



SNS COLLEGE OF TECHNOLOGY

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Department of Mechanical Engineering

Classification of Power Plants

- 1.Steam or Thermal power plant.
- 2.Gas power plant.
- 3.Diesel Power plant.
- 4.Hydel power plant.
- 5.Nuclear power plant.
- 6.Solar power plant.
- 7.Wind power plant.
- 8.Tidal power plant.
- 9.Oceanic power plant.
- 10.Geo thermal power plant.

1. STEAM (or) THERMAL POWER PLANT

Steam is an important medium for producing mechanical energy. It is used to drive Steam engines and Steam turbines.

The advantages are:

Steam can be raised quickly from water which is available in plenty.

It does not react much with the material of the equipment's.

It is stable at temperature required in the plant.

FACTORS TO BE CONSIDERED IN CHOOSING STEAM POWER PLANT

- 1.Supply of fuel: Plant should be nearer to the coal mines. Transport cost can be reduced.
- 2.Aailability of water: There should be natural source to get continuous water supply.
- 3.Transport facilities: There should be enough roads and rails connecting the plant.
- 4.Cost and type of land: Land cost should be cheap. Soil should have the bearing capacity of the weight of equipment and machineries.
- 5.Distance from populated area: It should be located at a favorable distance to prevent from pollution.

WORKING OF STEAM POWER PLANT

The plant should have the following equipment's:

--Furnace for burning the fuel.

--Steam generator or boiler for steam generation.

Power unit of an engine or turbine to convert heat energy into Mechanical energy.

--Generator to convert mechanical energy into electrical energy.

--Piping system to carry steam and water.

2. GAS POWER PLANT:

In a gas turbine plant air is used as a working fluid. The air compressed by compressor is fed to the combustion chamber where heat is added to the air.

Heat is added to the compressed air either by burning fuel in the chamber or by the use of air heaters.

The hot and high pressure air from the combustion chamber is then passed to the gas turbine, where it expands and does the mechanical work.

The gas turbine drives the alternator which converts the mechanical energy into electrical energy.

3. DIESEL POWER PLANT

A generating station in which diesel engine is used as the prime mover for the generation of electrical energy is known as Diesel Power Plant.

The diesel power plant consists of the following components: 1.Diesel engine 2. Starting system 3.Fuel supply system. 4.Air intake system 5. Exhaust system 6.Cooling system and 7. Lubricating system.

4. HYDRO ELECTRIC POWER PLANT

In Hydro electric power plants, the potential energy of water stored in a reservoir is converted into kinetic energy and then to mechanical energy in the turbine. Then the mechanical energy is converted to electric energy by the use of an alternator or generator.

Water	Dam	Pipes	Turbine	Generator
	Potential Energy	Kinetic Energy	Mechanical Energy	Electrical Energy

Components of Hydro Electric Power Plant:

1.Reservoir, 2.Dam 3.Surge tank 4.Penstock 5.Turbine 6.Generator.

5. NUCLEAR POWER PLANT

Worlds first nuclear power plant was commissioned in 1954 in USSR. In India the first nuclear power plant station was started at Tarapur (Maharashtra) in the year 1969.

Matter consists of minute particles known as atoms. These atoms contain enormous 'binding energy'. Protons, Electrons and Neutrons are sub-atomic particles. The central part of the atom is nucleus and negatively charged electrons revolve around this nucleus in an orbit. Nucleus contains positively charged protons and neutrons.

When a slow moving neutron is induced to enter the nuclei of a certain heavy atom, they will fission into two smaller nuclei. They eject two or three neutrons and fragments emit rays such as alpha, beta and gamma rays. During this process of fission, enormous amount of heat energy is liberated and it is called "Nuclear energy".

Controlled fission of heavier unstable atoms such as U-235 (Uranium), Th-232 (Thorium) and artificial elements Pu-239 liberates large amount of heat energy which can be used to heat water and generate steam. Steam is used to drive the turbines which when coupled to electrical generators and produce power.

Fission Reaction: When heavy nucleus like Uranium is bombarded with slow neutron, it splits into two nuclei of nearly equal magnitude and a large amount of energy is produced. This process is called NUCLEAR FISSION.

Chain Reaction: The chain reaction is a process in which the nuclear fission of an atom induces nuclear fission in another atom which again induces in another and so on. When a nucleus $^{92}\text{U}-235$ is bombarded by a slow neutron, it splits into two approximately equal fragments (Barium – Ba) and Krypton – Kr and

about 2.5 neutrons are released. In this process, a large amount of heat energy is also released.

Selecting the site for Nuclear power plant:

Availability of water: As sufficient water is required for the cooling purposes, therefore the plant site should be located where ample quantity of water is available.

Disposal of waste: The waste produced by fission in nuclear power station is generally radio active which much be disposed off properly to avoid health hazards. The waste should either be buried in a deep trench or disposed off in a sea quite away from the sea shore.

Distance from the populated areas: The site selected for a nuclear power plant should be quite away from the populated areas as there is a danger of presence of radio activity in the atmosphere near the plant.