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

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

Course Code : AEE003 Course Name : Electrical and Electronics Engineering Laboratory.

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

Exercise Number : 07 Week Number : 07 Date : 22 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 the condition of reciprocity for an electric network theoritically and practically.

Apparatus :

S.NO	Name of the Equipment	Range	Type	Quantity
01.	Ammeter	(0-200 mA)	Digital	01
02.	Voltmeter	(0-30V)	Digital	01
03.	R.P.S	(0-30V)	Digital	01
04.	Resistors	100Ω, 150Ω, 10Ω, 220Ω, 47Ω	-	05
05.	Bread Board	-	-	01
06.	Connecting wires	-	-	As required.

Statement : In any linear, bilateral, single source network the ratio of excitation to response is constant even when their positions are inter changed

ROLL NUMBER: 23951A66F1

Circuit Diagram:

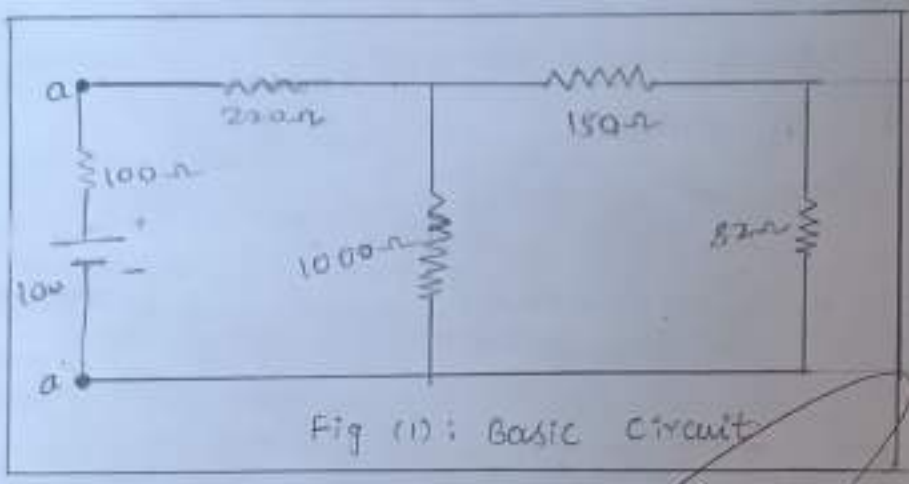

Fig (1): Basic Circuit

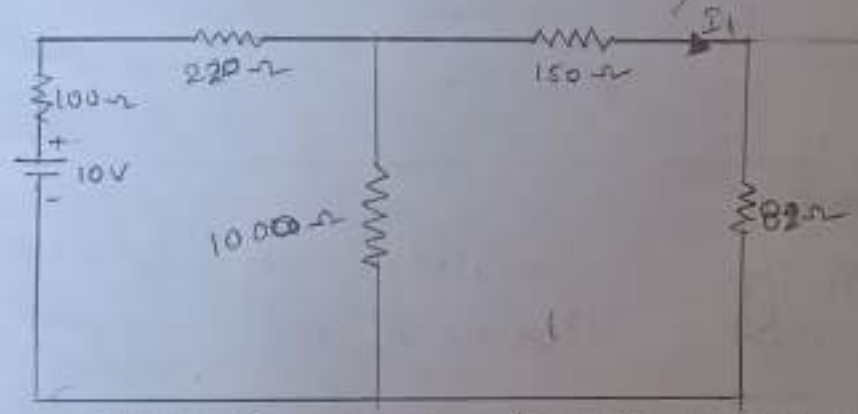

Fig (2): Response due to 10V before interchanging load

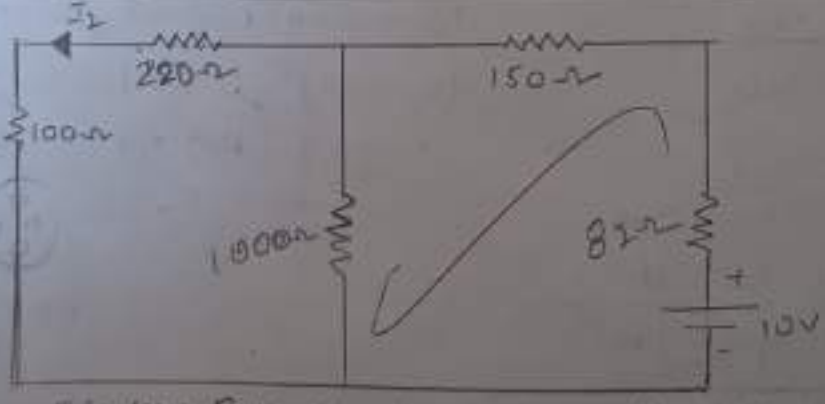

Fig (3): Response due to 10V after interchanging load.

ROLL NUMBER: 23957A66F2

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

② Measure the current I_1 in the branch.

③ Inter-change voltage source and response as shown in fig (3) and note down the current I_2.

④ Observe that the currents I_1 and I_2 should be same.

⑤ Measure the ratio of excitation and response and check whether they are equal in both cases.

Calculations:

From fig ②

$$R_{eq} = \left(\frac{232 \times 1000}{1232}\right) + 220 + 100 = 508.13\,\Omega$$

$$I_T = \frac{10}{508.13} = 0.019\,A = 19 \times 10^{-3}\,A$$

$I_T = 19\,mA$

$$I_1 = \frac{OPD}{Total} \times I_T$$

$$I_1 = 0.019 \times \frac{1000}{1232} \Rightarrow I_1 = 0.0154\,A$$

$V/I_1 = 649.35$

From fig ③

$$R_{eq} = \left(\frac{320 \times 150}{1320}\right) + 150 + 82$$

$R_{eq} = 474.42\,\Omega$

$I_T = \frac{10}{474.42} = 0.021A$

$I_T = 21mA$

$I_2 = I_T \times \frac{OPR}{Total} = 0.021 \times \frac{1000}{1320}$

$I_2 = 0.015A$

$V/I_2 = 649.35$

$\Rightarrow V/I_1 = V/I_2$

Tabular Column:

Parameters	Theoritical Values	practical Values
I_1	15.4mA	16.4 mA
I_2	15.4mA	16.1mA

Precautions:

1. Check for proper connections before switching ON the supply.
2. Make sure of proper colour coding of resistors.
3. The terminal of the resistance should be properly connected.

Result:

Hence, Reciprocity theorem for an electric circuit network is verified both theoritically and practically.