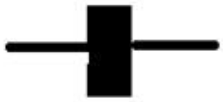
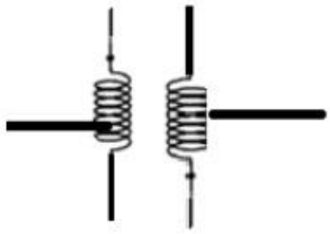
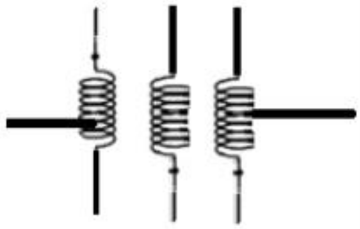
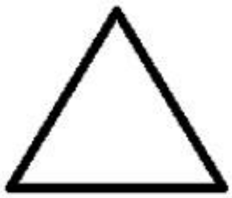
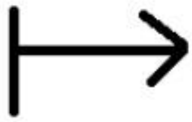
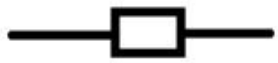
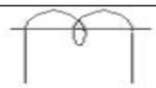
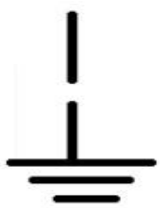
REPRESENTATION

Sl.no	Components	Symbol
1	Rotating M/c(or) armature	
2	Bus	
3	Two winding power Transfomer	
4	Three winding power Transformer	
5	Delta connection (3Φ, 3 wire)	
6	Wye connection (3Φ, neutral un grounded)	
7	Wye connection (3Φ, neutral grounded)	

8	Transmission lines	
9	Static load	
10	Circuit Breaker	
11	Circuit Breaker (air)	
12	Disconnect	
13	Fuse	

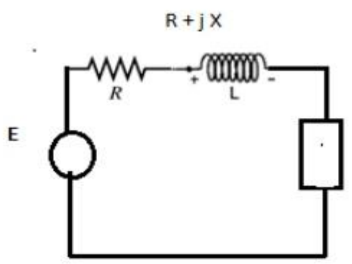
14	Capacitor	
15	Current transformer	
16	Potential transformer	
17	Lighting arrester	

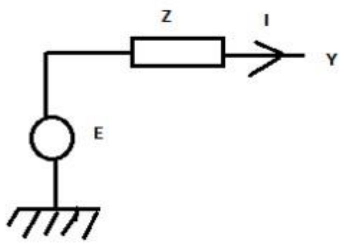
MODELING OF COMPONENTS FOR LOAD FLOW ANALYSIS

Generator model:

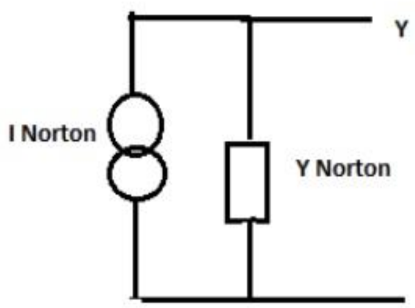
Generators

The thevenins equivalent circuit of the generator i.e. The voltage source in series with the thevenins equivalent impedance. Z = R + jX





The Norton form equivalent circuit of the generator i.e. the current source in parallel with the admittance



Transformer model

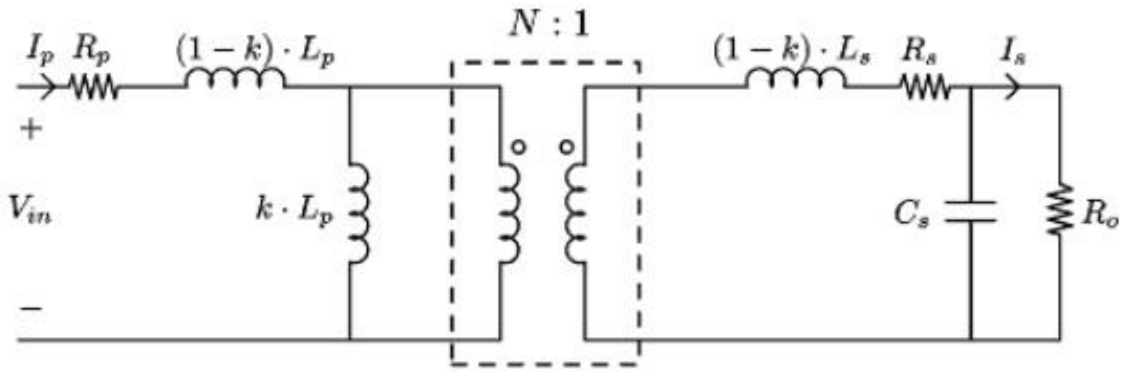


Fig. 5. Simplified model of a transformer.

