Lec 35

Chp 8.

5. $I_c = C\frac{dV}{dt}$

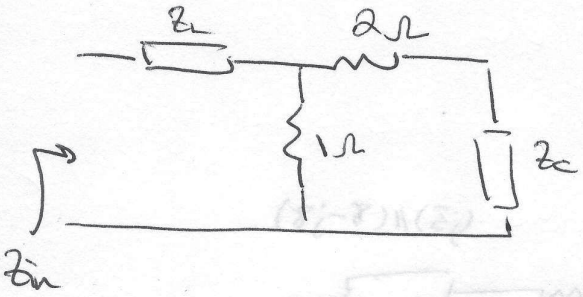
a) $= C\frac{d(10\cos(377t-30^\circ))}{dt}$

$= C)(10)(-377)\sin(377t-30^\circ)$

$= 3770C\sin(377t+150^\circ)$

b) $I_c = (C)(12)(377)\cos(377t+60^\circ)$

7.



$Z_c = \frac{1}{j\omega C} = \frac{1}{j(2\pi)(60)(10\times10^{-6})}$

$= -j265.3\ \Omega$

$Z_L = j\omega L = j(2\pi)(60)(10\times10^{-3})$

$= j3.7\ \Omega$

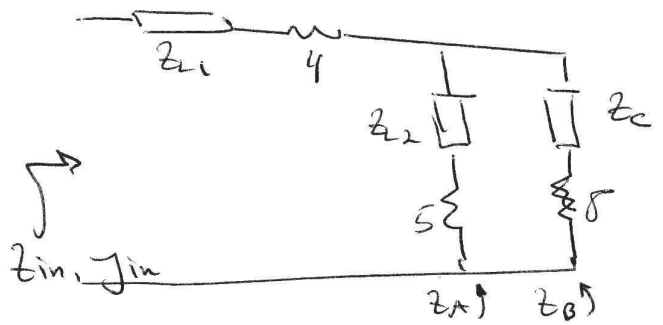
$Z_{in} = Z_L + [1 \,||\, (2+Z_c)]$

$= Z_L + \left(\frac{1}{1} + \frac{1}{2-j265}\right)^{-1}$

$= Z_L + \frac{2-j265}{3-j265} \cong 1$

$\cong 1 + Z_L$

8.



$Z_{L_1} = j\omega L$

$= j(10)(0.1) = 1j\ \Omega$

$Z_{L_2} = 2j\ \Omega$

$Z_C = \frac{1}{j\omega C} = \frac{1}{j(10)(0.01)} = -j10\ \Omega$

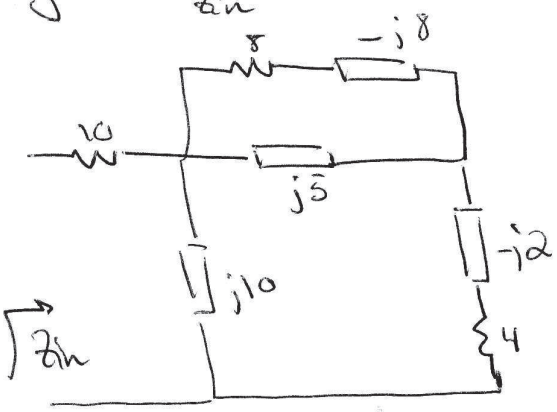
$Z_{in} = Z_{L_1} + 4 + Z_A \| Z_B$

and $Z_A = Z_{L_2} + 5 = 5 + j2$

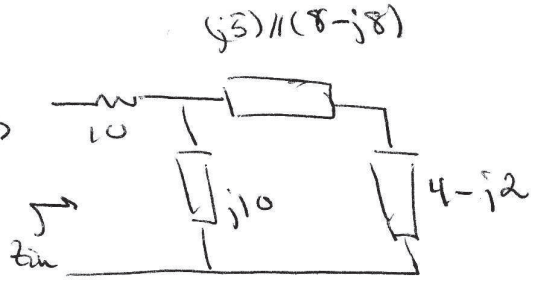
$Z_B = Z_C + 8 = 8 - j10$

and $Y_{in} = \frac{1}{Z_{in}}$

9.

