一、选择题

1. C
2. A
3. A
4. C
5. C
6. C
7. B
8. C
9. A
10. A

二、填空

1. 容性

2. $5\angle 60°$

3. $3+j2$

4. 500   200

5. 10

6. $L_1\dfrac{di_1}{dt}$

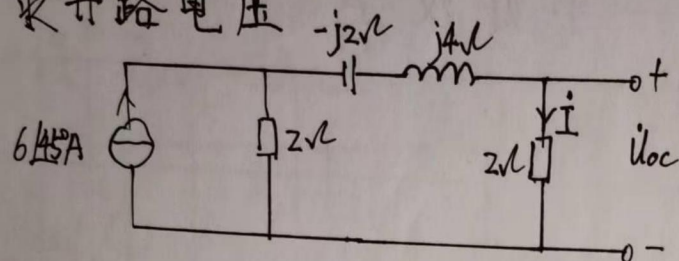7. 70

8. $\dfrac{1}{100}$ $-\dfrac{1}{100}$

9. 75   5

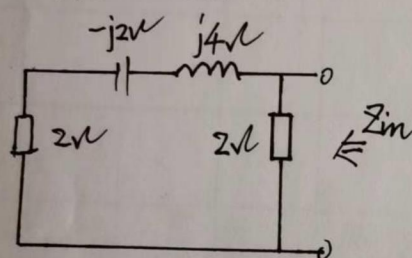10. 相电压   线电压

三．计算题 （每题 12 分）
(1)

求开路电压

$-j2Ω$　$j4Ω$

$6\angle 45°A$　$2Ω$　$2Ω$　$\dot{I}$　$\dot{U}_{oc}$

$\dot{U}_{oc} = 2\dot{I} = 5.36\angle 18.4°\,V$

$\dot{I} = \dfrac{2}{2+2+j2} \times 6\angle 45°$

$= 2.5456 + 0.8485j\,A$

$= 2.68\angle 18.4°\,A$

求输入阻抗

$-j2Ω$　$j4Ω$

$2Ω$　$2Ω$　Z_{in}

$Z_{in} = 2 \parallel (2+j2)$

$= \dfrac{2\times(2+j2)}{2+2+j2} = 1.2+j0.4\,Ω$ ✓

求电流相量

Z_{in}　$\dot{I}$

$\dot{U}_{oc}$　$j1Ω$
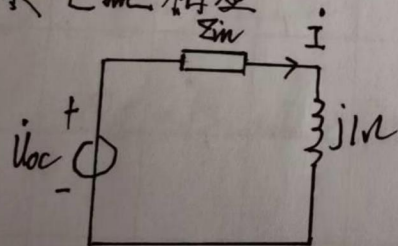
$\dot{I} = \dfrac{\dot{U}_{oc}}{Z_{in}+j1} = \dfrac{5.36\angle 18.4°}{1.2+j1.4} = 2.49-1.49j$

$= 2.9\angle -31.0°\,A$

(2)

线电压为 380V，相电压为 220V，

设 $\dot{U}_{AN} = 220\underline{/0°}$ V。
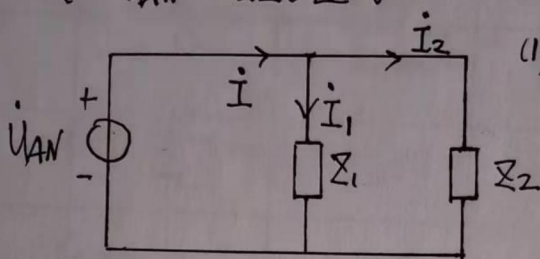
(1) $\dot{I}_1 = \dfrac{\dot{U}_{AN}}{Z_1} = \dfrac{220\underline{/0°}}{40-j30} = 4.4\underline{/36.9°}$ A

$\dot{I}_2 = \dfrac{\dot{U}_{AN}}{Z_2} = \dfrac{220\underline{/0°}}{20+j20} = 7.78\underline{/-45°}$

$\dot{I} = \dot{I}_1 + \dot{I}_2 = 9.46\underline{/-17.6°}$ A

$|\dot{I}_1| = 4.4A$　$|\dot{I}_2| = 7.78A$　$|\dot{I}| = 9.46A$

(2)　$Z = \dfrac{Z_1 \cdot Z_2}{Z_1 + Z_2} = \dfrac{(40-j30)(20+j20)}{40-j30+20+j20} = 23.25\underline{/17.59°}$ Ω

$P_总 = \sqrt{3}\,U_L I_L \cos\varphi = \sqrt{3} \times 380 \times 9.46 \times \cos 17.59° = 5935$ W

$Q_总 = \sqrt{3}\,U_L I_L \sin\varphi = \sqrt{3} \times 380 \times 9.46 \times \sin 17.59° = 1882$ var.

