DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY, Kattankulathur – 603 203

Title of Experiment	:	**4.LOAD TEST ON SINGLE PHASE TRANSFORMER**
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Register Number	:	RA2111028010094
Date of Experiment	:	19/10/2021

Sl. No.	Marks Split up	Maximum marks (50)	Marks obtained
1	Pre Lab questions	5	
2	Preparation of observation	15	
3	Execution of experiment	15	
4	Calculation / Evaluation of Result	10	
5	Post Lab questions	5	
Total		**50**	

Staff Signature

PRE LAB QUESTIONS

1. Explain the working principle of transformer.

Transformer works on the principle of Faraday's law of Mutual Induction. It is a phenomenon by which when the amount of magnetic flux linked with the coil changes, An E.M.F. is induced in the neighboring coil.

An alternating current applied to the primary winding induces a alternating magnetic flux in the iron core. The alternating magnetic flux in the iron core then links the turns of the secondary windings inducing a voltage.

2. What are the main parts of a transformer?

Main parts of transformer are as follows:

1. Core: The core acts as a support to the winding in the transformer. It also provides a low reluctance path to the flow of magnetic flux.

2. Windings: Windings are the set of copper wires wound over the transformer core. There are mainly two types namely primary winding, to which supply current is fed and secondary winding from which output is taken.

3. Insulation agents: Insulation is necessary for transformers to separate windings from each other and to avoid short circuit.

3. What are the types of transformers?

Basically there are two types of transformers:

1. Step-up transformer: It increases the voltage from primary to secondary, and has more secondary winding turns than primary.

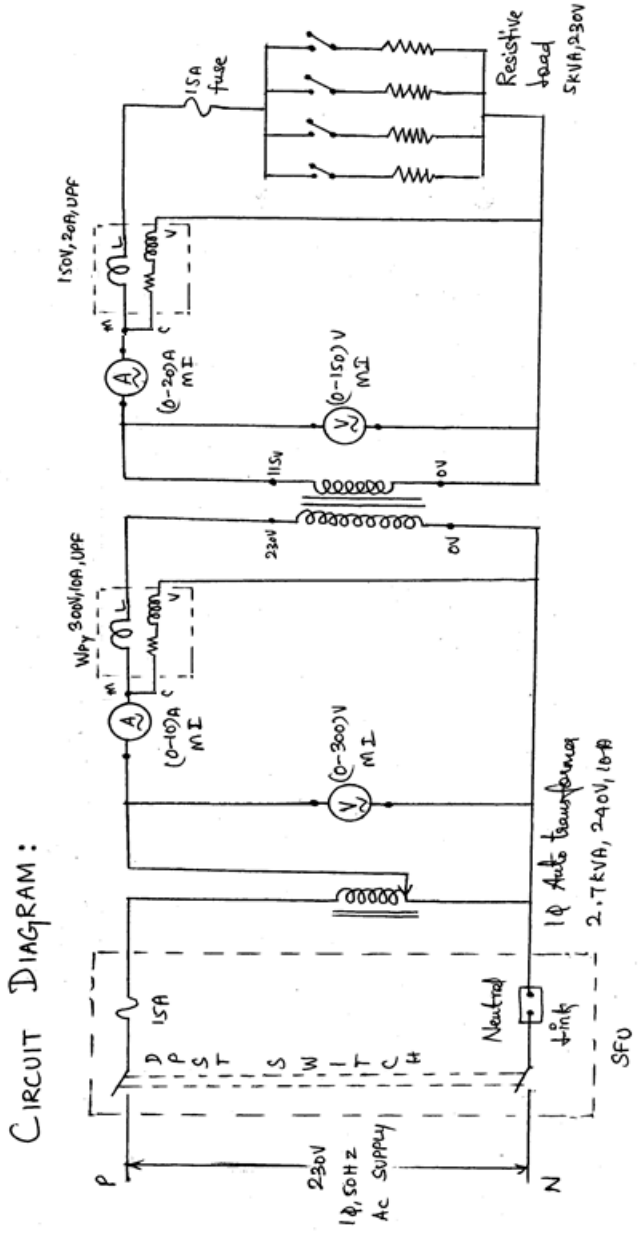
2. Step-down transformer: Works conversely and have more primary turns than secondary.

