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AUTOMATIC LOAD SHARING OF TRANSFORMER USING MICROCONTROLER

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ABSTRACT - The aim of the paper is automatic load sharing of transformer under overload condition and protect the transformer from damage and give uninterrupted power supply. Due to overloading the surpasses current flow, the windings become overheated and may burn, resulting in a decrease in efficiency.Protect the transformer by attaching a second transformer with the same rating in parallel and sharing loads using a microcontroller.The first transformer's load is compared to a reference value by the microcontroller.The second transformer will share the additional load if the load exceeds the reference value.As a result, the two transformers operate effectively and are protected from harm.The load currents in this project are controlled by three modules.The first module serves as a sensing unit to measure the load's current, while the second module serves as a control unit. The microcontroller is the final module. unit and it will read the analogue signal from the sensor module and perform some calculation and finally gives control signal to a relay. The advantages of the project is protection of transformer, uninterrupted power supply, short circuit protection, and for maintenance purpose.

I. INTRODUCTION

Transformer protection was necessary since transformers are among the most important pieces of equipment in the electrical power system.In addition to this, the growing population's unavoidable demands are driving up the demand for power.The existing systems are now overburdened due to the increased power demand.The transformer's efficiency and protective systems may be impacted by overloading that appears at the consumer end of the transformer's terminals.The effectiveness of the transformer decreases as a result of overload, and the windings become overheated and may burn. It costs a lot of money and takes a long time to fix. Transformers can sometimes be loaded. beyond nameplate ratings because of existing possible contingencies on the transmission lines, any failure or fault in power systems, or economic considerations. One of the reported damage or tripping of the distribution transformer is due to thermal overload. To eliminate the damaging of transformers due to overloading from consumer end, it involves the control against over current tripping of distribution transformer. Rise in operating temperature of the transformer. The project is all about protecting the transformer under overload condition. by connecting another transformer in parallel through a microcontroller and a relay which shares the excess load of the first transformer. The transformers are switched alternatively to avoid thermal overloading.

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1.1 OBJECTIVES

- Protect transformers from overloaded condition by sharing the load.
- To measure the current and load in watt of both the transformers.
- To monitor the loading on both the transformers.
- To calculate the percent of overload condition on transformer.

II. METHODOLOGY

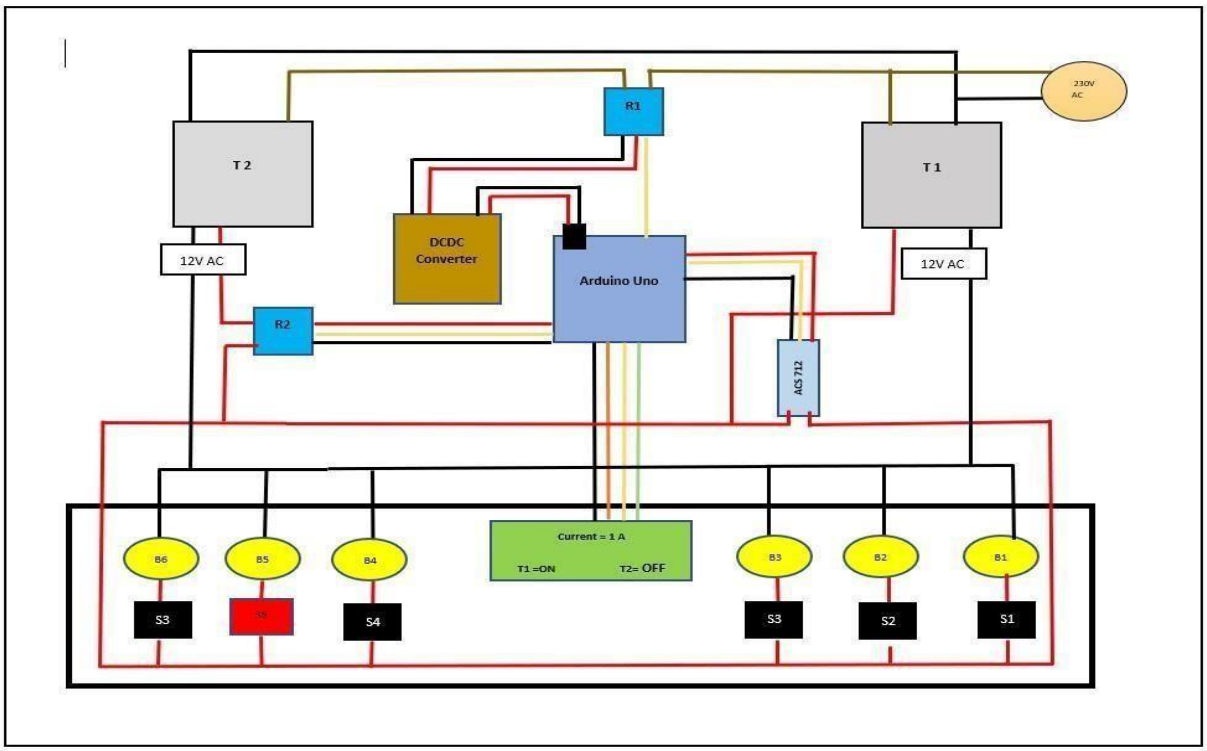

Fig 1: block digram of automatic load sharing of transformer

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2.1 WORKING AND OPERATION

There are three modes of working:

1) Normal working mode when Load is < 5 Amps

In the above figure three bulbs are switched on i.e., S1, S2, S3 and based upon the load of 4.5 Amps. condition Relay 1 is kept ON and Relay 2 is in OFF condition. This means Transformer 1 will be active and Transformer 2 will be OFF hence the LCD screen shows the amperage as 4.5 and T1 = ON and T2 = OFF. In this case the load up to 5 amps will be supplied using Transformer 1 (Primary Transformer).

