IARE
INSTITUTE OF
AERONAUTICAL ENGINEERING
(An Autonomous Institute affiliated to JNTUH, Hyderabad)
Dundigal, Hyderabad - 500 043

LABORATORY WORK SHEET

Name of the Student: MADKI SAI CHARAN

Class: CSM -'C' Semester: I st

Course Code: AEED03 Course Name: Electrical and Electronics Engineering Laboratory.

Roll Number									
2	3	9	5	1	A	6	6	F	2

Name of the Course Faculty: MS.M. VARALAKSHMI. Faculty ID: IARE 11072

Exercise Number: 05 Week Number: 05 Date: 01 December 2023

DAY TO DAY EVALUATION:

Marks	Aim / Preparation	Algorithm / Procedure Performance in the Lab	Source Code Calculations and Graphs	Program Execution Results and Error Analysis	Viva - Voce	Total
Max. Marks	4	4	4	4	4	20
Obtained	4	4	4	4	4	20

Signature of Faculty

START WRITING FROM HERE :

Aim: To verify Norton's theorem for electrical circuit theoritically and practically.

Apparatus:

S.No	Equipment	Range	Type	Quantity.
01.	Ammeter	(0-200mA)	Digital	01
02.	Voltmeter	(0-20V)	Digital	01
03.	R.P.S	(0-30V)	Digital	01
04.	Bread Board	-	-	01.
05.	Resistors	82Ω, 47Ω, 100Ω, 150Ω	—	04
06.	Connecting wires	-	—	As required

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Statement: Any linear, Bilateral network with current sources, voltage sources and resistances can be replaced by an equivalent circuit consisting of a current source in parallel with a resistance. The value of the current source is the current flowing through the short circuit terminals of the network and the resistance is the equivalent resistance measured between the open circuit terminals of the network with all the energy sources replaced by the internal resistance.

Circuit Diagram:

