Title: **Combination Circuits** Worksheet: 13

Course: Electrical Applications Unit: Electrical Theory CLO: 3

Name ANSWER KEY Grade 70pts Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall calculate power, current, resistance and voltage for each resistor in a combination circuit.
2. Student shall distinguish the characteristics that a series-parallel combined with the characteristics of 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 combination circuit combines aspects of a series circuit with that of a parallel. Unlike the series-parallel or the parallel-series circuits which stay within a certain domain of configuration, a combination circuit can have a series component and/or a parallel component inserted at any position. Refer to the schematic below for an example of a combination circuit.

**Circuit**



Where;

**Instructions**

To solve the circuit shown above, use the strategies that you learn in the series-parallel and parallel-series worksheets. Begin with the inner-most circuit and work your way out. In the above circuit, start by calculating RBC, then RAC and finish computing value for branch 1. Move to the next branch and solve those value.

RBC = 1kΩ RAC = 2kΩ RDE = 1.28kΩ RFE = 1.21kΩ

IAC = 22.5mA IDE = 35.156mA IFE = 37.19mA

Using the schematic and information on the previous page, complete the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 506.25mW | 22.5mA | 1kΩ | 22.5V |
| R2 | 253.125mW | 11.25mA | 2kΩ | 22.5V |
| R3 | 253.125mW | 11.25mA | 2kΩ |
| R4 | 617.981mW | 35.156mA | 500Ω | 17.578V |
| R5 | 964.05mW | 35.156mA | 780Ω | 27.422V |
| R6 | 456.424mW | 37.19mA | 330Ω | 12.273V |
| R7 | 1.217W | 37.19mA | 880Ω | 32.727V |
| Total | 4.268W | 94.846mA | 474.452Ω | 45V |

**Circuit**



Where;

Compute the inner parallel circuit values.

RBC = 1kΩ RDE = 231.892Ω IAE = 16.472mA EBC = 16.472V EDE = 3.82V

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 271.33mW | 16.472mA | 1kΩ | 16.472V |
| R2 | 135.665mW | 8.236mA | 2kΩ | 16.472V |
| R3 | 135.665mW | 8.236mA | 2kΩ |
| R4 | 135.665mW | 16.472mA | 500Ω | 8.236V |
| R5 | 18.706mW | 4.897mA | 780Ω | 3.82V |
| R6 | 44.214mW | 11.575mA | 330Ω |
| R7 | 2.301W | 51.136mA | 880Ω | 45V |
| Total | 3.042W | 67.608mA | 665.597Ω | 45V |