



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

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19EET101 / BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING I YEAR / I SEMESTER

UNIT-II: ELECTRICAL MACHINES

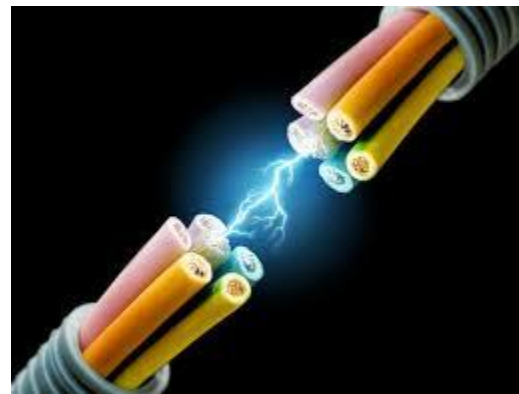
PRINCIPLE OF SINGLE PHASE TRANSFORMER



TOPIC OUTLINE



- ✓ Working Principle
- ✓ EMF Equation
- ✓ TYPES
- ✓ Applications



Transformer



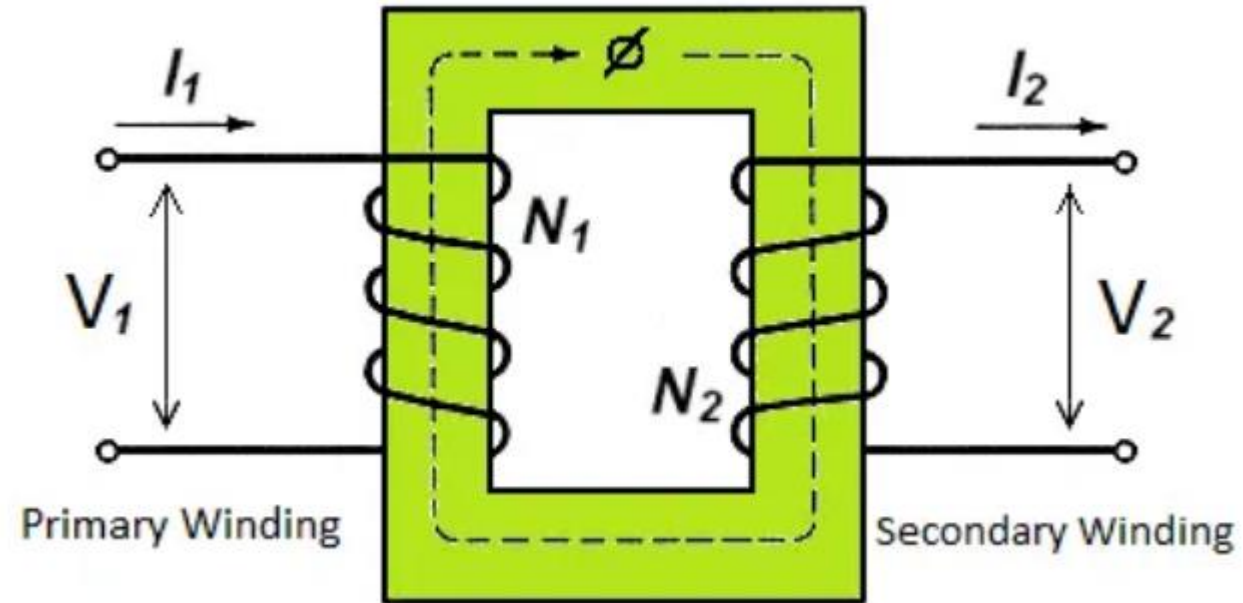
Transformer is a device which transfers electric power from one circuit to another circuit with Step up and step down the value of current and voltage without changing frequency.

Transformer is working on principle of Mutual Induction, it's state that

“MUTUAL INDUCTION IS DEFINED AS WHEN TWO COIL ARE PLACED TOGETHER AND PASSED CURRENT THROUGH THE ONE COIL WHICH PRODUCES THE MAGNETIC FLUX THAT FLUX LINK WITH ANOTHER COIL. HENCE THAT FLUX PRODUCED THE EMF IN ANOTHER COIL.”



Principle of Operation





Basic Construction:-



A simple two winding transformer consist of silicon steel core and two winding are placed on it. That two winding are electrically separate but magnetically link through a path of low reluctance as shown in fig.

