**Inductive Reactance** - **Answer Key Assignment #1**

1. XL = ω L or XL = 2π f L
2. b
3. Increase
4. Increase
5. a. XL = 2π f L = 6.28 x 60 Hz x .02 h = 7.54 Ω
   1. XL = 2π f L = 6.28 x 400 hz x 0.025 h x 2 = 125.6 Ω
   2. XLT = XL1 + XL2 = 25Ω + 25Ω = 50Ω
   3. XL = 2π f L = 6.28 x 500000 Hz x 0.00001 h = 31.4 Ω

**Answer Key Assignment #2**

1. a. True
   1. True
   2. True
   3. False
   4. False
   5. True
   6. True
   7. False

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_ |  |  |
| 2. | Z = √ ( R )2 + (XL)2 = | √ (10Ω)2 + (10Ω)2 | = √200 = 14.14 Ω | | |
|  | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_ |  |  |
| 3. | VA = √ (ER)2 + (EL)2 = | √ (30)2 + (40)2 = | √ 2500 = | 50 | volts |

Phase angle = ER / EA = 30/50 = .6 = 53º

1. a. XL = 2π f L = 6.28 x 60 Hz x .1274 h = 48 Ω

\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Z = √ ( R )2 + (XL)2 = √ (20Ω)2 + (48Ω)2 = 52 Ω
2. I = EA / Z = 130 volts / 52 Ω = 2.5 amperes

d. θ = tan-1 (  XRL ) = 67.38°

1. VR = I R = 2.5 a x 20Ω = 50 volts
2. VL = I XL = 2.5 a x 48Ω = 120 volt

**Answer Key Assignment #3**

1.

a. PT = I2R

b. PT = ERIR

c. PT = VI (PF) or El cos *θ*

2. a. PA – VI

b. PA = I2Z

c. PA = (V2) / Z

3. a. PX = 12X

b. PX – VXIX

c. PX = VI sin *θ*

4. a. PF = PT / PA

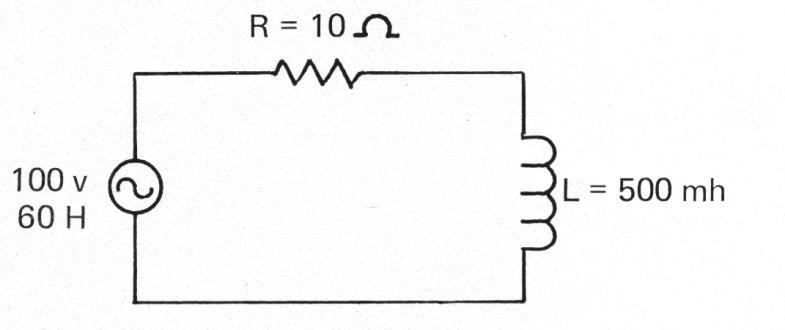
b. PF = VR / VA

c. PF = R / Z

1. Since there is no resistor, there is no true power. Therefore, answer is 0 watts.
2. a. XL = 2π f L = 6.28 x 60 Hz x 0.5h = 188.4 Ω

\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. Z = √ ( R)2 + (XL)2 = √ (10Ω)2 + (188.4Ω)2 = 188.66 Ω

1. I = VA / Z = 100 v / 188.66Ω = .53 amps
2. VR = IR = 0.53 a x 10 Ω = 5.3 volts
3. VL = IXL = 0.53 a x 188.4 Ω = 99.85 volts
4. PF = R / Z = 10 Ω / 188.66 Ω = 0.053
5. PA = VI = 100v x .53 a = 53 volt-amperes
6. PT = I2R = (0.53 a)2 x 10Ω = 2.81 watts
7. PX = I2XL = (0.53)2 x 188.4 Ω = 52.92 vars

**Answer Key Assignment #4**

1. Q = XL / RS
2. Lower

3. a. True b. True c. True d. False

1. Q = XL / RS = 300 Ω / 0.5 Ω = 600
2. Increases

1. XL = 2π f L = 6.28 x 60 x 0.5h = 188.4 Ω

Q = XL / RS = 88.4 Ω / 0.5 ΩΩ = 376.8 or 377

**Answer Key Assignment #5**

1. b
2. a. 5
3. 63.2%
4. 86.5%
5. 95%, 98%
6. 36.8 %
7. 13.5%, 5%
8. a. I = V / R = 10 volts / ½ Ω = 20 amperes
   1. TC = L/R = 0.5 h / 0.5 Ω = 1 second
   2. 5TC = maximum current = 5 seconds
   3. 19/20 = 95% = 3TC = 3 seconds