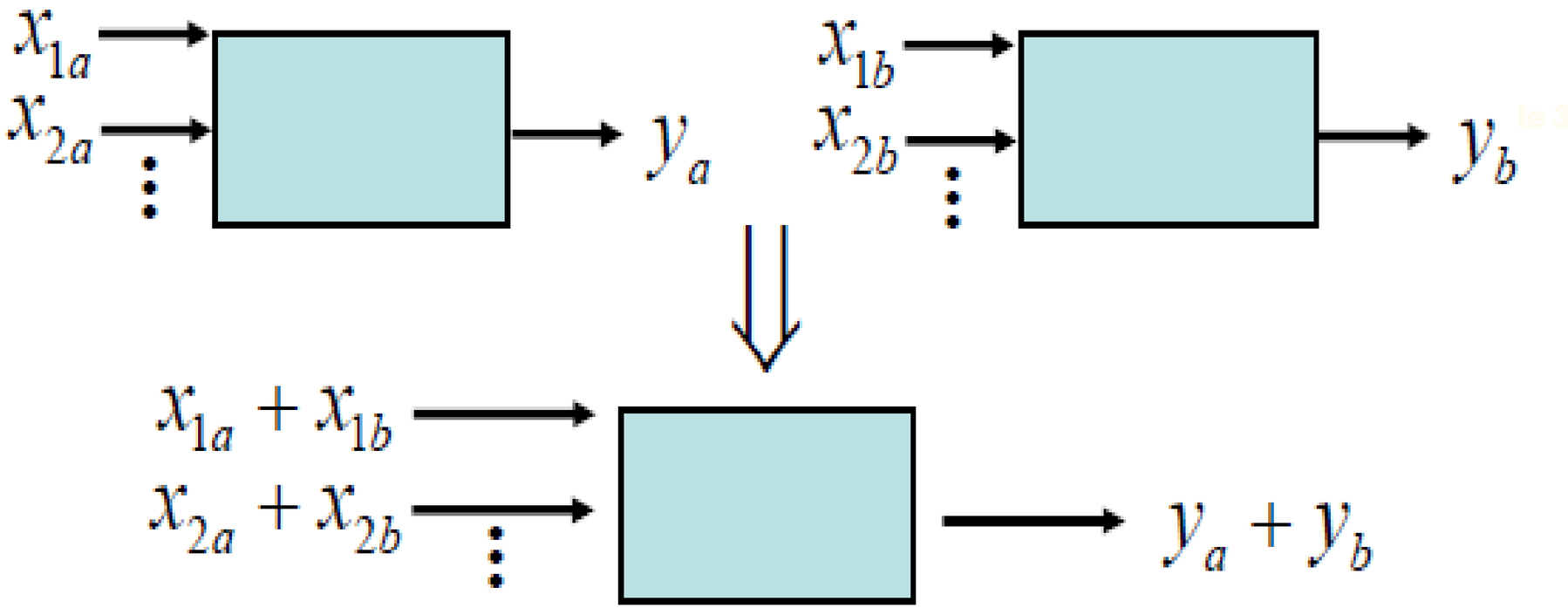
•It is applied by calculating the contribution ofeach independent source separately.

•The output of a circuit is determined by summing the individual responses of each independent source.

•The idea of superposition rests on the linearity property (specifically, additive)

