IARE

INSTITUTE OF AERONAUTICAL ENGINEERING

(An Autonomous Institute affiliated to JNTUH, Hyderabad)

Dundigal, Hyderabad - 500 043

# LABORATORY WORK SHEET

Name of the Student: Abdul Basith Khan

Class: 1st Year (CSM-A) Semester: 1st

| Roll Number | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3 | 9 | 5 | 1 | A | 6 | 6 | 0 | 1 |

Course Code: AEE001 Course Name: EEE Laboratory

Name of the Course Faculty: Dr. L. Rajashekhar - Guid Faculty ID: IARE11067

Exercise Number: 03 Week Number: 03 Date:

**DAY TO DAY EVALUATION:**

| Marks | Aim / Preparation | Algorithm / Procedure | Source Code | Program Execution | Viva-Voce | Total |
|---|---|---|---|---|---|---|
| | | Performance in the Lab | Calculations and Graphs | Results and Error Analysis | | |
| Max. Marks | 4 | 4 | 4 | 4 | 4 | 20 |
| Obtained | 4 | 4 | 4 | 3 | 4 | 19 |

Signature of Faculty

**START WRITING FROM HERE :** Mesh Analysis:-

Aim:-

The study of mesh analysis is the objective of this existence especially its usage in multi-source DC circuits, Its applicati in finding circuit currents and voltages will be investigated

Apparatus:-

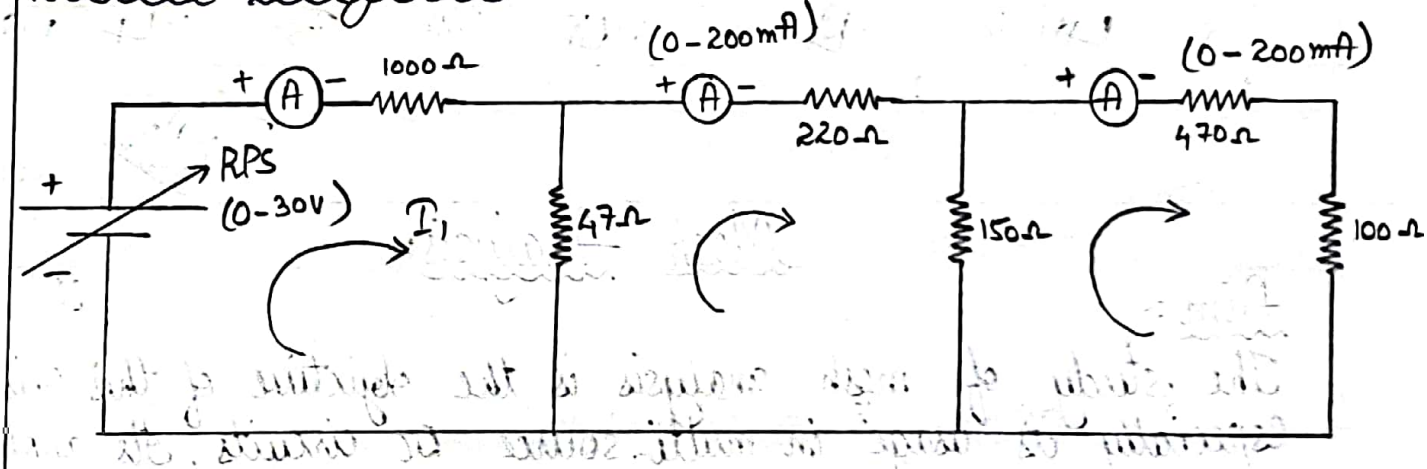
| S. No. | Equipment | Range | Type | Quantity |
|---|---|---|---|---|
| 1. | Resistor | 1KΩ, 220Ω, 470Ω, 100Ω, 150Ω, 47Ω | Carbon | 06 |
| 2. | Ammeter | 0-200 mA | Digital | 01 |
| 3. | RPS | (0-30 V) | Digital | 01 |
| 4. | Bread Board | - | - | 01 |
| 5. | Connecting wires | - | - | required |

ROLL NUMBER :

## Theory:-

Multi source DC circuits may be analized using a mesh current techniques. The process involves identifying a minimum number a small loops such that every component exists in atleast one loop KVL is then applied to each loop. The loop currents are referred as mesh currents as each. As a result there will be a set of simultaneous equations created as unknown mesh current for each loop once the mesh currents are determined various branch currents and components derived.

## Circuit Diagram:-




## Observation:-

| Applied Voltage V (Volts) | Loop Current ($I_1$) mA | | Loop Current ($I_2$) mA | | Loop Current ($I_3$) mA | |
|---|---|---|---|---|---|---|
| | Theoritical | Practical | Theoritical | Practical | Theoritical | Practical |
| 15 V | 14.7 | 15.2 | 1.75 | 1.80 | 0.36 | 0.4 |

ROLL NUMBER :

## Steps :-

1. Recognize the meshes and label the diagram direction of mesh current i.e. anti clockwise or clockwise directions
2. The next step is the amount of current flowing through every circuit element is observed & noted in form of mesh.
3. Apply KVL & Ohm's law to write equations for all meshes.
4. To obtained the values of mesh currents, solve all the mesh equations obtained before.
5. Hence, the following the above steps, it is very easy to determine the current that flows through each element & the voltage that is present across the elements in circuit or network.

## Procedure :-

1. Connect the circuit diagram as shown in fig.
2. Switch on the supply to RPS.
3. Apply the voltage (say 15 V)
4. Gradually increase the supply voltage in steps.
5. Connect ammeters in the loop & find its current $I_1, I_2, I_3$
6. Verify the practical results obtained with theoritical result

## Calculations :-

1st mesh :-

$$-100I_1 - 47(I_1 - I_2) + 15 = 0$$

$$-1047I_1 - 47I_2 + 15 = 0 \quad \text{——} (1)$$

2nd mesh :-

$$-220I_2 - 150(I_2 - I_3) + 47(I_1 - I_2) = 0$$

$$47I_1 - 417I_2 + 150I_3 = 0 \quad \text{——} (2)$$

3rd mesh :-

$-470I_3 - 100I_3 + 150(I_2 - I_3) = 0$

$150I_2 - 720I_3 = 0$ ——— ③

By Solving equations ①, ② & ③ we get

$I_1 = 14.7\,mA$

$I_2 = 1.75\,mA$

$I_3 = 0.30\,mA$

## Precautions :-

→ Check the proper connections before switching on supply

→ Make sure of proper colour coding of resistors.

→ The terminal of the resistance should be properly connect

## Result :-

Hence, By mesh analysis, loops of voltage '0' we can find the current passing through resistance or Loop easily.