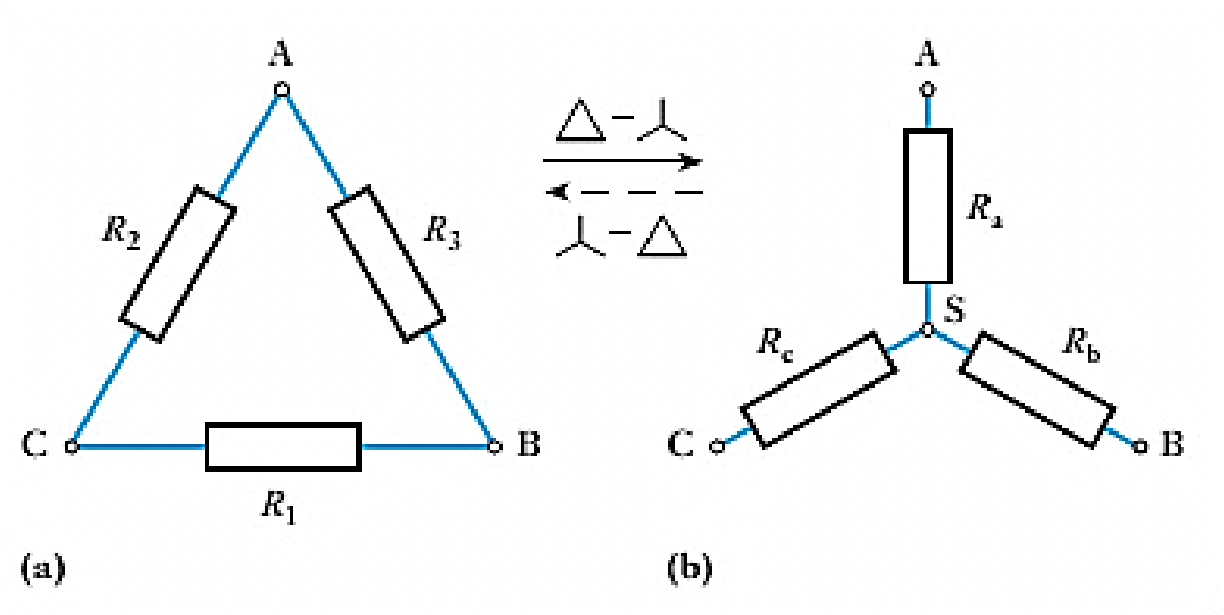


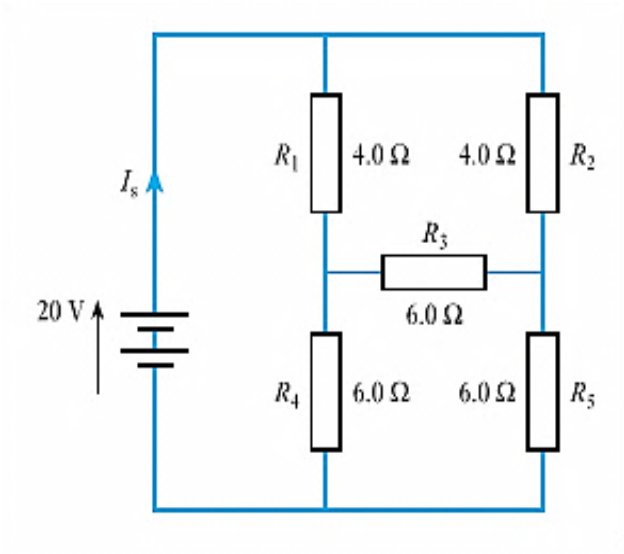
1-Delta–star transformation:

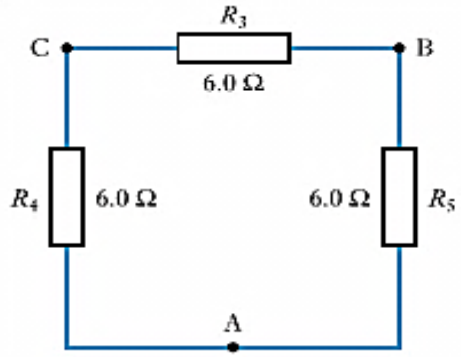
$$R_a = \frac{R_2 R_3}{R_1 + R_2 + R_3} \qquad R_b = \frac{R_3 R_1}{R_1 + R_2 + R_3} \qquad R_c = \frac{R_1 R_2}{R_1 + R_2 + R_3}$$

