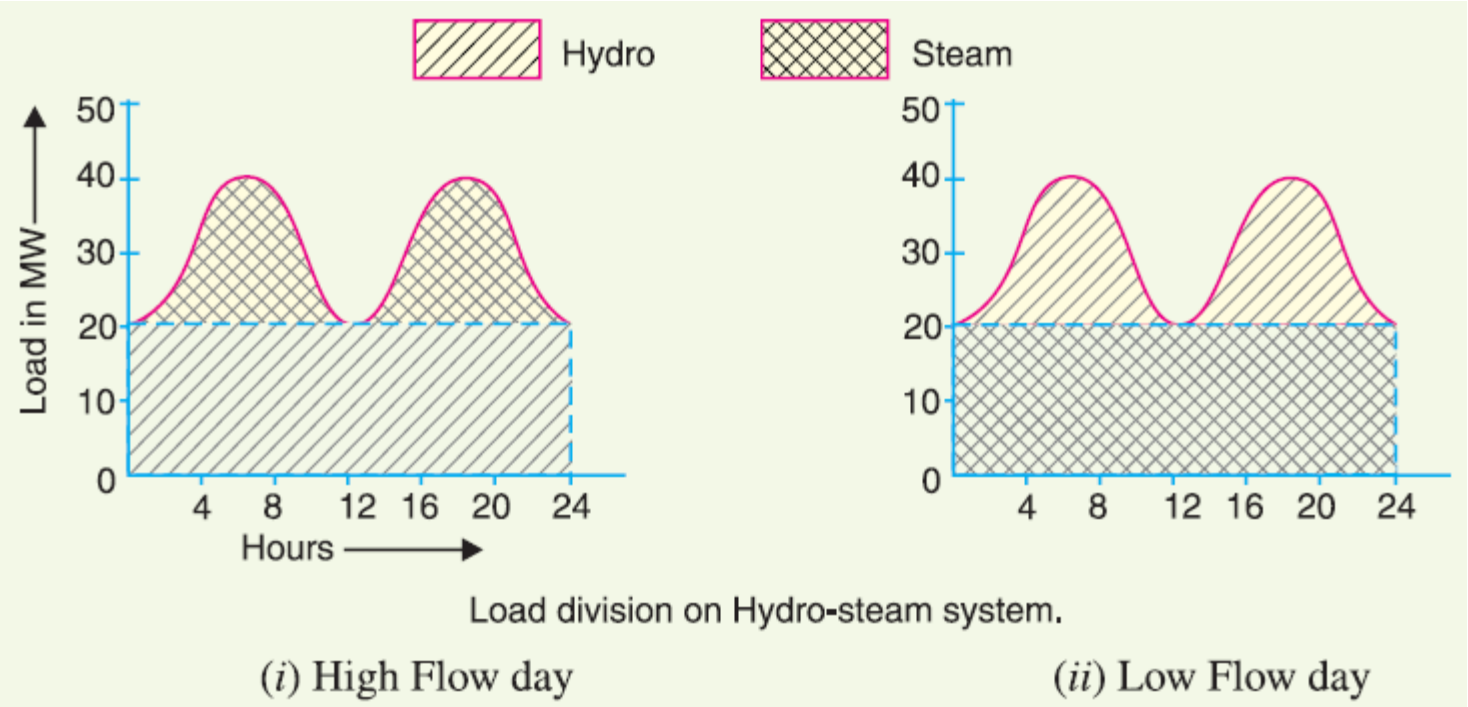
# TPS Planning Studies (Load Forecasting)



## Meeting the Load

Interconnecting two power stations, the more efficient plant is assigned the base load, while the less efficient one is assigned the peak load.




Load division on Hydro-steam system.

(*i*) High Flow day (*ii*) Low Flow day

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## Interconnected Grid System

The connection of several generating stations in parallel is known as interconnected grid system.

Some of the advantages of interconnected system are listed below :

1. **Exchange of peak loads:** If the load curve of a power station shows a peak demand that is greater than the rated capacity of the plant, then the excess load can be shared by other stations interconnected with it.
2. **Use of older plants:** The interconnected system makes it possible to use the older and less efficient plants to carry peak loads of short durations. Although such plants may be inadequate when used alone, yet they have sufficient capacity to carry short peaks of loads when interconnected with other modern plants. Therefore, interconnected system gives a direct key to the use of obsolete plants.

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## Interconnected Grid System

3. **Ensures economical operation :** It is because sharing of load among the stations is arranged in such a way that more efficient stations work continuously throughouts the year at a high load factor and the less efficient plants work for peak load hours only.
4. **Increases diversity factor :** The load curves of different interconnected stations are generally different. The result is that the maximum demand on the system is much reduced as compared to the sum of individual maximum demands on different stations. In other words, the diversity factor of the system is improved, thereby increasing the effective capacity of the system.
5. **Reduces plant reserve capacity :** Every power station is required to have a standby unit for emergencies. However, when several power stations are connected in parallel, the reserve capacity of the system is much reduced. This increases the efficiency of the system.
6. **Increases reliability of supply :** If a major breakdown occurs in one station, continuity of supply can be maintained by other healthy stations.

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## Load Curves and Selection of Generating Units

In actual practice, a number of generating units of different sizes are installed in a power station. The selection of the number and sizes of the units is decided from the annual load curve of the station. The number and size of the units are selected in such a way that they correctly fit the station load curve. Once this underlying principle is adhered to, it becomes possible to operate the generating units at or near the point of maximum efficiency.

