2.1 Determine the current and power dissipated in the resistor in Fig. P2.1.

Figure P2.1

SOLUTION:

$$I = \frac{9}{12} = \frac{3}{4}\,A$$

$$P_{12\Omega} = I^2R = \left(\frac{3}{4}\right)^2(12)$$

$$P_{12\Omega} = 6.75\,W$$

2.10 Find I_1 in the network in Fig. P2.10.

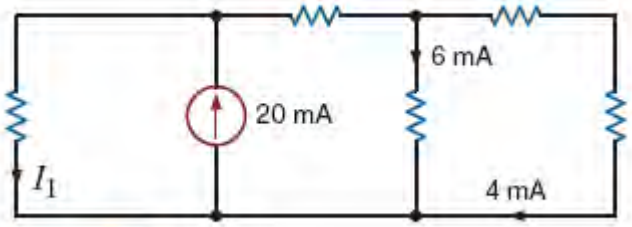


Figure P2.10

SOLUTION:

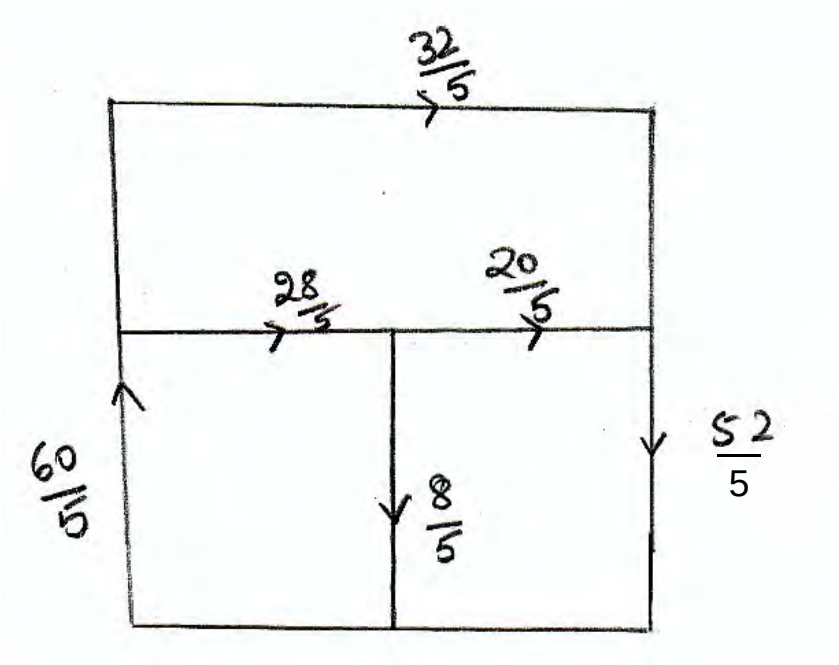
KCL at node B: $I_2 = 6m + 4m$

$I_2 = 10m\ A$

KCL at node A: $I_1 + I_2 = 20m$

$I_1 = 20m - 10m$

$I_1 = 10m\ A$



2.44 Find the power absorbed by the dependent source in the circuit in Fig. P2.44.

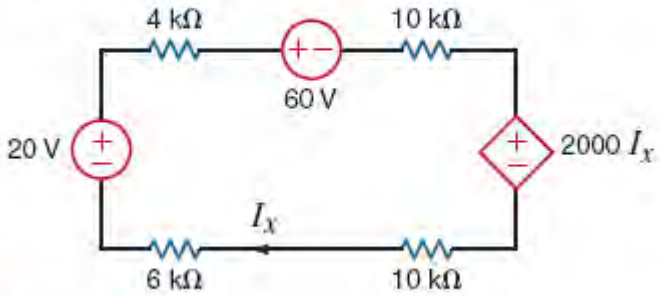


Figure P2.44

SOLUTION:

KVL:

