LAB ASSIGNMENT – 8

Course: Basic Electrical and Electronics Engineering

Course Code: EEE1001

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Slot: L-19+L-20

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Registration Number: 18BIT0272

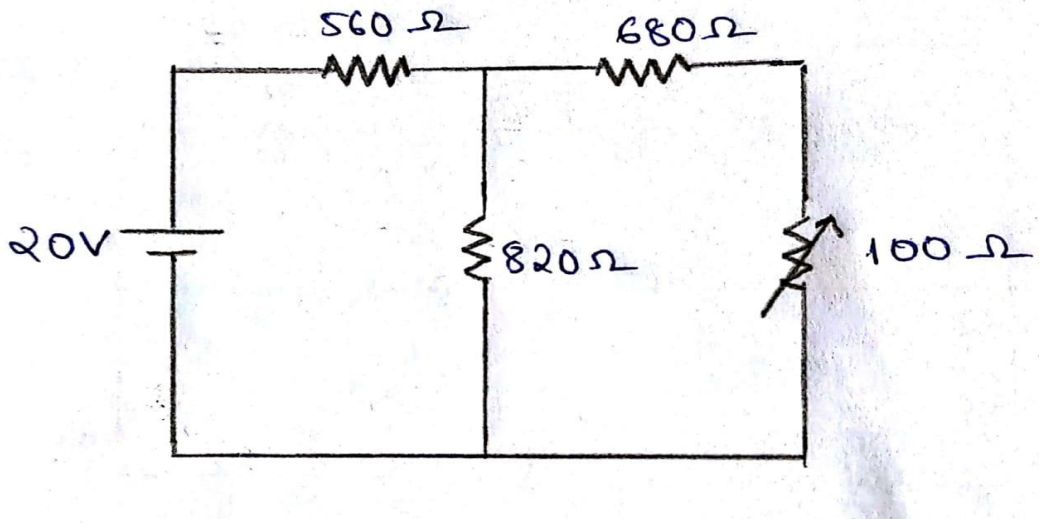
Submission Date: 20.10.2018

Ex. No.:3 **Date:** 20/10/2018

Verification of Thevenin's Theorem

Aim: Derive the Thevenin's equivalent circuit for the given circuit and verify it practically.

Circuit Diagram



Apparatus/Tool required:

Sl. No.	Components Name	Range	Quantity
1	Resister	120Ω, 330Ω, 470Ω, 220Ω, 100Ω	Each 1 No.
2	Ammeter	0-50mA (DC)	1 No.
3	Voltmeter	0-10V (DC)	1 No.
4	RPS	0-32 V (DC)	1 No.
5	Connecting Wires	-	Few
6	Bread Board	-	1 No.

Theory

Statement: Thevenin's Theorem

Thevenin's Theorem states that "Any linear circuit containing several voltages and resistances can be replaced by just one single voltage in series with a single resistance connected across the load."

It is possible to simplify any electrical circuit, no matter how complex.

Hardware Circuit:

To Find V_{TH}:

PHOTO OF CIRCUIT ATTACHED IN LAST PAGE

Reading:

Applied Voltage (Volts)	V_{TH} (Volts)
20V	11.69V

To Find R_{TH}:

PHOTO OF CIRCUIT ATTACHED IN LAST PAGE

Reading:

Applied Voltage	Voltmeter Reading	Ammeter Reading	$R_{TH} = V/I$ ohms
10V	—	9 mA	1110
12V		11 mA	1090
14V		13mA	1077

Average of R_{TH} = 1093 **Ohms.**

To Find I_L:

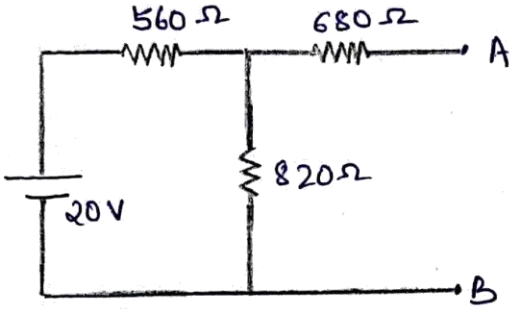
PHOTO OF CIRCUIT ATTACHED IN LAST PAGE

Reading:

