

Design and fabrication of a Single-phase 1KVA Transformer with automatic cooling system

Rahul Turkar¹, Rahul Shahare², Prashant Sidam³, Vijay Giradkar⁴, Avinash Patil⁵, Priya Sarode⁶

Department of Electrical Engineering, Nagpur Institute of Technology, Nagpur(441501), India.

Abstract: This paper presents a method for the design of shell type, single phase distribution transformers to obtain the manufacturing specifications. This transformer have two output voltages it convert from 230V to 115V and 120V. There are without providing any tapping on the transformer. Here is a simple temperature sensor Circuit are use to sensing the temperature with the help of including temperature sensor, automatically switch ON and off the dc fan are start and stop according to the temperature increase and decrease. This project uses IC LM358 is used as a Voltage Comparator, it compares two input voltages at pins 2 and 3. The basic working principle of temperature controlled DC fan is based on the thermistor and provides protection from overheating of Transformer. Air blast cooling method is used in transformer.

Key words: Transformer ,Transformer protection, Temperature sensor

1. INTRODUCTION

The transformer is probably one of the most useful electrical devices ever invented. It can change the magnitude of alternating voltage or current from one value to another. They also have a very high efficiency as high as 99%. When search for the same during this period then got the information about winding and maintenance. The transformer is a static device which is use to transfer electrical energy from one ac circuit to another ac circuit, with increase or decrease in voltage/current but without any change in frequency. Temperature controlled DC fan is a temperature based fan. It can cool the devices by operating a DC fan when the temperature in its vicinity increases above the preset level. Its operation is fully automatic and turns off when the temperature returns normal.

1.1 Need of Transformer

In most of the cases, appliances are manufactured to work under some explicit voltage. Transformer is used to adjust the voltages to a proper level. The transformer is the basic components for the transmission of the electricity.

Transformer is use to increase the voltage at the power generating station (step up) and to decrease the voltage (step down) for house hold persistence. By increasing the voltages the loss of the electricity in the transmission purpose in minimalize.

1.2 Hardware requirement

- Bobbin
- Winding Machine
- Copper wire
- Stamping(E & I Shape)
- Transformer Clamp
- Resistor (4.7K Ω)
- Op Amp (LM 358)
- Transistor (BC 548)
- 9V DC Battery
- 5V DC Fan
- NTS Thermistor (4.7k Ω)
- Potentiometer (4.7k Ω)

1.3 THE TRANSFORMER DESIGN PROBLEM

A. Design Considerations and limitations:

In a design, a concept is given shape with the application of science, technology and invention to realization of a machine so as to content required performance and characteristics. A design process is not merely engineering calculations but involves careful considerations of the design base, conditions, design transfer and information updating.

Knowing the characteristics and specifications that a transformer has to satisfy, the main areas of design include:

- Magnetic circuit; core, window etc.
- The electric circuit; the windings.
- The insulation.
- The mechanical construction.

The designer's work lies in properly allocating the space to frame, core, air gap, windings, insulation and cooling circuit in the transformer. Moreover economy in manufacturing costs, operating and running costs are also kept in vision.

Limitations are imposed on design because of:-

- Saturation of magnetic parts.

