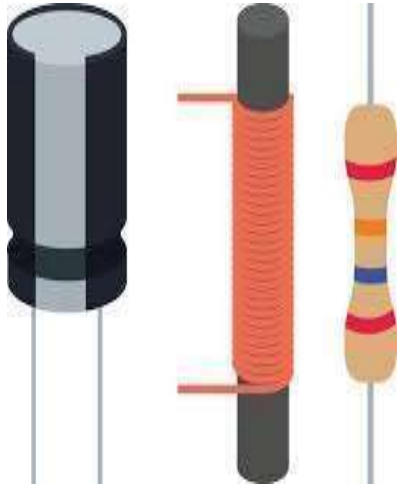
SNS COLLEGE OF TECHNOLOGY

An Autonomous Institution
Coimbatore-35

Department of Artificial Intelligence and Data Science

23EET103-Electric Circuits and Electron Devices



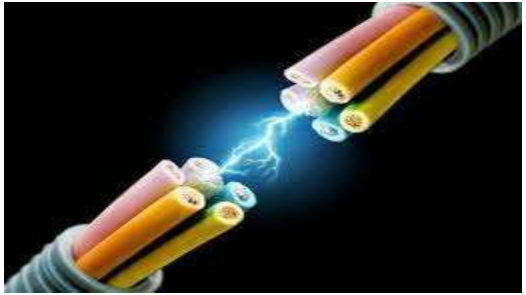
I B.Tech. IT / II SEMESTER

UNIT I : DC CIRCUITS

Topic 1 : Voltage, Current, Power and Energy

TOPIC OUTLINE

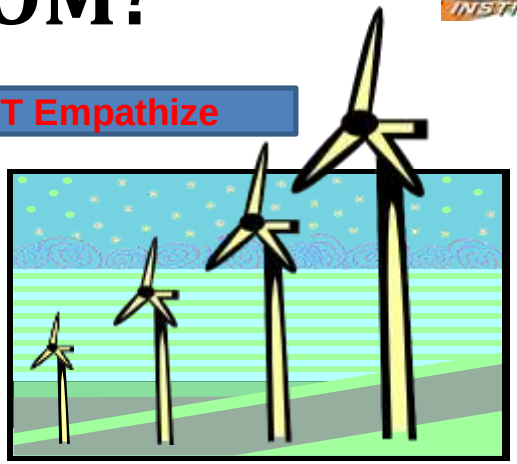
- Electricity?
- Voltage, Current, Resistance
- Nature of Current

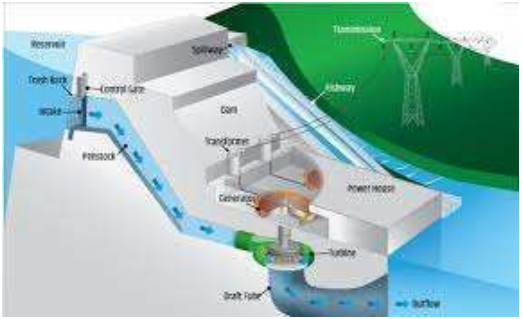


ELECTRICITY COMES FROM?

DT Empathize

- We buy it from Power Plants – Eg.Hydro
- We can generate it ourselves
  - Diesel or gasoline generators
  - Generated in our Car
  - Generated by home Solar or wind power
- We can get it from Batteries
- Sometimes we get it when we don't want it
  - Lightning



