Introduction to Electrical Engineering Practice

Course Code: EE 113

Department: Electrical Engineering

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Introduction to the Course

- Covers various aspects of Electrical and Electronics Engineering
  - basic circuits to control systems.
- Main objective:
  - to motivate EE students to pursue further studies and a career in EE.
- Involves practical aspects of day-to-day Electrical/Electronics engineering in our lives.
- Will have demonstration of experiments to reinforce classroom learnings.

Five Modules

- Analog Electronics
- Digital Electronics
- Signals & Systems
- Energy Systems
- Control systems

Marks Distribution(Tentative):

First mid-semester exam	25%
End Semester exam	45%
Laboratory	20%
Quiz	10%

Plan:

One Quiz per module

Midsem and End sem examinations

Broad outline and plan

- Five lectures per module – Total of 26 lectures
- Two lab experiments per module – 10 experiments

- Timings:
  - Lectures: Monday 9:30-10:25 Hrs and Tuesday 10:35-11:30 Hrs
  - Tutorial: Thursday 10:35-11:30 Hrs
  - Lab Demos: Thursday 11:35-12:30 Hrs
  - Doubt clearing session 5:00-6:00 PM from 8th December

Reference Material

- Reference material
  - Will be uploaded on Moodle and Teams

- Home Practice problems will also be uploaded

Remember..

`Not everything that counts can be counted
and not everything that is counted truly counts'

Create a meaningful purposeful fulfilling lives for yourselves and learn how to use that to make an impact and a difference in the lives of others..

- Day in the life of hibiscus mutabilis aka China rose/Confederate rose/Bettada Tavare/Neladavare. It is pure white in the morning when it blooms and slowly turns pink as the sun comes up and is bright pink by sunset.
- Here is a series of pictures taken at 6:30 am, 8:30 am, 11:30 am and 6:00 pm. Wonderful creation of nature.

- The sun has set and I have done my bit to add beauty and colour to the world I existed in, although just for a day.

Finally,

`They can because they think they can...'

Good luck to all of you....

Analog Electronics: Syllabus

- KCL, KVL fundamentals, network theorems
- PN diodes, and other special diodes, transistors
- Opamp Circuits

Review of DC Circuit Analysis & Network Theorems:

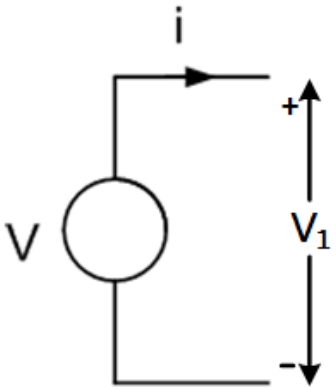
Electric Circuit $\Rightarrow$ Closed path composed of active & passive elements.

Active Elements $\Rightarrow$ Capable of delivering power to some external device

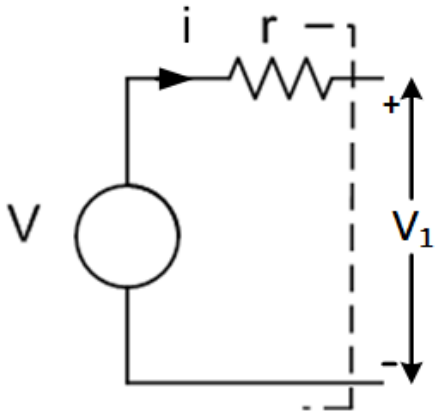
Two types
- Independent source
- Dependent source

Independent source
- Independent V source
- Independent I source

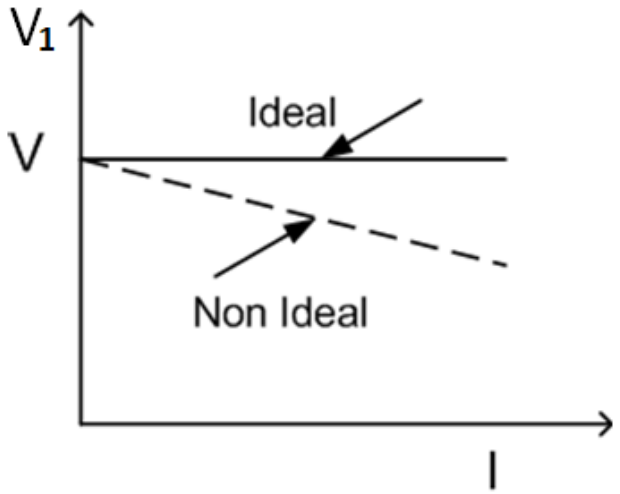
Independent V source ⟶ Terminal V is INDEPENDENT of I flowing through it.



