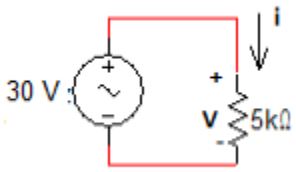
Assignment-1

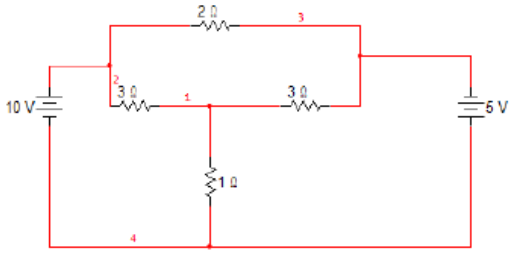
1. In the given circuit, calculate current I, the conductance G and the power P?

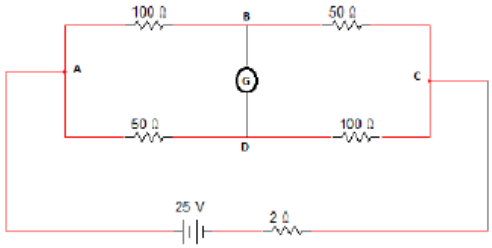


2. A voltage source of 20Sinπt V is connected across a 5KΩ resistor. Find the current through the resistor and power dissipated.

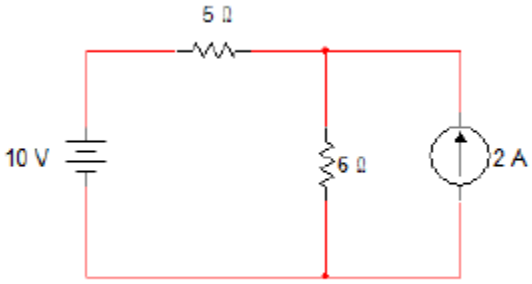
3. A resistor absorbs an instantaneous power of 20Cos2t mW when connected to a voltage source V=10Cost V. Find I and R.

4. Write KCL and KVL equations for the given circuits:



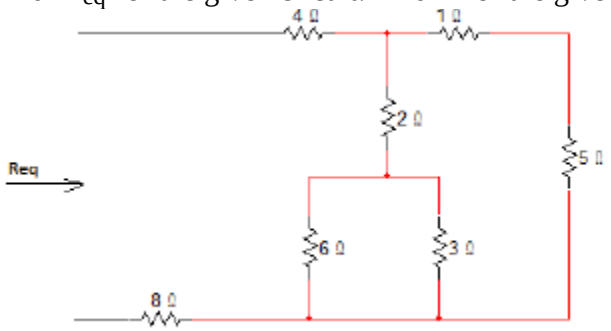


5. Determine the number of branches and nodes in the circuit shown. Identify which elements are in series and which are in parallel.

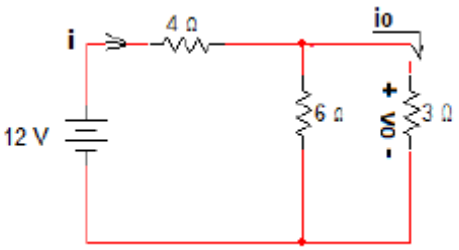


6. A bulb rated 110V , 60W has to be operated from a 230V supply. Show the arrangement. A 50Ω and a 100Ω rheostats are each rated at 100W. What is the maximum voltage that may be applied without causing overheating of either rheostat (i) when they are connected in series and (ii) when they are in parallel.

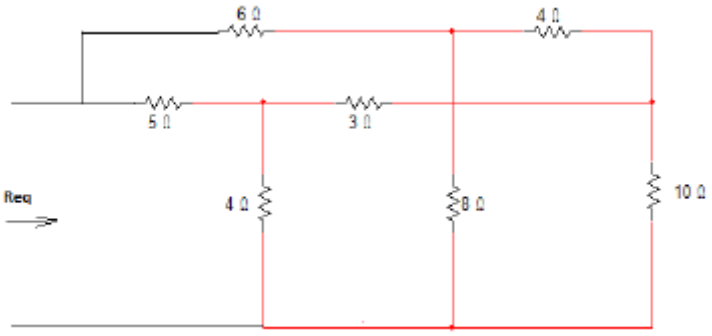
7. Find R_{eq} for the given circuit. Find for the given circuit.



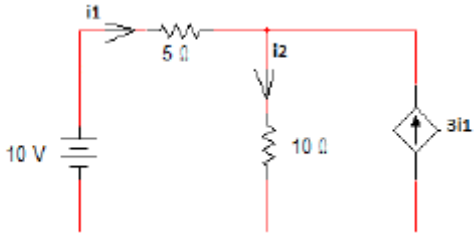
8. Find I_0 and V_0 in the given circuit. Calculate the power dissipated in 3Ω.



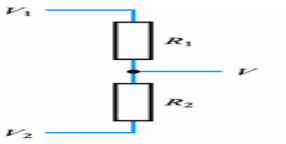
9. Two batteries of 24V and 20V with internal resistances of 0.4Ω and 0.25Ω respectively are connected in parallel across a load of 4Ω. Calculate (i) the current supplied by each battery and (ii) voltage across the load.
   Calculate the voltage across AB in the network and indicate the polarity of the voltage using star-delta conversion. Determine the equivalent resistance Req.



