

System LoadSystem Load

From systems point of view, there are 5 broad category of loads:

1. Domestic
2. Commercial
3. Industrial
4. Agriculture
5. Others - street lights, traction.

Domestic:

Light Fans, domestic appliances like heaters, refrigerators, air conditioners, mixers, ovens, small motors etc.

Demand factor = 0.7 to 1.0;

Diversity factor = 1.2 to 1.3;

Load factor = 0.1 to 0.15

Commercial:

Lightings for shops, advertising hoardings, fans, AC etc.

Demand factor = 0.9 to 1.0;

Diversity factor = 1.1 to 1.2;

Load factor = 0.25 to 0.3

Industrial:

Small scale industries: 0-20kW

Medium scale industries: 20-100kW

Large scale industries: above 100kW

System load-continue

Industrial loads need power over a longer period which remains fairly uniform throughout the day.

For heavy industries:

Demand factor = 0.85 to 0.9;

Load factor = 0.7 to 0.8

Agriculture:

Supplying water for irrigation using pumps driven by motors

Demand factor = 0.9 to 1;

Diversity factor = 1.0 to 1.5;

Load factor = 0.15 to 0.25

Other Loads:

Bulk supplies,
street lights,

traction,
government loads
which have their own peculiar characteristics

System Load Characteristics

Connected Load
Maximum Demand

Average Load
Load Factor
Diversity Factor
Plant Capacity Factor
Plant Use Factor

Plant Capacity Factor:

It is the ratio of actual energy produced to the maximum possible energy that could have been produced during a given period.

Plant Use Factor:

It is the ratio of kWh generated to the product of plant capacity and the number of hours for which the plant was in operation.

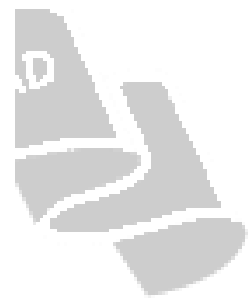
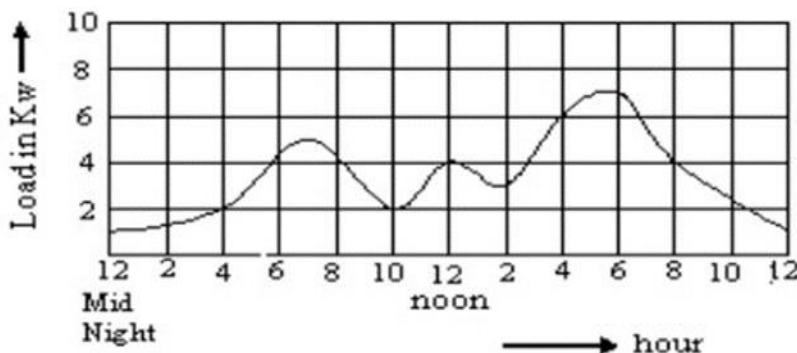
Plant use factor = Station output in kWh / Plant capacity * Hours of use

When the elements of a load curve are arranged in the order of descending magnitudes.

Economic of Generation

1. Load curves

The curve showing the variation of load on the power station with respect to time
The curve drawn between the variations of load on the power station with reference to time is known as load curve. Fig shows the load curve
There are three types, Daily load curve, Monthly load curve, Yearly load curve .



Types of Load Curve:

Daily load curve–Load variations during the whole day

Monthly load curve–Load curve obtained from the daily load curve
 Yearly load curve–Load curve obtained from the monthly load curve

Daily load curve

The curve drawn between the variations of load with reference to various timeperiod of day is known as daily load curve.

Monthly load curve

- It is obtained from daily load curve.
- Average value of the power at a month for a different time periods are calculated and plotted in the graph which is known as monthly load curve.

Yearly load curve

It is obtained from monthly load curve which is used to find annual load factor.

Load duration curve

- When the elements of a load curve are arranged in the order of descending magnitudes. The load duration curve gives the data in a more presentable form
- The area under the load duration curve is equal to that of the corresponding load curve
 The load duration curve can be extended to include any period of time

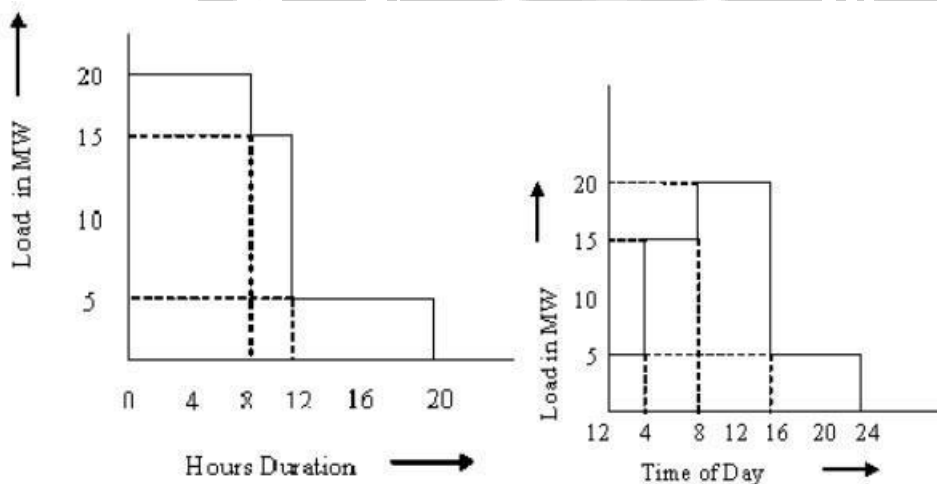


Fig 1.3 Load Duration Curve

Connected load

It is the sum of continuous ratings of all the equipments connected to supply systems.

Maximum demand

It is the greatest demand of load on the power station during a given period.

Demand factor

It is the ratio of maximum demand to connected load.

$$\text{Demand factor} = \frac{\text{max demand}}{\text{connected load}}$$

Average demand

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

$$\text{Daily average demand} = \frac{\text{no of units generated per day}}{24 \text{ hours}}$$

$$\text{Monthly average demand} = \frac{\text{no of units generated in month}}{\text{no of hours in a month}}$$

$$\text{Yearly average demand} = \frac{\text{no of units generated in a year}}{\text{no of hours in a year}}$$

Load factor

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

$$\text{Load factor} = \frac{\text{average load}}{\text{maximum demand}}$$

Diversity factor

The ratio of the sum of individual maximum demand on power station is known as diversity factor.

$$\text{Diversity factor} = \frac{\text{sum of individual maximum demand}}{\text{maximum demand}}$$

Capacity factor

This is the ratio of actual energy produced to the maximum possible energy that could have been produced during a given period.

$$\text{Capacity factor} = \frac{\text{actual energy produced}}{\text{maximum energy that have been produced}}$$

Plant use factor

It is the ratio of units generated to the product of plant capacity and the number of hours for which the plant was in operation.

$$\text{Units generated per annum} = \text{average load} * \text{hours in a year}$$

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