Unit – I

1. State / Explain/ Short notes on the following
   i) Kirchhoff’s current law
   ii) Kirchhoff’s voltage law
   iii) Voltage divider rule
   iv) Current divider rule
   v) Superposition theorem
   vi) Maximum power transfer theorem
   vii) Thevenin’s theorem
   viii) Star–delta transformation

2. While applying KVL to loop, how signs are applied to emf and voltage drop.


4. State Thevenin’s theorem. Illustrate of theorem with reference to appropriate electrical network.

5. State maximum power transfer theorem. Show that for maximum power transfer \( R_L = R_i \) and explain its importance.

6. Calculate current through 2 \( \Omega \) resistor using KVL. (Ans: 10 A)

7. Find the current in all branches using KVL.

8. Find the value of voltages \( V_1, V_2 \) & \( V_3 \) with the help of voltage divider rule. 
   (Ans: \( V_1 = 6 \) V, \( V_2 = 4.5 \) V, \( V_3 = 1.5 \) V)
5. A resistance of 10 Ω is connected on series with two resistances each of 15 Ω arranged in parallel. What resistance must be shunted across parallel combination so that the current taken shall be 1.5 A with 20 V applied. \(\text{Ans: 6 } \Omega\)

6. Calculate the total resistance at terminal A & B. \(\text{Ans: 17.5 } \Omega\)

7. Calculate the total resistance at terminal A & B. \(\text{Ans: 11.42 } \Omega\)

8. Find the current supplied by the battery. \(\text{Ans: 5 } \text{A}\)

9. Find the total current ‘I’ taken from 100 V supply from given network using star/delta transformation. \(\text{Ans: 10 } \text{A}\)

10. Find the total current ‘I’ in the network using star/delta transformation. \(\text{Ans: 1.055 } \text{A}\)
11. Using source conversion techniques to find the load current $I_L$ in the circuit. \((\text{Ans: } 2 \text{ A})\)

12. Find the current through $8 \, \Omega$ resistor using Thevenin’s theorem.
\((\text{Ans: } E_{th} = 26.66 \text{ V, } R_{th} = 7\, \Omega, \, I = 1.77 \text{ A})\)

13. Find the current through $4 \, \Omega$ resistor using Thevenin’s theorem.
\((\text{Ans: } E_{th} = -1\text{ V, } R_{th} = 3.33 \, \Omega, \, I = 0.136 \text{ A})\)

14. Calculate the value of the load resistance $R_L$ to which maximum power transfer from the circuit. Also determine the value of maximum power. \((\text{Ans: } E_{th} = 40\text{ V, } R_i = 73.33 \, \Omega, \, R_{th} = R_L = 73.33 \, \Omega, \, \text{Maximum Power} = 5.45 \text{ W})\)

15. Find the equivalent resistance between X and Y.