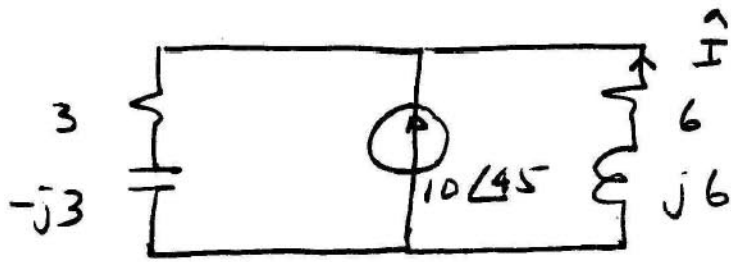


EE 204 Home Work # 9 Solution

6.4-16

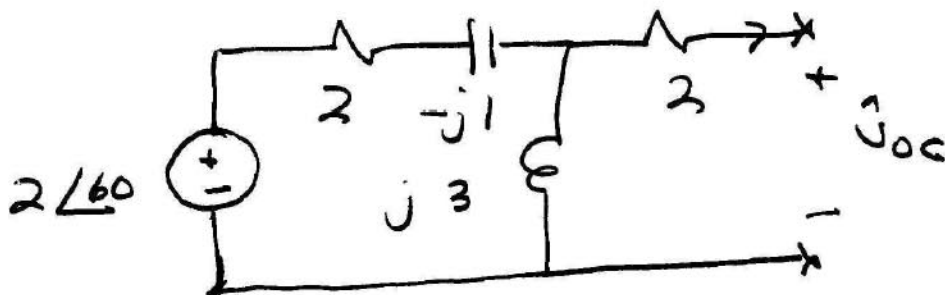


$$\hat{I} = - \frac{3 - j3}{3 - j3 + 6 + j6} 10 \angle 45^\circ = - \frac{3\sqrt{2} \angle -45^\circ}{9 + j3} 10 \angle 45^\circ$$

$$= -4.47 \angle -18.43^\circ = 4.47 \angle 161.57^\circ$$

$$\therefore i(t) = -4.47 \cos(3t - 18.43^\circ) \text{ A}$$

6.4-17

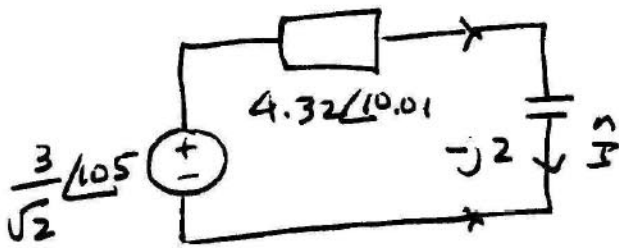


$$\hat{V}_{0c} = \frac{j3}{2 - j1 + j3} 2 \angle 60^\circ = \frac{6 \angle 150^\circ}{2\sqrt{2} \angle 45^\circ} = \frac{3}{\sqrt{2}} \angle 105^\circ$$

$$\hat{Z}_{TH} = 2 + \frac{(-j3)(2 - j1)}{j3 + 2 - j1}$$

$$= 2 + \frac{3 + j6}{2 + j2}$$

6.4-17 Continue

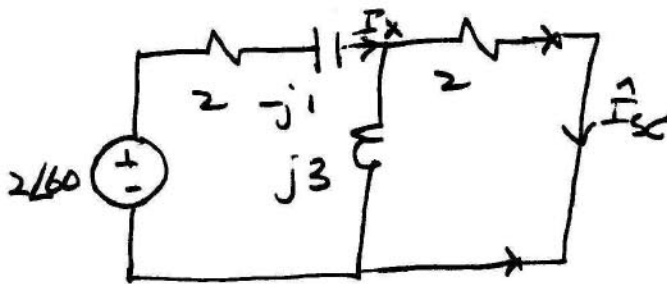


$$\hat{Z}_{TH} = 4.25 + j0.75$$

$$= 4.32 \angle 10.01$$

$$\hat{I} = \frac{\frac{3}{\sqrt{2}} \angle 105}{4.32 \angle 10.01 - j2} = \frac{\frac{3}{\sqrt{2}} \angle 105}{4.43 \angle -16.39} = 0.48 \angle 121.39$$

