9-10.

设 $\dot{U}_s = 220\angle 0°$

当S闭合时

$\dot{I} = 10\angle\varphi_1$

$220 \cdot 10 \cdot \cos(0-\varphi_1) = 1000$

$\cos\varphi_1 = \frac{5}{11}$

$Z_2 = \frac{\dot{U}_s}{\dot{I}} = 22\angle -\varphi_1 = 22\angle\varphi_3$，易知 Z_2 为容性阻抗，$Z_2 = 10 - 19.6j$

同理，$\cos\varphi_2 = \frac{20}{33}$，$\varphi_2 = \pm 52.7°$

$Z_1 + Z_2 = \frac{\dot{U}_s}{\dot{I}_1} = \frac{55}{3}\angle -\varphi_2 = \frac{55}{3}\angle\varphi_4 = 11.11 \pm 14.58j$

∵ ~~Z_1 为容性~~

∴ ~~$\varphi_4 > \varphi_3$~~

$Z_1 = \begin{cases} 1.11 + j5.02 \\ 1.11 + j34.18 \end{cases} \Omega$

9-11.

设 $\dot{I} = 4\angle 0°$

$\dot{U}_1 = 171\angle\varphi_1$

$P = 171 \times 4\cos(\varphi_1 - 0°) = 240W$

$\varphi_1 = \pm 69.46$，$Z_1 = 42.75\angle \pm 69.46$

$\dot{U} = 100\angle\varphi$，$\dot{U}_2 = 240\angle\varphi_2$

$Z = \frac{\dot{U}}{\dot{I}} = 25\angle\varphi$

$Z_2 = \frac{\dot{U}_2}{\dot{I}} = 60\angle\varphi_2$，$Z = Z_1 + Z_2$

$25\angle\varphi = 42.75\angle \pm 69.46 + 60\angle\varphi_2$

$25\angle\varphi\mp69.46 = 42.75\angle0^\circ + 60\angle\varphi_2\mp69.46$

设 $\varphi' = \varphi\mp69.46$ · $\varphi'' = \varphi_2\mp69.46$

$25\angle\varphi' = 42.75 + 60\angle\varphi'$

解得. $\varphi_2 = \mp90^\circ$

$\therefore Z_1 = 42.75\angle69.46^\circ$, $Z_2 = 60\angle-90^\circ$ 或 $Z_1 = 42.75\angle-69.46^\circ$, $Z_2 = 60\angle90^\circ$.

9-18. 设 $\dot{I}_1 = I_1\angle\varphi_1$, $\dot{I}_2 = I_2\angle\varphi_2$

设 $\dot{I}_S = 10\angle0^\circ$

$\dot{U}_C = \dot{I}_S \cdot \frac{1}{j\omega C} = 200\angle-90^\circ = -j200$

由电路列方程

$$\begin{cases} 10I_1\angle\varphi_1 - (0.5X - j200) = 10I_2\angle\varphi_2 \\ I_1\angle\varphi_1 + I_2\angle\varphi_2 = 10\angle0^\circ \end{cases}$$

$$\begin{cases} \dot{I}_1 = 5\sqrt{2}\angle-45^\circ \\ \dot{I}_2 = 5\sqrt{2}\angle45^\circ \end{cases}$$

$\dot{U}_{R_2} = \dot{I}_2 \cdot R = \cancel{25\sqrt{2}}\ 50\sqrt{2}\angle45^\circ$

$\dot{U} = \dot{U}_{R_2} + \dot{U}_C = \cancel{(25-j175)}\ 150-150j$

$\bar{S} = \dot{U}\dot{I}^* = \cancel{(25-j175)\times10} = (150-150j)$ VA

$\cancel{= 250 - j1750}$

~~9-21. 戴维宁等效电路~~

$\cancel{Z_{eq} = \frac{R \cdot \frac{1}{j\omega C}}{R + \frac{1}{j\omega C}}} =$

9.21. 当流过RC串联部分电流最大时，有P_{max}

$$I = I_s \cdot \left| \frac{\frac{1}{R}+j\omega C}{\frac{1}{\frac{1}{R}+j\omega C}+\frac{1}{\frac{1}{j\omega C}+R}} \right|$$

$$= I_s \cdot \left| \frac{1}{1+(\frac{1}{j\omega C}+R)(\frac{1}{R}+j\omega C)} \right|$$

原式$=(\frac{1}{j\omega C}+R)(\frac{1}{R}+j\omega C)$

$$=2+\frac{1}{j\omega CR}+j\omega CR$$

$$=2+j(\omega CR-\frac{1}{\omega CR})$$

易知 当$\omega CR-\frac{1}{\omega CR}=0$时，有$I_{max}$

解得此时 $\omega=1000\,rad/s$

$$\therefore I_{max} = I_s \cdot \left|\frac{1}{1+2}\right|$$

$$=\frac{I_s}{3}=0.2A$$

$$P_{max}=I^2R=40W$$

10-3.

(1). $\psi_1=L_1i_1-Mi_2=6(2+5\cos(10t+30^\circ))-4\times10e^{-5t}\,Wb$

$$=12+30\cos(10t+30^\circ)-40e^{-5t}\,Wb$$

$\psi_2=L_2i_2-Mi_1=30e^{-5t}-8-20\cos(10t+30^\circ)\,Wb$

(2). $U_1=\frac{d\psi_1}{dt}=-300\sin(10t+30^\circ)+200e^{-5t}\,V$

$U_2=\frac{d\psi_2}{dt}=-150e^{-5t}+200\sin(10t+30^\circ)\,V$

(3). $k=\frac{M}{\sqrt{L_1L_2}}=0.943$

10-4.

解: (1). $L_{eq}=\frac{L_1L_2-M^2}{L_1+L_2-2M}=2H$

(2)同理: $0H$ (3). $4H$

(b). $L_{eq} = \frac{L_1L_2 - M^2}{L_1+L_2+2M}$

(1) 0.857 H

(2) 0 H

(3). 0 H.

(c). $L_{eq} = L_1 - M + \frac{M(L_2 - M)}{L_2}$

(1) 6H (2) 0H (3) 0H

(d) $L_{eq} = L_1 + M + \frac{-M(L_2+M)}{L_2}$

(1) 6H (2) 0H (3) 0H.