Tutorial 3

Star-Delta and Delta-Star Transformation

1. A network is arranged as shown in Figure 1. Using star-delta transformation , calculate the equivalent resistance between A and C.
   Ans: 2.86 Ω

2. Referring to the circuit shown in Figure 2, perform the delta-star conversion on the 500 Ω, 2500 Ω, 100 Ω branches and hence, find the current I in the 50 ohm resistor.
   Ans: 1.32 mA

3. Convert the three impedances forming a Δ in Figure 3 into an equivalent Y. Hence find an overall Y-equivalent.
   Ans:(11 + j2) Ω; (4 – j1) Ω; (1 + j2) Ω

4. The three-terminal network shown in Figure 4 contains a balanced delta in parallel with a balanced Y. Obtain the Y-connected equivalent.
   Ans: $2.28\angle -3.54^0$ Ω (balanced)

5. By converting the star-connected resistors of 2 Ω, 4 Ω and 6 Ω (shown in the dotted box) into an equivalent delta connection, calculate the effective resistance between the terminals A and B of the circuit shown in Figure 5.
   Ans: 22 Ω; 11 Ω; 7.33 Ω; R_{AB} = 4.09 Ω.

6. Simplify the circuit shown in Figure 6 to prove that the equivalent resistance at the terminals AB is R_{AB} = 4.87 Ω using star to delta transformation for the 6 Ω star connected resistances connected to the terminals ABC.
   Ans: R_Δ =18 Ω; R_{AB} = 4.87 Ω.

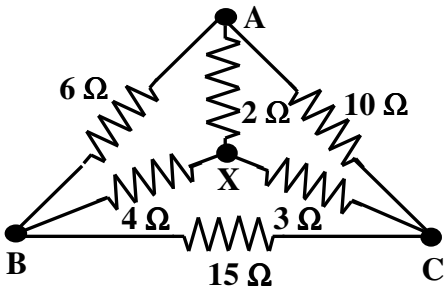

Figure 1

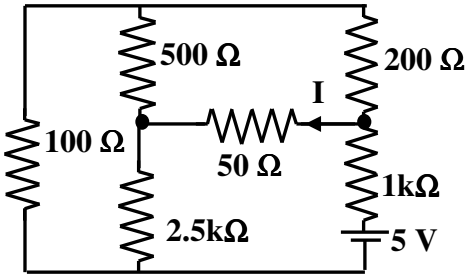

Figure 2

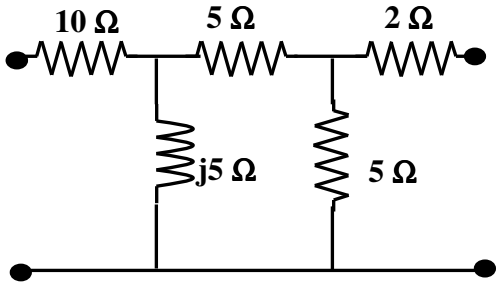

Figure 3

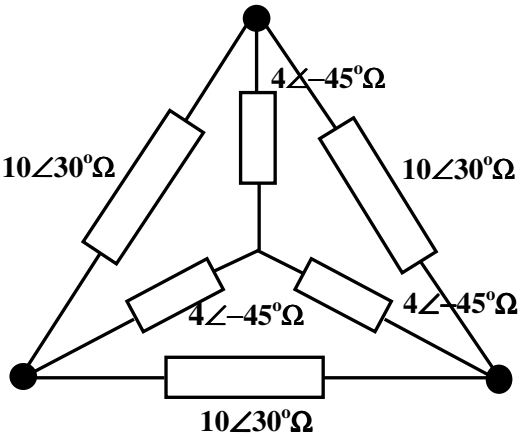

Figure 4

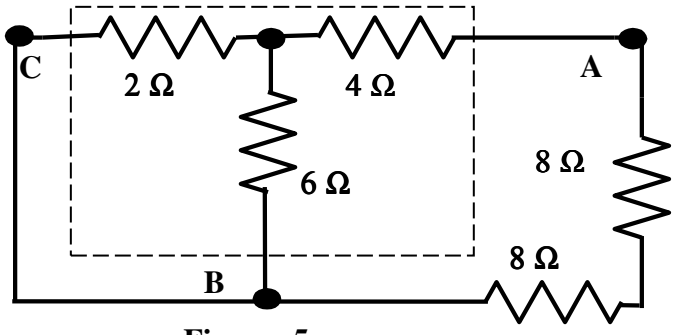

Figure: 5

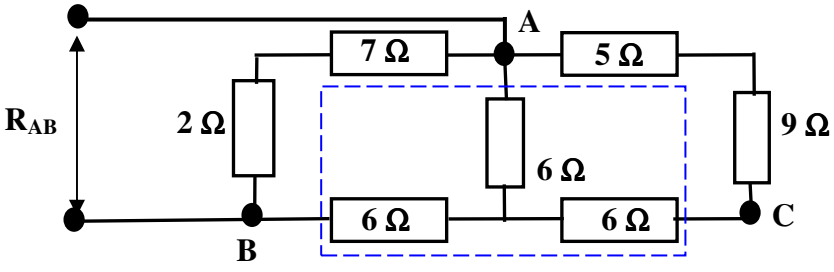

Figure: 6