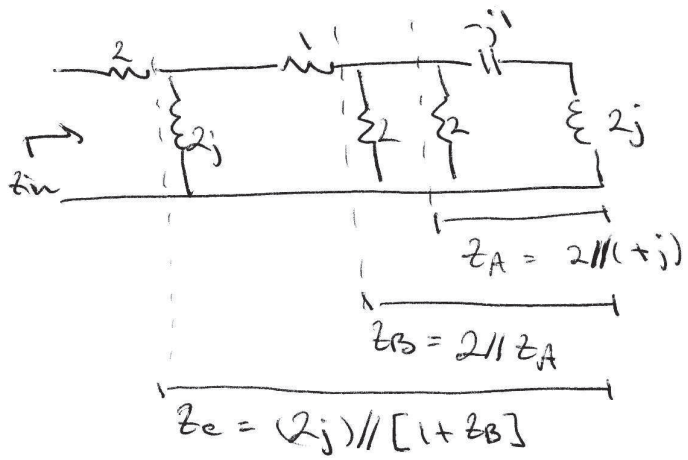


$\Rightarrow$



$Z_{in} = 10 + (j10) \| [(j5 \| (8-j8)) + 4 - j2]$

11.



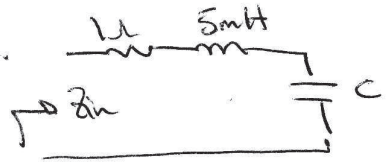
$Z_A = 2 \| (+j)$

$Z_B = 2 \| Z_A$

$Z_e = (2j) \| [1 + Z_B]$

$Z_{in} = 2 + Z_e$

16.



need $Z_L = -Z_C$ and then

$Z_{in} = 1 + Z_L + Z_C = 1$

$Z_L = j\omega L = j(2\pi)(60)(5\times10^{-3})$

$= j1.9$

$Z_C = \frac{1}{j\omega C} = \frac{-j}{\omega C}$

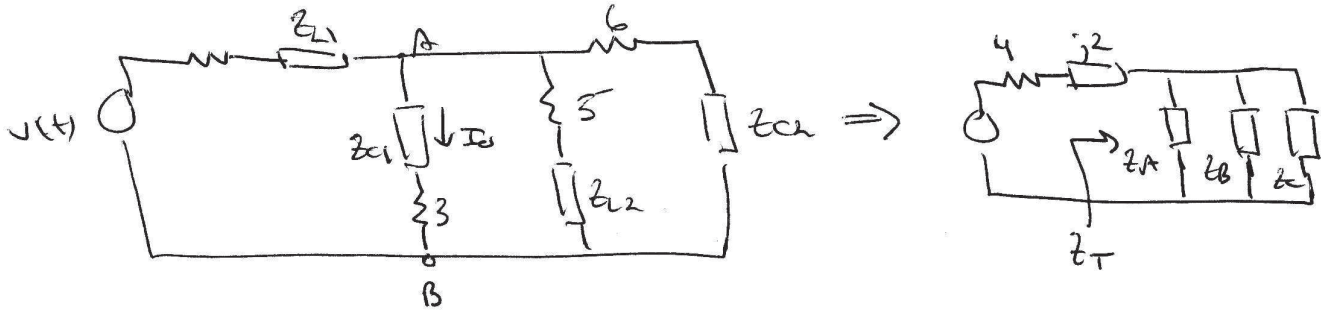
$\therefore \frac{1}{\omega C} = 1.9 \rightarrow C = 1.4 \times 10^{-3}\ F$

Lec 36

chap 9.

$v(t) = 50\cos(10t) \rightarrow \omega = 10$

29.



