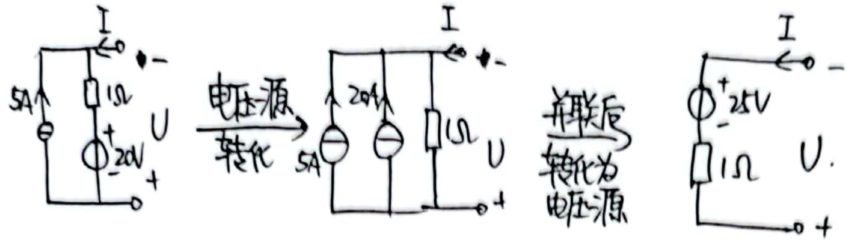
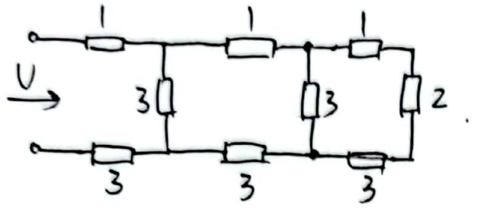
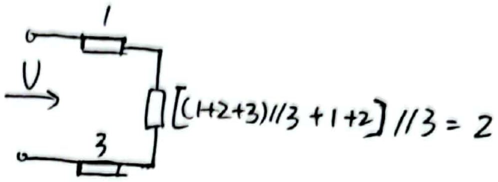
一、1、



$\therefore U=-I-25$

2、



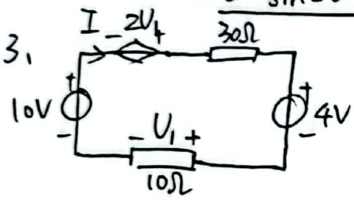


$\therefore u_R=\frac{2}{1+2+3}\times\frac{2}{1+2+3}\times\frac{2}{1+2+3}u_s$

$=(\frac{1}{3})^3u_s$

$=e^{-t}\sin 2t\ V$

3、

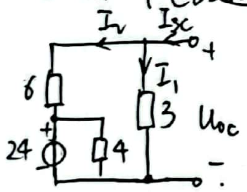


回路KVL有：$\begin{cases}U_1=10I\\10+2U_1=30I+4+U_1\end{cases}$

$\therefore I=0.3A$

$\therefore P_S=U_SI=10\times0.3=3W$

4、对除R外电路进行戴维宁等效：$\begin{cases}u_{oc}=6I_2+24\\u_{oc}=3I_1\end{cases}$



$\therefore u_{oc}=(2I_{sc}+8)V$

即：$\begin{cases}u_{oc}=8V\\R_{eq}=2\Omega\end{cases}$

$\therefore R=2\Omega$时，$P=P_{max}$，

此时 $P_{max}=\frac{u_{oc}^2}{4R}=8W$

5、对该电路书写节点电压方程：$\begin{cases}5u_{n1}-3u_{n2}=2\\-3u_{n1}+\cancel{4}u_{n2}=gU\\u_{n1}-u_{n2}=-U\end{cases}$ 与原式比对。

$\therefore g=2S$

6、令 $\dot I_{A1}=5\angle0^\circ A$. $\therefore \dot I_{A2}=20\angle90^\circ A$ $\dot I_{A3}=25\angle-90^\circ A$

即：$U=\dot I_{A1}R=\omega L\dot I_{A2}=\frac{1}{\omega C}\dot I_{A3}$

若 $\omega=2\omega_0$ 有：$U=\dot I_{A1}'R=2\omega_0L\dot I_{A2}'=\frac{1}{2\omega_0C}\dot I_{A3}'$.

$\therefore \dot I_{A2}'=10\angle90^\circ A$, $\dot I_{A3}'=50\angle-90^\circ A$.

$\therefore |\dot I_A|=|\dot I_{A1}'+\dot I_{A2}'+\dot I_{A3}'|=\sqrt{5^2+(50-10)^2}=\sqrt{1625}A=5\sqrt{65}A\approx40.3A$

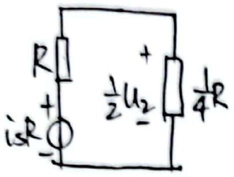
7、 $\dot{U}=-5-j5\ V=5\sqrt{2}\angle -135^\circ\ V$.

$\therefore u(t)=\underline{10\cos(10t-135^\circ)\ V}$ (更优)

or

$u(t)=\underline{10\sin(10t-135^\circ)V}$

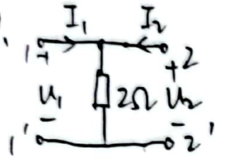
8、变压器等效有:



即: $\frac{1}{2}u_2=\frac{1}{5}i_sR$

即: $\underline{u_2=\frac{2}{5}i_sR}$.

9、

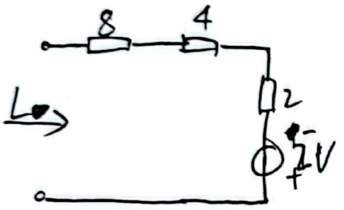


有: $\begin{cases} u_1=2I_1+2I_2 \\ u_2=2I_1+2I_2 \end{cases}$

PS: $Z=\begin{pmatrix} Z_{11} & Z_{12} \\ Z_{21} & Z_{22} \end{pmatrix} \Rightarrow \begin{pmatrix} u_1 \\ u_2 \end{pmatrix}=Z\begin{pmatrix} I_1 \\ I_2 \end{pmatrix}$

$\therefore \underline{Z_{21}=2\Omega}$

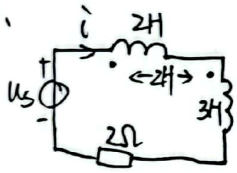
10、断开开关后: 对L有等效电路转换:



$\therefore R_{eq}=14\Omega$.

