

Fundamentals of Electronics and Electrical

Introduction to -

- Types of Electricity
- Electrical Power Generation
- AC & DC Supply
- Basic Concept of Power



What do you know about electricity?

What are the different types of generation of electricity?

What are the ways to generate electricity?

Electricity is a form of energy resulting from the existence of charged particles (such as electrons or protons), either statically as an accumulation of charge or dynamically as a current.

Types of electricity generation -

- Solar Energy.
- Photovoltaics.
- Thermoelectrics.
- Power Generation.
- Turbines.
- Biomass.
- Hydrogen.
- Renewable Energy

Lesson Aims:

1. Discover the fundamental of electricity
2. Identify different types of power supply
3. Differentiate basic concepts



Watch the power plant animation at home. Think about power generation and share ideas. Use a paper circuit to measure current and voltage.



About Electrical Supply

Electricity is the flow of electrons from one place to another. Electrons can flow through any material, but does so more easily in some than in others. How easily it flows is called resistance. The resistance of a material is measured in Ohms.

Conductors:

electrons flow easily.
Low resistance.

Semiconductors:

electrons can be made to flow under certain circumstances. Variable resistance according to formulation and circuit conditions.

Insulator:

electrons flow with great difficulty. High resistance.



Since electrons are very small, as a practical matter they are usually measured in very large numbers. A Coulomb is 6.24×10^{18} electrons. However, electricians are mostly interested in electrons in motion. The flow of electrons is called current, and is measured in AMPS. One amp is equal to a flow of one coulomb per second through a wire.

Making electrons flow through a resistance requires an attractive force to pull them. This force, called Electro-Motive Force or EMF, is measured in volts. A Volt is the force required to push 1 Amp through 1 Ohm of resistance.

As electrons flow through a resistance, it performs a certain amount of work. It may be in the form of heat or a magnetic field or motion, but it does something. This work is called Power, and is measured in Watts. One Watt is equal to the work performed by 1 Amp pushed by 1 Volt through a resistance.

NOTE:

- AMPS is the amount of electricity.
- VOLTS is the Push, not the amount.
- OHMS slows the flow.
- WATTS is how much gets done.



Electricity is most often generated using a generator. Generators use motion energy and electromagnetism to generate the electricity that powers much of our homes.



What is happening in the picture?



What is the function of the turbine?



Where does the electrical energy come to our houses?

We use generators at our homes.
What is its function?

What is a dynamo?



About Power Generation

We divide the power system into three parts; power generation, transmission, and distribution. In this article, we will discuss power generation. Actually, in power generation, one form of energy gets converted into electrical energy. We produce electrical energy from various natural sources.



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What is electricity generation?

What are the different types of generation of electricity?

What do you mean by power plant?

Difference between AC & DC?

Is there any frequency in DC?

An AC-DC power supply or adapter is an electrical device that obtains electricity from a grid-based power supply and converts it into a different current, frequency, and voltage. AC-DC power supplies are necessary to provide the right power that an electrical component needs

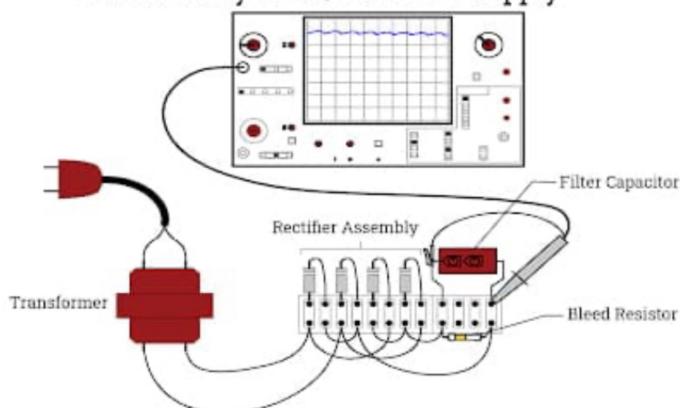


Introduction to Power Supplies

Power is the backbone of any electronic system and the power supply is what feeds the system. Choosing the right supply can be the critical difference between a device working at optimum levels and one that may deliver inconsistent results.



Functionality of AC/DC Power Supply



Ac-dc conversion basics

A power supply takes the ac from the wall outlet, converts it to unregulated dc, and reduces the voltage using an input power transformer, typically stepping it down to the voltage required by the load. For safety reasons, the transformer also separates the output power supply from the main **input**.

Current: Current can be defined as it is the rate of flow of charge carriers like electrons.

Voltage: Voltage can be defined as it is a difference in charge between two points. Or It is the pressure released from the power source which pushes charge carriers through a conducting glow that illuminates our light.

Power: Power can be defined as it is the amount of work done in a unit of time.

Resistance: Resistance can be defined as it is the materials that oppose the flow of electrons in a particular direction.

Inductance: The property of the inductor is to oppose any change in current passing through it.

Capacitance: Capacitance is a property of electrical devices, which has the ability to store an electrical charge.

Frequency: Frequency can be defined as it is the number of cycles that occurs in a second.

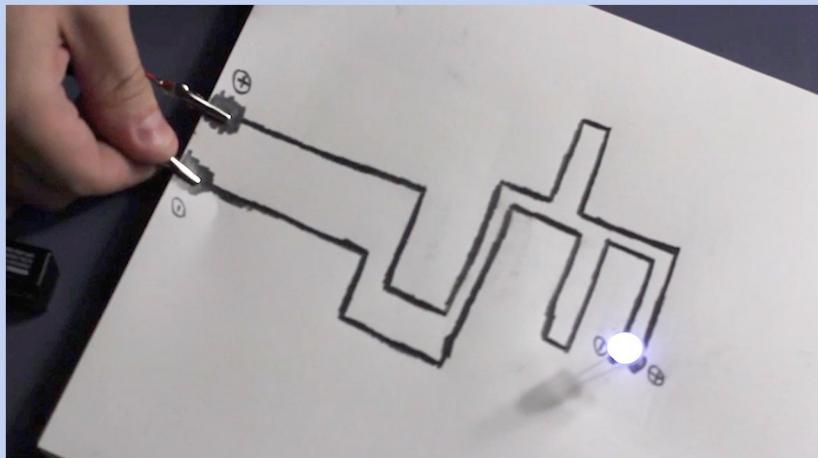




Activity

Circuit Introduction through Pencil and Paper Circuit

- 1) Use your graphite pencil and draw any design on your paper. Tip: Draw a simple image where all the lines are connected and make sure to create thick, bold lines with your pencil.
- 2) In your drawing, leave at least a 1 cm gap on opposite ends of your drawing. Mark your positive and negative lines.
- 3) Once you're done with your design, place the battery on one of the gaps. Align the positive and negative ends with the graphite lines.
- 4) Take an LED and bend the bottom ends of the wires.
- 5) Tape the wire at the end of the lines across the other gap, aligning positive and negative wires. Make sure your LED stands upright. The wires should be in contact with the graphite lines. Tip: The longer side of the LED is the positive side.



Reflection

- 1) What are the basic principles of electricity?
- 2) What is the concept of capacitance?
- 3) What is Concept voltage?
- 4) What is resistance also known as?



For more information
scan the qr code

