EE 202-132
HW3 (Due Sunday, March 09 - 2014)
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P1.

For the circuit shown in Figure 1, use the mesh-current method to calculate:

a)- The current in all the circuit.

b)- The power of each element in the circuit.

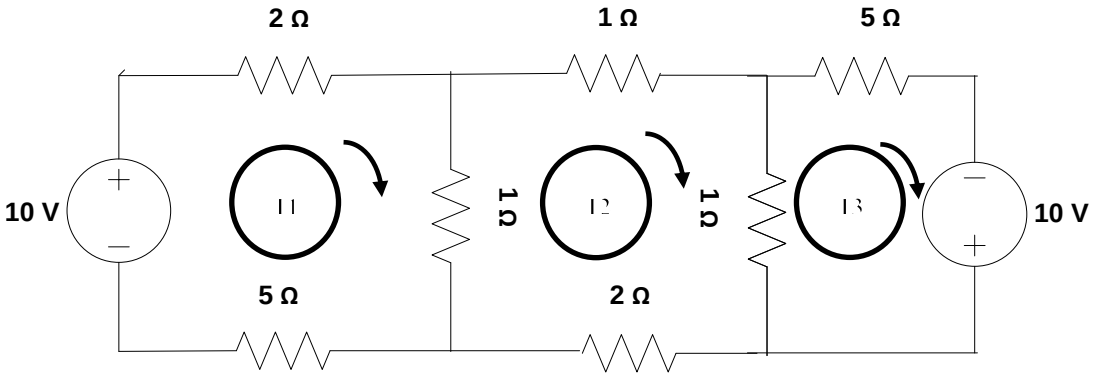


Figure 1.

Solution:

$10 = 8\,I1 - I2 - 0$

$0 = -I1 + 5I2 - I3$

$10 = 0 - I2 + 6I3$

$I1 = 1.32$ A; $I2 = 0.619$ A; $I3 = 1.77$ A;

$P(10V) = I1 \cdot V = 1500/113$;

$P'(10V) = I3 \cdot V = 2000/113$;

$P(Rx) = (Ix)^2 \cdot Rx$ (For each individual resistance)

$P(R = 1) = (I1-I2)^2 \cdot (1)$

$P(R = 1) = (I2-I3)^2 \cdot (1)$

P2.

For the circuit shown in Figure 2, use the node-voltage method to calculate the power in the voltage sources.

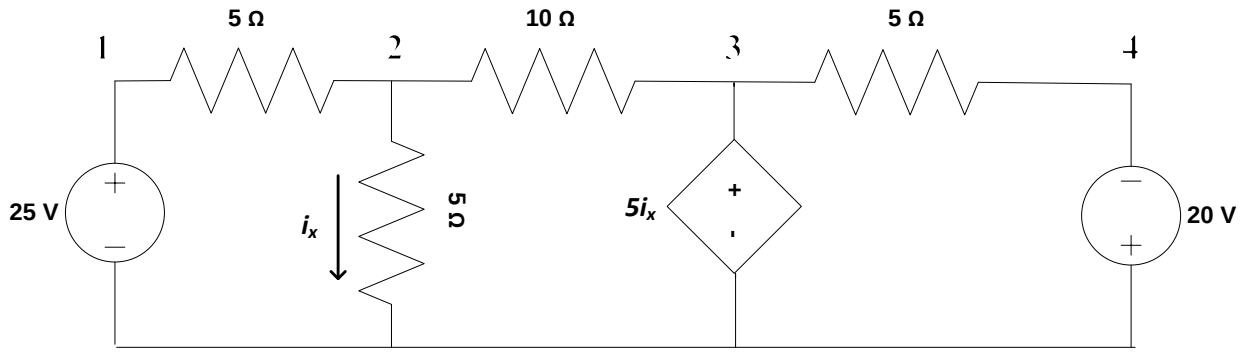


Figure 2.

V1 = 25; V4 = -20V; V3 = 5 ix = 5 (V2/5) = V2;

KCL at node 2:
- V1(1/5) + V2 (1/5 +1/5 +1/10) – V3 (1/10) = 0; (1)

Sub. V1 and V3 => V2 = 12.5 v.

