

Electrical Science-1 (15B11EC111)

Tutorial-1

- Using minimum number of 1K resistors only, synthesize a resistor of value $3/5$ K and $5/3$ K.
- Find the effective resistance between terminals A and B for the networks given in Fig. 1.1.
[Ans. (a) $12\ \Omega$; (b) $5\ \Omega$; (c) $10R/3$ (d) $3\ \Omega$ (e) $4\ \Omega$]

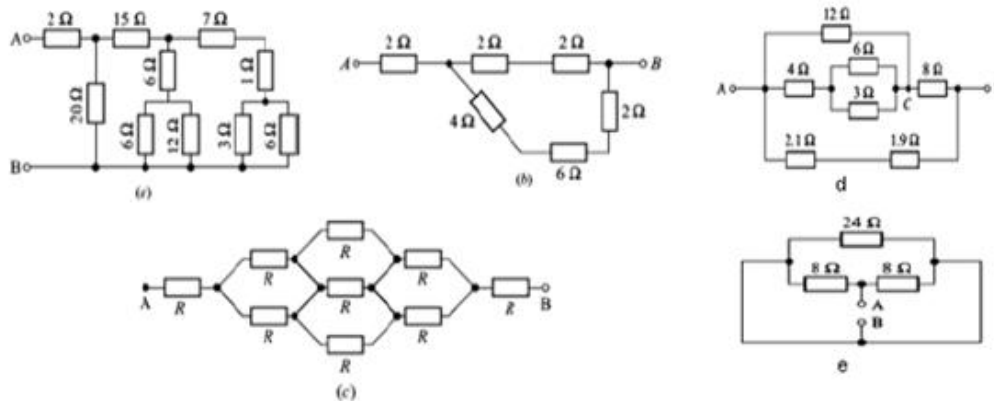


Fig. 1.1

- The resistance of two coils is 25 ohms when connected in series, and 6 ohms when connected in parallel. Determine the individual resistances of the two coils.
[Ans. 15 Ω , 10 Ω]
- Determine the current I_x flowing through the 3- Ω resistor in the circuit of Fig. 1.2. [Ans. $4/3$ A]

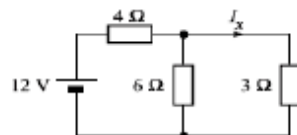


Fig. 1.2

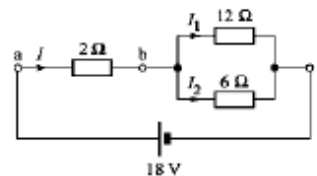


Fig. 1.3

- A resistance of 8 ohms is connected in series with a parallel combination of 12 ohms and 24 ohms. The whole circuit is connected across a 100-V supply. Find (a) the current drawn from the supply, (b) the voltage across 8-ohm resistance, and (c) the currents flowing in 12-ohm and 24-ohm resistances.
[Ans. (a) 6.25 A; (b) 50 V; (c) 4.17, 2.08 A]
- Determine I , I_1 , I_2 , V_{ab} , and V_{bc} in the network of Fig. 1.3. [Ans. 3 A, 1 A, 2A, 6 V, 12 V]

7. Calculate the current drawn from a 12-V supply with internal resistance $0.5\ \Omega$ by the infinite ladder network, each resistance being $1\ \text{ohm}$, in Fig. 1.4. [Ans. 3.71 A]

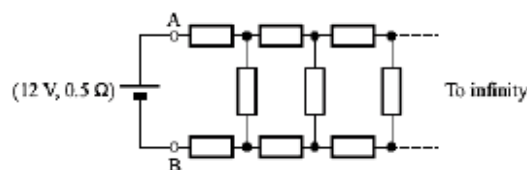


Fig. 1.4

8. For the circuit shown in Fig. 1.5, find (a) the equivalent resistance between points A and B, (b) the current and power supplied by the battery. [Ans. (a) $8\ \Omega$; (b) 6 A, 288 W]
9. Determine the value of resistance R , if the power dissipated in 10-ohm resistance is 360 W in the circuit of Fig. 1.6. [Ans. $36\ \Omega$]

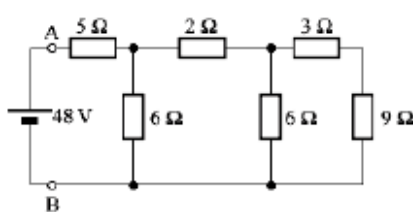


Fig. 1.5

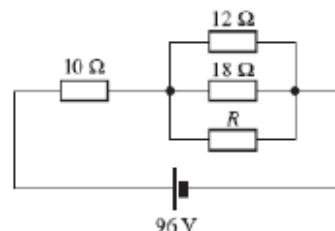


Fig. 1.6

10. When two resistances R_1 and R_2 are connected in parallel, they dissipate four times the power that they dissipate when they are connected in series with the same ideal source of emf. If $R_1 = 3\ \Omega$, find R_2 . [Ans. $3\ \Omega$]
11. If two electric bulbs, each designed to operate with a power of 500 W in 220-V line, are put in series in a 110-V line, what will be the power dissipated by each bulb? [Ans. 31.25 W]
12. The current in the 6-ohm resistor of the network shown in Fig. 1.7 is 2 A. Find the currents in all other resistors and the voltage across the network. [Ans. 3.5 A, 1.5 A, 2.5 A, 1 A, 46 V]

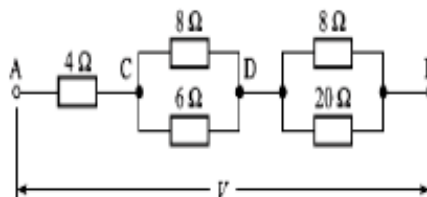


Fig. 1.7