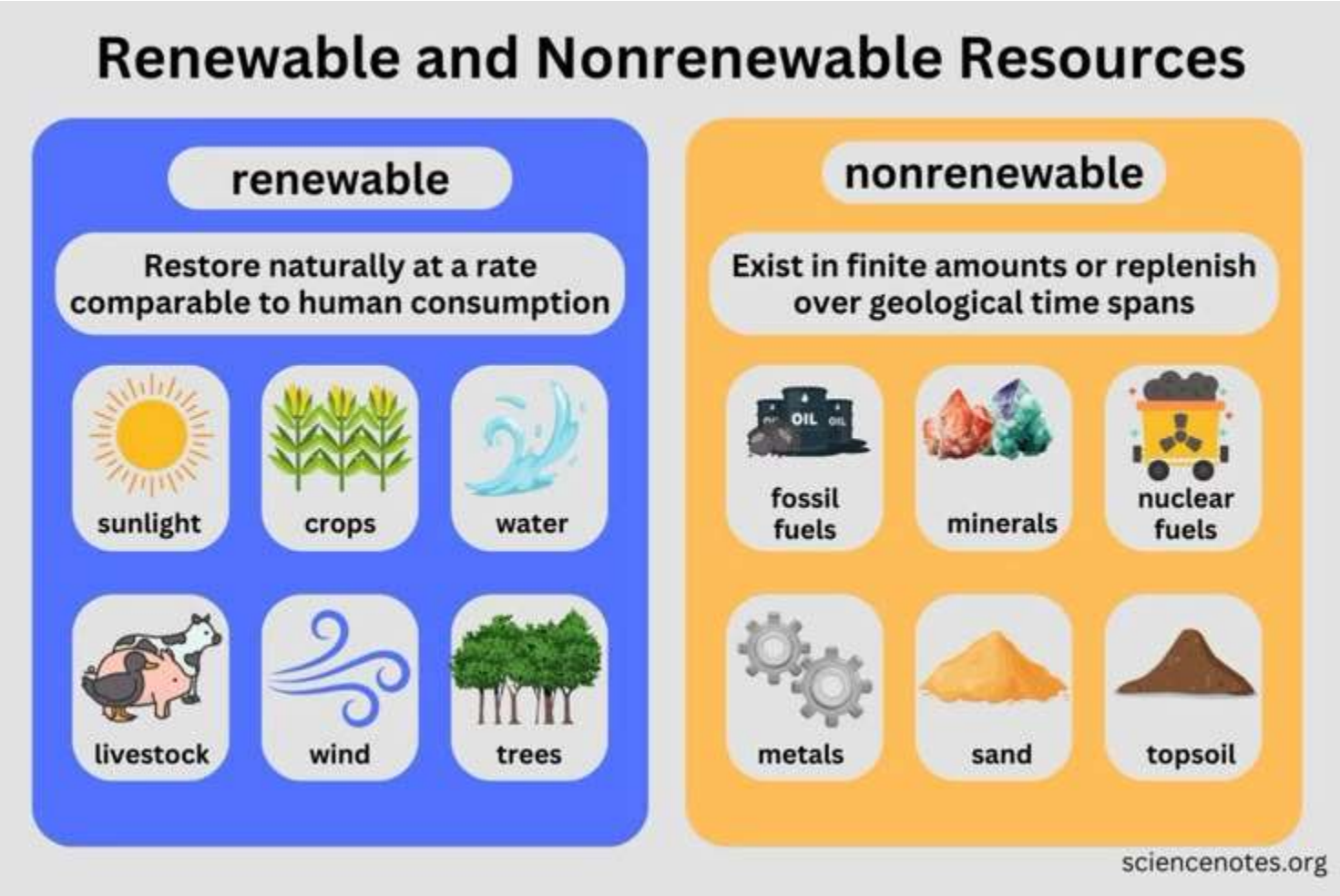


Identify
the DAM?

Ans: PYKARA DAM AND POWER HOUSE

Renewable and Non-renewable Energy Sources

- Renewable resources (solar, wind, hydro) naturally replenish quickly and are sustainable.
- Nonrenewable resources (coal, oil, gas, nuclear) exist in finite amounts and take millions of years to form, making them unsustainable. Renewables have lower emissions, while fossil fuels are major sources of pollution and greenhouse