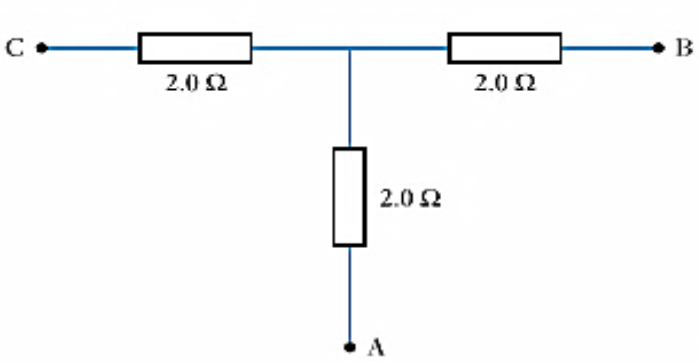
2-Star–delta transformation:

$$R_1 = R_b + R_c + \frac{R_b R_c}{R_a} \qquad R_2 = R_c + R_a + \frac{R_c R_a}{R_b} \qquad R_3 = R_a + R_b + \frac{R_a R_b}{R_c}$$

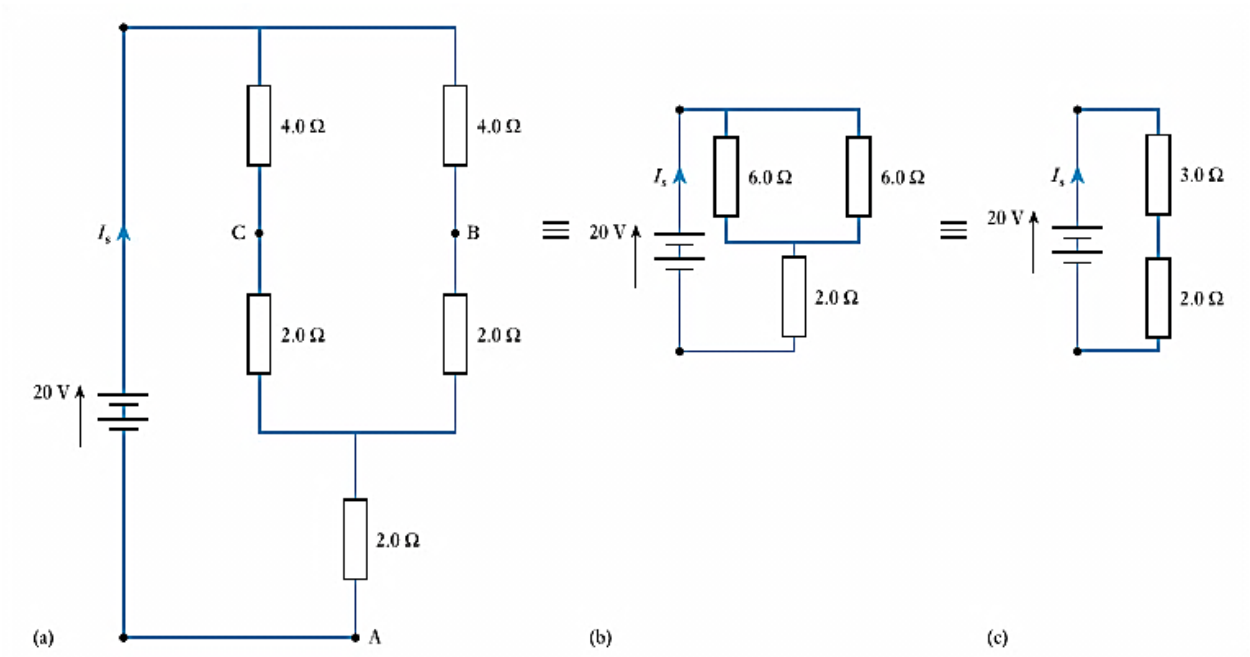
Example1:



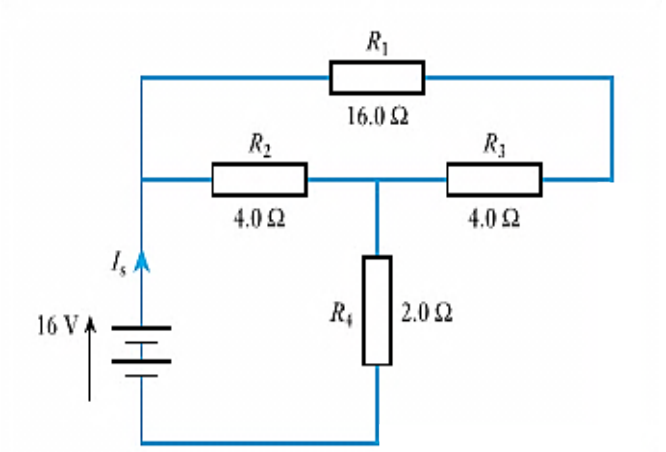


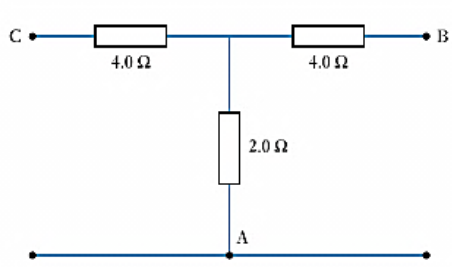


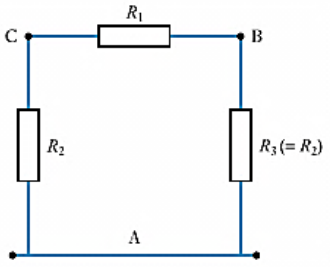
$$\frac{6 * 6}{6 + 6 + 6} = \frac{36}{18} = 2\Omega$$

