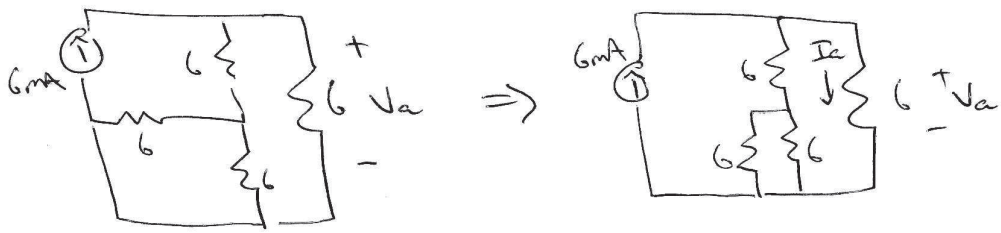
Lec 25

chp 5.

#15

1)



$$I_a = \left[\frac{3+6}{(6\|6+6)+6}\right]\cdot 6mA = \frac{18}{5}mA \rightarrow V_a = \left(\frac{18}{5}\right)6k\Omega = 21.6V$$

2)

KVL ① $12 + 6i_1 + 6(i_1 - i_2) = 0$

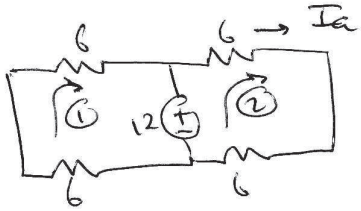
② $6(i_2 - i_1) + 6i_2 + 6i_2 = 0$

↳ $i_1 = 3i_2$

$\rightarrow i_2 = -\frac{2}{5}mA$ so $V_b = \left(-\frac{2}{5}\right)(6) = -2.4V$

$V_o = V_a + V_b = \underline{19.2V}$

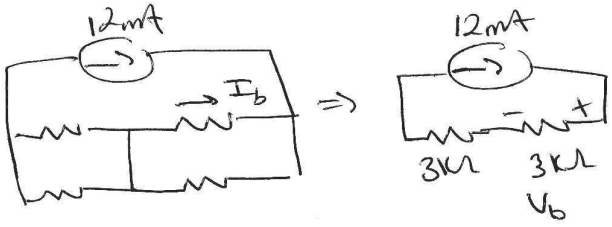
17 1)



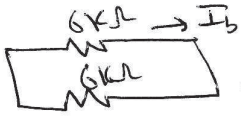
KVL ① $6i_1 + 12 + 6i_1 = 0 \rightarrow i_1 = -1mA$

② $-12 + 12i_2 = 0 \rightarrow i_2 = 1mA = I_a$

2)

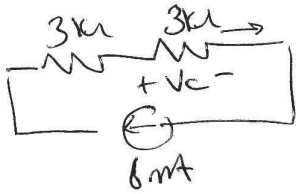


$V_b = 36V$ so have



and $I_b = -6mA$

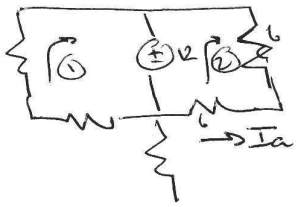
3)



Similarly $V_c = 18V \rightarrow I_c = +8mA$

$I_o = I_a + I_b + I_c = -2mA$

21. 1)

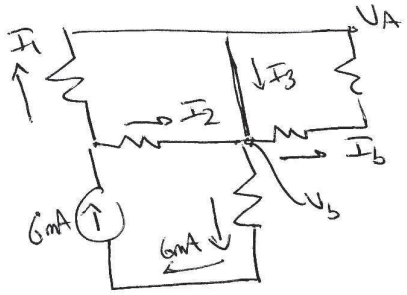


KVL ② $-12 + 12i_2 = 0$

$i_2 = i_a = 1\,mA$

$\therefore i_a = -1\,mA$

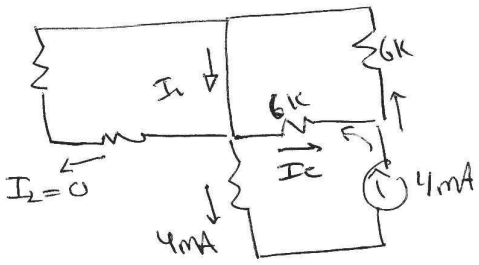
2)



$i_1 = i_3$ since right loop is shorted

$(V_a = V_b = 0 \rightarrow i_b = 0)$

3)



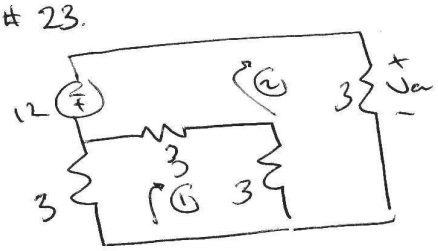
resistance in 2 paths is equal, so $I_3 = 4\,mA$ splits evenly:

$I_c = -2\,mA$

Lec 26

Chp 5 # 23.

