Answers

1 (a) $Q = 150\text{C}, t = 60\text{sec}$ so, $I = \frac{Q}{t} = \frac{150}{60} = 2.5\text{ A}$

2 (a) $V = IR \Rightarrow I = \frac{V}{R} = \frac{1.5\text{ V}}{30\Omega} = 0.05\text{ A}$

3 (a) $Q = I \times t \Rightarrow Q = 10\text{ A} \times (2 \times 60\text{sec}) = 1200\text{C}$

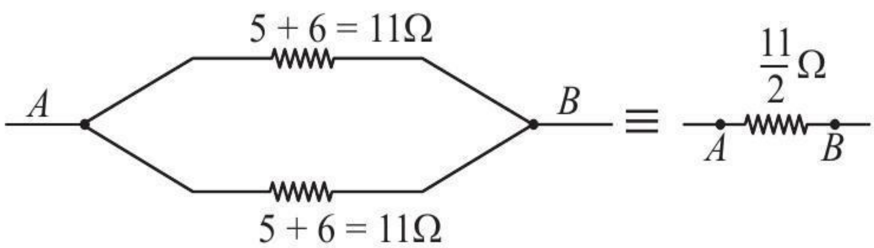
4 (a) Charge on one electron $e = -1.6 \times 10^{-19}\text{C}$ So, number of electrons flown

$$n = \frac{Q}{e} = \frac{10 \times 2 \times 60}{1.6 \times 10^{-19}} = 75 \times 10^{20}$$

5 (a) $R = \rho\frac{l}{A} \Rightarrow \rho = R\frac{A}{l} = 0.000115\Omega\text{m}$

6 (a) 7. (a) 8. (b)

7 (c) $R_{\text{equivalent}} = \frac{(5+6)}{2} = \frac{11}{2}\Omega$



10 (a) To get the maximum resistance, all four resistors should be connected in series,

$$\therefore \text{R} = \frac{1}{2}\Omega + \frac{1}{2}\Omega + \frac{1}{2}\Omega + \frac{1}{2}\Omega = 2\Omega$$

11 (a)

12 (a)

13 (c)

14 (c)

15 (d)

16 (c)

17 (c)

18 (d)

19 (d)

20 (b)

21 (d)

22 (c)

23 (b)

24 (d)

25 (b)

26 (d)

27 (b)

28 (c)

29 (c)

30 (b)

31 (c)

32 (c)

33 (b)

34 (a)

35 (c)

36 (b)

37 (b)

38 (b)

39 (b)

40 (a)

41 (c)

42 (d)

43 (c)

44 (c)

45 (b)

46 (d)

47 (a)

48 (a)

49 (c)

50 (a)

51 (b)

52 (d)

53 (b)

54 (d)

55 (b)

56 (d)

57 (b)

58 (d)

59 (b)

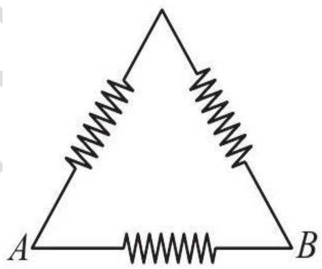
60 (b)

61 (b)

62 (b)

63 (b)

64 (d) $R_{AB} = \frac{(4+4)\times 4}{4+4+4} = \frac{8}{3}\Omega$



65 (a) Same metal means same specific resistance

$$\frac{R_1}{R_2} = \frac{A_2}{A_1} = \frac{1}{3} \Rightarrow R_2 = 3R_1 = 3 \times 10 = 30\Omega$$
$$R = R_1 + R_2 = 40\Omega$$

66 (c) $R \propto \frac{\ell}{A}$. Hence minimum for option (c)

67 (b) $R \propto \frac{1}{A} \propto \frac{1}{r^2}$. Hence $\frac{1}{4}^{\text{th}}$

68 (d) $R = \frac{\rho\ell}{A}; \ell = \frac{RA}{\rho} = \frac{4.2\times\pi\left(\frac{0.4}{2}\times 10^{-3}\right)^2}{4.8\times 10^{-8}} = 1.1$ m

69 (c) Ideal voltmeter should not draw any current flow source hence its resistance = ∞.

Practically infinite resistance is not possible, but ideal voltmeter is possible with the help of potentiometer that you will learn in higher classes.

