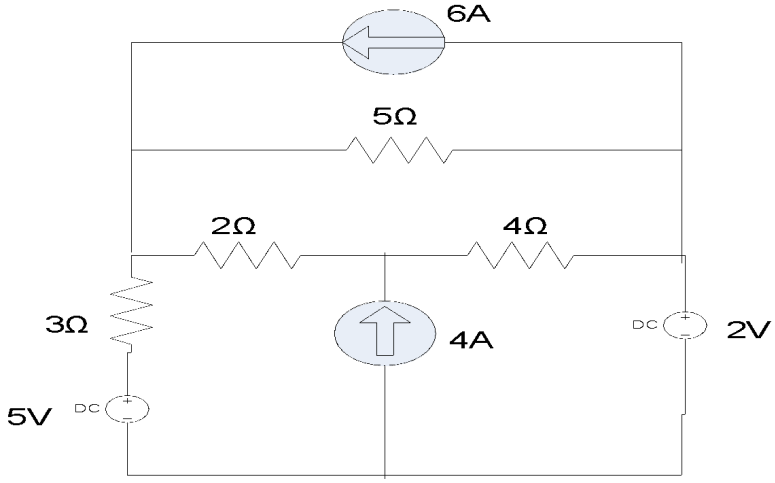
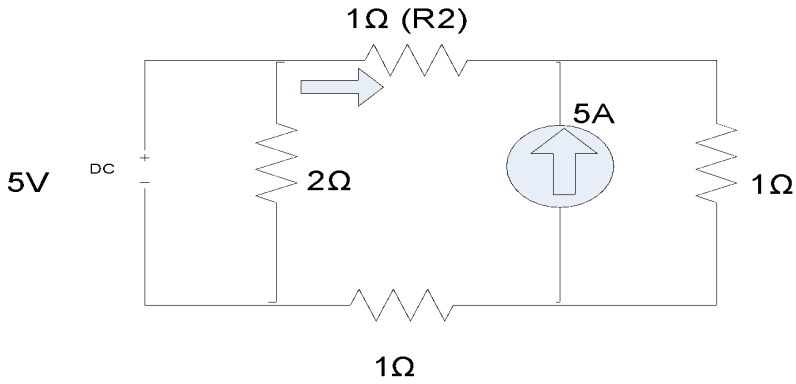
Network Analysis
Tutorial-II (Mesh and Nodal Analysis)

1. Using Nodal Analysis find the current through the resistors in the circuit shown.



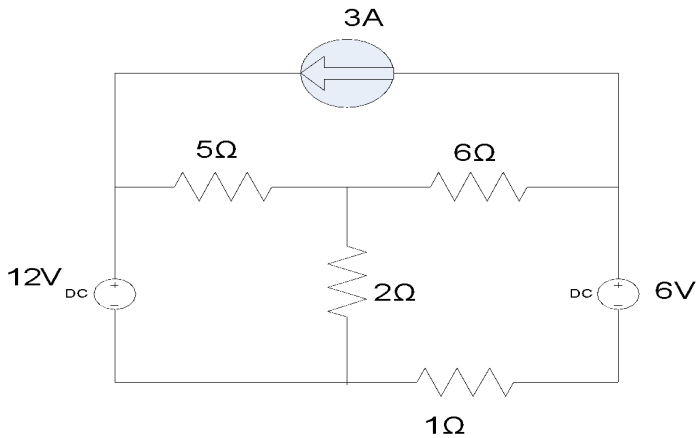
Ans: I_5 = 2.76 A, I_2 = 0.375 A, I_4 = 3.63 A, I_3 = 3.6 A

