

Problem 1.27 Find the instantaneous time sinusoidal functions corresponding to the following phasors:

- (a) $\tilde{V} = -5e^{j\pi/3}$ (V)
- (b) $\tilde{V} = j6e^{-j\pi/4}$ (V)
- (c) $\tilde{I} = (6 + j8)$ (A)
- (d) $\tilde{I} = -3 + j2$ (A)
- (e) $\tilde{I} = j$ (A)
- (f) $\tilde{I} = 2e^{j\pi/6}$ (A)

Solution:

(a)

$$\tilde{V} = -5e^{j\pi/3} \text{ V} = 5e^{j(\pi/3-\pi)} \text{ V} = 5e^{-j2\pi/3} \text{ V},$$

$$v(t) = 5 \cos(\omega t - 2\pi/3) \text{ V}.$$

(b)

$$\tilde{V} = j6e^{-j\pi/4} \text{ V} = 6e^{j(-\pi/4+\pi/2)} \text{ V} = 6e^{j\pi/4} \text{ V},$$

$$v(t) = 6 \cos(\omega t + \pi/4) \text{ V}.$$

(c)

$$\tilde{I} = (6 + j8) \text{ A} = 10e^{j53.1^\circ} \text{ A},$$

$$i(t) = 10 \cos(\omega t + 53.1^\circ) \text{ A}.$$

(d)

$$\tilde{I} = -3 + j2 = 3.61e^{j146.31^\circ},$$

$$i(t) = \Re\{3.61e^{j146.31^\circ}e^{j\omega t}\} = 3.61 \cos(\omega t + 146.31^\circ) \text{ A}.$$

(e)

$$\tilde{I} = j = e^{j\pi/2},$$

$$i(t) = \Re\{e^{j\pi/2}e^{j\omega t}\} = \cos(\omega t + \pi/2) = -\sin \omega t \text{ A}.$$

(f)

$$\tilde{I} = 2e^{j\pi/6},$$

$$i(t) = \Re\{2e^{j\pi/6}e^{j\omega t}\} = 2 \cos(\omega t + \pi/6) \text{ A}.$$