70 (d) $R = \frac{\rho\ell}{A} = \frac{d\rho\ell^2}{m}; R \propto \frac{\ell^2}{m}$

$$\left[V = A\ell, d = \frac{m}{V} = \frac{m}{A\ell} \Rightarrow A = \frac{m}{d\ell}\right]$$

$$R_1 : R_2 : R_3 \equiv \frac{9}{1} : \frac{4}{2} : \frac{1}{3} \equiv 9 : 2 : \frac{1}{3} = 27 : 6 : 1$$

71 (c) Same material → same density, specific resistance as they are material property.

$$R = \frac{\rho\ell}{A} = \frac{\rho V}{A^2} = \frac{\rho m}{dA^2}$$

$$R \propto \frac{1}{A^2} \propto \frac{1}{r^4}$$

$$\frac{R_A}{R_B} = \frac{r_B^4}{r_A^4} = 2^4 = 16 \Rightarrow R_B = \frac{24}{16} = 1.5\Omega$$

72 (b) $R = \frac{\rho\ell}{A} = \frac{\rho\ell}{\pi r^2}$

$$R' = \frac{\rho 2\ell}{\pi(2r)^2} = \frac{R}{4}$$

Specific resistance will remain same as it is a material property but remember it depends on temperature.

73 (a) Two resistances $(R/2)$ will be in parallel, hence

$$R_{eq} = R/4$$

74 (a) $V = i \times R;\ R = 60/15 = 4\Omega$

75 (d) Copper is a conductor while germanium is a semiconductor. Resistance of temperature decreases with temperature while that of semi-conductor increases hence resistance of copper strip decreases and that of germanium increases.

76 (d) $2\Omega, 4\Omega, 2\Omega$ on right side are in series resultant parallel to 8Ω then in series with $2\Omega, 2\Omega$ then in parallel with 8Ω, then in series with $3\Omega, 2\Omega$. Thus, $R_{eq} = 9$ohm.

$i = 9/9 = 1$ amp flow from battery.

Passing through 3Ω it will divide into equal parts ($1/2$amp) in 8Ω (near to cell) and remaining section then again divide into equal parts (1/4 amp) in 8Ω (middle one) and remaining section hence $1/4$amp. passes through 4Ω.

77 (d)

78 (d)

79 (d)

80 (c)

81 (b)

82 (c)

83 (c)

84 (b)

85 (a)

86 (d) Fuse wire should be such that it melts immediately when strong current flows through the circuit. The same is possible if its melting point is low and resistivity is high.

87 (a) A heating wire should be such that it produces more heat when current is passed through it and also does not melt. It will be so if it has high specific resistance and high melting point.

88 (b) The rate of generation of heat, for a given potential difference is, $P = V^2/R$

89 (b) The rate of heat generation

$$= I^2R = I^2(\rho\ell/\rho r^2).$$

90 (a) Heat produced, $H = V^2t/R$ i.e., $H \propto 1/R$

$$\text{so } H_1/H_2 = R_2/R_1.$$

91 (c) Power = $V \cdot I = I^2R$

$$i_2 = \sqrt{\frac{\text{Power}}{R}} = \sqrt{\frac{2}{8}} = \sqrt{\frac{1}{4}} = \frac{1}{2} \text{ A}$$

Potential over 8Ω = $Ri_2 = 8 \times \frac{1}{2} = 4$ V

This is the potential over parallel branch. So, $i_1 = \frac{4}{4} = 1$ A

Power of 3Ω = $i_1^2R = 1 \times 1 \times 3 = 3$ W

92. (d) In house electrical circuits the fuse wire for safety should be of high resistance and low melting point.

93 (b) The three resistors are connected in parallel

$$\frac{1}{\mathrm{R}_{eq}} = \frac{1}{R} + \frac{1}{R} + \frac{1}{R} \Rightarrow \frac{1}{R_{eq}} = \frac{3}{R} R_{eq} = \frac{R}{3}$$

94 (d) Resistance $(R) = \frac{\rho L}{A}$

Length is stretched to double

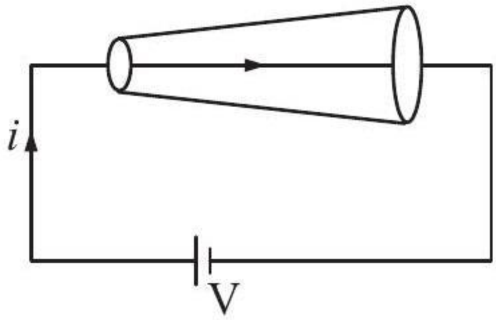
$L' = 2L$

$$\text{Area } A' = \frac{A}{2} \quad \therefore R' = \frac{\rho \times 2L}{\frac{A}{2}}$$

$$R' = 4\frac{\rho L}{A} \Rightarrow R' = 4R$$

$$R = 1\Omega \ \therefore \ \text{New Resistance, } R' = 4\Omega$$

95 (a) Here, metallic conductor can be considered as the combination of various conductors connected in series. And in series combination current remains same.



