LAB NO: 08

TO ANALYZE A DC CIRCUIT USING NODAL ANALYSIS

OBJECTIVE:

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THEORY:

NODE:

In electrical engineering, node refers to any point on a circuit where two or more circuit elements meet. For two nodes to be different, their voltages must be different.

NODAL ANALYSIS:

In electric circuits analysis, nodal analysis, node-voltage analysis, or the branch current method is a method of determining the voltage (potential difference) between "nodes" (points where elements or branches connect) in an electrical circuit in terms of the branch currents. Multi-source DC circuits may be analyzed using a node voltage technique. The process involves identifying all of the circuit nodes, a node being a point where various branch currents combine. A reference node, usually ground, is included. Kirchhoff's Current Law is then applied to each node. Consequently a set of simultaneous equations are created with an unknown voltage for each node with the exception of the reference.

STEPS FOR NODAL ANALYSIS:

1. Note all connected wire segments in the circuit. These are the nodes of nodal analysis.
2. Select one node as the ground reference. The choice does not affect the result and is just a matter of convention. Choosing the node with the most connections can simplify the analysis. For a circuit of N nodes the number of nodal equations is N−1.
3. Assign a variable for each node whose voltage is unknown. If the voltage is already known, it is not necessary to assign a variable.
4. For each unknown voltage, form an equation based on Kirchhoff's current law. Basically, add together all currents leaving from the node and mark the sum equal to zero. Finding the current between two nodes is nothing more than "the node you're on, minus the node you're going to, divided by the resistance between the two nodes."

5. If there are voltage sources between two unknown voltages, join the two nodes as a super node. The currents of the two nodes are combined in a single equation, and a new equation for the voltages is formed.
6. Solve the system of simultaneous equations for each unknown voltage.

APPARATUS:

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

SCHEMATIC DIAGRAM:
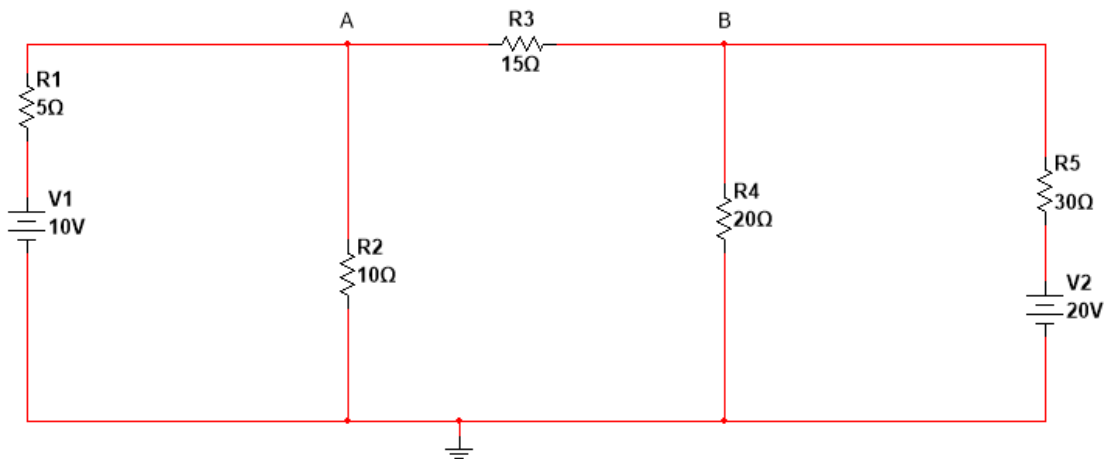
Figure 8.1: Circuit Diagram

PROCEDURE:

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CALCULATIONS:

Parameters	Theoretical	Practical
V_A		
V_B		
Current through R_1		
Current through R_2		
Current through R_3		
Current through R_4		
Current through R_5		

Table 8.1

CONCLUSION:

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POST LAB QUESTIONS:

1. What is the difference between node and junction?

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2. What is the main difference between mesh analysis and nodal analysis?

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3. If there are 8 nodes in a network, how many number of equations can we get in the nodal analysis?

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Teacher Remarks:

Obtained Marks: _____ **/** 10