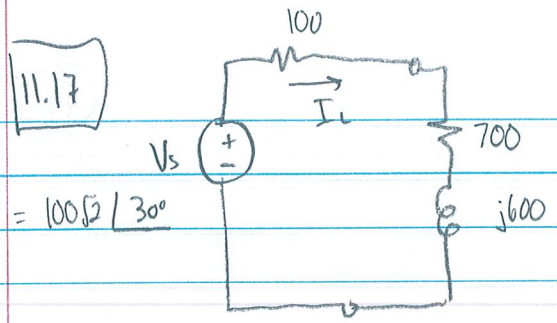
11.17



$= 100\sqrt{2} \angle 30°$

$$I_L = V_s / Z_{eq} = \frac{100\sqrt{2} \angle 30°}{100 + 700 + j600} = \frac{100\sqrt{2} \angle 30°}{1000 \angle 36.87°} = \frac{\sqrt{2}}{10} \angle -6.87°$$

$$\boxed{i_L(t) = \sqrt{2}/10 \cos(500t - 6.87°)}$$

$$V_{eff} = \frac{100\sqrt{2}}{\sqrt{2}} = 100 \angle 30° \qquad I_{eff} = \frac{\sqrt{2}}{10} / \sqrt{2} = 1/10 \angle -6.78°$$

$$V_{L_{eff}} = 100 \angle 30° \left(\frac{700 + j600}{100 + 700 + j600} \right) = 76.67 + j51.2$$

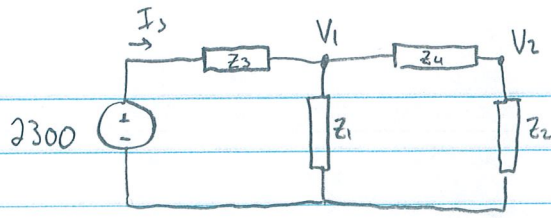
$$S = (V_{L_{eff}})(I_{eff}^*) = (76.67 + j51.2)(1/10 \angle +6.78°)$$

$$\boxed{S = 7 + j6}$$

Average Power = $Re(S) = \boxed{7 W}$

Apparent Power = $|S| = \sqrt{7^2 + 6^2} = \boxed{9.22 \text{ VA}}$

11.20



$\omega = 2\pi \cdot 60$

$S_1 = 20 + j8$ KVA

$S_2 = 20 + j18$ KVA

$S_3 = 5 + j6$ KVA

$S_4 = 3 + j4$ KVA

a) $S_{s1} = S_1 + S_2 + S_3 + S_4 = (20+j8) + (20+j18) + (5+j6) + (3+j4)$

$= 48 + j36$ KVA delivered.

$S_{s1} = V_s I_s^* \rightarrow I_s^* = \dfrac{48+j36}{2300}$ (KVA) $= 20.87 + j15.6$ A

$I_s = 20.87 - j15.6$ A

b) $I_s = 26.1 \angle 36.8°$ A

c) delivered to Z_1, Z_2, Z_4: $S = S_1 + S_2 + S_4 = (20+j8) + (20+j18) + (3+j4)$

$= 43 + j30$ KVA

d) $S_3 = (V_s - V_1) I_s^* = 5 + j6$.

$(2300 - V_1)(20.87 + j15.6) = 5 + j6$ KVA

$2300 - V_1 = 291.6 + j69.6$

$V_1 = 2008 - j69.6$ Volts $= 2009 \angle -1.98°$

11.20...

e) $S_1 = V_1 I_1^* = 20 + j8 = (2008 - j69.6)\, I_1^* \rightarrow I_1 = 9.81 + j4.32$ (kVA)

$I_4 = I_2 = I_s - I_1 = 10.2 - j20$ A

$S_2 = V_2 I_2^* = (20 + j18) = V_2 (10.2 + j20)$ (kVA)

$$\boxed{V_2 = 1119 - j429.3 \text{ volts}}$$