Akshata K. Gawande 2020BTECS00029

BEE

Experiment No. 8

- **TITLE:** To perform open circuit test on transformer.

- **OBJECTIVES:** To determine the no-load current and losses of the transformer

- **APPARATUS:**

Sr No	Item	Rating	Quantity
1	1 phase dimmer stat	-	1
2	AC Ammeter	0-5 amp	1
3	AC Voltmeter	0-150 V	2
4	Wattmeter	5A, 150V	1
5	Transformer	-	1

- **THEORY:**

Consider circuit diagram for open circuit test on transformer. Wherein one winding is connected to supply of normal voltage and frequency as per rating and other is kept open. The considerations are as follows:

[1] Ammeter connected in the circuit gives no load current drawn by transformer.

[2] As no load current is very small as compared to full load current hence copper losses in this test are very small.

[3] Wattmeter connected in the circuits indicates iron losses occurring in the transformer.

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[4] In this test we can calculate W_o, I_o, V_o, i.e wattmeter, vo ammeter and voltmeter respectively and also $\cos\phi$ i.e power factor of transformer.

CIRCUIT DIAGRAM

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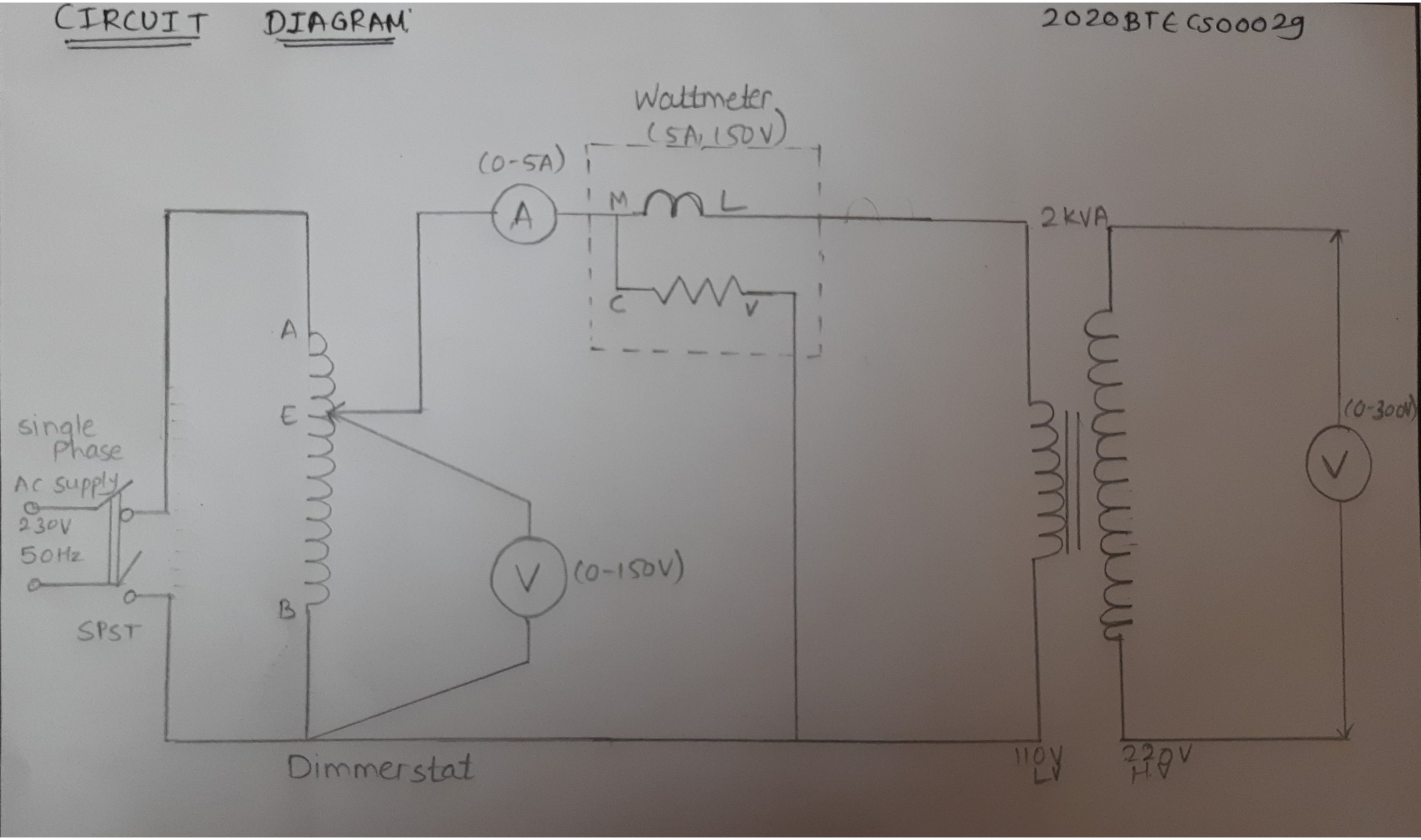

