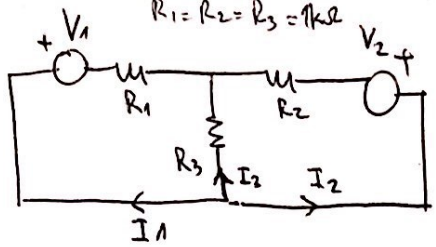
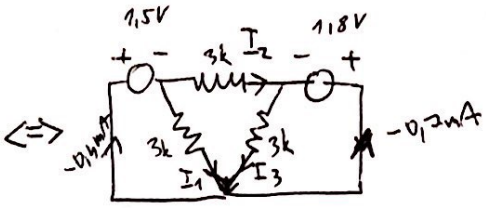




$R_{13} = R_1 + R_3 + \frac{R_1 R_3}{R_2} = 3k\Omega$

$R_{12} = 3k\Omega$

$R_{23} = 3k\Omega$

$I_1 = -\frac{1,5V}{3k\Omega} = -\frac{1}{2}mA = -0,5mA$

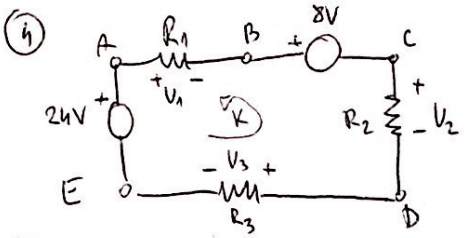
$I_3 = -\frac{1,8V}{3k\Omega} = -0,6\,mA$

$I_2 = \frac{1,8V - 1,5V}{3k\Omega} = 0,1\,mA$

① a) $I = +1A$ $U = 10V$ b) $U = 2V$ $I = +2A$ c) $U = 1V$ $I = -1A$ ② a) $-\rightarrow +$ b) $-\leftarrow +$ c) $-\rightarrow +$

③ a) $P_A = 6W$ $P_B = -6W$ b) $P_C = -30W$ $P_D = 30W$

④



$U_1 = 9V$

$U_2 = 5V$

U_3, U_{BE}, U_{DB}

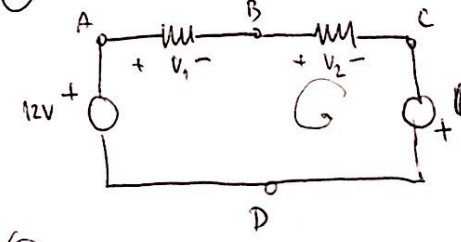
$U_{BE} = 15V$ $U_{DB} = -13V$

$U_3 + U_2 + 8V + U_1 - 24V = 0$

$U_3 = 16V - U_1 - U_2 = 16V - 14V = 2V$

$U_3 = 2V$

⑤

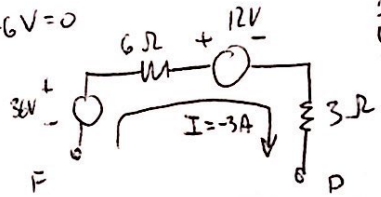


$U_2, U_{BD} = ?$ $U_1 = 4V$

$U_2 + U_1 - 12V - 6V = 0$

$U_2 = 14V$

$U_{BD} = 8V$



$-3V + 72V - 18V - 36V = 9V$

⑥ $U_1 = 1V$ $U_2 = 4V$, $U_3 = 2V$ $U_4, U_A, U_B = ?$

$U_A = 12V + U_1 = 13V$

$U_B = U_3 - 24V = -22V$

$U_4 + 24V - U_3 - U_2 - U_1 - 12V = 0$

$U_4 = U_1 + U_2 + U_3 - 12V = 7 - 12 = -5V$

⑦ a) $36V - I \cdot 6\Omega - 12V - I \cdot 3\Omega - I \cdot 2\Omega - I \cdot 1\Omega = 0$

$I(6 + 3 + 2 + 1) = 24V$ $\boxed{I = 2A}$

$U_{BE} = -2V + 36V - 12V = 22V$

$U_{FD} = 2 \cdot 3V + 12V + 2 \cdot 6V - 36V = -6V$

$P_{36V} = 72W$ $P_{3\Omega} = 12W$

$U_{=D} = -3I = 9V$

b) $36 - I(6 + 3 + 2 + 1) - 72 = 0$ $P_{3\Omega} = 27W$

$I = -\frac{36}{12} = -3A$

$P_{36V} = -108W$

$U_{BE} = -I \cdot 1\Omega + 36V - I \cdot 6\Omega = 57V$

$U_{=D} = 36V + 6I + 12V + 3I =$

$= 24V + 27V = 51V$

(8)

(K2) $-I(1\Omega + 2\Omega + 3\Omega) - 30V + 18V = 0$ $\quad V_{OUT} = -4V$

$6\,\pm = -12A$ $\quad I = -2A$ $\quad P_{30V} = 60W$

(9)

