OM ENGINEERING COLLEGE

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DEPARTMENT OF ELECTRICAL ENGINEERING

Industrial Training Report

13th February 2016

At

Universal Transformer Maintenance & Repairing

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CONTENT

ACKNOWLEDGEMENT

We are gladly & thankful to Director as well as Principal, Dr. V.N Jasani and Head of the Departments Prof. M. M. Baraiya and our faculties who give us a great guidance regarding training and instruct us the importance of training in electrical field. So we decided to take Training in Universal Transformer & Repairing.

We are especially thankful to respected owner of this unit because they granted us permission for taking visit and assistant engineers of this unit (Mr.Sanjay Pachani) who gave the proper guidance to us and gave practical based approach learning to us.

GENERAL INFORMATION

The Universal Transformer Maintenance and repairing is the unit of repair the PGVCL's faulty transformer and test after repair the transformer.

Generally the transformer working on demand load, but the transformer design on maximum load. When the Connected load is over the maximum load that time possibility of burned out of transformer winding is high.

The Unit is replace the burned winding and other burned- out part of transformer and fill up the transformer fresh oil.

After repair the transformer they perform below tests

1) Open Circuit tests
2) Short Circuit test
3) Turn Ratio Test

PURPOSE OF VISIT

Our main purpose for this visit is to be familiar with industrial environment and to get practical knowledge of Construction of Transformer, Repairing of Distribution Transformer and transformer testing. one other purpose is how we can decide our 8-semester project on industrial based (IDP).

WHAT WE LEARN?

On 13th Feb. ,2016 (Saturday) at 10:00 am we reached at savarkundla.

When We Reached, we saw many distribution transformer are there in faulty condition.

At the beginning the assistant engineer explained general knowledge of Basic transformer construction and working.

Then learn different parts of transformer like….

❖ Type of Transformer

(1) Core type transformer

In core-type transformer, the windings are given to a considerable part of the core. The coils used for this transformer are form-wound and are of cylindrical type. Such a type of transformer can be applicable for small sized and large sized transformers. In the small sized type, the core will be rectangular in shape and the coils used are cylindrical. In the case of circular cylindrical coils, they have a fair advantage of having good mechanical strength. The cylindrical coils will have different layers and each layer will be insulated from the other with the help of materials like paper, cloth, mica board and so on.

(2) Shell Type Transformer

In shell-type transformers the core surrounds a considerable portion of the windings. The coils are form-wound but are multi layer disc type usually wound in the form of pancakes. Paper is used to insulate the different layers of the multi-layer discs.

➢ Outer Parts Of Transformer

❖ Yoke

It is use to protect the transformer inner part to bad environment condition.

❖ Buchholz Relay

it is a very sensitive gas and oil operated instrument which safely detect the formation of gas or sudden pressure inside the oil transformer. It is a electrical and mechanical both type operated device. Electrical type relay is vary accurate as compare to mechanical type relay.

❖ Conservator Tank

This is a cylindrical tank mounted on supporting structure on the roof of the transformer's main tank. When transformer is loaded, the temperature of oil increases and consequently the volume of oil in the transformer gets increased. Again, when ambient temperature is increased, the volume of oil is also increased. The conservator tank of a transformer provides adequate space for expansion of oil. Conservator tank of transformer also acts as a reservoir of oil.

❖ Oil Level Indicator

It is used to show the oil level in the transformer.

❖ Breather

When the temperature changes occur in transformer insulating oil, the oil expands or contracts and there an exchange of air also occurs when transformer is fully loaded. When transformer gets cooled, the oil level goes down and air gets absorbed within. This process is called breathing and the apparatus that pass through the air is called breather**.** Actually, silica gel breathers controls the level of moisture, entering electrical equipment during the change in volume of the cooling medium and airspace caused by temperature increasing. So it sucks the moisture from the air which is taken by transformer so that dry air is taken by transformer.

❖ Winding Temperature Indicator

Used to show the temperature of transformer winding.

❖ Cooling Fans/Radiator

These are used for cooling of the transformer oil. The capacity of the transformer is dependent to its temperature that is why it is imperative for it to have a cooling mechanism for better performance and higher efficiency.

❖ System Ground Terminal

system ground terminals in a power transformer are usually present whenever the connection type of the transformer windings has in it. This terminal can be found in-line with the main terminals of the transformer.