Applied Voltage (Volts)	Ammeter Reading (Amps)
11.6 V	11 mA

Manual Calculations:

To Find V_{TH}:



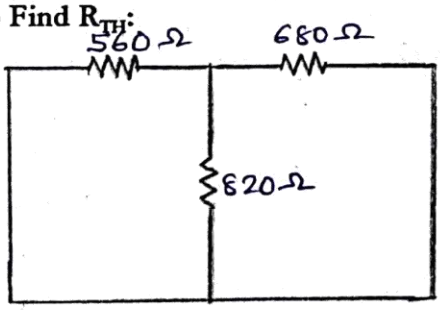
$$i = \frac{20}{(560+820)} = \frac{1}{69}$$

(current through 680 = 0)

$V_{th} = i \times 820 = 11.88V$

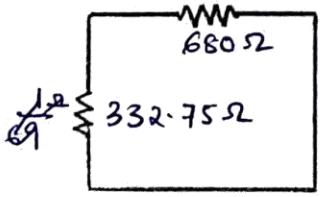
(voltage through 820 is V_{th} because 820 is in parallel)

To Find R_{TH}:

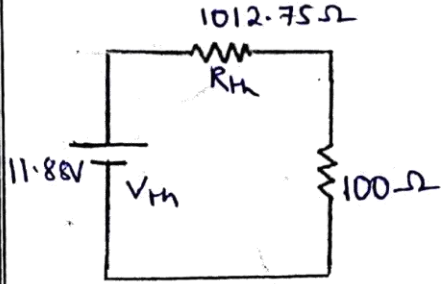


$R_{th} = \frac{560 \times 820}{(560+820)} + 680$

$R_{th} = 1012.75\Omega$



To Find I_L:



$R = R_{th} + 100 = 1112.75\Omega$

$V_{th} = IR \rightarrow I = \frac{V_{th}}{R}$

$I = \frac{11.88}{1112.75} = 10.67 mA$

Procedure:

1) Manually calculate, V_{th}, R_{th} and I_L using Thevenin's Theorem.
2) For practical purpose connect the circuit as shown in the circuit diagrams.
3) First find current through the whole circuit.
4) To find V_{th}, remove ammeter, 680Ω resistor & 100Ω resistor and replace them with voltmeter.
5) To find R_{th}, remove voltmeter and reconnect 680Ω resistor, ammeter and connect a variable voltage source as shown in diagram.
6) Take 3 ammeter readings and calculate R_{th}
7) Check if practical output is same as manual calculations.

Result:

Thevenin's Theorem

Manual Calculations

$V_{th} = 11.88V$

$R_{th} = 1012.75\Omega$

$I_L = \frac{V_{th}}{R_{th}} = 11.7mA$

$I_L = 10.67mA$

Practical Output

$V_{th} = 11.67V$

$R_{th} = 1093\Omega$

$I = 11mA$

$I_L = \frac{V_{th}}{R_{th}} = 10.67mA$

Inference:

Since manual calculations are same as practical output, Thevenin's Theorem is verified.