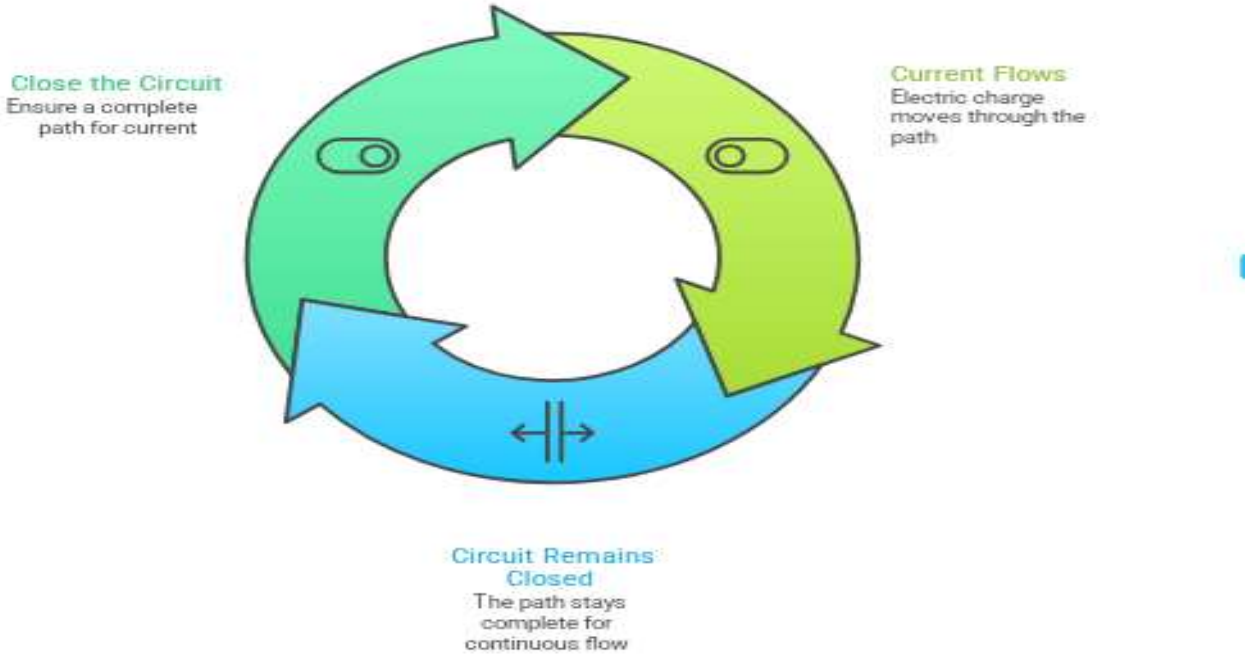

Renewable and Nonrenewable Resources
renewable
Restore naturally at a rate comparable to human consumption
sunlight
crops
water
livestock
wind
trees
nonrenewable
Exist in finite amounts or replenish over geological time spans
OIL
fossil fuels
minerals
nuclear fuels
metals
sand
topsoil
sciencenotes.org

What is an Electric Circuit?

An **electric circuit** is a **closed conducting path** through which electric current flows.

☞ For current to flow, the circuit **must be closed**.

Electric Circuit Current Flow Cycle



Basic Components of an Electric Circuit

Source of Energy

- Battery (DC)
- AC supply / Generator

Conductor

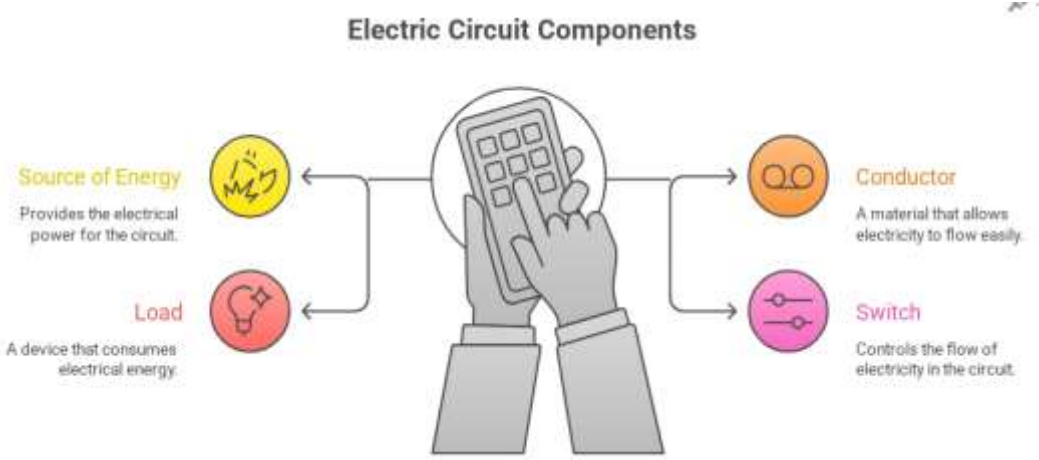
- Copper wires
- Provides path for current

