Kirchhoff’s Laws

Necessary Tools:

Power source, Multimetre, Resistance, Connection cables

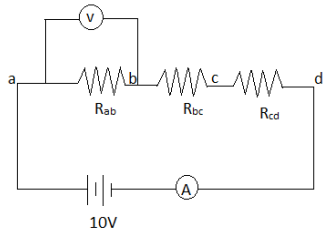
Objectives:

Examine the Kirchoff rules.

Introduction:

1. Kirchhoff’s voltage law: In a closed circuit, the potential differences between the terminals of series connected circuit elements (including the generator and the resistors) are total zero (ring rule). If the ring rule applies to the circuit in figure 1.

Figure 1.



$V_{ab} + V_{bc} + V_{cd} + V_{ad} = 0$ or $-IR_{ab} - IR_{bc} - IR_{cd} + V_0 = 0$

In here ,Vo is the potential difference between the generator's electromotive force (emk), ie the ends of the generator.

2. Kirchhoff's current law: In a circuit consisting of more than one ring (Figure 2), the sum of the currents coming to the node is equal to the sum of the currents coming out of that node.

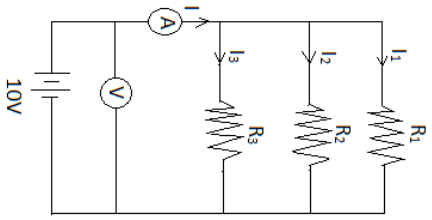
   $I = I_1 + I_2 + I_3$ can be written (Node rule). This rule also defines the protection of charge.

Procedure:

1. Construct the circuit shown in Figure 1.
   a) Measure the current supplied by the generator and the potential difference on each resistance.
   b) Interpret the result according to Kirchhoff’s voltage law.
   c) Using Ohm's law, calculate the value of each resistor, find the colors on the resistors and compare them with the resistance values.
   d) Find equivalent resistance.

2. Construct the circuit shown in Figure 2.

Figure 2.



a) Read the current at the node and the current flowing through each resistor.

b) Interpret the result according to Kirchhoff's current law.

c) Using Ohm's law, calculate the value of each resistor, find the colors on the resistors and compare them with the resistance values.

d) Find equivalent resistance.