記分欄 從此處開始寫起。試卷用紙務須節用，非經主試認可不得續用其他紙張作答。/Please write from here.

1、 $F(s)=\frac{(s+4)(s+8)}{s(s^2+4s+8)}=\frac{k_0}{s}+\frac{(s+2)k_1}{(s+2)^2+2^2}+\frac{2k_2}{(s+2)^2+2^2}$,

$k_0=4$

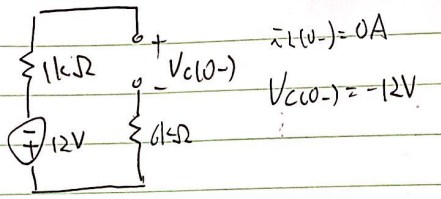
$k_1=-3$

$k_2=1$

$f(t)=\mathcal{L}^{-1}[F(s)]=[4-3e^{-2t}\cos 2t+e^{-2t}\sin 2t]u(t)$

2. $f(t)=\left[2e^{-t}\cos 2t+5e^{-t}\sin 2t\right]=\frac{2(s+1)}{(s+1)^2+2^2}+\frac{5\times 2}{(s+1)^2+2^2}=\frac{2s+12}{s^2+2s+5}$ //

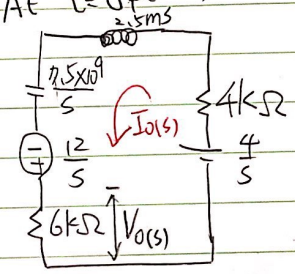
3、 At $t=0_-$



$i_L(0_-)=0A$

$V_C(0_-)=-12V$

At $t=0_+(2.5ms)$



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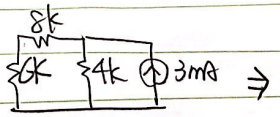
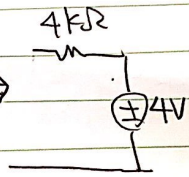


⇒



$$\frac{4}{s}+\frac{12}{s}=(10k I_o(s)+2.5ms\, I_o(s)+\frac{7.5\times10^{9}}{s}I_o(s)$$

$$I_o(s)=\frac{6400}{(s^2+4\times10^6 s+3\times10^{12})}=\frac{k_0}{(s+1M)}+\frac{k_1}{(s+3M)}$$

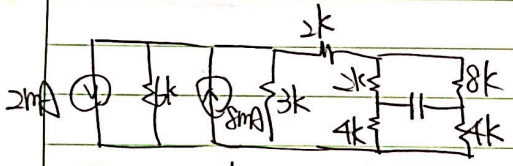
$k_0=-3200\times10^{-6}$, $k_1=-3200\times10^{-6}$

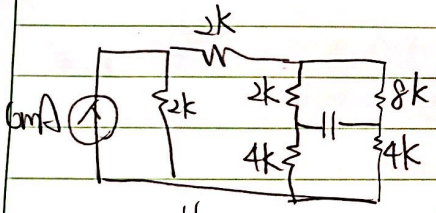
$$i_o(t)=\mathcal{L}^{-1}[I_o(s)]=3200\times10^{-6}e^{-1Mt}-3200\times10^{-6}\times e^{-3Mt}$$

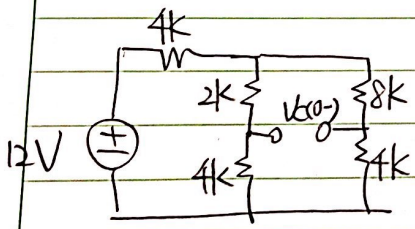
$$V_o(t)=6k\times i_o(t)=19.2e^{-Mt}-19.2e^{-3Mt}$$

記分欄 轉頁從此開始寫起。

4. At $t=0_-$

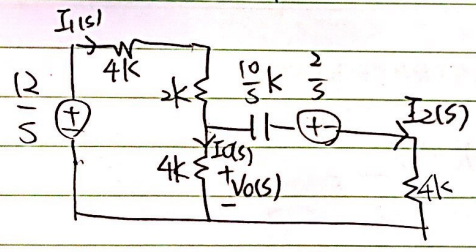






$$V_{C(0-)}=12\times\left(\frac{6K//12K}{4K+6K//12K}\right)\times\left[\frac{4}{4+2}-\frac{4}{8+4}\right]=2V$$

L.T at $t=0_+$



$$I_1(s)=I_0(s)+I_2(s)$$

$$\frac{\frac{12}{s}-V_0(s)}{6k}=\frac{V_0(s)}{4k}+\frac{V_0(s)-\frac{2}{s}}{4k+\frac{10}{s}k}$$

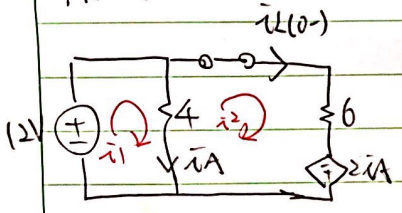
$$\Rightarrow V_0(s)=\frac{\frac{15}{4}(s+2)}{s(s+\frac{25}{16})}=\frac{k_0}{s}+\frac{k_1}{s+\frac{25}{16}}$$

$k_0=4.8$, $k_1=-1.05\left(\frac{-21}{20}\right)$

$$V_0(t)=\mathcal{L}^{-1}[V_0(s)]=\left(4.8-1.05e^{-\frac{25}{16}t}\right)u(t)$$

5.