1)



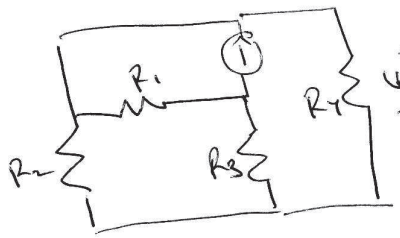
① $3K i_1 + 3K(i_1 - i_2) + 3K(i_1 - i_2) = 0$

$\rightarrow 3i_1 = 2i_2$

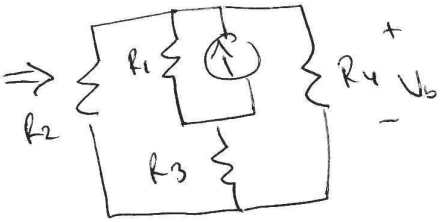
② $6K(i_2 - i_1) + 12 + 3K i_2 = 0$

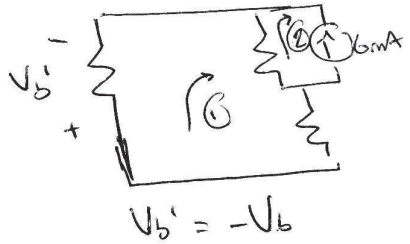
$i_2 = \frac{-12}{5}\,mA \rightarrow V_a = \frac{-36}{5}\,V$

2)



$\Rightarrow$





$V_b' = -V_b$

$i_2 = -6\,mA$

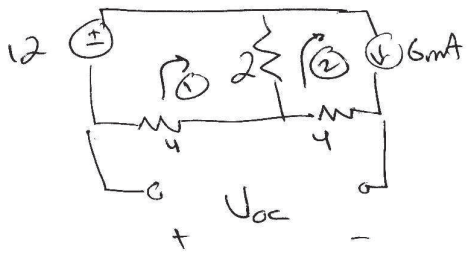
① $(R_2 \| R_4) i_1 + R_1(i_1 - i_2) + R_3 i_1 = 0$

$i_1 = -2.4\,mA$

$V_b' = -3.6\,V$

$V_b = +3.6\,V$

33.

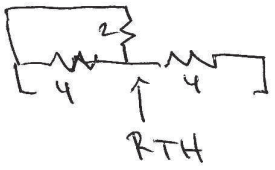


$i_2 = 6\,mA$

① $-12 + 2K(i_1 - 6mA) + 4Ki_1 = 0$

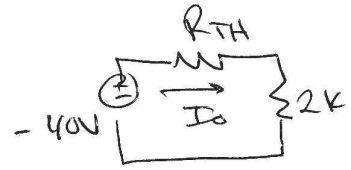
$i_1 = 4\,mA$

$V_{oc} = -(4Ki_1 + 4Ki_2) = -40\,V$



$R_{TH} = 4 + 4 \| 2 = 5.3\ K\Omega$

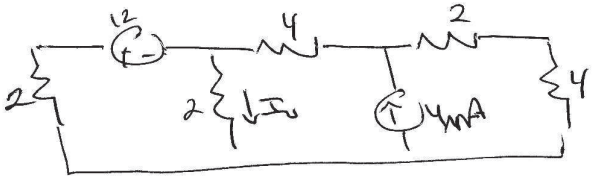
∴ Here

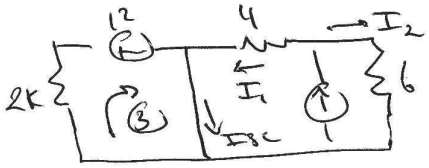


$I_o = \dfrac{-40}{(R_{TH} + 2K)}$

Lec 27.

52



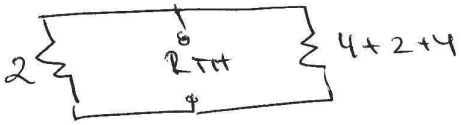


$I_2 = \left(\frac{4}{10}\right)4\,mA \qquad I_1 = \left(\frac{6}{10}\right)4\,mA$

$I_{sc} = I_1 + I_3 = -3.6\ mA$

③ $2Ki_3 + 4i_3 = 0$

$i_3 = -6\,mA$

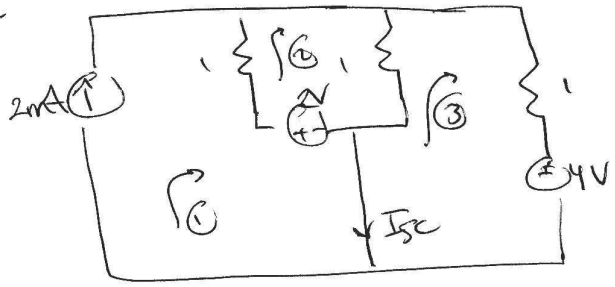


$R_{TH} = 2 \| 10 = 1.67\ K\Omega$

∴

$I_o = \left(\dfrac{R_{TH}}{2K + R_{TH}}\right) I_{sc} = -1.6\,mA$

55.



