Problem 1

Given:
\[ R_1 = 1 \, k\Omega, \quad R_2 = 2 \, k\Omega, \quad R_3 = 4 \, k\Omega, \]
\[ V_{S1} = 9 \, V, \quad V_{S2} = 6 \, V \]

Find:
All the mesh currents,
The current through \( R_3 \)
The voltage across \( R_3 \)
The current through \( V_{S1} \) and \( V_{S2} \)

Problem 2

Given:
\[ R_1 = 4 \, \Omega, \quad R_2 = 1 \, \Omega, \quad R_3 = 2 \, \Omega \]
\[ R_4 = 4 \, \Omega, \quad R_5 = 5 \, \Omega \]
\[ V_{S1} = 3 \, V, \quad V_{S2} = 12 \, V \]

Find:
All the mesh currents,
The voltage across \( R_3 \)
The current through \( R_4 \)
The current through \( V_{S1} \)
The current through \( V_{S2} \)

Problem 3

Given:
\[ R_1 = 2 \, k\Omega, \quad R_2 = 4 \, k\Omega, \quad R_3 = 1 \, k\Omega \]
\[ I_s = 3 \, mA, \quad V_s = 20 \, V \]

Find:
All the mesh currents,
The current through \( R_2 \)
The voltage across \( R_3 \)
The voltage across \( I_s \)
The current through \( V_s \)
**Problem 4**

**Given:**
- \( R_1 = 1 \, \Omega, \ R_2 = 2 \, \Omega, \ R_3 = 4 \, \Omega, \ R_4 = 8 \, \Omega \)
- \( V_{s1} = 40 \, V, \ V_{s2} = 20 \, V, \ I_s = 5 \, A \)

**Find:**
- All the mesh currents,
- The voltage across \( R_3 \)
- The voltage across \( R_4 \)
- The current through \( V_{s1} \) and \( V_{s2} \)
- The voltage across \( I_s \)

**Problem 5**

**Given:**
- \( R_1 = 10 \, \Omega, \ R_2 = 2 \, \Omega, \ R_3 = 1 \, \Omega \)
- \( R_4 = 5 \, \Omega, \ I_s = 4I_x \, A, \ V_S = 30 \, V \)

**Find:**
- All the mesh currents,
- The current through \( R_3 \)
- The voltage across \( R_4 \)
- The current through \( V_S \)
- The voltage across \( I_s \)
- \( I_s, I_x \)

*Note: \( I_s \) is handled the same as before except substitute in \( 4I_x \) and then express \( I_x \) in terms of node voltages.*

**Problem 6**

**Given:**
- \( R_1 = 10 \, \Omega, \ R_2 = 5 \, \Omega, \ R_3 = 2 \, \Omega, \)
- \( R_4 = 4 \, \Omega, \ I_{s1} = 6 \, A, \ I_{s2} = 3 \, A \)

**Find:**
- All the mesh currents,
- The voltage across \( R_3 \)
- The current through \( R_3 \)
- The voltage across \( I_{s1}, I_{s2} \)