At $t=0-$

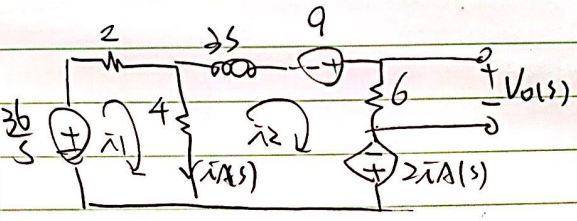


$$\begin{cases} 12 = 4(i_1 - i_2) & ① \\ 2i_A = 10i_2 - 4i_1 & ② \\ i_1 - i_2 = i_A & ③ \end{cases}$$

整理可得

$i_2 = i_L(0-) = 3A$

L.T at $t>0$



$$\begin{cases} \frac{36}{s} = 6I_1(s) - 4I_2(s) & — ① \\ 9 + 2I_A(s) = (10+3s)I_2(s) - 4I_1(s) & — ② \end{cases}$$

由①②得

$$I_2(s) = \frac{\frac{9s+36}{s}}{8+3s} = \frac{k_0}{s} + \frac{k_1}{s+\frac{8}{3}}, \quad k_0 = \frac{9}{2}, k_1 = \frac{3}{2}$$

$$i_2(t) = \mathcal{L}^{-1}[I_2(s)] = \frac{9}{2} - \frac{3}{2}e^{-\frac{8}{3}t}$$

$$V_o(t) = i_2(t) \times 6$$

$$= 27 - 9e^{-\frac{8}{3}t}$$

記分欄 從此處開始寫起。試卷用紙務須節用，非經主試認可不得續用其他紙張作答。/Please write from here.

6. $w=\delta$ (pole)

$w=\delta_0$ (zero)

$w=\delta_\infty$ (zero)

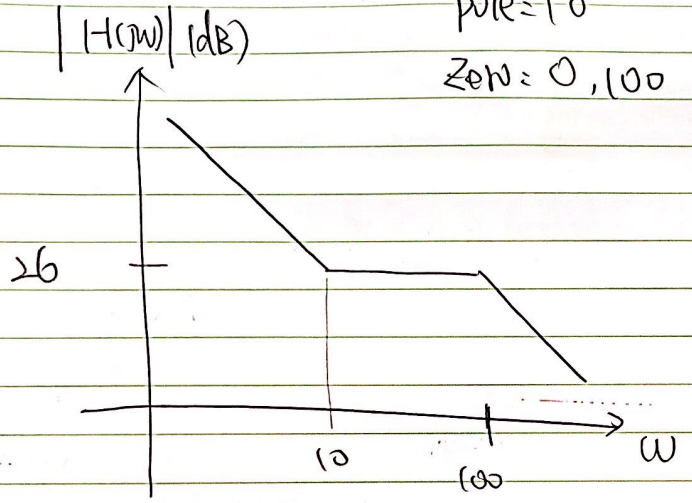
$w=\delta_\infty$ (pole)

$$\Rightarrow H(jw)=\frac{k_0\left(\frac{1}{\delta_0}jw+1\right)\left(\frac{1}{\delta_\infty}jw+1\right)}{\left(\frac{1}{\delta}jw+1\right)\left(\frac{1}{\delta_\infty}jw+1\right)}$$

when $w=\delta$, $20\log|1+jw| = 20\log k_0 + 20\log|1+j0.1| + 20\log|1+j\alpha 01| - 20\log|1+j1| - 20\log|1+j\alpha\infty|$

$0-3dB = 20\log k_0 - 3dB \Rightarrow k_0=1$

7.



pole = 10

zero = 0, 100

$$H(jw) = \frac{0.5\left(1+\frac{1}{10}jw\right)}{jw\left(1+\frac{1}{100}jw\right)}$$

when $w=10$, $20\log|H(jw)|$

$= 20\log 0.5 + 20\log|1+j1| - 20\log|10| - 20\log|1+j0.1|$

$= 20\log|0.05| + 3dB$

$= 20\log 10^{-2} + 20\log 5 + 3dB = -40 + 20\log 5 + 3dB$

$= 26dB$

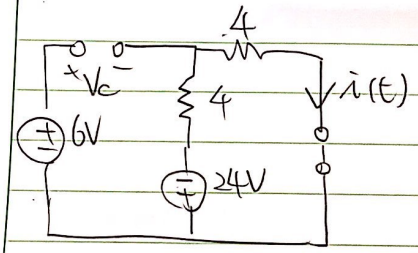
可轉頁再寫。

記分欄

轉頁從此開始寫起。

8.

At $t=0^-$

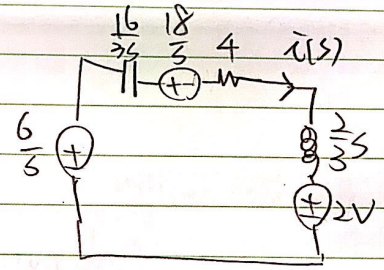


$i(0^-)=\frac{-24}{4+4}=-3A$

$V_c(0^-)=6+24+4\times i(0^-)$

$=18V$

At $t=0^+$



$I(s)=\frac{\frac{6}{5}-\frac{18}{5}\cdot\frac{2}{5}}{\frac{16}{35}+4+\frac{2}{3}s}=\frac{-3s-18}{(s+4)(s+2)}$

$=\frac{3}{s+4}+\frac{-6}{s+2}$

$i(t)=\mathcal{L}^{-1}[I(s)]=(3e^{-4t}-6e^{-2t})u(t)$

$i(50m)=3e^{-36om}-6e^{-18om}$