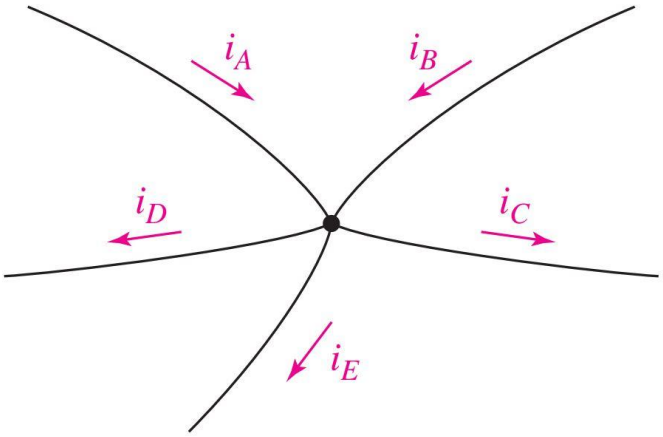
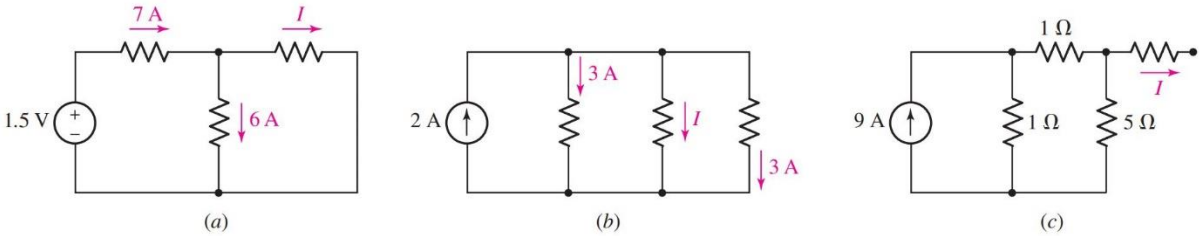
Fundamentals of Electronics (ECN-102)

Tutorial 1(Chapter 1)

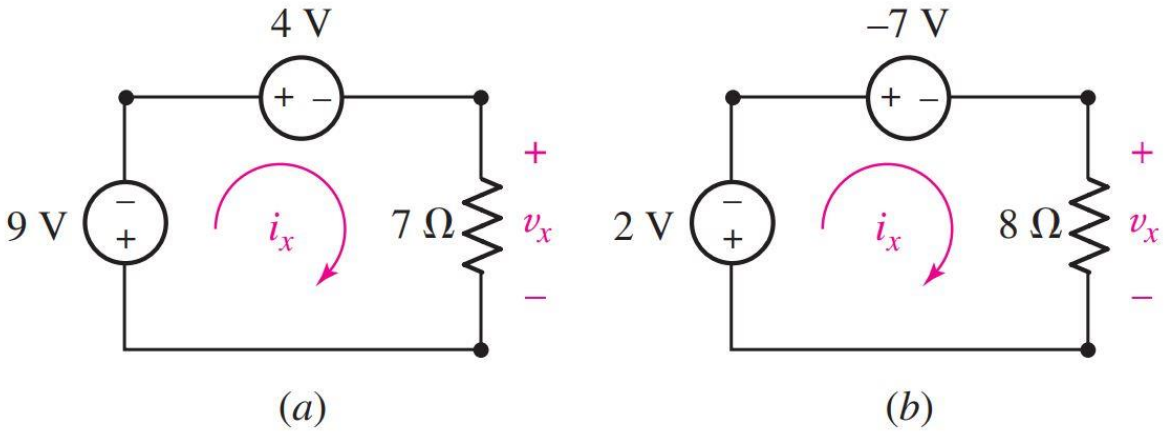
1. Referring to the below node compute:
   a) i_B, if i_A = 2A, i_C = -1A, i_D = 4A and i_E = 0A
   b) i_A, if i_B = -2A, i_C = 2A, i_D = 1A and i_E = -3A using KCL



