

JOB ROLE – Consumer Energy Meter Technician

Sector: Power
(Qualification Pack Code : PSS/Q0107)



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Shyamla Hills, Bhopal – 462013, Madhya Pradesh, India

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Unit 1: Basic Electricity -1

Session 1: Basic Electricity Generation Concept

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Session Objectives

1. The student will be able to explain the foundational concepts of origin of electricity.
2. Able to explain the concept of electricity
3. Able to explain the Importance of Electricity

Introduction

Electricity is a form of energy and it occurs in nature. It is a fundamental part of nature and it is one of the commonly used forms of energy. **Electricity** word comes from Greek word electron which means amber. It is converted into mechanical energy to the electrical energy by the help of prime mover i.e. turbine to generator, so it was not “**invented.**” As to who discovered it, many misconceptions abound. Some give credit to **Benjamin Franklin** for discovering **electricity**, but his experiments is only helped to establish the connection between lightning and **electricity**.

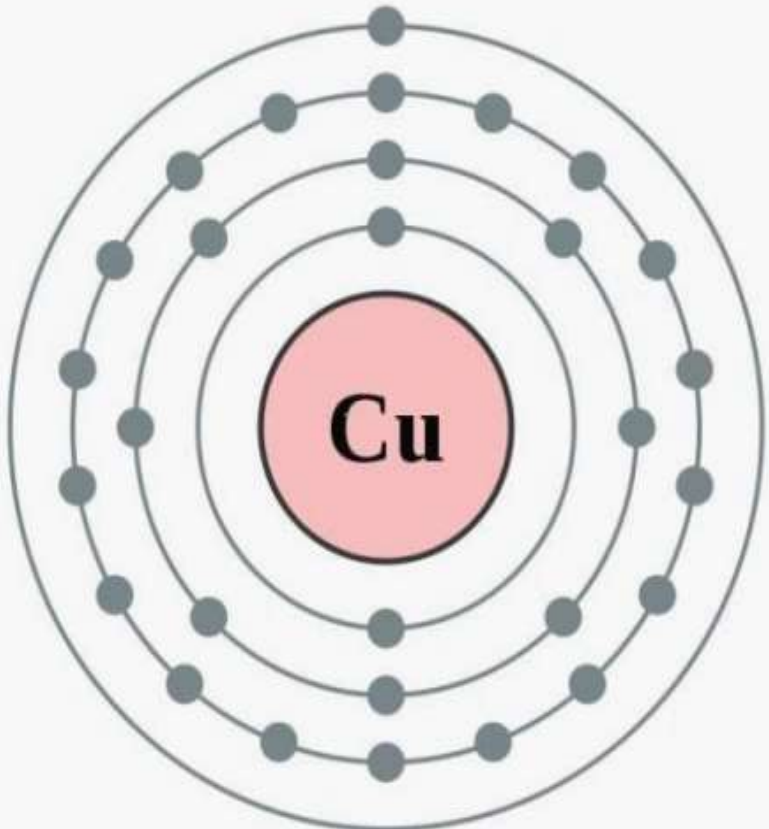
Concept of Electricity

Electricity is a type of energy which involves the flow of electrons. All elements are made up of atoms and the center of it is called a nucleus. The nucleus has positively charged particles known as protons and electrically neutral particles called neutrons. The nucleus of an atom is bounded by negatively charged particles known as electrons. The negative charge of an electron is the same as the positive charge of a proton, and the number of electrons in an atom is equal to the number of protons. When the force between protons and electrons is disturbed by an outside force, an atom may gain or lose an electron.

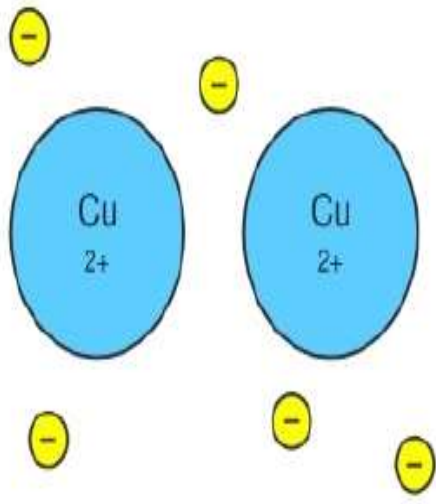
Distribution of Electrons in the Orbit

29: Copper

2,8,18,1



Electrons of outermost orbit will free if we apply external force like magnetic or heating.



