

Kirchhoff's Law

Spoken Tutorial Project

<https://spoken-tutorial.org>

National Mission on Education through ICT

Spoken Tutorial & FOSSEE Team

IIT Bombay

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Learning Objectives



Learning Objectives

We will learn about



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We will learn about

- **Kirchhoff's Voltage Law**



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- **Kirchhoff's Voltage Law**
- **Kirchhoff's Current Law**



System Requirement



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- **Ubuntu Linux 20.04 OS**



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- **CircuitJS Application**



Pre-requisites



Pre-requisites

To follow this tutorial, you should have basic knowledge of

- **Electrical Circuits**



Kirchhoff's Voltage Law



Kirchhoff's Voltage Law

- **The sum of all voltages in a closed loop is zero**



Kirchhoff's Current Law



Kirchhoff's Current Law

- **The sum of currents entering the junction is equal to the sum of currents leaving the junction**



Verification of Kirchhoff's Voltage Law



Verification of Kirchhoff's Voltage Law

$$V1 = I_1R1 + I_3R5 + I_1R3$$

$$V1 = 1.25 + 2.5 + 1.25$$

$$V1 = 5$$

$$V2 = I_2R2 + I_3R5 + I_2R4$$

$$V2 = -(1.25 + 2.5 + 1.25)$$

$$V2 = -5$$



Verification of Kirchhoff's Voltage Law



Verification of Kirchhoff's Voltage Law

$$V = V_1 + V_2$$

$$V = 5 + (-5)$$

$$V = 0$$

Here, the sum of all the voltages (V) in the closed circuit is 0



Verification of Kirchhoff's Current Law



Verification of Kirchhoff's Current Law

$$I_1 = 1.25\text{mA}$$

$$I_2 = 1.25\text{mA}$$

$$I_3 = 2.5\text{mA}$$

Kirchhoff's Current Law formula:

$$I_1 + I_2 = I_3$$

$$1.25\text{mA} + 1.25\text{mA} = 2.5\text{mA}$$



Summary

In this tutorial, we learnt about

- **Kirchhoff's Voltage Law**
- **Kirchhoff's Current Law**



Assignment

- 1 In the above circuit, change the value of V1 to 12V and value of R5 to 4 Kilo Ohms
- 2 Keep the values same for other components in the circuit
- 3 Verify Kirchhoff's Voltage and Current Laws



About the Spoken Tutorial Project

- Watch the video available at https://spoken-tutorial.org/What_is_a_Spoken_Tutorial
- It summarises the Spoken Tutorial project
- If you do not have good bandwidth, you can download and watch it



Spoken Tutorial Workshops

The Spoken Tutorial Project Team

- Conducts workshops using spoken tutorials
- Gives certificates to those who pass an online test
- For more details, please write to contact@spoken-tutorial.org



Answers for THIS Spoken Tutorial

- Questions in THIS Spoken Tutorial?
- Visit <https://forums.spoken-tutorial.org>
- Choose the minute and second where you have the question
- Explain your question briefly
- The Spoken Tutorial project will ensure an answer



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Thank You

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