Ideal



Non-ideal



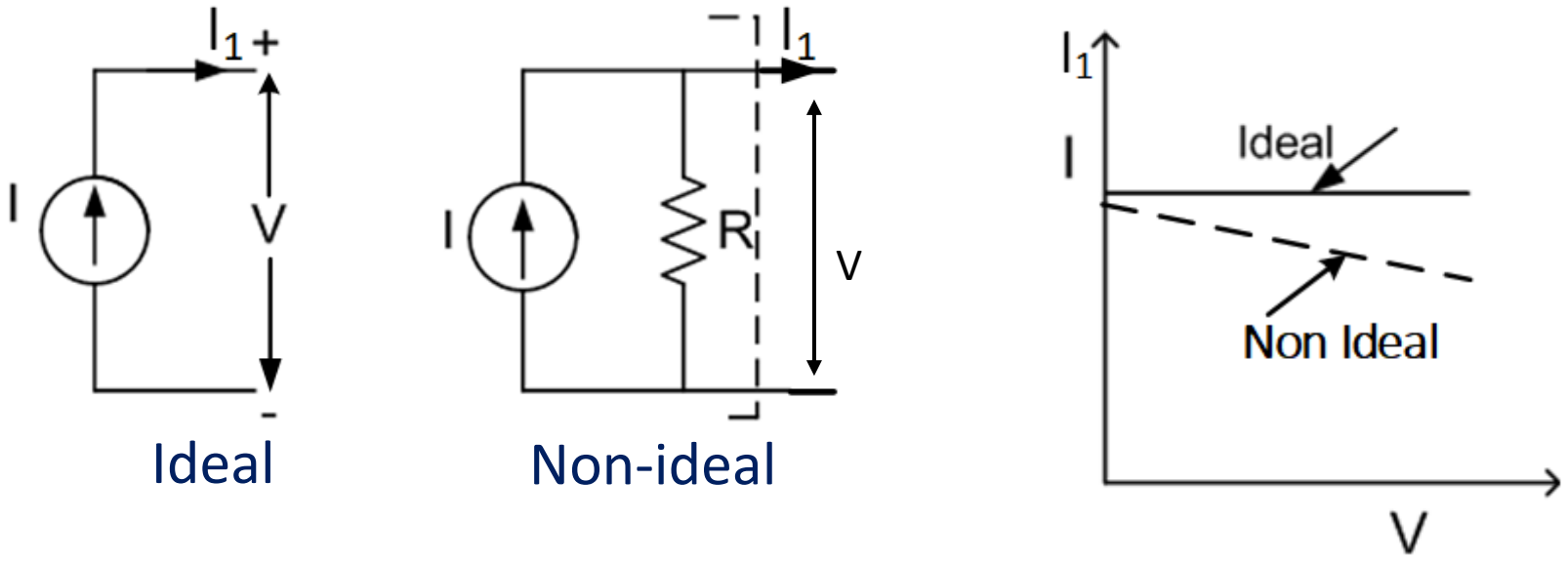
⇒ Battery

- Ideal V source can "source and sink" any current within its rated value
- Current through V source can change instantaneously

Precautions:

- Never short-circuit a V source
- Do not connect two V sources of different magnitude in parallel

Independent I source : I is independent of ‘V’ across it

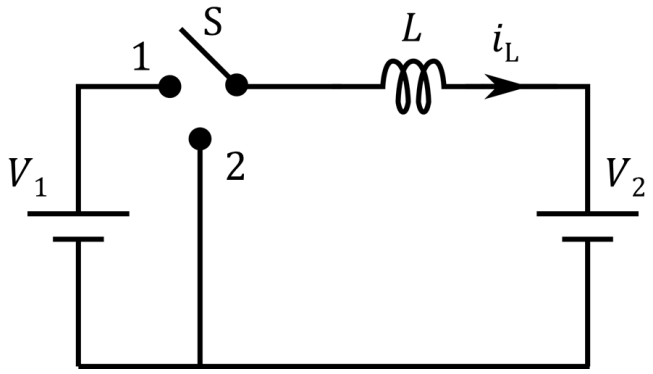


- Ideal I source can have any voltage across it (within its rated value)
- Voltage across the I source can change instantaneously

