SNS COLLEGE OF TECHNOLOGY

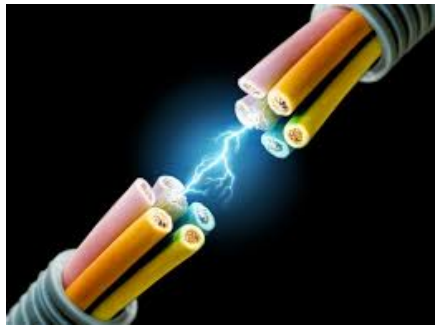
(An Autonomous Institution)
COIMBATORE-35
Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

23EET101 / BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING
I YEAR / I SEMESTER

UNIT-I:AC CIRCUITS
Topic:KCL

TOPIC OUTLINE

- ✓ Introduction
- ✓ KCL
- ✓ Problems



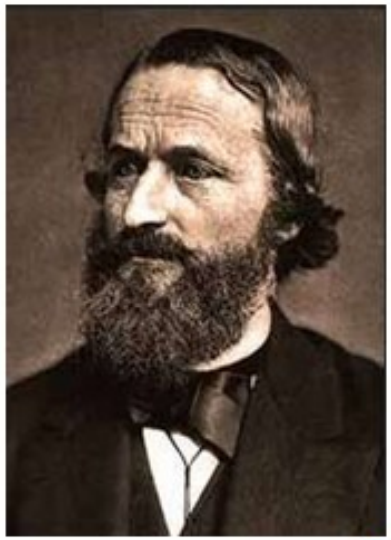
Introduction

HISTORY OF KIRCHOFF'S LAW

INTRODUCTION

TYPES OF KIRCHOFF'S LAW

HISTORY



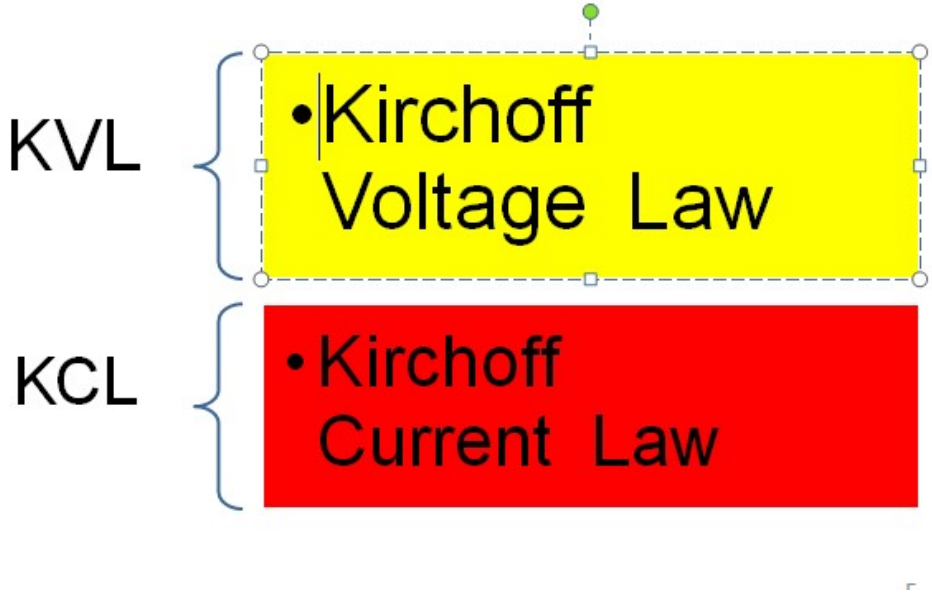
Gustav Robert Kirchhoff (German physicist)

- described two laws that became central to electrical engineering in 1845
- The laws were generalized from the work of Georg Ohm
- It's can also be derived from Maxwell's equations, but were developed prior to Maxwell's work

LAWS

- A pair of laws stating general restrictions on the current and voltage in an electric circuit
- The first of these states that at any given instant the sum of the voltages around any closed path, or loop, in the network is zero.
- The second states that at any junction of paths, or node, in a network the sum of the currents arriving at any instant is equal to the sum of the currents flowing away.

