

## Chapter 11

## Electricity Ncert Exemplar Answers

## Multiple Choice Question Answers

1. (d)

2. (a)

3. (d)

4. (a)

5. (b)

6. (d)

7. (b)

8. (a)

9. (a)

10. (c)

11. (c)

12. (c)

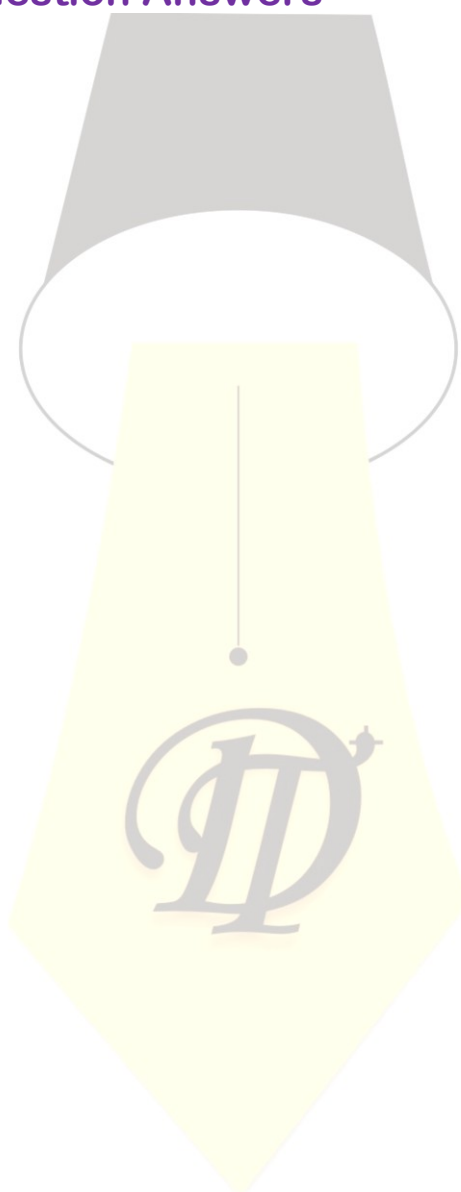
13. (c)

14. (c)

15. (c)

16. (d)

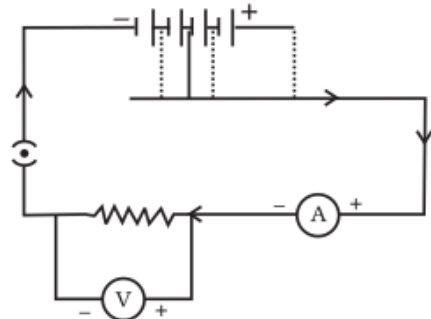
17. (b)



18. (a)

### Short Answer Question Answers

19. The error is ammeter should be in series and voltmeter should be in parallel to the circuit. corrected diagram with correct connections is:

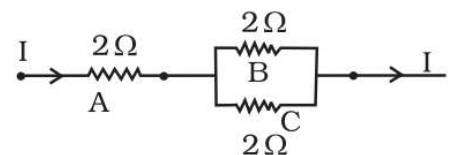


20. Maximum power of resistance A, B and C each is  $P = 18\text{W}$  (given)

Since Power through a resistor  $P = I^2R$

So Maximum current through A will be  $I^2 = \frac{P}{R} = \frac{18}{2} = 9$

so  $I = \sqrt{9} = 3\text{A}$  (first answer)



As same maximum current  $I (= 3\text{A})$  flows through B and C

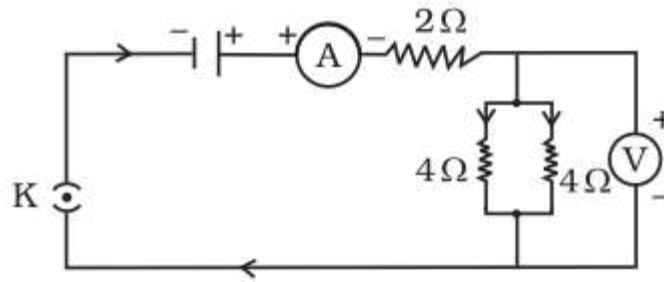
As resistor B and C are in parallel so  $I = I_1 + I_2$

Also  $R_B = R_C = 2\Omega$  so  $I_1 = I_2$  now  $I = 2I_1$  therefore  $I_1 = \frac{I}{2} = \frac{3}{2} = 1.5\text{A}$

Thus the maximum current through resistors B and C each =  $1.5\text{A}$  (second answer)

21. The resistance of an idle ammeter should be zero ohm, but practically it is not possible so it should be as close to zero as possible. As ammeter is connected in series to the electric circuit, the high value of its resistance will affect the true current of the circuit.

22.



Yes, total resistance of the parallel combination (of 4 ohm, 4 ohm) is also 2 ohm.

**Reason:** In series potential difference varies but in parallel potential difference remains same. But if identical resistors are connected in series the potential difference becomes same.

23. Fuse is a circuit protecting instrument made up of a conductor with lesser melting point. If a current larger than a specified value flows in a circuit, temperature of fuse wire increases to its melting point. The fuse wire melts and the circuit breaks.

24. Referred to the definition of electrical resistivity.

As the formula of resistance  $R = \rho \frac{l}{A}$ . and,  $V = I R$ .

As length becomes double so  $R$  is doubled while  $V$  remains unchanged. Hence current becomes  $\frac{1}{2}$ .