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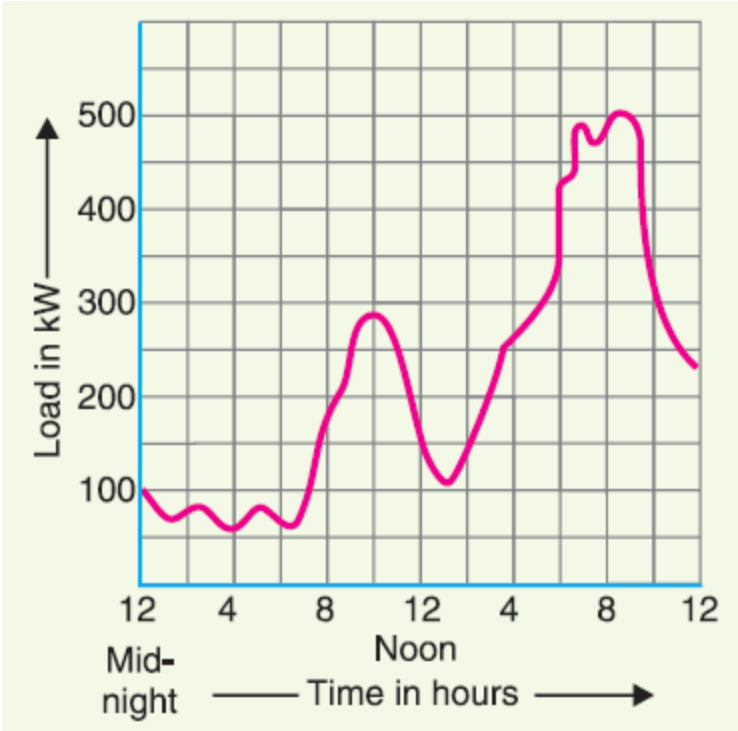
## Load Curves and Selection of Generating Units

The principle of selection of number and sizes of generating units with the help of load curve is illustrated in the following figure. The annual load curve of the station is shown. It is clear form the curve that load on the station has wide variations ; the minimum load being somewhat near 50 kW and maximum load reaching the value of 500 kW. It hardly needs any mention that use of a single unit to meet this varying load will be highly uneconomical.



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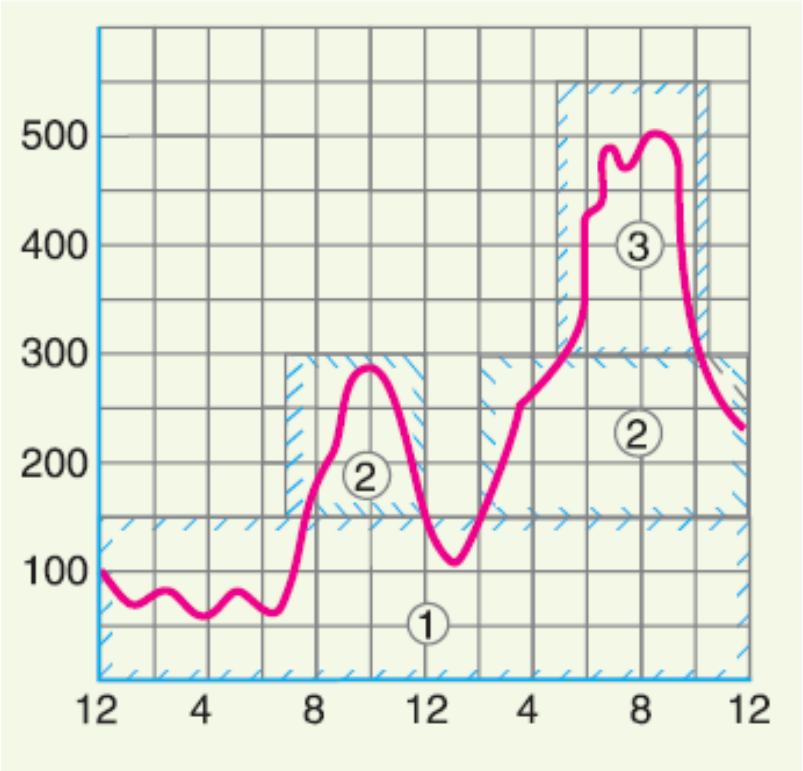
## Load Curves and Selection of Generating Units

As discussed earlier, the total plant capacity is divided into several generating units of different sizes to fit the load curve. This is illustrated in the following figure where the plant capacity is divided into three* units numbered as 1, 2 and 3. The cyan color outline shows the units capacity being used. The three units employed have different capacities and are used according to the demand on the station.



# TPS Planning Studies (Load Forecasting)



## Load Curves and Selection of Generating Units

| *Time* | *Units in operation* |
|---|---|
| From 12 midnight to 7 A.M. | Only unit no.1 is put in operation. |
| From 7 A.M. to 12.00 noon | Unit no. 2 is also started so that both units 1 and 2 are in operation. |
| From 12.00 noon to 2 P.M. | Unit no. 2 is stopped and only unit 1operates. |
| From 2 P.M. to 5 P.M. | Unit no. 2 is again started. Now units 1 and 2 are in operation. |
| From 5 P.M. to 10.30 P.M. | Units 1, 2 and 3 are put in operation. |
| From 10. 30 P.M. to 12.00 midnight | Units 1 and 2 are put in operation. |

Thus by selecting the proper number and sizes of units, the generating units can be made to operate near maximum efficiency. This results in the overall reduction in the cost of production of electrical energy.

# TPS Planning Studies (Load Forecasting)

## Important Points in the Selection of Generating 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. Although use of identical units (i.e., having same capacity) ensures saving* in cost, they often do not meet the load requirement.
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. It is because the investment cost per kW of capacity increases as the size of the units decreases.


Thank You