96 (d) $\because$ 10Ω and 20Ω are in series $= (10+20)\Omega = 30\Omega$ and 10Ω and 5Ω are in series $= (10+5)\Omega = 15\Omega$

$$R_{\text{eff}} = \frac{30 \times 15}{15 + 30} = \frac{450}{45} = 10\Omega$$

So, the total current $I = \frac{V}{R} = \frac{30}{10} = 3$ Ampere

In branch CA current = 1 A

In branch CB current = 2 A

$\therefore V_C - V_A = 10\text{Volt}$

$\& V_C - V_B = 20\text{Volt}$

Subtracting (i) from (ii), $V_A - V_B = 10$ volt.

97 (d) Let the Diameter of wire $= \frac{d}{5}$

Radius will be $= \frac{r}{5}$

Changed Area will be $= \mathrm{A} = \pi \mathrm{r}^2$

$$= \pi\left(\frac{r}{5}\right)^2 = \frac{\pi r^2}{25} \Rightarrow A = \frac{\pi r^2}{25} \Rightarrow 25A = \pi r^2$$

Hence stretched length will be $= 25l$

$$\text{Change resistance } (R) = \frac{\rho \ell}{A} = \frac{\rho(25\ell)}{A/25} = 625R$$

98 (a) Resistance of the heater be R.

New resistance of heater is R/2

$$\text{Initial power } = \frac{V^2}{R} \quad \text{Final power } = \frac{V^2}{R/2} = 2\frac{V^2}{R}$$

$\therefore$ Heat generated is doubled.

99 (d) $R = \frac{\rho\ell}{A}$; New area $= nA \therefore$ New length $= \frac{\ell}{n}$

$$\Rightarrow R' = \frac{\rho\ell}{n^2 A} = \frac{R}{n^2}$$

100 (b) We know that, $R = \frac{\rho\ell}{A}$

or $R = \frac{\rho\ell^2}{\text{Volume}} \Rightarrow R \propto \ell^2$

According to question $\ell_2 = \text{n}\ell_1$

$$\frac{R_2}{R_1} = \frac{n^2 l_1^2}{l_1^2}$$

$$\text{or, } \frac{R_2}{R_1} = n^2$$

$$\Rightarrow R_2 = n^2 R_1$$

101 (b) Resistance of 40 W − 200 V, 50 W − 200 V,
100 W − 200 V are respectively.

$$R_{40} = \frac{V^2}{P_{40}} = \frac{200 \times 200}{40} = 1000\Omega$$

$R_{50} = 800\Omega$ and $\text{R}_{100} = 400\Omega$

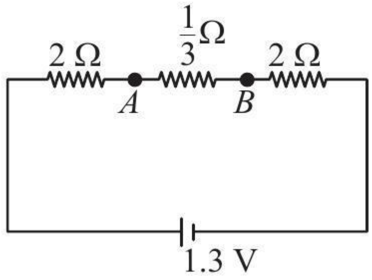
$$I = \frac{600}{1000 + 800 + 400} = \frac{600}{2200} = 0.2727 \text{ A}$$

$$I_{40} = \frac{P_1}{V} = \frac{40}{200} = 0.2 \text{ A}$$

$$I_{50} = \frac{P_2}{V} = \frac{50}{200} = \frac{5}{20} = 0.25 \text{ A}$$

$$I_{100} = \frac{P_3}{V} = \frac{100}{200} = 0.5 \text{ A}$$

Clearly, 0.2 A&0.25 A < 0.27 A hence both 40 W and 50 W bulbs will fuse. 102. (b) After simplifying the given circuit, we get,



$$R_{AB} = \frac{1}{3}\Omega$$

Then equivalent resistance across the battery, $R_{eq} = 2 + \frac{1}{3} + 2 = \frac{13}{3}\Omega$

