CHITTAGONG UNIVERSITY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING
CHITTAGONG-4349, BANGLADESH.

Course No. EEE-182

Course Title: Basic Electrical Engineering Sessional

Experiment No. 2

VERIFICATION OF KVL AND VOLTAGE DIVIDER RULE

PRELAB WORK:

- **Read this laboratory manual carefully before coming to the laboratory class, so that you know what is required.**
- Try to **follow** the lecture notes of **EEE 111.**
- **DONOT** copy others blindly!!!
- **Submit your lab report before the roll call.**

OBJECTIVE:

This experiment is intended to verify Kirchhoff's voltage law (KVL) and voltage divider law with the help of series circuits and derive the equivalent resistance of the series circuit both experimentally and analytically.

THEORY:

KVL states that, around a close circuit, the sum of voltage rises equals the sum of the voltage drops –

$$\sum V_{rise} = \sum V_{drop}$$

The voltage divider law is given by –

$$V_x = \frac{R_x}{R_s} \times V_s$$

The equivalent (total) resistance of a series circuit is given by –

$$R_s = \sum R_y = R_1 + R_2 + R_3 + \cdots \quad ; where, \;\; y = 1, 2, 3 \; etc$$

APPARATUS:

1. One DC voltmeter (0~300V).
2. One DC Ammeter (0~5A).
3. Three Rheostats.
4. One SPST switch.
5. One multimeter.
6. One DC power supply.

CIRCUIT DIAGRAM:

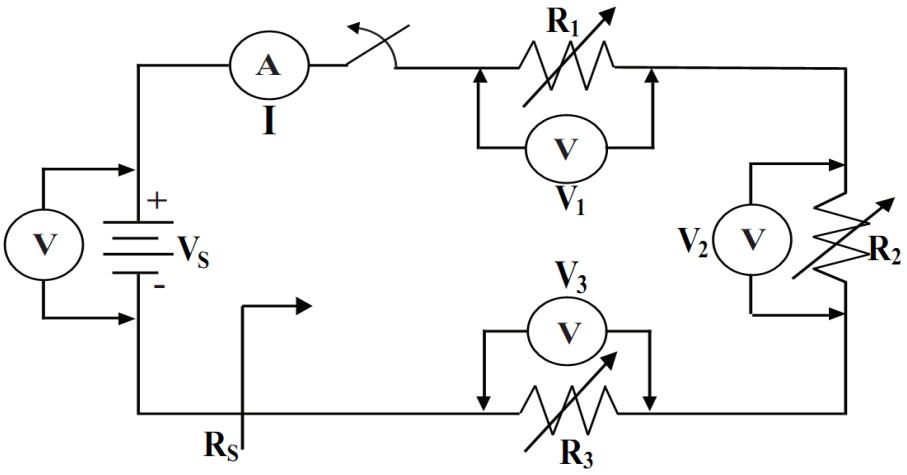

Figure: Verification of KVL and Voltage divider rule.

PROCEDURE:

1. Connect three rheostats R_1, R_2, R_3 in series through a SPST switch to a DC power supply as shown in Fig. 1.
2. Apply 15V DC from the DC power supply.
3. Set the rheostats at their maximum value and take readings of V_1, V_2, V_3, V_s using a voltmeter, I using an ammeter and R_1, R_2, R_3 using a multimeter. Vary the rheostats in such a way that ammeter reading does not exceed the current rating of any of the rheostats. Take at least 5 sets of reading and enter it in the table.
4. Verify KVL (i.e. $V_s = V_1 + V_2 + V_3$) for each set of data, find total resistance of the series circuit using the formula $R_s = R_1 + R_2 + R_3$. Compare this with experimentally obtained value $R_s = V_s/I$. Verify voltage divider rule for each set of data.

EXPERIMENTAL DATA:

No. of obs.	V_s volts	I amps	V_1 volts	V_2 volts	V_3 volts	$R_s = R_1 + R_2 + R_3$ ohms	Rs=Vs/I ohms	$V_s = V_1 + V_2 + V_3$ volts

REPORT:

1. Show the results in tabular form.
2. Comment on the results obtained and discrepancies (if any).

CAUTION:

1. Do not switch on the supply until the circuit has been checked by your teacher.
2. Take care of the apparatus.
3. Do not touch any open ended wire or cable with applying voltage supply at the other end.

HOME TASK:

Answer the following questions –

1. State the rules of connecting ammeter and voltmeter in the circuit.
2. If an ammeter is connected in parallel across an element, what could be the possible danger?
3. "KVL is the restatement of the Law of the conservation of energy" – justify the statement.
4. Why the rheostats have current ratings in addition to the resistance ratings?
5. "KVL is applicable for open circuit too" – justify the statement.