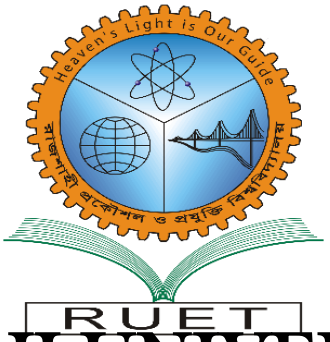

RAJSHAHI UNIVERSITY OF ENGINEERING AND TECHNOLOGY

Course No: EEE 2252

Course Title: Sessional Based on EEE-2251

Lab Report : 3 and 4

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Experiment no:3

Experiment name: Ratio test and no-load current observation of a single-phase transformer

Theory:

A single-phase transformer is an electrical device that accepts single-phase AC power and outputs single-phase AC. This is used in the distribution of power in non-urban areas as the overall demand and costs involved are lower than the 3-phase distribution transformer. They are used as a step-down transformer to decrease the home voltage to a suitable value without a change in frequency. For this reason, it is commonly used to power electronic appliances at residences.

For step up transformer turns ratio is **a=**$\frac{E_s}{E_p}$**=**$\frac{N_s}{N_p}$**=**$\frac{I_p}{I_s}$

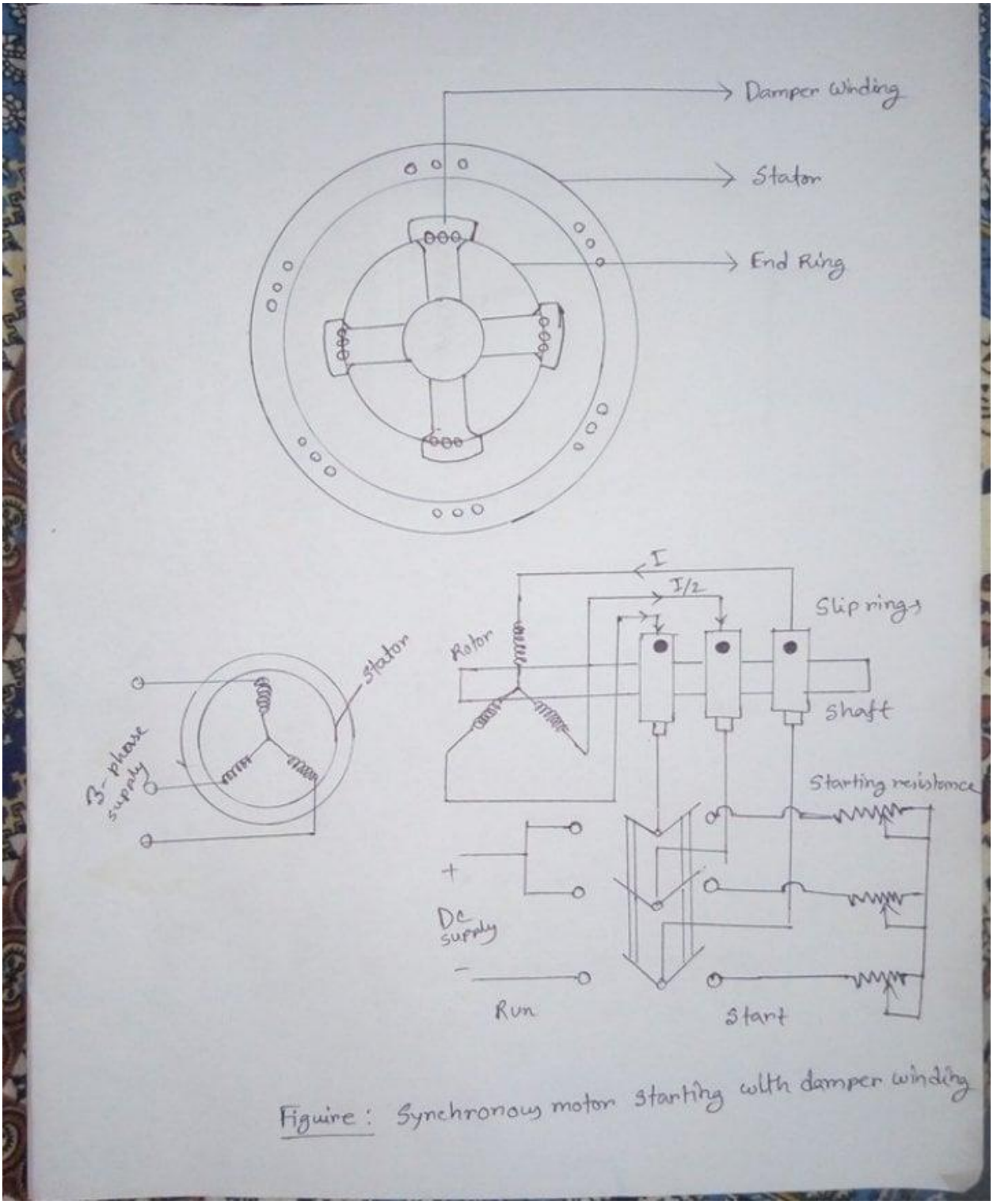
In the case of no load there shouldn't pass any current (theoretically).But practically there flow a few amount of current which is called no load current .