So current in circuit, $I = \frac{V}{R_{eq}} \Rightarrow \frac{1.3}{13} \times 3\text{amp}$

$$I = \frac{3}{10}\text{amp}$$

Power dissipated across arm AB,

$$P_{AB} = I^2 \times R_{AB} = \left(\frac{3}{10}\right)^2 \times \frac{1}{3}$$
$$P_{AB} = \frac{3}{100} = 0.03 \text{ Watt}$$

Total power dissipated in circuit,

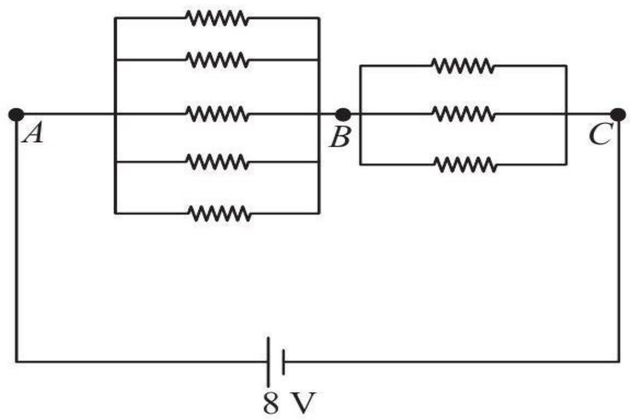
$$P_{ckt} = I^2 \times R_{eq} = \left(\frac{3}{10}\right)^2 \times \frac{13}{3}$$
$$P_{ckt} = \frac{39}{100} = 0.39 \text{ watt}$$

Ratio of power across A and B to total power = Ratio of work done across A and B to total circuit

$\because W = P \times t$

$$\text{So, } \frac{P_{AB}}{P_{ckt}} = \frac{W_{AB}}{W_{ckt}} = \frac{0.03}{0.39} = \frac{1}{13}$$

103 (b) After simplifying the given circuit, we get



Resistance between arm $AB, R_{\text{net } AB} = \frac{1}{5} k\Omega = \frac{1000}{5} \Omega$ Resistance between arm $BC, R_{\text{net } BC} = \frac{1}{3} k\Omega = \frac{1000}{3} \Omega$

$$\text{So, } R_{\text{net}} = R_{\text{net } AB} + R_{\text{net } BC}$$

We get, $R_{\text{net}} = \frac{1000}{5} + \frac{1000}{3}$

$$R_{\text{net}} = \frac{8000}{15} \Omega$$

According to ohm's law, $V = IR$

$$I = \frac{8 \times 15}{8000} = 15 \text{ mA}$$

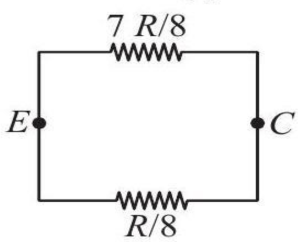
104 (b) Here $R_{DA} = R_{AB} = R_{BC} = R/4$

and $R_{DE} = R_{EC} = R/8$

Now $R_{ED,}, R_{DA,}, R_{AB,}, R_{BC}$ are in series.

$$\therefore R_s = \frac{R}{8} + \frac{R}{4} + \frac{R}{4} + \frac{R}{4} = \frac{R + 2R + 2R + 2R}{8} = \frac{7R}{8}$$

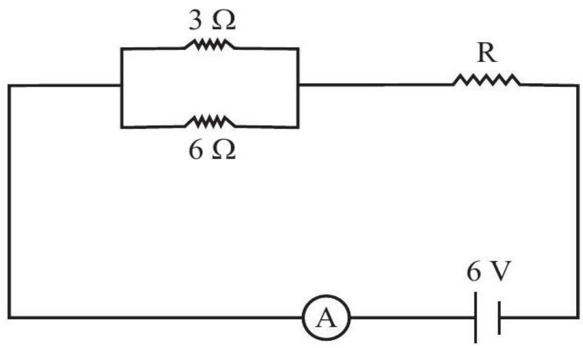
$$\therefore R_{eq} = \frac{\left(\frac{7R}{8}\right)\left(\frac{R}{8}\right)}{R} = \frac{7R}{64}$$



105 (d)

Fuse is a safety device that operates to provide over current protection of an electrical circuit. A fuse is mainly a metal wire that melts when too much current flows through it due to low melting point and protects electric appliances.

