

यूनिट 1.2: बिजली की मूल बातें

इकाई परिचय

इस इकाई के अंत में, आप समर्थ होंगे।

1. कुशलता से आप अपने के बिजली के घरेलू उपकरणों को सुरक्षित रूप से उपयोग करें।
2. घरेलू बिजली घरेलू जीवन के बीच जोड़ें करें।



1.2.1 विद्युत परिपथ

एक विद्युत परिपथ के घटक संलग्न से एक एक है। संलग्न का एक और से इलेक्ट्रिक एक एक का प्रदर्शन है। (विशेषता बिजली एक घरेलू बिजली परिपथ में से एक एक को प्रदर्शित करता है।)



एक बिजली के एक उपकरण को बिजली प्रदान की करता करता है जो उसे काम करता है।
उदाहरण: बल्ब



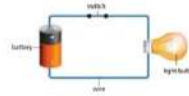
एक बिजली को बिजली उपकरणों को काम करने में मदद करने के बिजली प्रदान करता करता है। बिजली संलग्न का है।
उदाहरण: बैटरी



एक संलग्न को बिजली को एक और से जोड़ता है।
उदाहरण: तार

चित्र 1.2.1: बिजली घटक

एक बिजली परिपथ में, एक बिजली को एक बिजली के बिजली प्रदान करता है। बिजली के बिजली, एक बिजली को एक बिजली प्रदान करता है। बिजली के बिजली के बिजली प्रदान करता है।



चित्र 1.2.2: एक बिजली परिपथ

UNIT 1.2: Basics of Electricity

Unit Objectives

At the end of this unit, you will be able to:

1. Use the knowledge basics of electricity to work efficiently
2. Differentiate between the basic electrical components



1.2.1 Electric Circuit

It is a path made by the interconnection of electrical components. Electrons from a voltage or current source flow along this path. The following figure lists the elements present in a basic electric circuit:



A device in a circuit which consumes electric power is called load.
Example: Bulb



A source that provides electrical pressure known as voltage or EMF to electrical equipment to enable them to work.
Example: Battery



A conductor that connects the supply source and the load.
Example: Wires

Fig 1.2.1: Electric circuit components

In a typical circuit, a battery provides voltage for the load through wires. For example, the required voltage for a bulb to glow is provided by a battery. The following figure shows such an electric circuit:

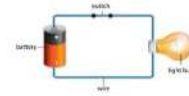


Fig. 1.2.2: An electric circuit

एक बिजली परिपथ में दो संलग्न होते हैं, जो एक बिजली प्रदान करता है।



चित्र 1.2.3: एक बिजली परिपथ (बाएं) और एक बिजली परिपथ (दाएं)

1.2.2 इलेक्ट्रिक सर्किट के प्रकार

बिजली परिपथ को दो प्रकार में बांटा गया है।

- सीरीज सर्किट
- पैरालल सर्किट

सीरीज सर्किट

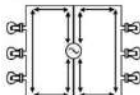
एक बिजली के सर्किट में, सभी बिजली एक बिजली के बिजली प्रदान करता है। बिजली के बिजली के बिजली प्रदान करता है। बिजली के बिजली के बिजली प्रदान करता है।



चित्र 1.2.4: एक सीरीज सर्किट

पैरालल सर्किट

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चित्र 1.2.5: एक पैरालल सर्किट

An electric circuit consists of two paths/loops, as shown in the following figure:



Fig. 1.2.3: Closed path (left) and open path (right)

1.2.2 Types of Electric Circuits

An electric circuit is classified into two types:

- Series circuit
- Parallel circuit

Series Circuit

In this type of a circuit, all components are connected as a chain and the current flowing through each of them is the same all over the circuit. There is a single route through which the current flows. So, the current passes through each and every component. Opening or breaking any point of a series circuit causes the whole circuit to stop functioning, which then needs to be replaced. The following figure represents a series circuit:



Fig 2.2.4: A series circuit

Parallel Circuit

In this type of a circuit, two or more components are connected in a parallel manner. In a parallel circuit, the components are of the same voltage. The current flow varies across the components. If any point of the circuit gets damaged, only that part needs to be replaced. The following figure represents a parallel circuit:

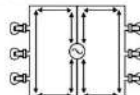


Fig 2.2.5: A parallel circuit

1.2.3 Parameters of Electric Circuit

Electricity is a natural force that comes into existence whenever there is a flow of electric charge between any two components. When working with circuits, awareness about some of the basic concepts of electricity is needed, otherwise wrong connection in a circuit may cause a high damage to the user and the circuit components. The main parameters associated with electricity are as follows:

- Voltage
- Current
- Resistance

Voltage

A force that causes electricity to move across the wire/cable is known as voltage. It can also be defined as the variance in the charge between the points of a circuit. Depending on the voltage, the electric current flows through a medium of a specific resistance. Volt is the unit of voltage and is denoted with letter V.

Current

Electric current, or simply current, is the flow of electric charge carried through electrons moving across wires. Ampere is the unit of current and is denoted with letter I. The units of current are listed in the following table:

Unit	Denoted by
Micro-Ampere	(μA) = 10 ⁻⁶ A
Milli-Ampere	(mA) = 10 ⁻³ A
Ampere	(A)

Alternating Current (AC) and Direct Current (DC) Current
The following figure shows the two types of current sources that are dependent on the direction in which the electrons flow:

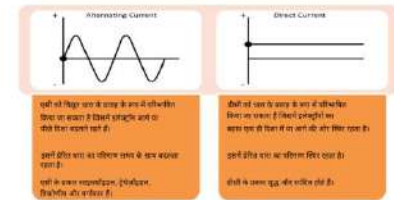


Fig 1.2.3: Difference between AC and DC current

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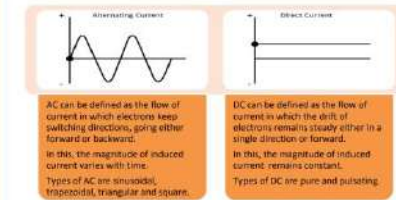


Fig 1.2.4: Difference between AC and DC current

Resistance

Resistance, as the word suggests, causes hindrance to any occurring force. In other words, it is an obstruction caused by a substance to the current flow. The unit of resistance is ohm and it is denoted with the symbol, Ω . According to Ohm's law, 10 resistance allows 1A of current to flow from one point to the other with a 1V voltage difference.

1.2.4 Ohm's Law

According to Ohm's law, the flow of current through a conducting material is directly proportional to the conductor's voltage. The mathematical formula of Ohm's law is as follows:

$$I = V/R$$

In this formula,

I is the current

V is the potential difference and

R is the resistance.

Ohm's law states that resistance R in an electric circuit is constant and independent of the current I flowing through the circuit as shown in the following figure:

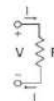


Fig 1.2.7: A simple electric circuit

1.2.5 Power Calculation and Energy Consumption

When electricity flows in an electric circuit, it results in some work done. For example, when it flows in a fan, the fan's blades rotate and when it flows in a refrigerator, it cools the items kept inside. Thus, when electricity flows through an appliance, it results in some work done. To calculate the electricity consumed, the following two parameters need to be considered:

- Power
- Energy

Power

The rate at which electrical energy flows through an electric circuit is known as electric power. Similar to mechanical power, electric power is the rate of doing electrical work, measured in watts (one joule per second) and denoted by P. The term wattage often refers to electric power in watts.

Thus, to denote the electric power (in watts) given by an electric current I consisting of a charge of Q coulombs in every t seconds through an electric potential (voltage) difference of V, use the following equation:

सामान्यतः, एक मानक क्लिप मीटर निम्नलिखित विद्युत मात्राओं को माप सकता है:

- AC (RMS) current
- AC voltage
- DC voltage

- Resistance
- Diode test
- Continuity

Usually, a standard clamp meter can measure the following electrical quantities:

- AC current
- Temperature
- AC voltage
- Capacitance
- DC voltage
- Resistance
- DC current
- Frequency