2. Determine the current *I* in the below circuits:

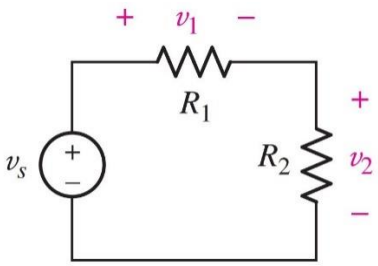


3. In the following circuits determine voltage v_x and current i_x using KVL:

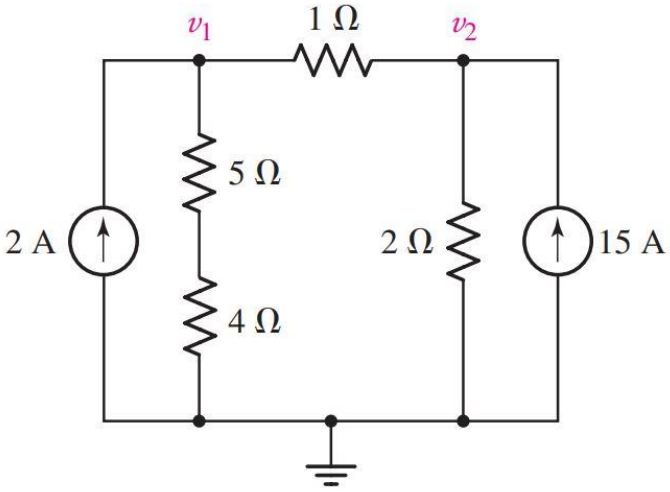


4. Consider the simple circuit below. Derive the following expressions for voltages using KVL:

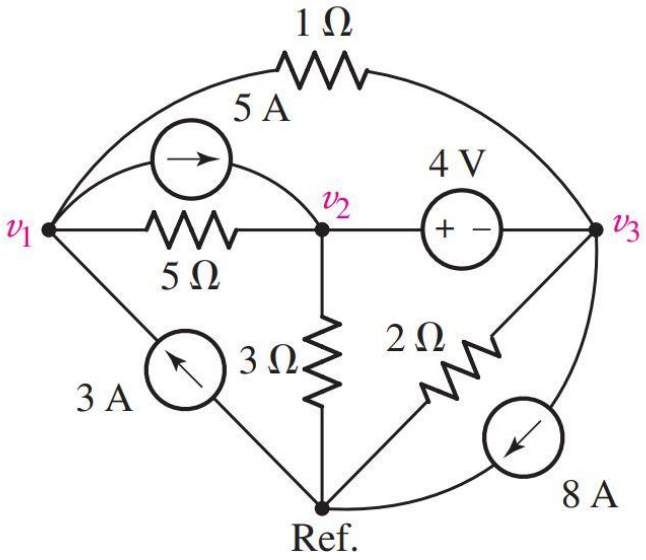
$$v_1 = v_s \frac{R_1}{R_1 + R_2} \quad \text{and} \quad v_2 = v_s \frac{R_2}{R_1 + R_2}$$



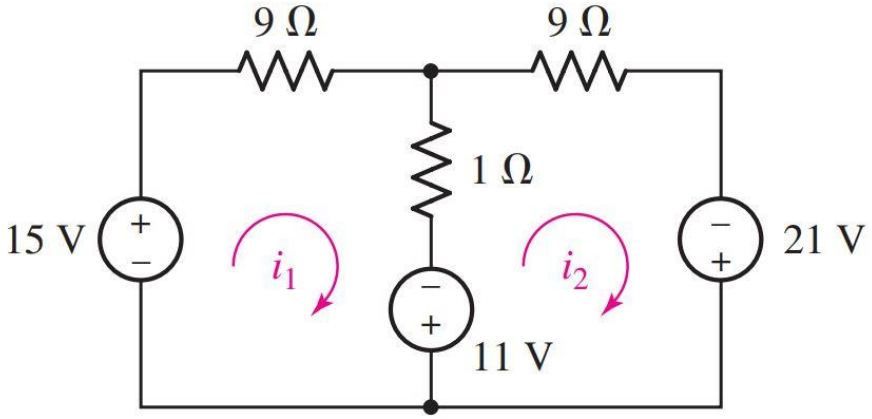
5. Using nodal analysis determine v_1-v_2 in the below circuit:



