1. Introduction

In this lesson a brief idea of a modern power system is outlined. Emphasis is given to create a clear mental picture of a power system to a beginner of the course Electrical Technology. As consumers, we use electricity for various purposes such as:

1. Lighting, heating, cooling and other domestic electrical appliances used in home.

2. Street lighting, flood lighting of sporting arena, office building lighting, powering PCs etc. 3. Irrigating vast agricultural lands using pumps and operating cold storages for various agricultural products.

4. Running motors, furnaces of various kinds, in industries.

5. Running locomotives (electric trains) of railways.

The list above is obviously not exhaustive and could be expanded and categorized in detail further. The point is, without electricity, modern day life will simply come to a stop. In fact, the advancement of a country is measured by the index per capita consumption of electricity more it is more advanced the country is.

2. AC &DC Circuit

Electricity flows in two ways: either in an alternating current (AC) or in a direct current (DC). Electricity or "current" is nothing but the movement of electrons through a conductor, like a wire. The difference between AC and DC lies in the direction in which the electrons flow. In DC, the electrons flow steadily in a single direction, or "forward." In AC, electrons keep switching directions, sometimes going "forward" and then going "backward".

Alternating current is the best way to transmit electricity over large distances.

Electrical signals come in an endless variety of shapes and sizes. However, if we focus on general characteristics, we can group signals into broad categories. Perhaps the most fundamental categorization is that of DC versus AC.

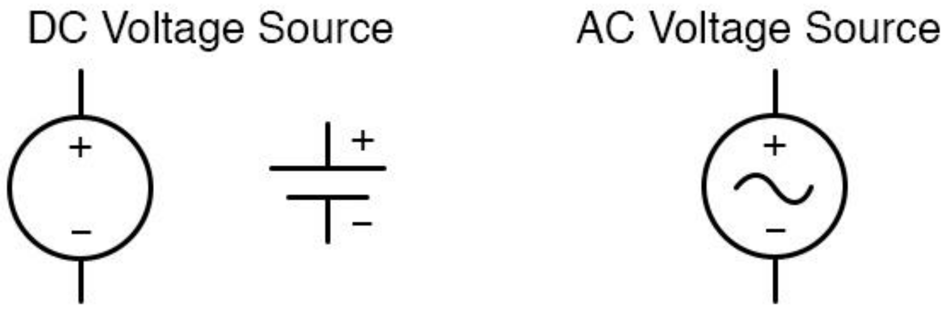
Alternating Current & Direct Current		
	AC	**DC**
Amount of energy that can be carried	Safe to transfer over longer city distances and can provide more power.	Voltage of DC cannot travel very far until it begins to lose energy.
Cause of the direction of flow of electrons	Rotating magnet along the wire.	Steady magnetism along the wire.
Frequency	The frequency of alternating current is 50Hz or 60Hz depending upon the country.	The frequency of direct current is zero.
Direction	It reverses its direction while flowing in a circuit.	It flows in one direction in the circuit.
Current	It is the current of magnitude varying with time	It is the current of constant magnitude.
Flow of Electrons	Electrons keep switching directions - forward and backward.	Electrons move steadily in one direction or 'forward'.
Obtained from	A.C Generator and mains.	Cell or Battery.
Passive Parameters	Impedance.	Resistance only
Power Factor	Lies between 0 & 1.	it is always 1.
Types	Sinusoidal, Trapezoidal, Triangular, Square.	Pure and pulsating.

3. AC and DC Sources

The terms “AC” and “DC” are closely associated with power-supply voltages. These voltages are generated by sources and are a means of injecting electrical energy into a circuit. Despite the fact that AC supply voltages always vary with respect to time, we generally don’t refer to them as signals. This makes sense because their purpose is to supply energy rather than represent or transmit information.

The two most common sources of electrical energy are generators and batteries. Generators are AC sources; they produce sinusoidal voltages that periodically vary between positive polarity and negative polarity.

Batteries create a static potential difference between two terminals, and consequently, they are DC sources. In circuit diagrams, DC and AC voltage sources can be represented by the following symbols:



Electrical energy is distributed through the power grid as alternating current, but electronic systems require DC supply voltages. An AC supply voltage can be converted into a stable DC supply voltage by means of a rectifier followed by a voltage regulator. We'll learn more about AC-to-DC conversion and voltage regulation in future video tutorials.

4. magnetic circuit

A magnetic circuit is made up of one or more closed loop paths containing a magnetic flux. The flux is usually generated by permanent magnets or electromagnets and confined to the path by magnetic cores consisting of ferromagnetic materials like iron, although there may be air gaps or other materials in the path. Magnetic circuits are employed to efficiently channel magnetic fields in many devices such as electric motors, generators, transformers, relays, lifting electromagnets, galvanometers, and magnetic recording heads. The concept of a "magnetic circuit" exploits a one-to-one correspondence between the equations of the magnetic field in an unsaturated ferromagnetic material to that of an electrical circuit. Using this concept the magnetic fields of complex devices such as transformers can be quickly solved using the methods and techniques developed for electrical circuits.Some examples of magnetic circuits are:

- horseshoe magnet with iron keeper (low-reluctance circuit)
- horseshoe magnet with no keeper (high-reluctance circuit)
- electric motor (variable-reluctance circuit)
- some types of pickup cartridge (variable-reluctance circuits)