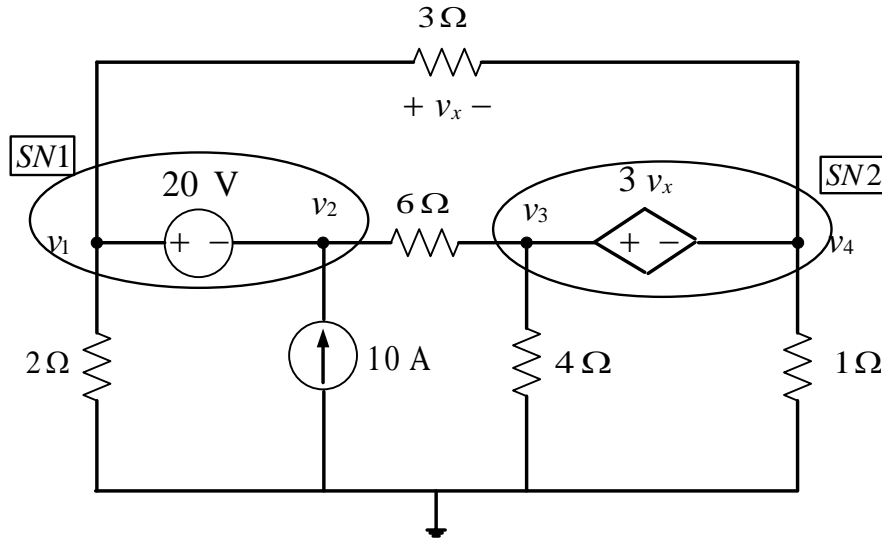


EE 202-02-Winter 2013(132)
QZ2

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For the circuit shown above, find node equations needed to solve for the nodes v_1, v_2, v_3, v_4 ? (Do Not Solve)

Solution

$$KCL \text{ at } SN1 : \frac{v_1}{2} + \frac{v_1 - v_4}{3} + \frac{v_2 - v_3}{6} - 10 = 0$$

$$\Rightarrow 5v_1 + v_2 - v_3 - 2v_4 = 60 \text{ -----(1)}$$

$$KCL \text{ at } SN2 : \frac{v_3 - v_2}{6} + \frac{v_3}{4} + \frac{v_4}{1} + \frac{v_4 - v_1}{3} = 0$$

$$\Rightarrow 4v_1 + 2v_2 - 5v_3 - 16v_4 = 0 \text{ -----(2)}$$

Independent Voltage Source Restriction

$$\Rightarrow v_1 - v_2 = 20 \text{ -----(3)}$$

dependent Voltage Source Restriction

$$\Rightarrow v_3 - v_4 = 3v_x = 3(v_1 - v_4)$$

$$\Rightarrow 3v_1 - v_3 - 2v_4 = 0 \text{ -----(4)}$$