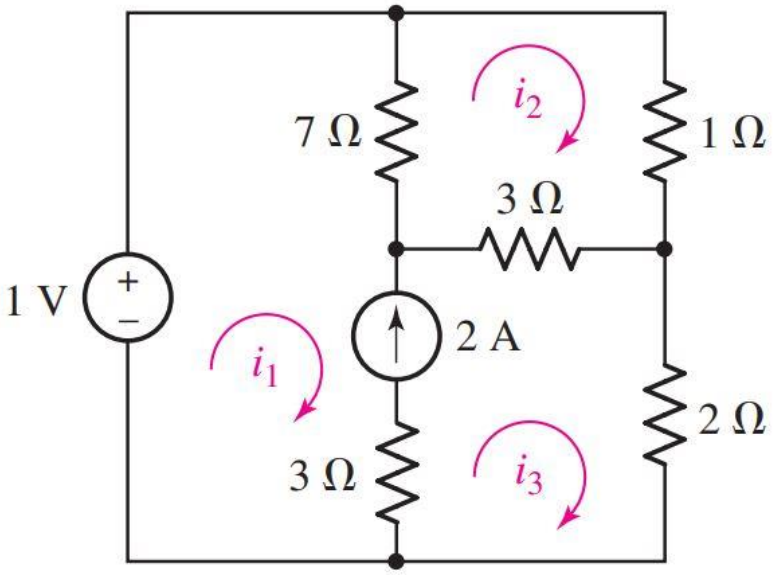
6. Determine the node voltages v_1, v_2 and v_3 using super node technique:



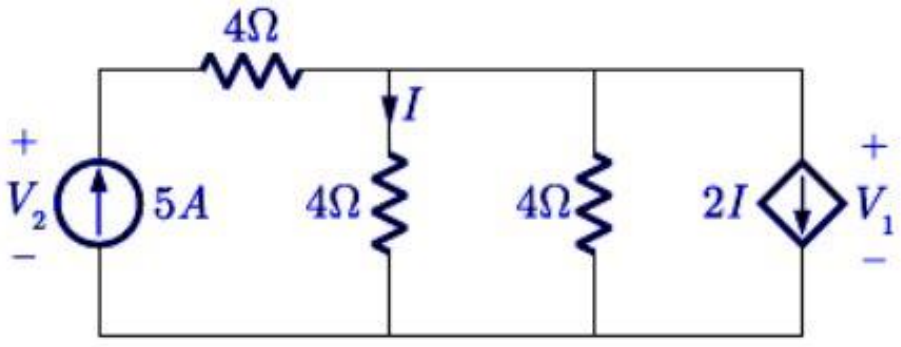
7. Using mesh analysis determine the mesh currents labelled in the below circuit:



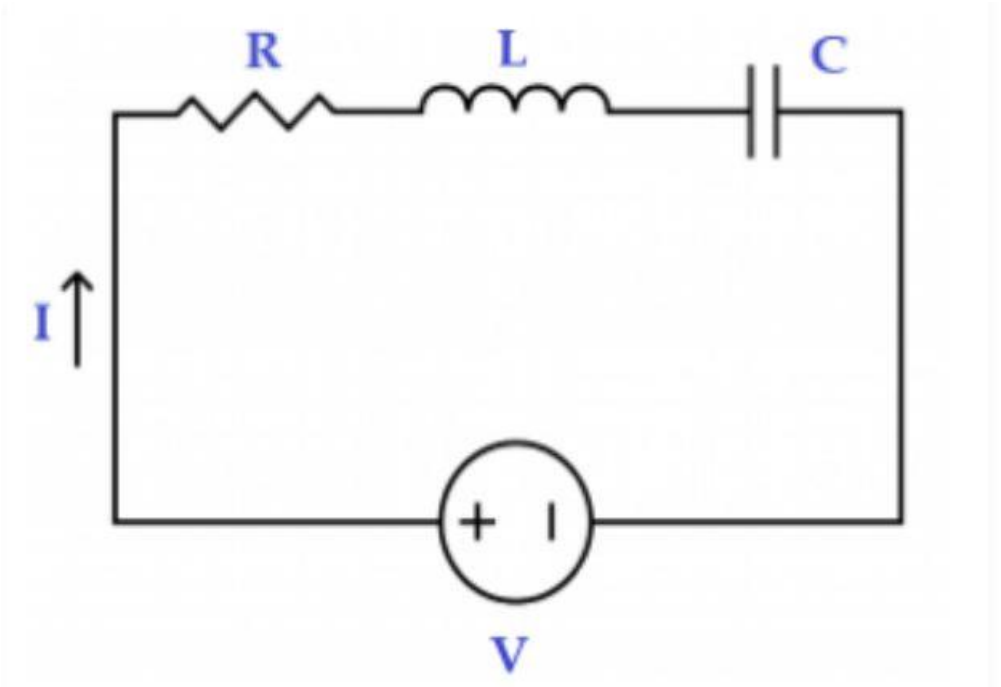
8. Determine the values of three mesh currents in the below circuit:



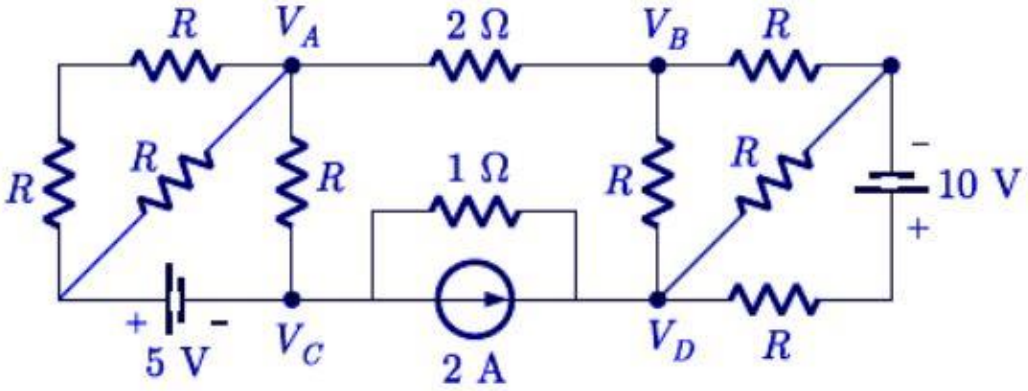
9. In the given circuit find the values of V_1, V_2 :



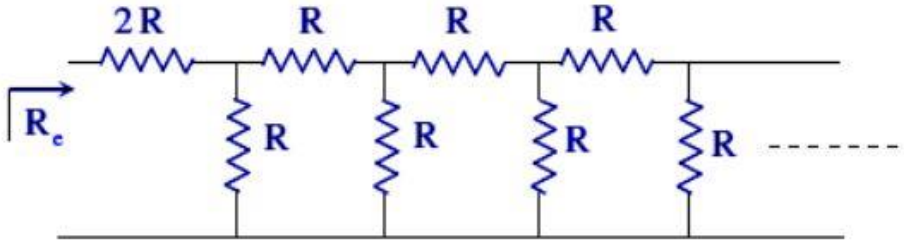
10. Derive the expression of current I for the given series RLC circuit below:



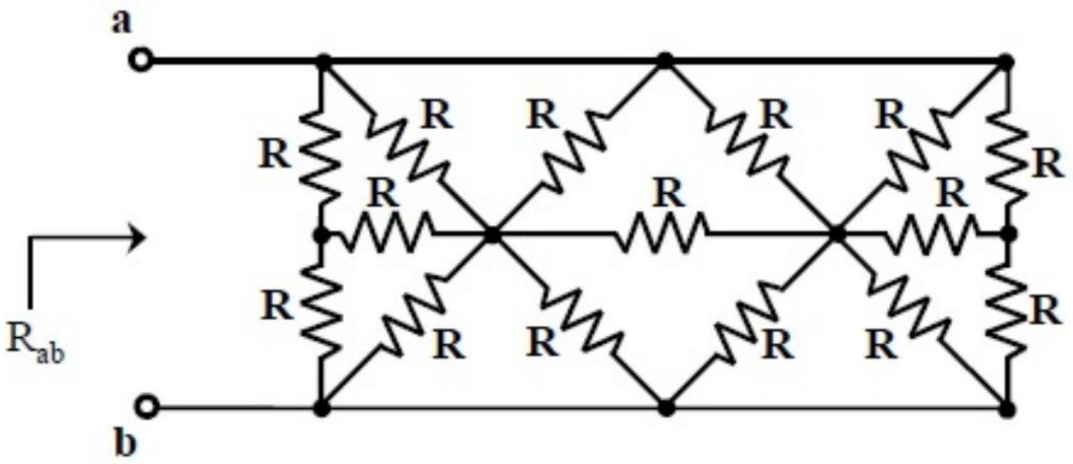
11. If V_A - V_B = 6V , then find the value of V_C - V_D in the below circuit:



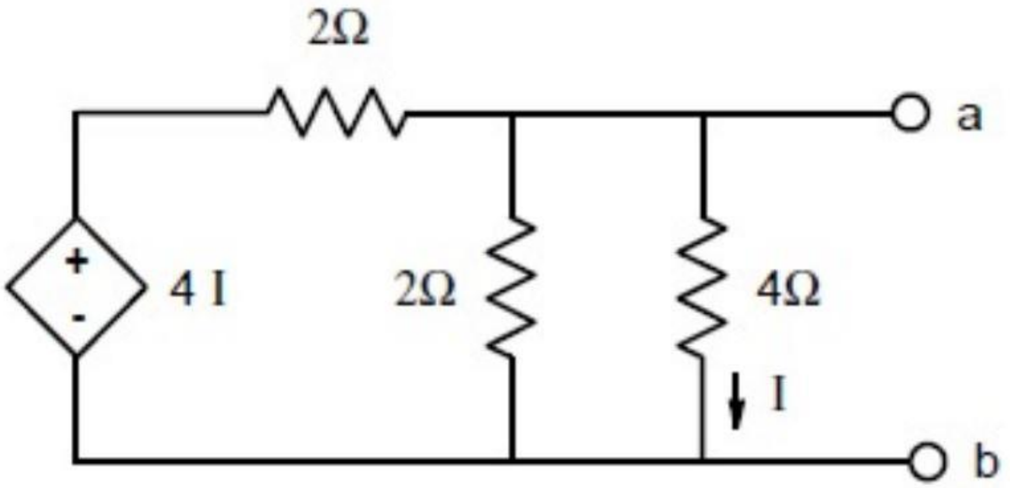
12. The equivalent resistance of infinite ladder shown in below figure is R_e , then find the value of R_e / R :



