Title: **Parallel Circuits** Worksheet: 8

Course: Electrical Applications Unit: Electrical Theory CLO: 3

Name ANSWER KEY Grade \_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall calculate power, current, resistance and voltage for each resistor in a series circuit.
2. Student shall distinguish the principle that a series circuit only contains one current.
3. Student shall formulate that a series circuit is a voltage divider.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Worksheet. Grading shall be based on an answer key.

**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**

|  |  |
| --- | --- |
| Branch 2  Branch 1 |  |

Where;

**Instructions**

Using the Ohms Wheel, solve for branch currents and power dissipated by each resistor. Use the conductance method to determine total resistance. Total current is the sum of all branch currents. You may check your conductance method answer by comparing it to the source voltage divided by the total current.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 454.545mW | 45.455mA | 220Ω | 10V |
| R2 | 303.030mW | 30.303mA | 330Ω | 10V |
| Total | 757.576mW | 75.758mA | 132Ω | 10V |

**Circuit**

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

Where;

Complete the table below for the parameters listed above.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 387.931mW | 25.862mA | 580Ω | 15V |
| R2 | 204.545mW | 13.636mA | 1.1kΩ | 15V |
| R3 | 261.628mW | 17.442mA | 860Ω | 15V |
| Total | 854.104mW | 56.940mA | 263.434Ω | 15V |

**Circuit**

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

Where;

Complete the table below for the parameters listed above.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 1.701W | 48.611mA | 720Ω | 35V |
| R2 | 437.5mW | 12.5mA | 2.8kΩ | 35V |
| R3 | 122.5W | 3.5A | 10Ω | 35V |
| Total | 124.639W | 3.561A | 9.828Ω | 35V |

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

Where;

Complete the table below for the parameters listed above.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 6.875W | 125mA | 440Ω | 55V |
| R2 | 25.208W | 458.333mA | 120Ω | 55V |
| R3 | 3.025W | 55mA | 1kΩ | 55V |
| R4 | 1.513W | 27.5mA | 2kΩ | 55V |
| Total | 36.621W | 665.833mA | 82.603Ω | 55V |

**Circuit**

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

1. List the characteristics of a parallel circuit.

*Same voltage across all components. It’s a current divider.*

Referring to the schematic above, if R1 was increased, what would happen to the following items within the circuit:

1. Total circuit current?
   1. Go up
   2. Go down
   3. Stay the same
2. Total circuit resistance?
   1. Go up
   2. Go down
   3. Stay the same
3. Current through R2?
   1. Go up
   2. Go down
   3. Stay the same

Referring to the schematic above, if the value of R3 was decreased, what would happen to the following items within the circuit:

1. Total circuit current?
   1. Go up
   2. Go down
   3. Stay the same
2. Voltage drop across R1?
   1. Go up
   2. Go down
   3. Stay the same
3. Current through R3?
   1. Go up
   2. Go down
   3. Stay the same