# Module 1: Circuit Theory

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Coded in LaTeX

# Basic Concepts

## Assumptions

- **Lumped Parameter System**

  In a system that is small enough to make the assumption that Electrical effects happen instantaneously through the system.

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**Example 1**

$$\lambda >> L$$

$$\lambda = \frac{c}{f} = \frac{3 \times 10^8 m/s}{60 s^{-1}} = 5 \times 10^6 m$$

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- **Net Charge**

  The net charge on every component in a system is always zero.

- **Magnetic Coupling**

  There is no magnetic coupling between components in a system.

## Charge, Voltage, and Current

- Charge is discrete

$$q = 1.602 \times 10^{-19} C$$

- **Charge is Bipolar**