

P2

a) LCK en cada nodo:

$$① I_1 + I_5 + I_7 = 0$$

$$② I_2 + I_6 - I_5 = 0$$

$$③ I_3 - I_6 - I_7 - I_{12} = 0$$

$$④ I_4 + I_{12} = 0$$

$$⑤ -I_1 - I_{11} = 0$$

$$⑥ I_8 + I_{10} + I_{11} - I_2 = 0$$

$$⑦ I_9 - I_3 - I_8 = 0$$

$$⑧ -I_4 - I_9 - I_{10} = 0$$

* 12 incógnitas y 7 ecuaciones l.i. \Rightarrow 5 corrientes independientes.

b) ① $I_1 + I_5 - 5 = 0$

② $I_2 + 24 - I_5 = 0$

③ $1 - 24 + 5 - I_{12} = 0 \Rightarrow \boxed{I_{12} = -18}$

④ $5 + I_{12} = 0 \Rightarrow \boxed{I_{12} = -5}$ ✖ sistema sin solución

⑤ $I_1 + I_{11} = 0$

⑥ $I_8 - 3 + I_{11} - I_2 = 0 \rightarrow I_{11} - I_2 = 6$

⑦ $I_9 - 1 - I_8 = 0 \Rightarrow \boxed{I_8 = -3}$

⑧ $-5 - I_9 + 3 = 0 \Rightarrow \boxed{I_9 = -2}$

$$c) \textcircled{1} -v_1 + v_5 + v_2 + v_{11} = 0$$

$$\textcircled{2} -v_5 + v_7 - v_6 = 0$$

$$\textcircled{3} -v_2 + v_6 + v_3 - v_8 = 0$$

$$\textcircled{4} -v_3 - v_{12} + v_4 - v_9 = 0$$

$$\textcircled{5} v_8 + v_9 - v_{10} = 0$$

* 12 incógnitas + 5 ecuaciones l.i. \Rightarrow 7 voltajes independientes

$$d) \textcircled{1} -10 + v_5 + 5 + v_{11} = 0 \Rightarrow \boxed{v_{11} = 10}$$

$$\textcircled{2} -v_5 - 3 - 2 = 0 \Rightarrow \boxed{v_5 = -5}$$

$$\textcircled{3} -5 + 2 + v_3 - v_8 = 0 \Rightarrow v_3 - v_8 = 3$$

$$\textcircled{4} -v_3 - 8 - 3 - v_9 = 0 \Rightarrow -v_3 - v_9 = 11$$

$$\left. \begin{array}{l} v_3 - v_8 = 3 \\ -v_3 - v_9 = 11 \end{array} \right\} v_8 + v_9 = -14 (*)$$

$$\textcircled{5} v_8 + v_9 - v_{10} = 0 \Rightarrow v_{10} = v_8 + v_9 = -14 \Rightarrow \boxed{v_{10} = -14}$$

(*)

$$\boxed{\begin{array}{l} v_8 = v_3 - 3 \\ v_9 = -v_3 - 11 \end{array}}$$