Outlines:-

- Introduction
- Working principle
- Construction
- Types of Transformer
- Transformer Auxillaries
- Poly phase transformer images
Introduction

- Transformer is an electrical device which transfers electrical power from one electrical circuit to another electrical circuit without change of frequency.
- Transformer can also step up or step down the voltage levels.
- Without transformer it is not possible to transfer electrical power from generating station to customer end.
- It is highly efficient electrical device.
WORKING PRINCIPLE

- Transformer works on the Faraday’s Law of Electro magnetic Induction same like induction motor.

- But in transformer there is mutual induction between primary and secondary winding.

- Basic construction of transformer is shown in below fig.
A transformer is shown with primary and secondary circuits. The primary circuit has a voltage $V_P$ and current $I_P$, with $N_P$ turns. The transformer core has a magnetic flux $\Phi_m$. The secondary circuit has a voltage $V_S$ and current $I_S$, with $N_S$ turns. The diagram illustrates the relationship between the primary and secondary circuits through the transformer.
BASIC CONSTRUCTION OF TRANSFORMER
Primary voltage

Secondary voltage

Voltage level changes but frequency i.e. time period \( T \) remains same
CONSTRUCTION OF POLY PHASE

[Diagram of a polyphase transformer with annotations for Oil conservator, Bushings, Tank, Radiator and fan, and Windings and core.]
Transformers are classified on basis of:

1. Duty they perform
2. Construction
3. Voltage output
4. Application
5. Cooling
6. Input supply
TYPES

Transformers

Based on Core
- Core Type

Based on transformer Ratio
- Shell Type
- Step up
- Step Down

Based on Service
- Distribution Transformer
- Power Transformer
CORE TYPE AND SHELL TYPE

Core type

Single phase

Three phase

Shell type
Voltage output:

- Step down transformer (Higher to Lower)
- Step up transformer (Lower to Higher)
- Auto transformer (Variable from ‘0’ to rated value)
1- PHASE TRANSFORMER

- Basic construction of single phase transformer

![Diagram of a single phase transformer with laminated cores, LV winding, HV winding, and sandwiched windings.](image)
TYPES

Duty they perform:

- Power transformer - from transmission and distribution
- Current transformer - instrument transformers
- Potential transformer - instrument transformers
POLY PHASE TRANSFORMER

- Poly phase transformer is generally used for transfer bulk electrical power requirement.
- Poly phase transformer are generally three types:
  - Station Transformer
  - Power transformer and
  - Distribution transformer
- Station Transformer
- Staterion transformer is used to provide electrical power to start generating station.
Power Transformer:

Power transformer is used to transfer bulk electrical power from generating station to distribution end.

This transformer has maximum efficiency compare to other transformer at full load.

It give approx. 99% efficiency at full load.
POLY PHASE TRANSFORMER

- Distribution transformer:-

- Distribution transformer is used to distribute electrical power from receive end to final consumer.

- It has law efficiency compare to other transformer.

- It has approx. 55 % efficiency.
POLY PHASE TRANSFORMER

- Station Transformer:-
POLY PHASE TRANSFORMER

- Power Transformer:-
POLY PHASE TRANSFORMER

- Distribution transformer:
There are auxiliaries provided in poly phase transformer for protection purposes as well as for efficient performance.

Following are the auxiliaries provided in poly phase transformer:

- Tank
- Conservator
- Breather
- Bucholz Relay
AUXILLARIES OF POLY PHASE TRANSFORMER

Tank:-

- It provide the mechanical support to the magnetic core as well as other auxiliaries like breather and conservator.

- Insulation oil or Di-electric oil is filled in the tank.

- It is made from the non-corrosive iron material.

- It can be visible from outside of transformer.
AUXILLARIES OF POLY PHASE TRANSFORMER

- Conservator (Expansion Tank):-
  - A small auxiliary oil tank mounted above the transformer and connected to main tank by a pipe.
  - Its function is to keep transformer tank full of oil.
LOCATION OF CONSERVATOR
AUXILLARIES OF POLY PHASE TRANSFORMER

- Breather:
  - It is a chamber which prevents entry of moisture inside the transformer tank.
  - It is filled with drying agent such as calcium chloride or silica gel.
  - This absorbs moisture and allows dry air to enter transformer tank. It is replaced regularly.
  - It can be identify by changes of colour. If there is moisture in oil then silica gel becomes pink colour from Blue colour.
LOCATION OF BREATHER
AUXILLARIES OF POLY PHASE TRANSFORMER

- **Bucholz Relay:**
  - First warning that fault is present is given by presence of bubbles in oil.
  - It gives an alarm in case of minor fault and to disconnect transformer.
  - From the supply mains in case of severe faults.
  - Bucholz relay is used above 100 KVA rating transformer.
LOCATION OF BUCHOLZ RELAY
IMAGES OF POLY PHASE TRANSFORMERS
IMAGES OF POLY PHASE TRANSFORMERS
Thank you!