❖ Drain Valve

can be usually found in the bottom part of the transformer tank. Drain valves are used whenever oil replacement is necessary. Through this valve, the replacement of oil in an oil-filled transformer can be easily done simply by opening this valve like that of a faucet.

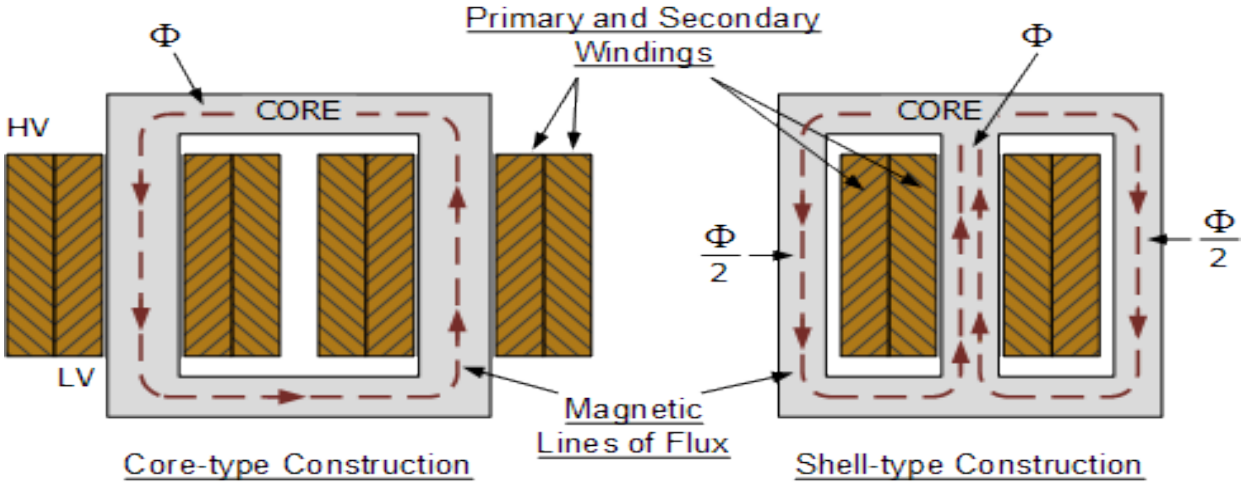
➢ Inner Parts Of Transformer

❖ Core

Core is used to support the windings in the transformer. It also provides a low reluctance path to the flow of magnetic flux. It is made up of laminated soft iron core in order to reduce eddy current loss and Hysteresis loss.

The composition of a transformer core depends on such factors as voltage, current, and frequency. Diameter of the transformer core is directly proportional to copper loss and is inversely proportion to the iron loss. If diameter of the core is decreased, the weight of the steel in the core is reduced which leads to less core loss of transformer and the copper loss increase. The vice versa happen when the diameter is increased.

Generally the core is made by many single strip (Width 0.5 to 0.6-mm).Because the eddy current loss. stripe is made up of aluminum and silicon composite material.



❖ Primary Winding (HV-Winding)

Generally in primary winding has low current and high voltage winding. Primary Windings (HV Winding) are made up of copper coil. The number of turns in it is the multiple of the number of turns in the low voltage windings. It has copper coils thinner than that of the low voltage windings.

Primary Winding is placed on secondary winding because of insulation purpose.

❖ Secondary Winding (LV-Winding)

Generally the secondary winding has high current and low voltage winding. Low voltage winding has lesser number of turns than that of the high voltage windings. It is made up of the thick copper conductors. This is because the current in the low voltage windings is higher than that of high voltage windings.

. The secondary winding are placed between core and primary winding.

❖ Transformer Oil

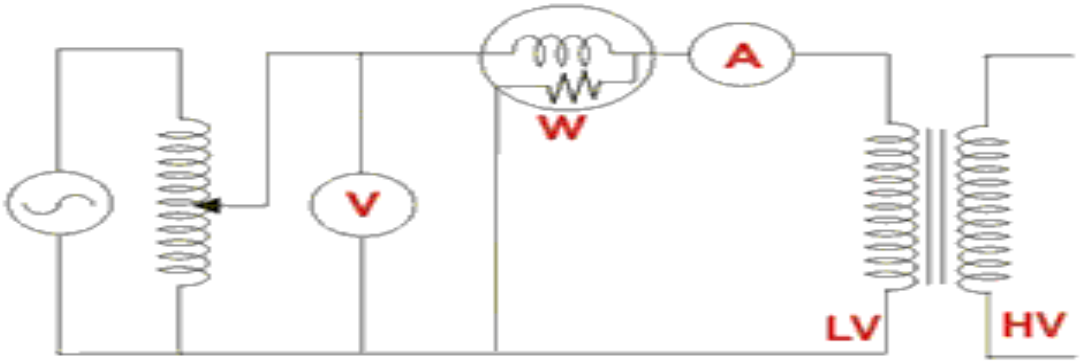
Transformer oil performs two important functions of insulation as well as cooling for the core and coil assembly. Core and windings of the transformer must be completely immersed in the oil. Normally hydrocarbon mineral oils are used as transformer oil.

