Title: **Combination Series-Parallel** Lab: 13

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

Name ANSWER KEY Grade 44pts Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall calculate combination series-parallel circuit quantities using the characteristics of a series and a parallel circuit.
2. Student shall apply the conductance method of determining total resistance.

**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**

A combination circuit is a configuration that mixes components connected in series as well as components connected in parallel. A combination circuit has two major schemes, series-parallel and parallel-series. This lab will focus on the former.

A series-parallel circuit is a circuit whose major circuit is a series configuration, that has one or more minor parallel circuits in line with the major series circuit. To solve a series-parallel circuit, solve each parallel circuit first, then the major series circuit. Once individual parallel circuits are calculated, the totals for the major series circuit can be computed using the individual minor circuit calculations.

**Circuit**



Where;

**Instructions**

Calculations

1. Compute the following values based on the Ohm’s Wheel and the information given on the pervious page.

RAB = 519.444Ω

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 20.884mW | 4.172mA | 1.2kΩ | 5.006V |
| R2 | 2.134mW | 984.988μA | 2.2kΩ | 2.167V |
| R3 | 6.906mW | 3.188mA | 680Ω |
| R4 | 6.787mW | 4.172mA | 390Ω | 1.627V |
| Total | 36.711mW | 4.172mA | 2.109kΩ | 8.8V |

Measurements

1. Construct the circuit on the previous page. Take measurements and complete the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 |  |  |  |  |
| R2 |  |  |  |  |
| R3 |  |  |  |  |
| R4 |  |  |  |  |
| Total |  |  |  |  |

Evaluations

1. What would be the effect of increasing the value of R2 on total circuit resistance?
   1. Go Up
   2. Go Down
   3. Stayed the same
2. What would be the effect of increasing ES on I2?
   1. Go Up
   2. Go Down
   3. Stayed the same
3. If R3 was removed, how would total power be affected?
   1. Go Up
   2. Go Down
   3. Stayed the same
4. What would be the effect of removing R4 on P2 and P3?
   1. Go Up
   2. Go Down
   3. Stayed the same