Title: **Parallel Circuits, Conductance** Lab: 9

Course: Electrical Applications Unit: Electrical Lab CLO: 2, 3, 4

Name ANSWER KEY Grade 18pts Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall calculate resistance values in a parallel circuit.
2. Student shall prove the conductance method for calculating total resistance in a parallel circuit.
3. Student shall contrast the total resistance in a series circuit versus that of a parallel circuit.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Lab. Grading shall be based on instructor evaluation.

**Materials**

|  |  |
| --- | --- |
| Student Provided Materials | Department Provided |
| Proto-Board | Power Supply |
| Multimeter |  |
| Resistor Kit |  |
| Calculator |  |

**Theory**

Resistance is the degree to which a component opposes the electrical current. Conductance is the degree to which a component conducts electricity. Conductance is the inverse of resistance and is represented by the letter “G”. The unit for electrical conductance is siemens (S).  
The formula is as follows;

The conductance method is used to calculate a parallel circuit’s total current. The conductance method is derived as follows;

|  |  |  |
| --- | --- | --- |
|  |  |  |

**Circuit**



Where;

,

Calculations

The rheostat R4 shall initially start at 1kΩ.

1. Using the information on the previous page, calculate the following values.

G1 = 1mS G2 = 1mS G3 = 1mS G4 = 1mS

1. Using the pervious calculated values, compute the following totals.

GT = 4mS RT = 250Ω

Measurements

1. Build the circuit from the previous page on the proto-board. Make sure to adjust the rheostat R4 to 1kΩ. Measure and record the following values.

RT = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Does the measured total match that of the calculated total from the previous step? Yes / No If you answered “No” to the previous question, get instructor assistance.
2. Recalculate the following values based on R4 being set to 500Ω.

G4 = 2mS GT = 5mS RT = 200Ω

1. Readjust the rheostat R4 to 500Ω. Measure and record the following value.

RT = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Does the measured total match that of the calculated total from the previous step? Yes / No If you answered “No” to the previous question, get instructor assistance.
2. Recalculate the following values based on R4 being set to 10kΩ.

G4 = 100μS GT = 3.1mS RT = 322.581Ω

1. Readjust the rheostat R4 to 10kΩ. Measure and record the following value.

RT = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Does the measured total match that of the calculated total from the previous step? Yes / No If you answered “No” to the previous question, get instructor assistance.

Evaluations

1. In a parallel circuit, the total resistance (RT) is equal to;
   1. Larger than the largest resistor in the circuit.
   2. Smaller than the smallest resistor in the circuit.
   3. It depends on the resistor values in the circuit.
2. In a parallel circuit, total resistance is the sum of all resistors.
   1. True
   2. False
3. Define conductance in your own words (don’t copy the definition from above).

*It’s how easy electricity travels through a component of wire.*