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Date:
Page No.

Experiment No. 1
(VLab)

Aim: To perform the open circuit and short circuit test ~~to perfo~~ on transformer. Determine the performance parameter, estimate efficiency & voltage regulation at various load condition

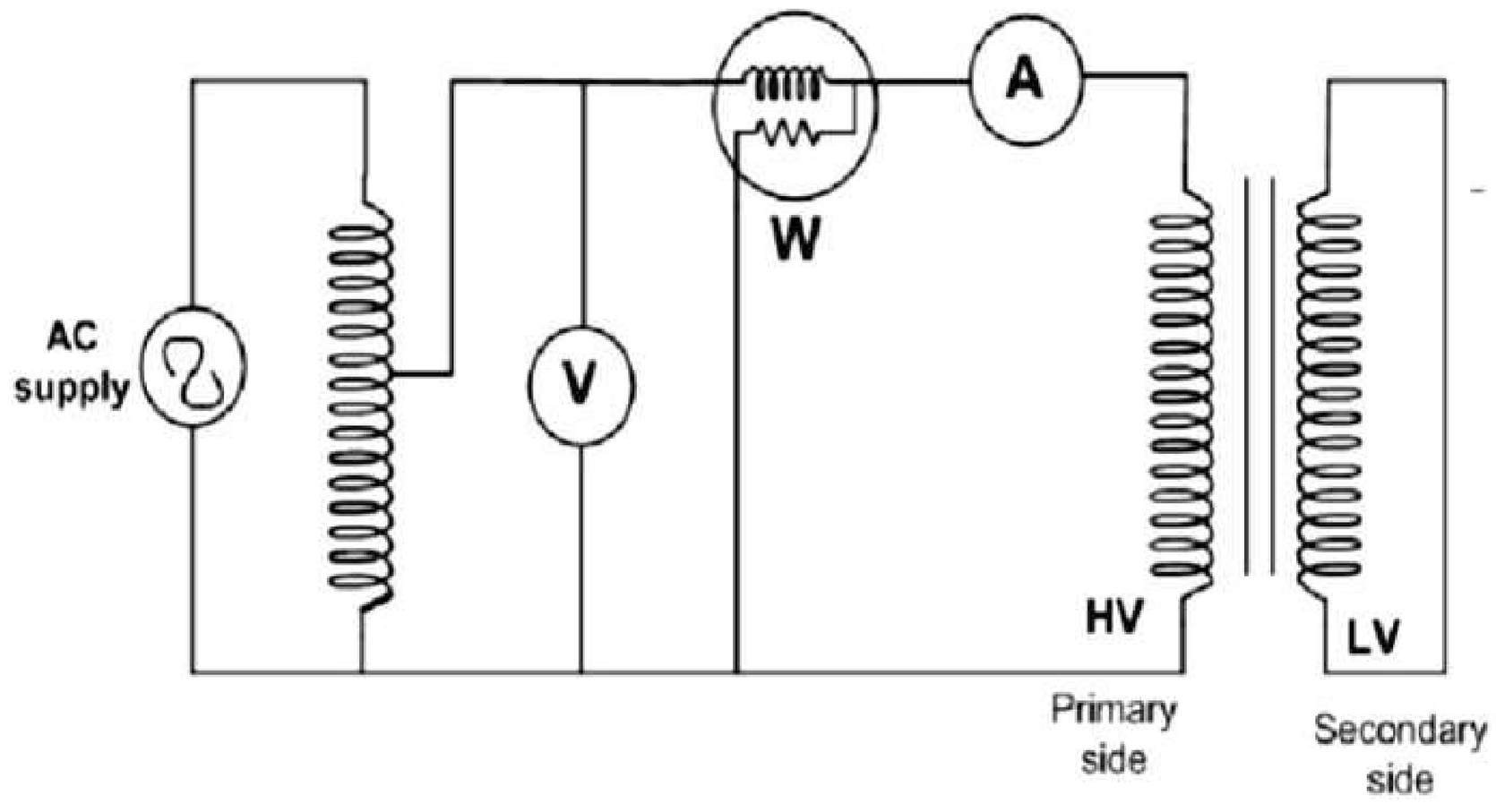
Theory:

Open circuit Test:
The prepare of the open-circuit test is to determine the no load current and losses of the transformer because of which this no load parameter is determined: This test is performed on the primary winding of transformer. The wattmeter, ammeter & ~~voltmeter~~ voltage ~~is determined~~ are connected to their primary winding. The nominal rated voltage is supplied to their primary winding with the help of the current source.

