


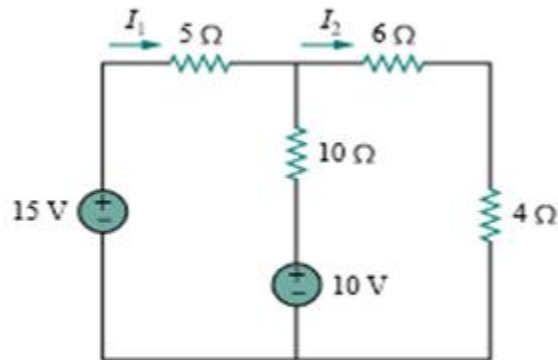


**Part I: Give clear and precise answer!!**

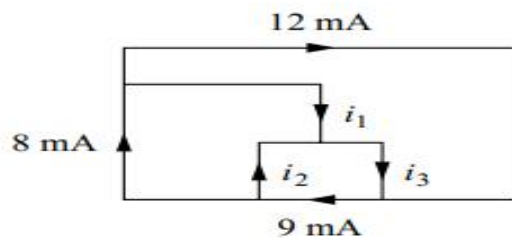
1. Define the Kirchhoff's laws (KCL & KVL) and ohm's law.
2. Define the following terms:
  -  Direct current (Dc)
  -  Alternative current (Ac)
  -  Electrical power
3. What is Intrinsic and Extrinsic semiconductor mean?
4. Explain briefly the terms Insulators, Conductors, and Semiconductors with their examples.
5. What is depletion layer mean, and how it forms?
6. Depending on the polarity of the voltage applied and the gate pulse given to the SCR, it can operate in three different modes. What are these and define them clearly.

*Part II: Show all your steps clearly for each question!!*

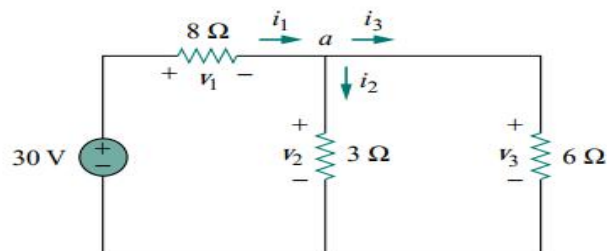
7. Determine the branch currents  $I_1$  and  $I_2$  using mesh analysis



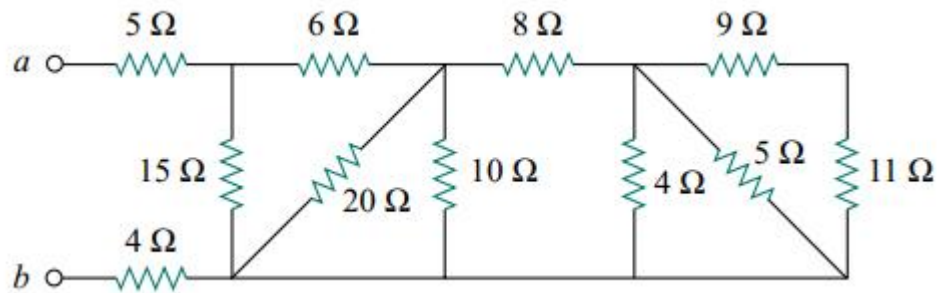
8. Use KCL to obtain current  $i_1$ ,  $i_2$  and  $i_3$  in the circuit shown below.



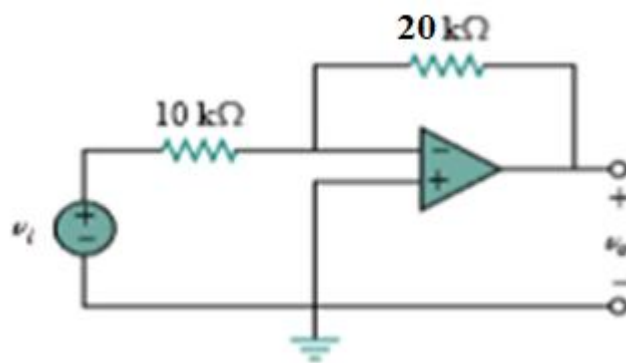
9. Find the currents and voltages in the circuit shown below.



10. Obtain the equivalent resistance at the terminals  $a-b$  shown below.



11. If  $V_i = 0.5\text{V}$  calculate the output voltage  $V_o$  and the current in  $10\text{K}\Omega$  resistor.



12. Calculate  $V_o$  and  $i_o$  in the op amp circuit given below

