Problem 3.22 Use mesh analysis to determine the amount of power supplied by the voltage source in the circuit of Fig. P3.22.

Solution:

Mesh 1: \( I_1 = 9 \) A
Mesh 2: \( 2(I_2 - I_1) + 4(I_2 - I_3) = 0 \)
Mesh 3: \( 4(I_3 - I_2) + 8I_3 + 40 = 0 \)

Simplification leads to:

\[
\begin{align*}
6I_2 - 4I_3 &= 18 \\
-4I_2 + 12I_3 &= -40
\end{align*}
\]

Solution is:

\( I_2 = 1 \) A, \( I_3 = -3 \) A.

Power supplied by voltage source:

\[ P = VI = 40 \times (-3) = -120 \text{ W}. \]