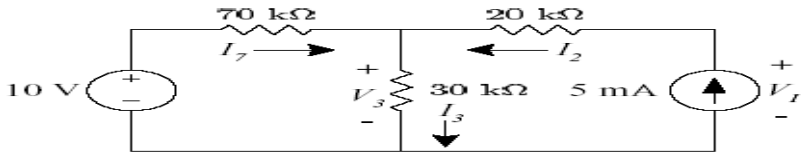
10. In the given circuit, determine all branch currents.



11. Write resistive potential dividers expression for the circuit.

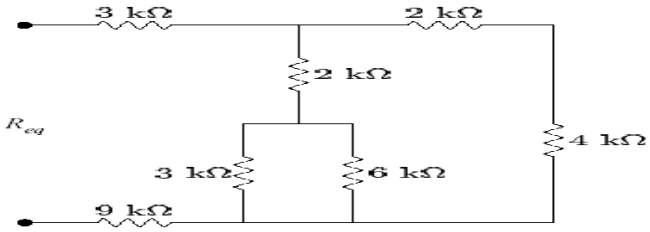


12.



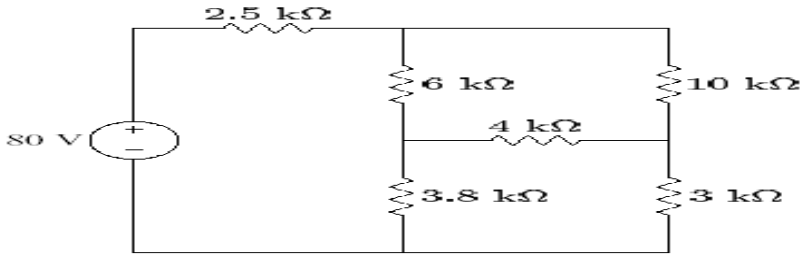
Find I_7, I_3, I_2, V_3, and V_1.

13.



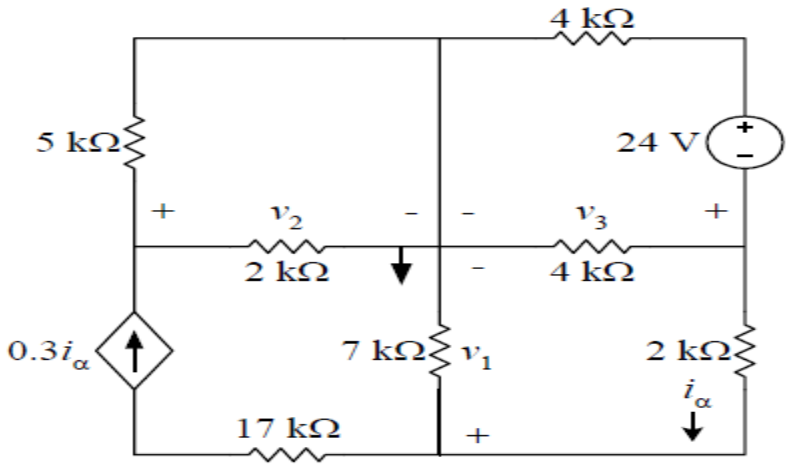
Find R_{eq}.

14. **Delta ←→ Wye Transformations**



Find R_{eq} and Power delivered by source

15. Use nodal analysis method to write three independent equations in terms of the node voltage v_1,v_2,v_2 for the circuit shown below. Do not use any other variable in your equations. If appropriate use super node. **Do not simplify your equations.**

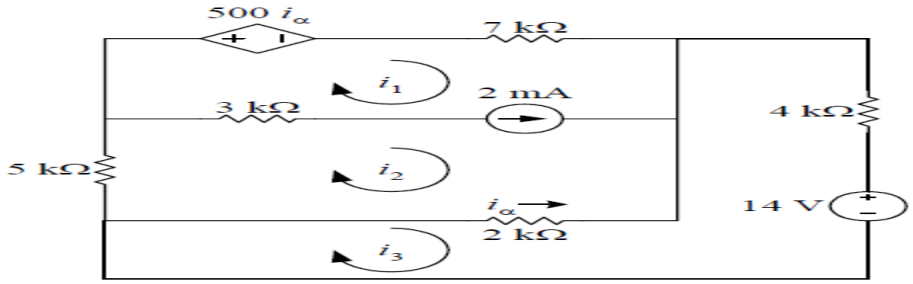


a. Solve for the node voltages V_1,V_2, and V_3 (1 point)

b. What is i_α? (1 point)

c. How much power is absorbed by the 24 V source? (1 point)

16. Use mesh analysis method to write three independent equations in terms of the currents $i_{1, i2, i3 \text{ for}}$ the circuit shown below. Do not use any other variable in your equations. If appropriate use super mesh. **Do not simplify your equations.**



a. Solve for the currents i_1 ,i_2 , and i_3 (1 point)

b. How much power is being absorbed by the dependent sources? (1 point)

c. How much power is being dissipated by the 5kohm resistor? (1 point)