SUMPNERS TEST

AIM:

To determine the efficiency and losses of a given transformer accurately under full load condition.

APPARATUS REQUIRED:

Sl. No.	Equipment	Type	Range	Quantity
1	Voltmeter	MI	(0-300)V (0-300)V (0-600)V	1 no 1 no 1 no
2	Ammeter	MI	(0-2)A (0-20)A	1 no 1 no
3	Wattmeter	Dynamo type	(0-150)V LPF (0-2.5)A	1 no
4	Wattmeter	Dynamo type	(0-150)V UPF (0-10)A	1 no
5	Connecting Wires	*****	*****	Required

Transformer Specifications:

Two identical 1- ϕ Transformers

Transformer Rating :(in KVA) _____

Winding Details:

LV (in Volts): _____

LV side current:_____

HV (in Volts): _____

HV side Current:_____

Type(Shell/Core):_____

1 - ϕ Auto transformer Specifications:

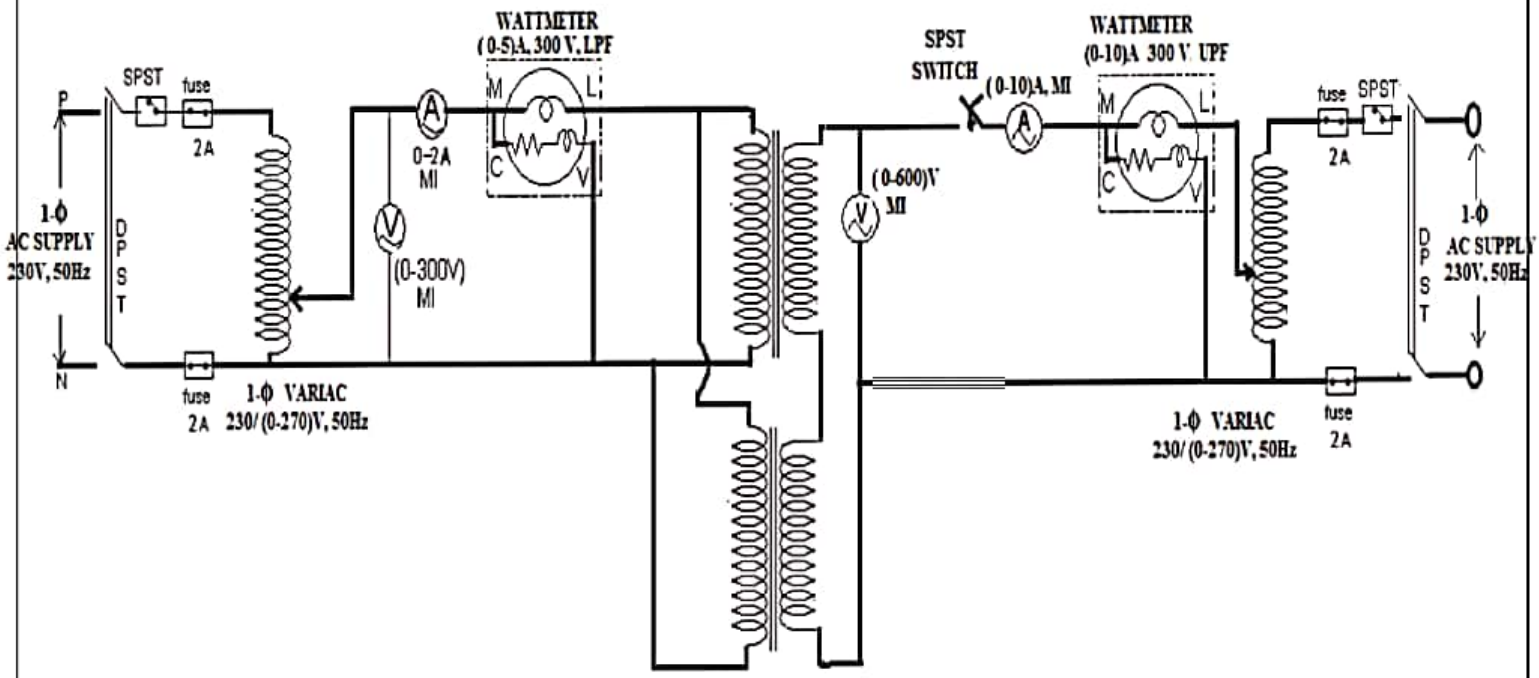
Input Voltage (in Volts):_____

Output Voltage (in Volts): _____

Frequency (in Hz):_____

Current rating (in Amp):_____

CIRCUIT DIAGRAM:



KVA:_____

PROCEDURE:

1. Make the connections as per the circuit diagram.
2. The secondary winding terminals of the two transformers are connected in series with polarities in phase opposition which can checked by means of a voltmeter.

3. Before starting the experiment, check the variacs are in minimum output voltage position.
4. Close the first DPST-1 switch and switch ON the supply.
5. Increase the variac slowly, and apply rated voltage to the primary windings of 1-ϕ transformers and check the voltmeter reading connected across the secondary terminals.
6. If the voltmeter reading is Zero, continue with step 8.