Transmission system model

Transmission Line

Transmission line are modelled as

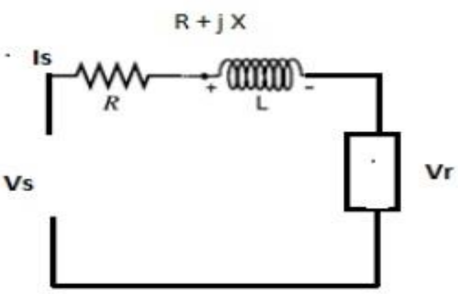
(i) Short line model

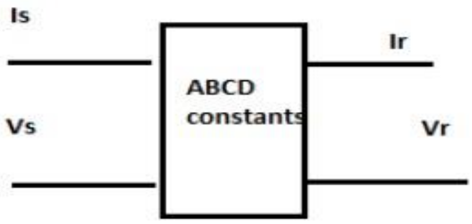
(ii) Medium line model

(iii) Long line model

(i) Short line model:

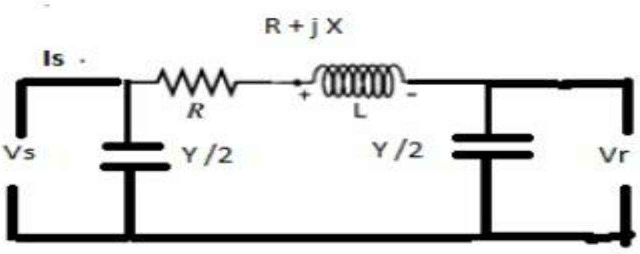
Resistance & inductance are assumed to be lumped





(ii) Medium line model (lines between 80 to 250km)

Resistance &inductance are assumed to be lumped &the total shunt admittance is divided in to two equal parts & placed at the receiving and sending ends.



$$\begin{bmatrix} Vs \\ Is \end{bmatrix} = \begin{bmatrix} A & B \\ C & D \end{bmatrix} \begin{bmatrix} Vr \\ Ir \end{bmatrix}$$

$X = L\omega$

$Y/2 = C\omega/2$

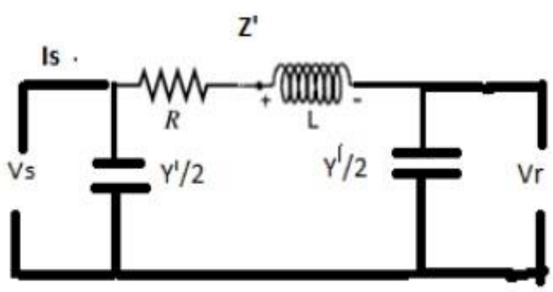
$A = 1+ZY/2$

$B=Z$

$C=Y(1+ZY/4)$

$D=1+ZY/4$

(iii) Long line model (lines above 250)



$Z' = Z \sinh\gamma L / \gamma L$

$Y'/2 = 1/Zc \tan h (\gamma L/2)$

$$\begin{pmatrix} Vs \\ Is \end{pmatrix} = \begin{pmatrix} \cosh \gamma l & Zc \sinh \gamma l \\ 1/Zc \sinh \gamma l & \cosh \gamma l \end{pmatrix} \begin{pmatrix} Vr \\ Ir \end{pmatrix}$$

Shunt Elements:

The shunt capacitor is connected to bus i. If S is MVAR rating of shunt capacitor. So is base MVA admittance P.u. Y P.u. = 0+jS/S0

Shunt reactors is connected to bus i. If S is MVAR rating of shunt capacitor. So is base MVA admittance P.u. Y P.u. = 0-jS/S0

Load representation

Load:

Load is represented by a constant power representation. Both MW (P) & MVAR (Q) – constant