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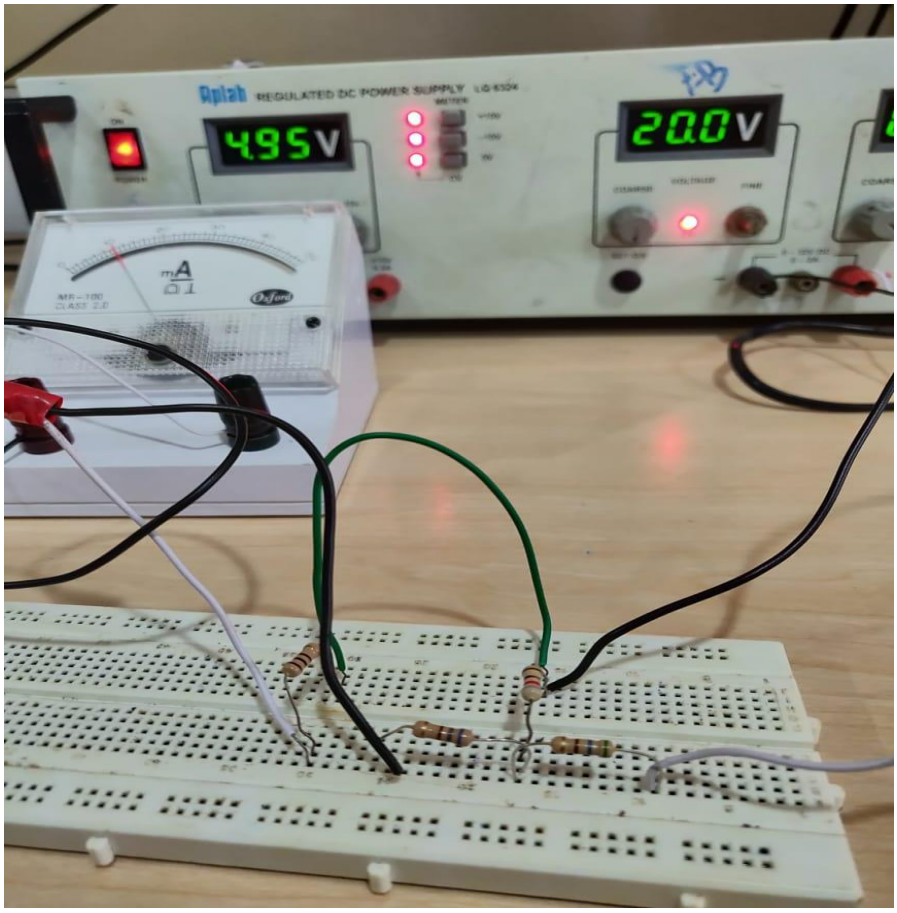