This current produce because of the core loss.

Required Apparatus :

1. Transformer
2. Wire
3. Ac supply voltage
4. Multimeter
5. Resistance (108 ohm)
6. Ammeter

Circuit Diagram:



Figuire : Synchronous motor starting with damper winding

Data Table:

Ratio Test		
Voltage (primary side) volt	Voltage (secondary side) volt	Ratio
40	76.3 (theoretically=80)	1.9075 (theoretically =2)
Ratio Test		
Current (primary side) Ampere	Current (secondary side) Ampere	Ratio
0.72 (theoretically=0.68)	0.34	2.11 (theoretically =2)

Here in this transformer

Primary rated voltage = 150V

Secondary rated voltage = 2*150 V

= 300 V

So, Turns ratio = 2

No load Current	
Voltage Rated (primary side) Volt	No load Current (Ampere)
150	0.11

Here No load current 0.11A produce due to core loss.

Conclusion:

In this experiment no load current should be zero in the secondary side .But we can find a few amount of current . This current is around 11% of the rated current 1A. The no load current is produced because of the core loss of the transformer.

Experiment No: 04

Experiment Name: Experimental starting of a synchronous motor

Theory:

A synchronous motor is an AC motor in which, at steady state, the rotation of the shaft is synchronized with the frequency of the supply current. Synchronous motor is not start itself.

There are 3 process for starting a synchronous motor.

1. reduction of supply frequency
2. Starting with the help of an External Prime Mover
3. Starting with the help of Damper Windings

Here we use damper winding to start that synchronous motor.

Damper Windings is the most widely used method to start a synchronous motor. A Damper Winding consists of heavy copper bars inserted in the slots of the pole faces of the rotor.

These copper bars are short-circuited by end rings at both ends of the rotor. Thus, these short-circuited Bars form a squirrel cage winding. When a three phase supply is connected to the stator, the synchronous motor with Damper Winding will start. It works as a three-phase induction motor. As soon as the motor approaches the synchronous speed, the DC excitation is

applied to the field windings. As a result, the rotor of the motor will pull into step with the stator magnetic field.

Required apparatus:

1. Synchronous motor
2. Variac
3. DC supply voltage
4. Ammeter
5. Multimeter

Circuit Diagram:

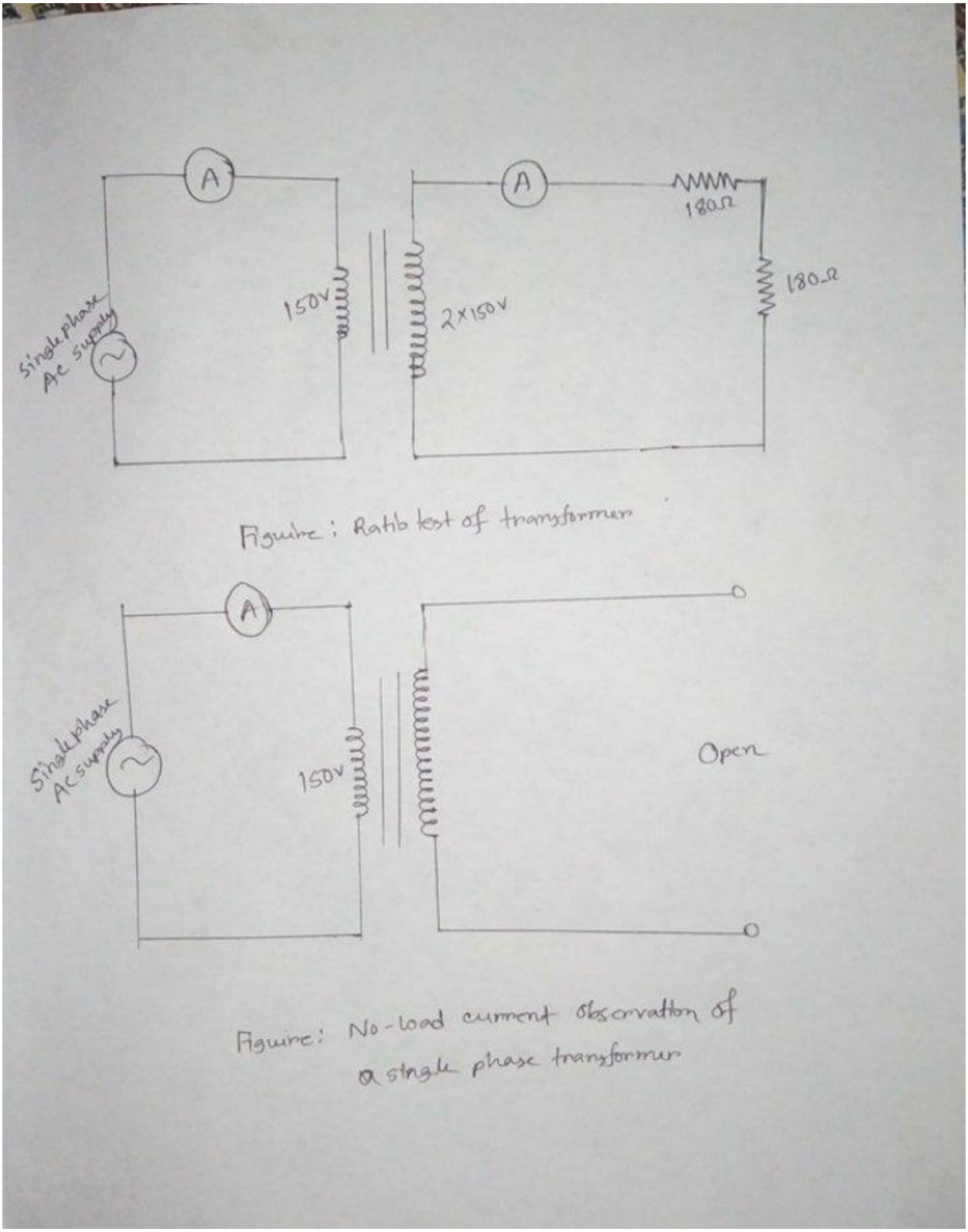


Figure : Ratio test of transformer

Figure: No-load current observation of a single phase transformer

Data Table and Analysis:

Input Frequency (Hz)	Number of Pole	Before applying DC voltage Synchronous Speed	After applying DC voltage Synchronous Speed
50	4	1457	1512

Here ,

Input frequency,f = 50 Hz

Number of poles, p = 4

So, Synchronous speed is, $N_s = 120f / p$ =1500 rpm

= 1500 rpm

Here, slip will be,

$\%s = (N_s - N) / Ns$

$=((1500-1457)/1500)*100$

$= 2.86\ \%$

After applying DC voltage supply, the speed of rotor becomes, N = 1512 rpm.

Conclusion:

Damper windings helps the synchronous motor to start on its own (self starting machine) by providing starting torque .When the motor speed is less than the synchronous speed it work like as an induction motor. After applying DC voltage the motor is magnetically interlocked and run as a synchronous motor.