I, V_{AC}, V_{CB}, $P_{6\Omega}$, P_{36V} $\quad V_{AC} = 72V - 6V = 66V$

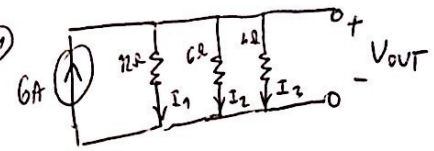
(K) $-I(4 + 6 + 2) + 36V = 0$ $\quad V_{CB} = -36V - 18V = -54V$

$I = 3A$ $\quad P_{6\Omega} = 54W$ $\quad P_{36V} = -108W$

$72:6 = 1$

(10) $V_{OUT} = \frac{R_2}{R_1 + R_2} V_{IN}$

(11)



$I_1 + I_2 + I_3 = 6A$

$\frac{V_{OUT}}{12} + \frac{V_{OUT}}{6} + \frac{V_{OUT}}{4} = 6 \;/\cdot 12$

$V_{OUT} + 2V_{OUT} + 3V_{OUT} = 72V$

$6V_{OUT} = 72V$

$\boxed{V_{OUT} = 12V}$

$I_1 = 1A$

$I_2 = 2A$

$I_3 = 3A$

5)

$6V_{OUT} = -144V$

$V_{OUT} = -24V$

$I_1 = -2A$ $\quad I_2 = -4A$ $\quad I_3 = -6A$

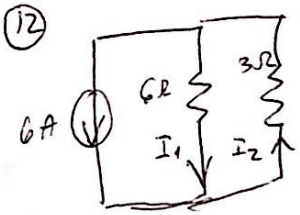
$P_{12A} = 480W$ $\quad P_{6\Omega} = 144W$

$P_{12A} = -24W$

$P_{4\Omega} = 36W$

(13) $I_{out} = \frac{R_1}{R_1 + R_2} I_{in}$

(12)



$I_2 = \frac{6}{9} \cdot 6 = 4A$

$I_1 = -2A$

$V_{OUT} = -12V$

$\boxed{P_{6\Omega} = 24W}$

(14)

$6\Omega \,||\, 12\Omega = \frac{1}{\frac{2}{6} + \frac{1}{12}} = \frac{12}{3} = 4\Omega$

$9\Omega \,||\, 18\Omega = \frac{1}{\frac{2}{18} + \frac{1}{18}} = 6\Omega$

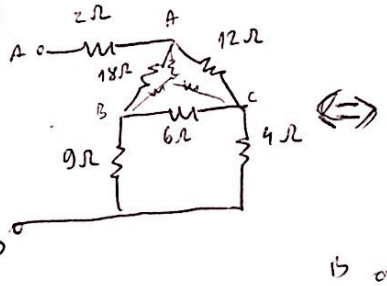
$R_e = 18\Omega$

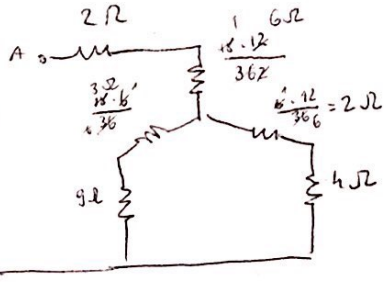
(15)

$6\Omega \,||\, 3\Omega = \frac{6 \cdot 3}{9} = 2\Omega$

$2\Omega \,||\, 2\Omega = 1\Omega$ $\quad 2\Omega \,||\, 2\Omega = 1\Omega$ $\quad \boxed{R_e = 7\Omega}$

(16)

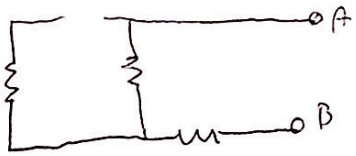




$12\Omega \,||\, 6\Omega = \frac{12 \cdot 6}{12 + 6} = \frac{12 \cdot 6}{18} = 4\Omega$

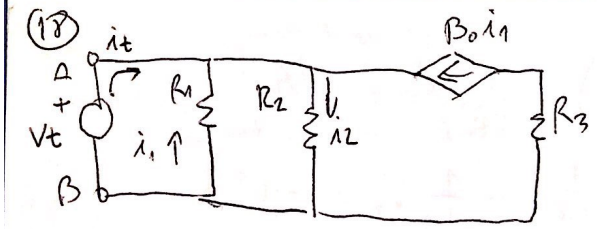
$\boxed{R_e = 12\Omega}$

(17)



$R_{AB} = 8\Omega$

(18)



$$i_t + i_1 + \beta_0 i_1 - i_2 = 0$$

$$i_1(1+\beta_0) - i_2 + i_t = 0$$

$$i_t = i_2 - i_1(1+\beta_0)$$

$$i_t = \frac{V_t}{R_2} + \frac{V_t(1+\beta_0)}{R_1}$$

$$-i_1 R_1 = V_t \qquad -i_1 = \frac{V_t}{R_1}$$

$$V_t = i_2 R_2$$

$$i_2 = \frac{V_t}{R_2}$$

$$R_e = \frac{V_t}{i_t} = \frac{1}{\frac{1}{R_2} + \frac{1+\beta_0}{R_1}} = \frac{R_1 R_2}{R_1 + R_2(1+\beta_0)}$$

$I = \frac{V}{R}$

$\beta \rightarrow$