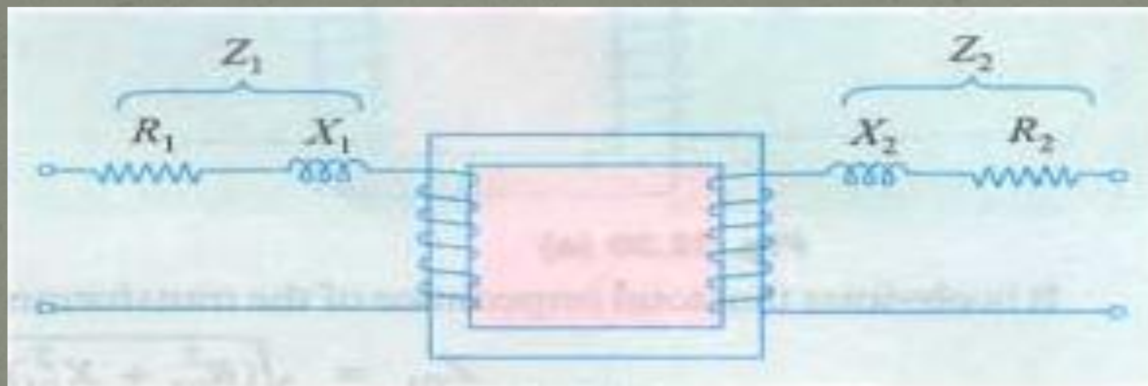
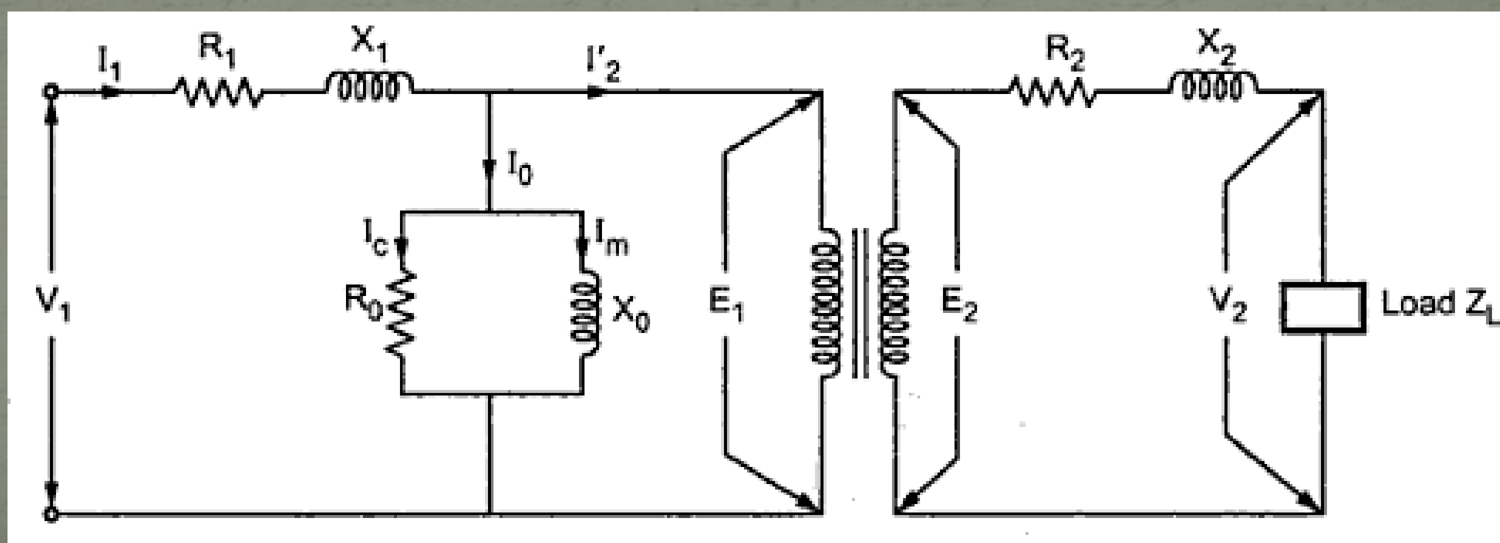
Equivalent circuit parameters referred to primary and secondary sides respectively