$$\therefore i(t) = 0.48 \sin(3t + 121.34^\circ) \text{ A}$$



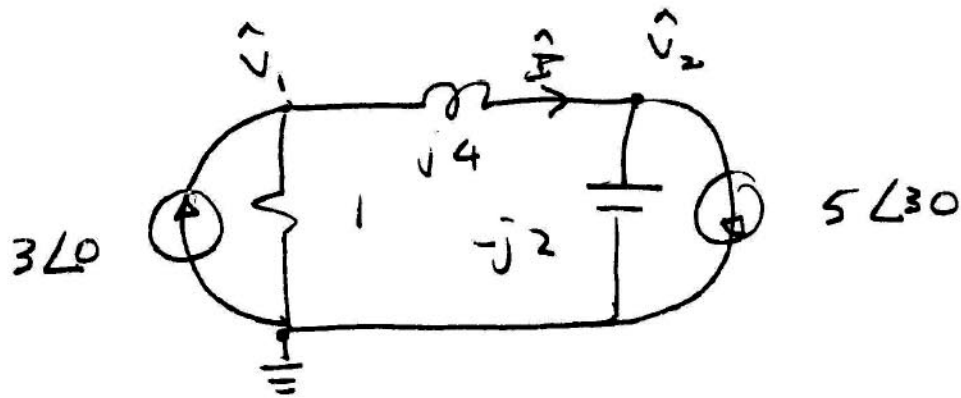
$$\frac{2(j3)}{2+j3} = \frac{j6}{3.61 \angle 56.31} = 1.66 \angle 33.69 = 1.38 + j0.92$$

$$\hat{I}_x = \frac{2 \angle 60}{2 - j1 + 1.38 + j0.92} = 0.59 \angle 61.30$$

$$\hat{I}_{SC} = \frac{j3}{2+j3} \quad \hat{I}_x = \frac{3 \angle 90}{3.61 \angle 56.31} = 0.83 \angle 33.69$$

$$= \frac{\hat{V}_{OC}}{\hat{Z}_{TH}} \quad \times 0.59 \angle 61.30 = 0.49 \angle 94.99$$

6.5-1



$$N1: \left(\frac{1}{1} + \frac{1}{j4} \right) \hat{V}_1 - \left(\frac{1}{j4} \right) \hat{V}_2 = 3 \angle 0^\circ$$

$$N2: - \left(\frac{1}{j4} \right) \hat{V}_1 + \left(\frac{1}{j4} + \frac{1}{-j2} \right) \hat{V}_2 = -5 \angle 30^\circ$$

$$\therefore (1 - j0.25) \hat{V}_1 + j0.25 \hat{V}_2 = 3$$

$$\therefore j0.25 \hat{V}_1 + j0.25 \hat{V}_2 = -5 \angle 30^\circ$$

$$(1 - j0.5) \hat{V}_1 = 3 + 5 \angle 30^\circ = 7.74 \angle 18.83^\circ$$

$$\therefore \hat{V}_1 = 6.93 \angle 45.4^\circ$$

$$\therefore \hat{V}_2 = \frac{-5 \angle 30^\circ}{j0.25} - \hat{V}_1 = -20 \angle 60^\circ - 6.93 \angle 45.4^\circ$$

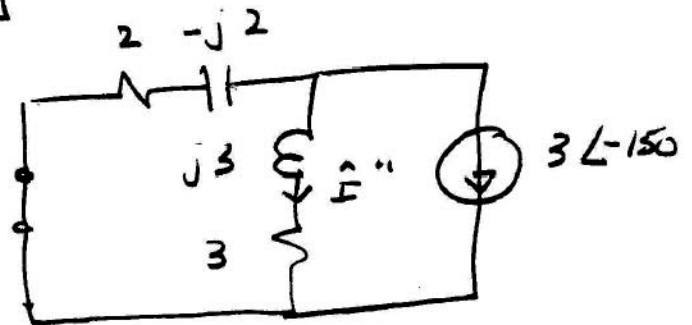
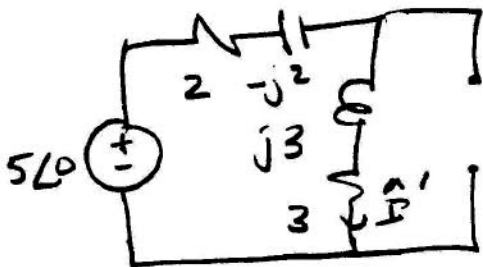
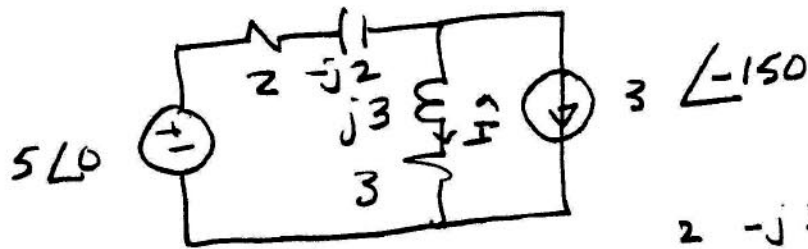
$$= 19.35 \angle 140.19^\circ$$

