

JOB ROLE – LINEMAN DISTRIBUTION

Sector: Power
(Qualification Pack Code : PSS/Q0102)



PSS Central Institute of Vocational Education
Shyamla Hills, Bhopal – 462013, Madhya Pradesh, India

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Unit 4: Repair and maintenance of power distribution lines

Session 2: Electric Terminology and Power System

Content

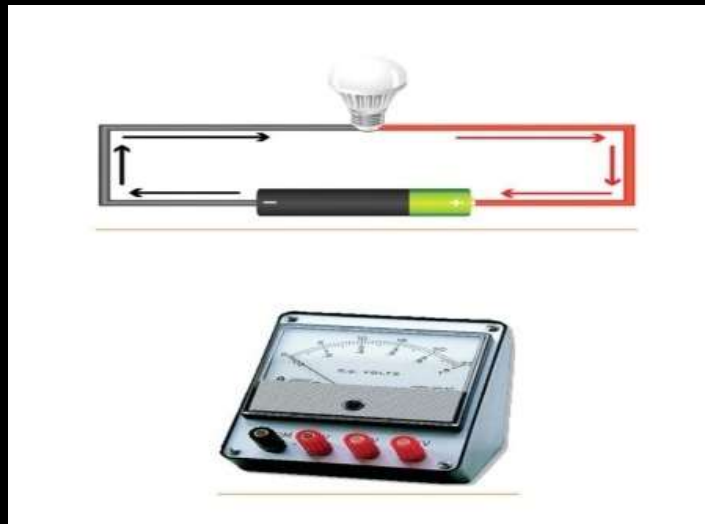
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Session Objectives

1. The student will be able to classify the common electricity terminology
2. explain details of distribution and utilization.

Common Electricity Terminology

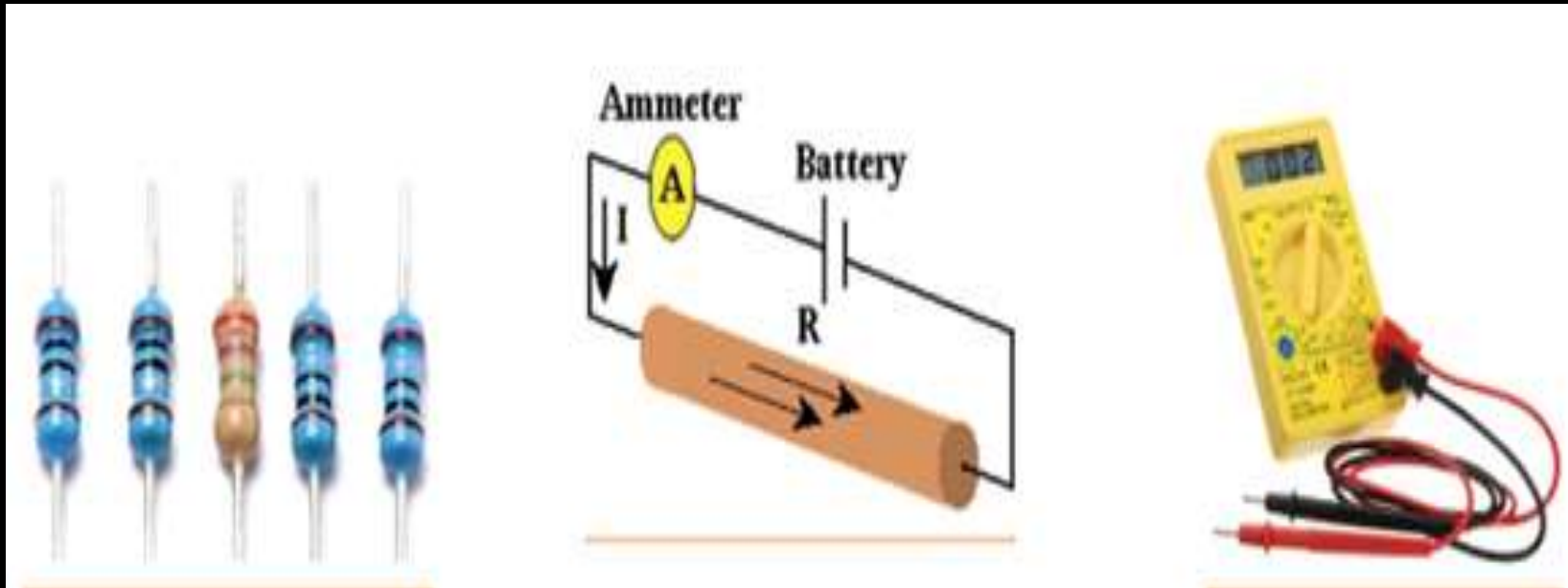
Voltage: Voltage is the force required to make electricity flow through a conductor. It is also called electric potential difference or electromotive force (emf). Voltage may also be defined as the energy difference between the positive and negative terminals of a battery. This energy difference is measured in volts and represented by the symbol 'V' or 'E'.



