Energy Estimation and Audit

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1Q) Explain the Construction of transformer.

A) A transformer is an Electrical device used to transfer Electrical Energy between two or more Circuits through Electromagnetic Induction.

1) Core: The Core is usually made of ferromagnetic materials like Silicon Steel to Enhance magnetic properties and minimize losses.

2) windings: 1) primary 2) Secondary 3) Insulation.

3) Insulating materials: used to seperate the windings and insulate the Core.

4) Tank or Enclosure: A tank is used to house the Core and windings.

5) Cooling System: Larger transformers may have additional Cooling Systems to despite heat.

6) Tap Changer: Adjust the voltage output by altering the turns ratio.

7) Terminal and Bushings: Bushing insulate the Connections from the tank and allow Electrical Conductors.

When Ac. Voltage is applied to the primary winding, it Creates a time varying magnetic field in the Core. This magnetic field induces a voltage in the Secondary winding through Electromagnetic Induction.

2) Describe the different losses in the transformer?

A) transformers experience several types of losses during operation which can effect their efficiency.

1) Core losses (iron losses):

i) hysteresis loss: Caused by the magnetization and demagnetization of core material as the magnetic field alternates.

ii) Eddy Current Loss: Induced currents circulate within the core material due to change in magnetic field.

2) Copper losses (winding loss): Copper losses occurs due to the resistance in the windings.

3) Stray losses: Stray losses can be minimized through proper design and placement of the transformer components.

4) Dielectric losses: Dielectric losses result in energy dissipation as heat within the insulation.

5) other losses:

a) temperature

b) Sound losses.

total losses = Core loss + Copper losses + Stray losses + Dielectric loss