$\therefore \underline{\tau=\frac{L}{R_{eq}}=\frac{1}{14}s}$.

11、



$i(0_-)=0A$

$i(\infty)=\frac{u_s}{R}=0.5A$.

$L_{eq}=L_1+L_2+2M=2+3+2\times2=9H$.

$\tau=\frac{L}{R_{eq}}=\frac{9}{2}s$.

$\therefore i(t)=0.5(1-e^{-\frac{2}{9}t})A$.

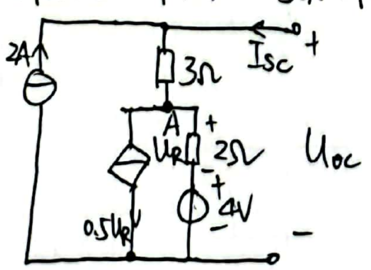
$\therefore \underline{i(1s)=(0.5-0.5e^{-\frac{2}{9}})A}$

12、状态1时: $u_c(0)=0V$, $u_c(\infty)=2V$. $u_s(t)=4\varepsilon(t)V$. $\tau=1s$.

状态2时: $u_s(t)=8\varepsilon(t)V \Rightarrow u_c(\infty)=4V$.

$\therefore \underline{u_c(t)=(4-e^{-t})V}$

二、对除R_L以外其余进行戴维宁等效: $\begin{cases} U_{oc}=3(2+I_{sc})+U_R+4 \\ 2+I_{sc}=0.5U_R+\frac{U_R}{2}.\ (A结点KCL) \end{cases}$



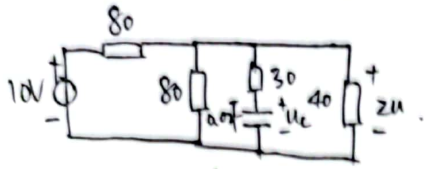
$\therefore U_{oc}=4I_{sc}+12$.

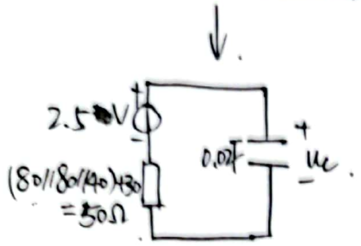
即: $\begin{cases} R_{eq}=4\Omega \\ U_{oc}=12V. \end{cases}$

$\therefore P_{R_L}=\left(\frac{U_{oc}}{R_{eq}+R}\right)^2R=\underline{9W}.$

三、 $u_C(0_-)=5V$.

S闭合后，有等效电路 ~~等效~~



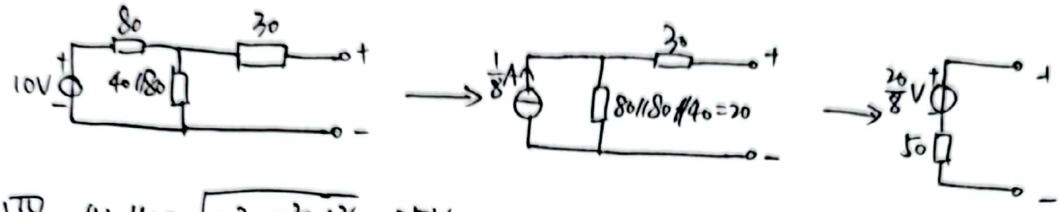


∴ $\tau = R_{eq}C = 1s$

$u_C(\infty) = 2.5V$

∴ $u_C(t) = 2.5 + 2.5e^{-t}$ V

∴ $u(t) = \frac{u_C(t)}{2} = 1.25(1+e^{-t})V$.



四、(1) $u_S = \sqrt{12^2+15^2+16^2} = 25V$

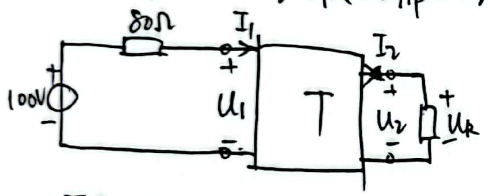
(2) C、L并联谐振频率：$\omega = \sqrt{\frac{1}{LC}} = 10^3 rad/s$.

∴ $u_R = 12 + 16\sqrt{2}\cos(2\omega t)$ （ω时发生并联谐振）

(3) $P = \frac{U_R^2}{R} = 12^2 + \left(\frac{16\sqrt{2}}{\sqrt{2}}\right)^2 = 400W$.

五、对于T_1、T_2级联二端口，有：$T = T_1T_2 = \begin{pmatrix}1 & 10\\ 0 & 1\end{pmatrix}\begin{pmatrix}1 & 0\\ 0.05 & 1\end{pmatrix}$

$= \begin{pmatrix}1.5 & 10\\ 0.05 & 1\end{pmatrix}$



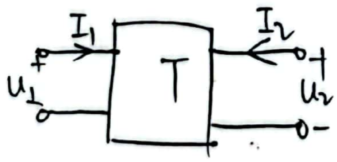
即：$\begin{cases} u_1 = 1.5u_2 + 10I_2 \\ I_1 = 0.05u_2 + I_2 \end{cases}$.

∵ $\begin{cases} u_2 = u_R \\ u_R = 20I_2 \\ 100 = 80I_1 + u_1 \end{cases}$.

（※注意I_2方向）

故有：$\begin{cases} I_1 = 1A \\ I_2 = 0.5A \\ u_R = 20I_2 = 10V \end{cases}$.

PS: $\begin{pmatrix}u_1\\ I_1\end{pmatrix} = T\begin{pmatrix}u_2\\ -I_2\end{pmatrix}$



$\begin{pmatrix}u_1\\ I_1\end{pmatrix} = T\begin{pmatrix}u_2\\ I_2\end{pmatrix}$