Title: **RC Series Circuit** Worksheet: 32

Course: Electrical Applications Unit: Electrical Theory CLO: 3

Name ANSWER KEY Grade 91pts. Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall determine the missing component(s) in a RC series circuit given other known quantities.
2. Student shall apply trigonometric functions to produce appropriate RC series circuit quantities.

**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**

A resistive-capacitive (RC) series circuit is one that shares the same current through both the resistive and capacitive components within the circuit. Since there is the existence of the impedance triangle, there shall also be a voltage and a power triangle.

|  |  |
| --- | --- |
| Impedance Opposition to current flow | Current Same current thru each component |
|  |  |
|  |  |
| Voltage-Current Response Current leads voltage by 90˚ (ICE) | Power Triangle Presence of Reactive Power |
|  |  |
|  |  |
|  |  |
|  |  |

**Circuit**



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P/Q/S | I | R/XC/Z | E |
| R1 | 212.259mW | 13.3mA | 1.2kΩ | 15.960V |
| C1 | 255.925mVAR | 13.3mA | 1.447kΩ | 19.243V |
| Total | 332.493mVA | 13.3mA | 1.880kΩ | 25V |
| θ | 50.328˚ | 0˚ | 50.328˚ | 50.328˚ |
| PF | 0.638 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P/Q/S | I | R/XC/Z | E |
| R1 | 316.402mW | 16.238mA | 1.2kΩ | 19.485V |
| C1 | 254.328mVAR | 16.238mA | 964.575Ω | 15.663V |
| Total | 405.946mVA | 16.238mA | 1.54kΩ | 25V |
| θ | 38.793˚ | 0˚ | 38.793˚ | 38.793˚ |
| PF | 0.779 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P/Q/S | I | R/XC/Z | E |
| R1 | 224.202mW | 9.665mA | 2.4kΩ | 23.197V |
| C1 | 90.108mVAR | 9.665mA | 964.575Ω | 9.323V |
| Total | 241.632mVA | 9.665mA | 2.587kΩ | 25.000V |
| θ | 21.896˚ | 0˚ | 21.896˚ | 21.896˚ |
| PF | 0.928 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P/Q/S | I | R/XC/Z | E |
| R1 | 250.309mW | 10.213 | 2.4kΩ | 24.510V |
| C1 | 50.300mVAR | 10.213 | 482.288Ω | 4.925V |
| Total | 255.313mVA | 10.213 | 2.448kΩ | 25V |
| θ | 11.362˚ | 0˚ | 11.362˚ | 11.362˚ |
| PF | 0.980 |

**Circuit**



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P/Q/S | I | R/XC/Z | E |
| R1 | 1.001W | 20.425mA | 2.4kΩ | 49.020V |
| C1 | 201.201mVAR | 20.425mA | 482.288Ω | 9.851V |
| Total | 1.021VA | 20.425mA | 2.448kΩ | 50.000V |
| θ | 11.362˚ | 0˚ | 11.362˚ | 11.362˚ |
| PF | 0.980 |

Evaluations

1. If the frequency is increased, the power phase angle?
   1. Increases
   2. Decreases
   3. Stays the same
2. If the voltage is decreased, the power factor will?
   1. Increase
   2. Decrease
   3. Stay the same
3. If the capacitance is increased, the total impedance will?
   1. Increase
   2. Decrease
   3. Stay the same
4. If the resistance is increased, the total current will?
   1. Increase
   2. Decrease
   3. Stay the same
5. If the capacitance is decreased, the capacitive reactance will?
   1. Increase
   2. Decrease
   3. Stay the same
6. If the frequency is decreased, the active power will?
   1. Increase
   2. Decrease
   3. Stay the same
7. If the voltage is decreased, the reactive power will?
   1. Increase
   2. Decrease
   3. Stay the same

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