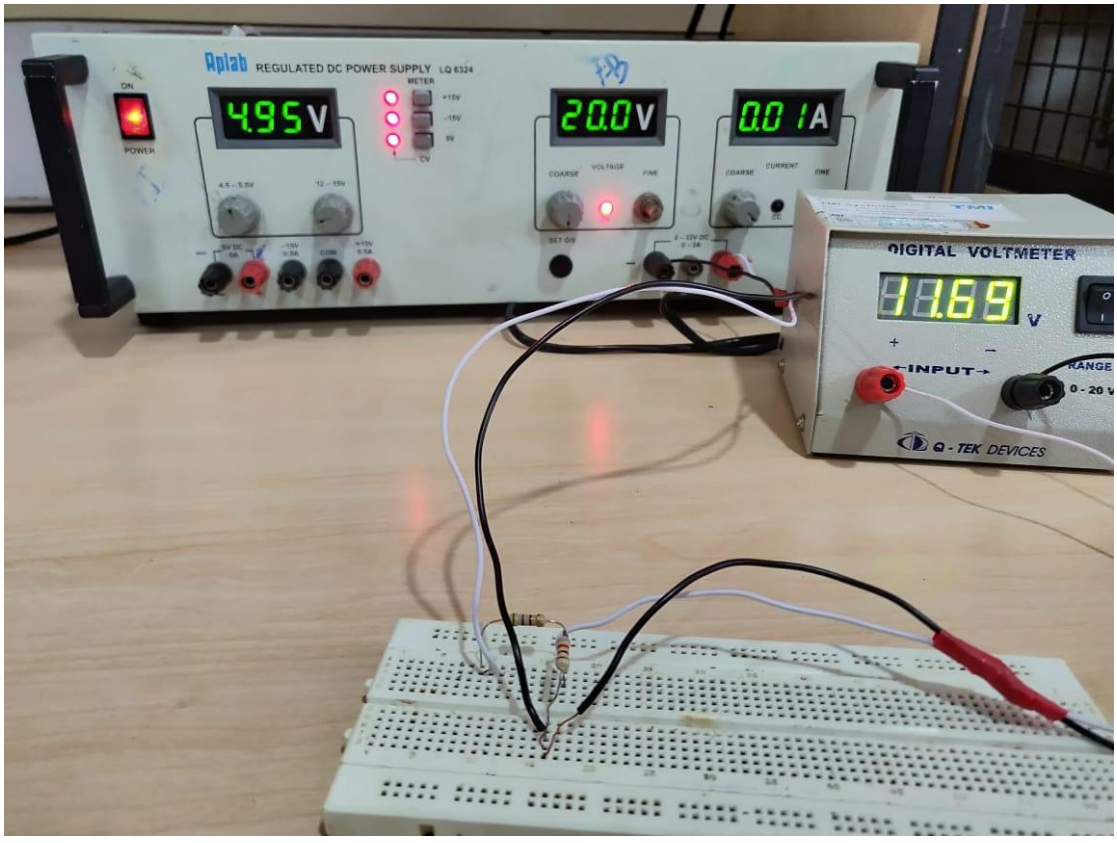
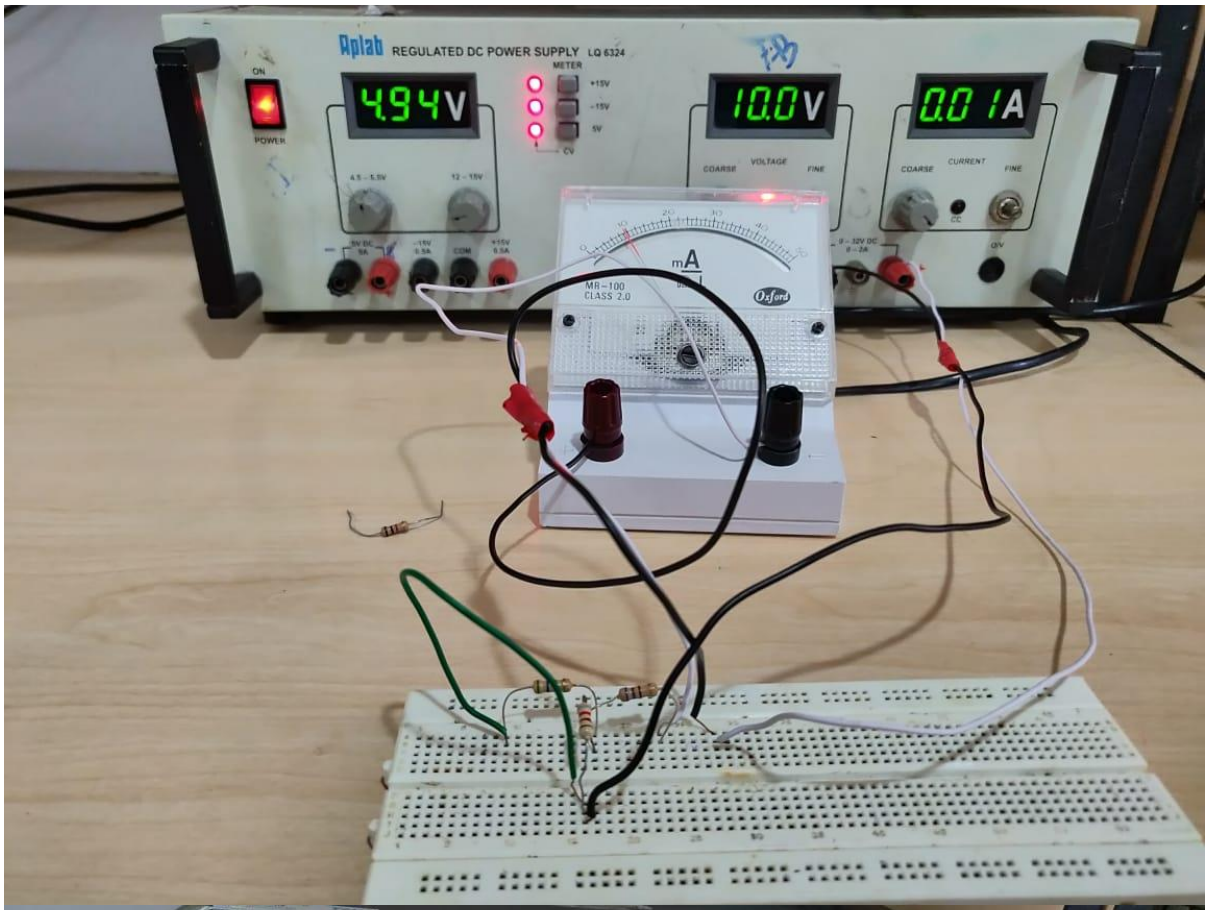
MAIN CIRCUIT