2. Find current through R_2 using nodal analysis.



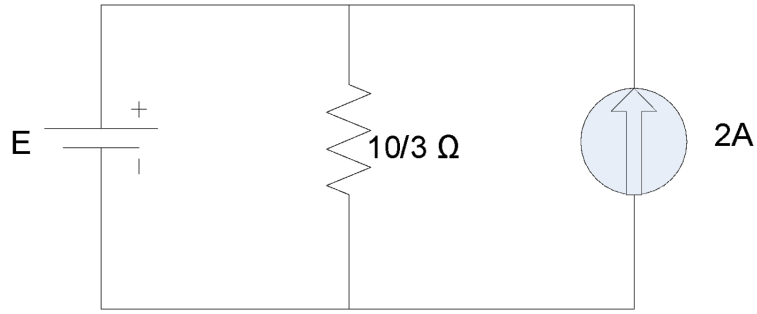
Ans: 0 A

3. Determine node voltages and the current through resistors using mesh analysis.



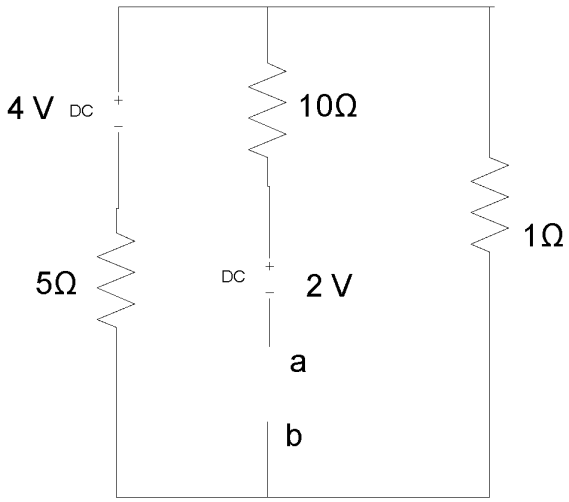
Ans: I_5=1.73 A, I_2=1.68 A, I_6=0.05 A, I_1= -2.95 A, V_a=0, V_b=3.05, V_c=3.36, V_d=12 V

