Title: **More Parallel Circuits** Worksheet: 10

Course: Electrical Applications Unit: Electrical Theory CLO: 3

Name ANSWER KEY Grade 100 pts. Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

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

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

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

**Circuit**

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

**Instructions**

Using the Ohms Wheel, solve for branch currents, total current, and power dissipated by each resistor.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 2.557mW | 1.705mA | 880Ω | 1.5V |
| R2 | 187.5mW | 125mA | 12Ω | 1.5V |
| Total | 190.057mW | 126.705mA | 11.839Ω | 1.5V |

**Circuit**

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

Complete the table below for the parameters listed within the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 73.143mW | 9.143mA | 875Ω | 8V |
| R2 | 68.817mW | 8.602mA | 930Ω | 8V |
| R3 | 53.333mW | 6.667mA | 1.2kΩ | 8V |
| Total | 195.293mW | 24.412mA | 327.712Ω | 8V |



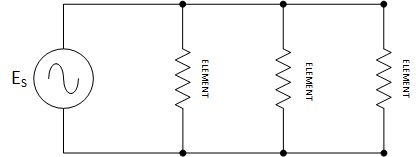
Complete the table below for the parameters listed within the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 648mW | 18mA | 2k | 36V |
| R2 | 1.296W | 36mA | 1k | 36V |
| R3 | 1.908W | 53mA | 680Ω | 36V |
| R4 | 4.32W | 120mA | 300Ω | 36V |
| Total | 8.172W | 227mA | 158.631Ω | 36V |

Complete the table below for the parameters listed within the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 11.52W | 160mA | 450Ω | 72V |
| R2 | 5.76W | 80mA | 900Ω | 72V |
| R3 | 2.88W | 40mA | 1.8kΩ | 72V |
| R4 | 1.44W | 20mA | 3.6kΩ | 72V |
| Total | 21.6W | 300mA | 240Ω | 72V |

A toaster contains three heating elements connected in parallel. Each heating element has a conductance of 6.944mS (S = siemens). The toaster is supplied by a line voltage of 120volts. Draw out the circuit and calculate the values below. (Drawing 5 pts)



1. Total Resistance 48Ω
2. Current through each Heating element 833.28mA
3. Total current to toaster 2.5A
4. Power dissipated by each heating element 100W
5. Total power of toaster 300W

A parallel circuit has a total power consumption of 28.8 watts. Branch 1 consumes 4.8 watts, branch 2 has 40 milliamps of current flowing through it and branch 3 consumes 14.4 watts. Draw out the circuit and calculate the values below. (Drawing 5 pts)

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

1. Total Resistance 2kΩ
2. Current through branch 1 = 20mA
3. Current through branch 3 = 60mA
4. R1 12kΩ R2 6kΩ R3 4kΩ

A parallel circuit consists of a power source and three branches, each branch consists of one resistor.

Branch 1 has a current of 37mA.

Branch 2 has a power of 150mW.

Twenty-four volts is present across branch 3.

The total circuit power is 1.372W

Draw the described parallel circuit and solve for the following:

1. ET 24V
2. R3 1.725kΩ
3. IR1 37mA
4. IR2 6.25mA
5. IR3 13.917mA
6. PR1 888mW
7. PR2 150mW
8. PR3 334mW
9. PT 1.372W