**Assignment**

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| **Name** | **AHAHAHAHAHAHAHAAAASASAHAH** |
| **Lecturer** |  |
| **Date of issue** |  |
| **Due date** |  |

***Complete the attached problems.***

***You must show formulae used to calculate answers.***

***You must draw the phasor diagrams.***

***You must show all answers with correct units of measurement.***

***WARNING CONTAINS ANSWERS***

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| ***f = 100Hz***  |
| ***Va = 230v*** |
| ***C = 3.3uF***  |
| ***L = 2.5H*** |
| ***R = 1800Ω***  |

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| XL = $2πfL$ = $2πx100x2.5$ = 1.57kΩ  |
| Xc = 1/$2πfC$ = 1/ 2$π x 100 x 3.3µ$ = 482Ω |
| XT = XL ~ XC = 1570 – 482 = 1.088kΩ |
| Draw phasor diagram. |
| Z = $\sqrt{R^{2} + X^{2}}$ = $\sqrt{1800^{2} + 1088^{2}}$ = 2.1kΩ | Alternate method using polar to rectangular conversion function. |
| IT = $\frac{V}{Z}$ = $\frac{230}{2100}$ = 0.110A (110mA) | Z = Pol(1800,1088 = 2.1kΩPhase angle = RCL “F” = 31.150 |
| VR = I x R = 0.110 x 1800 = 198V | All other values calculated as per previous method |
| VL = I x XL = 0.110 x 1570 = 173V  |  |
| Vc = I x XC = 0.110 x 482 = 53V |  |
| Phase angle = $\frac{X}{R}$ tan-1 = $\frac{1088}{1800}$ tan-1  = -31.150 |  |

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| ***f = 50Hz***  |
| ***Va = 230v*** |
| ***C = 68uF***  |
| ***L = 82mH*** |
| ***R = 32 Ω*** |

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| XL = $2πfL$ = $2πx50x0.082$ = 26Ω  |
| Xc = 1/$2πfC$ = 1/ 2$π x 50 x 68µ$ = 47Ω |
| X = XL ~ XC = 47 – 26 = 21Ω |
| Draw phasor diagram |
| Z = $\sqrt{R^{2} + X^{2}}$ = $\sqrt{32^{2} + 21^{2}}$ = 38Ω | Alternate method using polar to rectangular conversion function. |
| IT = $\frac{V}{Z}$ = $\frac{230}{38}$ = 6.05A  | Z = Pol(32,21 = 38ΩPhase angle = RCL “F” = - 33.270 |
| VR = I x R = 6.05 x 32 = 194V | All other values calculated as per previous method |
| VL = I x XL = 0.110 x 26 = 157V | Ɵ |
| Vc = I x XC = 0.110 x 47 = 284V |  |
| Phase angle = $\frac{X}{R}$ tan-1 = $\frac{21}{32}$ tan-1  = -33.270 |  |

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| ***f = 1kHz***  |
| ***Va = 230V*** |
| ***C = 6.3uF***  |
| ***L = 3mH*** |
| ***R = 35Ω***  |

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| XL = $2πfL$ = $2πx1000x0.003$ = 19Ω  |
| Xc = 1/$2πfC$ = 1/ 2$π x 1000 x 6.3µ$ = 25Ω |
| X = XL ~ XC = 25 – 19 = 6Ω |
| Draw phasor diagram |
| Z = $\sqrt{R^{2} + X^{2}}$ = $\sqrt{35^{2} + 6^{2}}$ = 35.5Ω | Alternate method using polar to rectangular conversion function. |
| IT = $\frac{V}{Z}$ = $\frac{230}{35.5}$ = 6.48A  | Z = Pol(35,6 = 35.5ΩPhase angle = RCL “F” = - 9.730 |
| VR = I x R = 6.48 x 35 = 227V | All other values calculated as per previous method |
| VL = I x XL = 6.48 x 19 = 123V |  |
| Vc = I x XC = 6.48 x 25 = 162V |  |
| Phase angle = $\frac{X}{R}$ tan-1 = $\frac{6}{35}$ tan-1  = -9.730 |  |

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| ***f = 50Hz***  |
| ***Va = 240V*** |
| ***C = 2.2uF***  |
| ***L = 2.7H*** |
| ***R = 820Ω***  |

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| XL = $2πfL$ = $2πx50x2.7$ = 848Ω  |
| Xc = 1/$2πfC$ = 1/ 2$π x 50 x 2.2µ$ = 1.447kΩ |
| X = XL ~ XC = 1447 – 848 = 599Ω |
| Draw phasor diagram |
| Z = $\sqrt{R^{2} + X^{2}}$ = $\sqrt{820^{2} + 599^{2}}$ = 1015Ω | Alternate method using polar to rectangular conversion function. |
| IT = $\frac{V}{Z}$ = $\frac{240}{1015}$ = 0.236A (236mA) | Z = Pol(820,599 = 1.015kΩPhase angle = RCL “F” = - 36.150 |
| VR = I x R = 0.236 x 820 = 194V | All other values calculated as per previous method |
| VL = I x XL = 0.236 x 848 = 200V |  |
| Vc = I x XC = 0.236 x 1447 = 341V |  |
| Phase angle = $\frac{X}{R}$ tan-1 = $\frac{599}{820}$ tan-1  = -36.150 |  |

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| ***f = 1.5kHz***  |
| ***Va =230V*** |
| ***C = 15nF***  |
| ***L = 330mH*** |
| ***R = 3.3kΩ***  |

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| XL = $2πfL$ = $2πx1500x0.33$ = 3.11kΩ  |
| Xc = 1/$2πfC$ = 1/ 2$π x 50 x 2.2µ$ = 7.07kΩ |
| X = XL ~ XC = 1447 – 848 = 3.96kΩ |
| Draw phasor diagram |
| Z = $\sqrt{R^{2} + X^{2}}$ = $\sqrt{3300^{2} + 3960^{2}}$ = 5.155kΩ | Alternate method using polar to rectangular conversion function. |
| IT = $\frac{V}{Z}$ = $\frac{230}{5155}$ = 0.045A (45mA) | Z = Pol(3300,3960 =5.155kΩPhase angle = RCL “F” = - 50.190 |
| VR = I x R = 0.045 x 3300 = 148.5V | All other values calculated as per previous method |
| VL = I x XL = 0.045 x 3110 = 140V |  |
| Vc = I x XC = 0.045 x 7070 = 318V |  |
| Phase angle = $\frac{X}{R}$ tan-1 = $\frac{3960}{3300}$ tan-1  = -50.190 |  |