BİLKENT UNIVERSITY
ELECTRICAL & ELECTRONICS ENGINEERING DEPARTMENT

EE 201 CIRCUIT THEORY

EXPERIMENT 1

Kirchhoff's Laws and Linear Resistors

Student Name:

Section :

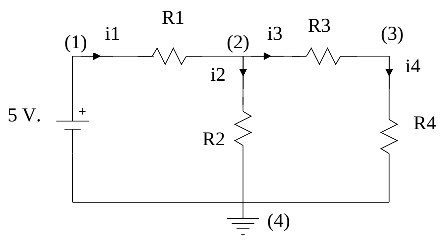
ID Number:

Date:

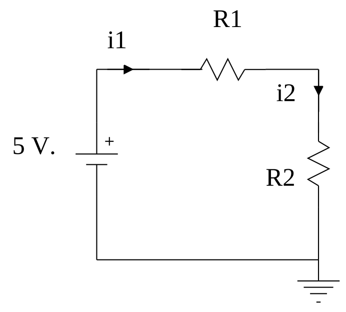
Preliminary Work

The standard resistors which are available at the lab are 1, 1.2, 1.5, 1.8, 2.2, 2.7, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2, (Ω), and their multiples of 10. In this experiment, choose the resistors in $1 - 10\ k\Omega$ range.

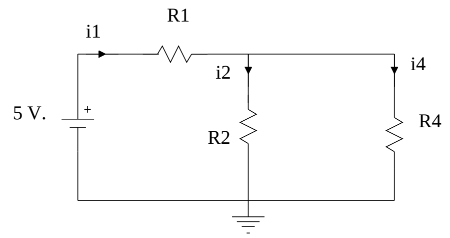
(1) Consider the following circuit. Choose arbitrary standard resistances in the range $1 - 10\ k\Omega$, and make sure that all resistances are distinct. (We have a limited number of resistors at the lab). Note that we expect a *random* distribution of resistances, hence the selection of same resistance combination by two or more students is highly *unlikely*. Find the voltages and currents of each element. (Standard references are used). Verify that KCL is satisfied at node (2) and KVL is satisfied for the closed node sequence (1)-(2)-(3)-(4)-(1). Find the node voltages e_1, e_2, e_3. Find v_1 and v_3 in terms of node voltages, and verify these relations.



(2) Consider the following circuit. This circuit is called a *voltage divider*. Without using the numerical values, find v_2 in terms of DC voltage source, R_1 and R_2. Using the same resistances used in the problem 1, find the numerical value of v_2.



(3) Consider the following circuit. This circuit is called a *current divider*. Without using numerical values, find the ratio i_4/i_1, in terms of the resistances. Using the same resistances used in the problem 1, find this ratio.



EXPERIMENT:

Part 1: By using the same resistance values used in the preliminary part, construct the circuit shown in problem 1. Measure the resistor voltages and currents. Verify the KCL for node (2) and KVL for the closed node sequence (1)-(2)-(3)-(4)-(1). Measure the node voltages e_1, e_2 and e_3. Measure the resistor voltages v_1 and v_3. Verify the relations between these voltages and the node voltages. Make comments if there are differences between computed and measured values.

Observation and comments:

Part 2: Construct the circuit shown in problem 2. Measure v_2. Make comments if there are differences between computed and measured values.

Observation and comments:

Part 3 : Construct the circuit shown in problem 3. Measure the currents i_1 and i_4. Evaluate the ratio i_4/i_1. Make comments if there are differences between computed and measured values.

Observation and comments :