**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***

***1)***

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| ***f = 100Hz***  |
| ***Vs = 230v*** |
| ***C = 3.3µF***  |
| ***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 |
|  Draw current phasor diagram. |
| IR = $\frac{V}{R}$ = $\frac{230}{1800}$ = 0.128A (128mA)  | Alternate method using polar to rectangular conversion function. |
| IL =$\frac{V}{Xl}$ = $\frac{230}{1570}$ = 0.146A (146mA) | Z = Pol(0.128,0.331 = 0.355A (355mA)Phase angle = RCL “F” = 68.860 |
| IC = $\frac{V}{Xc}$ = $\frac{230}{482}$ = 0.477A (477mA) | All other values calculated as per previous method |
| IX = Il ~ Ic = 0.477 – 0.146 = 0.331 (331mA) |  |
| IT = $\sqrt{Ir^{2} + Ix^{2}}$ = $\sqrt{0.128^{2} + 0.331^{2}}$ = 0.355A (355mA) |  |
| Z = $\frac{V}{I}$ = $\frac{230}{0.355}$ = 648Ω |  |
| Phase angle = $\frac{Ir^{}}{Iz^{}}$ = $\frac{0.128}{0.355}$ = 0.36  | cos-1 0.36 = 68.860 |

***2)***

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

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| XL$=2πfL$ = $2πx50x0.082$ = 26Ω |
| XC= 1/$2πfC$ = 1/ 2$π x 50 x 68µ$ = 47Ω |
|  Draw current phasor diagram. |
| IR = $\frac{V}{R}$ = $\frac{230}{32}$ = 7.2A  | Alternate method using polar to rectangular conversion function. |
| IL =$\frac{V}{Xl}$ = $\frac{230}{26}$ = 8.85A | Z = Pol(7.2,3.95 = 8.2APhase angle = RCL “F” = -28.750 |
| IC = $\frac{V}{Xc}$ = $\frac{230}{47}$ = 4.9A | All other values calculated as per previous method |
| IX = Il ~ Ic = 8.85A – 4.9A = 3.95A |  |
| IT = $\sqrt{Ir^{2} + Ix^{2}}$ = $\sqrt{7.2^{2} + 3.95^{2} }$ = 8.2A |  |
| Z = $\frac{V}{I}$ = $\frac{230}{8.2}$ = 28Ω |  |
| Phase angle = $\frac{Ir^{}}{Iz^{}}$ = $\frac{7.2}{8.2}$ = 0.88  | cos-1 0.88 = 28.590 |

***3)***

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| ***f = 1kHz***  |
| ***Vs = 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 |
|  Draw current phasor diagram. |
| IR = $\frac{V}{R}$ = $\frac{230}{35}$ = 6.6A  | Alternate method using polar to rectangular conversion function. |
| IL =$\frac{V}{Xl}$ = $\frac{230}{19}$ = 12.1A | Z = Pol(6.6,2.9 = 7.2APhase angle = RCL “F” = -23.720 |
| IC = $\frac{V}{Xc}$ = $\frac{230}{25}$ = 9.2A | All other values calculated as per previous method |
| IX = Xl ~ Xc = 12.1 – 9.2 = 2.9A |  |
| IT = $\sqrt{Ir^{2} + Ix^{2}}$ = $\sqrt{6.6^{2} + 2.9^{2}}$ = 7.2A |  |
| Z = $\frac{V}{I}$ = $\frac{230}{7.2}$ = 32Ω |  |
| Phase angle = $\frac{Ir^{}}{Iz^{}}$ = $\frac{6.6}{7.2}$ = 0.917  | cos-1 0.917 = -23.520 |

***4)***

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

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| XL$=2πfL$ = $2πx50x2.7$ = 848Ω |
| XC= 1/$2πfC$ = 1/ 2$π x 100 x 3.3µ$ = 1.45kΩ |
|  Draw current phasor diagram. |
| IR = $\frac{V}{R}$ = $\frac{240}{820}$ = 0.290A (290mA)  | Alternate method using polar to rectangular conversion function. |
| IL =$\frac{V}{Xl}$ = $\frac{240}{848}$ = 0.283A (283mA) | Z = Pol(0.290,0.117 = 0.313A (313mA)Phase angle = RCL “F” = -21.970 |
| IC = $\frac{V}{Xc}$ = $\frac{240}{1450}$ = 0.166A (166mA) | All other values calculated as per previous method |
| IX = Xl ~ Xc = 0.283 – 0.166 = 0.117 (117mA) |  |
| IT = $\sqrt{Ir^{2} + Ix^{2}}$ =$\sqrt{0.290^{2} + 0.117^{2}}$ = 0.313A (313mA) |  |
| Z = $\frac{V}{I}$ = $\frac{240}{0.313}$ = 767Ω |  |
| Phase angle = $\frac{Ir^{}}{Iz^{}}$ = $\frac{0.29}{0.313}$ = 0.93  | cos-1 0.93 = -22.10 |

***5)***

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

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| XL$=2πfL$ = $2πx1500x0.33$ = 3.1kΩ |
| XC= 1/$2πfC$ = 1/ 2$π x 1500 x 15n$ = 7.1Ω |
|  Draw current phasor diagram. |
| IR = $\frac{V}{R}$ = $\frac{230}{3300}$ = 0.070A (70mA)  | Alternate method using polar to rectangular conversion function. |
| IL =$\frac{V}{Xl}$ = $\frac{230}{3100}$ = 0.074A (74mA) | Z = Pol(0.07,0.042 = 0.082A (82mA)Phase angle = RCL “F” = -30.960 |
| IC = $\frac{V}{Xc}$ = $\frac{230}{7100}$ = 0.032A (32mA) | All other values calculated as per previous method |
| IX = Xl ~ Xc = 0.074 – 0.032 = 0.042 (42mA) |  |
| IT = $\sqrt{Ir^{2} + Ix^{2}}$ =$\sqrt{0.070^{2} + 0.042^{2}}$ = 0.082A (82mA) |  |
| Z = $\frac{V}{I}$ = $\frac{230}{0.082}$ = 2.805kΩ |  |
| Phase angle = $\frac{Ir^{}}{Iz^{}}$ = $\frac{6.6}{7.2}$ = 0.917  | cos-1 0.917 = -23.520 |