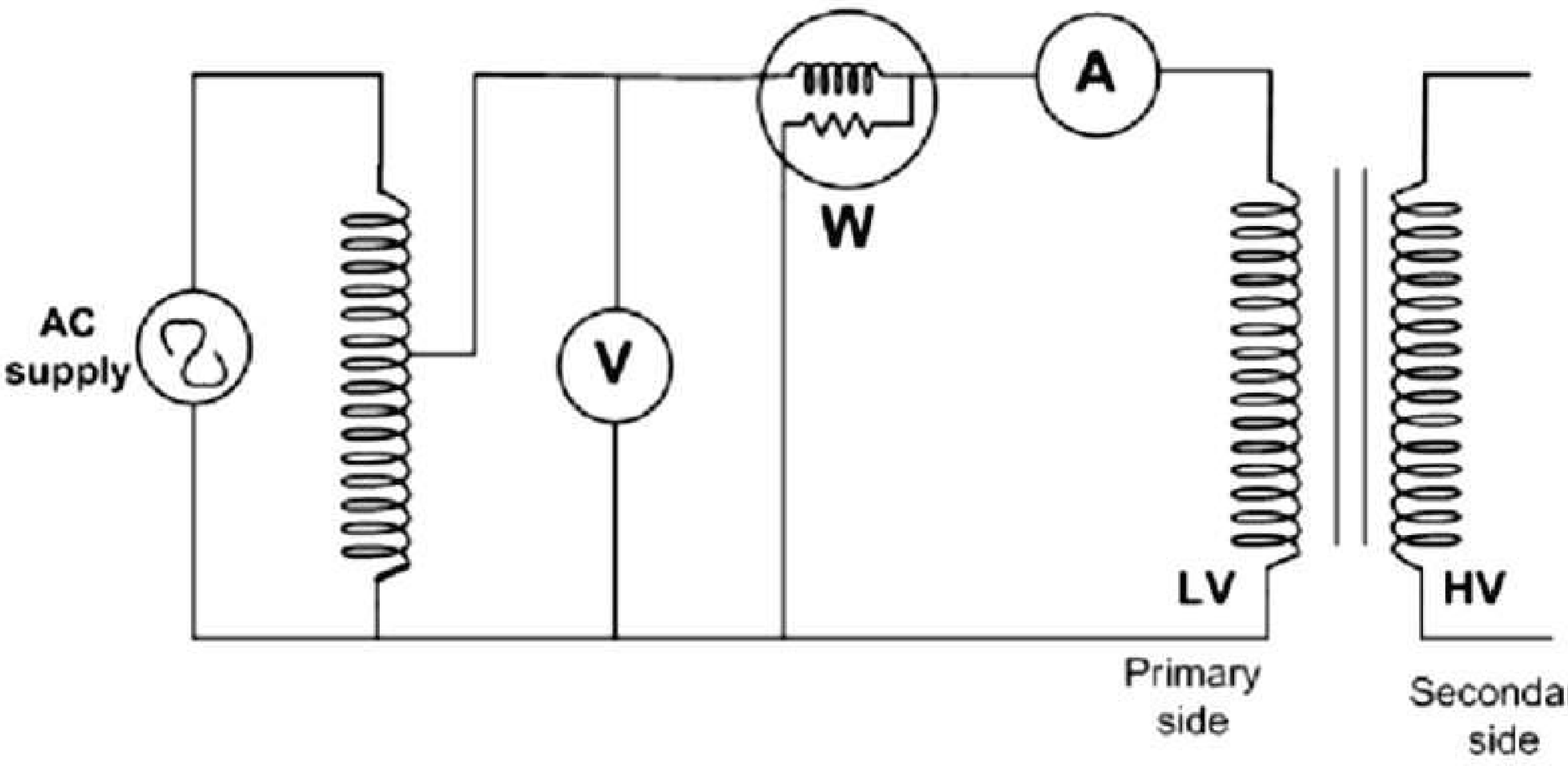
Short-Circuit Test:
The short-circuit test is performed for determining the ~~loss~~ ~~lulus~~ motion parameter of the transformer.

- It determine the copper loss occurs on the full load. The copper loss is used for finding the efficiency of the transformer.
- The equivalent resistance, impedance & leakage restance are known by the short-circuit test.

Diagram



Equivalant circuit diagram for short circuit test on transformer



Calculations

For Open circuit test:

let,

Wattmeter reading - WO = 20.96 W

Voltmeter reading - V1 = 245.75 V

Ammeter reading - IO = 0.15 A

Then the iron loss transformer P_i = WO &

$$WO = (V1)(IO)\cos\phi \longrightarrow (eq\ 1)$$

$$\Rightarrow \cos\phi = \frac{WO}{(V1)(IO)}$$

$$= \frac{20.96}{245.75 \times 0.15}$$

$$= \frac{20.96}{36.86} = 0.57$$

Working component Iw is:

$$Iw = WO/V1 \longrightarrow (eq\ 2)$$

from eq1 we get,

$$Iw = \cos\phi\ IO = 0.57 \times 0.15$$

$$Iw = 0.0855$$

Magnetizing component is

$$Im = [(I0)^2 - (Iw)^2]^{1/2}$$

$$= [(0.15)^2 - (0.0855)^2]^{1/2}$$

$$Im = \sqrt{0.0152} = 0.123$$

No load Parameter are given below.