4. What is the meaning of KVA rating of transformer?

KVA stands for Kilovolt-Ampere and is the rating normally used to rate a transformer. The size of a transformer is determined by the kVA of the load. For example a 1KW (1000 Watts) load would require a 1kVA transformer.

5. **What is the necessity of the load test for a transformer?**

The load test is performed on a single phase transformer, to find out its efficiency and regulation. In this method, a resistive load is connected to the transformer and it's loaded up to the rated current.



Experiment No. 4 Date : 19/10/2021	**Load test on single phase transformer**

Aim:

To conduct the load test on the given a single phase transformer for finding the efficiency and its regulation.

Apparatus Required:

S.NO	APPARATUS	RANGE	TYPE	QUANTITY
1.	Voltmeter	(0-150)V (0-300) V	MI MI	1 1
2.	Ammeter	(0-10)A (0-20) A	MI MI	1 1
3.	Wattmeter	150V,20A 300V,10A	UPF UPF	1 1
4.	Auto transformer	240 V, 2.7 KVA,10A		1

Formula Used:

Formulae:

1.Percentage Regulation = $(V_{o2}-V_2)/V_{o2}*100$

Where V_{o2} = Secondary voltage on no load

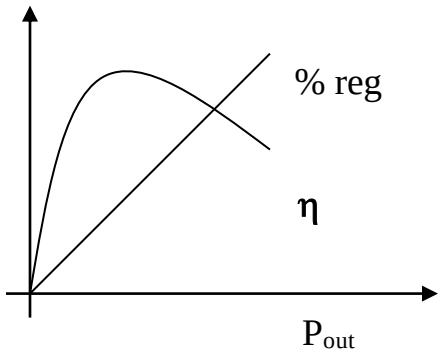
V_o = Secondary voltage at a particular load

2. Percentage efficiency = Pout/Pin*100

Where Pout = Secondary power in Watts

Pin = Primary power in Watts.

Model Graph:



Procedure

1.Connections are given as per the circuit diagram.

2.Verify whether the autotransformer is kept at zero voltage position.

3.By closing the DPST switch, 230V,1ϕ,50HZ AC supply is given to the transformer.

4.At no load, the readings from the meters are noted down.

5.The load is applied to the transformer in steps upto 125% of the rated value of the primary

Current by using rheostatic load..

6.The corresponding values from the meters are tabulated for different loads.

7.Then the load is removed gradually, auto transformer is brought to its minimum position and

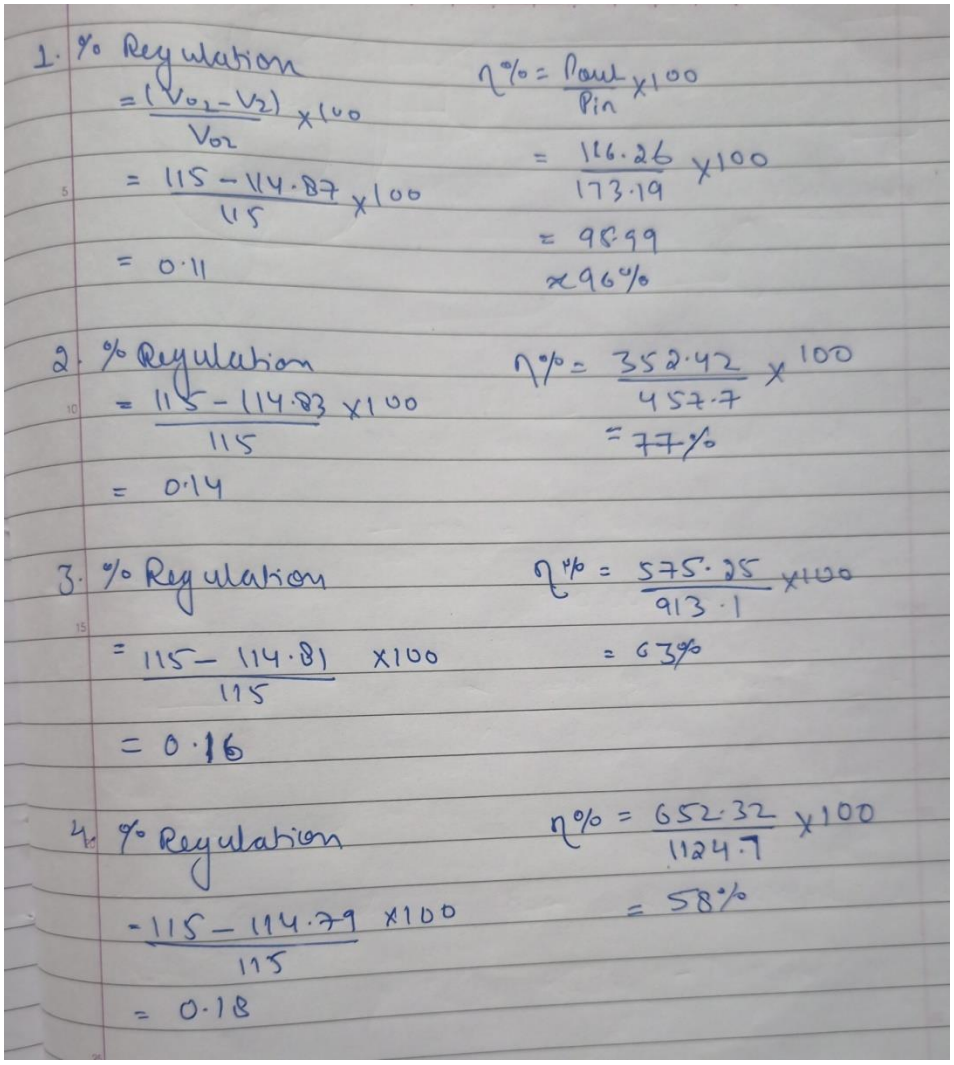
the supply is switched off.

