

Department of EEE

UNIT-II

Economics of Power Generation

Subject: Power systems - I

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INTRODUCTION

Load Curves

The curve showing the variation of load on the power station with respect to time is known as **load curve**.

- 1.Connected Load
- 2.Maximum Demand
- 3.Demand Factor
- 4.Diversity Factor
- 5.Load Duration Curve

Connected load :It is the sum of continuous ratings of all the equipments connected to supply system.

Maximum demand: It is the greatest demand of load on the power station during a given period. The load on the power station varies from time to time. The maximum of all the demands that have occurred during a given period (say a day) is the maximum demand.

Demand factor: It is the ratio of maximum demand on the power station to its connected load.

$$\text{Demand factor} = \frac{\text{Maximum demand}}{\text{Connected load}}$$

Average load The average of loads occurring on the power station in a given period (day or month or year) is known as **average load** or **average demand**.

$$\text{Yearly average load} = \frac{\text{No of units (kWh) generated in a day}}{8760 \text{ hours}}$$

$$\text{Daily average load} = \frac{\text{No of units (kWh) generated in a day}}{24 \text{ hours}}$$

$$\text{Monthly average load} = \frac{\text{No of units (kWh) generated in a day}}{\text{Number of hours in a month}}$$

Load factor : The ratio of average load to the maximum demand during a given period is known as **load factor**.

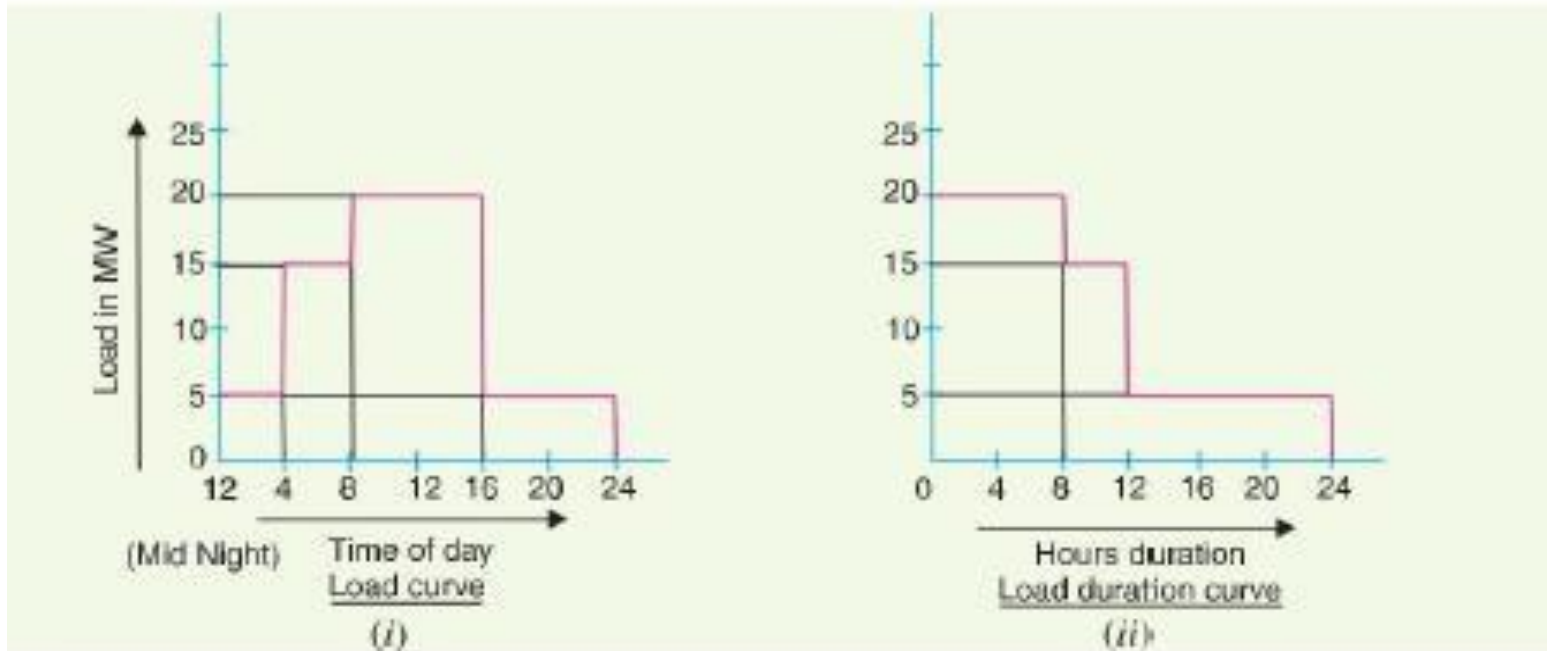
$$\text{Load factor} = \frac{\text{Average load}}{\text{Max demand}}$$

The load factor plays key role in determining the overall cost per unit generated. Higher the load factor of the power station, lesser* will be the cost per unit generated.