Load

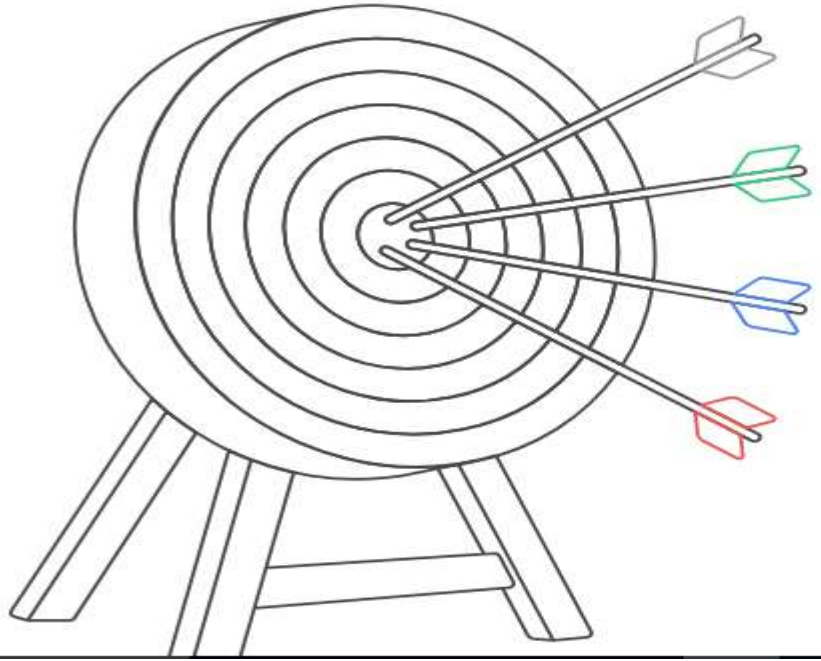
- Bulb, resistor, motor
- Uses electrical energy