106 (a) $I = 2$ A



Two resistances are in parallel,

$$\frac{1}{R_1} = \frac{1}{3} + \frac{1}{6} = \frac{2+1}{6} = \frac{3}{6} = \frac{1}{2}$$

$$\therefore R_1 = 2\Omega$$

$$\mathrm{R_{eq}} = \frac{\text{Voltage}}{\text{Current}}$$

$$\mathrm{R_{eq}} = \frac{6\text{ V}}{2\text{ A}} = 3\Omega$$

where unknown resistance R, from (i) and (ii)

$$\mathrm{R} = 3\Omega - 2\Omega$$
$$\mathrm{R} = 1\Omega$$

107 (c) **Ammeter**: In series connection, the same current flows through all the components. It aims at measuring the current flowing through the circuit and hence, it is connected in series.

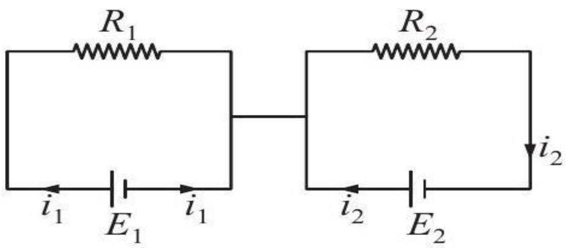
Voltmeter: A voltmeter measures voltage change between two points in a circuit. So we have to place the voltmeter in parallel with the circuit component.

108 (d)

109 (d)

110 (a) In parallel combination, total power $P = P_1 + P_2$

111 (d) Current leaving the cell must be equal to current going into the cell.

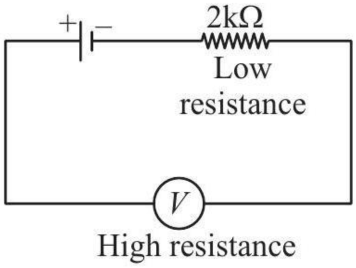


For any value of E or R current going from first loop to second loop must be zero.

Hence, there is no current through the wire 1.

112 (c) The resistance of ammeter is very low and resistance of voltmeter is very high. When ammeter is put in parallel to 8kΩ resistor, nearly whole of current goes through the ammeter.

The equivalent circuit is as follows



Hence, maximum potential drop occurs in the voltmeter.

So, reading of voltmeter is nearly 6 V.

113 (c) Power delivered by the UPS battery is 1kVA i.e., 1000 V.A = 1000 W

When all the laptops connected directly to UPS then total power requirement

$90 \times 10 = 900$w, So battery (UPS) can provide power to all laptops.

If all laptops are used for 5 hours, then cost of electricity consumed as the cost of electricity is ₹5.00 per unit.

$$= \frac{900 \times 5 \times 3600}{3.6 \times 10^6} \times 5 = 22.5$$

114 (c) Resistance, $R = \frac{\rho \ell}{A}$

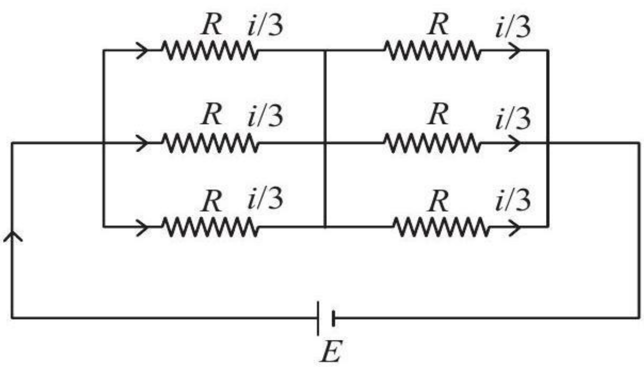
$$R = \rho \frac{\ell}{A} \times \frac{\ell}{\ell} = \frac{\rho \ell^2}{V}$$

[$\because$ Volume (V) = $A\ell$]

