Name: Key
Section: —

EE331 Homework PS1 – fall 2012

Problems from Alexander & Sadiku:

CH1

- 1.18 (*Ans:-300W, 100W, 280W, -32W, -48W*)

CH2

- 2.4 (Warm-up!)
- 2.12 (*Ans:* v_1 = 70V, v_2 = 10V, v_3 = 60V, use KVL)
- 2.26 (find the voltage across the parallel network using the data given for the 16Ω resistor and use that voltage to calculate the remaining currents) (*Ans:* i_x = 45A, P_{total} = 22.4W)
- 2.34 (*Ans:* R_{eq} = 100 Ohm, P_{tot} = 400 W)
- 2.41 (*Ans:* 16 Ohms)

Additional Problems (Instructor Option):

- 2nd page of this Problem Set
- Any as assigned by instructor

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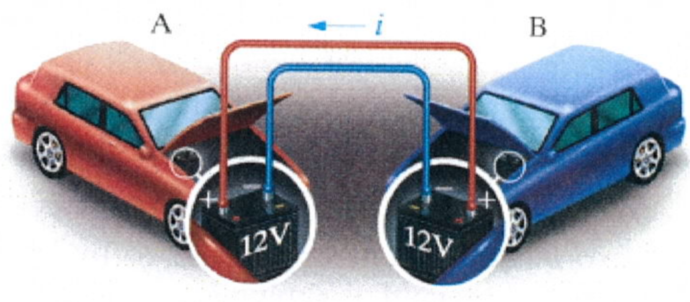
1.15 When a car has a dead battery, it can often be started by connecting the battery from another car across its terminals. The positive terminals are connected together as are the negative terminals. The connection is illustrated in Fig. P1.15. Assume the current i in Fig. P1.15 is measured and found to be 30 A.

a) Which car has the dead battery?

b) If this connection is maintained for 1 min, how much energy is transferred to the dead battery?

Figure P1.15



a) Current Flows into "A"

$P = Vi = (30)(12) = 360\ W$

(+) Power or Absorbing by "A"

∴ A is the Dead Battery

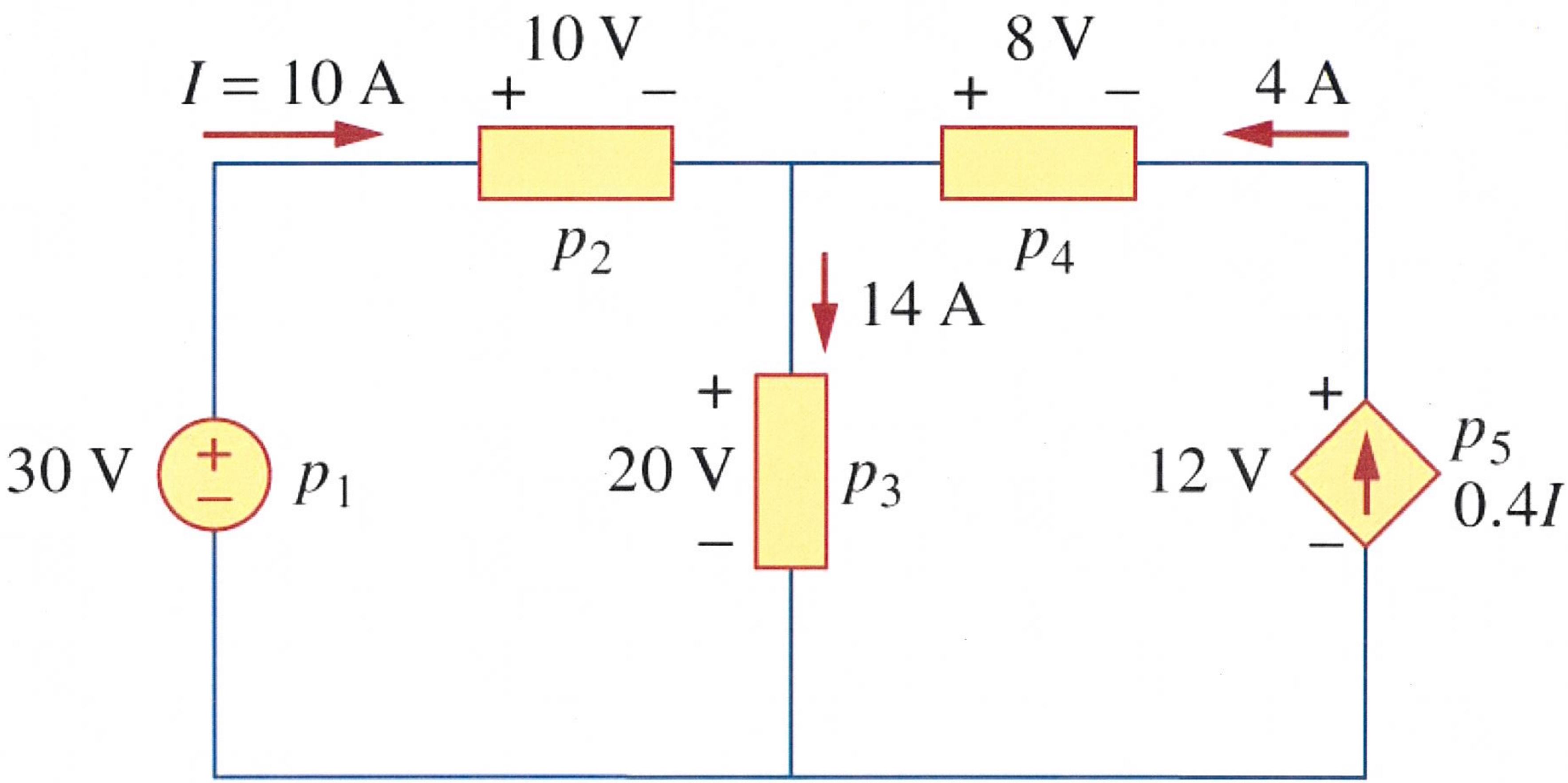
b) $w(t) = \int_0^t p\,dx$; 1 min = 60 sec