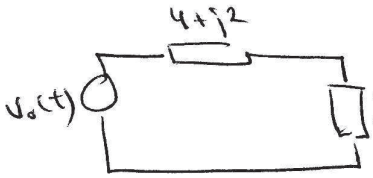
Find voltage V_{AB} and then find I_o through branch $Z_A = 3 + Z_{C1}$

$= 3 - j5\ \Omega$

$Z_B = 5 + j5 \qquad Z_C = 6 - j10$

$$Z_T = \left(\frac{1}{Z_A} + \frac{1}{Z_B} + \frac{1}{Z_C} \right)^{-1}$$

$= \cdots = 3.4 \mp j1.8$



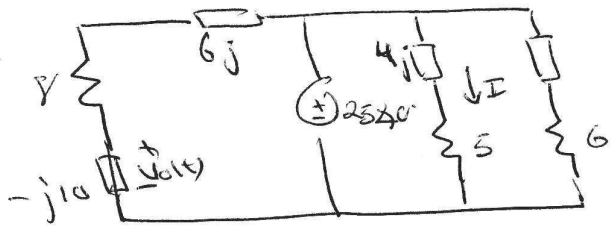
$$V = \left(\frac{Z_T}{Z_T + (4+j2)} \right) V_o(t), \quad V_o(t) = 50 \angle 0^\circ$$

$\cong 26 \angle -29^\circ$

and $I_o = \dfrac{V}{3 - j5}$

$\cong 4.4 \angle 30^\circ$ A

30.

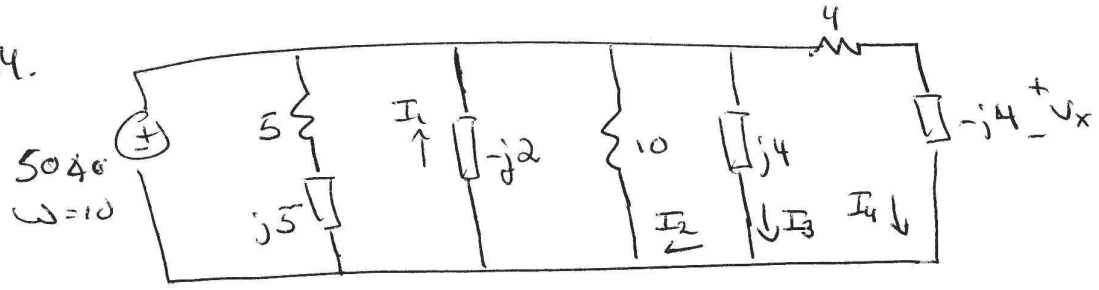


$\omega = 2$

$$I(t) = \frac{25\angle 0^\circ}{5+j4} = 4\angle -39^\circ \text{ A}$$

$$V_o = \left(\frac{-j10}{8-j10+j6}\right)(25\angle 0^\circ) = \underline{28\angle -63^\circ \text{ V}}$$

34.



$$V_x = \left(\frac{-j4}{4-j4}\right)(50\angle 0^\circ) = 35\angle -45^\circ$$

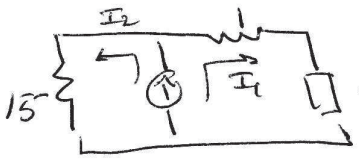
$$I_1 = \frac{-50}{-j2} = 25\angle -90^\circ$$

note direction of current

$$I_2 = I_3 + I_4$$

$$= \frac{50}{j4} + \frac{50}{4-j4} \approx \underline{9\angle -45^\circ \text{ A}}$$

41.



$$I_1 = \left(\frac{15}{1-j12+13}\right)(5\angle 30^\circ)$$

$$= 3.7\angle 67^\circ$$

$$\therefore V_o = (I_1)(-j12)$$

$$= \underline{45\angle -23^\circ \text{ V}}$$