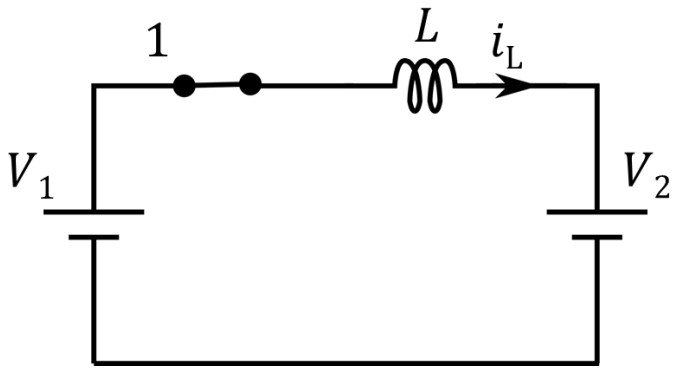
Precautions:

- Never open-circuit a I source
- Do not connect two I sources of different magnitude in series

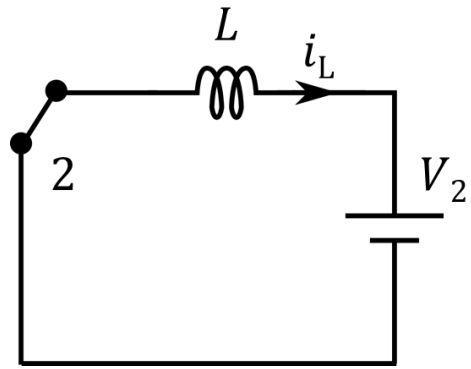
How to realize a current source??



$V_1 > V_2$



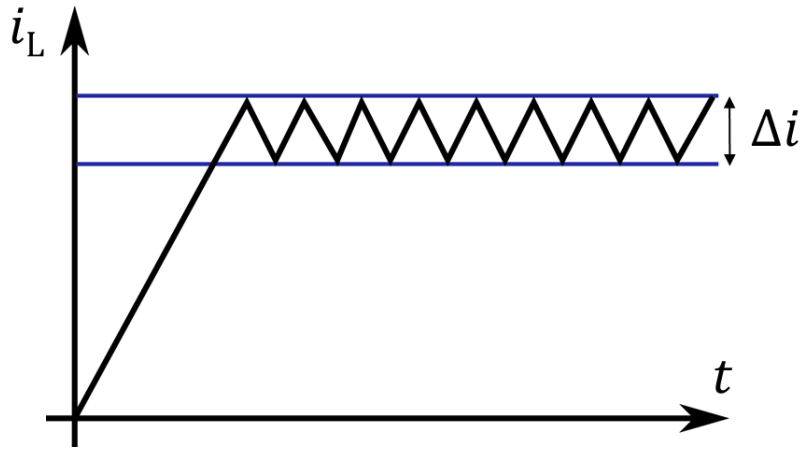
When S at position 1



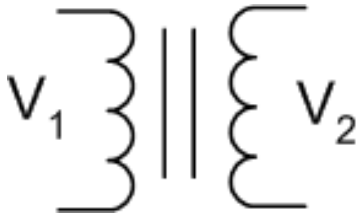
When S at position 2

$$di_L = \left(\frac{V_1 - V_2}{L}\right) dt$$

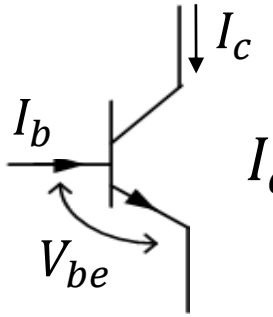
$$di_L = \left(\frac{-V_2}{L}\right) dt$$



Dependent source: Source quantity depends on either ‘V’ or ‘I’ existing at some other location in the circuit.



$V_2 \propto V_1$



$I_c = \beta I_b$