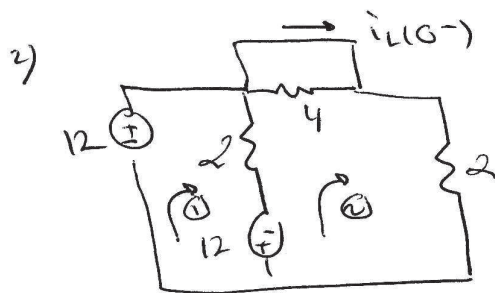


32. Lec 31

(67)

1)  $V(t) = K_1 + K_2 e^{-t/\tau}$



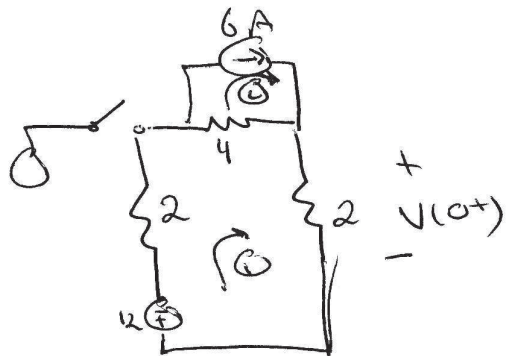
KVL ①  $-12 + 2(i_1 - i_2) - 12 = 0$

②  $12 + 2(i_2 - i_1) + 2i_2 = 0$

$\hookrightarrow i_2 = 6A$

and  $i_L(0^-) = \underline{\underline{i_2 = 6A}}$

3)

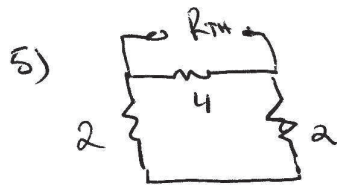
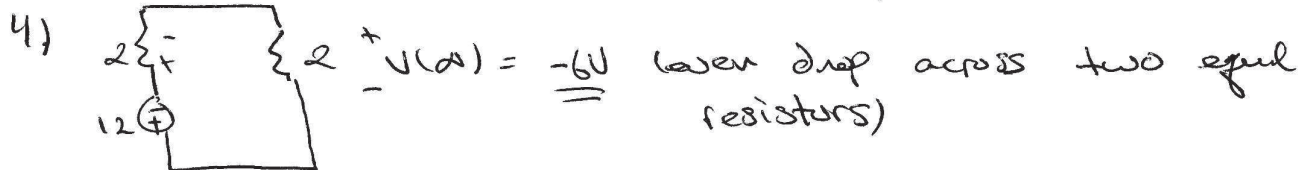


KVL ①  $12 + 2i_1 + 4(i_1 - i_2) + 2i_1 = 0$

$i_2 = 6A$

$\hookrightarrow i_1 = \frac{12}{8}$

$V(0^+) = 2\left(\frac{12}{8}\right) = 3V$



$R_{TH} = (2+2) \parallel 4 = 2\Omega$

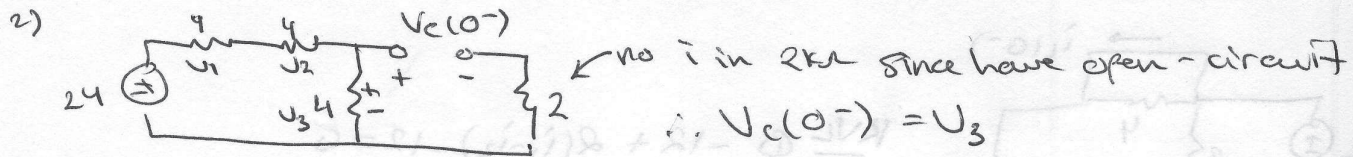
$\tau = \frac{L}{R_{TH}} = \frac{1}{6} s$