$$20 = 6KI_x + 4KI_x + 60 + 10KI_x + 2KI_x + 10KI_x$$

$$32KI_x = -40$$

$$I_x = 1.25\,mA$$

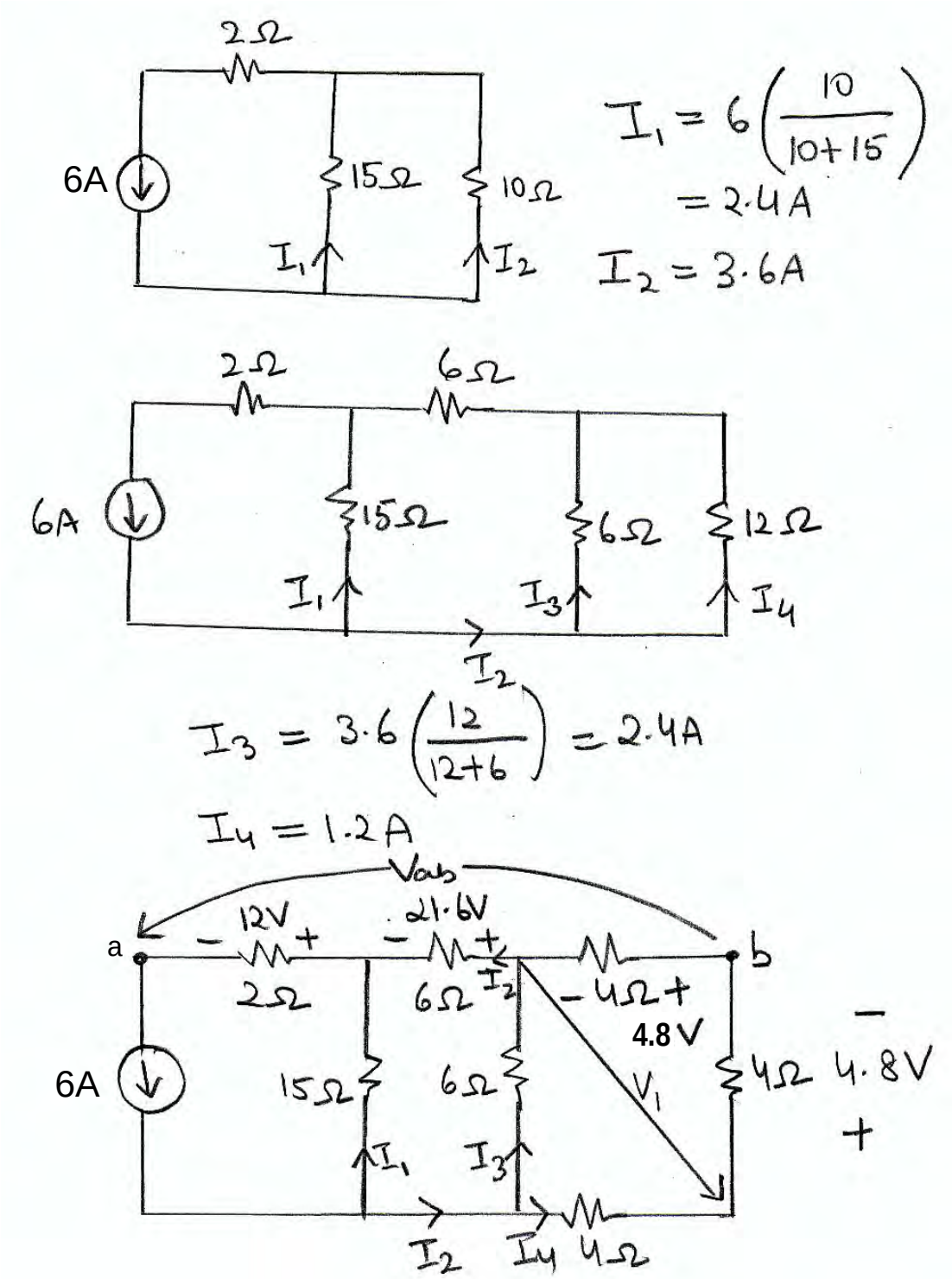
$$P = (2000I_x)(I_x)$$

$$P = \{2000(-1.25\,m)\}(-1.25\,m)$$

$$P = 3.125\,mW$$

$$R_{ab} = R_{10} + R_{11} + R_2 = 4 + 8 + 5.45$$

$$R_{ab} = 17.45\ \Omega$$



2.87 If $V_1 = 5$ V in the circuit in Fig. P2.87, find I_S.

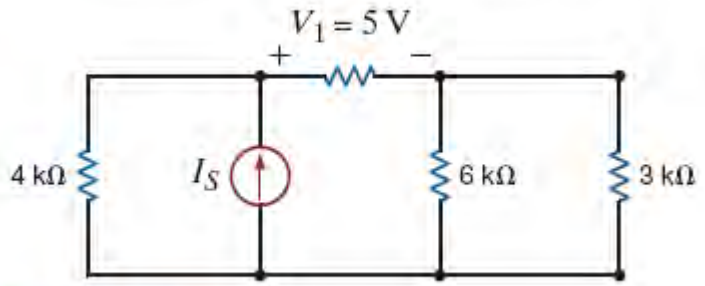
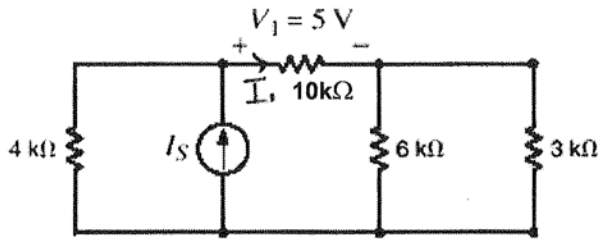
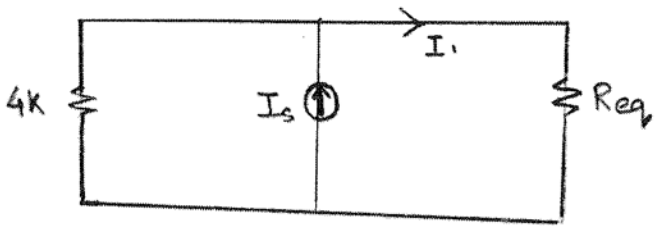


Figure P2.87

SOLUTION:



$$I_1 = \frac{V_1}{10k} = \frac{5}{10k} = \frac{1}{2}\text{ mA}$$



$$R_{eq} = (6K \| 3K) + 10K$$

$$R_{eq} = 12K\,\Omega$$

$$I_1 = \left(\frac{4K}{4K+12K}\right) I_S$$

$$I_S = \frac{I_1}{\left(\frac{4K}{4K+12K}\right)} = \frac{\frac{1}{2}m}{\left(\frac{4K}{4K+12K}\right)}$$

$$I_S = 2\text{mA}$$

KCL:

$$I_1 + I_8 = I_2$$

$$I_3 = 4m - 2m$$

$$I_3 = 2mA$$

KCL:

$$I_3 + I_4 = 5mA$$

$$I_4 = 3mA$$

KCL:

$$I_4 = I_B + 4m$$

$$I_B = -1mA$$

KVL:

$$2K I_3 + 16 = 6K I_4 + V_B + V_1$$

$$V_B = 2K(2m) + 16 - 6K(3m) - 4$$

$$V_B = -2V$$

$$V_B = I_B R_B$$

$$R_B = \frac{-2}{-1m} = 2K\Omega$$

$$I_3 = 6 - 3$$

$$I_3 = 3\,A$$