$w(60) = \int_0^{60} 360\,dx$

$= 360(60-0)$

Energy → $w = 21,600\ J$

Figure 1.29



Chapter 1, Solution 18

$p^1 = 30(-10) =$ **-300 W**

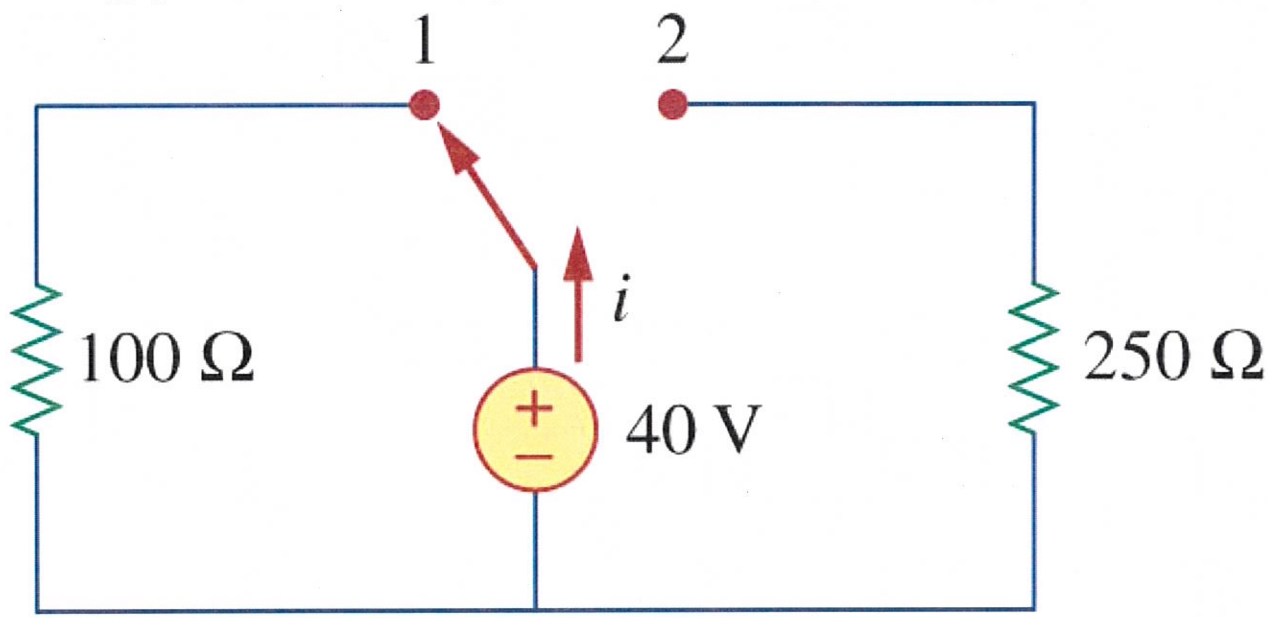
$p^2 = 10(10) =$ **100 W**

$p^3 = 20(14) =$ **280 W**

$p^4 = 8(-4) =$ **-32 W**

$p^5 = 12(-4) =$ **-48 W**

Figure 2.68

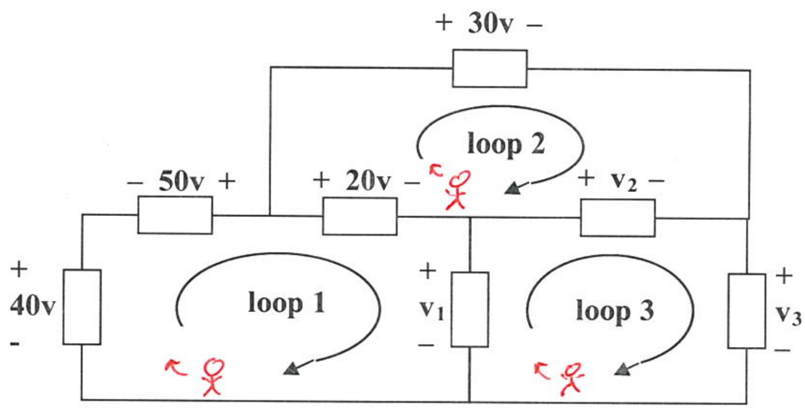


2.4

(a) **i = 40/100 = 400 mA**

(b) **i = 40/250 = 160 mA**

Chapter 2, Solution 12



For loop 1, $-40 - 50 + 20 + v_1 = 0$ or $v_1 = 40 + 50 - 20 =$ **70 V**

For loop 2, $-20 + 30 - v_2 = 0$ or $v_2 = 30 - 20 =$ **10 V**

For loop 3, $-v_1 + v_2 + v_3 = 0$ or $v_3 = 70 - 10 =$ **60 V**

Chapter 2, Problem 26.

For the circuit in Fig. 2.90, $\boldsymbol{i_o} = 3$ A. Calculate $\boldsymbol{i_x}$ and the total power absorbed by the entire circuit.

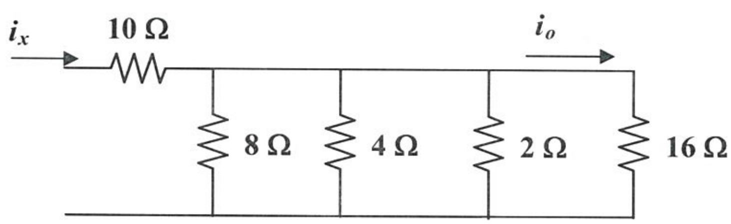


Figure 2.90
For Prob. 2.26.

Solution

If $i_{16} = \boldsymbol{i_o} = 3$A, then $v = 16x3 = 48$ V and $i_8 = 48/8 = 6$A; $i_4 = 48/4 = 12$A; and $i_2 = 48/2 = 24$A.

