PARALLEL OPERATION OF TRANSFORMER AND LOAD SHARING USING MICROCONTROLLER

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***Abstract*:The transformer isan important part of the power system. They are used to convert power from one level to another level statically. Also, they are quite costly in terms of maintenance and repair and if not operated underrated conditions or in a proper manner then it may degrade the efficiency of the entire system.The design and principle of the project aim for achieving more efficiency, optimum loading of a transformer by load sharing or Parallel operation monitored and controlled by a microcontroller-based kit, it implies the basic principle of operation in parallel and load sharing between them the online parameter is monitored by the microcontrollerusing a specified sensor.Depending upon the load parameter and infeed current and voltage condition the microcontroller will of wisely to do load sharing.**

Keywords:Transformer,microcontroller,sensing unit,Wi-Fi module.

1. INTRODUCTION:

The transformer is a static device that converts energy at one voltage level to another voltage level it is electrically isolated inductively coupled device which changes voltage level without a change in frequency. Transformer transfer ac voltage from one electrical circuit to another by the principle of mutual induction, therefore monitoring and controlling of key parameterslike voltage and current is necessary for evaluating the performance of the transformer. Transformeris one of the most significant equipment in electrical power system, needs protection as a part of the general system protection approach moreover on overloading the transformer voltage Regulation may increase and power factor drops the project is all about protecting the transformer under overloads condition this can be done by connecting another transformer in parallel through an microcontroller and a relay which shares the excess load of the first transformer, therefore, two transformers worked efficiently under overload condition and damage can be prevented

2. LITERATURE REVIEW:

Background study:

All the details regarding the design of the transformer all types of classification and theoretical aspects regarding a transformer theory is been taken and studied from (1)

The information regarding switchgear and protection scheme were studied and all the data regarding the same were studied from (2)

All related work and data for technical ratings, pin diagram, hardware details. Architecture and specification with all software and programming support is been studied and applied from (3)

Theories related to protection schemes such as overcurrent, earth fault, unit protection, relay setting, relay testing and all other theories required forprotection practices for a three phase transformer is referred from (4)

An intelligent method for load sharing of transformer with temperature monitoring and automatic correction of power factor is been studied from (5)

3. WORKING PRINCIPLE: We have designed a kit for automatic switching of a transformer in parallel operation for load sharing phenomenon if a load is increased. The load is supplied from a single transformer under normal condition and a standby transformer is connected in parallel through a relay. The data regarding the online parameter are sensed

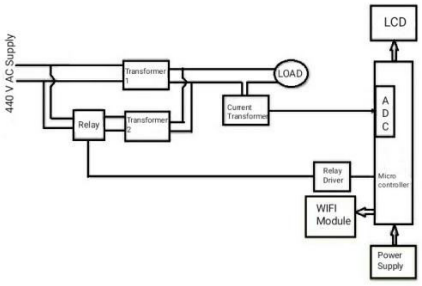
by CT for current measurement. CT converts the high current to the required current level i.e. 10 to 50mA. Then the current from CT is rectified using a diode and infeed to the microcontroller. For voltage sensing instead of PT we have use Optocoupler to lower down line voltage to the required level. Microcontroller gives a signal to the normally open relay and the contacts are closed and the second transformer is switched on and parallel with the first transformer and the load is shared. Thus the load is shared by the transformer equally as the transformer are identical. The CT still measure the load current and compare it with the reference value. If the load value increases further beyond the capacity of two transformer, load will be cut-off from the main supply. Each of the process is informed to the microcontroller by Wi-Fi module installed in the circuit. The sensed data is also indicated on a board present LCD which displays current and voltage. Also, it has a temperature sensor to have a constant guard ontemperature parameter using LM358 IC which gives its data to the microcontroller.

4. HARDWARE:

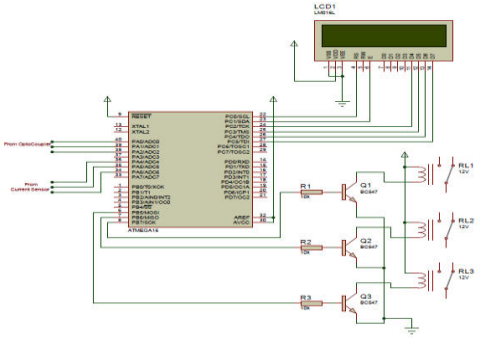
List of hardware used

Sr. no.	Components and specification	No. of components used
3.1	Transformer (5KVA, 3phase, 220/440V)	2
3.2	Current transformer(30A)	3
3.3	Relay(12V,30A)	6
3.4	LCD DISPLAY	1
3.5	WIFI MODULE	1
3.6	MICROCONTROLLER (At mega 16)	1

5. BLOCK DIAGRAM:



6. DESIGN OF KIT:



7. SOFTWARE DESCRIPTION:

1. AVR studio

2. Express PCB2.0

8.ADVANTAGES:

1. The load is shared by the transformer automatically.
2. No manual error is taking place.
3. It prevents the main transformer from damage due to the problem like overload and overheats.
4. Uninterrupted power supply to the consumer is supplied

9. CONCLUSION:

This project reduces the manual work per sharing the load of the transformer. Also, provide reliable power by using the load sharing of the transformer with another transformer. It increases the efficiency of the system. Using this methodology, we supplied an uninterrupted power supply this will have done automatically and increase the life of the transformer and to make the system efficient.

10. FUTURE SCOPE:

1.The Future scope of our project is, particularly in a substation.

2.In substation particularly the peak hour there is aneed for the operation of an additional transformer to supply the additional load requirement our project automatically connects the transformer under critical loads thus there is no need to operate both transformers under normal loads,particularly during off-peak hours.

11. REFERENCE:

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