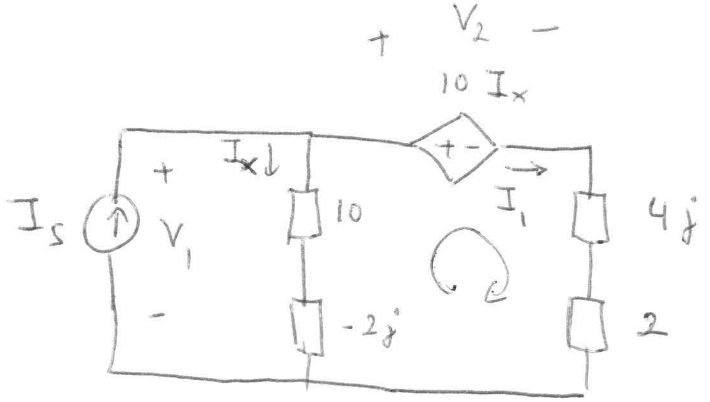

$I_1 = I_s - I_x$

$|I_s|^2 = 4$

<u>KVL</u>: $I_x(10-2j) = 10 I_x + (2+4j) I_1$

$= 10 I_x + (2+4j)(I_s - I_x)$

$I_x(\cancel{10} - 2j - \cancel{10} + 2 + 4j) = (2+4j) I_s$

$I_x(2+2j) = I_s(2+4j) \Rightarrow I_x = I_s \frac{(1+2j)}{(1+j)} = I_s \frac{(3+j)}{2}$

(1) $V_1 = I_x(10-2j) = I_s \frac{(3+j)(10-2j)}{2} = I_s(16+2j)$

NOTE DIRECTION OPPOSITE PASSIVE SIGN CONVENTION

$S_1 = \frac{1}{2} V_1 \cdot I_s^* = \frac{1}{2} I_s(16+2j) I_s^* = |I_s|^2 (8+j) \Rightarrow \boxed{S_1 = 32 + 4j}$

(2) $S_2 = \frac{1}{2} \cdot Z_{10\Omega} \cdot |I_x|^2 = \frac{1}{2} \cdot 10 \cdot |I_s|^2 \cdot \frac{(10)}{4} \Rightarrow \boxed{S_2 = 50 + 0j}$

AS EXPECTED

(3) $I_1 = I_s - I_x = I_s\left(1 - \frac{(3+j)}{2}\right) = I_s \frac{(-1-j)}{2}$

$S_3 = \frac{1}{2} Z_{2\Omega} |I_1|^2 = \frac{1}{2} \cdot 2 |I_s|^2 \cdot \frac{|-1-j|^2}{4} = \frac{|I_s|^2}{4} \cdot 2 \Rightarrow \boxed{S_2 = 2 + 0j}$

(4) $S_4 = \frac{1}{2} V_2 I_1^* = \frac{1}{2} \cdot 10 I_x \cdot I_1^* = 5 \cdot I_s \frac{(3+j)}{2} \cdot I_s^* \frac{(-1+j)}{2} = |I_s|^2 \cdot \frac{5}{4}(-4+2j)$

$\Rightarrow \boxed{S_4 = -20 + 10j}$ RECEIVED SINCE WE USED PASSIVE SIGN CONVENTION

(5) $S_5 = \frac{1}{2} Z_L \cdot |I_1|^2 = \frac{1}{2} \cdot 4j |I_s|^2 \cdot \frac{|-1-j|^2}{4} = 2j \cdot 4 \cdot \frac{2}{4} \Rightarrow \boxed{S_5 = 0 + 4j}$

AS EXPECTED

(6) $S_6 = \frac{1}{2} Z_c |I_x|^2 = \frac{1}{2}(-2j)|I_s|^2 \frac{|3+j|^2}{4} = -j \cdot 4 \cdot \frac{10}{4} \Rightarrow \boxed{S_6 = 0 - 10j}$

CHECK: $\sum P_{REC} = \sum P_{SUPPL} \Rightarrow 50 + 2 - 20 = 32$ <u>OK</u>

$\sum Q_{REC} = \sum Q_{SUPPL} \Rightarrow 10 + 4 - 10 = 4$ <u>OK</u>