Title: **Parallel-Series Circuits** Worksheet: 12

Course: Electrical Applications Unit: Electrical Theory CLO: 3

Name ANSWER KEY Grade 62pts Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall calculate power, current, resistance and voltage for each resistor in a parallel-series circuit.
2. Student shall distinguish the characteristics that a parallel-series circuit exhibits.

**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**

As the name suggests, a parallel-series circuit contains both a parallel circuit and a series circuit. In the case of a parallel-series circuit, the major circuit is a parallel circuit, hence the name parallel coming first in the name. Within the parallel branch circuits there exists a series circuit. To solve a parallel-series circuit you must first solve the individual branch circuit resistances, then use those values to solve the larger parallel circuit.

**Circuit**

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

Where;

**Instructions**

1. To solve the circuit above, first solve the branch resistance “totals”.

RAB = 6kΩ RCD = 3.3kΩ

1. Once you have obtained these resistance values, calculating each branch current is possible.

IAB = 4.167mA ICD = 7.576mA

1. Next use RAB and RCD and the conductance method, compute total circuit resistance.

RT =

1. Now that we know total circuit resistance, we can calculate the total circuit current.

IT = 11.742mA

1. Using the calculated branch currents along with RAB and RCD, you can calculate the voltage drop across each resistor.

ER1 = 4.167V ER2 = 20.833V ER3 = 8.333V ER4 = 16.667V

1. Now you have all the information necessary to complete the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 17.364mW | 4.167mA | 1kΩ | 4.167V |
| R2 | 86.811mW | 4.167mA | 5kΩ | 20.833V |
| R3 | 63.131mW | 7.576mA | 1.1kΩ | 8.333V |
| R4 | 126.269mW | 7.576mA | 2.2kΩ | 16.667V |
| Total | 293.55mW | 11.742mA | 2.129kΩ | 25V |

**Circuit**



Where;

Compute the inner parallel circuit values.

RAB = 10.58kΩ RCD = 4.65kΩ IAB = 4.726mA ICD = 10.753mA

Complete the table below for the parameters and calculated values listed above.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | P | I | R | E | |
| R1 | 223.341mW | 4.726mA | 10kΩ | 47.259V |
| R2 | 12.954mW | 580Ω | 2.741V |
| R3 | 381.547mW | 10.753mA | 3.3kΩ | 35.484V |
| R4 | 127.182mW | 1.1kΩ | 11.828V |
| R5 | 28.905mW | 250Ω | 2.688V |
| R6 | 16.667W | 333.333mA | 150Ω | 50V |
| Total | 17.441W | 348.812mA | 143.344Ω | 50V |