PROBLEM # 2

Note: There is a voltage dependent voltage source of value 5V, it is NOT 5 volts!!

\[ V_1 = 15V \]

\[ V_2 = V_0 \]

\[ V_3 = V_2 - 5V_0 = V_2 - 5V_2 \]

\[ V_3 = -4V_2 \quad \text{(1)} \]

KCL to supernode:

\[
\frac{V_2 - 15}{10} + \frac{V_2}{2} + \frac{V_3}{20} + \frac{V_3}{40} = 0 \quad \text{(sum of currents leaving the node)}
\]

\[ 4(V_2 - 15) + 20V_2 + 2V_3 + V_3 = 0 \]

\[ 8V_2 + V_3 = 20 \quad \text{(2)} \]

Solve (1) \& (2)

\[ 8V_2 - 4V_2 = 20 \]

\[ V_2 = 5V, \quad V_3 = -20V \]

\[ V = V_2 = 5 \text{ volts} \]

To find power, we need to find current \( i \)

\[ i = i_1 + i_2 \]

\[ = \frac{V_1}{15} + \frac{V_1 - V_2}{10} \]

\[ = \frac{15}{15} + \frac{15 - 5}{10} = 2 \text{A} \]

\[ P_{15} = -15 \times (2\text{A}) = -30 \text{W} \]

or 30 W supplied.