Equivalent exciting resistance is

$$R0 = V1/Iw$$
$$= 245.75/0.0855$$
$$= 2857.56\ \Omega$$

Equivalent exciting reactance is

$$X0 = V1/Im$$
$$= 245.75/0.123$$
$$= 1997.97\ \Omega$$

For Short Circuit test:

let,

Watt meter reading - Wc = 2096W

Voltmeter reading - Vsc = 245.75 V

ammeter reading - Isc = 0.15 A

Then the full load copper loss of the transformer is given by:

$$Pc = [Ifl/Isc]^2 \cdot Wc$$

$$Isc^2 Rs = Wc$$

Equivalent resistance referred to secondary side is given by

$$R_S = W_C / (I_{SC})^2$$

$$= \frac{20.95}{(0.15)^2}$$

$$= 931.11$$

Equivalent impedance referred to secondary side is given by:

$$Z_S = V_{SC} / I_{SC}$$

$$= \frac{245.75}{0.15}$$

$$= 1638.33$$

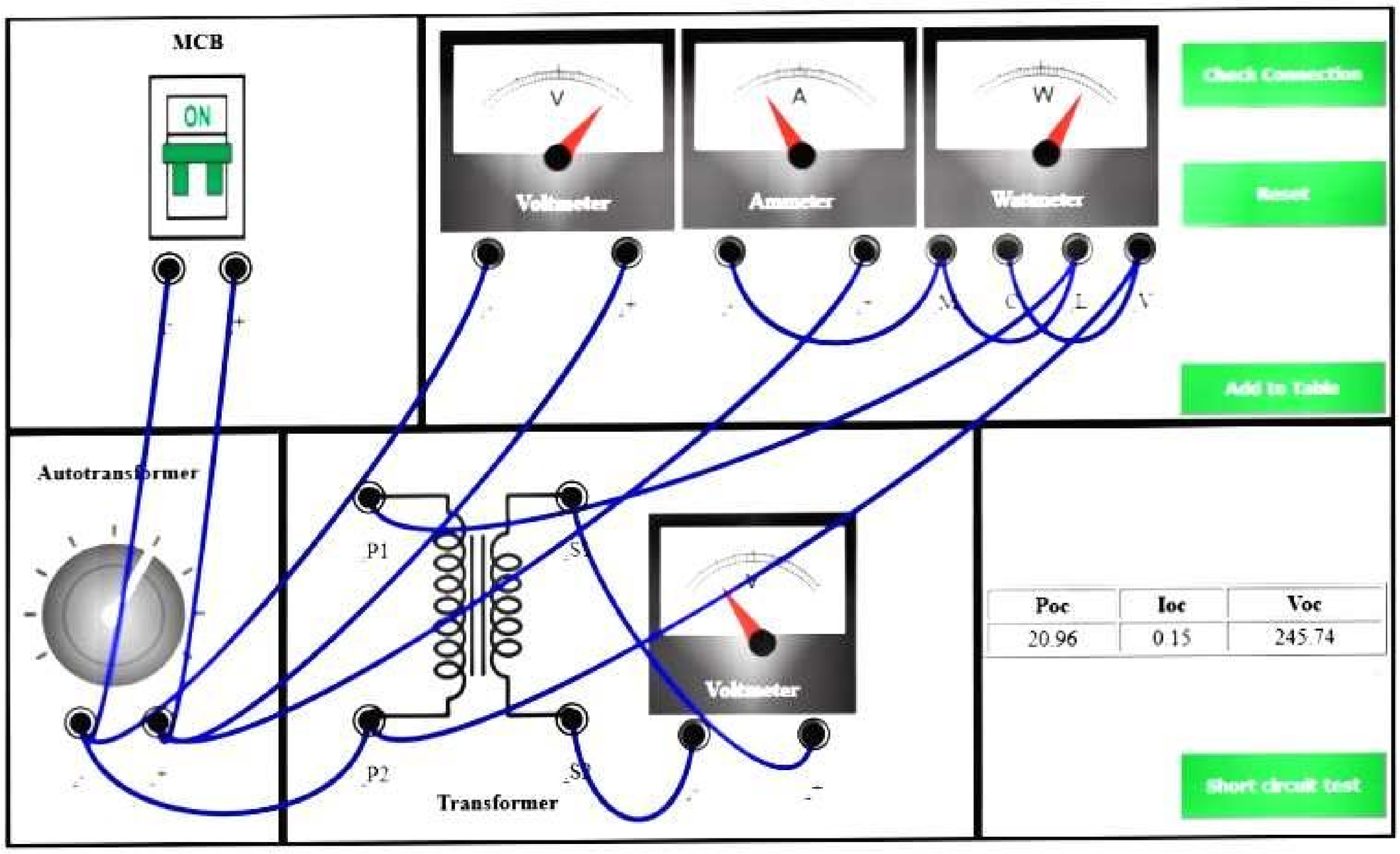
The Equivalent reactance referred to the secondary side is geven by:

