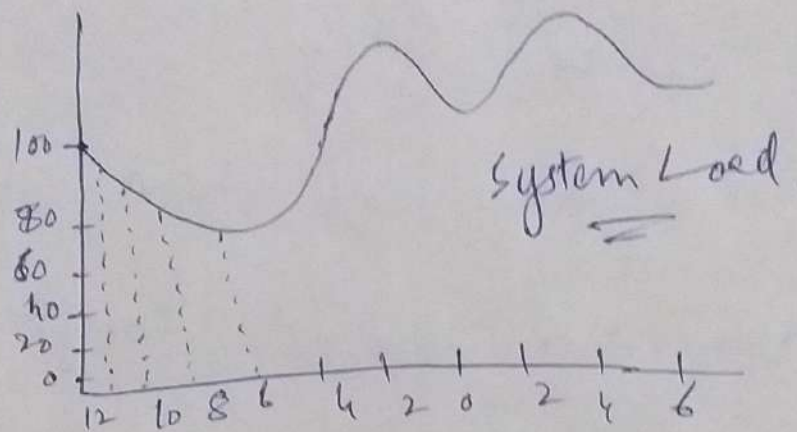


## ⊛ Load Flow Solutions and Control:-

⊛ Power Flow Problems:- is one of the most fundamental problem in Power systems.

⇒ Till now we have discussed the models for various components of the power systems and now we are starting with the analysis and power system analysis is the most fundamental analysis in the power system.

④ What we have mean by  
Power System Analysis or Load Flow  
Analysis?



In Power System What we have?

From Diagram:- Load on the  
System keeps on changing i.e. not  
constant. b/c we have a  
different generators which generates  
this load.

This load is not concentrated at one point but it is dispersed in different substations and these substations are connected to the generators by means of transmission and distribution network.

⇒ In Power System Analysis the basic idea is to find out the voltages at different bus bars i.e. different substations and the flow of power on these lines.

From Diagram:

The loads keeps on changing and this load is an aggregation of loads at various substations or busbars therefore loads at different bus bars are changing.

⇒ What we do is consider the loads at various instants shown from Lines Lines shows the load at a particular instant. The instants we choose are of very short duration i.e. if we have chosen these load values then we expect the change in load b/c two successive instances is not much and for the time b/w two successive instances we consider that the

the load become constant and therefore we consider the network to be working in a steady state or a static condition. This kind of classification of power system operating condition is called a

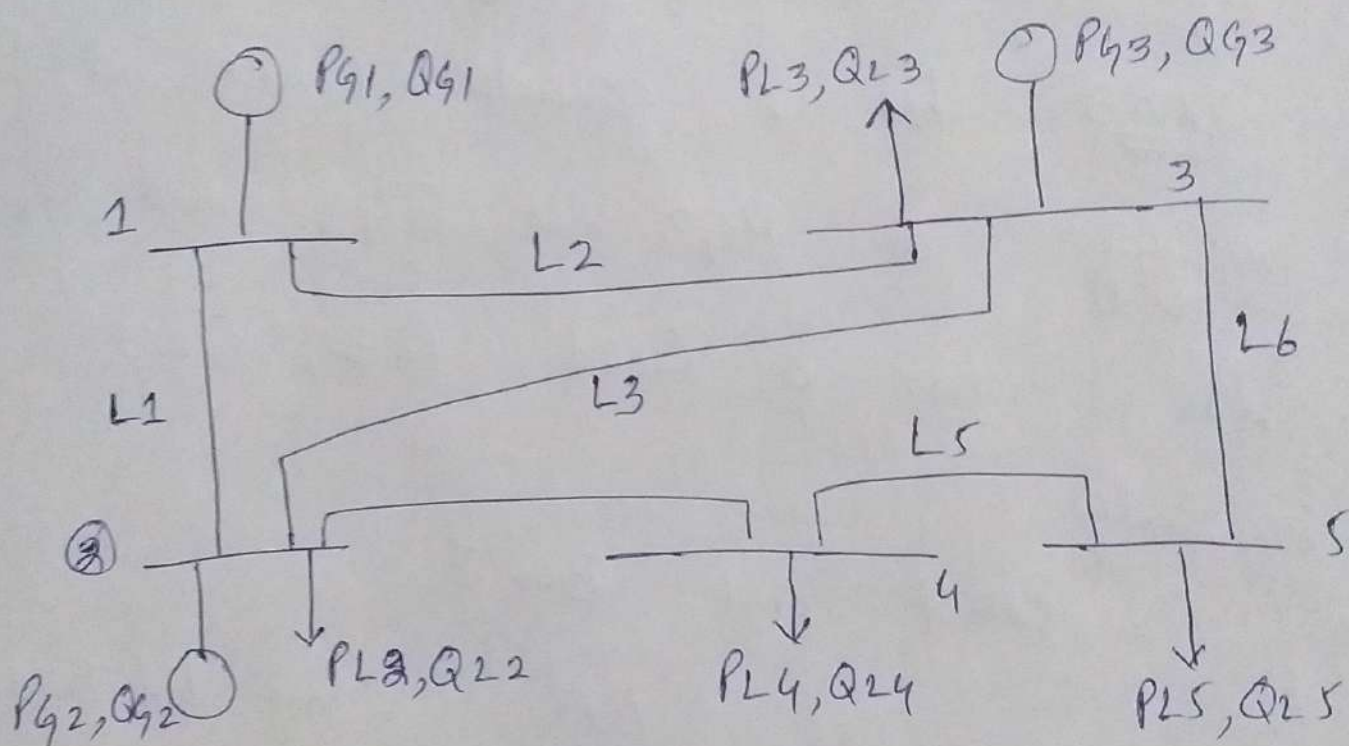
Quasi-static Condition. i.e. we

are considering the power systems loads and a power flow on a transmission lines to remain constant for a short duration of time.

So in a Load Flow Analysis we try to find out the voltages, Power Flows and Power injections at various bus bars for any given operating condition. Therefore we find that Load Flow is basically a static Network analysis problem for a power network.

Let us start with a Power Network.

Power System Network



From Diagram:

5 Busbars and consider in actual systems as substation.

Bus 1 has a generator which is supplying  $PG1$  and  $QG1$

Similarly

Poyettos

Bus 2 has a generator which is supplying  $P_{G2}$  and  $Q_{G2}$ .

Bus 1 and 2 are ~~considered~~ connected by Line L1. Similarly

Bus 3 has a generator which is supplying a  $P_{G3}$  and  $Q_{G3}$  and

also has a load  $P_{L3}$ ,  $Q_{L3}$ .

Similarly

Bus 4 and Bus 5.

⊛ We see that some bus bars

have a generator connected and

we called them a Generating

Bus bar.



While some bus bars have only loads connected so we called them as Load Bus bars.

We also have a bus bars in the Network which have both generators and loads. In fact most of the generating bus bars have the loads connected. e.g. in Thermal generating unit it must supply the load power for the residences in this power plant and these are the loads which are connected to these bus bars.

⇒ So In general we have a generating bus bars, a Load bus bars and these are connected by a transmission lines, Transformers and other equipments. and thus these lines & transformers makes a power system network and the whole idea of the power system network is to find out the voltages at different bus bars and the power flows in various lines b/w we know we must keep the voltages within a specified limit and a Transmission lines has a capacity so we

Lecture #11

PSA

Page 9

Keep the power in a specified  
limit so that the Transmission  
Lines is not overloaded.