2) Parallel working mode when load is > 5 Amps

In the above figure four bulbs are switched on i.e., S1, S2, S3, S4 and based upon the load of 7 Amps. Relay 1 and Relay 2 is kept ON condition. This means Transformer 1 and Transformer 2 will be Parallelly connected with the load and in this case as both of the transformers have same specification the load will be divided equally among both transformers. hence the LCD screen shows the amperage as 7 and T1 and T2 = ON. In this case load above 5 amps will be shared between Primary Transformer (T1) and Secondary Transformer (T2).

3) Overloading mode when Load is > 10 Amps

In the above figure when all the bulbs are switched on i.e., S1, S2, S3, S4, S5, S6 the current of 13 Amps or greater than 10 Amps is drawn through T1 and T2. In this condition Relay 1 & Relay 2 is kept in OFF condition. This means Transformer 1 and Transformer 2 will be OFF hence the complete system will be shut down and will continue to be in same stage till the load becomes less and LCD screen shows the amperage as 13 Amps and “OVERLOAD” is continuously displayed on the screen.

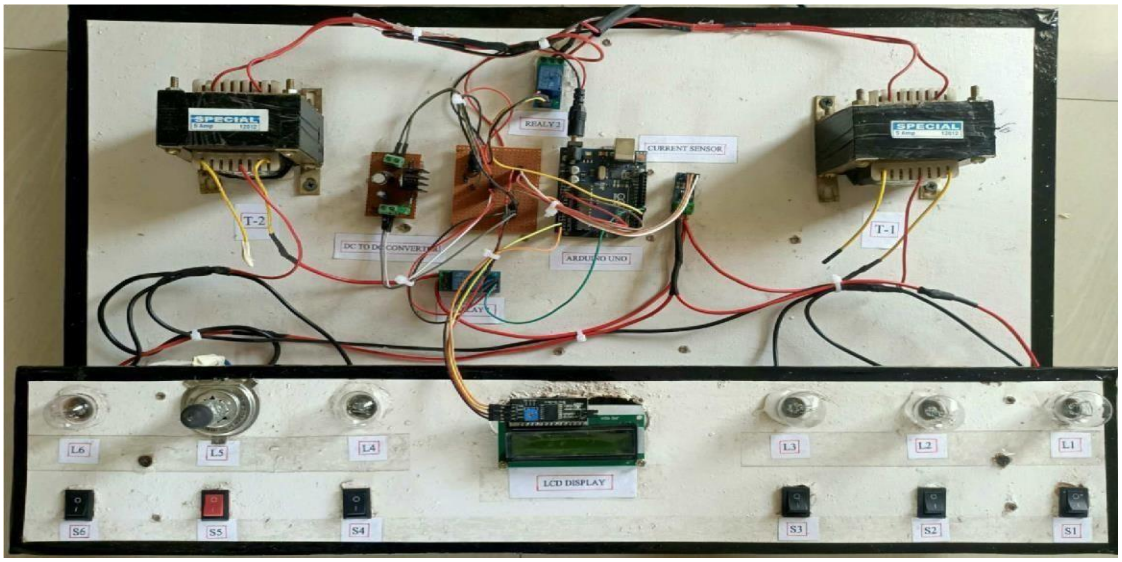

Fig 2: Automatic load sharing of transformer

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Table 1- LOOK UP TABLE

Condition	Switch (ON)	Display			Load Sharing (A)		Load in Watt		
		T-1	T-2	Total load (A)	T1 (A)	T2 (A)	T1	T2	Total Load
Normal	L1	ON	OFF	1.75	1.75	0	21	0	21
Normal	L1&L2	ON	OFF	3.5	3.5	0	42	0	42
Load sharing	L1,L2&L3	ON	ON	5.25	2.6	2.6	31.5	31.5	63
Load sharing	L1,L2,L3&L4	ON	ON	7	3.5	3.5	42	42	84
Overloading	L1,L2,L3,L4&L5	OFF	OFF	15.33	0	0	0	0	0

Where,

L1, L2, L3, L4 = Load (21W)
L5 = Load (100W)
T1 & T2 = Transformer 1 & Transformer 2 (60W each)

III. CONCLUSION

Transformer maintenance and protection are necessary since they are one the most important and costly pieces of equipment in the electrical generation, transmission, and distribution system.To meet the growing demand fo r power, the load capacity of the transformer must be increased. This can be accomplished by operating the tran sformers in parallel.With the aid of a microprocessor, parallel operations are carried out automatically in this pr oject, preventing load sharing and ensuring an uninterrupted power supply.

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