Title: **RL Parallel Circuit** Worksheet: 31

Course: Electrical Applications Unit: Electrical Theory CLO: 3

Name ANSWER KEY Grade 77pts. Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall determine the missing component(s) in a RL parallel circuit given other known quantities.
2. Student shall apply trigonometric functions to produce appropriate RL parallel 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-inductive (RL) parallel circuit is one that shares the same voltage throughout the circuit. Since there is the existence of the impedance triangle, there shall also be a current and a power triangle.

|  |  |
| --- | --- |
| Impedance Opposition to current flow | Voltage Response Total voltage is the same |
|  |  |
|  |  |
| Current Response Total current is the vector sum | Power Triangle Presence of Reactive Power |
|  |  |
|  |  |

**Circuit**



|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P/Q/S | | I | | R/X/Z | E |
| R1 | 520.833mW | | 20.833mA | | 1.2kΩ | 25V |
| L1 | 904.289mVAR | | 36.172mA | | 691.15Ω | 25V |
| Total | 1.044mVA | | 41.742mA | | 598.914Ω | 25V |
| θ | 60.06˚ | PF | 0.499 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P/Q/S | | I | | R/X/Z | E |
| R1 | 520.833mW | | 20.833mA | | 1.2kΩ | 25V |
| L1 | 602.860mVAR | | 24.114mA | | 1.037kΩ | 25V |
| Total | 796.685mVA | | 31.867mA | | 784.501Ω | 25V |
| θ | 49.175˚ | PF | 0.654 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P/Q/S | | I | | R/X/Z | E |
| R1 | 260.417mW | | 10.417mA | | 2.4kΩ | 25V |
| L1 | 602.860mVAR | | 24.114mA | | 1.037kΩ | 25V |
| Total | 656.701mVA | | 26.268mA | | 951.726Ω | 25V |
| θ | 66.637˚ | PF | 0.397 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P/Q/S | | I | | R/X/Z | E |
| R1 | 260.417mW | | 10.417mA | | 2.4kΩ | 25V |
| L1 | 301.430mVAR | | 12.057mA | | 2.073kΩ | 25V |
| Total | 398.343mVA | | 15.934mA | | 1.569kΩ | 25V |
| θ | 49.175˚ | PF | 0.654 |

**Circuit**



|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P/Q/S | | I | | R/X/Z | E |
| R1 | 1.042W | | 20.833mA | | 2.4kΩ | 50V |
| L1 | 1.206VAR | | 24.114mA | | 2.073kΩ | 50V |
| Total | 1.593VA | | 31.867mA | | 1.569kΩ | 50V |
| θ | 49.175˚ | PF | 0.654 |

Evaluations

Answer the following questions based on the last configured circuit above.

1. If the frequency is increased, the 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 inductance is increased, the total current 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 inductance is decreased, the impedance 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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