Switch

- Opens or closes the circuit



Types of Electric Circuits



Electric Circuit

Basic flow of electricity

Open Circuit

Broken path, no current flow

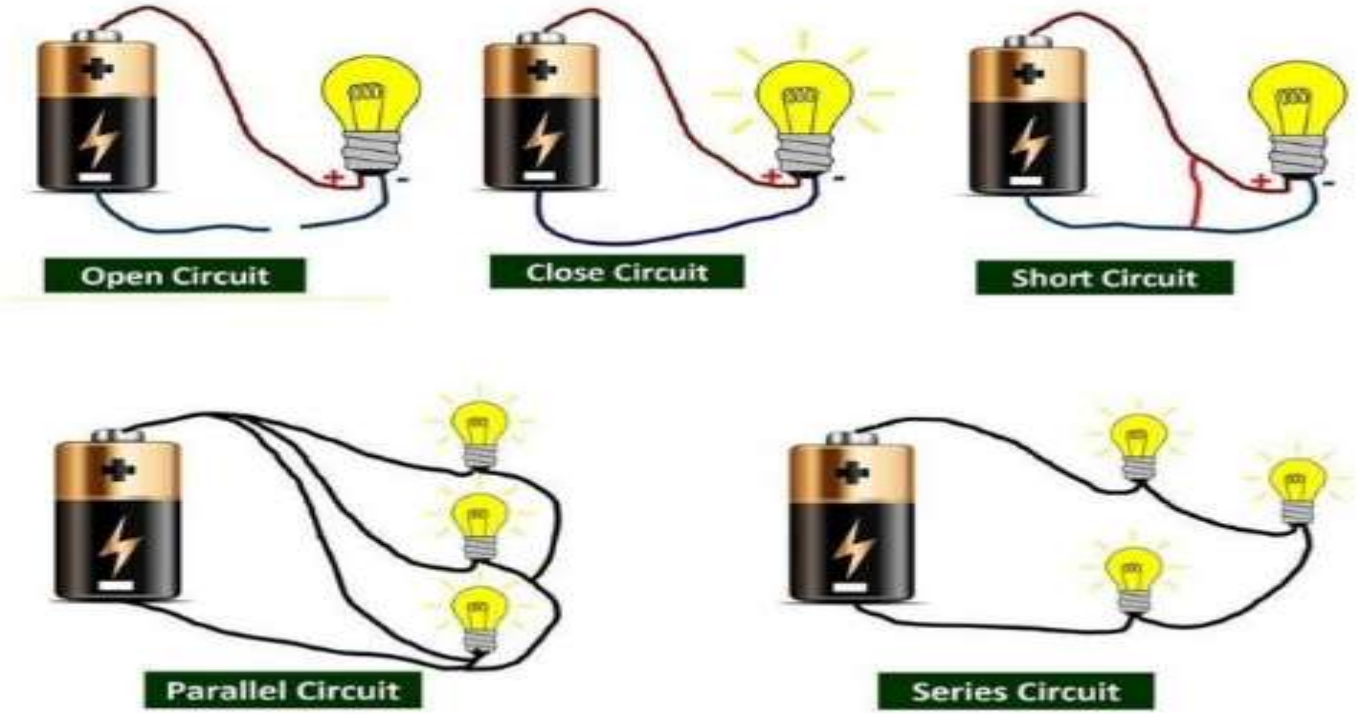
Closed Circuit

Complete path, current flows

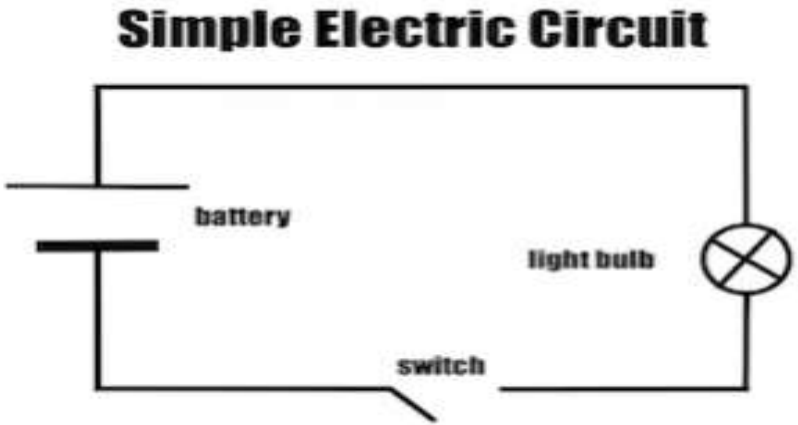
Short Circuit

Low resistance, excessive current

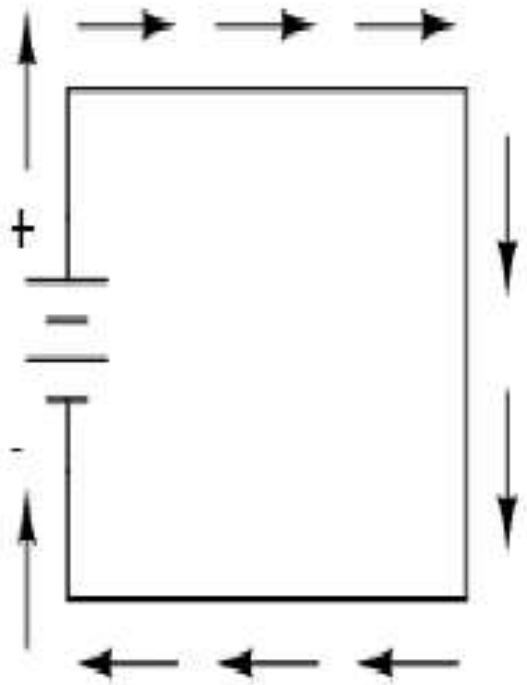
Types of Electric Circuits



SIMPLE ELECTRIC CIRCUIT



Conventional flow notation

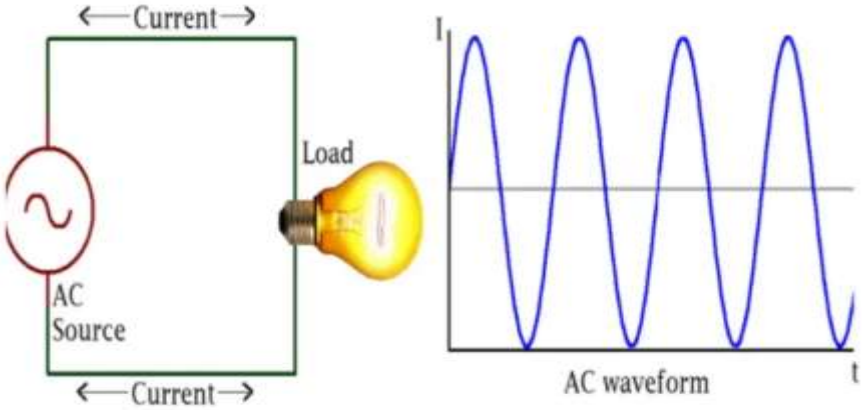


Electric charge moves from the positive (surplus) side of the battery to the negative (deficiency) side.

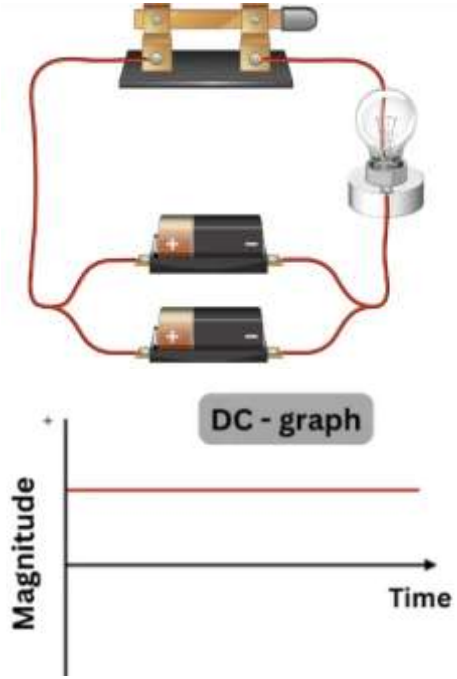
Types of Electric Current

DT - DEFINE

1.AC Current



2.DC Current



NATURE OF CURRENT

- Most power generated is **Alternating Current (AC)** power where the current and voltage varies Sinusoidal with time
- **Direct Current (DC)** power doesn't vary with time
- Most consumer products use both AC and DC

a. DC CURRENT

- DC current is used to power electronics
- DC current is easier to store (batteries)
- DC current is used in mobile applications
- Inverters convert DC to AC

b. AC CURRENT

- AC current is easier to distribute
  - ➢ Higher voltage and smaller current yields same power distributed
  - ➢ Transformers make it easy to change voltage levels so smaller wire
    can used
- AC is used for most machinery, lights and appliances
- Power supplies convert AC to DC

VOLTAGE (V)

- It is the push or pressure behind current flow through a circuit, and is measured in (V) volts.

- Quantitative expression of the potential difference in charge between two points in an electrical field.