$i_1 = 2\,mA$

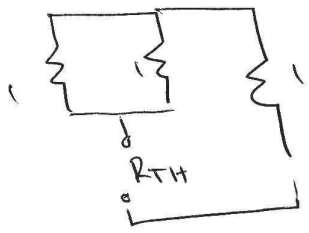
① ~~$1k i_1 + 1k i_2 + 2 = 0$~~

② $-2 + 1k(i_2 - i_1) + 1k(i_2 - i_3) = 0$

③ $1k(i_3 - i_2) + 1k i_3 + 4 = 0$

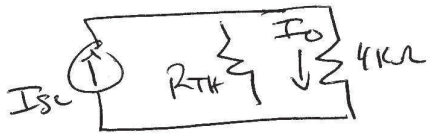
$\Rightarrow i_3 = \frac{-4}{3}\,mA$

$I_{sc} = I_1 - I_3 = \frac{10}{3}\,mA$



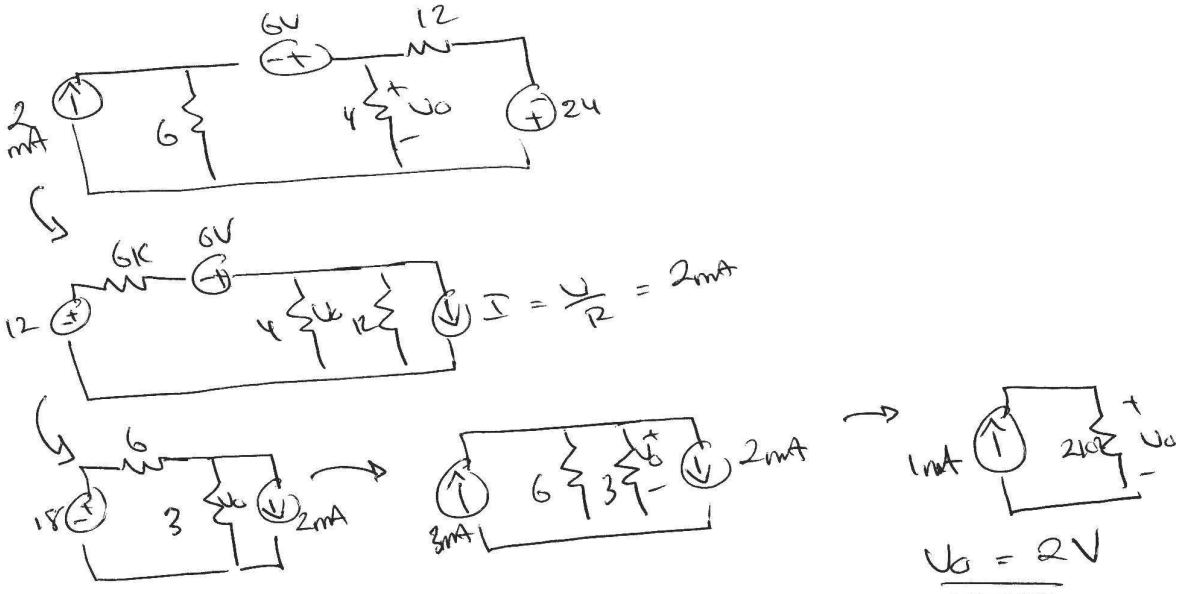
$R_{TH} = (1k \| 1) + 1 = 1.5\,k\Omega$

so get



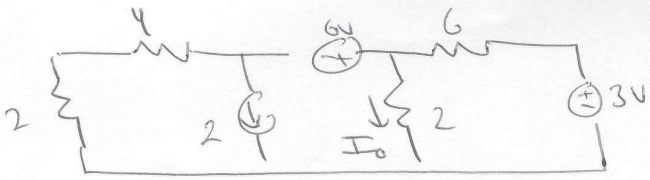
$I_o = \left(\frac{R_{TH}}{R_{TH}+4k}\right) I_{sc} = 0.91\,mA$

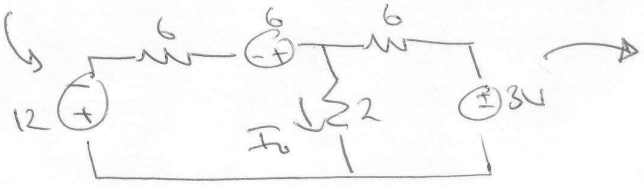
85.

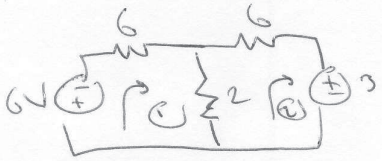


$v_o = 2V$

88







① $6 + 6i_1 + 2(i_1 - i_2) = 0$ ② $2(i_2 - i_1) + 6i_2 + 3 = 0$

$\therefore \quad i_1 = -0.9\ mA, \quad i_2 = -0.6\ mA$

$I_o = i_1 - i_2$

$= -0.3\ mA$