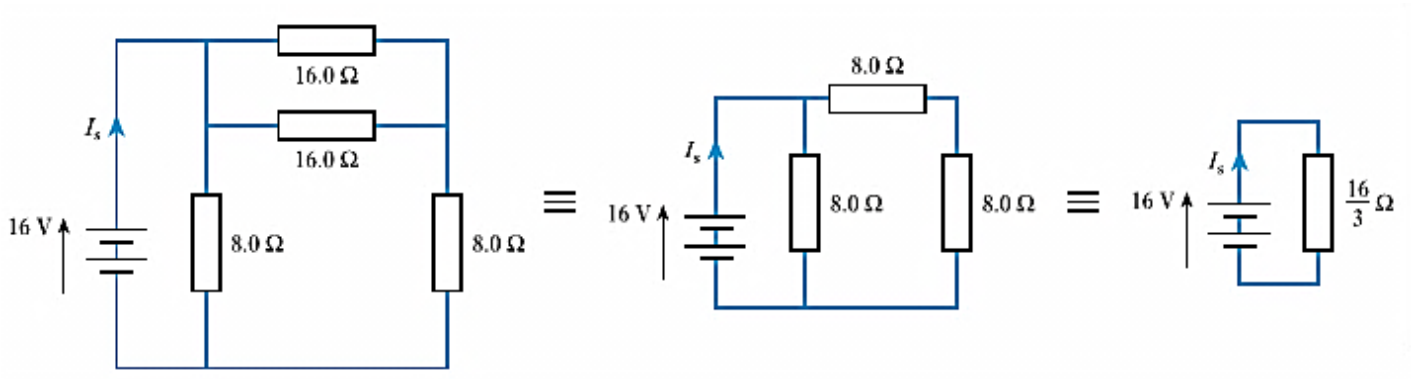

4.0 Ω
4.0 Ω
I_s
C
B
2.0 Ω
2.0 Ω
20 V
2.0 Ω
A
(a)
≡
6.0 Ω
6.0 Ω
2.0 Ω
20 V
(b)
≡
3.0 Ω
2.0 Ω
20 V
(c)

Example 2:


R_1
16.0 Ω
R_2
4.0 Ω
R_3
4.0 Ω
I_s
16 V
R_4
2.0 Ω


C
4.0 Ω
4.0 Ω
B
2.0 Ω
A


R_1
C
B
R_2
$R_3 (= R_2)$
A



Exercises:

(1) A network is arranged as shown in Fig. A. Calculate the value of the current in the 8Ωresistor by (a) the Kirchhoff 's laws, and (b) Nodal analysis?

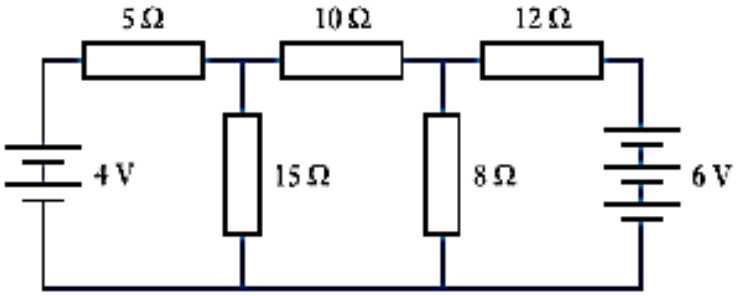


Fig. A

(2) Find the voltage across the 4 Ωresistor in Fig. B. using Nodal analysis?

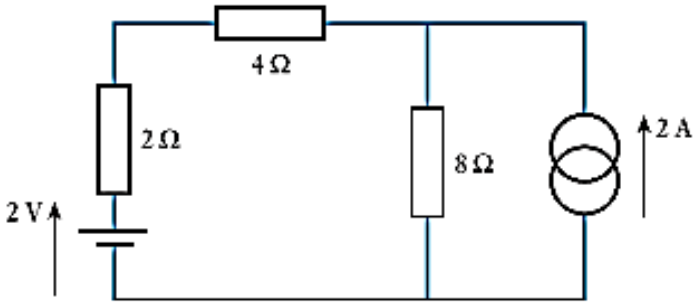


Fig. B

(3) A network is arranged as in Fig. C. Calculate the equivalent resistance between (a) A and B, and (b) A and N.

