1 List ***any four*** main factors that influence electrical power generation. (2.0 Marks)

Electrical power cannot be stored in bulk. It has to be generated and supplied to the consumer as and when required at proper voltage and frequency.

There is a continuous increase in the demand of electrical power. This necessitates the additions of generation, transmission and distribution capacities to the existing system.

The distribution and nature of primary sources of energy in a country or region also affect how the power is generated.

Environmental considerations influence the location, construction cost, and operation of generating plants.

2. Compare the main sources (water, fuel and nuclear) of electrical energy in terms of **Running Cost**. (1.0 Mark)

Characteristic	***Water Power***	***Fuel Power***	***Nuclear Power***
Running cost	*Lowest*	*Highest*	*Low*

3. What is the function of following in a Steam Turbine Power Plant? (2.0 Marks)

a. Condenser

Condenser causes the steam to condense by letting it flow over cooling pipes

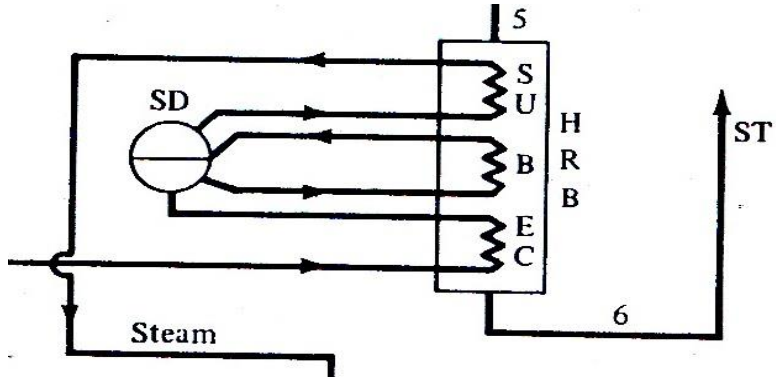
b. Super Heater

It is used to increase the temperature of the steam and ensures that the steam is absolutely dry and raises the overall efficiency of the station.

4. What are the **three** main types of Hydroelectric Power Plants? (1.0 Mark)

Runoff River
Storage based or impoundment
Pumped storage

5. Figure below represents a schematic diagram of a **Heat Recovery Boiler**. Explain working of HRB in a Combined Cycle Power Plant (3.0 Marks)



The feed water enters HRB through economizer

Exhaust gasses of the gas turbine enters from the other side.

The feed water is converted into saturated steam in the boiler, which is stored in the steam drum.

The saturated steam is further heated in the super heater storing energy and carrying it to the steam turbine

6. What are the functions of **lubrication system** in a Diesel engine power plant? (1.0 Mark)

Minimize the friction between the moving parts of engine

Seal in the hot gasses inside the engine cylinders.

7. Describe the function of the following parts in a Nuclear Power Plant (2.0 Marks)

a. Moderator

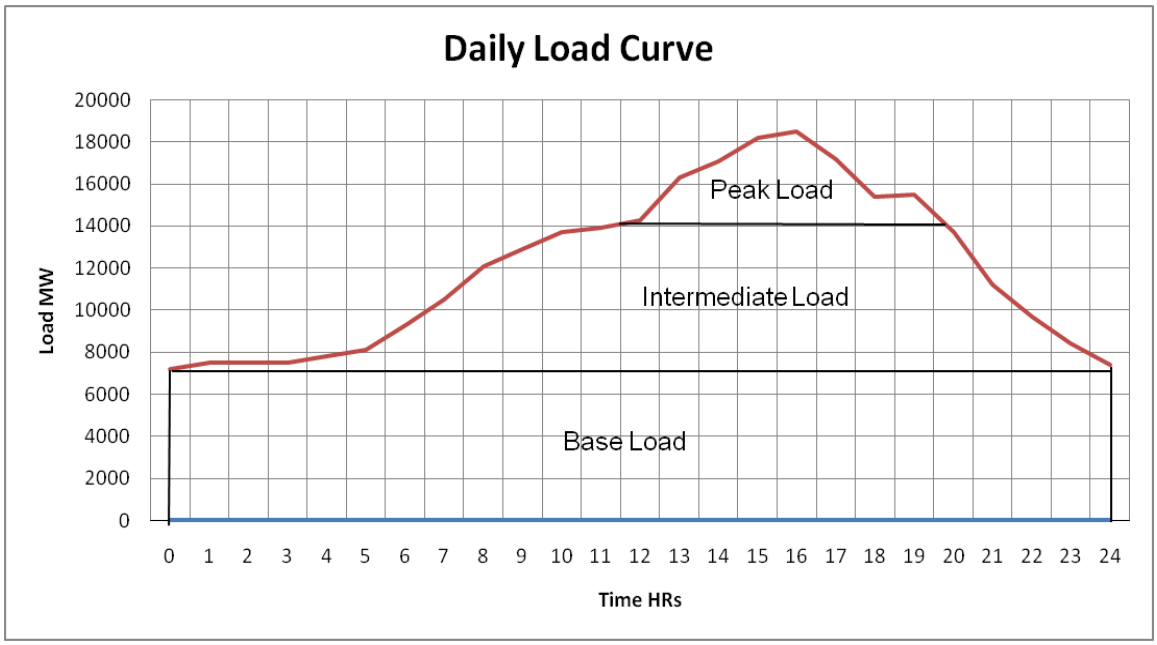
It is a material used to slow down or moderate the fast neutrons produced in fission.

b. Heat Exchanger

The heat exchanger receives feed water, which is heated by the coolant and changes into high temperature, high pressure steam.

8. Draw a **daily load curve** and show Base load, Intermediate load and Peak load on it. .

(1.0 Mark)



9. How does change in excitation affects alternators connected to infinite bus? (1.0 Mark)

The change in the field current of an alternator connected to a power system affects the exchange of reactive power.

- ***If the alternator is over-excited, it supplies reactive power to the infinite bus. (lagging power factor)***
- ***I the alternator is under-excited, it draws reactive power from the infinite bus. (leading power factor)***

10. What is meant by **Interconnected Power Plants**? (1.0 Mark)

Two or more power plants are interconnected through transmission lines and share the loads connected to the network.