I25 = (V1 – V2)/5 = 2.5 v. => P25 = I.V = 2.5 . 25 = 62.5 w;

I20 = (V3 – V4)/5 = 6.5 v. => P20 = I.V = 6.5 . 20 = 130 w;

P3.

For the circuit shown in Figure 3, use the mesh-current method to calculate:

a)- The current i_z

b)- The power in the circuit.

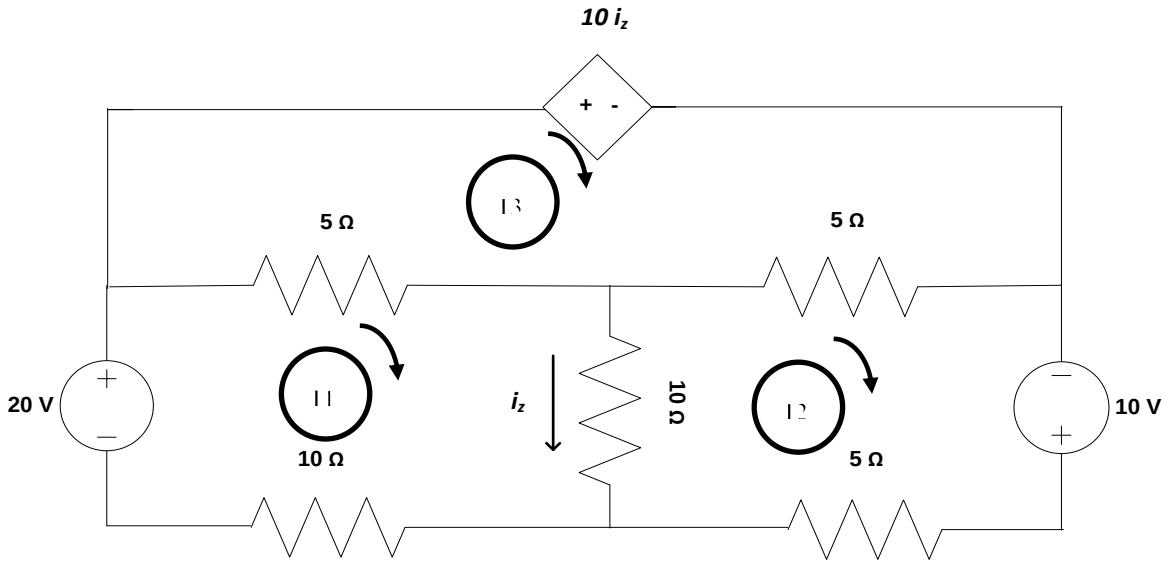


Figure 4.

Solution:

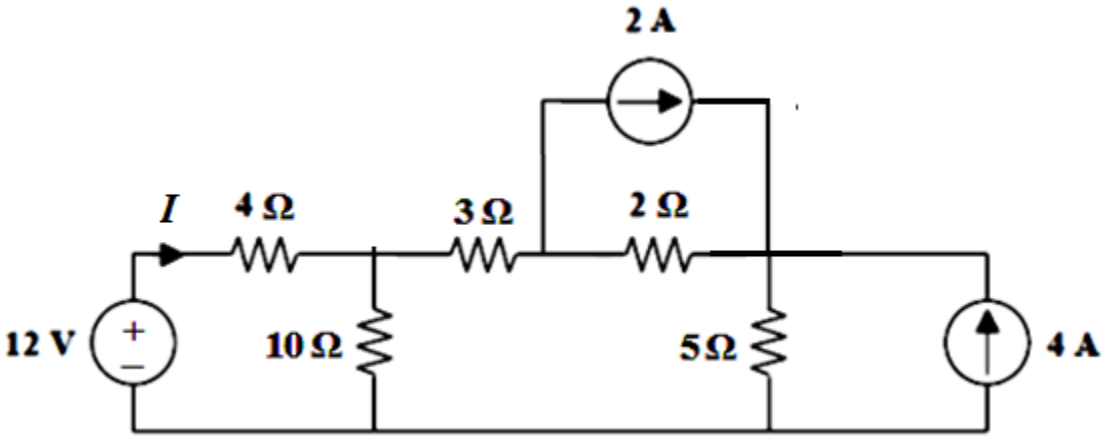
Iz = (I1 – I2);
20 = I1 (25) – I2 (10) – I3 (5)
10 = -I1 (10) + I2 (20) – I3 (5)
-10 (I1 – I2) = -I1 (5) – I2 (5) + I3 (10)