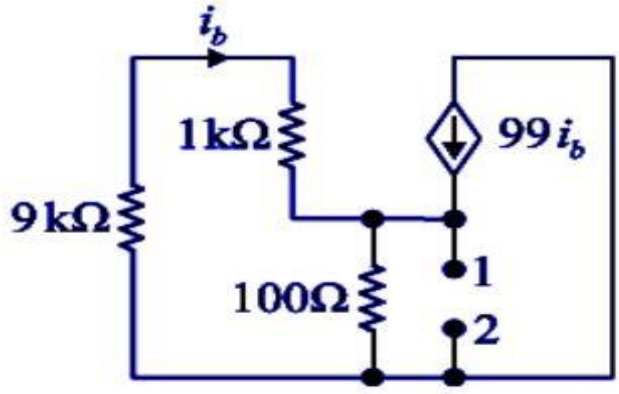
13. In the network shown below, all the resistors are identical with R = 300 Ω, find the equivalent resistance R_{ab}:



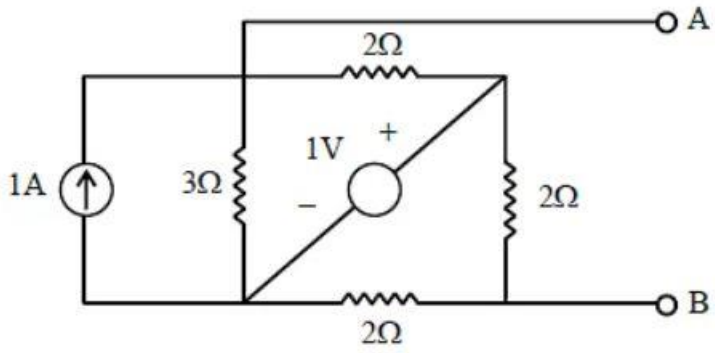
14. In the circuit below, the equivalent resistance between the terminals a and b is:



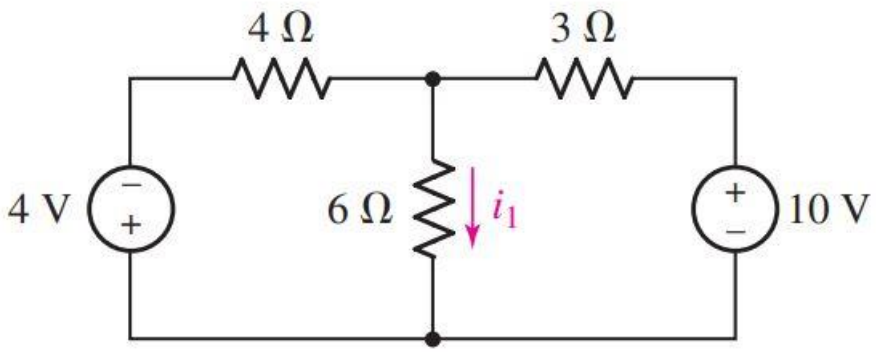
15. Find the equivalent resistance between nodes 1 and 2:



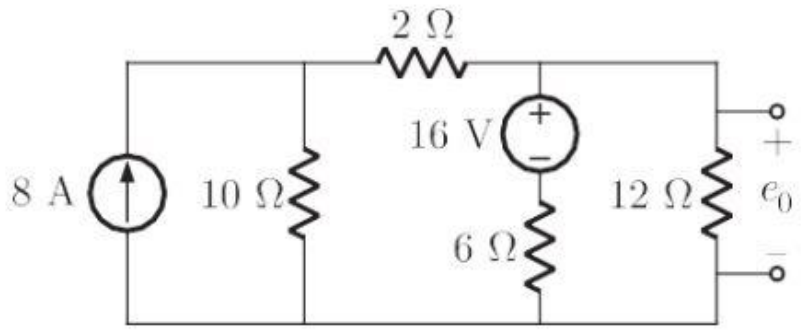
16. The Thevenin impedance across terminal A and B is:



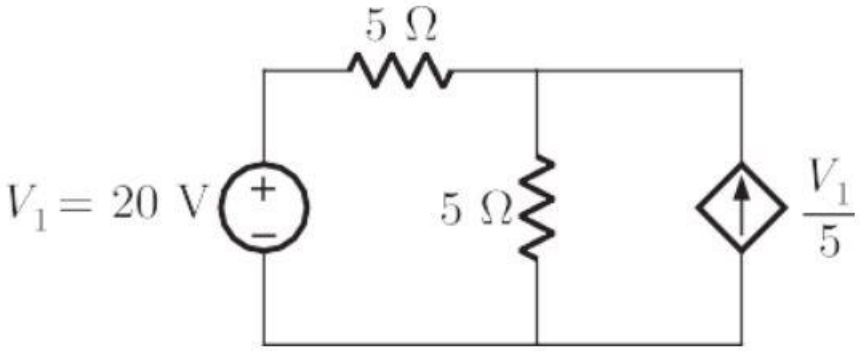
17. Determine the value of current i_1 using superposition theorem and also verify the same using Thevenin's or Norton's theorems treating 6Ω as the load resistance:



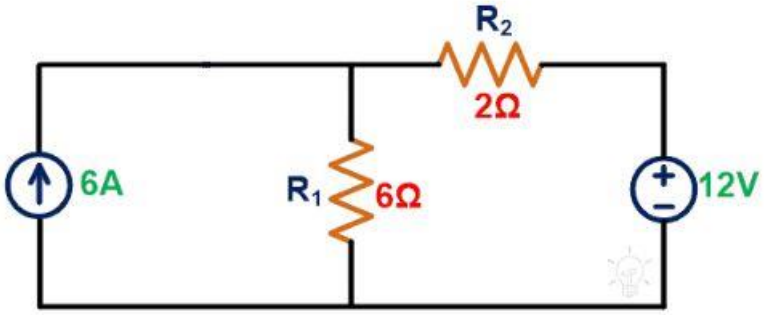
18. Find value of voltage e_0 using both Thevenin's and Norton's theorems treating 12Ω as the load resistance:



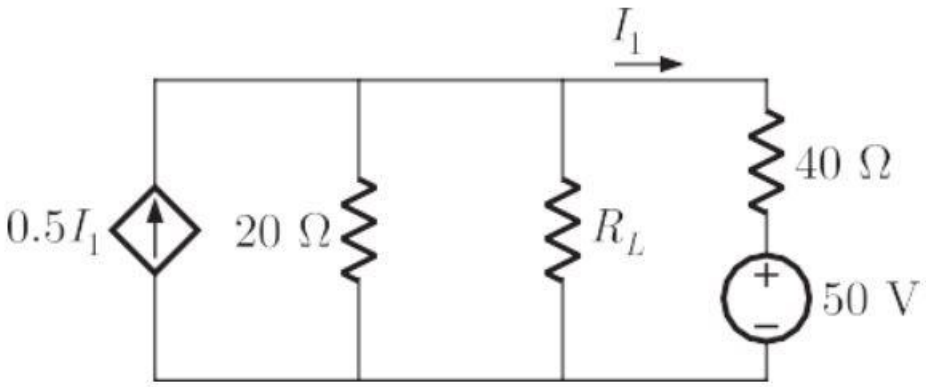
19. Determine the power delivered or absorbed by the dependent current source in the below network:



20. Find the voltage across 6A current source using Tellegen's theorem:



21. In the network shown below, the maximum power is delivered to R_L if its value is:



Answers:

1. 1,2A
2. 1,-4,0A
3. Proof
4. -13,-13/7,5,5/8
5. -1V
6. -8.6,-3.6,-7.6V
7. 2.7272,1.2727A
8. -1.21875,-0.5625,0.78125A
9. 5V,25V
10. -5V
11. proof
12. 2.618
13. 100
14. 4/3
15. 50
16. 11/5
17. 14/27A
18. 28V
19. 80W delivered
20. 18V
21. 16W