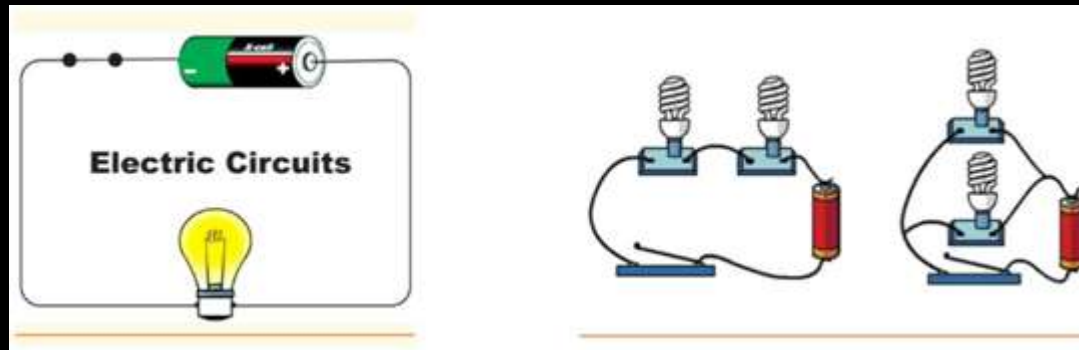
Current: Current is the flow of electrons in a material from one atom to the next atom in the same direction. Just as pressure causes current to flow in a circuit, voltage causes current to flow in the conductor. Current is measured in amperes and is denoted by the symbol 'I'.



Resistance: It is an inherent property of materials to oppose the flow of electricity. This property is called resistance, represented by the symbol 'R'. It is measured in ohms by a measuring instrument called ohm meter.



Electric Circuit: A simple electric circuit consists of a voltage source, some type of load and conductors to allow electrons to flow between the voltage source and the load. An electric circuit can be either in series or parallel.

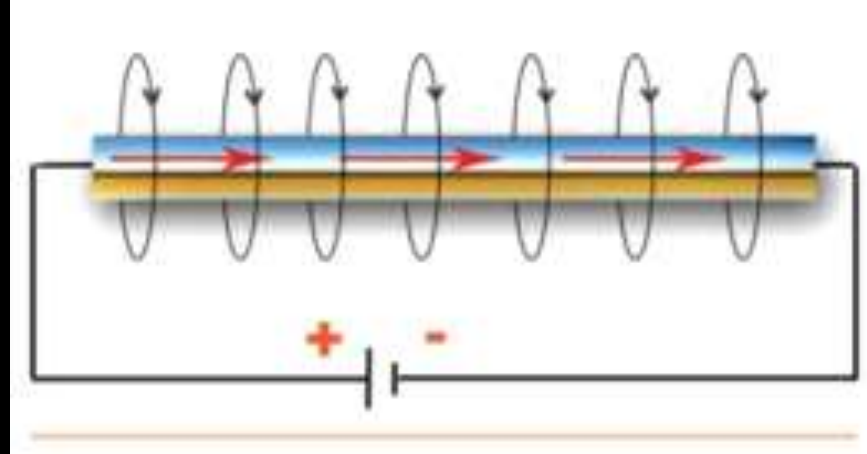


Inductance and Capacitance

Inductance: Inductance is the property of an electric circuit that opposes any change in electric current. Resistance opposes current flow; inductance opposes changes in current flow. Inductance is designated by the letter 'L'. The unit of measurement for inductance is Henry (H); however, because Henry is a relatively large unit, inductance is often rated in millihenries or microhenries. Inductors are coils of wire wound for a specific inductance. The inductance of a coil is determined by the number of turns in the coil, the coil diameter and length and the core material.



Current flow produces a magnetic field in a conductor. The amount of current determines the strength of the magnetic field. As current flow increases, field strength increases and as current flow decreases, field strength decreases. Any change in current causes a corresponding change in the magnetic field surrounding the conductor.



Current is constant for a regulated direct current (DC) source, except when the circuit is turned on and off, or when there is a load change. However, alternating current (AC) is constantly changing, and inductance is continually opposing the change. A change in the magnetic field surrounding the conductor induces a voltage in the conductor. This self-induced voltage opposes the change in current. This is known as counter emf.

Capacitance: Capacitance is a measure of a circuit's ability to store an electrical charge. Any object that can be electrically charged exhibits capacitance. If the charges on the plates are $+q$ and $-q$ respectively and V is the voltage between the plates, then the capacitance 'C' is given by the formula:

$$C = q/V$$

A device manufactured to have a specific amount of capacitance is called a capacitor. A capacitor is made up of a pair of conductive plates separated by a thin layer of insulating material. Another name for the insulating material is dielectric material.



A common form of energy storage device is a parallel-plate capacitor. In a parallel plate capacitor, capacitance is directly proportional to the surface area of the conductor plates and inversely proportional to the separation distance between the plates.

Distribution and Utilisation

Power distribution involves distribution of power received at HV substations to consumers through distribution system which operates at voltages at 33 KV and below. A distribution system consists of electrical sub stations, distribution transformers and distribution lines.

Primary distribution system: It connects the transmission system with secondary distribution network, at 33 kV or 11 kV voltage levels and form the backbone of the distribution system.

Secondary distribution system: Supplies power to consumers at voltages of 415 volts and/ or 240 volts and constitutes the first contact of utility authorities with the consumers.

Distribution lines: These include overhead lines and/or cables. The lines in rural areas are mostly radial in nature. The lines in city areas are mostly mesh-like networks often called 'ring mains', which are used to increase the reliability of supply and to meet the high density of loads.

Utilisation refers to the process through which the electricity is put to different uses such as:

Power for industrial units

Power for different kinds of household appliances and gadgets

Power for communication and electrical traction

Use in medical equipment, electrolysis, etc.

Project Coordinator : Dr. Saurabh Prakash

**Assistance
Er. R. V. Iyer , Retired DGM
MPSEB Bhopal**



Joint Director
PSS Central Institute of Vocational Education
Shyamla Hills, Bhopal – 462013 , Madhya Pradesh, India

**E-mail: jdpsscive@gmail.com
Tel. +91 755 2660691, 2704100, 2660391, 2660564
Fax +91 755 2660481
Website: www.psscive.ac.in**