Title: **Combination Circuits** Test: 6

Course: Electrical Applications Unit: Electrical Theory CLO: 3

Name ANSWER KEY Grade 94pts Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall identify different electrical characteristics as they pertain to combination circuits.
2. Student shall calculate various electrical quantities for a series-parallel, parallel-series and complex combination circuits based on the Ohm’s Wheel.

**Assessment**

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

**Instructions**

Select the correct answer to the following multiple-choice questions.

1. A parallel-series circuit can also be thought of as a;
   1. A series circuit that has a parallel component inside of it.
   2. A parallel circuit that has a series component inside of it.
   3. Any combination of a series circuit and a parallel circuit.
   4. None of the above
2. A series-parallel circuit can also be thought of as a;
   1. A series circuit that has a parallel component inside of it.
   2. A parallel circuit that has a series component inside of it.
   3. Any combination of a series circuit and a parallel circuit.
   4. None of the above
3. A complex combination circuit can also be thought of as a;
   1. A series circuit that has a parallel component inside of it.
   2. A parallel circuit that has a series component inside of it.
   3. Any combination of a series circuit and a parallel circuit.
   4. None of the above
4. When solving a combination circuit, the first step is to;
   1. Solve for the inner minor circuit
   2. Solve for the outer major circuit
   3. Solve from top to bottom
   4. Solve from bottom to the top
5. In a parallel-series circuit;
   1. Voltage is common through all branch circuits
   2. Current is common through the major circuit
   3. There is no distinguishing characteristic between voltage or current
   4. No common statement can be discerned
6. In a series-parallel circuit;
   1. Voltage is common through all branch circuits
   2. Current is common through the major circuit
   3. There is no distinguishing characteristic between voltage or current
   4. No common statement can be discerned

**Circuits**

|  |  |
| --- | --- |
|  |  |
| Figure 1 | Figure 2 |
| Where ES = 7V  R1 = 220Ω, R2 = 680Ω,   R3 = 1.2kΩ, R4 = 120Ω | Where ES = 22V  R1 = 330Ω, R2 = 2kΩ, R3 = 4.7kΩ,   R4 = 10kΩ, R5 = 270Ω, R6 = 10Ω |

RAB = 434.043Ω RT = 774.043Ω

Refer to Figure 1 above and complete the table below;

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 17.992mW | 9.043mA | 220Ω | 1.990V |
| R2 | 22.658mW | 5.772mA | 680Ω | 3.952V |
| R3 | 12.84mW | 3.271mA | 1.2kΩ |
| R4 | 9.814mW | 9.043mA | 120Ω | 1.085V |
| Total | 63.304mW | 9.043mA | 774.043Ω | 7V |

RAB = 2.33kΩ IAB = 9.442mA RCD = 14.97kΩ ICD = 1.475mA RT = 9.951Ω

Refer to Figure 2 above and complete the table below;

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 29.42mW | 9.442mA | 330Ω | 3.112V |
| R2 | 178.305mW | 2kΩ | 18.884V |
| R3 | 10.219mW | 1.475mA | 4.7kΩ | 6.930V |
| R4 | 21.742mW | 10kΩ | 14.745V |
| R5 | 587.045μW | 270Ω | 398.123mV |
| R6 | 48.4W | 2.2A | 10Ω | 22V |
| Total | 48.64W | 2.211A | 9.951Ω | 22V |

1. Figure 1 is an example of a;
   1. Parallel-series circuit
   2. Series-parallel circuit
   3. Complex combination circuit
   4. All the above
2. Figure 2 is an example of a;
3. Parallel-series circuit
4. Series-parallel circuit
5. Complex combination circuit
6. All the above
7. Referring to Figure 1, if R3 were decreased, total current would?
8. Increase
9. Decrease
10. Stay the same
11. Referring to Figure 1, if ES were increased, E4 would?
12. Increase
13. Decrease
14. Stay the same
15. Referring to Figure 2, if R6 were removed, E2 would?
16. Increase
17. Decrease
18. Stay the same
19. Referring to Figure 2, if R3 were increased, E2 would?
20. Increase
21. Decrease
22. Stay the same
23. Referring to Figure 2, if P4 went down, ICD would have?
24. Increased
25. Decreased
26. Stayed the same
27. Regardless of the type of circuit, series-parallel, parallel-series or complex combination circuit, total power will always be the sum of individual component power?
28. True
29. False

**Circuit**



Where;

RBC = 68.276Ω RDE = 1.245kΩ RAB = 2.462kΩ RT = 290.99Ω IAE = 5.281mA

Refer to the figure above and complete the table below;

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | R | E |
| R1 | 1.339mW | 5.281mA | 48Ω | 253.498mV |
| R2 | 1.182mW | 3.278mA | 110Ω | 360.589mV |
| R3 | 722.320μW | 2.003mA | 180Ω |
| R4 | 30.68mW | 5.281mA | 1.1kΩ | 5.809V |
| R5 | 21.626mW | 3.288mA | 2kΩ | 6.577V |
| R6 | 13.107mW | 1.993mA | 3.3kΩ |
| R7 | 512.121mW | 39.394mA | 330Ω | 13V |
| Total | 580.777mW | 44.675mA | 290.99Ω | 13V |