POWER SYSTEM OPERATION

(i) Load Forecasting

(ii) Unit Commitment

(iii) Load Scheduling.

1. Load forecasting:

The load on their systems should be estimated in advance. This estimation in advance is known as load forecasting. Load forecasting based on the previous experience without any historical data.

Classification of load forecasting:

Forecasting	Lead Time	Application
Very short time	Few minutes to half an hour	Real time control, real time security evaluation.
Short term	Half an hour to a few hours	Allocation of spinning reserve, unit commitment, maintenance scheduling.
Medium term	Few days to a few weeks	Planning or seasonal peak-winter, summer.
Long term	Few months to a few years	To plan the growth of the generation capacity.

Need for load forecasting:

- To meet out the future demand.
- Long term forecasting is required for preparing maintenance schedule of the generating units, planning future expansion of the system.
  For day-to-day operation, short term load forecasting demand and for maintaining the required spinning reserve. Very short term load forecasting is used for generation and distribution.
- generation scheduling and load dispatching.
- Medium term load forecasting is needed for predicted monsoon acting and hydro availability and allocating.

2. Unit Commitment:

The unit commitment problem is to minimize system total operating costs while simultaneously providing sufficient spinning reserve capacity to satisfy a given security level. In unit commitment problems, we consider the following terms.

- A short term load forecast.

- System reserve requirements.
- System security.
- Startup costs for all units.
- Minimum level fuel costs for all units.
- Incremental fuel costs of units.
- Maintenance costs.

3. Load Scheduling (Load Dispatching):

Loading of units are allocated to serve the objective of minimum fuel cost is known as load scheduling. Load scheduling problem can be divided into:

i. Thermal scheduling.
ii. Hydrothermal scheduling.

i. Thermal scheduling.

The loading of steam units are allocated to serve the objective of minimum fuel cost. Thermal scheduling will be assumed that the supply undertaking has got only form thermal or from steam stations.

ii. Hydrothermal scheduling.

Loading of hydro and thermal units are allocated to serve the objective of minimum fuel cost is known as hydrothermal scheduling.

Scheduling of hydro units are complex because of natural differences I the watersheds, manmade storage and release elements used to control the flow of water are difficult.

During rainy season, we can utilize hydro generation to a maximum and the remaining period, hydro generation depends on stored water availability. If availability of water is not enough to generate power, we must utilize only thermal power generation. Mostly hydroelectric generation is used to meet out peak loads. There are two types of hydrothermal scheduling.

a) Long range hydro scheduling
b) Short range hydro scheduling.

a) Long range hydro scheduling

Long range hydro scheduling problem involves the long range forecasting of water availability and the scheduling of reservoir water releases for an interval of time that depends on the reservoir capacities. Long range hydro scheduling involves

from I week to I year or several years. Long range hydro scheduling involves optimization of statistical variables such as load, hydraulic inflows and unit availabilities.

b <u>Short range hydro scheduling.</u>

Short range hydro scheduling involves from one day to one week or hour-by-hour scheduling of all generation on a system to achieve minimum production cost foe a given period.

Assuming load, hydraulic inflows and unit availabilities are known, for a given reservoir level, we can allocated generation of power using hydro plants to meet out the demand, to minimize the production cost.

The largest category of hydrothermal system includes a balance between hydroelectric and thermal generation resources. Hydrothermal scheduling is developed to minimize thermal generation production cost.