8.From the recorded values, the regulation, power factor and efficiency are calculated.

TABULATION:

S. No	Primary Voltage V_1 (V)	Primary Current I_1 (A)	Primary power W_1 (W)	Secondary Voltage V2 (V)	Secondary Current I_2 (A)	Secondary power W_2 (W)	% Regulation %	η %
1.	230	0	0	115	0	0	0	0
2.	230	0.753	173.19	114.87	1.44	166.26	0.11	96
3.	230	1.99	457.7	114.83	3.06	352.42	0.14	77
4.	230	3.97	913.1	114.81	5.01	575.25	0.16	63
5.	230	4.89	1124.7	114.79	5.68	652.32	0.18	58

Model Calculation:



Result


File Edit Draw Scopes Options Circuits
-789.42 mA
-1.36 A
50Hz
-324.66 V
t = 1.45 s
time step = 5 µs
4 bad connections
Person 1
ABDUL AHAD (RA2111028010094)
Sync is off
Turn on sync...
Manage your Google Account
Sign out
Other profiles
Guest
Add

POST LAB QUESTIONS

1. What will happen if a DC voltage is given to the transformer primary?

When a DC voltage is applied to the primary winding of a transformer, due to low resistance, the winding acts as a short circuit across the terminals of the DC source that lead to the flow of heavy current through the winding resulting in overheating of the winding. Eventually, the source or the winding will be damaged.

2. What are the losses in a transformer?

Losses in transformer are as follows:

a. Hysteresis loss.

b. Eddy current loss.

c. Copper loss or ohmic loss.

3. How can we minimize the core losses in a transformer?

Core loss of a transformer consists of two parts.

a. Hysteresis losses: In order to minimize hysteresis losses, soft magnetic materials example: Si steel, steel alloys ,Mn-Zn ferrite are used.

b. Eddy current losses: In order to reduce eddy current losses, the magnetic core of the transformer should not made from a single magnetic material because in this case the circulating eddy current flowing will be higher.

4. What is meant by eddy current losses?

When the flux links with a closed circuit, an emf is induced in the circuit and the current flows, the value of the current depends upon the amount of emf around the circuit and the resistance of the circuit. Since the core is made of conducting material, these EMFs circulate currents within the body of the material. These circulating currents are called Eddy Currents. As these currents are not responsible for doing any useful work and it produces a loss (I2R loss) in the magnetic material known as an Eddy Current Loss.

5. How hysteresis loss can be reduced?

Hysteresis loss occurs due to magnetization saturation in the core of the transformer. It can be reduced by using soft magnetic materials. For example: Si steel, steel alloys ,Mn-Zn ferrite, because they have high saturation magnetization, Low coercivity and High magnetic permeability.