NEED FOR SYSTEM PLANNING AND OPERATIONAL STUDIES AND POWER SCENARIO IN INDIA

INTRODUCTION

Every power system has three major components

Generation: source of power, ideally with a specified voltage and frequency

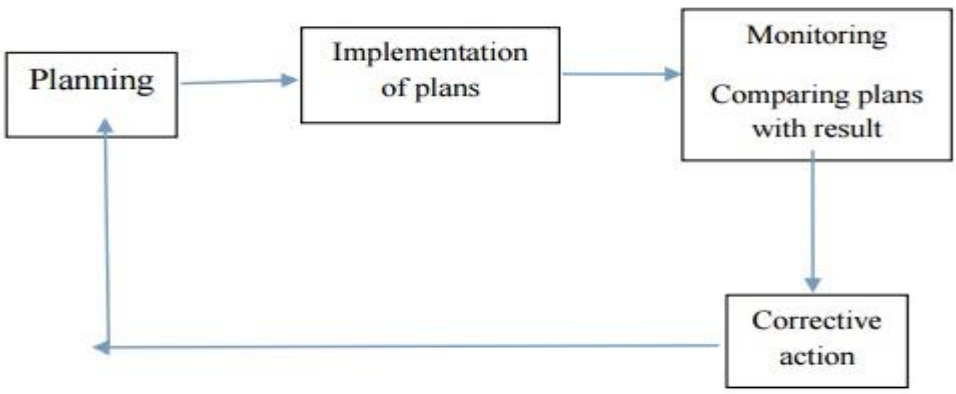
Load: consumes power; ideally with a constant resistive value

Transmission System: transmits power; ideally as a perfect conductor

The power system is a network which consists generation, distribution and transmission system. It uses the form of energy (like coal and diesel) and converts it into electrical energy. The power system includes the devices connected to the system like the synchronous generator, motor, transformer, circuit breaker, conductor, etc. The power plant, transformer, transmission line, substations, distribution line, and distribution transformer are the six main components of the power system. The power plant generates the power which is step-up or step-down through the transformer for transmission. The transmission line transfers the power to the various substations. Through substations, the power is transferred to the distribution transformer which step-down the power to the appropriate value which is suitable for the consumers.

Needs for system analysis in planning and operation of power system

- Planning and operation of power system - Operational planning covers the whole period ranging from the incremental stage of system development.
- The system operation engineers at various points like area, space, regional & national load dispatch of power.
- Power system planning and operational analysis covers the maintenance of generation, transmission and distribution facilities.



Steps:

- Planning of power system
- Implementation of the plans
- Monitoring system
- Compare plans with the results
- If no undesirable deviation occurs, then directly go to planning of system
- If undesirable deviation occurs, then take corrective action and then go to planning Of the system

Planning and operation of power system

Planning and operation of power system the following analysis are very important.

a) Load flow analysis
b) Short circuit analysis
c) Transient analysis

Load flow analysis

- Electrical power system operate at Steady state mode
- Basic calculation required to determine the characteristics of this state is called as Load flow
- Power flow studies - To determine the voltage current active and reactive power flows in given power system
- A number of operating condition can be analyzed including contingencies.

That operating conditions are

- Loss of generator
- Loss of a transmission line
- Loss of transformer (or) Load
- Equipment over load (or) unacceptable voltage levels

The result of the power flow analysis is starting point for the stability analysis and power factor improvement. Load flow study is done during the planning of a new system or the extension of an existing one.

Short circuit studies

- To determine the magnitude of the current flowing throughout the power system at various time intervals after fault

- The objective of short circuit analysis - To determine the current and voltages at different location of the system corresponding to different types of faults

Transient stability analysis

- The ability of the power system consisting of two (or) more generators to continue to operate after change occurs on the system is a measure of the stability.
- In power system the stability depends on the power flow pattern generator characteristics system loading level and the line parameters