



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

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



19EET302/ POWER SYSTEMS – I

III YEAR / V SEMESTER

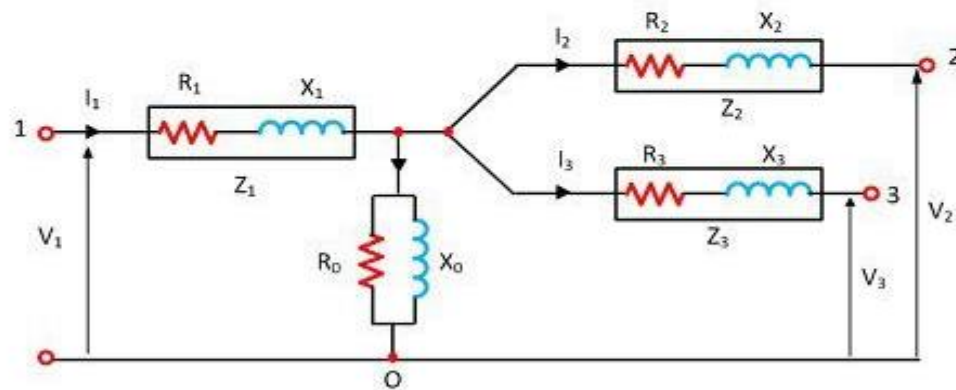
UNIT-II: POWER SYSTEM MODELLING

TRANSFORMERS: THREE-WINDING TRANSFORMERS, TAP-CHANGING IN TRANSFORMERS



Equivalent Circuit of a Three Winding Transformer

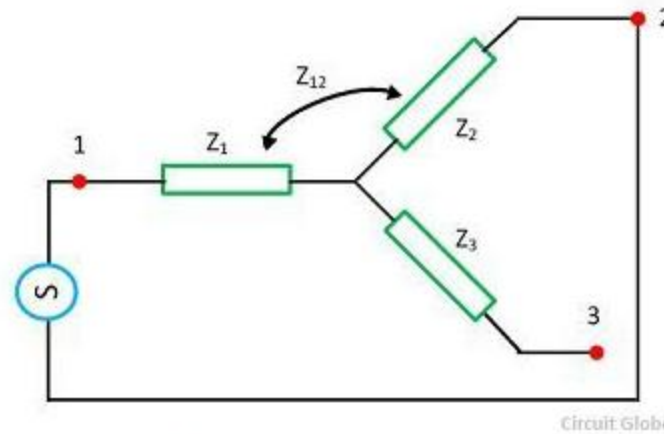
The equivalent circuit diagram of the three-phase transformer is shown in the figure. Consider the R_1 , R_2 and R_3 are the resistance and the X_1 , X_2 and X_3 are the impedance of their windings.



Equivalent Diagram of a 3-Winding Transformer

Circuit Globe

The V_1 , V_2 , V_3 are the voltages and the I_1 , I_2 , I_3 are current flows through their windings.



Solving equation (1), (2) and (3) we get the leakage impedance Z_1 , Z_2 and Z_3 all referred to as primary,

$$Z_1 = \frac{1}{2}(Z_{12} + Z_{13} - Z_{23})$$

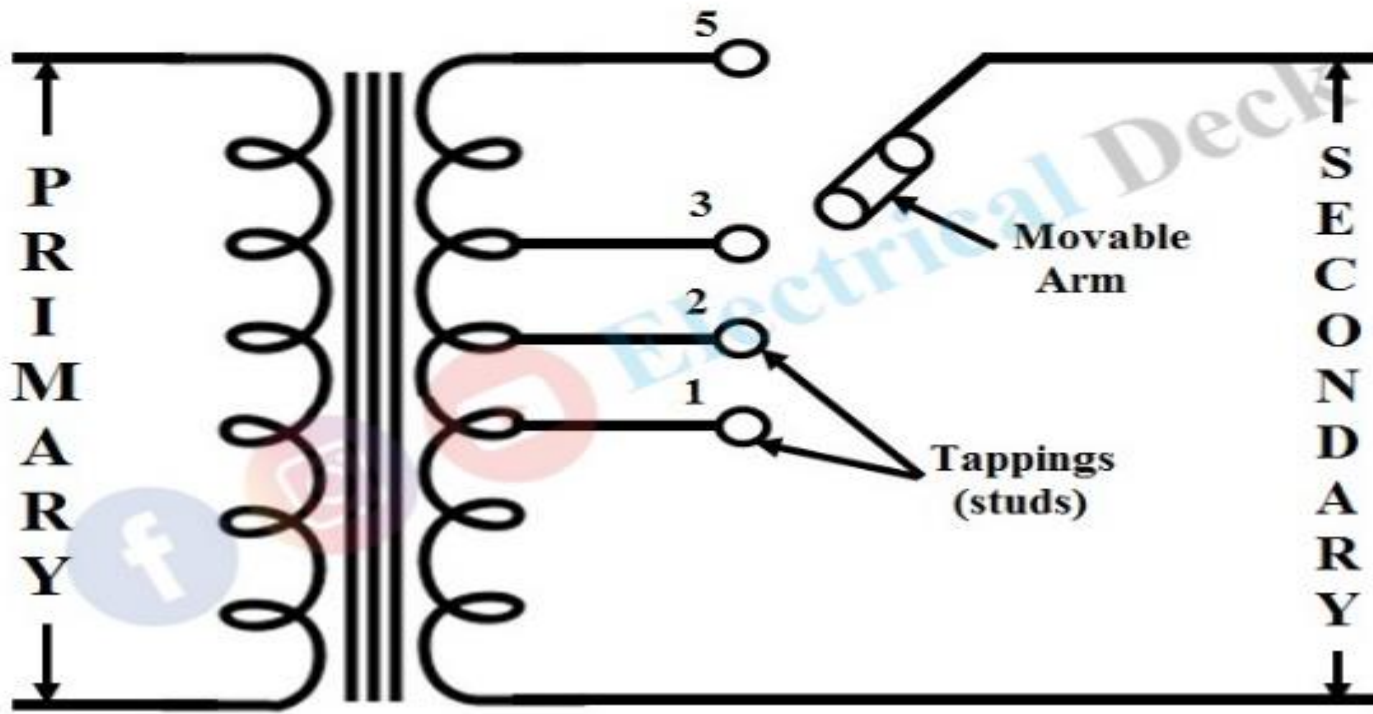
$$Z_1 = \frac{1}{2}(Z_{23} + Z_{12} - Z_{13})$$