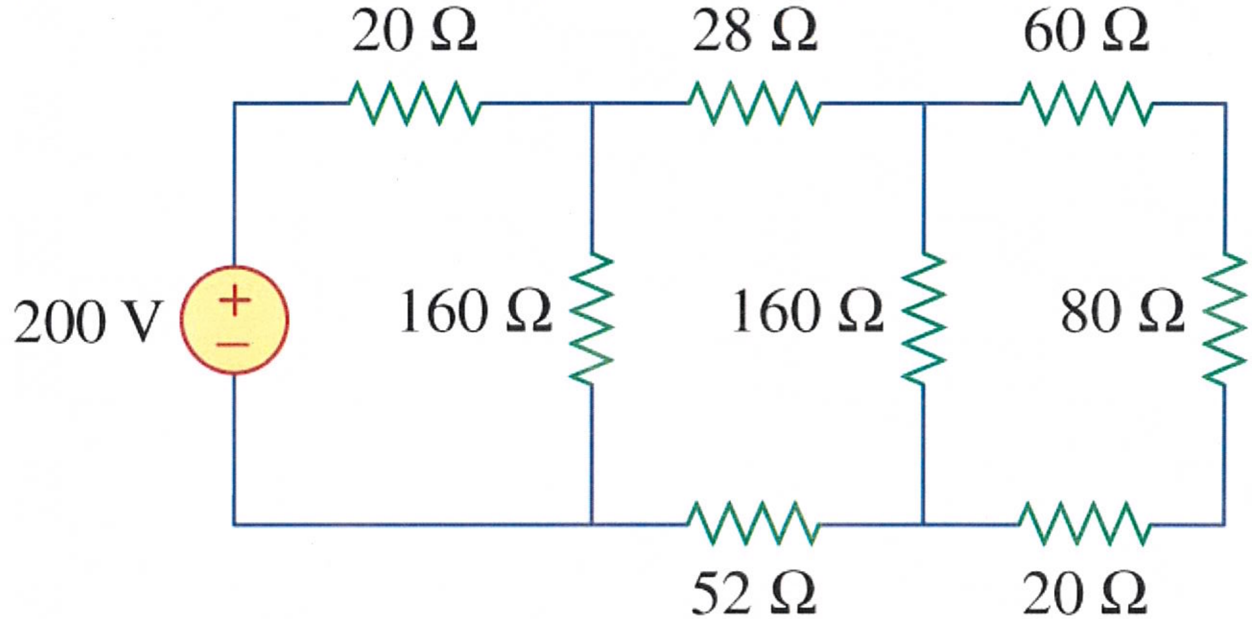
Thus,

$$i_x = i_8 + i_4 + i_2 + i_{16} = 6 + 12 + 24 + 3 = \mathbf{45\ A}$$

$$p = (45)^2 10 + (6)^2 8 + (12)^2 4 + (24)^2 2 + (3)^2 16 = 20{,}250 + 288 + 576 + 1152 + 144$$

$$= 20250 + 2106 = \mathbf{22.356\ kW}.$$

Figure 2.98



Chapter 2, Solution 34

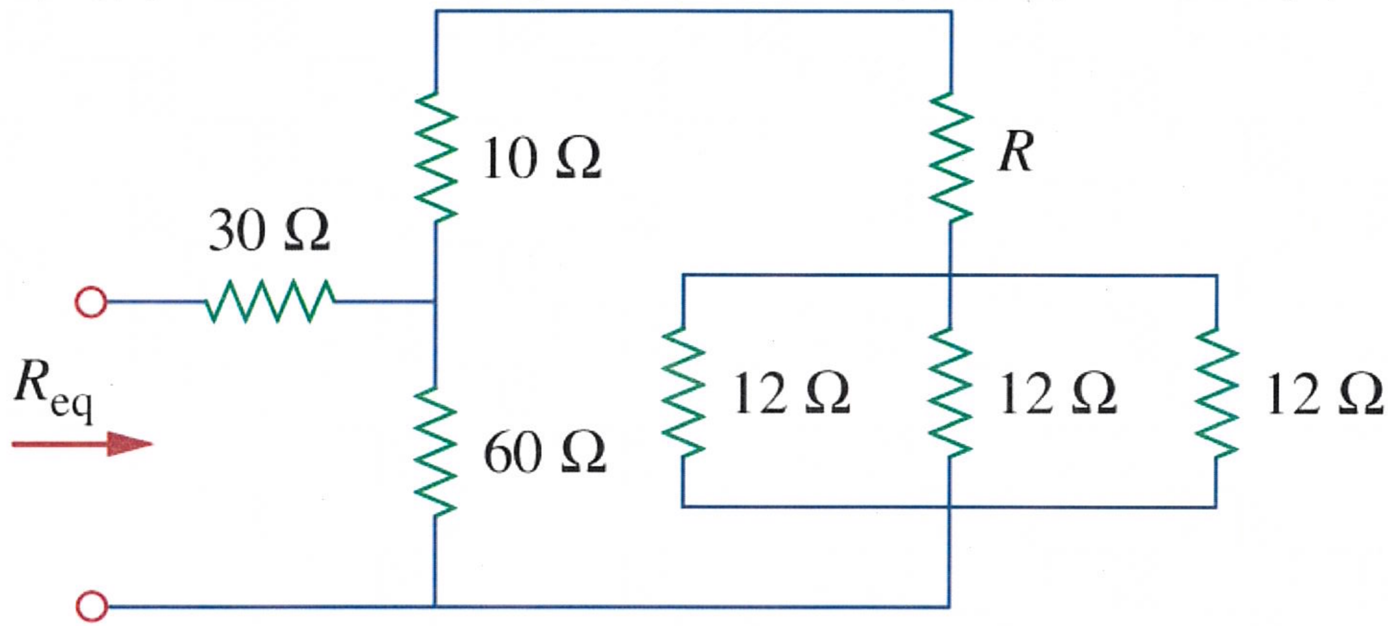
160//(60 + 80 + 20)= 80 ***Ω***,

160//(28+80 + 52) = 80 ***Ω***

$\boldsymbol{R^{eq} = 20+80 = 100\ \Omega}$

I = 200/100 = 2 A or p = VI = 200x2 = **400 W.**

Figure 2.105



Chapter 2, Solution 41

Let R_0 = combination of three 12Ω resistors in parallel

$$\frac{1}{R_o} = \frac{1}{12} + \frac{1}{12} + \frac{1}{12} \longrightarrow R_o = 4$$

$$R_{eq} = 30 + 60 \| (10 + R_0 + R) = 30 + 60 \| (14 + R)$$

$$50 = 30 + \frac{60(14 + R)}{74 + R} \longrightarrow 74 + R = 42 + 3R$$

or **R = 16 Ω**