4. Find E if the power supplied by the current source is double of the supplied by the battery.



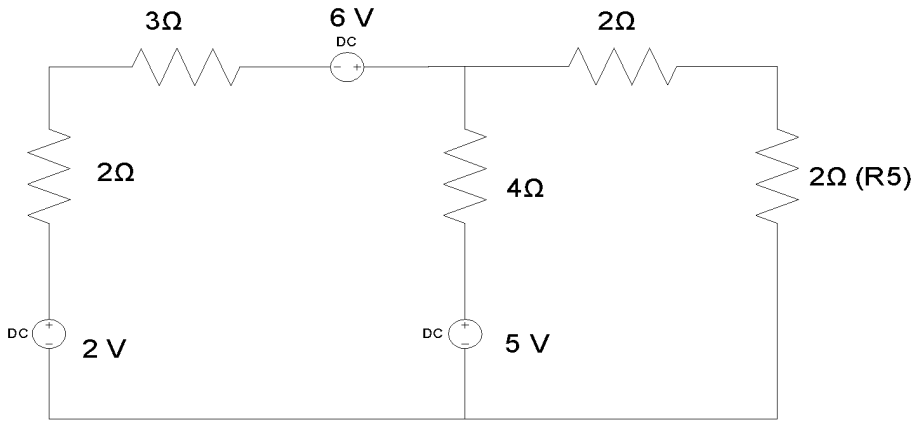
Ans: E = 10 V

5. Find V_{ab}. Also find the current through a-b if a-b is short circuited.



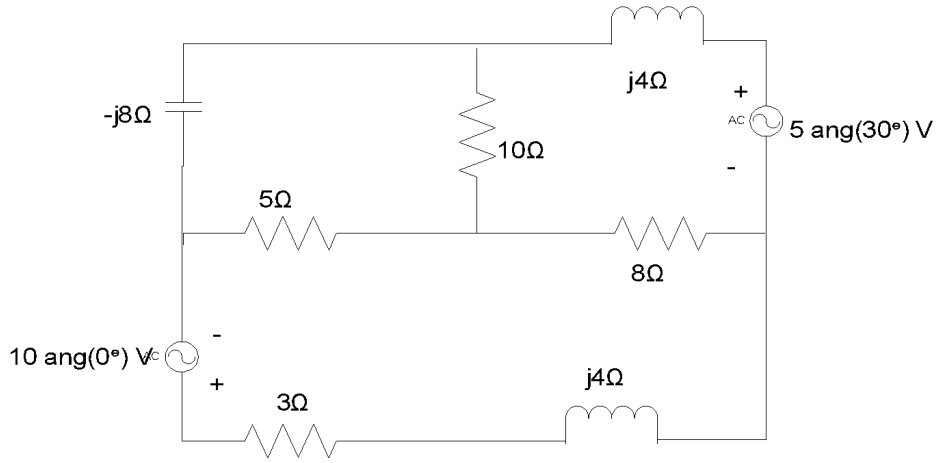
Ans: V_{ab} = -1.33 V, I_{ab} = 0.12 A

6. Find drop across R_5.

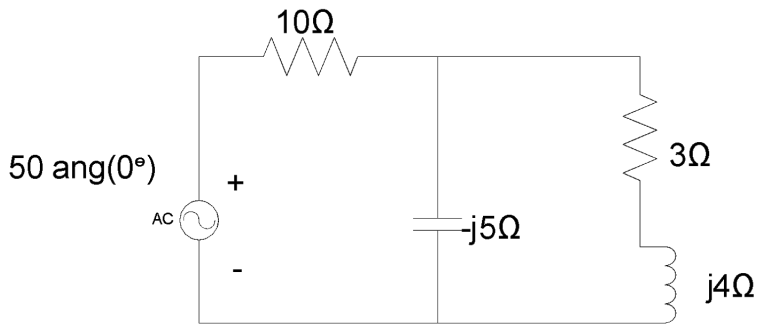


Ans: 2.034 V

7. Write mesh equations for the network shown.

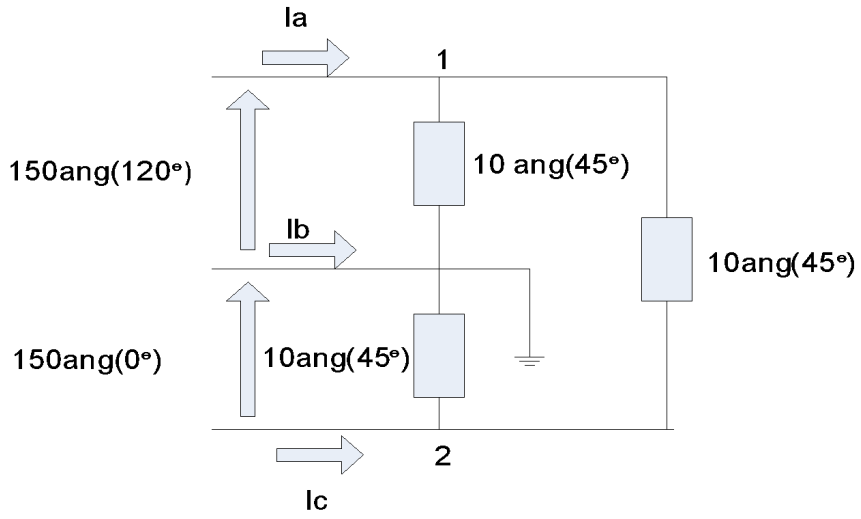


8. Find the power output of the voltage source in the circuit shown. Also determine the power in the circuit resistors. Apply Cramer's Rule.



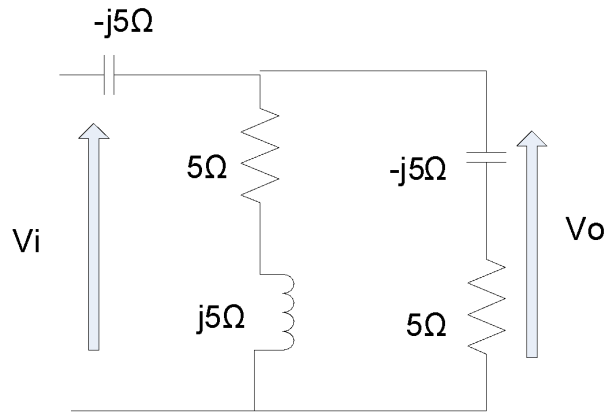
Ans: P = 140W, P_{10} = 80W, P_3 = 60W

9. Find the currents I_a, I_b and I_c using nodal analysis. Apply Cramer's Rule.



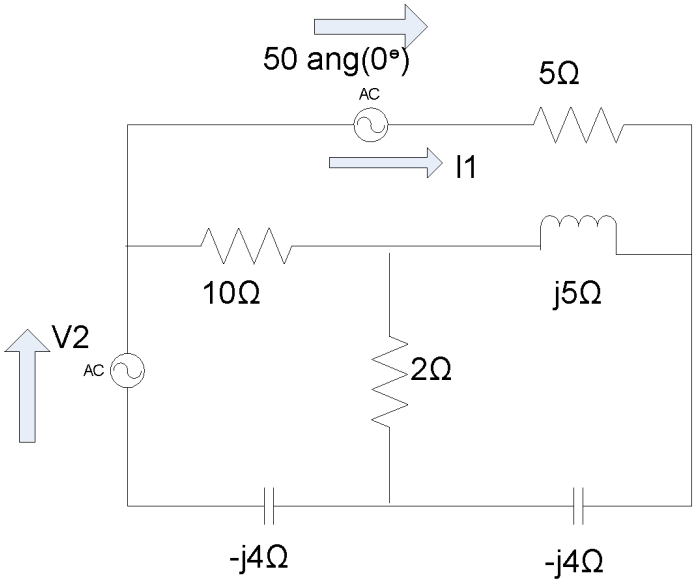
Ans: Ia = 26ang(45), Ib = 26ang(-75) and Ic = 26ang(-195)

10. Find the ratio of Output voltage to Input voltage $\frac{Vo}{Vi}$ using Mesh analysis. Also verify the answer with Nodal analysis?



Ans: 0.707 ang(45□)

11. Find the value of voltage V_2 which causes the current I_1 to be zero.



Ans: 43 ang(144.4□)