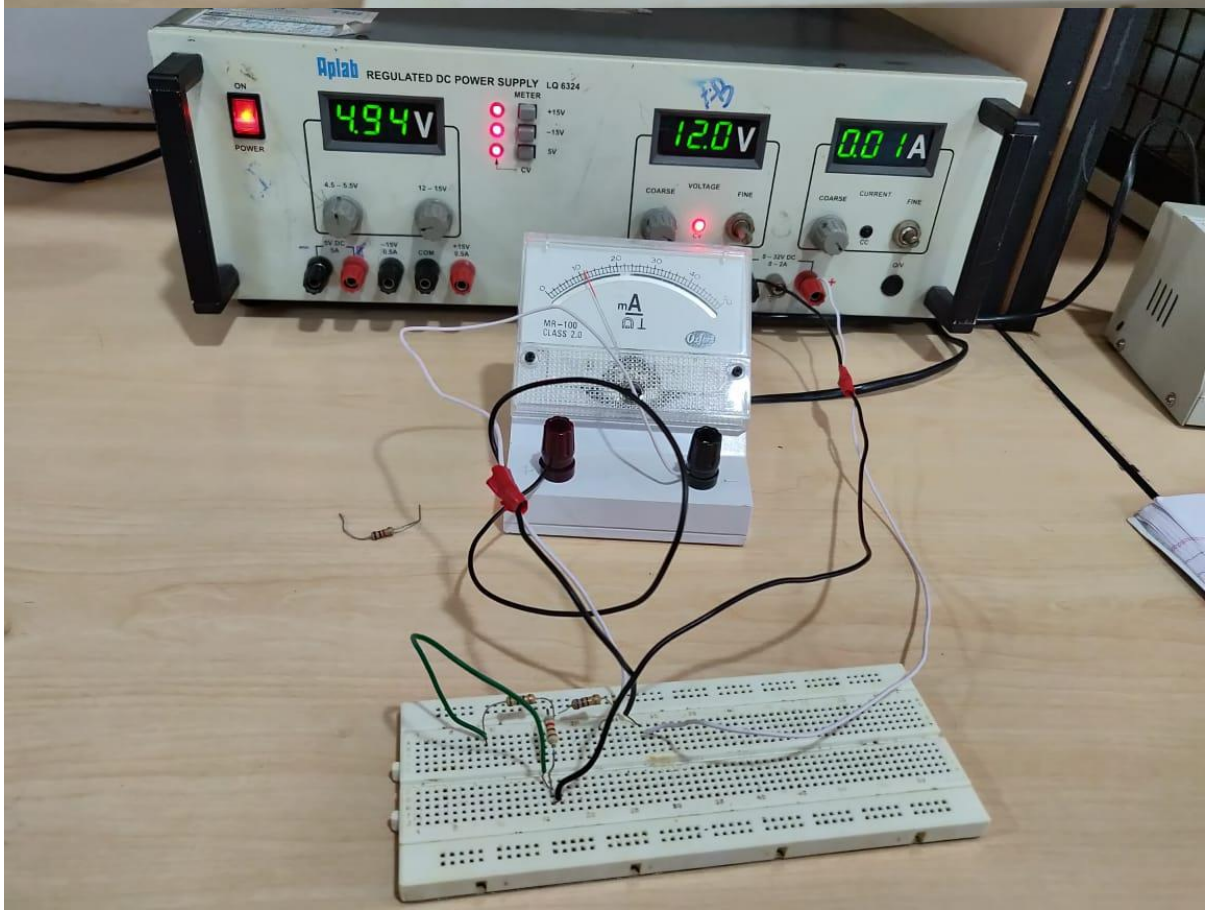


