RAMA UNIVERSITY

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FACULTY OF ENGINEERING & TECHNOLOGY

Electrical Machine-1

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Conditions for parallel operation

When two or more transformers run in parallel, they must satisfy the following conditions for satisfactory performance.

These are the conditions for parallel operation of transformers.

1. Same voltage ratio of transformer.
2. Same percentage impedance.
3. Same polarity.
4. Same phase sequence.

Difference Between Power Transformer and Distribution Transformer

The difference between the two transformers is given below:

POWER TRANSFORMER

VERSUS

DISTRIBUTION TRANSFORMER

Criterion	Power transformer	Distribution transformer
Definition	Stepping up the voltage for efficient transmission	Stepping down the voltage in order to be consumed
Specifications	Higher voltages, and commonly rated above 200 MVA	Middle to lower voltage ranges, and commonly rated below 200 MVA
Efficiency	Operating at maximum efficiency (100 %)	Around 60 - 70 %
Size	Larger and heavier	Smaller compared to power transformer
Losses	More constant, optimal losses at full load operation	Fluctuating, optimal losses when operating around 75 % of full load
Winding connection	Primary winding connected in star, secondary in delta	Primary winding connected in delta, secondary in star

Cooling of Transformer and Methods of Cooling

Cooling of Transformer is the process by which heat generated in the transformer is dissipated or treated to the safe value. This is achieved by various cooling methods of transformer available. The major factor for the generation of heat in the transformer is the various losses like hysteresis, eddy current, iron, and copper loss. Among all the various losses the major contributor of the heat generation is the copper loss or I^2R loss. The various coolants used for the cooling purpose of the transformer are air, synthetic oils, mineral oils, gas, water.

Basically, there are two types of transformer one is the dry type, and another one is oil-immersed type. For the cooling of transformers, the following cooling methods listed below are used.

1. Air Natural
2. Air Blast or forced
3. Oil Natural Air Natural
4. Oil Natural Air Forced
5. Oil Forced Air Forced
6. Oil Natural Water Forced
7. Oil Forced Water Forced