$V(\infty) = K_1$

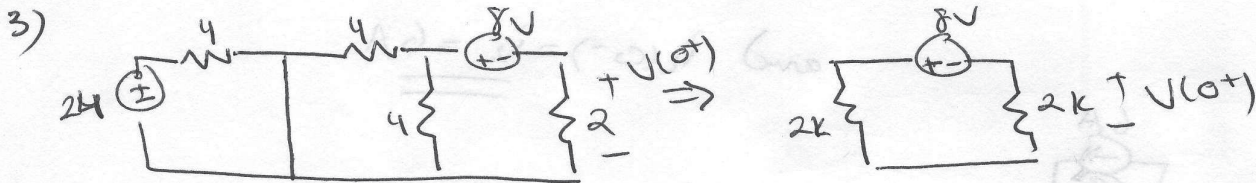
$V(0^+) = K_1 + K_2$

$\therefore V(t) = -6 + 9e^{-6t}$

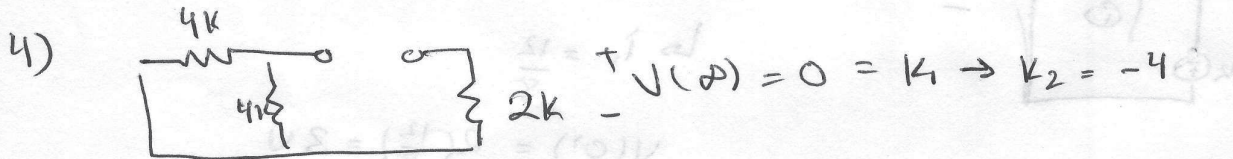
37. 1)  $V(t) = \dots$



$$U_3 = \left(\frac{4k}{12k}\right)(24) = \underline{\underline{8V}}$$



$$V(0^+) = \underline{\underline{-4V}} \text{ (KVL)}$$



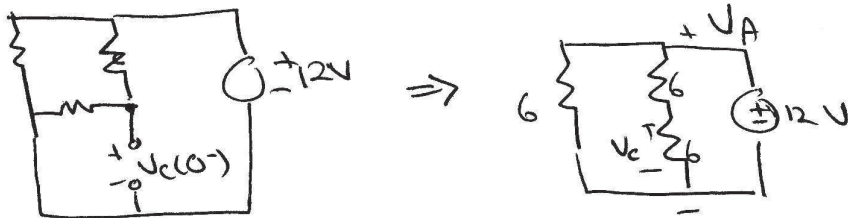
$$R_{TH} = (4 \parallel 4) + 2 = 4k\Omega \rightarrow \tau = R_{TH} \cdot C$$

$$\therefore V(t) = -4e^{-t/\tau}$$

47.

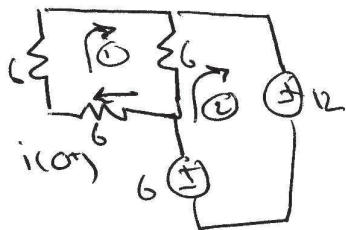
(69)

2)



$V_A = 12\text{ V}$  and  $V_C(0^-) = 6\text{ V}$  (even drop across ~~two~~ equal resistors)

3)

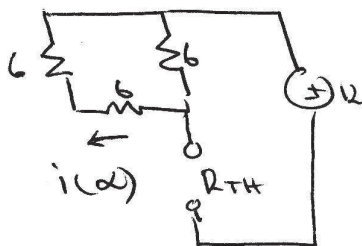


$$\textcircled{1} \quad 12k i_1 + 6k(i_1 - i_2) = 0 \rightarrow i_2 = 3i_1$$

$$\textcircled{2} \quad -6 + 6k(i_2 - i_1) + 12 = 0$$

$$\hookrightarrow i_1 = -\frac{1}{2} \text{ mA} \quad \text{and} \quad \underline{\underline{i(0^+) = i_1}}$$

4)



$$i(\infty) = 0 = k_1 \rightarrow k_2 = -\frac{1}{2} \quad (\because k_1 + k_2 = i(0^+))$$

$$R_{TH} = (6+6) \parallel 6 = 4\text{ k}\Omega$$

$$\tau = R_{TH} \cdot C$$

$$\therefore i(t) = \frac{-1}{2} e^{-t/\tau}$$

Lec 32

Chap 8.

1.  $i = 5 \cos(4\omega t - 120^\circ)$

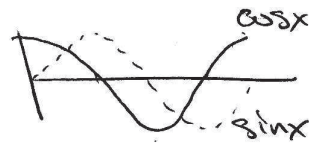
$$\omega t = 4\omega t = (2\pi f)t$$

$$\therefore f = 63.7 \text{ Hz}$$

$$T = \frac{1}{f}$$

2.  $V_2$  leads by  $90^\circ + 30^\circ = 120^\circ$

3. 
$$i(t) = 5 \sin(377t - 20^\circ)$$
$$= 5 \cos(377t - 20^\circ - 90^\circ)$$



i.e.  $\cos x = \sin(x + 90^\circ)$

and  $v(t) = 10 \cos(377t + 30^\circ)$

So phase diff =  $140^\circ$  and  $v(t)$  leads

4.  $v_1(t) = \sin(x + 25^\circ)$

$$i_1 = \cos(x - 20^\circ) = \sin(x - 20^\circ + 90^\circ) = \sin(x + 70^\circ)$$

$$i_2 = -\sin(x + 45^\circ) = +\sin(x + 45^\circ - 180^\circ) = \sin(x - 135^\circ)$$

 $\therefore v_1$  leads  $i_1$  by  $-45^\circ$  (lags by  $+45^\circ$ ) $v_1$  leads  $i_2$  by  $+160^\circ$