Quiz - 05

1) $V_s = 4\angle 30^\circ \text{ V}$

$I_s = 2\angle -60^\circ \text{ A}$

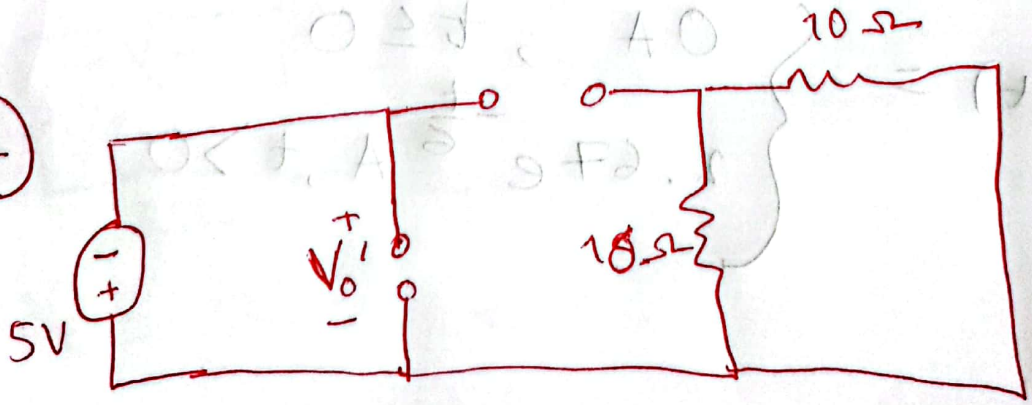
$$Z_{unknown} = \frac{V_s}{I_s} = 2\angle 90^\circ = j2$$

As it is a positive imaginary number, $Z_{unknown}$ is an inductance

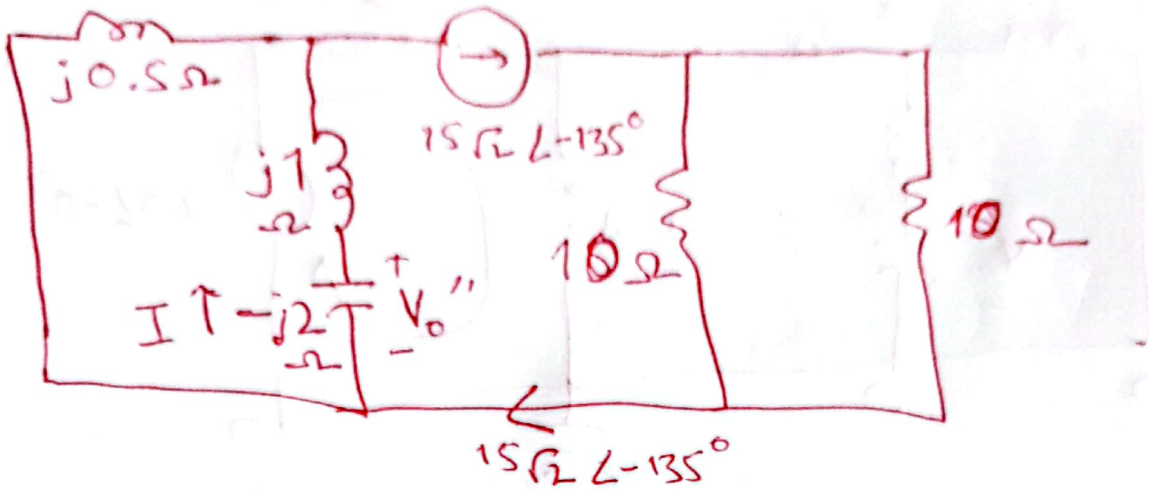
$\therefore j\omega L = j2 \quad (\omega = 100 \text{ rad/s})$

$$L = \frac{2}{100} = 0.02\text{H}$$

2)



$V_o' = -5 \text{ V}$



$\omega = 10$ rad/s

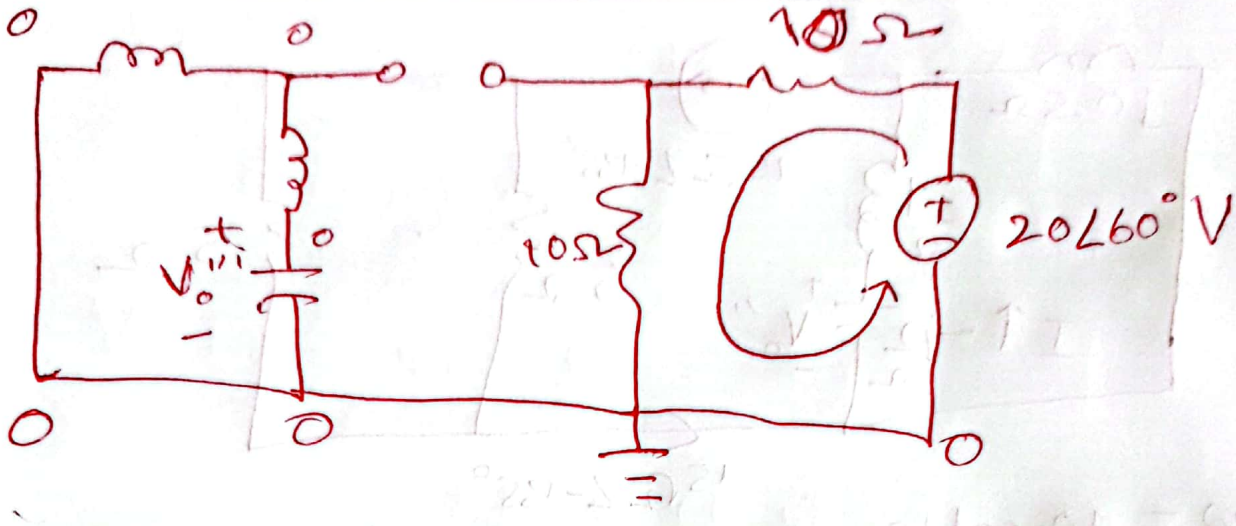
$$I = \frac{\frac{1}{j1-j2}}{\frac{1}{j1-j2} + \frac{1}{j0.5}} \times 15\sqrt{2}\angle -135^\circ$$

$$= 15\sqrt{2}\angle 45^\circ \text{ A}$$

$$V_0'' = -\left[(15\sqrt{2}\angle 45^\circ) \times (-j2)\right]$$

$$= 30\sqrt{2}\angle 135^\circ \text{ V}$$

$$v_0''(t) = 30\sqrt{2}\sin(10t + 135^\circ) \text{ V}$$



$20\angle 60^\circ$ V source has no influence on $v_o(t)$ as the current source is open

$\therefore V_o'' = 0V$

$\therefore v_o(t) = -5 + 30\sqrt{2}\sin(10t + 135^\circ)$ V