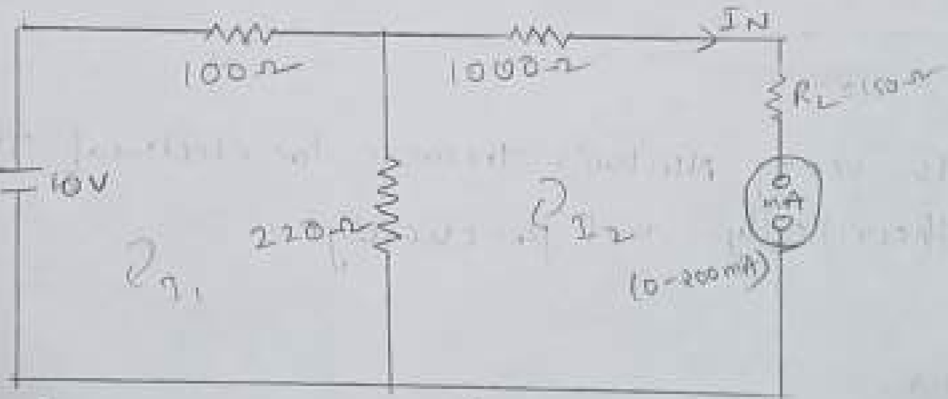

fig (1) Basic Circuit

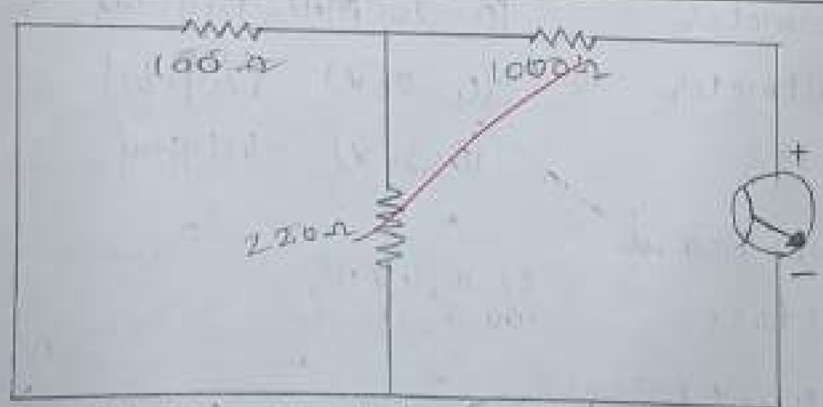

Fig (2) Norton's Equivalent circuit

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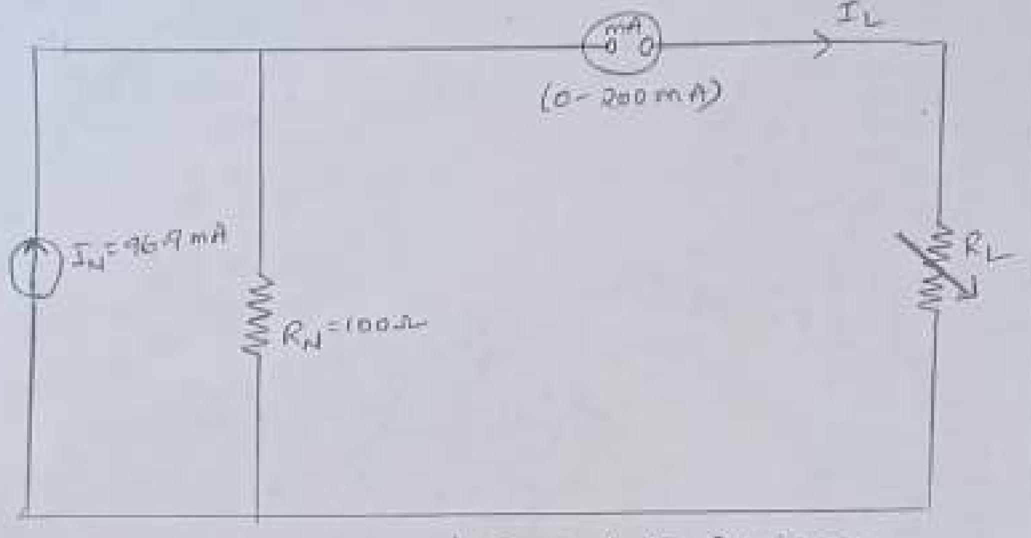

Fig (3) Norton's Equivalent Resistance.

Procedure :- ① Connect the circuit diagram as shown in fig (1).

② Measure the current I_{sc} (or) I_N through short circuited terminal.

③ Connect the circuit diagram as shown in fig (2).

④ Find the resistance between open circuited terminals by using multimeter.

⑤ Draw Norton's equivalent circuit by connecting I_N & R_N in parallel as shown in fig (3) and find out the load current.

Tabular column:

Parameters	Theoritical values	Practical values.
I_N.	6.43 mA	6.6mA
R_N	1068.75 Ω	1051.6 Ω
I_L	5.64mA	5.5 mA

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Calculations: $R_L = 150\Omega$

$$R_N = \left(\frac{100 \times 220}{100+220}\right) + 1000 = 68.75 + 1000$$

$$R_N = 1068.75\,\Omega$$

for loop-1:

$10 - 100I_1 - 220(I_1 - I_2) = 0$

$320I_1 - 220I_2 = 10$ — ①

For loop 2:

$1000I_2 + 220(I_2 - I_1) = 0$

$220I_1 - 1220I_2 = 0$ — ②

solve ① & ②; we get $I_1 = 0.03567A$

$I_2 = 0.00643A$

$\therefore I_N = I_2 = 0.00643A$

$$I_L = I_N \times \frac{R_N}{R_N + R_L} = 0.00643 \times \frac{1068.75}{1068.75+150}$$

$I_L = 0.00564\,A = 5.64\,mA$

Result: Hence, Norton's theorem is verified both practically and Theoritically.