Importance of Electricity

- Electricity makes it possible to light our home, road, offices, market and factories. This helps us to continue working at night. A Power Station provides us electricity. If the supply of electricity fails, in this situation a electrical torches are used for providing light. We use electricity to operate the pump that lift water from wells or ground level to roof top of water tank. We need electricity to run computer in shops, offices, bank and other establishment. Other electrical equipment like AC, Geyser, Electrical Iron, Television, Refrigerator, Induction cooker, Oven etc requires electricity to run them.

Electricity Used for Lighting



Incandescent

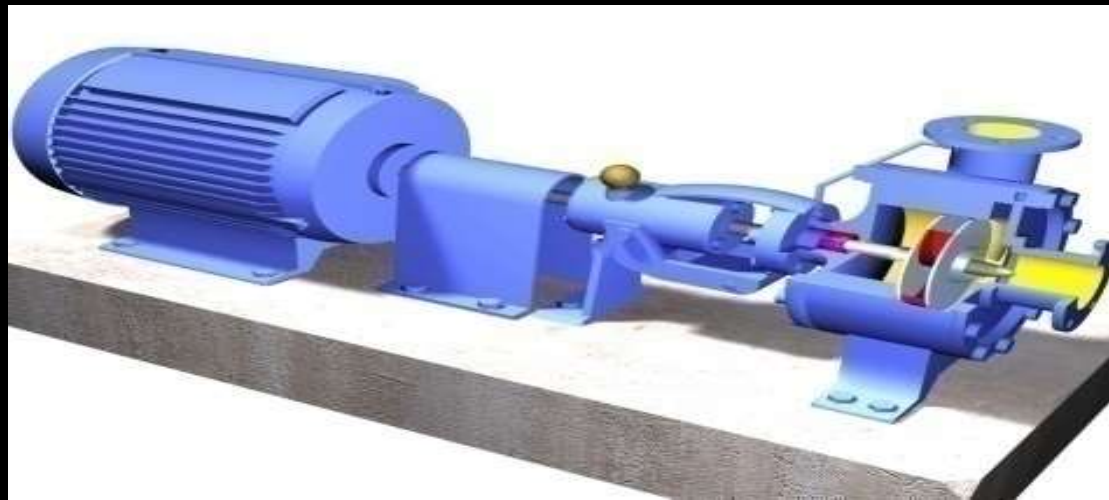
3-Way 2 Filament

Hybrid Halogen CFL

Compact Florescent

LED

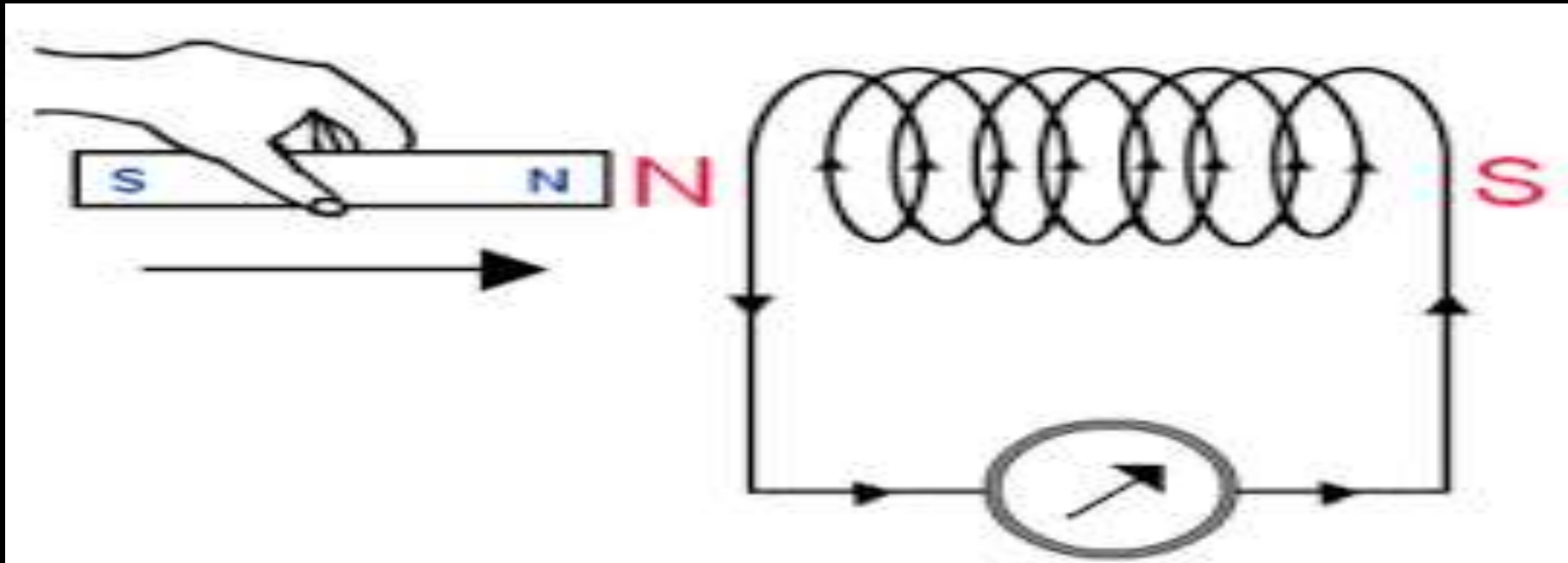
Electricity Used for Heating and other Application