CURRENT (I)

- Current refers to the quantity/volume of electrical flow. Measured in Amps (A)
- Flow of Electrons

RESISTANCE (R)

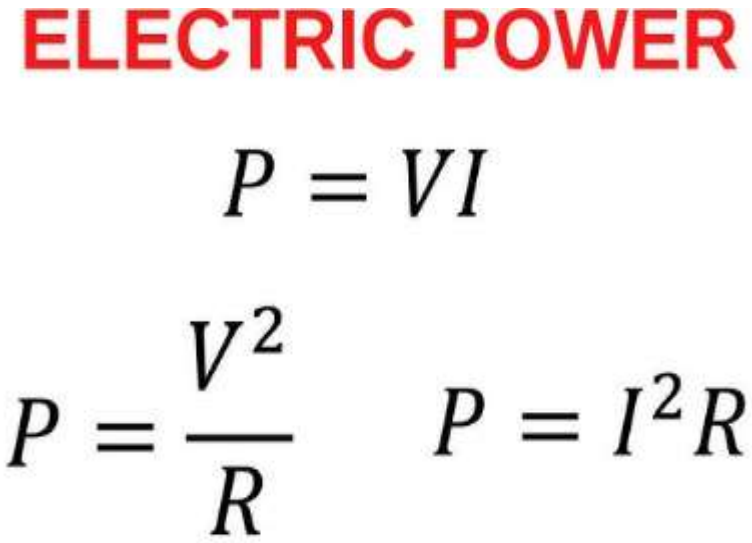
- Resistance to the flow of the current. Measured in Ω Ohms
- It opposes an Electric Current

CHART

Quantity	Symbol	Unit of Measurement	Unit Abbreviation
Current	I	Ampere ("Amp")	A
Voltage	E *or* V	Volt	V
Resistance	R	Ohm	Ω

Power

Electric power is the rate at which electrical energy is transferred or converted, measured in watts (Joules per second), calculated by multiplying voltage (V) by current (I) (P=VI)



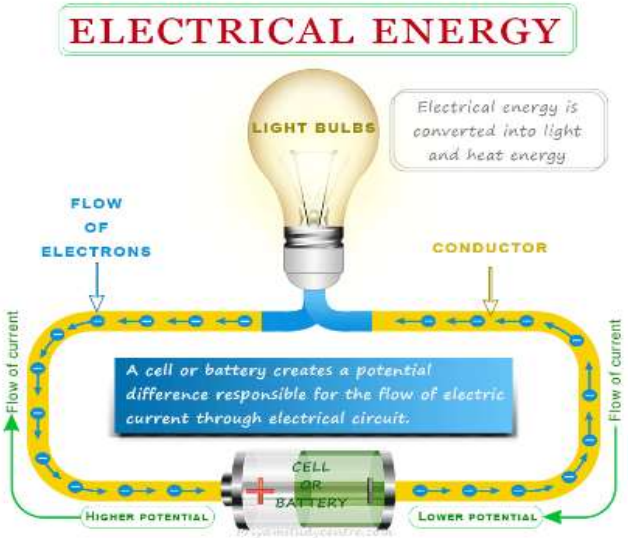
ENERGY

Energy Transfer in Circuits

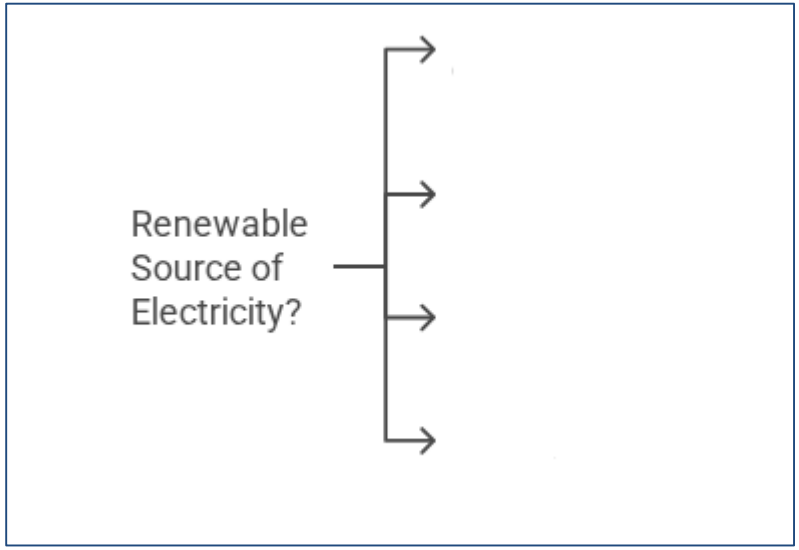
The energy carried by an electric current is related to the charge and voltage.