$$Z_1 = \frac{1}{2}(Z_{13} + Z_{23} - Z_{12})$$



Off-Load Tap-Changing Transformer :

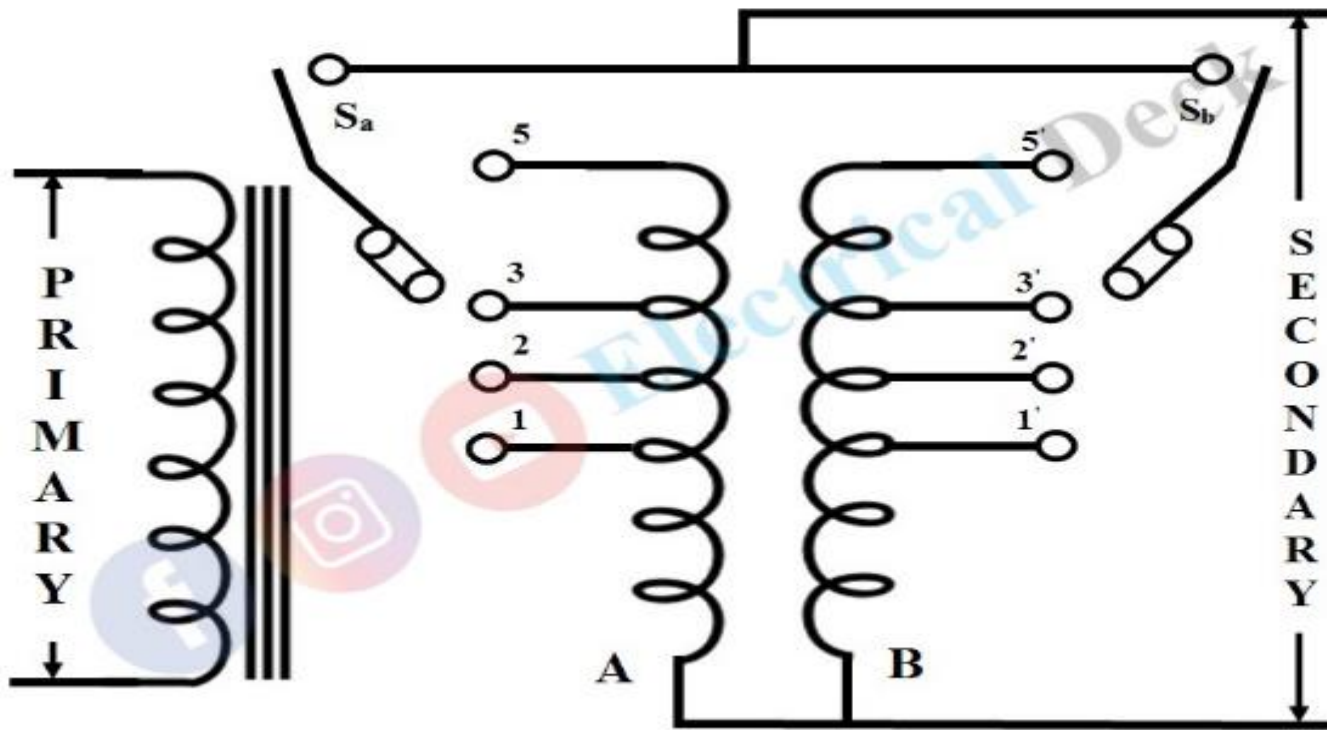
The below figure shows the off-load tap-changing transformer provided with tapplings (1 to 5) on the secondary winding. The position of the movable arm on the first stud will give minimum secondary voltage and on the fifth stud will give maximum voltage across secondary.





On-Load Tap-Changing Transformer :

The drawback of off-load tap-changing can be overcome by using a special arrangement of coil connections to the transformer known as the on-load tap-changing of the transformer. The transformer connection for on-load tap-changing is shown below.





RECAP....



...THANK YOU