Title: **Inductive Reactance** Worksheet: 27

Course: Electrical Applications Unit: Electrical Theory CLO: 3

Name ANSWER KEY Grade 18pts. Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall determine the inductive reactance of a component given its inductance and the frequency.

**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**

Inductive reactance is a property exhibited by an inductor, and inductive reactance exists based on the fact that an electric current produces a magnetic field around its conductor. This magnetic field is constantly changing as a result of the AC source. It is this change in magnetic field that induces another electric current to flow in the same wire, in the opposite direction from the current that produced it. Inductive reactance is the opposition to the change of current through an element. Inductive reactance is represented by XL in mathematical formulas. The units for inductive reactance is ohms (Ω).

For an ideal inductive AC circuit (contains inductance only), the inhibitive effect on change in current flow results in a delay, or a phase shift, of the alternating current with respect to alternating voltage. Specifically, an ideal inductor (contains no resistance) will cause the current to lag the voltage by a quarter cycle, or 90°.

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| --- | --- |
| Unit Circle | ELI |
|  | Current  Voltage |
|  | Inductive Reactance Formula |

**Instructions**

Using the formula from the previous page, determine the inductive reactance of each given inductor.

|  |  |  |  |
| --- | --- | --- | --- |
|  | f | L | XL |
| 1. | 10kHz | 470mH | 29.531kΩ |
| 2. | 250Hz | 250mH | 392.699Ω |
| 3. | 7.5kHz | 220H | 10.367MΩ |
| 4. | 60Hz | 170mH | 64.088Ω |
| 5. | 400Hz | 2.2H | 5.529Ω |
| 6. | 105kHz | 4.7mH | 3.101Ω |
| 7. | 75Hz | 8H | 3.77kΩ |
| 8. | 270kHz | 250μH | 424.115Ω |
| 9. | 5.968kHz | 200mH | 7.5kΩ |
| 10. | 400Hz | 87.535mH | 220Ω |
| 11. | 2.7kHz | 32.951mH | 559Ω |
| 12. | 3.183kHz | 30mH | 600Ω |
| 13. | 500Hz | 1.2mH | 3.77Ω |
| 14. | 3.1kHz | 169.423mH | 3.3kΩ |
| 15. | 3.183kHz | 100mH | 2kΩ |

Evaluations

1. If the frequency increases, the inductive reactance (XL)?
   1. Goes Up
   2. Goes Down
   3. Stays the same
2. If inductance is increased, the inductive reactance (XL)?
   1. Increases
   2. Decreases
   3. Stays the same
3. In an inductor, the following statement is true.
   1. Voltage Leads Current
   2. Current Leads Voltage
   3. Voltage and Current are in phase.