Economics of Power Generation

Introduction to Economics of Power Generation:

The function of a power station is to deliver power at the lowest possible cost per kilo watt hour. This total cost is made up of fixed charges consisting of interest on the capital, taxes, insurance, depreciation and salary of managerial staff, the operating expenses such as cost of fuels, water, oil, labor, repairs and maintenance etc.

The cost of power generation can be minimized by :

1. Choosing equipment that is available for operation during the largest possible % of time in a year.

2. Reducing the amount of investment in the plant.

3. Operation through fewer men.

4. Having uniform design

5. Selecting the station as to reduce cost of fuel, labor, etc.

All the electrical energy generated in a power station must be consumed immediately as it cannot be stored. So the electrical energy generated in a power station must be regulated according to the demand. The demand of electrical energy or load will also vary with the time and a power station must be capable of meeting the maximum load at any time. Certain definitions related to power station practice are given below:

Load curve :

Load curve is plot of load in kilowatts versus time usually for a day or a year.

Load duration curve :

Load duration curve is the plot of load in kilowatts versus time duration for which it occurs.

Maximum demand :

Maximum demand is the greatest of all demands which have occurred during a given period of time.

Average load :

Average load is is the average load on the power station in a given period (day/month or year)

Base load :

Base load is the minimum load over a given period of time.

Connected load :

Connected load of a system is the sum of the continuous ratings of the load consuming apparatus connected to the system.

Peak load :

Peak load is the maximum load consumed or produced by a unit or group of units in a stated period of time. It may be the maximum instantaneous load or the maximum average load over a designated interval of time.

Demand factor :

Demand factor is the ratio of maximum demand to the connected load of a consumer.

Diversity factor :

Diversity factor is the ratio of sum of individual maximum demands to the combined maximum demand on power stations

Load factor :

Load factor is the ratio of average load during a specified period to the maximum load occurring during the period.

Load factor = Average Load / Maximum demand

Station load factor :

Station load factor is the ratio of net power generated to the net maximum demand on a power station.

Plant factor :

Plant factor is the ratio of the average load on the plant for the period of time considered, to the aggregate rating of the generating equipment installed in the plant.

Capacity factor :

Capacity factor is the ratio of the average load on the machine for a period of time considered, to the rating of the machine.

Demand factor :

Demand factor is the ratio of maximum demand of system or part of system, to the total connected load of the system, or part of system, under consideration.