Contd.,

- The effect of circuit parameters shouldn’t be changed while transferring the parameters from one side to another side
- It can be proved that a resistance of R_2 in sec. is equivalent to R_2/k^2 will be denoted as R_2'(ie. Equivalent sec. resistance w.r.t primary) which would have caused the same loss as R_2 in secondary,

$$I_1^2 R_2' = I_2^2 R_2$$

$$R_2' = \left(\frac{I_2}{I_1}\right)^2 R_2$$

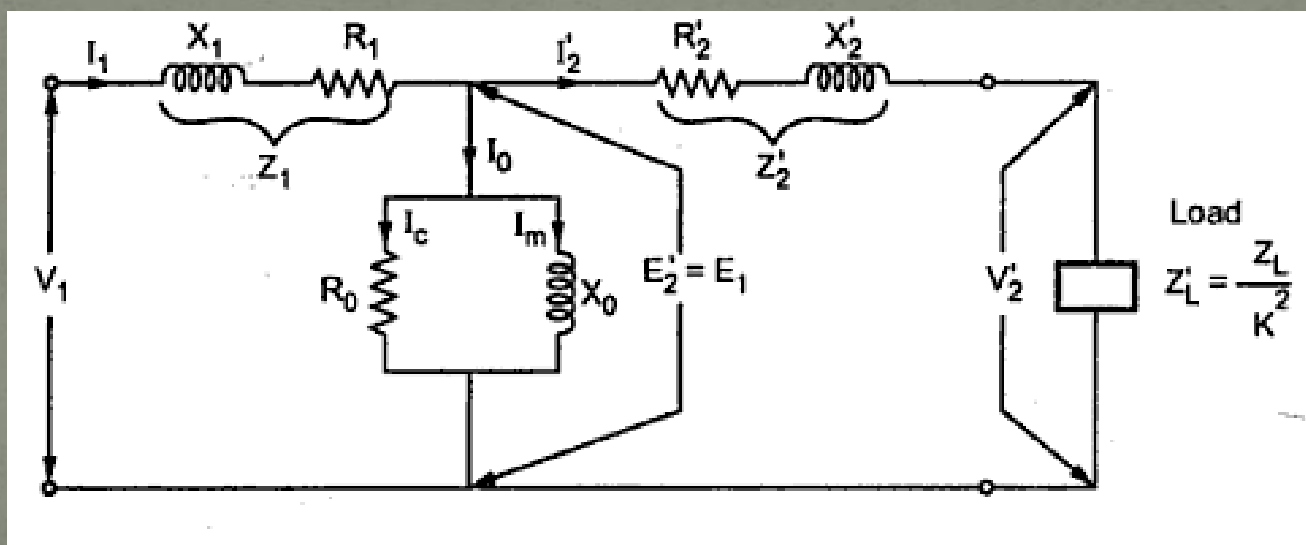
$$= \frac{R_2}{k^2}$$

Transferring secondary parameters to primary side

$$R_2' = \frac{R_2}{K^2}, \qquad X_2' = \frac{X_2}{K^2}, \qquad Z_2' = \frac{Z_2}{K^2}$$

