电路分析（III）参考答案

一. 单项选择题

1. C　　2. A　　3. C　　4. D　　5. A
6. D　　7. B　　8. A　　9. C　　10. B
11. D　　12. B　　13. A　　14. D　　15. C
16. A

二. 填空

1. 电荷　　2. 0　　3. b - (n-1)　　4. 平面　　5. 9

6. $u = L\dfrac{di}{dt}$　　7. $50\sqrt{2}\angle -45°$ V　　8. $10\sqrt{2}\cos(100\pi t+30°)$ A

9. 电感　　10. 0　　11. 350 W

三. 解：

$-12 = (120 + 60)I - 30$

$I = \dfrac{18}{180} = 0.1$ A

$U_{表} = 80I - 30 = -22$ V

电压表极性为下“+”、上“—”

$U_a = -22 + 60I = -16$ V

四. 解：

$I = \dfrac{12-U_R}{5} = \dfrac{12-2}{5} = 2A$

$I_R = \dfrac{U_R}{R} = I + 6 - 2I = 4A$

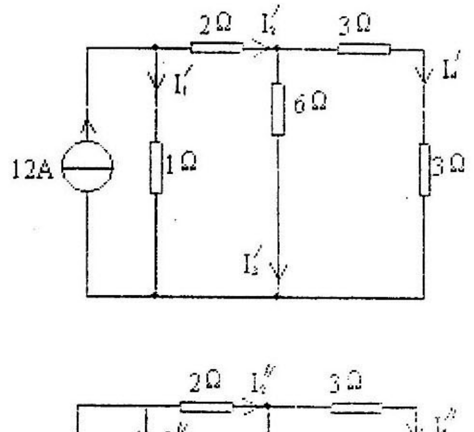
$R = \dfrac{U_R}{I_R} = \dfrac{2}{4} = \dfrac{1}{2}\Omega$

$P_{受} = U_R \cdot 2I = 2\times 2\times 2 = 8W$

五. 解： 电流源单独作用，

$I_2' = 12\times\dfrac{1}{1+2+6//6} = 2A$

$I_1' = 10$A　　$I_3' = I_4' = \dfrac{1}{2}I_2' = 1$A



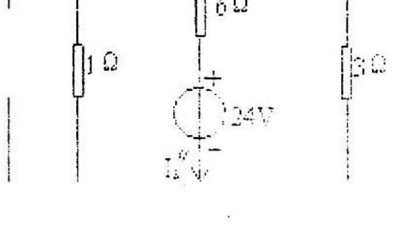
电压源单独作用

$I_3'' = -\dfrac{24}{6+3//6} = -3A$

$I_2'' = I_3''\dfrac{6}{6+3} = -3\times\dfrac{2}{3} = -2A$

$I_1'' = -I_2'' = 2$A

$I_4'' = I_2'' - I_3'' = -2-(-3) = 1$A



IV-1

叠加：$I_1 = I_1' + I_1'' = 10 + 2 = 12A$

$I_2 = I_2' + I_2'' = 2 - 2 = 0$

$I_3 = I_3' + I_3'' = 1 - 3 = -2A$

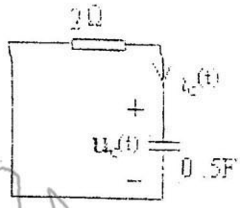
$I_4 = I_4' + I_4'' = 1 + 1 = 2A$

$P_{12A} = -I_1 \cdot 1 \times 12 = -144W$

六. 解： $t < 0$， $u_c(0-) = 6\ V$　　　$i_L(0-) = 0$

$t > 0$，为两个一阶电路

电容一阶：$u_c(0+) = u_c(0-) = 6V$



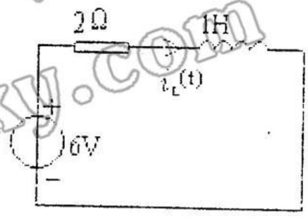
$$i_c(0+) = \frac{-u_c(0+)}{2} = \frac{-6}{2} = -3A$$

$i_c(\infty) = 0$

$\tau = RC = 2 \times 0.5 = 1S$

$\therefore\ i_c(t) = i_c(0+)e^{-\frac{t}{\tau}} = -3e^{-t}A$　　$t \geqslant 0$

电感一阶：$i_L(0+) = i_L(0-) = 0$



$$i_L(\infty) = \frac{6}{2} = 3A$$

$$\tau = \frac{L}{R} = \frac{1}{2}S$$

$\therefore\ i_L(t) = i_L(\infty)\left(1 - e^{-\frac{t}{\tau}}\right)$

$= 3\left(1 - e^{-2t}\right) A$　　　$t \geqslant 0$

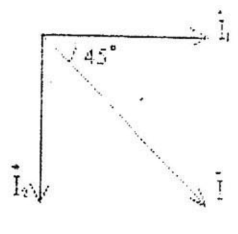
$\therefore\ i(t) = i_L(t) - i_c(t) = 3\left(1 - e^{-2t}\right) + 3e^{-t}\ A$　$t \geqslant 0$

七. 解：画出相量模型，可得：

$$\dot I = \frac{\dot U_S}{5 + j15 + \dfrac{10 \times (-j10)}{10 - j10}} = \frac{100\angle 0°}{10 + j10} = 5\sqrt{2}\angle -45° A$$

$$\dot I_1 = \dot I \frac{10}{10 - j10} = 5\sqrt{2}\angle -45° \times \frac{1}{\sqrt{2}\angle -45°} = 5\angle 0° A$$

$$\dot I_2 = \dot I - \dot I_1 = 5 - j5 - 5 = -j5 = 5\angle -90° A$$



$\therefore\ i(t) = 10\cos(10t - 45°)\ A$

$i_1(t) = 5\sqrt{2}\cos 10t\ A$

$i_2(t) = 5\sqrt{2}\cos(10t - 90°)\ A$