

King Fahd University of Petroleum & Minerals
 Electrical Engineering Department
 EE201- 07 Electric Circuits
 Quiz # 2

$i_2 = \frac{40 - 10}{8} = \frac{30}{8} = 3.75$
 $i_2 = 5 - \frac{5i_1}{4}$

Name: Omar Ballouli	I.D# 279489
Serial Number: 27	

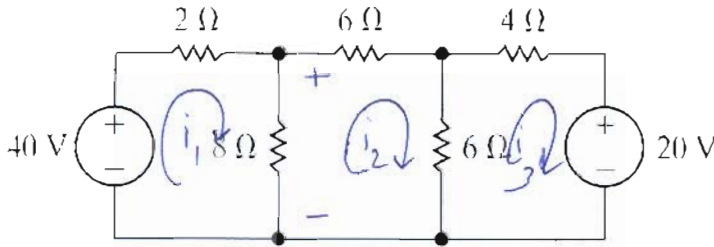


Figure 04-21Ex4
 Copyright © 2008 Pearson Prentice Hall, Inc.

- (a) Use the mesh-current method to determine the power associated with each voltage source in the circuit.
 (b) Calculate the voltage v_o .

1) $-40 + 2i_1 + 8(i_1 - i_2) = 0 \Rightarrow 2i_1 + 8i_1 - 8i_2 = 40$
 2) $8(i_2 - i_1) + 6i_2 + 6(i_2 - i_3) = 0 \Rightarrow 8i_2 - 8i_1 + 6i_2 + 6i_2 - 6i_3 = 0$
 3) $20 + 6(i_3 - i_2) + 4i_3 = 0 \Rightarrow 20 + 6i_3 - 6i_2 + 4i_3 = 0$

1) $10i_1 - 8i_2 = 40$
 2) $-8i_1 + 20i_2 - 6i_3 = 0$
 3) $-6i_2 + 10i_3 = -20$

$$\begin{pmatrix} 10 & -8 & 0 \\ -8 & 20 & -6 \\ 0 & -6 & 10 \end{pmatrix} \begin{pmatrix} i_1 \\ i_2 \\ i_3 \end{pmatrix} = \begin{pmatrix} 40 \\ 0 \\ -20 \end{pmatrix}$$

$i_1 = \frac{\begin{vmatrix} 40 & -8 & 0 \\ 0 & 20 & -6 \\ -20 & -6 & 10 \end{vmatrix}}{\begin{vmatrix} 10 & -8 & 0 \\ -8 & 20 & -6 \\ 0 & -6 & 10 \end{vmatrix}} = \frac{40[200 - 36] - 8[120]}{1640 - 640} = \frac{5600}{1000} = 5.6 \text{ A}$

$i_2 = \frac{\begin{vmatrix} 10 & 40 & 0 \\ -8 & 0 & -6 \\ 6 & -20 & 10 \end{vmatrix}}{\begin{vmatrix} 10 & -8 & 0 \\ -8 & 20 & -6 \\ 0 & -6 & 10 \end{vmatrix}} = \frac{-1200 + 3200}{1000} = 2 \text{ A}$

$i_3 = \frac{\begin{vmatrix} 10 & -8 & 40 \\ -8 & 20 & 0 \\ 6 & -6 & -20 \end{vmatrix}}{\begin{vmatrix} 10 & -8 & 0 \\ -8 & 20 & -6 \\ 0 & -6 & 10 \end{vmatrix}} = \frac{1290 - 4000 + 8[20 \cdot 8] + 1920}{1000} = \frac{-800}{1000} = -0.8 \text{ A}$

a) $P_{40V} = (5.6)(40) = 224 \text{ W}$
 $P_{20V} = (20)(-0.8) = -16 \text{ W}$

b) $I = (i_1 - i_2)$
 $V_o = I(8)$
 $V_o = (5.6 - 2)(8) = 28.8 \text{ Volt}$