(3)

4. 解: (1) 当 $I_{S1} = 1A$ 时
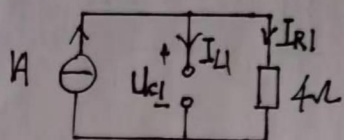
$U_{C1} = 4V$
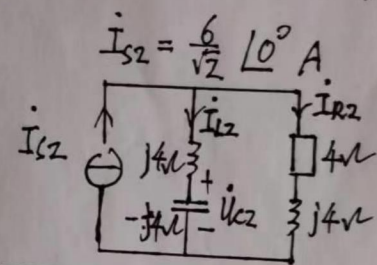
$I_{R1} = 1A$

$I_{L1} = 0A$

$U_{C1} = 4V$

② 当 $i_{s2} = 6\sin\omega t$ 时

$\dot{I}_{S2} = \dfrac{6}{\sqrt{2}}\angle 0° A$

$\dot{I}_{R2} = 0A \qquad \dot{I}_{L2} = \dot{I}_{S2}$

$\dot{U}_{C2} = -j4 \times \dot{I}_{S2} = -j\dfrac{24}{\sqrt{2}}A = \dfrac{24}{\sqrt{2}}\angle -90° V$

$U_{C2}(t) = 24\sin(\omega t - 90°) V$

$i_{L2}(t) = 6\sin\omega t A$

$i_R(t) = I_{R1} + i_{R2}(t) = 1 (A)$

$i_L(t) = I_{L1} + i_{L2}(t) = 6\sin\omega t (A)$

$u_C(t) = U_{C1} + U_{C2}(t) = 4 + 24\sin(\omega t - 90°) V$

(4)

$$X_c = \frac{1}{wc} = \frac{1}{100 \times 0.4 \times 10^{-6}} = 25000\ \Omega.$$

$$I_c = \frac{U_c}{X_c} = \frac{80}{25000} = 0.0032A.$$

$$R = \frac{10}{I_c} = 3125\ \Omega.$$

$$X_c = wL \Rightarrow L = \frac{X_c}{w} = 250H$$

(5)

(1) 由 kCL 对 结点 ①.

$$15\underline{/-30°} = \dot{I}_1 + \dot{I}_2 \quad ①$$

$$\dot{I}_1 = \frac{\dot{U}_{n1}}{j2} \quad ②$$

$$\dot{I}_2 = \frac{\dot{U}_{n1} - \dot{U}_{n2}}{-j2} \quad ③$$

$$\dot{U}_{n2} = 2\dot{I}_1 = \frac{2\dot{U}_{n1}}{j2} = -j\dot{U}_{n1} \quad ④$$

书点 电压方程为

$$\begin{cases} \dfrac{\dot{U}_{n1}}{j2} + \dfrac{\dot{U}_{n1} - \dot{U}_{n2}}{-j2} = 15\underline{/-30°} \\ \dot{U}_{n2} = -j\dot{U}_{n1} \end{cases} \Rightarrow \begin{cases} \dot{U}_{n1} = 30\underline{/150°} \text{ V} \\ \dot{U}_{n2} = 30\underline{/60°} \text{ V} \end{cases}$$

(2) $\dot{I}_1 = \dfrac{\dot{U}_{n1}}{j2} = 15\underline{/60°}$ A.

$\dot{I}_2 = \dfrac{\dot{U}_{n1} - \dot{U}_{n2}}{-j2} = 21.2\underline{/-75°}$ A.

(3) $\dot{I}^* = 15\underline{/30°}$ A

$$\overline{S_{发}} = \dot{U}_{n1} \cdot \dot{I}^* = 30\underline{/150°} \times 15\underline{/30°} = -450 \text{ VA}$$