$$\hat{I} = \frac{\hat{V}_1 - \hat{V}_2}{j4} = \frac{21.09 \angle -20.7^\circ}{4 \angle 90^\circ} = 5.27 \angle -110.7^\circ$$

$$\therefore i(t) = 5.27 \sin(2t - 110.7^\circ) \text{ A}$$

6.5-4

$$3 \sin(2t - 60^\circ) = 3 \cos(2t - 150^\circ)$$



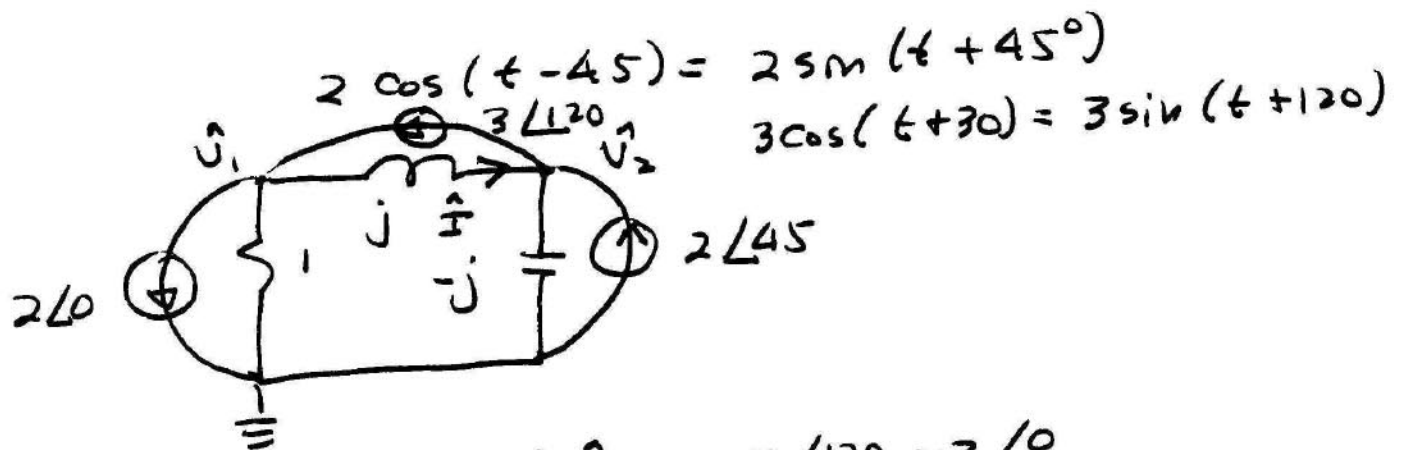
$$\begin{aligned} \hat{I}' &= \frac{5\angle 0}{2 - j2 + j3 + 3} \\ &= \frac{5\angle 0}{5 + j1} \\ &= 0.98 \angle -11.31^\circ \\ &= 0.96 - j0.19 \end{aligned}$$

$$\begin{aligned} \hat{I}'' &= - \frac{2 - j2}{2 - j2 + j3 + 3} \cdot 3 \angle -150^\circ \\ &= - \frac{6\sqrt{2} \angle -135^\circ}{5.1 \angle 11.31^\circ} \\ &= -1.66 \angle -206.31^\circ \\ &= 1.49 - j0.74 \end{aligned}$$

$$\hat{I} = \hat{I}' + \hat{I}'' = 2.62 \angle -20.76^\circ$$

$$i(t) = 2.62 \cos(2t - 20.76^\circ)$$

6.5-8



$$N1: \left(\frac{1}{1} + \frac{1}{j}\right) \hat{V}_1 - \left(\frac{1}{j}\right) \hat{V}_2 = 3 \angle 120 - 2 \angle 0$$

$$N2: -\left(\frac{1}{j}\right) \hat{V}_1 + \left(\frac{1}{j} - j\right) \hat{V}_2 = 2 \angle 45 - 3 \angle 120$$

$$\therefore (1-j) \hat{V}_1 + j \hat{V}_2 = 4.36 \angle 143.41$$

$$j \hat{V}_1 = 3.15 \angle -22.11$$

$$\therefore \hat{V}_1 = 3.15 \angle -112.11$$

$$\hat{H} = \frac{\hat{V}_1 - \hat{V}_2}{-j} = 5.98 \angle -247.21 = 5.98 \angle 112.76^\circ$$

$$\therefore \boxed{i(t) = 5.98 \sin(t + 112.76^\circ) \text{ A}}$$