7. If the voltmeter reading is not zero, interchange the secondary terminals.
8. Now close the DPST-2 switch and vary the variac-2 slowly till rated current flows in the two series-connected secondaries.
9. Note down the readings of V_1,V_2, I_1, I_2, W_1, and W_2 and enter them in a tabular column.
10. $W_1 = 2P_c$, $W_2 = 2P_{sc}$. Losses of each transformer = $(W_1+W_2)/2$
11. Now the Variacs are brought to zero voltage position and open DPST switches.

OBSERVATIONS:

Sl no.	Voltmeter reading V_1	Voltmeter reading V_2	Ammeter reading I_1	Ammeter reading I_1	Wattmeter Reading W_1	Wattmeter Reading W_2	Transformer losses $= (W_1+W_2)/2$	η = op/(op+loss)

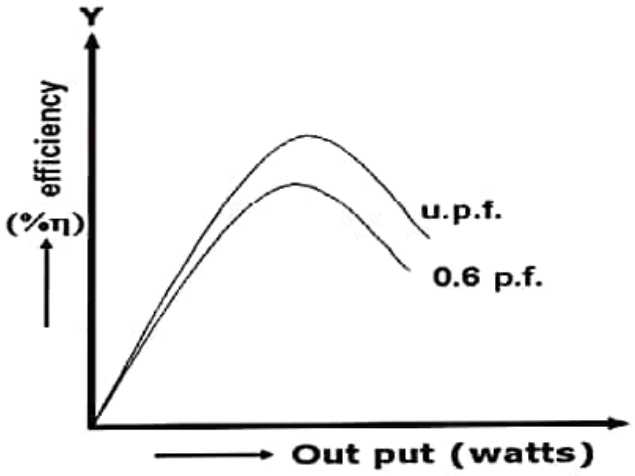
MODEL CALCULATIONS:

$$\text{Losses in each transformer} = \frac{w_i + w_c}{2} \quad \% \ \eta \text{ combined} = \frac{V I_1}{V I_1 + w_i + w_c} \ x\ 100$$

Efficiency of each transformer (% η)= $\dfrac{V I_1}{V I_1 + \frac{w_i}{2} + \frac{w_c}{2}}$ x 100

MODEL GRAPH:

i) Output power Vs Efficiency



PRECAUTIONS:

1. Connections must be made tight
2. Before making or breaking the circuit, supply must be switched off

RESULT:

VIVA QUESTIONS:

1. What for this test is really intended?
2. Why to conduct the test on identical transformers?
3. What happens if the rated values of voltage and frequency of supply vary?
4. What are the advantages and disadvantages of this test?
5. Can you perform this test on 3 – ϕ star/ delta transformers?
6. What is all-day efficiency?