

$$1) 30 \cos(\omega t + 30^\circ) = V_1$$

$$20 \sin(\omega t + 30^\circ) = V_2$$

$$\bar{V}_1 = 30 e^{j30^\circ} = 30 \left(\frac{\sqrt{3}}{2} + j\frac{1}{2} \right) = 15\sqrt{3} + 15j$$

$$\bar{V}_2 = 20 e^{-j60^\circ} = 20 \left(\frac{1}{2} - j\frac{\sqrt{3}}{2} \right) = 10 - 10\sqrt{3}j \rightarrow \sqrt{3} \frac{1}{2} = \frac{1}{2} \rightarrow 36 \cos(\omega t - 3,69^\circ)$$

$$\bar{V}_3 = \bar{V}_1 + \bar{V}_2 = 15\sqrt{3} - 10 + j(15 + 10\sqrt{3})$$

$$V_3(t) = 36 \cos(\omega t + 63,69^\circ) \text{ V}$$

$$2) V(t) = 20 \cos(\omega t + 30^\circ) \text{ V}$$

$$I(t) = 1,5 \sin(\omega t) + \cos(\omega t) \text{ V}$$

$$f = 50 \text{ Hz}$$

$$Z = ?$$

$$\bar{V} = 20 e^{j30^\circ} = 10\sqrt{3} + 10j$$

$$\bar{I} = 1,5 e^{-j90^\circ} + e^{j0^\circ} = 1,5j + 1$$

$$\bar{Z} = \frac{\bar{V}}{\bar{I}} = \frac{10\sqrt{3} + 10j}{1 - 1,5j} = 0,714 + j11,07$$

$$3) R \sim L = 19,1 \text{ H}$$

$$V(t) = 220 \cos(134t + 30^\circ) \text{ V}$$

$$I(t) = ?$$

$$Z_L = 2559,4 j \sim$$

$$\bar{V} = 220 e^{j30^\circ} = 110\sqrt{3} + 110j$$

$$Z_{\text{tot}} = 8 + 2559,4 j$$

$$\bar{I} = \frac{\bar{V}}{Z_{\text{tot}}} = \frac{110\sqrt{3} + 110j}{8 + 2559,4j} = 0,043 - 0,74j$$

$$I(t) = 0,085 \cos(134t - 59,82^\circ) \text{ A}$$