SNS COLLEGE OF TECHNOLOGY
(An Autonomous Institution)
COIMBATORE-35
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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

19EEB302/ POWER SYSTEMS – II
III YEAR / VI SEMESTER
UNIT-I: POWER FLOW ANALYSIS

FORMATION OF Y BUS MATRIX

FORMATION OF BUS ADMITTANCE MATRIX

TWO-RULE METHOD (BASED ON NODE - VOLTAGE ANALYSIS)

Consider a three-bus power system shown in Fig.2.1 .The equivalent power network for the system is shown in Fig.2.2 in which the generator is replaced by Norton equivalent, the loads by equivalent admittances and the lines by π - equivalent circuits.

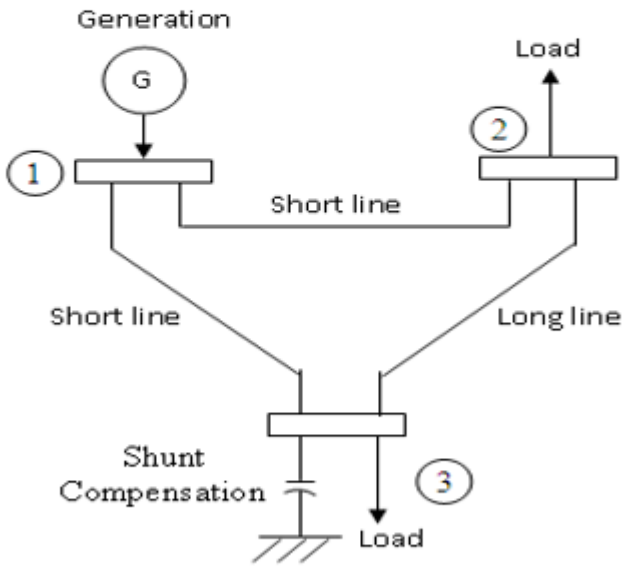


Fig.2.1 A Sample Power System

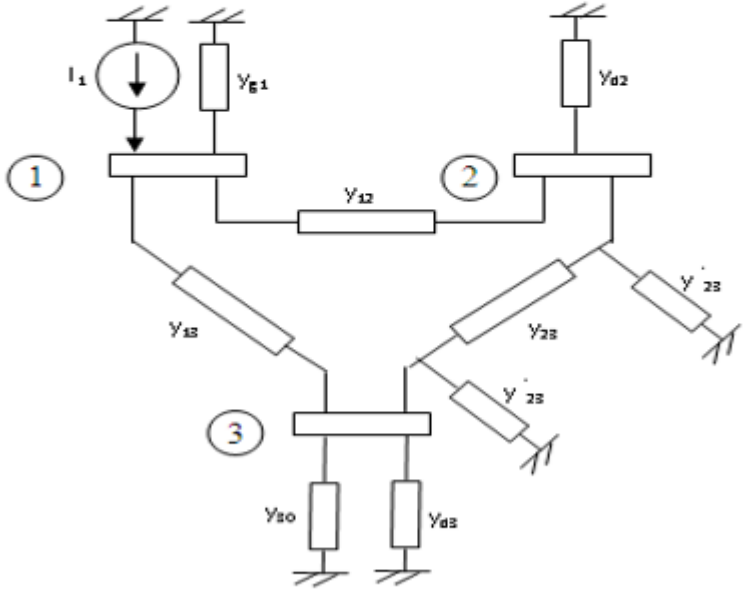


Fig.2.2 Equivalent Power Network

Rearranging these equations

$$(y_{g1} + y_{12} + y_{13})\, V_1 + (-y_{12})\, V_2 + (-y_{13})\, V_3 = I_1$$

$$(-y_{12})\, V_1 + (y_{d2} + y_{12} + y_{23} + y'_{23})\, V_2 + (-y_{23})\, V_3 = 0 \qquad (2.4)$$

$$(-y_{13})\, V_1 + (-y_{23})\, V_2 + (y_{d3} + y_{30} + y_{23} + y'_{23} + y_{13})\, V_3 = 0$$

In matrix form

$$\begin{pmatrix} Y_{11} & Y_{12} & Y_{13} \\ Y_{21} & Y_{22} & Y_{23} \\ Y_{31} & Y_{32} & Y_{33} \end{pmatrix} \begin{pmatrix} V_1 \\ V_2 \\ V_3 \end{pmatrix} = \begin{pmatrix} I_1 \\ 0 \\ 0 \end{pmatrix} \qquad (2.5)$$