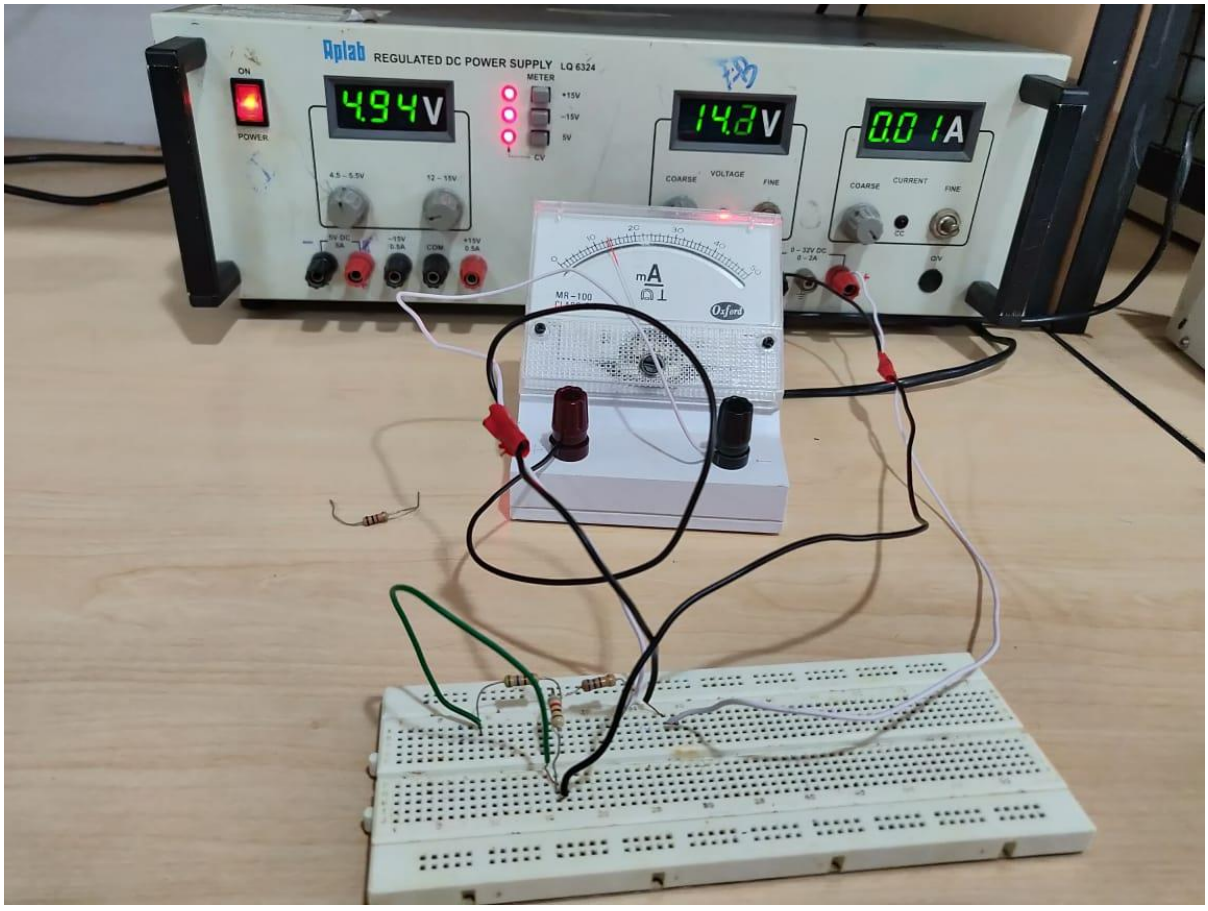
TO FIND Vth:



TO FIND Rth:

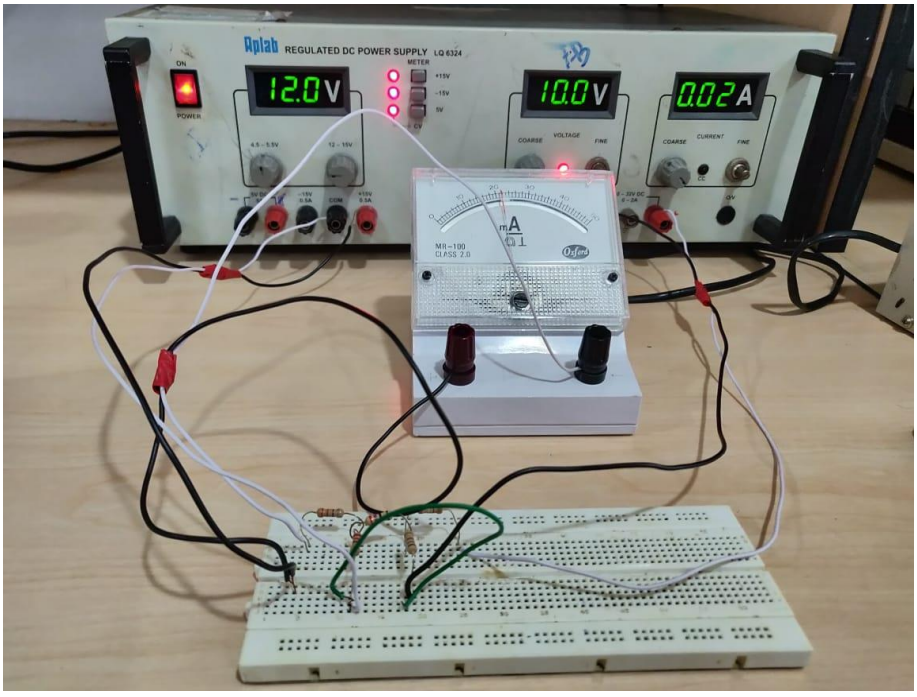

Aplab
REGULATED DC POWER SUPPLY
LQ 6324
4.94V
10.0V
0.01A
MR-100
CLASS 2.0
Oxford


Aplab
REGULATED DC POWER SUPPLY
LQ 6324
4.94V
12.0V
0.01A
MR-100
CLASS 2.0
Oxford