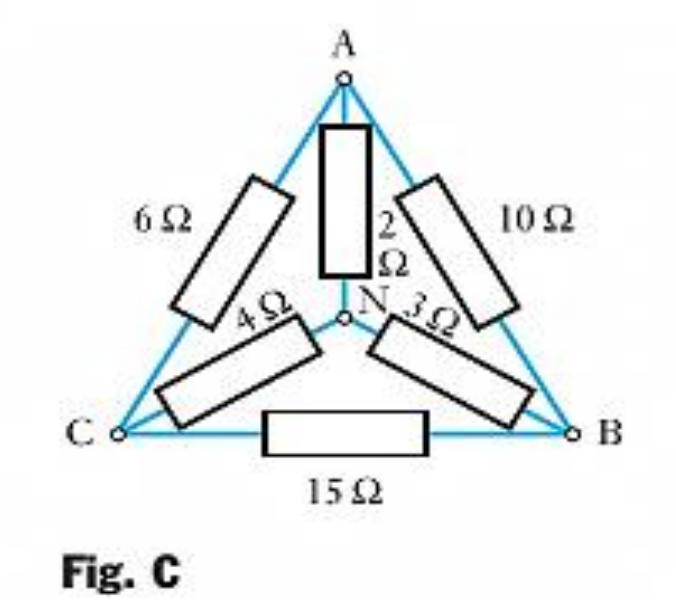


Fig. C

(4) A network is arranged as in Fig. D, Determine the value and direction of the current in branch BE?

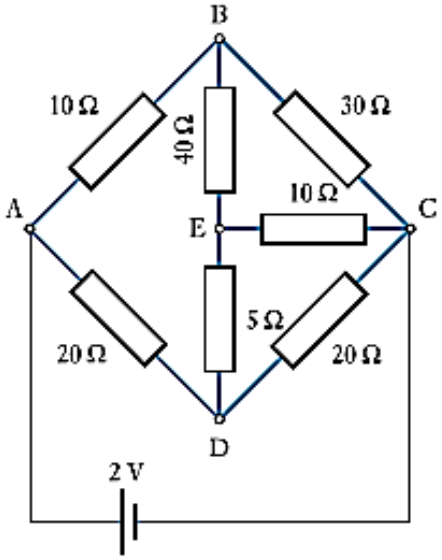


Fig. D

(5) Calculate the value of the current through the 40Ω resistor in Fig. E

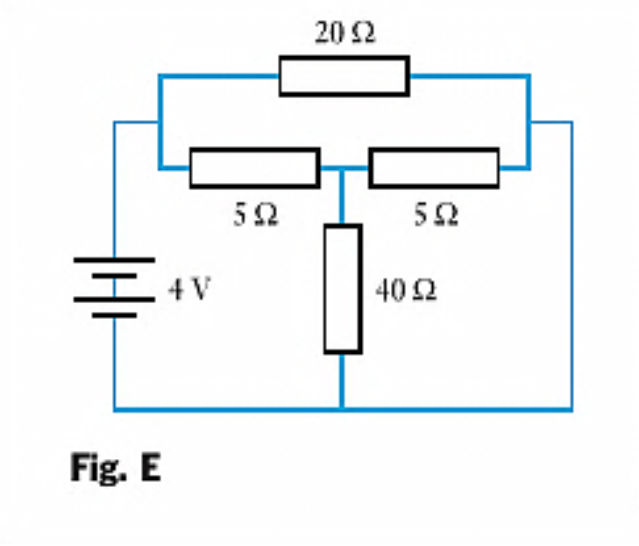


Fig. E

(6) Three resistors having resistances 50Ω, 100Ω and 150Ω are star-connected to terminals A, B and C respectively. Calculate the resistances of equivalent delta-connected resistors?

(7) Three resistors having resistance 20Ω, 80Ω and 30Ω are delta-connected between terminals AB, BC and CA respectively. Calculate the resistances of equivalent star-connected resistors?

(8) Calculate the current in the 10Ω resistor in the network shown in Fig. G?

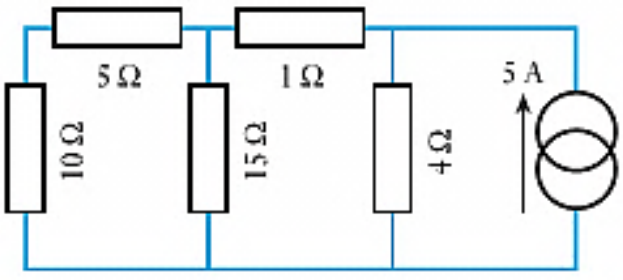


Fig. G