- **PROCEDURE:**

[1] Connect the circuit as per provided circuit diagram.
[2] Check the connections twice.
[3] start the main switch.
[4] Adjust the required voltage on demonstrate.
[5] Take the reading

$MF = \frac{2.5 \times 300}{500} = 1.5$

- **OBSERVATION TABLE:**

Applied rated voltage V_o(volt)	No load current I_o(amp)	No load power loss W_o
220	1.1	$15 \times 1.5 = 22.5$

- **CALCULATIONS:**

No load current (I_o) is divided into two components:

i) Magnetizing Current (I_u) = $I_o \sin\phi_o$
ii) Active current (I_w) = $I_o \cos\phi_o$
iii) we can also calculate:
Magnetizing reactance, $X = V/I_u$
Equivalent resistance, $R = V/I_w$

- **CONCLUSION:** Secondary voltage is exactly double to primary voltage.

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Experiment No. 9

- **TITLE:** To perform short circuit test on transformer.

- **OBJECTIVES:** To determine the series branch parameters of the equivalent circuit of a transformer.

- **APPARATUS:**

Sr No	Item	Rating	Quantity
1	1 phase dimmer stat	-	1
2	AC ammeter	0-10 amp	2
3	AC Voltmeter	0-200 V	1
4	Wattmeter	10A, 75 V	1
5	Transformer	-	1

- **THEORY:**

The figure shows the circuit diagram for conducting the short circuit test on a transformer, one of the windings of the transformer is short circuited through an ammeter, while a low voltage is applied to other winding.

The applied voltage is slowly increased until full load current flows in this winding. As such full load current will then flow in the order winding also. Normally, the voltage applied is hardly 5-7% of rated voltage of this winding.

Flux established in the core will be quite small and so iron losses occurring under this condition are negligible

W_{sc}, I_{sc}, V_{sc} will be readings of Wattmeter, Ammeter and Voltmeter.

$$W_{sc} = (I_{sc})^2 R_{eq} \quad ; \quad R_{eq} = \frac{W_{sc}}{(I_{sc})^2}$$

$$Z_{eq} = \frac{V_{sc}}{I_{sc}} \quad , \quad X_{eq}^2 = (Z_{eq})^2 - (R_{eq})^2$$

CIRCUIT DIAGRAM:

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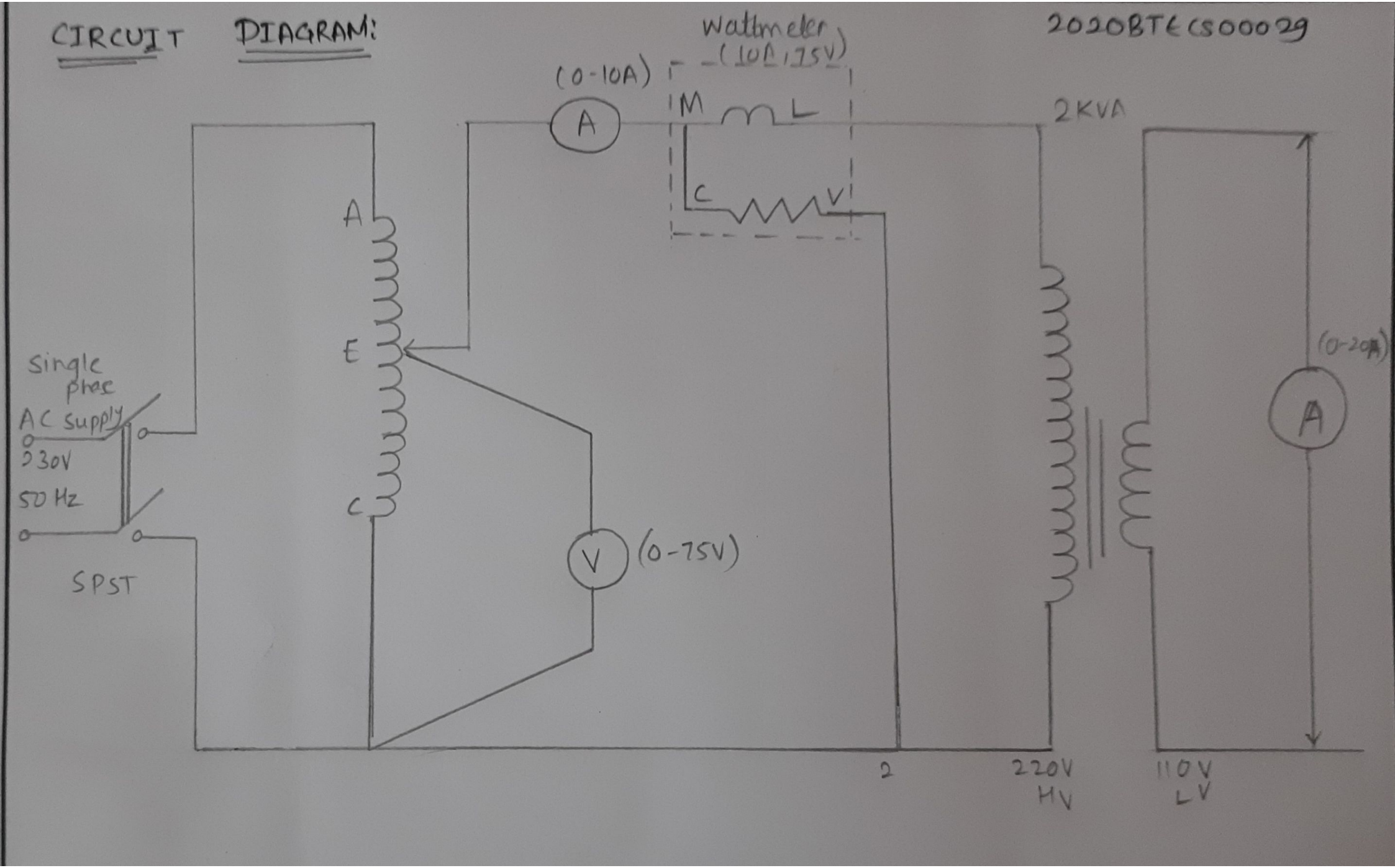

- **PROCEDURE:**

[1] Connect the circuit as per provided circuit diagram.
[2] Check the connections twice.
[3] Start the main switch
[4] Adjust the required voltage or demonstrate.
[5] Take the readings.

$$MF = \frac{150 \times 10}{750} = 2$$

- **OBSERVATION TABLE:**

Voltage (V_{sc})	Current (I_{sc})	No load power losses (W_{sc})
28	8.6	$120 \times 2 = 240$

- **CALCULATIONS:**

Equivalent loss, $W_{sc} = (I_{sc})^2 R_{eq}$

Therefore, $R_{eq} = W_{sc} / (I_{sc})^2$

Equivalent impedance, $Z_{eq} = V_{sc} / I_{sc}$

Equivalent reactance, $X_{eq} = \sqrt{Z_{eq}^2 - R_{eq}^2}$

- **CONCLUSION**: The secondary side current is almost double to that of primary side current.