Problem 1

Given:
R_1 = 2 \, \Omega, \, R_2 = 4 \, \Omega, \, R_3 = 6 \, \Omega,
R_4 = 1 \, \Omega, \, R_5 = 3 \, \Omega, \, R_6 = 5 \, \Omega,
I_{s1} = 9 \, A, \, I_{s2} = 5 \, A, \, I_{s3} = 7 \, A

Find: All the node voltages,
The voltage across R_4
The current through R_2
The voltage across R_2
The voltage across I_{s1}, I_{s2}, and I_{s3}

Problem 2

Given:
R_1 = 5 \, \Omega, \, R_2 = 10 \, \Omega, \, R_3 = 20 \, \Omega,
R_4 = 15 \, \Omega, \, R_5 = 30 \, \Omega, \, R_6 = 35 \, \Omega,
R_7 = 25 \, \Omega, \, V_S = 25 \, V

Find: All the node voltages,
The current through R_4
The voltage across R_4
The current through R_6
The voltage across R_6
The current through V_S

Problem 3

Given:
R_1 = 6 \, \Omega, \, R_2 = 12 \, \Omega, \, R_3 = 10 \, \Omega, \, R_4 = 14 \, \Omega
R_5 = 8 \, \Omega, \, V_S = 10 \, V, \, I_S = 2 \, A

Find: All the node voltages,
The voltage across R_1
The voltage across R_3
The current through R_2
The current through V_S
The voltage across I_S
**Problem 4**

Given:
\[ R_1 = 1 \, \Omega, \quad R_2 = 2 \, \Omega, \quad R_3 = 4 \, \Omega \]
\[ R_4 = 3 \, \Omega, \quad I_S = 10 \, \text{A} \]
\[ V_{S1} = 8 \, \text{V}, \quad V_{S2} = 4 \, \text{V} \]

Find:
- All the node voltages,
- The current through \( R_3 \)
- The voltage across \( R_3 \)
- The current through \( V_{S1} \)
- The current through \( V_{S2} \)
- The voltage across \( I_S \)

**Problem 5**

Given:
\[ R_1 = 2 \, \Omega, \quad R_2 = 5 \, \Omega, \quad R_3 = 10 \, \Omega \]
\[ I_S = 10i_{vs1}, \quad V_{S1} = 12 \, \text{V}, \quad V_{S2} = 20 \, \text{V} \]

Find:
- All the node voltages,
- The current through \( R_1 \)
- The voltage across \( R_1 \)
- The voltage across \( I_S \)
- \( I_S \)
- The current through \( V_{S1} \)
- The current through \( V_{S2} \)

Note: \( I_S \) is handled the same as before except substitute in \( 10 \times i_{vs1} \). The problem is easier if you eliminate \( i_{vs1} \) and \( i_{vs2} \) before substituting node voltages.

**Problem 6**

Given:
\[ R_1 = 10 \, \Omega, \quad R_2 = 20 \, \Omega, \quad R_3 = 15 \, \Omega \]
\[ R_4 = 25 \, \Omega, \quad R_5 = 5 \, \Omega \]
\[ V_{S1} = 5 \, \text{V}, \quad V_{S2} = 10 \, \text{V}. \quad I_S = 2 \, \text{A} \]

Find:
- All the node voltages,
- The voltage across \( R_1 \)
- The current \( R_4 \)
- The voltage across \( R_5 \)
- The current through \( V_{S1} \)
- The current through \( V_{S2} \)
- The voltage across \( I_S \)