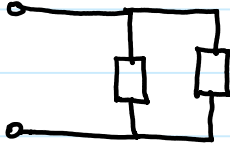


# Quiz 1 Review

2.4)



$$\bar{Z}_1 = 25 \Omega$$

$$\bar{Z}_2 = -j15 \Omega$$

$$v(t) = \sqrt{2}(120)\cos(\omega t - 45^\circ)$$

a)  $\bar{V} = 120 \angle -45^\circ$

$$\bar{Z}_{tot} = \left( \frac{1}{25} + \frac{1}{-j15} \right)^{-1} \Rightarrow \left( \frac{1}{25} + \frac{j}{15} \right)^{-1} = \left( \frac{1}{5} \left[ \frac{1}{5} + \frac{j}{3} \right] \right)^{-1} = \left( \frac{1}{5} \left[ \frac{3+j5}{15} \right] \right)^{-1}$$

$$= \left( \frac{1}{75} [3+j5] \right)^{-1} \Rightarrow 75 \left( \frac{1}{3+j5} \right) \Rightarrow 75 \left( \frac{3-j5}{4+25} \right)$$

$$\bar{Z}_{tot} = 6.618 - j11.029 \Omega \Rightarrow 12.862 \angle -59.034^\circ$$

$$\bar{I} = \frac{120 \angle -45^\circ}{12.862 \angle -59.034^\circ} \Rightarrow \boxed{\bar{I} = 9.330 \angle 14.034^\circ \text{ A}}$$

$$i(t) = \sqrt{2}(9.330)\cos(\omega t + 14.034^\circ) \text{ A}$$

$$\bar{S} = \bar{V} \bar{I}^* \Rightarrow \boxed{\bar{S} = 1119.6 \angle -59.034^\circ \text{ VA}}$$

b)  $Z_2 = j20 \Omega$

$$\bar{Z}_{tot} = 9.756 + j12.195 \Omega \Rightarrow \bar{Z}_{tot} = 15.617 \angle 51.340^\circ$$

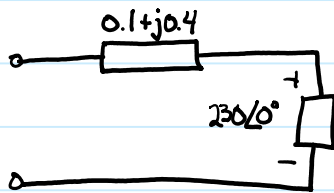
$$\bar{I} = \frac{120 \angle -45^\circ}{15.617 \angle 51.340^\circ} \Rightarrow \boxed{\bar{I} = 7.684 \angle -96.34^\circ \text{ A}}$$

$$i(t) = \sqrt{2}(7.684)\cos(\omega t - 96.34^\circ)$$

$$\bar{S} = \bar{V} \bar{I}^* = 922.08 \angle 51.340^\circ \text{ VA}$$

# Quiz 1 Review

2.7)



$$PF = 0.7 \text{ lag}$$

$$P_L = 10 \text{ kW}$$

$$P_L = VI(PF) \Rightarrow I = \frac{P_L}{V(PF)} \Rightarrow I = \frac{10 \text{ kW}}{230(0.7)} \Rightarrow I = 62.112 \text{ A}$$

$$\bar{I} = 62.112 \angle -45.573^\circ \text{ A}$$

$$\bar{V}_s = (0.1 + j0.4)\bar{I} + 230\angle 0^\circ$$

$$\bar{V}_s = 25.609 \angle 30.39^\circ + 230\angle 0^\circ$$

$$\bar{V}_s = 252.09 + j12.956$$

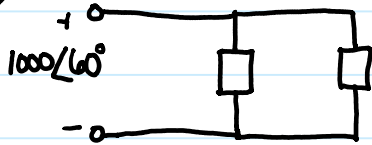
$$\bar{V}_s = 252.423 \angle 2.942^\circ$$

$$\bar{S} = \bar{V}\bar{I}^* \Rightarrow \bar{S} = 15,678.5 \angle 48.515^\circ$$

$$PF = 0.662 \text{ lag}$$

# Quiz 1 Review

2.12)



$$S_1 = 100 \text{ kVA}, \text{ PF}_1 = 0.866 \text{ lag}$$

$$P_2 = 40 \text{ kW}, \text{ PF} = 0.5 \text{ lag}$$

$$\bar{S}_1 = 100 \angle 30^\circ \text{ kVA}$$

$$\bar{S}_2 = 80 \angle 60^\circ \text{ kVA}$$

$$\bar{S}_{\text{tot}} = \bar{S}_1 + \bar{S}_2 \Rightarrow \bar{S}_{\text{tot}} = 86.603 + j50 + 40 + j69.282 \text{ kVA}$$

$$\bar{S}_{\text{tot}} = 126.603 + j119.282 \text{ kVA}$$

$$\bar{S}_{\text{tot}} = 173.944 \angle 43.295^\circ \text{ kVA}$$

$$\bar{S}_{\text{tot}} = \bar{V} \bar{I}^* \Rightarrow \bar{I} = \left( \frac{\bar{S}_{\text{tot}}}{\bar{V}} \right)^* \Rightarrow \bar{I} = 173.944 \angle 16.705^\circ \text{ A}$$

$$\bar{I}_1 = \left( \frac{\bar{S}_1}{\bar{V}} \right)^* \Rightarrow \bar{I}_1 = 100 \angle 30^\circ \text{ A}$$

$$\bar{I}_2 = \left( \frac{\bar{S}_2}{\bar{V}} \right)^* \Rightarrow \bar{I}_2 = 80 \angle 0^\circ \text{ A}$$