TYPES



Introduction to KCL

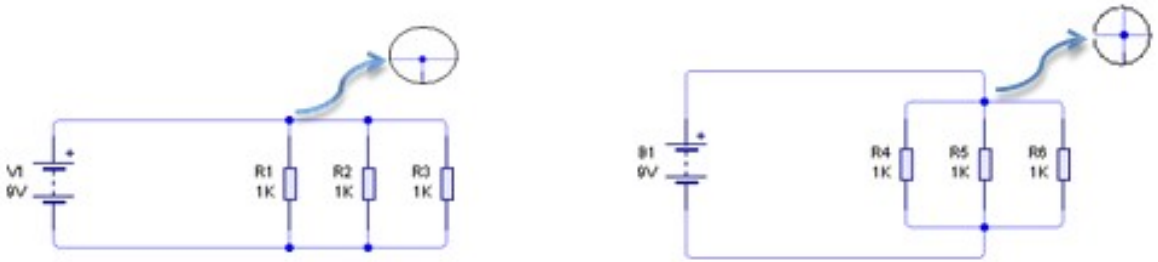
1. Kirchhoff's Current Law is sometimes called "Kirchhoff's First Law" or "Kirchhoff's Junction Rule"

2. In this lesson it will be shown how Kirchhoff's Current Law describes the current flow through a junction of a circuit

along with Kirchhoff's Voltage Law makes up the two fundamental laws of Electrical Engineering

KCL

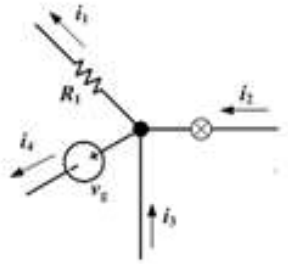
Junction - A junction is any point in a circuit where two or more circuit paths come together.



Examples of a Junction

KCL

The algebraic sum of all currents entering (+) and leaving (-) any point (junction) in a circuit must equal zero.



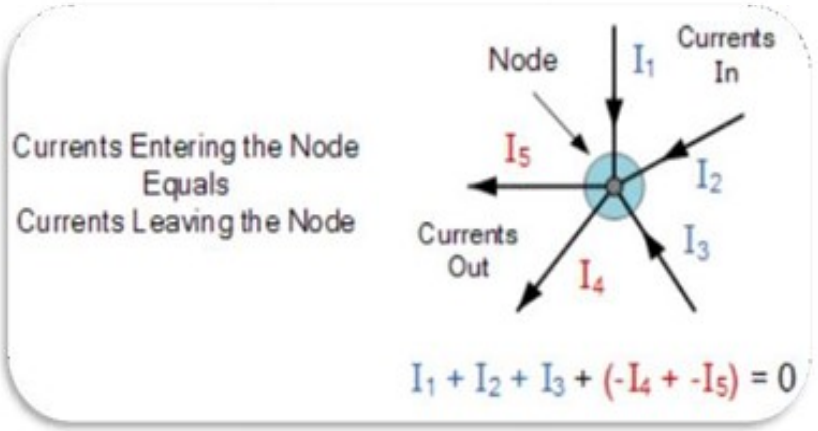
$$\sum_n i_n = i_1 + i_2 + i_3 + i_4 = 0$$

Restated as:

The sum of the currents into a junction is equal to the sum of the currents out of that junction.

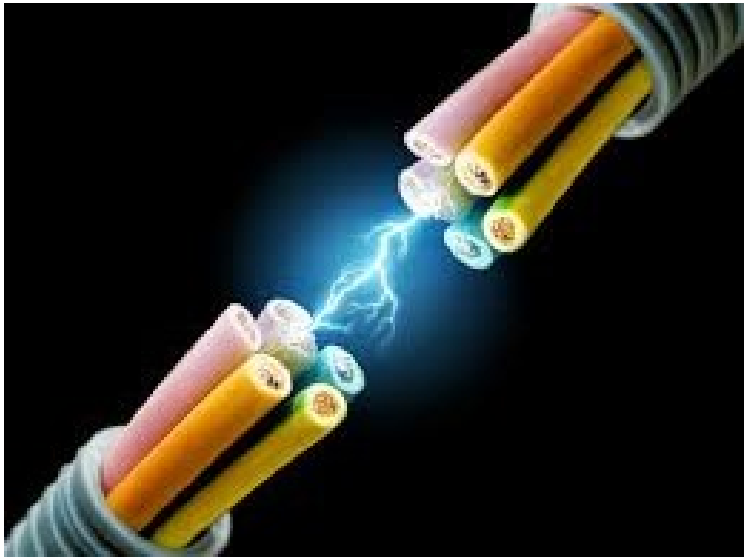
KCL

- The algebraic sum of all currents entering (+) and leaving (-) any point (junction) in a circuit must equal zero.
- Here, the 3 currents entering the node, I_1, I_2, I_3 are all positive in value and the 2 currents leaving the node, I_4 and I_5 are negative in value. Then this means we can also rewrite the equation as;



- $I_1 + I_2 + I_3 - I_4 - I_5 = 0$

RECAP….



…THANK YOU