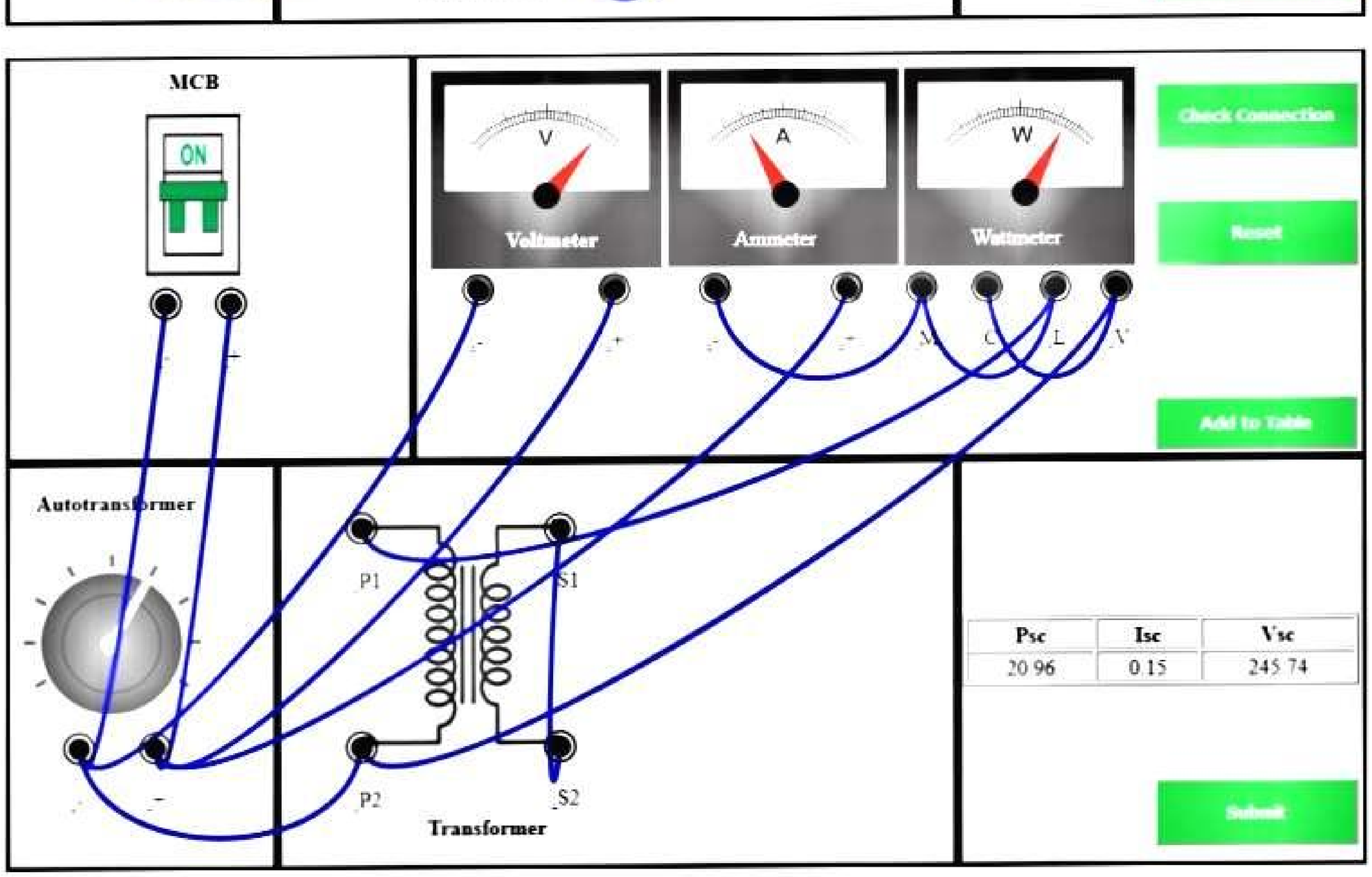
$$X_S = \sqrt{(Z_S)^2 - (R_S)^2}$$

$$= \sqrt{(1638.3)^2 - (931.1)^2}$$

$$= 1347.98$$

Transformer equivalent circuit from Open Circuit and Short circuit Test





Equivalent Circuit diagram of transformer