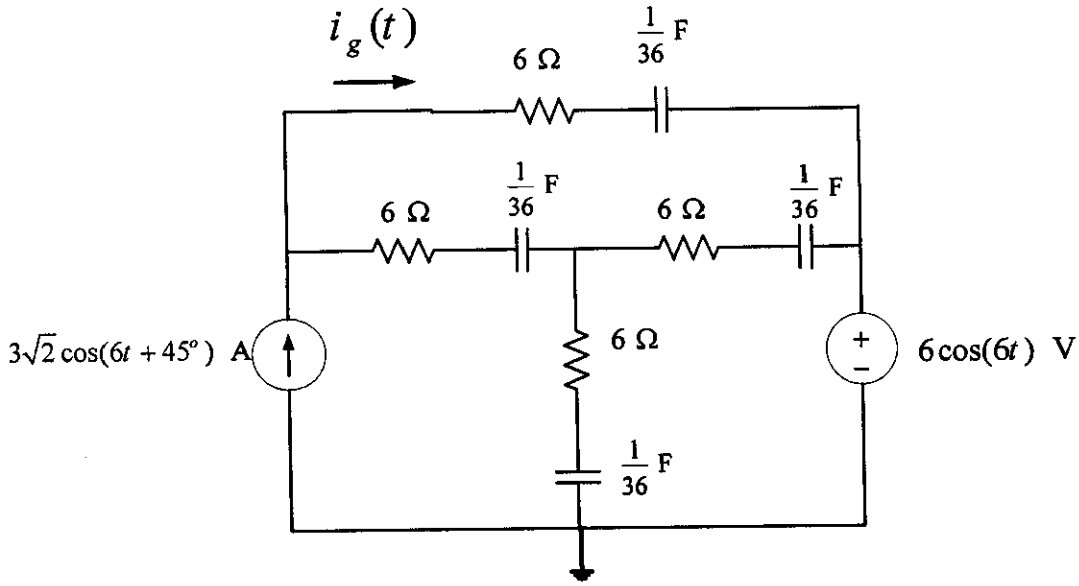
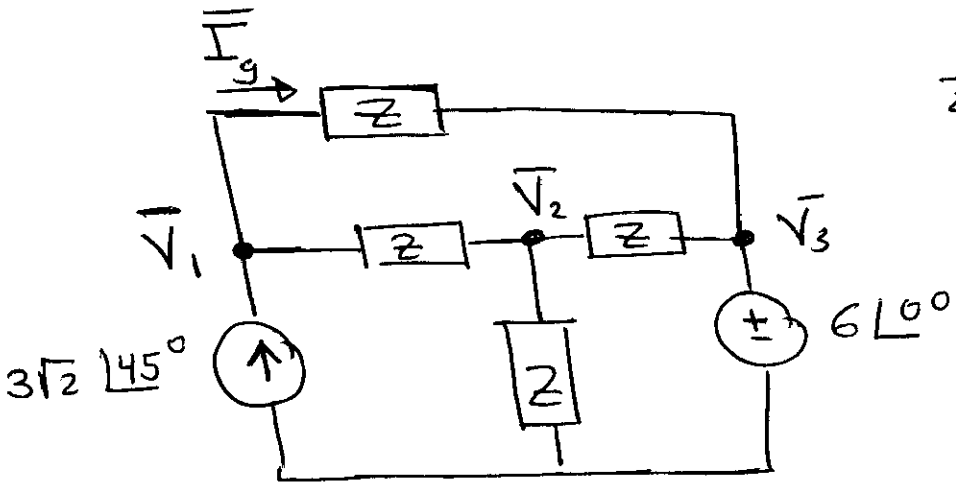
EE 201-01 – Fall 2011(111)
Quiz 7

SER	ID	NAME KEY



For the circuit shown above , find $i_g(t)$?



$$Z = 6 - j6\ \Omega = 6\sqrt{2}\angle -45^\circ\ \Omega$$

$$\bar{V}_3 = 6\angle 0^\circ\ V \quad \text{(by inspection)}$$

KCL at $\bar{V}_2$ $\quad \frac{\bar{V}_2 - 6\angle 0^\circ}{Z} + \frac{\bar{V}_2}{Z} + \frac{\bar{V}_2 - \bar{V}_1}{Z} = 0$

$$\Rightarrow \quad -\bar{V}_1 + 3\bar{V}_2 = 6\angle 0^\circ \quad -(1)$$

KCL at $\bar{V}_1$ $\quad \frac{\bar{V}_1 - \bar{V}_2}{Z} + \frac{\bar{V}_1 - 6\angle 0^\circ}{Z} = 3\sqrt{2}\angle 45^\circ$

$$\Rightarrow \quad 2\bar{V}_1 - \bar{V}_2 = 3\sqrt{2}\angle 45^\circ Z + 6$$

$$2\bar{V}_1 - \bar{V}_2 = 42\angle 0^\circ \quad -(2)$$

Solving for $\bar{V}_1$ (No need to solve for $\bar{V}_2$)

$$\bar{V}_1 = \frac{132}{5}\angle 0^\circ \quad V$$

$$\Rightarrow \bar{I}_g = \frac{\bar{V}_1 - \bar{V}_3}{Z}$$

$$= \frac{\frac{132}{5}\angle 0^\circ - 6\angle 0^\circ}{6\sqrt{2}\angle -45}$$

$$= \frac{17}{10}\sqrt{2}\angle 45^\circ \quad A$$

$$= 2.4\angle 45^\circ \quad A$$

$$\Rightarrow i_g(t) = 2.4\cos(6t + 45^\circ) \quad A$$