

Generating Power Stations

□ Water Power

$$P = \frac{0.736}{75} Q \eta H \text{ kW}$$

where, Q = Discharge; m^3/sec

H = Water head; m

η = Overall efficiency of turbine alternator set

- Specific speed of a turbine is the speed of a scale model of turbine which develops 1 metric h.p. under a head of 1 metre.

□ Specific Speed

$$N_s = \frac{N \sqrt{P_t}}{H^{1.25}}$$

where, N_s = Specific speed in metric units

N = Speed of turbine in rpm

P_t = Output in metric h.p.

H = Effective head in metres

□ Power output of Tidal scheme

$$P = Q \rho g H \text{ watts}$$

where, Q = Quantity of water flow, m^3/sec

g = Acceleration due to gravity = 9.81 m/sec^2

H = Water head, metre

ρ = Density of sea water = 1025 kg/m^3

Classification of Turbine

1. Based on Water Discharge

- High discharge : Kaplan
- Medium discharge : Francis
- Low discharge : Pelton

2. Based on Water Pressure

- Impulse : Pelton
- Reaction : Kaplan, Francis, Propeller

3. Base on Direction of Water Flow

- Axial : Kalpan
- Radial : Francis
- Tangential : Peltron
- Diagonal : Deriaz

Component of Hydroelectric Power Station

1. Reservoir
2. Dam
3. Trash rack
4. Spill-way
5. Gates
6. Intake gates
7. Forebay
8. Surge tank
9. Pen stock.

Component of Nuclear Power Station

1. **Reactor core:** Reactor core is made-up of stainless steel or zirconium.
2. **Moderator:** It decrease speed of neutron. (i) Heavy water, (ii) Graphite and (iii) Beryllium.
3. **Reflector:** Prevents escape of neutron from reactor core, and made-up of high grade graphite.
4. **Control rod:** During earthquake it trips the generating station.
5. **Cooler:** Na and Li are used as coolant material.
6. **Shielding:** Shielding eliminates the effect of radiation.

Component of Thermal Generating Stations

1. Coal handling plant.
2. **Boiler:** In boiler combustion takes place.
3. **Super heater:** In super heater steam is converted into the super heated steam.
4. **Airpreheater:** In airpreheater the atmospheric air absorb the heat of the flue gases and air at higher temperature send to boiler for effective combustion.
5. **Economizer:** In economizer water absorbs the heat of flue gases and send to boiler.
6. **Turbine:** Turbine runs by superheated steam and generate mechanical energy.
7. **Condenser:** Here steam is converted into feed water.