

LAB NO: 13**TO ANALYZE A DC CIRCUIT USING MILLMAN'S THEOREM****OBJECTIVE:**

THEORY:**MILLMAN'S THEOREM:**

Millman's theorem was named after famous electrical engineering professor Jacob Millman who proposed the idea of this theorem. Millman's theorem acts as a very strong tool in case of simplifying the special type of complex electrical circuit. This theorem is nothing but a combination of Thevenin's Theorem and Norton's Theorem. It is very useful theorem to find out voltage across the load and current through the load. This theorem is also called as parallel generator theorem.

Millman's theorem is applicable to a circuit which may contain only voltage sources in parallel or a mixture of voltage and current sources connected in parallel.

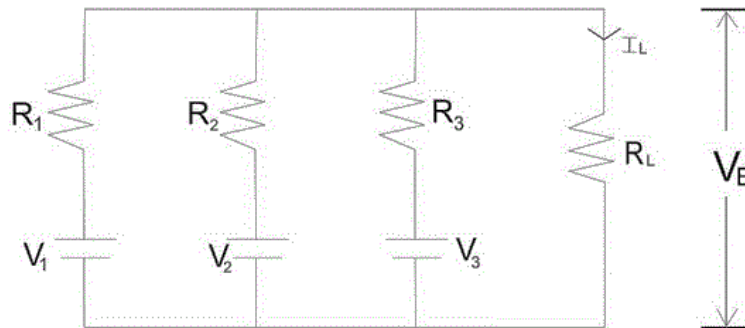


Figure 13.1: Circuit Containing Voltage Sources Only

Here V_1 , V_2 and V_3 are voltages of respectively 1st, 2nd and 3rd branch and R_1 , R_2 and R_3 are their respective resistances. I_L , R_L and V_T are load current, load resistance and terminal voltage respectively. Now this complex circuit can be reduced easily to a single equivalent voltage source with a series resistance with the help of Millman's Theorem.

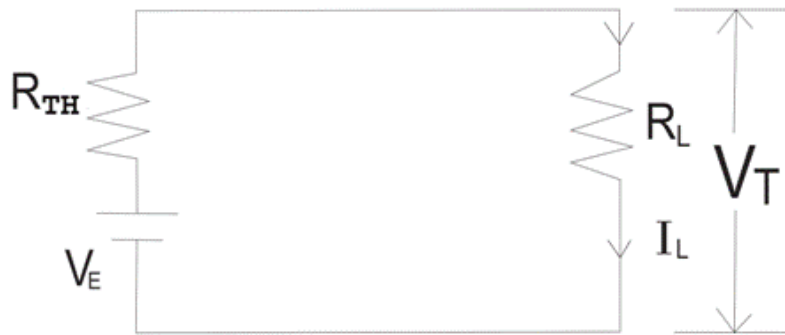


Figure 13.2: Equivalent Circuit

The value of equivalent voltage V_E is specified as per Millman's theorem will be:

$$V_E = \frac{\frac{V_1}{R_1} + \frac{V_2}{R_2} + \frac{V_3}{R_3}}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}} = \frac{\sum \frac{V}{R}}{\sum \frac{1}{R}}$$

This V_E is nothing but Thevenin's voltage and Thevenin's resistance R_{TH} can be determined as per convention by shorting the voltage source. So R_{TH} will be obtained as:

$$R_{TH} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}$$

Now load current and terminal voltage can be easily found by:

$$I_L = \frac{V_{TH}}{R_L + R_{TH}} \quad \& \quad V_T = I_L \times R_L$$

APPARATUS:

- Digital multi-meter
- DC power supply
- Resistors
- Connecting Wires

SCHEMATIC DIAGRAM:

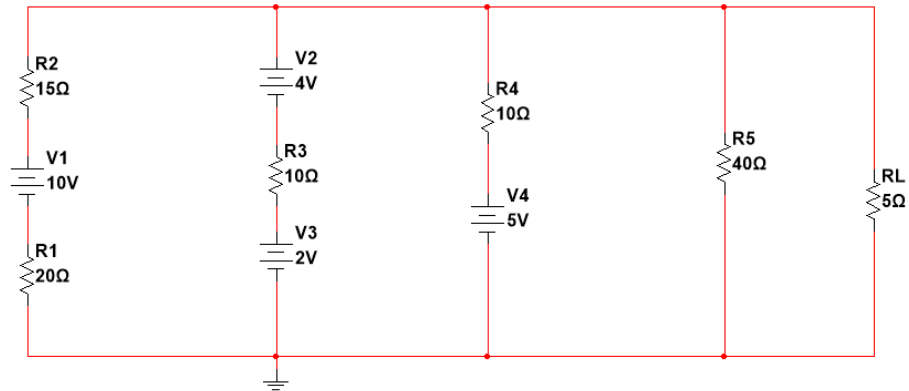


Figure 13.3: Circuit Diagram

PROCEDURE:

CALCULATIONS:

Parameters	Theoretical	Practical
V_{TH}		
R_{TH}		
Current through R_L		
Voltage across R_L		

Table 13.1

CONCLUSION:

POST LAB QUESTIONS:

1. In Millman's theorem, how R_{TH} is calculated?

2. In Millman's theorem, how V_{TH} is calculated?

3. What is the main difference between Thevenin's Theorem and Millman's Theorem?

Teacher Remarks:

Obtained Marks: _____ / 10