➢ Type of Testing

❖ Open Circuit Test

Mainly Open circuit test is perform to find out the transformer losses. A voltmeter, wattmeter, and an ammeter are connected in LV side of the transformer. The voltage at rated frequency is applied to that LV side with the help of a variac of variable ratio auto transformer. The HV side of the transformer is kept open. Now with the help of variac, applied voltage gets slowly increased until the voltmeter gives reading equal to the rated voltage of the LV side. After reaching at rated LV side voltage, all three instruments reading (Voltmeter, Ammeter and Wattmeter readings) are recorded. This reading is shows that losses of transformer.

Below fig. shows that open circuit test diagram.



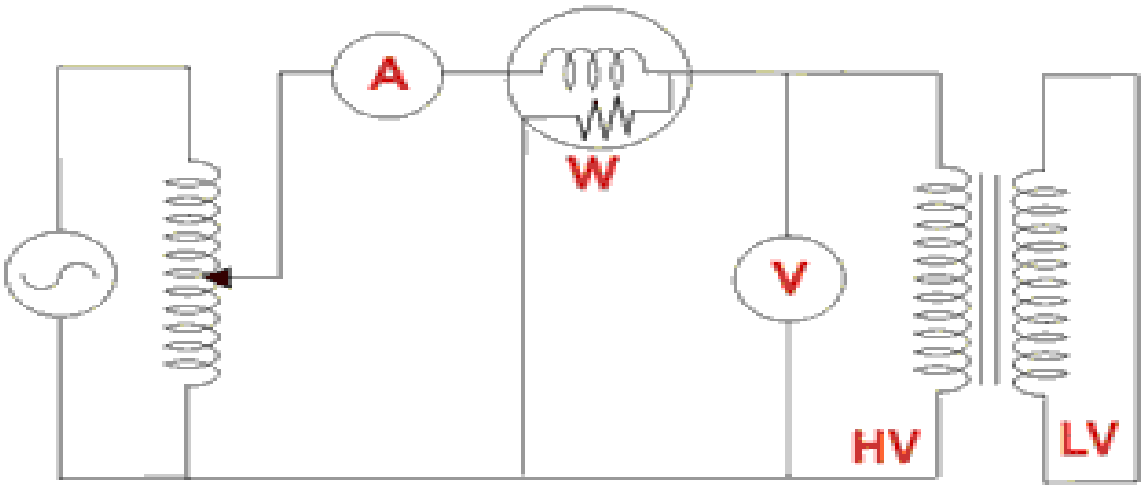
Open Circuit Test on Transformer

❖ Short Circuit Test

The LV side of the transformer is short circuited. Now with the help of variac applied voltage is slowly increased until the ammeter gives reading equal to the rated current of the HV side. After reaching at rated current of HV side, all three instruments reading (Voltmeter, Ammeter and Watt-meter readings) are recorded. The ammeter reading gives the primary equivalent of full load current . As the voltage applied for full load current in short circuit test on transformer is quite small compared to the rated primary voltage of the transformer, the core losses in transformer can be taken as negligible here.

As the transformer is short circuited, there is no output, hence the input power here consists of copper losses in transformer.

Below fig. shows that short circuit test diagram.



Short Circuit Test on Transformer

CONCLUSION

From this visit, we got the information and practical knowledge about Distribution Transformer . We got the knowledge about different outer and inner part of transformer like core, winding, relay and different type of transformer testing. They got the idea how to find out transformer fault and how to solve it, and also see that how change transformer oil and winding. Then we learn the importance of core design in transformer that core design is important to improve transformer efficiency. Then after we see that how to purify the transformer oil with the use of oil filter. Then we see that winding placed in core then core is put in industrial oven in 2 to 3 days (85` to 90 ` c).

THANK YOU

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