Diversity factor : The ratio of the sum of individual maximum demands to the maximum demand on power station is known as **diversity factor**.

$$\text{Diversity factor} = \frac{\text{Sum of individual max demands}}{\text{Maximum demand on power station}}$$

Load duration curve : When the load elements of a load curve are arranged in the order of descending magnitudes, the curve thus obtained is called a **load duration curve**.



The load duration curve is obtained from the same data as the load curve but the ordinates are arranged in the order of descending magnitudes

Types of Loads

1.Domestic load

2.Commercial load

3.Industrial load

4.Municipal load

5.Irrigation load

6.Traction load

Load Curves and Selection of Generating Units

- 1.The load on a power station is not constant .
- 2.It varies from time to time. a single generating unit (ie, alternator) will not be an economical proposition to meet this varying load
- 3.It is because a single unit will have very poor efficiency during the periods of light loads on the power station Therefore, in actual practice, a number of generating units of different sizes are installed in a power station.
4. The selection of the number and sizes of the units is decided from the annual load curve of the station.
- 5.The number and size of the units are selected in such a way that they correctly fit the station load curve.

Important Points in the Selection of Units

While making the selection of number and sizes of the generating units, the following points should be kept in view:

1.The number and sizes of the units should be so selected that they approximately fit the annual load curve of the station.

2.The units should be preferably of different capacities to meet the load requirements.

3.The capacity of the plant should be made 15% to 20% more than the maximum demand to meet the future load requirements.

4.There should be a spare generating unit so that repairs and overhauling of the working Units can be carried out.

5.The tendency to select a large number of units of smaller capacity in order to fit the load curve very accurately should be avoided.

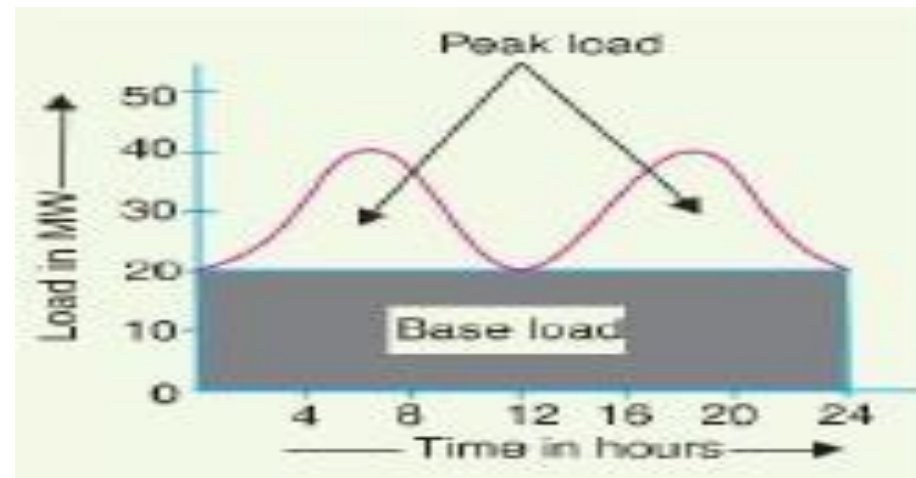
Base Load and Peak Load on Power Station

The changing load on the power station makes its load curve of variable nature Fig. shows the typical load curve of a power station. It is clear that load on the power station varies from time to time.

The load on the power station can be divided in two parts, namely;

1.Base load

2.Peak load



Base Load

The unvarying load which occurs almost the whole day on the station is known as base load.

Peak Load

The various peak demands of load over and above the base load of the station is known as peak load.

Tariff

The rate at which electrical energy is supplied to a consumer is known as **tariff**

Objectives of Recovery of cost of producing electrical energy at the power station

- 1.Recovery of cost on the capital investment in transmission and distribution systems.
- 2.Recovery of cost of operation and maintenance of supply of electrical energy
eg, metering equipment, billing etc.
- 3.A suitable profit on the capital investment.

Desirable Characteristics of a Tariff

A tariff must have the following desirable characteristics:

- 1.Proper return.
- 2.Fairness.
- 3.Simplicity.
- 4.Reasonable profit.

THANK YOU