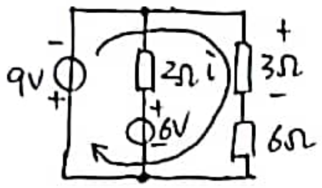
样卷0

1、



对i路使用KVL：

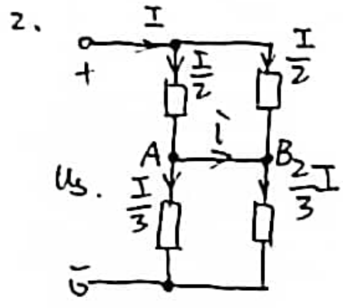
$9+u+2u=0$

6Ω电压：$\frac{u}{3}\times 6=2u$.

$\Rightarrow u=\underline{-3V}$

（−3中"−"为参考方向）.

2、



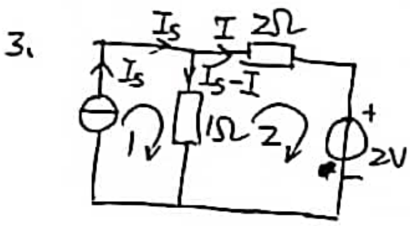
$\therefore i=\frac{I}{2}-\frac{I}{3}=\frac{I}{6}$（A结点KCL）

$u_s=\frac{I}{2}\times 6+\frac{I}{3}\times 6=5I$

即：$i=\frac{u_s}{30}=\underline{0.4e^{-t}A}$.

（AB线可拆为两部分）

3、

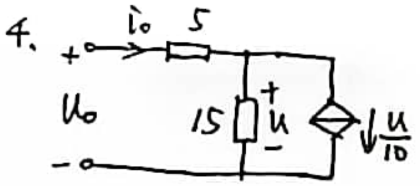


回路2 KVL：$I_s-I=2$

即：$\begin{cases}I_s=2A.\\ U_s=2V.\end{cases}$

$\therefore P_s=U_sI_s=\underline{4W}$.

4、



$R_{eq}=\frac{u_0}{i_0}$（等效电阻$=\frac{开路电压}{短路电流}$）.

由KVL有：$\begin{cases}5i_0+15(i_0-\frac{u}{10})=u_0.\\ u=15(i_0-\frac{u}{10})\end{cases}$.

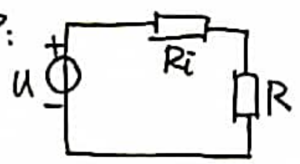
$\therefore R_{eq}=\frac{u_0}{i_0}=\underline{11\Omega}$.

5、对称定理：$\frac{U_{s1}}{I_{s1}}=\frac{U_{s2}}{I_{s2}}\Rightarrow I_{s2}=\underline{2.5A}$.

6、对于本题：将18Ω处清除，其余处用戴维宁定理：

$R_i=(20\parallel 5)+(6\parallel 3)=6\Omega$.

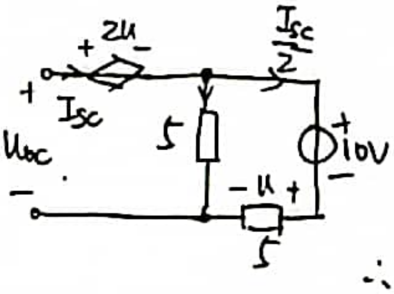
即：



$\begin{cases}u=I(R_i+R_1)\\ u=2I(R_i+R_2)\end{cases}$

令$R_1=18\Omega$，有：$R_2=\underline{\underline{6\Omega}}$.

7、



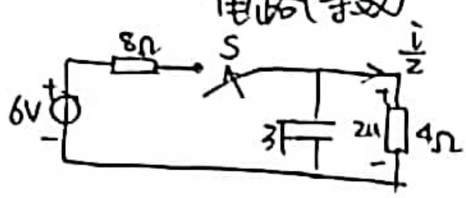
$\begin{cases}2u=R_{eq_1}I_{sc}.\\ u=\frac{I_{sc}}{2}\times 5\end{cases}$

即：$R_{eq_1}=5\Omega$

$\therefore R_{eq}=R_{eq_1}+\frac{5}{2}=7.5\Omega$.

$\therefore \tau=R_{eq}C=7.5\times 0.2=\underline{1.5s}$.

8. 电路(等效)



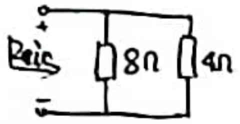
t<0时，$u_C(0_-)=0V$，$i(0_-)=0A$

t>0时，有戴维宁等效电路：

$R_{in}=8//4=\frac{8}{3}\Omega$

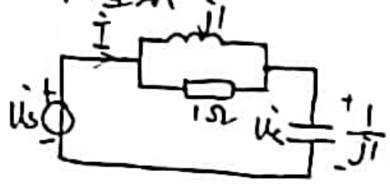
∴ $\tau=R_{in}C=8s$.　$i(\infty)=\frac{6}{8+4}\times 2=1A$.

即：$i(t)=(1-e^{-\frac{t}{8}})A$.



(三要素法：$i(t)=i(\infty)-[i(\infty)-i(0)]e^{-t/\tau}$).

9. 相量法：



$$\begin{cases}\dot U_s=\dot I[(j1//1)+\frac{1}{j1}]\\ \dot U_C=\dot I\frac{1}{j1}\end{cases}$$

∴ $\dot U_C=(1-j)V=\sqrt{2}\angle-45^\circ V$.