Since resistivity and volume remains constant therefore % change in resistance

$$\frac{\Delta R}{R} = \frac{2\Delta \ell}{\ell} = 2 \times (0.5) = 1\%$$

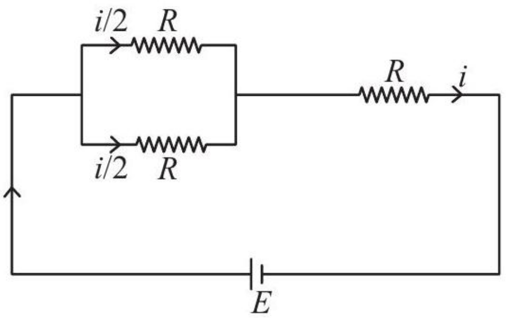
115 (b) When all bulbs are glowing



$$R_{eq}=\frac{R}{3}+\frac{R}{3}=\frac{2R}{3}$$

Power $(P_i)=\frac{E^2}{R_{eq}}=\frac{3E^2}{2R}$

When two from section A and one from section B are glowing, then



$$R_{eq}=\frac{R}{2}+R=\frac{3R}{2}$$

Power $(P_f)=\frac{2E^2}{3R}$

Dividing equation (i) by (ii) we get

$$\frac{P_i}{P_f}=\frac{3E^2 3R}{2R2E^2}=9:4$$

116 (a) When the lamps are connected in parallel, then potential difference V across each lamp will be same and will be equal to potential necessary for full brightness of each bulb. Because illumination produced by a lamp is proportional to electric power consumed in it, and power consumed,

$$P_1=\frac{V^2}{R_1}<\frac{V^2}{R_2}=P_2$$

Hence, illumination produced by 2 nd bulb will be higher than produced by lst bulb, i.e., bulb having lower resistance will shine more brightly.

117 (b) When R_1 burns out, then power is dissipated in R_2 only. Because internal resistance is quite low in lighting circuit, potential difference is still equal to V, hence, power dissipated in 2 nd lamp, i.e.,

$$\frac{V^2}{R_2}<\left(\frac{V^2}{R_1}+\frac{V^2}{R_2}\right)$$

i.e., net power consumed initially. In other words, net illumination will now decrease.

118 (b) When two lamps are connected in series, the potential difference across each lamp will be different but current I flowing through each lamp will be same.

Hence, $P_1=I^2R_1>I^2R_2=P_2$

i.e., illumination produced by lst lamp will be higher as compared to that produced by 2 nd lamp, i.e., lamp having higher resistance will glow more brightly.

119 (b) When lamp of resistance R_2 burns out and only lamp of resistance R_1 is connected in the circuit then current flowing the circuit will change. Let new current be I'. Because potential difference still remains same (due to low internal resistance), hence

$I'R_1 = I(R_1 + R_2)$

or $I' = \frac{I(R_1+R_2)}{R_1}$

If P' is the power consumed, then

$$P' = I'2R_1 = I^2 \frac{(R_1 + R_2)(R_1 + R_2)}{R_1}$$

When both the lamps were present then total power consumed was given by:

$P_S = P_1 + P_2 = I^2(R_1 + R_2)$, i.e., $P' > P_S$

i.e., illumination gets increased when only one bulb is used.

120. (a) If a water pipe is given bend at some points, then it definitely reduces the flow of water in the pipe but this is not true in case of an electric current flowing in a conductor because electric current is established in a conductor due to drift motion of electrons in it along the line of the potential gradient. Hence, illumination is not affected due to bending along the length of supply wires.

121 (b) $P = VI = V^2/R = I^2R$

122 (d) $P = \frac{V^2}{R} \Rightarrow R = \frac{V^2}{P} = \frac{220\times220}{100} = 484\Omega$

$$P = \frac{V^2}{R} = \frac{110 \times 110}{484} = 25 \text{ W}$$

123 (c) $R_S = R_1 + R_2 = R + R = 2R$

$$\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{R} + \frac{1}{R} = \frac{2}{R}$$

$$R_P = R/2$$

$$\frac{H_1}{H_2} = \frac{V^2R_P}{R_SV^2} = \frac{R_P}{R_S} = \frac{R}{2 \times 2R} = \frac{1}{4} = 1:4.$$

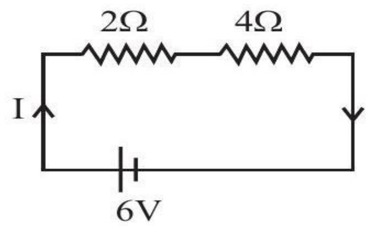
124 (c) The bulb with the highest wattage glows with maximum brightness. Brightness of bulb B(100 W) is maximum.

Correct order of brightness will be,

Bulb of 100 W > Bulb of 60 W > Bulb of 40 W.

125 (c) Given, resistors, $R_1 = 2\Omega$ and $R_2 = 4\Omega$

Voltgage, $V = 6$ V



Equivalent Resistance,

$$= R_1 + R_2 = 2 + 4 = 6\Omega \text{ [Series combination]}$$

Current, $I = \frac{V}{R} = \frac{6}{6} = 1$ A.