Where,

$$Y_{11} = (y_{g1} + y_{12} + y_{13})$$

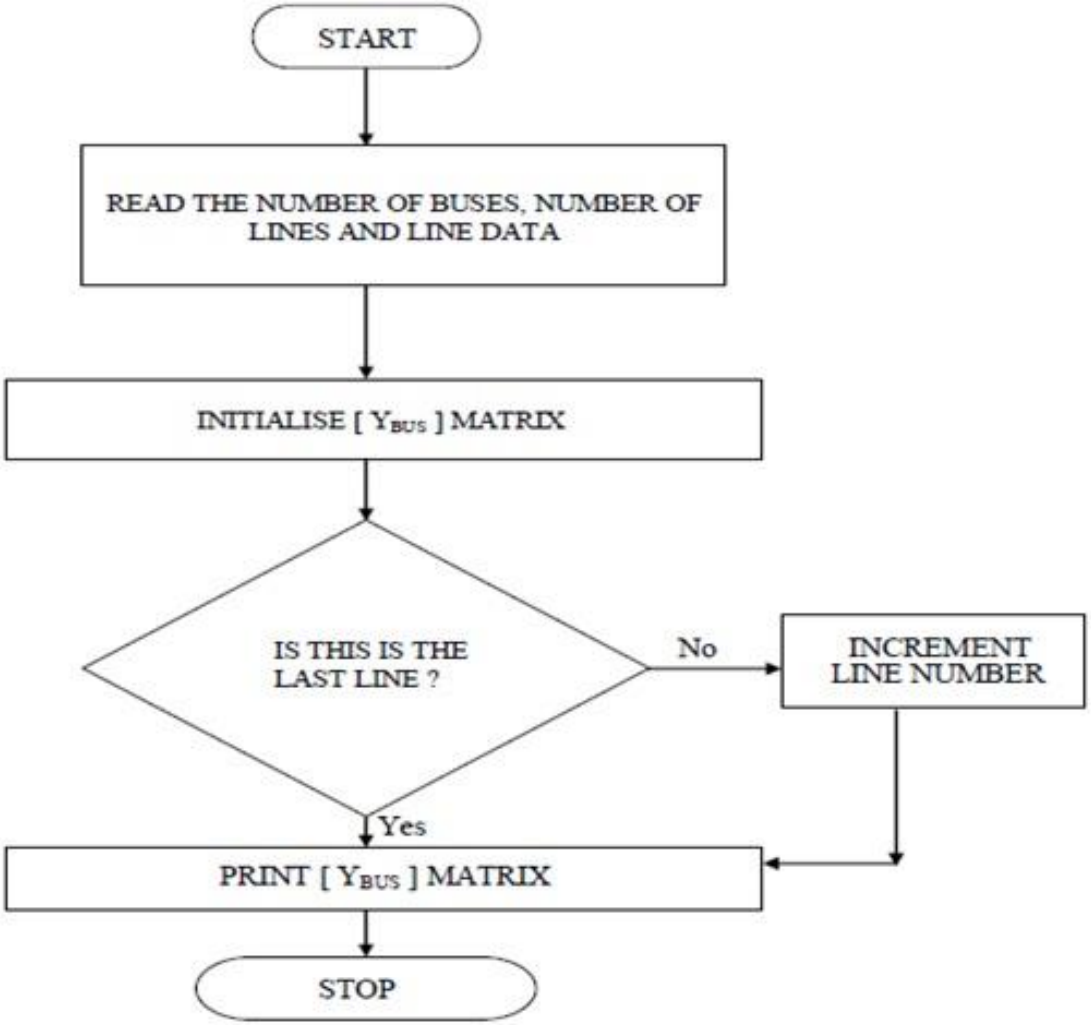
$$Y_{22} = (y_{d2} + y_{12} + y_{23} + y'_{23}) \qquad (2.6)$$

$$Y_{33} = (y_{d3} + y_{30} + y_{23} + y'_{23} + y_{13})$$

$$Y_{12} = Y_{21} = -y_{12}$$

$$Y_{13} = Y_{31} = -y_{13}$$

$$Y_{23} = Y_{32} = -y_{23}$$


START
READ THE NUMBER OF BUSES, NUMBER OF LINES AND LINE DATA
INITIALISE [Y_{BUS}] MATRIX
IS THIS IS THE LAST LINE ?
No
INCREMENT LINE NUMBER
Yes
PRINT [Y_{BUS}] MATRIX
STOP

RECAP….

…THANK YOU