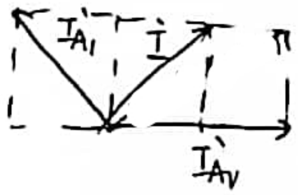
∴ $u_C=2\cos(t-45^\circ)V$.　(相量⟷时域，$\sqrt{2}$)

10. 相量法：令 $\dot I_{A_2}=10\sqrt{2}\angle0^\circ A$. $\dot I_{A_1}=10\angle\theta A$.

∴ $10\angle\theta(-j15)=10\sqrt{2}\angle0^\circ(7.5+j7.5)$.

∴ $\theta=135^\circ$.

矢量法：$\dot I=10\angle45^\circ A$



即：$I_A=10A$.

11. $\dot U=\frac{10}{\sqrt{2}}\angle30^\circ V$.　$\dot I=\sqrt{2}\angle-30^\circ A$.

∴ $Z=\frac{\dot U}{\dot I}=5\angle60^\circ\Omega$.

$S=\dot U\dot I^*=10\angle60^\circ V\cdot A$ (复功率)

∴ $P_N=Re(S)=10\cos60^\circ=5W$.

12. 由电路KVL：
$$\begin{cases}20\angle0^\circ=(10+j10)\dot I_1+j5\dot I_2\\ \dot U_{oc}=j5\dot I_1+j8\dot I_2\\ \dot I_2=0\end{cases}$$

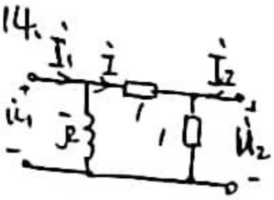
∴ $\dot U_{oc}=5\sqrt{2}\angle45^\circ V$.

13. $\frac{\dot I}{2}=\frac{\frac{20}{\sqrt{2}}\angle0^\circ}{10-j10}$.

∴ $\dot I=2\angle45^\circ$

∴ $I_A=2A$.

14.



有: $\begin{cases} \dot U_1 = j2(\dot I_1 - \dot I) & ① \\ \dot U_2 = (\dot I_2 + \dot I) & ② \\ \dot U_1 - \dot U_2 = \dot I & ③ \end{cases}$

③代入②，有: $2\dot U_2 = \dot I_2 + \dot U_1$. ④

③④代入①，有: $\dot U_1 = j2(\dot I_1 - \dot U_1 + \dot U_2)$

$= j2(\dot I_1 - \dot U_1 + \frac{\dot I_2 + \dot U_1}{2})$.

∴ $\dot U_1(1+j2) = j2\dot I_1 + j1\dot U_1 + j1\dot I_2$.

即: $\dot U_1 = \frac{j2}{1+j1}\dot I_1 + \frac{j1}{1+j1}\dot I_2$

即: $Z_{11} = \frac{\dot U_1}{\dot I_1}\Big|_{\dot I_2=0} = \frac{j2}{1+j1} = 1+j = \underline{\sqrt{2}\angle 45^\circ \Omega}$

二、
$$\begin{cases} \left(\frac{1}{R_2+R_3}+\frac{1}{R_4}\right)U_1 - \left(\frac{1}{R_4}\right)U_2 = I_{S1} - I_{S5} + \frac{U_{S4}}{R_4} \\ -\frac{1}{R_4}U_1 + \left(\frac{1}{R_4}+\frac{1}{R_6}\right)U_2 = I_{S5} + \beta I_2 - \frac{U_{S4}}{R_4} - \frac{U_{S6}}{R_6}. \\ I_2 = \frac{U_1}{R_2+R_3} \end{cases}$$

即:
$$\begin{cases} \left(\frac{1}{R_2+R_3}+\frac{1}{R_4}\right) - \frac{1}{R_4}U_2 = I_S - I_{S5} + \frac{U_{S4}}{R_4} \\ \left(-\frac{1}{R_4}+\frac{\beta}{R_2+R_3}\right)U_1 + \left(\frac{1}{R_4}+\frac{1}{R_6}\right)U_2 = I_{S5} - \frac{U_{S4}}{R_4} - \frac{U_{S6}}{R_6}. \end{cases}$$

三、线性纯电阻，$u_2 = a u_S + b i_S$.

即: $\begin{cases} 1 = a+b \\ 6 = 10a+2b \end{cases}$.

即: $\begin{cases} a = 0.5 \\ b = 0.5 \end{cases}$

∴ $u_2 = 0.5a + 0.5b$.

即: $u_2\big|_{u_S=4V,\ i_S=10A} = \underline{7V}$.

四. $u_C(0_-) = \frac{U_S}{R_1+R_3}R_3 = 40V$.

$i_L(0_-) = \frac{U_S}{R_1+R_3} = 1A$.

$\tau_C = 1.25\times10^{-4}\times40 = 5\times10^{-3}s$.

$\tau_L = \frac{1}{40}s$.

∴ $i(\infty) = \frac{U_S}{R_1} = \frac{5}{3}A$

∴ $\underline{i(t) = \frac{5}{3} - e^{-40t} + e^{-200t}\ A}$.

五. ∵ $u_S = 300\sqrt{2}\cos(1000t) + 9\sqrt{2}\cos(2000t)\ V$

$u_R = 300\sqrt{2}\cos(1000t)\ V$.

∴ $\begin{cases} Z_1 = (j\omega L \,//\, \frac{1}{j\omega C_1}) + \frac{1}{j\omega C_2} = 0 \\ Z_2 = (j\omega L \,//\, \frac{1}{j\omega C_1}) + \frac{1}{j\omega C_2} \to \infty \end{cases}$.

(串并联谐振).

即: $\begin{cases} C_1 = 0.25\mu F \\ C_2 = 0.75\mu F \end{cases}$.

$w=1000$时，$U_V = 40V$.

$w=2000$时，$U_V = 9V$.

∴ $U_V = \sqrt{9^2+40^2} = \underline{41V}$