The core is made from thin layer of silicon steel lamination to provide path of low reluctance to magnetic flux. the winding is connected to the supply mains that winding is called primary winding and which winding is connected to the load side that winding is called secondary winding. These both winding are connected by common magnetic flux.





EMF equation :-



$$E = 4.44 f \Phi_m N$$

where, Φ_m = Maximum Value of Flux in Core

f = Frequency of Supply

N = No. of Turns of Conductor

- Transformation ratio is given by :-

$$\frac{V_P}{V_S} = \frac{I_S}{I_P} = \frac{N_P}{N_S} = K \text{ (transformation ratio)}$$





Classification of Transformer :-

- According to construction.
 - 1.Core Type
 - 2.Shell Type

- According to supply.
 - 1.Single Phase
 - 2.Three Phase

- According to output voltage.
 - 1.Step-Up
 - 2.Step-Down

- According to application. (Instrumentation X'mer)
 - 1.Potential X'mer
 - 2.Current X'mer





Classification of Transformer :-



•According to commercial .

- 1.Power X'mer
- 2.Distribution X'mer

According to output voltage Two types of the transformer:-

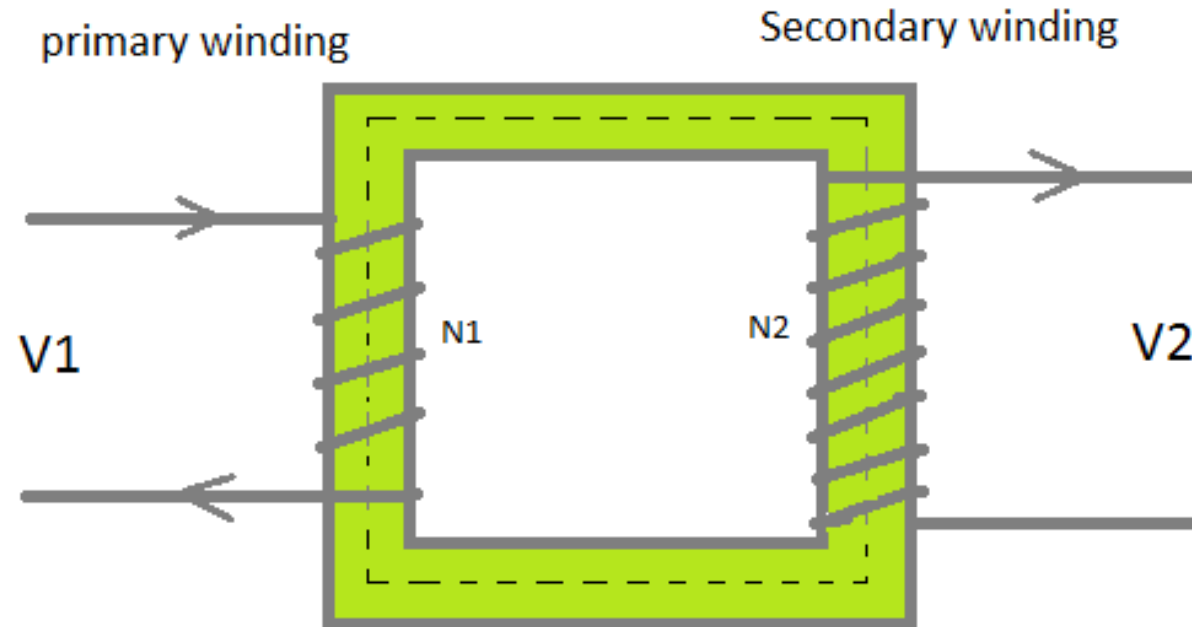
1.Step-Up Transformer :- Which is convert the low value of AC voltage in to high value of AC voltage.