While $$E_2' = \frac{E_2}{K}, \qquad I_2' = KI_2$$

where $$K = \frac{N_2}{N_1}$$



Exact equivalent circuit referred to primary

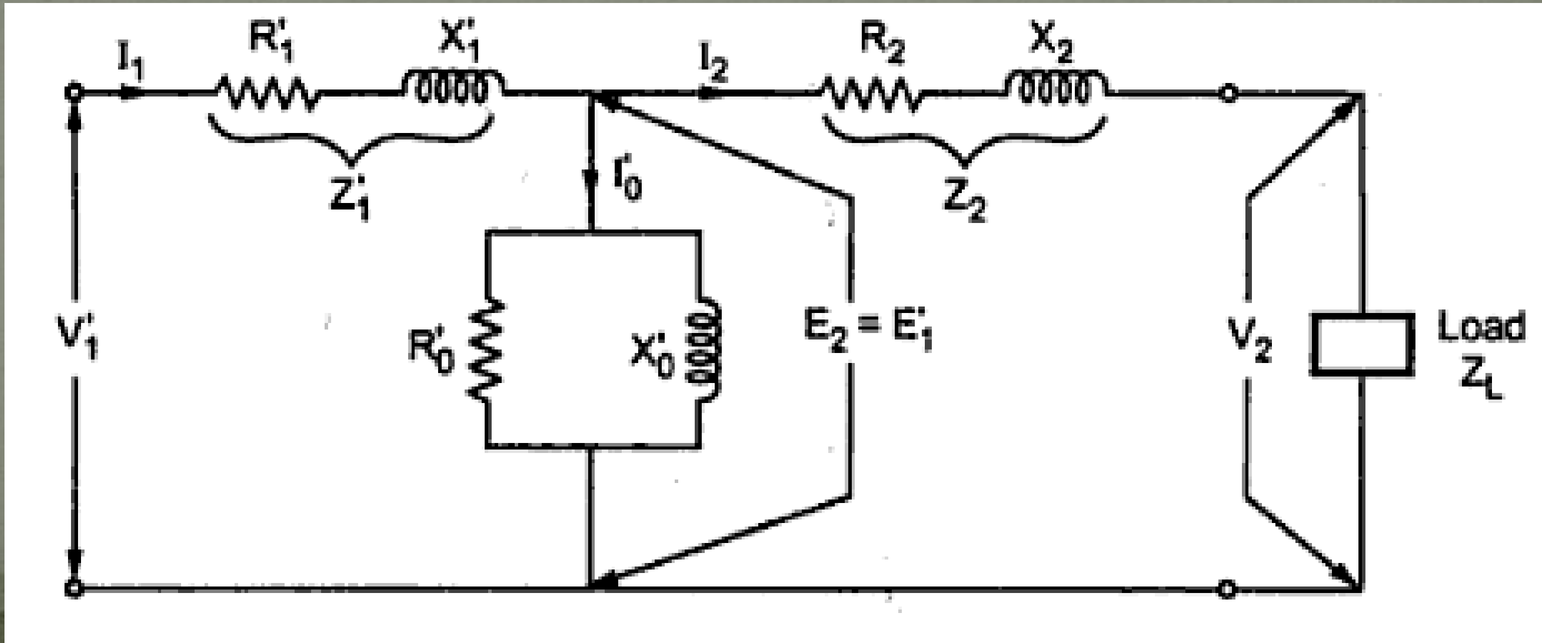
Equivalent circuit referred to secondary side

- Transferring primary side parameters to secondary side

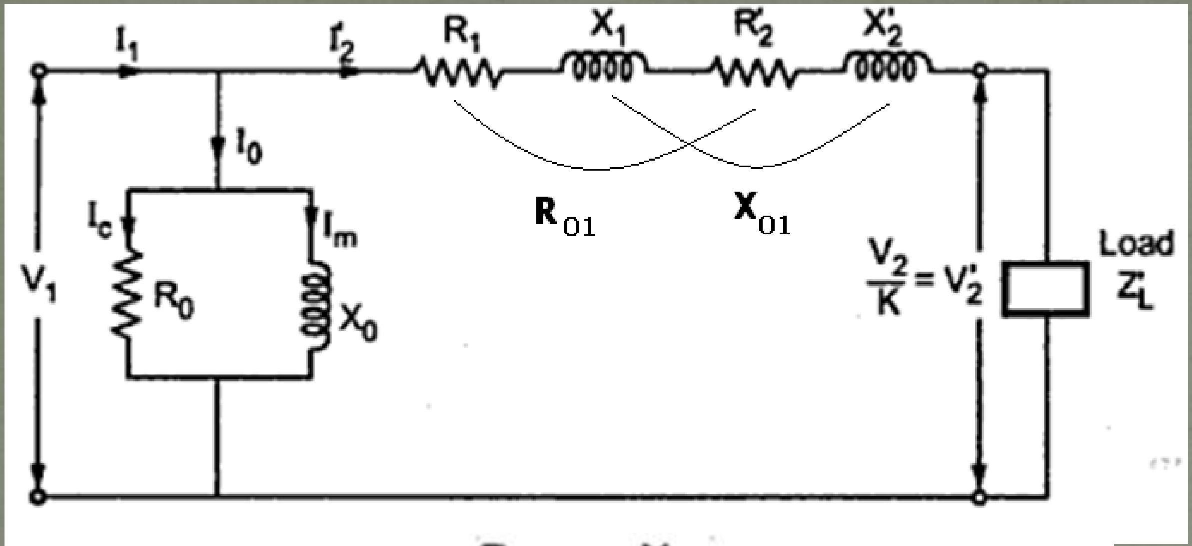
$$R_1' = K^2 R_1, \quad X_1' = K^2 X_1, \quad Z_1' = K^2 Z_1$$

