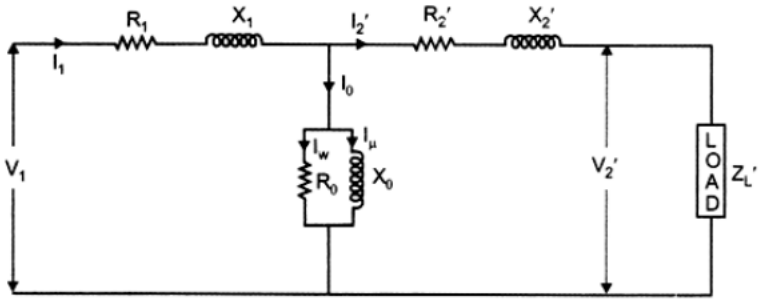
Equivalent circuit of a transformer referred to primary

If all the secondary parameters are referred to the primary side, we get the equivalent circuit of transformer referred to primary as shown in below.



$$R_2' = \frac{R_2}{K^2}$$

$$X_2' = \frac{X_2}{K^2}$$

$$I_2' = KI_2$$

$$Z_L' = \frac{Z_L}{K^2}$$

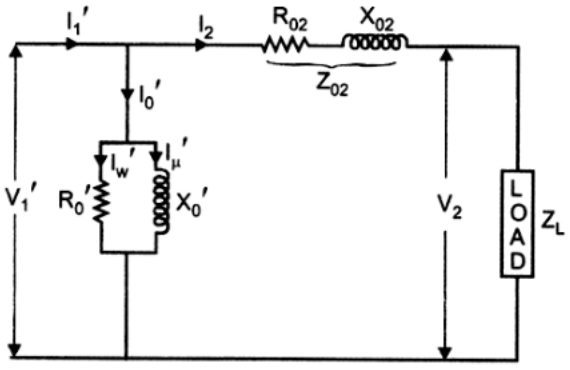
$$V_2' = \frac{V_2}{K}$$

$$R_o = \frac{V_1}{I_w}$$

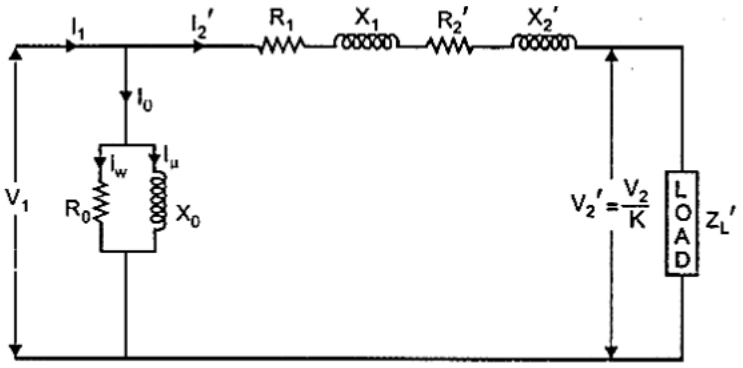
$$X_o = \frac{V_1}{I_\mu}$$

$$X_{02} = X'_1 + X_2 = X_1 K^2 + X_2$$

$$Z_{02} = \sqrt{R_{02}^2 + X_{02}^2}$$



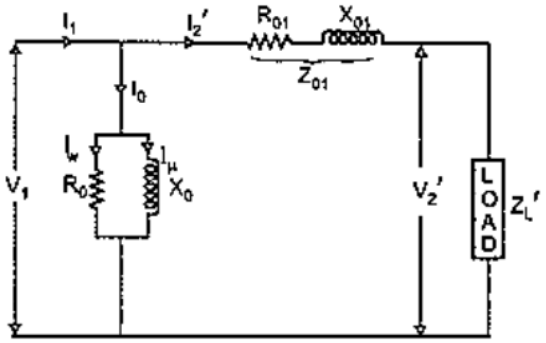
By transferring the exciting branch (R_o and I_1) to the left position of the circuit as shown in below fig. this circuit is known as approximate equivalent circuit.



The below fig shows R_1 and $R_2^{'}$ and X_1 and $X_2^{'}$. ie.,

$$R_{01} = R_1 + R_2^{'}$$

$$X_{01} = X_1 + X_2^{'}$$



$$Z_{01} = \sqrt{R_{01} + X_{01}}$$

The above fig shows all parameters referred to primary. Similarly the same fig shows all parameters referred to secondary.

$$R_{01} = R_1^{'} + R_2 = R_1K^2 + R_2$$