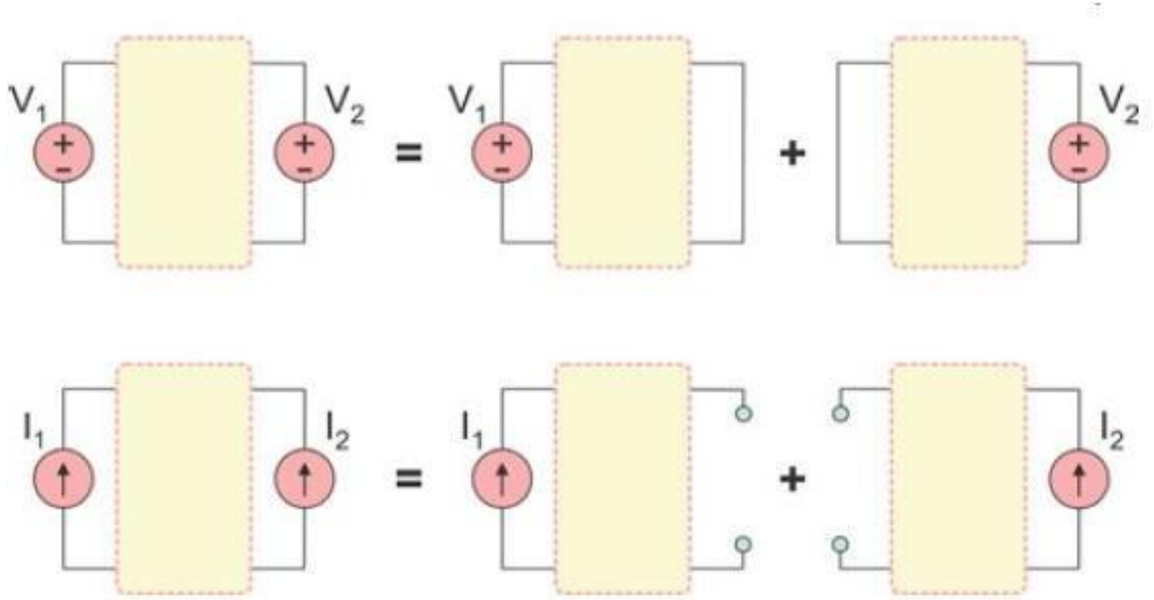
Linearity – Additive Property

- The response to a sum of inputs is the sum of the responses to each input applied separately.



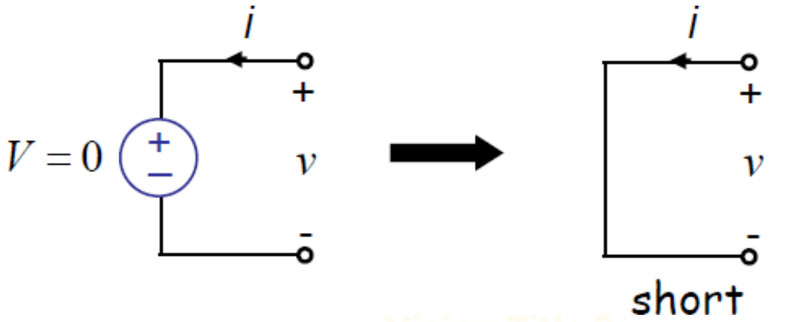
Statement

- In any **linear bilateral network** containing two or more independent sources (voltage and/or current sources), **the resultant current / voltage** in any branch is the **algebraic sum of currents / voltages** caused by **each independent source** (with all other independent sources turned off).

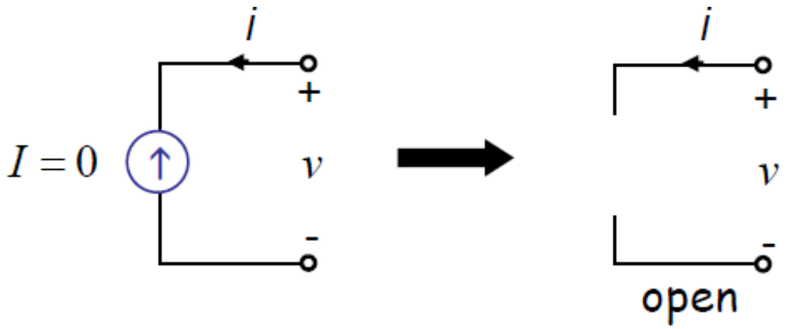


Statement

- **To turn off a voltage source**: Replace by its internal resistance (for non-ideal source) or short circuit (for ideal source).



- **To turn off a current source**: Replace by its internal resistance (for non-ideal source) or open circuit (for ideal source).



- **The dependent sources should not be zeroed**. They remain the same for every particular solution with each independent source

Steps to Apply

- **Step-1:** Retain one source at a time in the circuit and replace all other sources with their internal resistances.
- **Step-2:** Determine the output (current or voltage) due to the single source acting alone using any circuit analysis techniques (mesh, node, transformations etc.).
- **Step-3:** Repeat steps 1 and 2 for every independent source.
- **Step-4:** Find the total contribution by adding algebraically all the contributions due to all the independent sources.