

ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS

UNIT 2

Instrument Transformers

Construction Potential Transformer

Basically a Potential transformer (PT) is a two winding transformer. The primary is connected with high voltage and has more number of turns and the secondary which has less number of turns, steps down the voltage between 110 V to 120 V. The core of the transformer is a shell type. The low voltage winding (secondary) is wound first around the core of the transformer to reduce the size of PT.

Construction Potential Transformer

The insulation is placed in between the L.V. winding and H.V. winding and finally high voltage winding is placed around the core. The P.T.'s which are used up to 6.6. KV are of DRY type and the other of higher ratings are generally oil immersed type.

Construction Potential Transformer

The few important points are kept in mind :

1. The output of PT's is very small and the size of PT is comparatively large, so there is no problem of temperature.
2. The size of the core of the PT is larger as compared to power transformers.
3. The material of core should be of high permeability to reduce the iron losses or to reduce the ratio error and phase angle error.

Construction Potential Transformer

The few important points are kept in mind :

4. The primary and secondary windings are co axial to reduce the leakage reactance.
5. There is no danger, if the secondary side of PT is left open circuited.
6. Usually, cotton tape and varnished are used as insulation. Hard fiber Separators” are also used in between the coils.

Phase Diagram of PT

In the phase diagram, E_2 is the induced e.m.f. in the secondary and V_2 is the secondary terminal voltage.

$$V_2 = E_2 - I_2 R_2 \cos \varphi_2 - I_2 X_2 \sin \varphi_2$$

The primary induced e.m.f. , E_1 is in phase opposite to the secondary induced e.m.f. E_2 .

Phase Diagram of PT

