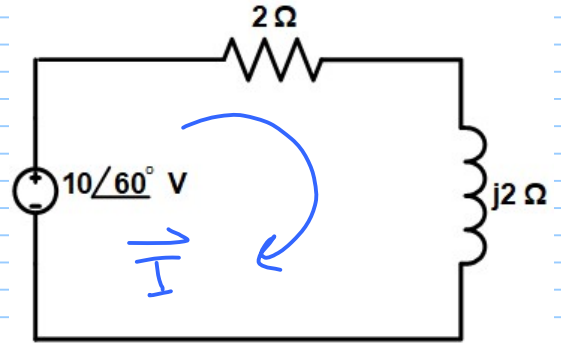


Example :

find the average power absorbed by each element.



$$P_{av} = \frac{1}{2} V_m I_m \cos(\theta_v - \theta_i)$$

$$P_{av, j2} = Z_{avg}$$

$$\vec{I} = \frac{10 \angle 60^\circ}{2 + j2} = 3.53 \angle 15^\circ \text{ A}$$

$$\vec{V}_R = \frac{2}{2 + j2} * 10 \angle 60^\circ = 7.07 \angle 15^\circ \text{ Volt.}$$

OR  $\vec{V}_R = \vec{I} R = 7.06 \angle 15^\circ \text{ Volt.}$

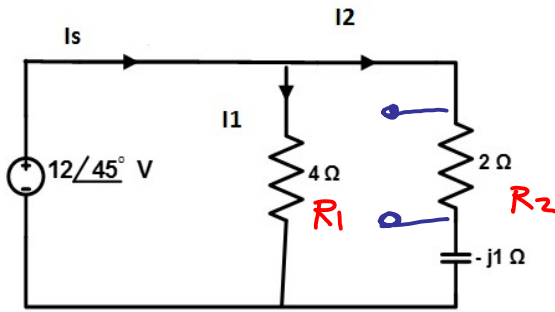
$$\begin{aligned} P_{av, R} &= \frac{1}{2} V_m I_m \cos(\theta_v - \theta_i) \\ &= \frac{1}{2} * 7.07 * 3.53 \cos(15^\circ - 15^\circ) \\ &= 12.47 \text{ W} \end{aligned}$$

$$P_{av, R} = \frac{I_m^2 R}{2} = \frac{1}{2} * (3.53)^2 * (2) = 12.46 \text{ W}$$

→ The average power supplied by the source

$$\begin{aligned} P_{av} &= \frac{1}{2} V_m I_m \cos(\theta_v - \theta_i) \\ &= \frac{1}{2} (10) (3.53) \cos(60^\circ - 15^\circ) \\ &= 12.48 \text{ W} \end{aligned}$$

Example :



Determine the average power absorbed by each resistor .  
Determine the total average power supplied by the source .

$$\rightarrow P_{av R_1} = \frac{V_m^2}{2R_1} = \frac{12^2}{2 \times 4} = \underline{\underline{18 W}}$$

$$\rightarrow \vec{I}_2 = \frac{12 \angle 45^\circ}{2 - j} = 5.366 \angle 71.56^\circ \text{ A}$$

$$\frac{V_{R_2}}{2 - j} * 12 \angle 45^\circ$$

$$\rightarrow P_{av R_2} = \frac{1}{2} I_{m_2}^2 R_2 = \frac{1}{2} \times 5.366^2 \times 2 = \underline{\underline{28.79 W}}$$

$$\rightarrow P_{av V_S} = 18 + 28.79 = \underline{\underline{46.79 W}}$$

del.

$$\underline{\underline{OR}} \quad \vec{I}_f = \frac{\vec{V}_f}{Z_{eq}} = \vec{I}_1 + \vec{I}_2$$

$$= \frac{12 \angle 45^\circ}{4} + 5.366 \angle 71.56^\circ$$

$$= \underline{\underline{8.16 \angle 62.1^\circ \text{ A}}}$$

$$P_{av V_S} = \frac{1}{2} V_m I_m \cos(\theta_v - \theta_i)$$

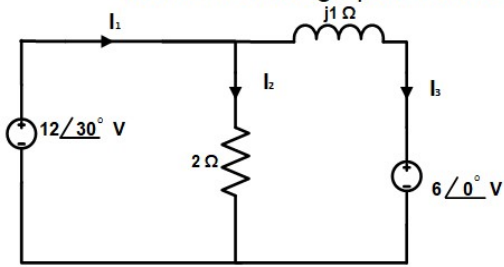
$$= \frac{1}{2} \times 12 \times 8.16 \times \cos(45 - 62.1)$$

$$= \underline{\underline{46.785 W}}$$

$$P_{abs.} = P_{del.}$$

Example :

Determine average power absorbed or supplied by each element .



$$\vec{I}_2 = \frac{12\angle 30^\circ}{2} = 6\angle 30^\circ \text{ A}$$

$$\vec{I}_3 = \frac{(12\angle 30^\circ) - (6\angle 0^\circ)}{j1\angle 90^\circ} = 7.43\angle -36.2^\circ \text{ A}$$

$$\vec{I}_1 = \vec{I}_2 + \vec{I}_3 = 6\angle 30^\circ + 7.43\angle -36.2^\circ = 11.28\angle -7.08^\circ \text{ A}$$

$$\rightarrow P_{av_{2\Omega}} = \frac{1}{2} I_{2m}^2 \times 2 = 36 \text{ W (absorbed)}$$
$$\frac{1}{2} I_m^2 R$$

$$\rightarrow P_{av_{j1\Omega}} = \text{Zero}$$