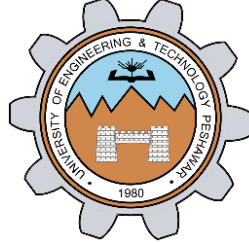


# OPEN ENDED LAB AND DESIGN PROBLEMS.

## LAB REPORT # 08



**Spring 2023**

**CSE103L Circuits & Systems-I Lab**

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“On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work.”

Student Signature: \_\_\_\_\_

Submitted to:

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## **LAB TITLE: OPEN ENDED LAB AND DESIGN PROBLEM**

### **OBJECTIVE OF LAB:**

In the following lab, we will do an open end discussion and practice on how much knowledge we about voltage divider method , nodal analysis and how to apply KCL and KVL to the nodes and loops of a circuit.

### **VOLTAGE DIVIDER METHOD:**

Voltage divider circuits are used to produce different levels from the voltage source but the current is the same for all components in a circuit.

### **EQAUTION:**

$$V_{out} = V_{in} \frac{R2}{R1+R2}$$

### **NODAL ANALYSIS:**

It is a method of determining the voltage between nodes in an electrical circuit in terms of the branch currents. Nodal voltage analysis finds the unknown voltage drops around a circuit between different nodes that provide a common connection for two or more circuit components.

### **KIRCHOFFS CIRCUIT LAW:**

Kirchoff circuit law allow us to solve complex circuit problems by defining a set of basic network laws and theorems for the voltage and currents and a circuit.

### **KIRCHHOFFS CURENT LAW:**

This law states that the amount of current entering a junction is exactly equal to the amount of current leaving the junction.

### **MATHEMATICAL FORM:**

$$I_{(exiting)} + I_{(entering)} = 0.$$

## KIRCHHOFF VOLTAGE LAW:

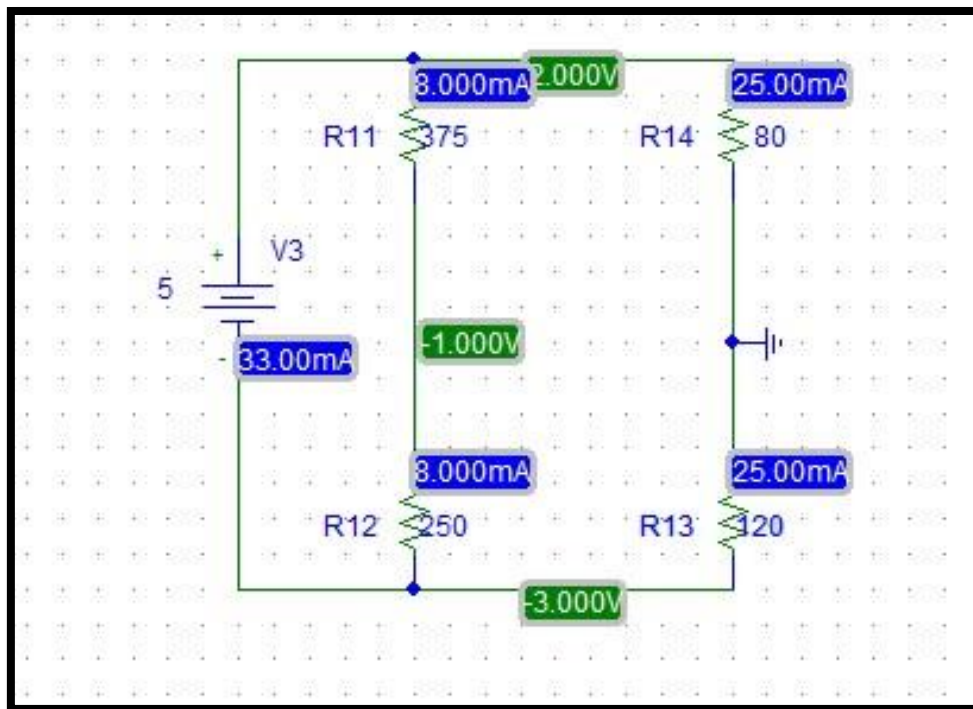
*This law states that the sum of voltage rise and voltage drop in loop is equal to zero.*

## MATHEMATICAL FORM:

$$\Sigma V = 0$$

**Q) Design a series-parallel circuit to get the two volt at the end of the output resistor providing a source of 5 volt. Also verify KCL & KVL.**

### 1.3 CIRCUIT:-



➤ **GIVEN:-**

We have assumed the resistance values.

$$R_2=250, R_4=120$$

Voltage supplied is 5 Volt.

We have assumed that voltage across  $R_1$  is 3V &  $R_2$  is 2V.

➤ **REQUIRED:**

**By these values, we will find  $R_1$  &  $R_3$ . We will also find total current across the circuit and current across each node.**

➤ **SOLUTION:-**

To find  $R_1$  &  $R_3$ :

**Apply voltage divider formula:-**

$$2 = (250 / (250 + R_1)) 5$$

$$R_1 = 375\Omega$$

$$3 = (120 / (120 + R_3)) 5$$

$$R_3 = 80\Omega$$

➤ **To find total current:**

$$\text{Total resistance: } 1/R_c = 1/(250+375) + 1/(120+80)$$

$$R_c = 151.5\Omega$$

$$I = V/R$$

$$I = 5/151.5 \Rightarrow$$

$$0.033A \text{ To find } I_1 \text{ \&}$$

$$I_2:$$

$$I_1 = V/R$$

$$=5/(375+250) \Rightarrow 0.008$$

$$I_2 = V/R$$

$$=5/(120+80) \Rightarrow 0.025$$

➤ **To verify KCL:**

Apply KCL at node A

$$I_{\text{total}} = I_1 + I_2$$

$$0.033A = 0.008A + 0.025A \Rightarrow$$

$$0.033A = 0.033A$$

➤ **To verify KVL:**

Apply KVL at loop 1

$$VR_1 + VR_2 + V_{\text{total}} = 0$$

$$3A + 2A - 5A = 0 \Rightarrow 0 = 0$$

**CONCLUSION:**

In this lab, the value of current calculated theoretically and the value of current by the stimulation of pspice, hence both are same.

### LAB RUBRICS: (Circuits & Systems-I Lab)

Criteria & Point Assigned	Outstanding 4	Acceptable 3	Considerable 2	Below Expectations 1
<b>Attendance and Attentiveness in Lab</b>  PLO10	Attended in proper Time and attentive in Lab	Attended in proper Time but not attentive in Lab	Attended late but attentive in Lab	Attended late not attentive in Lab

<b>Equipment / Instruments Selection and Operation</b>  PLO1, PLO2, PLO3, PLO5,	Right selection and operation of appropriate equipment and instruments to perform experiment.	Right selection of appropriate equipment and instruments to perform experiment but with minor issues in operation	Needs guidance for right selection of appropriate equipment and instruments to perform experiment and to overcome errors in operation	Cannot appropriately select and operate equipment and instruments to perform experiment.
<b>Result or Output/ Completion of target in Lab</b> PLO9,	100% target has been completed and well Formatted.	75% target has been Completed and well formatted.	50% target has Been completed but not well formatted.	None of the outputs are correct
<b>Overall, Knowledge</b> PLO10,	Demonstrates excellent knowledge of lab	Demonstrates good knowledge of lab	Has partial idea about the Lab and procedure followed	Has poor idea about the Lab and procedure followed
<b>Attention to Lab Report</b> PLO4,	Submission of Lab Report in Proper Time i.e. in next day of lab., with proper Documentation.	Submission of Lab Report in proper time but not with proper Documentation.	Late Submission with proper Documentation.	Late Submission Very poor documentation