GIVEN: $Z_L = 4.2 + j3.6\ \Omega$

$V_s = 220\text{V}$ 60 Hz

FIND: A) pf B) P C) Q D) C FOR UNITY pf

SOLN: A) $pf = \cos(\underbrace{\theta_V - \theta_I}_{\text{ANGLE OF } Z!})$

$pf = \cos(40.6) = \underline{0.76 \text{ LAGGING}}$

B) $P = V_{RMS} I_{RMS}\ pf$

$= 220\left(\frac{220}{|Z|}\right)(0.76)$

$= \underline{6.6\text{ KW}}$

C) $Q = V_{RMS} I_{RMS} \sin(\cos^{-1}(0.76))$

$= \underline{5.7\text{ KVAR}}$

D) $C = \frac{Q}{\omega V^2} = \frac{5.7}{377(220)^2}$

$= 312\ \mu F$

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GIVEN: $V_s = 110\ V$ 60 Hz

$|S| = 120\ VA$ $pf = 0.707$ LAG

FIND: A) S B) I_{rms} C) Z D) R & L

SOLN: A)

$$S = 120 \angle \cos^{-1}(0.707) = \underline{120 \angle 45^\circ\ VA}$$

B) $|S| = |V|\,|I|$

so, $\underline{I = 1.1 \angle -45^\circ\ A_{rms}}$

C) $Z = \dfrac{V}{I} = 100.8 \angle 45^\circ\ \Omega$

D) $R = \underline{71.3\ \Omega}$ $Z\cos(45)$

$X_L = 71.3\ \Omega$ $Z\sin(45)$

$= j\omega L$

$\therefore L = \underline{189\ mH}$

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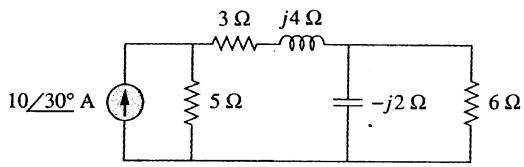
GIVEN:



FIND: S

SOLN: MANY POSSIBLE APPROACHES... FIND Z_T ...

$$Z_T = 5 \,//\, \left[(3 + j4) + -j2 \,//\, 6 \right]$$

$$Z_T = 2.272 + j0.698 \ \Omega$$

$$\therefore \ V = IZ = 23.77 \angle 47.1^\circ \ V_{RMS}$$

AND $S = VI^*$

$$= (23.77 \angle 47.1)(10 \angle -30)$$

$$= \underline{237.7 \angle 17.1 \ \text{VA}}$$

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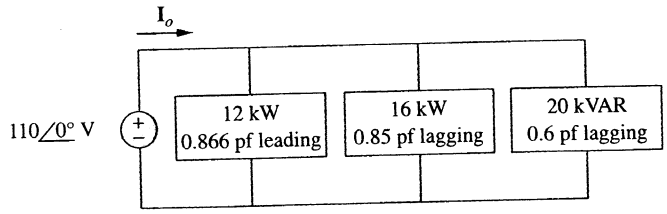
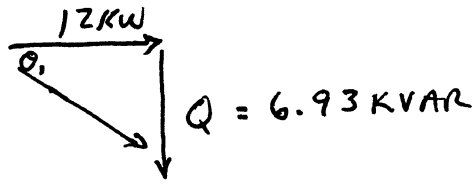
GIVEN:

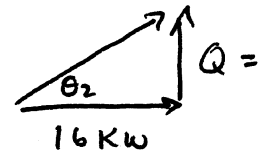


FIND: I_o

SOLN: CONSIDER EACH LOAD:

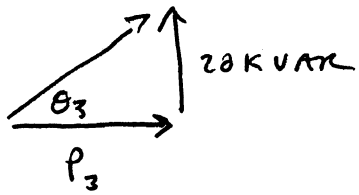
$\theta_1 = \cos(0.866) = 30°$





$\theta_2 = \cos^{-1}(0.85) = 31.79°$

$Q = 9.92$ KVAR



$\theta_3 = \cos^{-1}(0.6) = 53.1°$

$P_3 = 15$ KW

SO, $P_T = 12 + 16 + 15 = 43$ KW

$Q_T = -6.93 + 9.92 + 20 = 22.99$ KVAR

AND $S = P + jQ = V I^* \rightarrow I^* = \dfrac{43 + j22.99}{110 \angle 0}$

$I = \underline{443 \angle -28° \text{ A}_{rms}}$

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