Generation of Electricity

The basic principal of Electrical Generator is Faraday's Law of electromagnetic induction. Electrical Generator is used to convert Mechanical Energy into Electrical Energy. Generation of electrical energy just conversion of kinetic energy into electrical energy.

Experiment of Michel Faraday



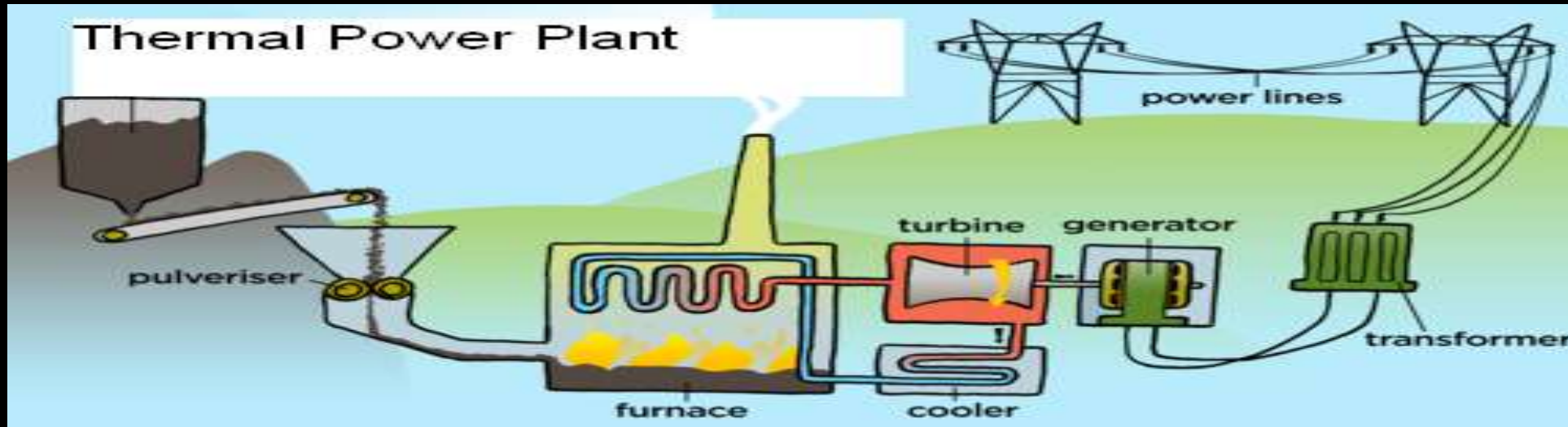
Electricity is generated by the Solar Cell

- A **solar cell** is a device that converts light energy into electrical energy. This conversion is called the photovoltaic effect .Solar cells have many applications. They have been used in situations where electrical power from the transmission lines is unavailable, such as in remote area, Earth-orbiting satellites and space probes, consumer systems like handheld calculators or wrist watches.



Electricity generated by thermal power station:

- A thermal power station is a power station in which heat energy is converted to electric power. In most of the places in the world the turbine is steam-driven. Water is heated, turns into steam and spins a steam turbine which drives an electrical generator. In a thermal power station fuel such as coal, oil or gas is burned in a furnace to produce heat - chemical to heat energy. This heat is used to change water into steam in the boiler and this drives the generator to produce electricity - kinetic to electrical energy.



Status of Electricity production in India

- **Total Installed Capacity (As on 30.06.2017) - Source : Central Electricity Authority (CEA)**

Fuel	MW	% of Total
Total Thermal	2,20,576	67.0%
Coal	1,94,553	59.1%
Gas	25,185	7.6%
Oil	838	0.3%
Hydro	44,614	13.6%
Nuclear	6,780	2.1%
Renewable Energy Sources *	57,260	17.4%
Total	329,231	100%

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