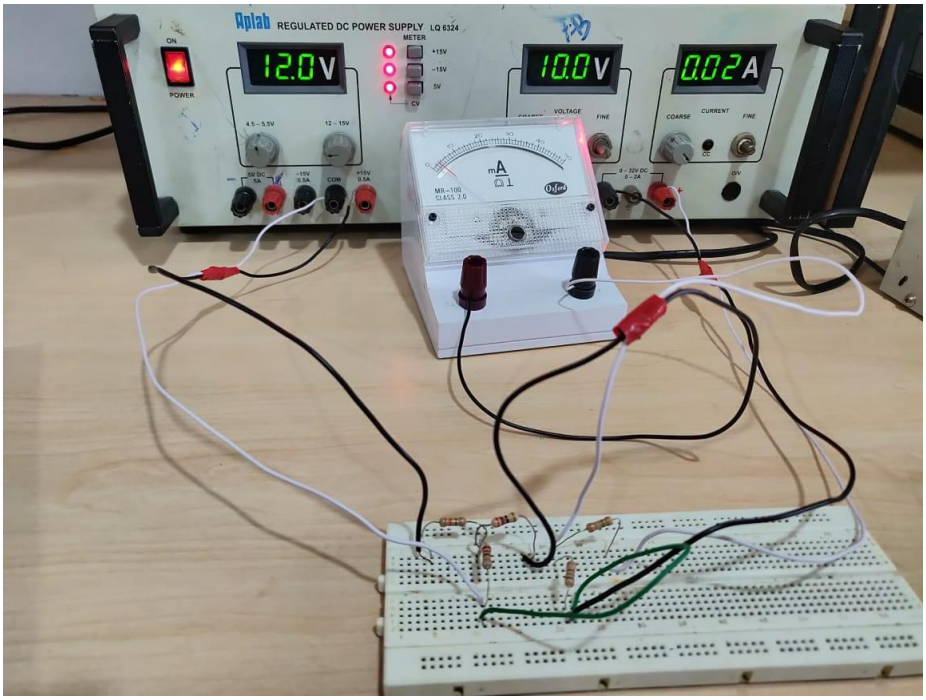

Aplab
REGULATED DC POWER SUPPLY
LQ 6324
4.94V
14.2V
0.01A
mA
Oxford

TO FIND I:

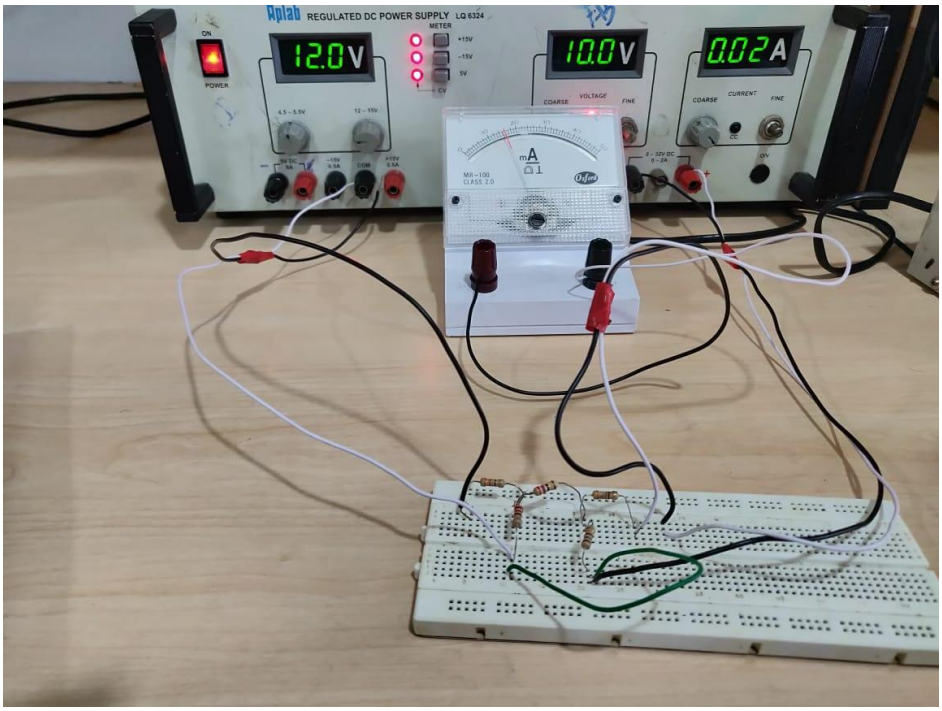
1) I1


Aplab
REGULATED DC POWER SUPPLY
LQ 6324
12.0V
10.0V
0.02A
mA
Oxford

2) I2


Aplab
REGULATED DC POWER SUPPLY
LQ 6324
12.0V
10.0V
0.02A

3) I3


Aplab
REGULATED DC POWER SUPPLY
LQ 6324
12.0V
10.0V
0.02A