



# **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

## **DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

### **23ECB101-CIRCUIT ANALYSIS AND DEVICES**

I YEAR/ II SEMESTER

#### **UNIT 1 – MESH AND NODE ANALYSIS OF ELECTRIC CIRCUITS**

**TOPIC – CHARGE, VOLTAGE, CURRENT AND POWER**

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# Charge, Voltage, Current and Power



## Charge

- Electric charge can be defined as a fundamental property of subatomic particles that gives rise to the phenomenon of experiencing force in the presence of electric and magnetic fields. These fields exert influence on charged particles, resulting in observable effects.



# Charge, Voltage, Current and Power



## Types of Charge

- Electric charge comes in two main types: **positive and negative charges**. Positive charges are associated with protons, which are subatomic particles residing in the nucleus of an atom.
- They are represented by the symbol “+”. On the other hand, negative charges are linked to electrons, which orbit the atomic nucleus and are denoted by the symbol “-”.



# Charge, Voltage, Current and Power



## Types of Charge

- The distinction between positive and negative charges plays a vital role in comprehending the behaviour of electrically charged objects.
- Opposite charges, such as positive and negative, attract each other, while like charges, such as positive and positive or negative and negative, repel each other.
- This fundamental principle is the foundation for various concepts in electromagnetism and is pivotal in understanding the interaction of charged particles.