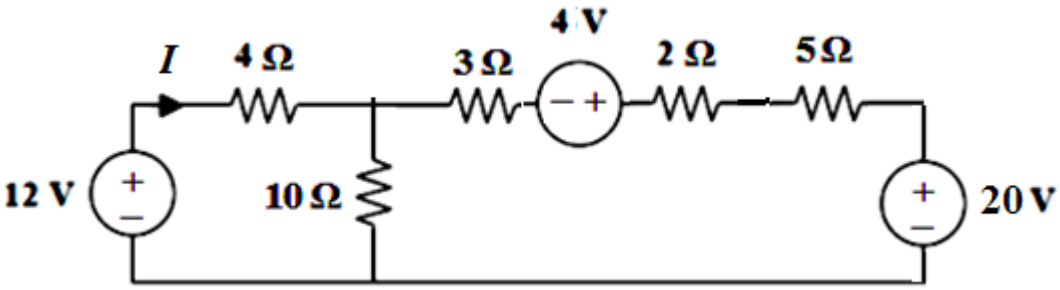
I1 = 2 A; I2 = 2 A; I3 = 2 A;

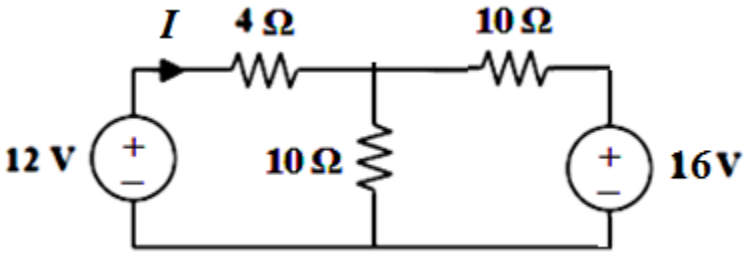
P20 = I1 (20) = 40 W, P10 = I2 (10) = 20 W and P10ix = 0 W.

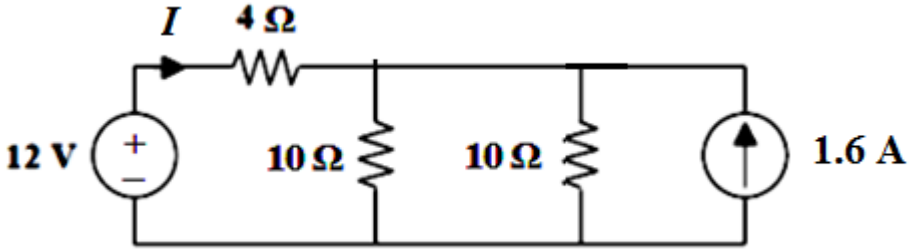
P4.

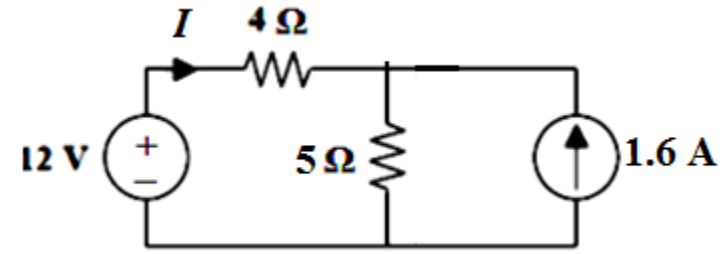
Use source transformations to reduce the circuit shown to a single loop, and then find the current ***I***. Draw a circuit for each step you take.

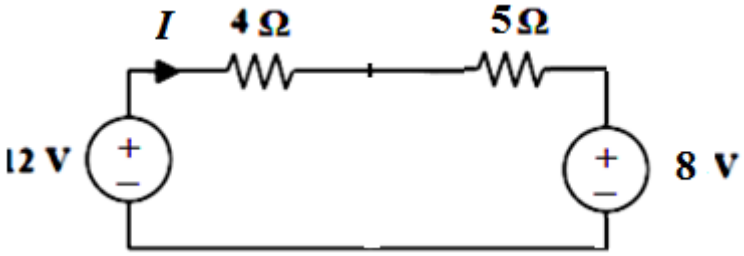












I = (12 - 8)/9 = 4/9 A.