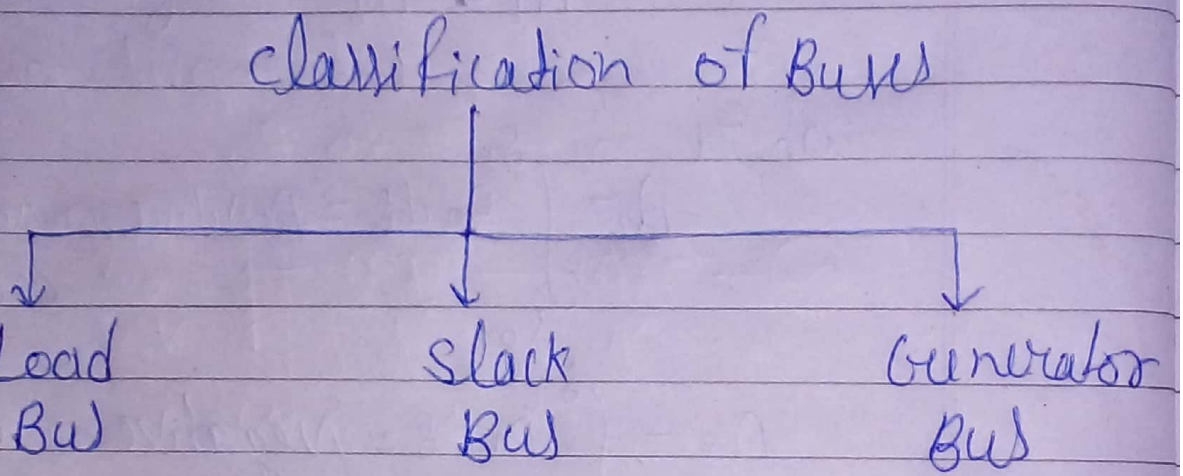
① Classification of power system buses

A bus in a power system is defined as the vertical line at which the several components of the power system like generators, load & feeders etc. are connected. The buses in a power system are associated with four of the voltage, the phase angle of the voltage, active or

true power and the reactive power.

In the load flow studies, two variable are known and two are to be determined. Depends on the quantity to be specified the buses are classified into three categories generator bus, load bus, and slack bus.



- For load bus real power (P) & reactive power Q are known but magnitude & phase angle of bus voltage is unknown.
- Generator bus (voltage controlled bus) is connected with a generator. Therefore bus voltage corresponds to generation voltage & active power generation corresponding to generator rating is specified for this bus.
- Slack bus (swing or reference bus) doesn't exist in real life. To

Supply power loss, an extra generator bus is connected considered for which bus magnitude & voltage is specified.

Algorithm of NR method-

(i) for Y-bus matrix
(ii) Assum initial bus voltage $|V_i|$ & phase angle δ_i. $|V_1| = 1$ pu & $\delta_1 = 0$ rad.
(iii) Set iteration count 0.
(iv) Calculate real & reactive power for each load buses.
(v) Compute errors for each load bus.
(vi) Calculate Jacobian matrix
(vii) obtain value of $\Delta|V_1|$ & $\Delta\delta_1$
(viii) find value of $|V_1|$ & δ_1 & next iteration starts.
(ix) Continue until scheduled error for all load buses.
(x) Calculate line flow & power at slack bus.