Heat dissipated in 4Ω Resistor

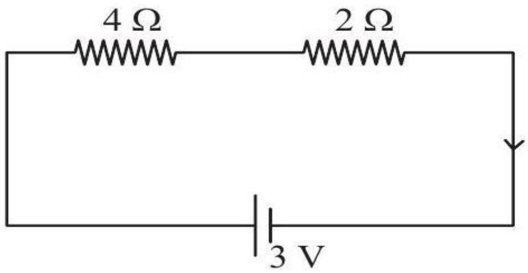
$$= I^2Rt = 1 \times 4 \times 5 = 20 \text{ J}$$

[$I = 1$ A, $R = 4\Omega, t = 5$sec.

126 (b) Equivalent resistance of 3Ω and 6Ω $= \frac{3\times6}{3+6} = 2\Omega$ as they are in parallel they have same p.d.

$$i = \frac{3}{6} = \frac{1}{2}$$

$$\text{P.D. across } 3\Omega = \frac{1}{2} \times 3 = 1.5 \text{ volt}$$



127 (b)

128 (a)

129 (d) Given: $R_1 = 12\Omega, R_2 = 3.0\Omega, R_3 = 5.0\Omega, R_4 = 4.0\Omega$, All four resistors are in series combination, so $R_s = R_1 + R_2 + R_3 + R_4 = 12\Omega + 3.0\Omega + 5.0\Omega + 4.0\Omega = 24\Omega$

130 (c) The current through all resistors in series is the same

$$I = \frac{V}{R} = \frac{V}{R_S} = \frac{12 \text{ V}}{24\Omega} = 0.50 \text{ A}$$

131 (b) Potential drop across, 12Ω resistor

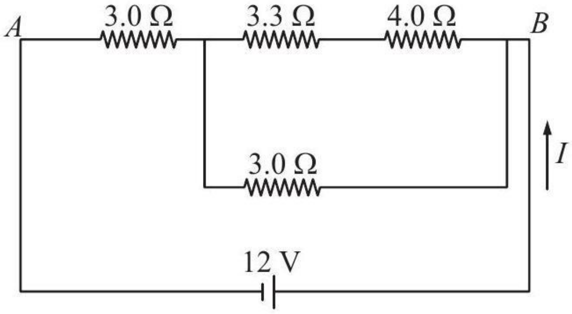
$V = IR = 12\Omega(0.5 \text{ A})$

or $V = 6$ V

132 (b) Here we have a variety of series-parallel combinations.

We follow the general procedures outlined in the text. The 10Ω and the 5.0Ω are in parallel

$$R_{p_1} = \frac{(10\Omega)\,(5.0\Omega)}{10\Omega + 5.0\Omega} = 3.33\,\Omega$$

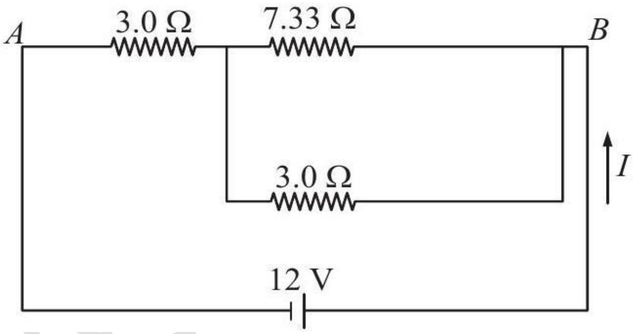


(i) The circuit reduces to figure (a)

Now the 3.33Ω and the 4.0Ω are in series.

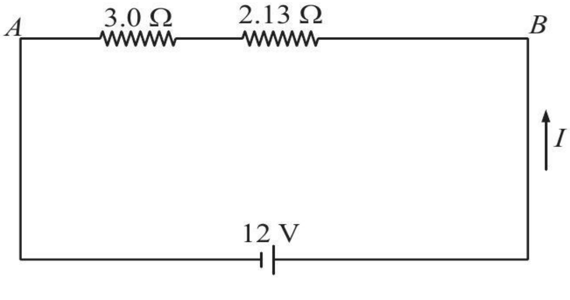
$$R_{S_1} = 3.33\Omega + 4.0\Omega = 7.33\Omega$$

The circuit reduces to figure (ii)



(ii) The 7.33Ω and the 3.0Ω are in parallel.

