



Class: 1st
Subject: Electrical Technology
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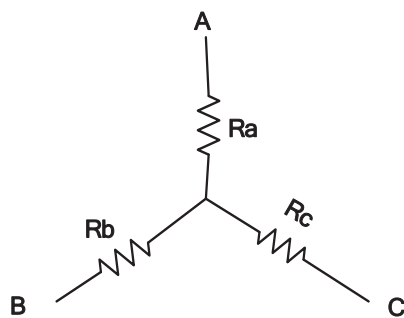
Lecture No. 13

“Solved Problems”

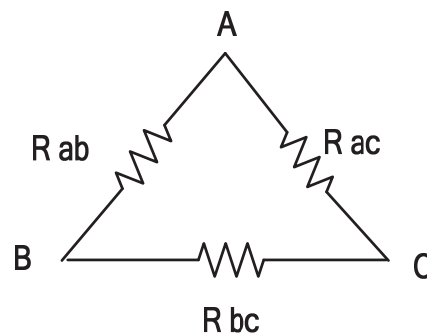


Star delta transformation :

In solving complicated networks , it is necessary to transform from star to delta or from delta to star as shown below .



star connection



delta connection

1. Convert from star to delta :

$$R_{ab} = R_a + R_b + \frac{R_a \times R_b}{R_c}$$

$$R_{ac} = R_a + R_c + \frac{R_a \times R_c}{R_b}$$

$$R_{bc} = R_b + R_c + \frac{R_b \times R_c}{R_a}$$



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2. Convert from delta to star :

$$R_a = \frac{R_{ab} \times R_{ac}}{R_{ab} + R_{ac} + R_{bc}}$$

$$R_b = \frac{R_{ab} \times R_{bc}}{R_{ab} + R_{ac} + R_{bc}}$$

$$R_c = \frac{R_{ac} \times R_{bc}}{R_{ab} + R_{ac} + R_{bc}}$$



Example : For the circuit shown in fig. 1 , find the total resistance

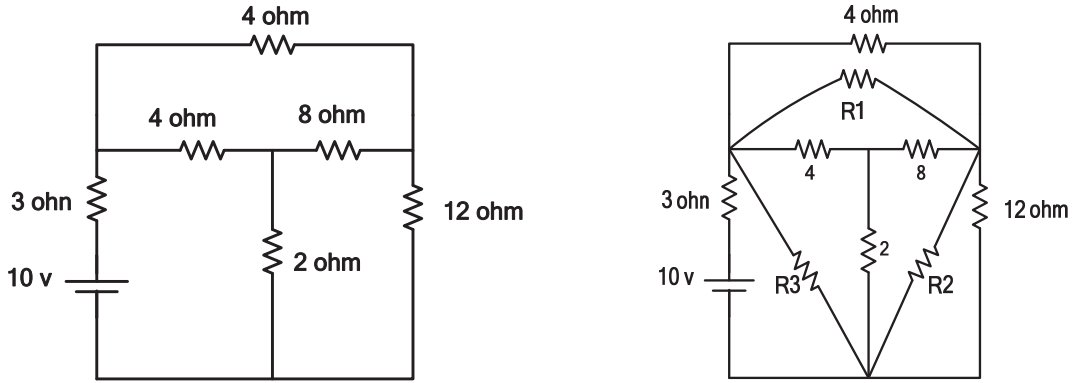


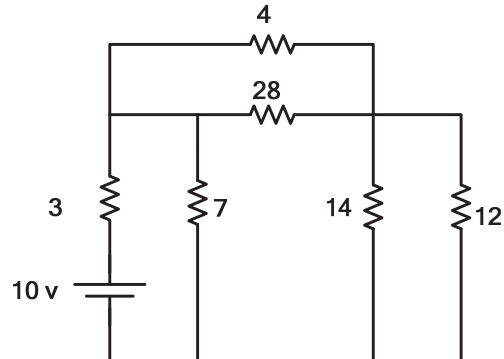
Fig. 1

Convert star to delta

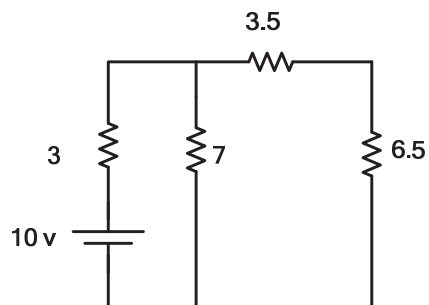
$$R_1 = 4 + 8 + \frac{4 \times 8}{2} = 28 \Omega$$

$$R_2 = 2 + 8 + \frac{2 \times 8}{4} = 14 \Omega$$

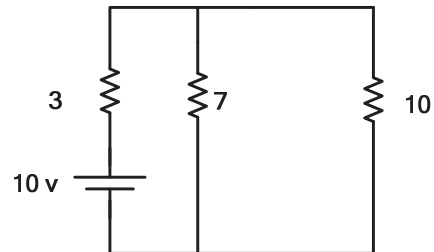
$$R_3 = 2 + 4 + \frac{2 \times 4}{8} = 7 \Omega$$



$$4 \Omega // 28 \Omega , \quad \frac{4 \times 28}{4 + 28} = 3.5 \Omega$$
$$14 \Omega // 12 \Omega , \quad \frac{14 \times 12}{14 + 12} = 6.5 \Omega$$



$$3.5 + 6.5 = 10 \Omega$$



$$7 \Omega // 10 \Omega$$

$$\frac{7 \times 10}{7 + 10} = 4 \Omega$$

$$R_t = 3 + 4 = 7 \Omega$$