# Charge, Voltage, Current and Power



## Types of Charge

Like charges repel each other



Opposite charges attract each other

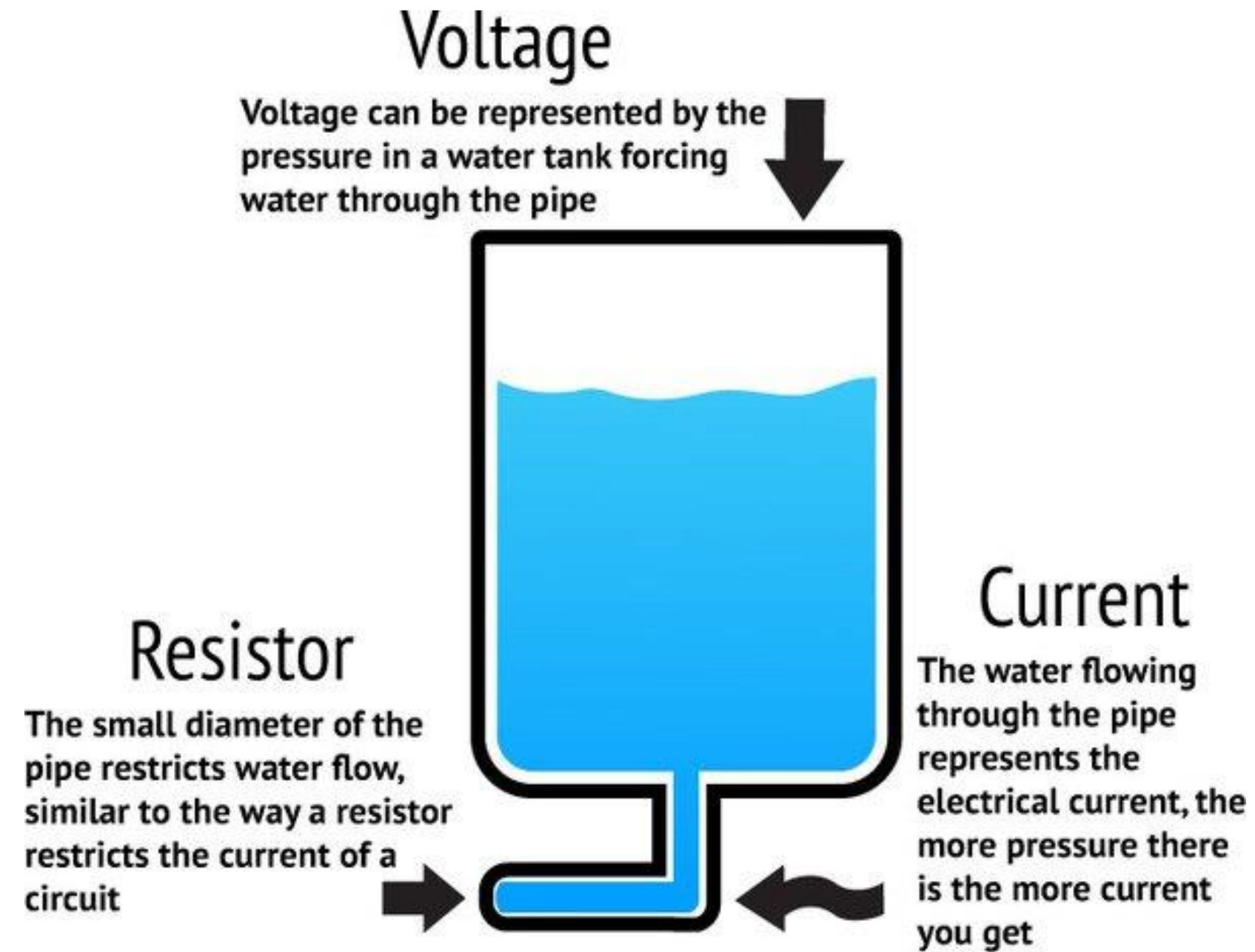




# Charge, Voltage, Current and Power



## Voltage and Current







# Charge, Voltage, Current and Power



## Voltage and Current

Voltage:

Voltage is the force that makes electrons flow. It's a difference in potential energy between two different points in a circuit.

Current:

Current is the rate of the flow of electrons.



# Charge, Voltage, Current and Power

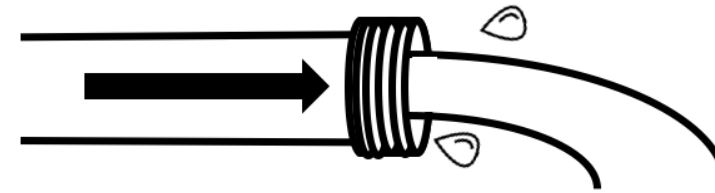


## Power

### Electric Power vs Energy

#### Power

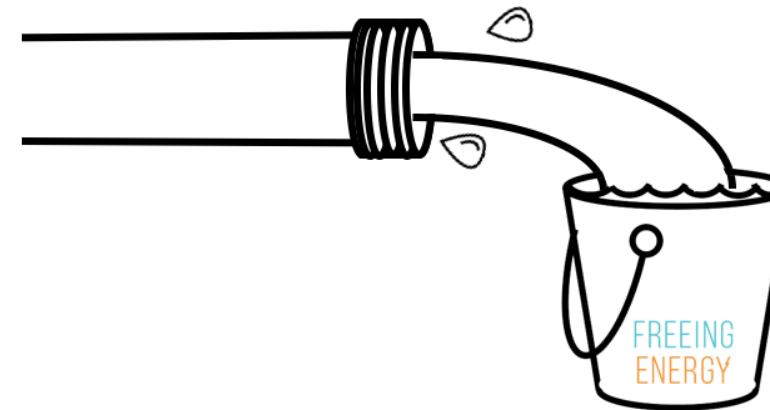
Watts or kilowatts



...is like the flow rate of the water

#### Energy

Watt-hours or kilowatt hours



...is like the the amount of water that ends up in the bucket





# Charge, Voltage, Current and Power



## Power

- We can define power as the rate of doing work, it is the work done in unit time. The SI unit of power is Watt (W) which is joules per second (J/s).
- Sometimes the power of motor vehicles and other machines is given in terms of Horsepower (hp), which is approximately equal to 745.7 watts.



# Charge, Voltage, Current and Power



## Power

Power is defined as the rate at which work is done upon an object. Power is a time-based quantity. Which is related to how fast a job is done. The formula for power is mentioned below.

$$\text{Power} = \text{Work} / \text{time}$$

$$P = W / t$$



**THANK YOU**