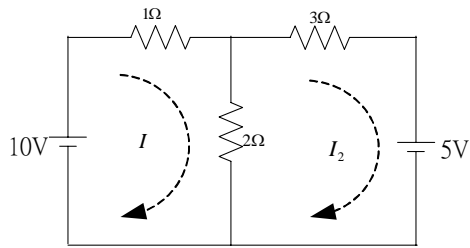


第三篇 網目分析 練習題解答

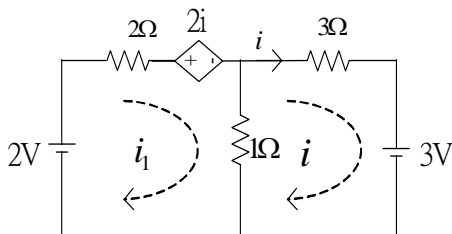
1. (A)



$$\begin{bmatrix} 3 & -2 \\ -2 & 5 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} 10 \\ -5 \end{bmatrix}$$

$$I = \frac{\begin{vmatrix} 10 & -2 \\ -5 & 5 \end{vmatrix}}{\begin{vmatrix} 3 & -2 \\ -2 & 5 \end{vmatrix}} = \frac{40}{11} \text{ (A)}$$

2. (B)



$$\begin{bmatrix} 3 & -1 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} i_1 \\ i \end{bmatrix} = \begin{bmatrix} 2-2i \\ -3 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 1 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} i_1 \\ i \end{bmatrix} = \begin{bmatrix} 2 \\ -3 \end{bmatrix}$$

$$i = \frac{\begin{vmatrix} 3 & 2 \\ -1 & -3 \end{vmatrix}}{\begin{vmatrix} 3 & 1 \\ -1 & 4 \end{vmatrix}} = \frac{-7}{13} \text{ (A)}$$

3. (C)

$$is = \frac{5}{3} \text{ (A)}$$

$$v_o = \frac{3}{2+3} \times 3is = \frac{3}{5} \times 5 = 3 \text{ (V)}$$

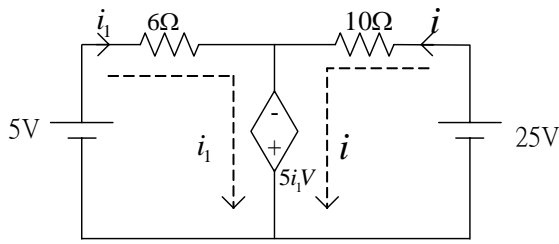
4. (C)

$$\begin{bmatrix} 6 & 0 \\ 0 & 9 \end{bmatrix} \begin{bmatrix} i_1 \\ i \end{bmatrix} = \begin{bmatrix} 6+4i_1 \\ 24+4i_1 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 0 \\ -4 & 9 \end{bmatrix} \begin{bmatrix} i_1 \\ i \end{bmatrix} = \begin{bmatrix} 6 \\ 24 \end{bmatrix}$$

$$i = \frac{\begin{vmatrix} 2 & 6 \\ -4 & 24 \end{vmatrix}}{\begin{vmatrix} 2 & 0 \\ -4 & 9 \end{vmatrix}} = 4 \text{ (A)}$$

5. (C)



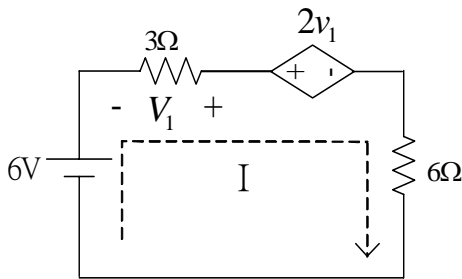
由網目分析可得

$$\begin{bmatrix} 6 & 0 \\ 0 & 10 \end{bmatrix} \begin{bmatrix} i_1 \\ i \end{bmatrix} = \begin{bmatrix} 5 + 5i_1 \\ 25 + 5i_1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 \\ -5 & 10 \end{bmatrix} \begin{bmatrix} i_1 \\ i \end{bmatrix} = \begin{bmatrix} 5 \\ 25 \end{bmatrix}$$

$$i = \frac{\begin{vmatrix} 1 & 5 \\ -5 & 25 \end{vmatrix}}{\begin{vmatrix} 1 & 0 \\ -5 & 10 \end{vmatrix}} = \frac{50}{10} = 5(\text{A})$$

6. (B)



由網目分析可得

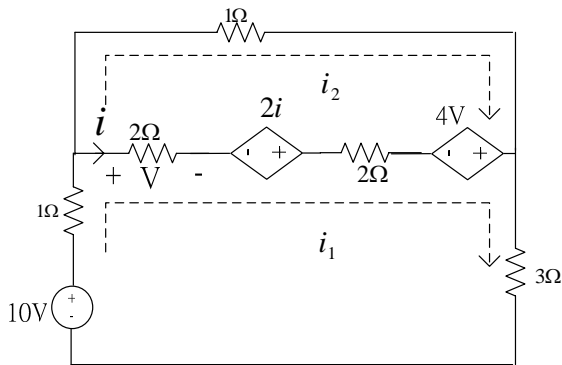
$$(3 \div 6)I = 6 - 2V_1, \text{ 其中 } V_1 = -3I$$

$$3I = 6$$

$$I = 2$$

$$P = I^2 \times 6 = 24$$

7. (B)



列出網目方程式

$$\begin{bmatrix} 8 & -4 \\ -4 & 5 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} 10 + 2i + 4V \\ -2i - 4V \end{bmatrix}$$

因 $V = 2(i_1 - i_2)$ $i = i_1 - i_2$ 可得

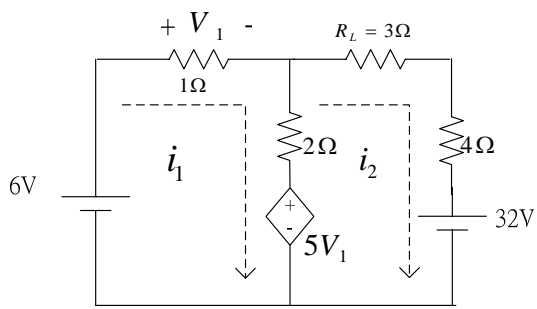
$$\begin{bmatrix} -2 & 6 \\ 6 & -5 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} 10 \\ 0 \end{bmatrix}$$

由克拉瑪法則可得

$$i_1 = \frac{\begin{vmatrix} 10 & 6 \\ 0 & -5 \end{vmatrix}}{\begin{vmatrix} -2 & 6 \\ 6 & -5 \end{vmatrix}} = \frac{25}{13}$$

$$V_o = 3 \times \frac{25}{13} = \frac{75}{13} (\text{V})$$

8. (A)



$$\begin{bmatrix} 3 & -2 \\ -2 & 9 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} 6 - 5V_1 \\ 5V_1 - 32 \end{bmatrix}$$

因 $V_1 = i \times 1 = i_1$ ，可得

$$\begin{bmatrix} 8 & -2 \\ -7 & 9 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} 6 \\ -32 \end{bmatrix}$$

$$i_2 = \frac{\begin{vmatrix} 8 & 6 \\ -7 & -32 \end{vmatrix}}{\begin{vmatrix} 8 & -2 \\ -7 & 9 \end{vmatrix}} = \frac{-107}{29}$$

$$P_{RL} = (i_2)^2 \times R_1 = 40.84(\text{W})$$