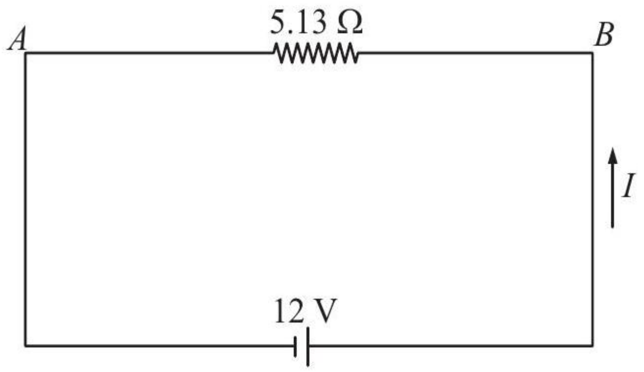
$$R_{p_2} = \frac{(7.33\Omega)\,(3.0\Omega)}{7.33\Omega + 3.0\Omega} = 2.13\Omega$$



(iii) The circuit reduces to figure (iii).

Finally, the 2.13Ω and the 3.0Ω are in series.

$$R = R_{S_2} = 2.13\Omega + 3.0\Omega = 5.13\Omega = 5.1\Omega$$



(iv) The circuit reduces to figure (iv).

133 (a) From Ohm's law, $I = \frac{V}{R} = \frac{12\ \text{V}}{5.13\Omega} = 2.33\ \text{A} = 2.3\ \text{A}$

134 (d) To find the current through the 4.0ohm resistor, we need to expand the combinations.

In figure (iii), the current through the 2.13Ω and 3.0 Ω is the same as the total current, 2.33 A.

The voltage across the 2.13Ω is then $V_{2.13} = (2.13\ \Omega)(2.33\ \text{A}) = 4.96\ \text{V}$.

In figure (ii), the voltage across the 7.33Ω and 3.0 Ω is the same as that across the 2.13Ω, 4.96 V.

So, the current through the 7.33Ω is

$$I_{7.33} = \frac{4.96\ \text{V}}{7.33\Omega} = 0.677\ \text{A}$$

In figure (i), the current through the 3.33Ω and the 4.0Ω is the same as the current through the 7.33Ω Therefore, $I_{4.0} = 0.68$ A.

135 (a) E.m.f. of the battery = 2 V

Effective resistance of the parallel resistors is given by R_1.

$$\frac{1}{R_1} = \frac{1}{6} + \frac{1}{2} = \frac{1+3}{6} = \frac{4}{6} = \frac{2}{3} \Rightarrow R_1 = \frac{3}{2} = 1.5\Omega$$

Total resistance of the circuit, $R = 1.5 + 0.5 = 2\Omega$

136. (a) Main current $I = \frac{V}{R} = \frac{2}{2} = 1$ A

Current flowing through 0.5Ω resistor = $1A$

137 (d) P.D. across the junctions:

$V_1 = IR_1 = 1 \times 1.5 = 1.5$ V

Hence current I_1, flowing through 6Ω resistor

$$I_1 = \frac{V_1}{6} = \frac{1.5}{6} = 0.25 \text{ A}$$

138 (c)

139 (c) Alloys are used in electrical heating device because they have high resistivity or resistance as compared to pure metals and high melting point.

140 (c) It is clear that in a battery circuit, the point of lowest potential is the negative terminal of battery and current flows from higher potential to lower potential.

141 (c) It is common error to say that $\mathrm{V} = \mathrm{Ri}$ is a statement of Ohm's law. The essence of Ohm's law is that the value of R is independent of the value of V. The equation $V = Ri$ is used for finding resistance of all conducting devices, whether they obey Ohm's law or not.

142 (d) (A) will read zero but (V) will read E

143 (d) ρ is the characteristic of the material of resistors. It does not depend on the length and cross-sectional area of resistors. But R depends on the length and the cross-sectional are of the resistor.

So, R_1 may be greater than R_2 even when $\rho_1 \leq \rho_2$.

144 (a)

145 (d)

146 (c) Resistivity is a material property.

147 (c) $\rho = \rho_0(1 + \alpha\Delta T)$

148 (b) Glow = Power $(P) = I^2 R$

$$\therefore \frac{dP}{P} = 2\left(\frac{dI}{I}\right) = 2 \times 0.5 = 1\%$$

149 (a) Power loss $= i^2 R = \left(\frac{P}{V}\right)^2 R$

[P = Transmitted power]

150 (b) $P = \frac{V^2}{R}$; $R \propto \frac{1}{P}$ (same rated voltage)

151 (c) Here, $P = \frac{E^2}{R}$, so $P \propto R$ only when I is constant.

Here I increases as R is decreased. Hence the reason is wrong.