7-5.

$u_C(0^-) = 5 \times \frac{100}{100+25} V = 4V$

$u_C(0^-) \frac{u_C}{R} = C \frac{du_C}{dt}$

$u_C = CR \frac{du_C}{dt}$

$\therefore RCp = 1$

$p = -\frac{1}{RC} = -1$

$\therefore u_C(t) = u_C(0^-) \cdot e^{-t}$

$= 4e^{-t} V$

$i(t) = \frac{u_C}{R} = 4e^{-t} \times 10^{-5} A$

7-6.

$i(0^+) = i(0^-) = \frac{60}{1+4} A = 2A$

当开关闭合后.

$-L \cdot \frac{di}{dt} = iR.$

$p = -\frac{R}{L} = -40$

$i(t) = 2e^{-40t} A$

$u_L(t) = i \cdot 8\Omega = 16 \cdot e^{-40t} V.$

7-7.

$u_C(0^-) = 60 \times \frac{100}{150+100} = 24V$

$i(0^+) = \frac{60}{100+150} = 0.24A$

电感电流

$-\frac{R}{L} = -1000$

$I(t) = 0.24 \cdot e^{-1000t} A$

$-\frac{1}{RC} = -2000$

$\therefore U(t) = 24 \cdot e^{-2000t} V$

$I'(t) = \frac{U(t)}{1000} = 0.24 \cdot e^{-2000t} A$

$i = I'(t) - I(t)$

$= 0.24 (e^{-2000t} - e^{-1000t}) A$

7-11

$u_c(0^+) = 0$

$u_c(\infty) = i_s R$

$R_{eq} = 2R$

$\therefore u_c(t) = i_s R - i_s R \cdot e^{-\frac{t}{2RC}}$

$= i_s R (1 - e^{-\frac{t}{2RC}})$

$i_c(t) = C \cdot \frac{du_c}{dt} = \frac{i_s}{2} \cdot e^{-\frac{t}{2RC}}$

$i'(t) = i_s - i_c(t)$

$= i_s (1 - \frac{1}{2} e^{-\frac{t}{2RC}})$

$U'(t) = i'(t) \cdot R = i_s R (1 - \frac{1}{2} e^{-\frac{t}{2RC}})$

$P = U'(t) \cdot i_s = i_s^2 R (1 - \frac{1}{2} e^{-\frac{t}{2RC}})$

$\therefore$ 发出功率为 $i_s^2 R (1 - \frac{1}{2} e^{-\frac{t}{2RC}})$

7-12.

$u_c(0+) = 0V$

$u_c(\infty) = 2V$, $R_{eq} = 7$

$u_c(t) = 2(1 - e^{-\frac{t}{2} \times 10^6}) V$

7-13.

$i_1(0^+)=0A$

当开关闭合后经无限长时间

电流源在电感处产生电流

$i_1=3A$

电压源在电感处产生电流

$i_2=-12\times\frac{1}{12+\frac{4\times6}{4+6}}\times\frac{4}{4+6}=-\frac{1}{3}A$

$\therefore i(\infty)=i_1+i_2=\frac{8}{3}A$,

$\therefore R_{eq}=6+\frac{4\times12}{4+12}=9\Omega$

$\tau=\frac{L}{R}=\frac{9}{2}$

$i_L(t)=i(\infty)+(i(0^+)-i(\infty))e^{-\frac{t}{\tau}}$

$=(1-e^{-\frac{2}{9}t})\cdot\frac{8}{3}A$

$u_L(t)=L\cdot\frac{di_L(t)}{dt}=\frac{32}{27}e^{-\frac{2}{9}t}$

7-15.

$u_C(0^+)=6V$

$u_C(\infty)=12V$

$R_{eq}=12\Omega$

$\tau=RC=2\times10^3\times20\times10^{-6}=4\times10^{-2}s$

$\therefore u_C=u_C(\infty)+(u_C(0^+)-u_C(\infty))\cdot e^{-\frac{t}{\tau}}$

$=12V+(6-12)\cdot e^{-25t}V$

$=(12-6e^{-25t})V$

$i_C(t)=C\cdot\frac{du_C}{dt}=3\times e^{-25t}\times10^{-4}A$

$U_C(2\times10^{-3}) = (12 - 6e^{-0.05})V = 6.293V$

$W_{oc}(2\times10^{-3}) = \frac{1}{2}Cu_C^2(2\times10^{-3}) = 3.96\times10^{-4}J$