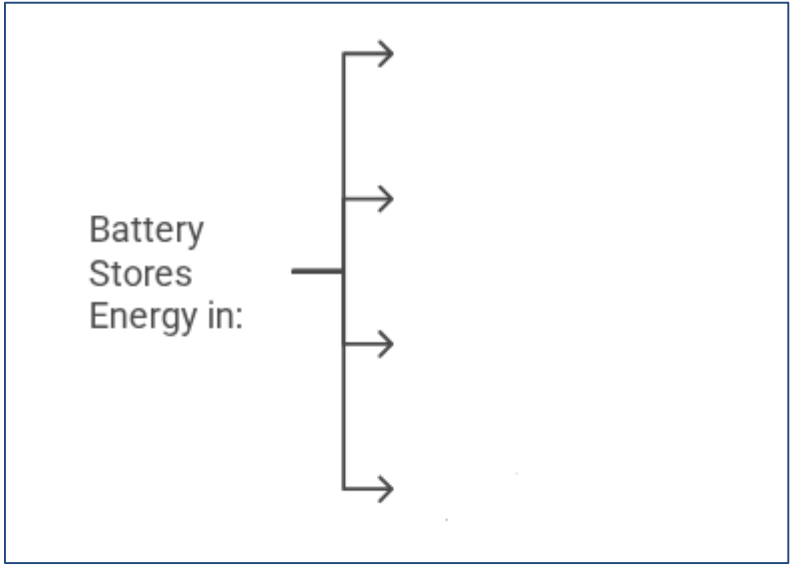
$E = QV$

E = Energy in Joules (J)
Q = Charge in coulombs (C)
V = Voltage in volts (V)



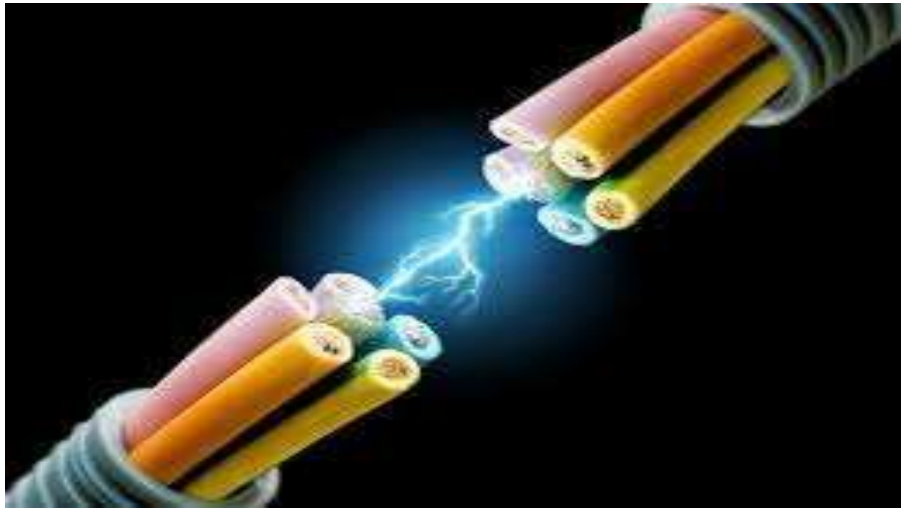
QUIZ???





ANSWERS


Renewable Source of Electricity?
Diesel Generator
Coal Power Plant
Solar Power
Petrol Engine
Battery Stores Energy in:
Electrical Form
Mechanical Form
Chemical Form
Thermal Form



…THANK YOU