2. Step-Down Transformer:- Which is convert the high value of AC voltage in to low value of AC voltage.





Stepup Transformer

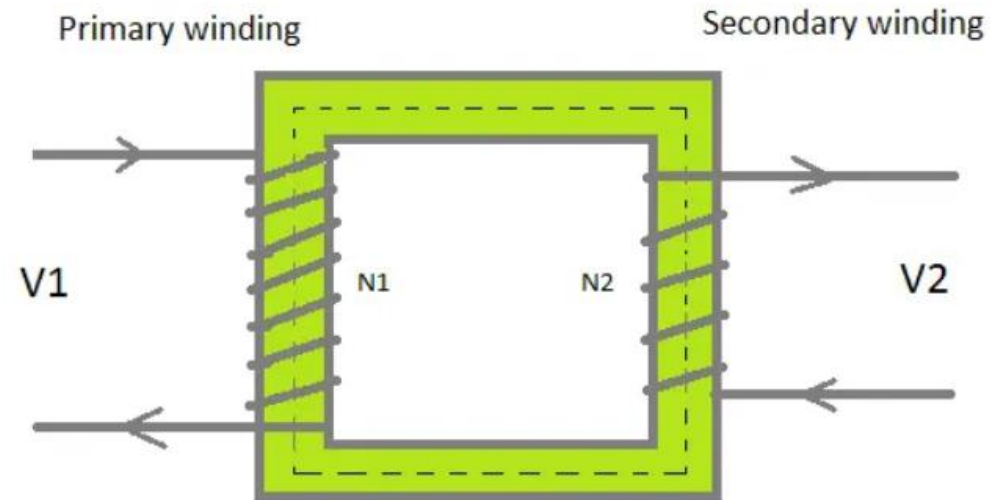


- **$N_2 > N_1$, $V_2 > V_1$, $I_2 < I_1$.**
- Then $K > 1$ is known as step-up transformer.





Step Down Transformer



- $N_2 < N_1$, $V_2 < V_1$, $I_2 > I_1$.
- Then $K < 1$ is known as step-down transformer.

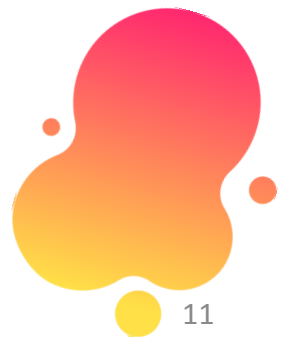




Applications



- ❖ To step-down long-distance signals to support both residential and light-commercial electronic devices.
- ❖ In television sets for voltage regulation.
- ❖ To step-up power in home inverters.
- ❖ To supply power to non-urban areas.
- ❖ The **transformer** used for impedance matching.
- ❖ The **transformer** used for isolate two circuits electrically.
- ❖ It is used to increase or decrease the alternating voltages in electric power **applications**.
- ❖ The **transformer** used in voltmeter, ammeters, protective relay etc.





PRINCIPLE OF OPERATION OF DC Transformer

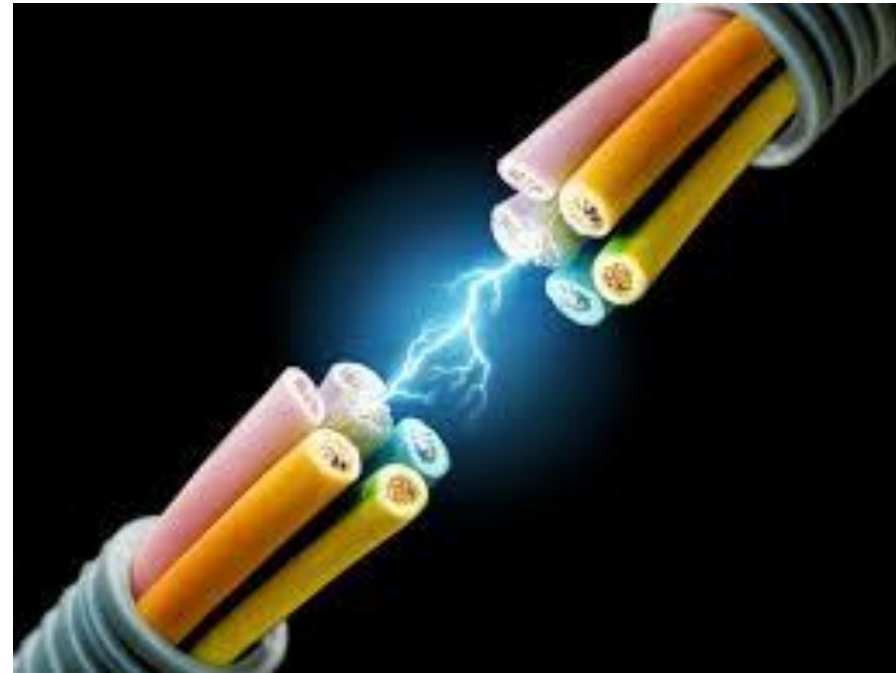


Video

<https://www.youtube.com/watch?v=hXLA5sdT9Cs>



RECAP...



...THANK YOU

