# Introduction to Transformer

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What is Transformer ?

- A transformer is a static piece of apparatus by means of which an electrical energy is transferred from one circuit to another circuit.
- There is no electrical contact between them.
- The desire change in voltage or current without change in frequency.
- It works on the principle of mutual induction.
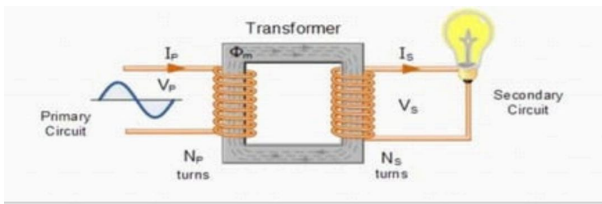
Principle of operation:
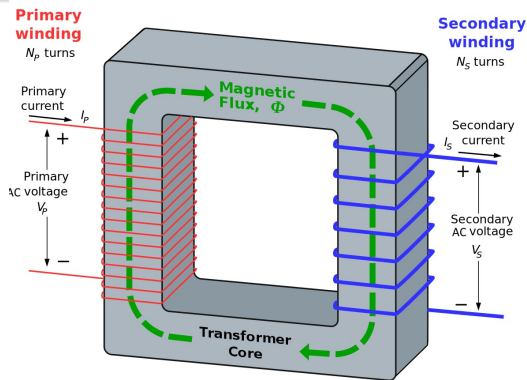
- The main principle of transformer is mutual induction formed between two coils.
- A transformer is basically an electromagnetic device that works on the principle of Faraday's law of induction by converting energy from one circuit to another.
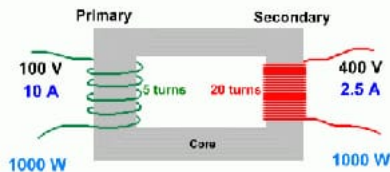
Classification of Transformer

1) Step Up Transformer:-

It converts a low voltage at high current to high voltage at low current. In this type of transformer, number of turns of secondary coil is greater than that in primary. i.e, Ns>Np

Step Up Transformer

Primary   Secondary

100 V   400 V
10 A   2.5 A
5 turns 20 turns
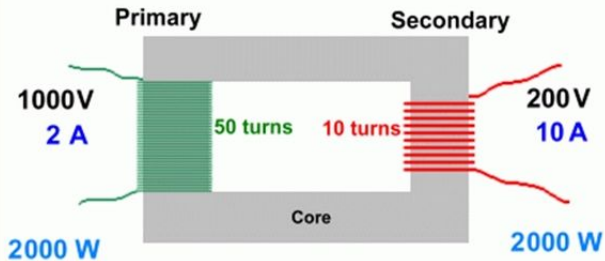Core
1000 W   1000 W

Here primary coil is made up of a thick insulated copper wire and secondary coil is made of thin insulated copper wire.

2) Step down Transformer:

It converts a high voltage at low current into a low voltage at high current. In this type of transformer, number of turns of secondary coil is less than that in primary. i.e, Ns<Np

Step Down Transformer

Primary   Secondary

1000V   200 V
2 A   50 turns   10 turns   10 A

Core

2000 W   2000 W

Here primary coil is made up of a thin insulated copper wire and secondary coil is made of thick insulated copper wire.

Application of Transformer:

- Isolation Process
- Filtering of DC component
- Stepping Up and Stepping down

Isolation Process

:- An isolation transformer is a transformer used to transfer electrical power from a source of alternating current (AC) power to some equipment or device while isolating the powered device from the power source, usually for safety reasons or to reduce transients and harmonics.
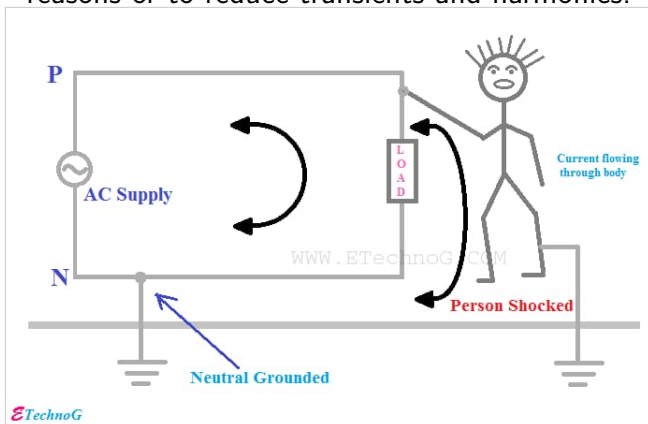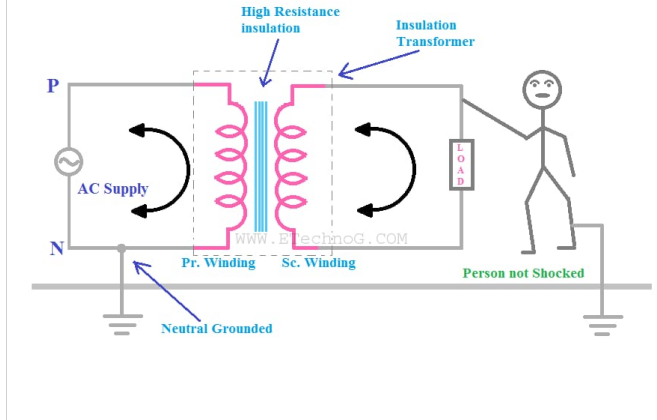
- There won't be any effect at the primary side(supply) due to any type of fault at load side.
- We are doing all these due to safety reasons.

Filtering of DC component:
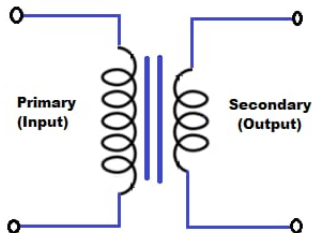
- Transformers works on Magnetic effect of Current. Since DC doesn't have any magnetic field, they will not get step-up or down.
- frequency=0; emf= -(d(fi)/dt)= 0 ; fi–>Flux
- you will get 0 voltage at the output. It is very simple, you will have no output.

Stepping Up and Stepping down:

- Step up Transformer:- In modern power system, electrical power is generated at voltage of 12 kv to 25 kv. Transformer will step up the voltage to between 110kv to 1000kv for transmission over long distance at very low cost.

- Step down Transformer:- The transformer will stepped down the voltage to 12kv from 34.5kv range for local distribution.