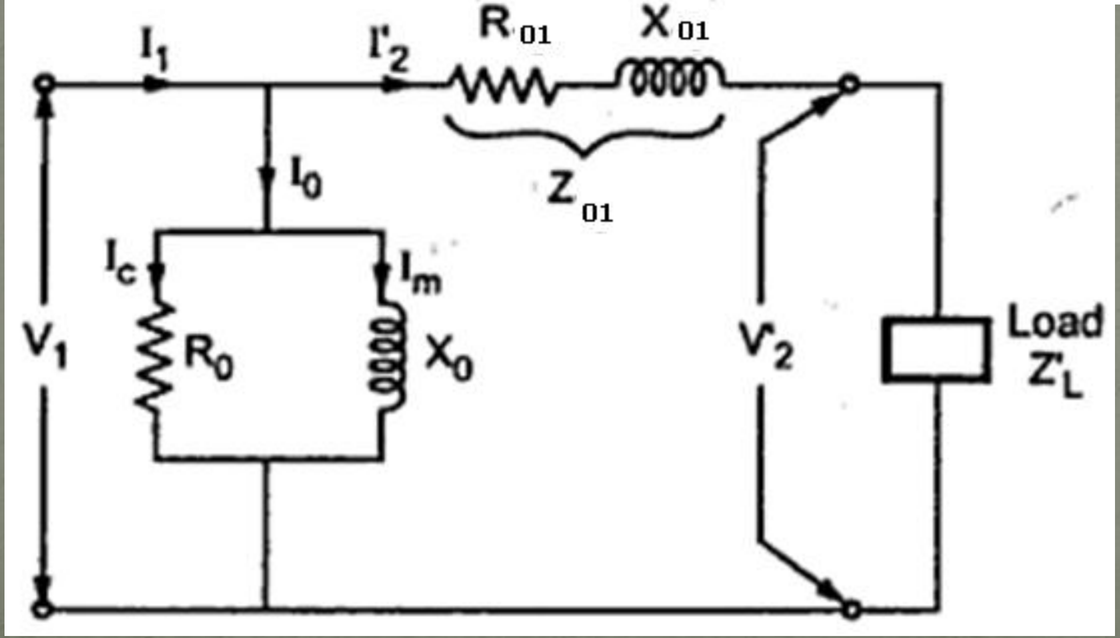
$$E_1' = K E_1, \quad I_1' = \frac{I_1}{K}, \quad I_0' = \frac{I_0}{K}$$

Similarly exciting circuit parameters are also transferred to secondary as R_o' and X_o'



equivalent circuit w.r.t primary





where

$$R_{01} = R_1 + R_2' = R_1 + \frac{R_2}{K^2}$$

$$X_{01} = X_1 + X_2' = X_1 + \frac{X_2}{K^2}$$

$$Z_{01} = R_{01} + j\,X_{01}$$

Approximate equivalent circuit

- Since the noload current is 1% of the full load current, the nolad circuit can be neglected