



# **SNS COLLEGE OF ENGINEERING**

Kurumbapalayam (Po), Coimbatore – 641 107

**An Autonomous Institution**

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## **DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

### **UNIT – III LOAD FLOW STUDIES**





# INTRODUCTION



- Load flow studies or power flow studies is the analysis of power system in normal steady state condition.
- To determine
  - Voltage
  - Current
  - Active power
  - Reactive power



# IMPORTANCE



- Generator supplies demand plus losses.
- Bus voltage value remains close to rated value
- Generation operates within specified real and reactive power
- Transmission losses and transformers are not over loaded



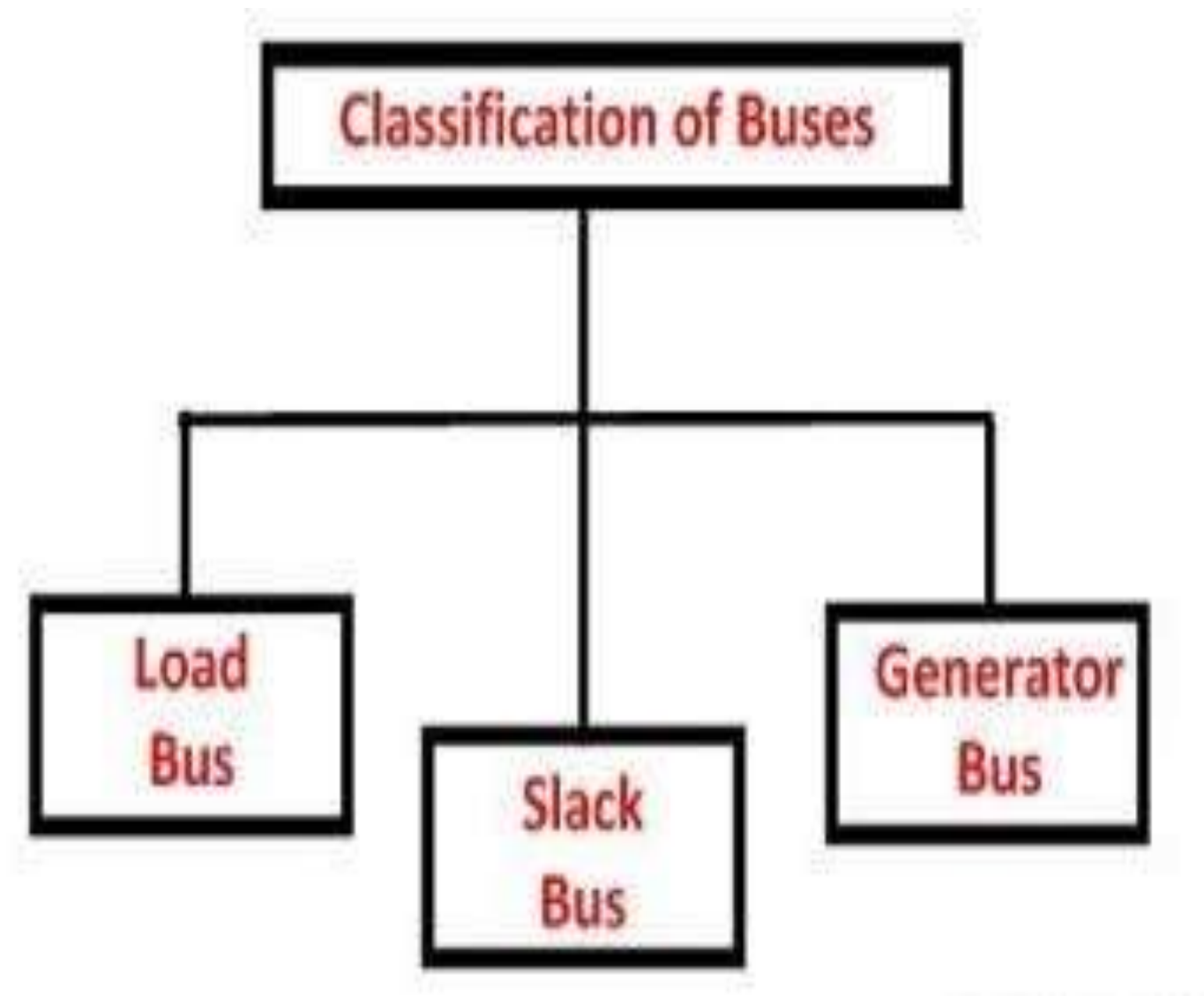
# NEED FOR LOAD FLOW STUDY



- Designing a power system
- Planning a power system
- Expansion of power system
- Providing guidelines for optimum operation of power system
- Providing guidelines for various power system studies.



# BUS CLASSIFICATION





# BUS CLASSIFICATION



- A bus is a node in which transmission lines, loads, generators are connected.
- It is indicated by vertical line at which number of components are connected.
- Load flow study
  - Out of 4 components – 2 will be specified – other 2 to be determined



## LOAD BUS (PQ BUS)



- Active power and reactive power are specified .
- Magnitude ( $V$ ) and phase angle ( $\delta$ ) of the voltage to be determined.
- These are most common type of bus.



Type of Buses	Know or Specified Quantities	Unknown Quantities or Quantities to be determined.
Generation or P-V Bus	$P,  V $	$Q, \delta$
Load or P-Q Bus	$P, Q$	$ V , \delta$
Slack or Reference	$ V , \delta$	$P, Q$





## GENERATOR BUS (PV BUS)



- Magnitude ( $V$ ) and Active power ( $P$ ) are specified.
- Reactive power ( $Q$ ) and phase angle ( $\delta$ ) to be determined.
- This bus is always connected to generator.



# SLACK BUS



- Magnitude ( $V$ ) and phase angle ( $\delta$ ) are specified.
- Reactive power ( $Q$ ) and Active power ( $P$ ) to be determined.
- There will be only one bus of this type in a power system.



# ASSESSMENT



1. At slack bus, the combinations of variable specified for load study is
  - a) P,Q
  - b) P, V
  - c)  $V, \delta$
  - d) Q,V



# ASSESSMENT



2. The busses in the power system are associated with the quantities such as
- a) Magnitude of the voltage
  - b) Phase angle
  - c) Active power
  - d) Reactive power
  - e) Apparent Power
  - f) Load