25. Kilowatt hour(Kwh)

$$1 \text{ kW h} = 1000 \text{ W} \times 60 \times 60 \text{ s} = 3.6 \times 10^6 \text{ J}$$

26. (i)  $I = 1\text{A}$ ,  $V = 10\text{V}$

Resistance of conductor  $R_1 = 5 \Omega$

Let resistance of lamp =  $R_2 = ?$

for series combination  $R = R_1 + R_2 = 5 + R$

Applying Ohm's law

$$V = IR \quad \text{so } R = \frac{V}{I} \quad \text{that is } R_1 + R_2 = \frac{V}{I}$$

$$\text{or } 5 + R_2 = 10 \quad \text{so } R_2 = 5 \Omega$$

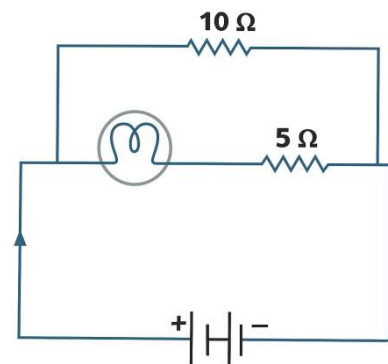
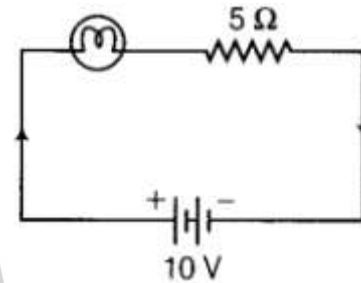
(ii) As  $10 \Omega$  resistance is connected in parallel

So total resistance of the circuit

$$\frac{1}{R_T} = \frac{1}{R} + \frac{1}{10} = \frac{1}{10} + \frac{1}{10} = \frac{2}{10}$$

$$R_T = 5 \Omega$$

$$\text{so } I = \frac{V}{R_T} = \frac{10}{5} = 2\text{A}$$



As both the arms have same resistance ( $10 \Omega$  each). So the currents will be  $1\text{A}$  through each wire. There will be no change in current flowing through  $5 \Omega$  conductor. Also there will be no change in potential difference across the lamp either as in parallel circuit potential difference remains same.

27. The parallel electric circuit provides the same potential difference across each electrical appliance.

28. (i) As the bulb  $B_1$  is connected in parallel with the bulbs  $B_2$  and  $B_3$ . So the potential difference is equal in the three bulbs. The glow of the bulbs will remain the same even after  $B_1$  gets fused.

(ii) Total current in the circuit is 3A (recorded by A), all the three bulbs are identical and connected in parallel so each bulb will draw 1A current. The moment when bulb  $B_2$  gets fused, no current will pass through it so  $A_2$  shows zero reading. However  $A_1$  and  $A_3$  will continue showing 1 ampere,

Hence  $A_1$  shows 1 ampere,  $A_2$  shows 0 ampere,  $A_3$  shows 1 ampere

Now A will show 2A

(iii) Power dissipated when all the three bulbs will glow together is P

$$V = 4.5 \text{ V (given), } I = 3 \text{ A (given)}$$

$$P = V \times I = 4.5 \times 3 = 13.5 \text{ W}$$

### Long Answer Question Answers:

29. (a) No. The resistance of the bulbs in series will be three times the resistance of single bulb. Therefore, the current in the series combination will be one-third

compared to current in each bulb in parallel combination. The parallel combination bulbs will glow more brightly.

(b) The bulbs in series combination will stop glowing as the circuit is broken and current is zero. However the bulbs in parallel combination shall continue to glow with the same brightness.

30. Ohm's law has to be defined. By explaining (activity 11.1 in new books and 12.1 in old books) mentioned in ncert in Ohms' law topic is to be explained here by giving details of experiment using a labelled circuit diagram. The relation between V and I and VI graph is to be drawn too. Ohm's law does not hold under all conditions. like for non ohmic conductors.

31. Resistivity  $\rho = R \frac{A}{L}$  is numerically equal to the resistance of a wire of unit length having an unit area of cross-section. Its unit is ohm metre ( $\Omega \text{ m}$ ).

Factors effecting resistance:

(i)  $R \propto L$  Resistivity depends directly on length of the wire

(ii).  $R \propto \frac{1}{A}$  Resistivity depends inversely on area of cross section.

(iii) Resistance depends upon nature of material ( $\rho$ ), for every material there is unique value of resistivity.(silver metal has least resistivity and nichrome has highest)

(iii) ( $R \propto T$  for Conductors) Resistance depends directly upon temperature of conducting wire and

( $R \propto \frac{1}{T}$  for insulators and semiconductors) Resistance depends inversely upon temperature of conducting wire.

32. Describe the experiment using a circuit diagram. Give details showing that same current flows through each component in a series circuit.

33. Describe the experiment using a circuit diagram. Give details showing that same potential difference exists across each resistance in a parallel circuit.

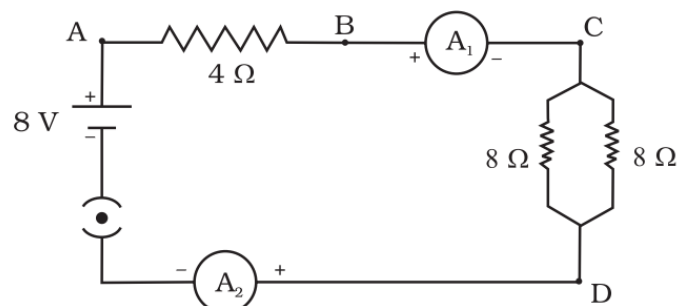
34. Joule's heating effect,  $H = I^2 R t$ . Describe the experiment using a circuit diagram. Applications: electric heater, geyser, laundry iron, electric oven, bulb, toaster, kettle etc.

35. (a)  $4 \Omega$ .

$$R_1 = 8 \Omega, R_2 = 8 \Omega$$

$$R_{CD} = R_1 R_2 / (R_1 + R_2) = \frac{8 \times 8}{8+8} = 4 \Omega$$

(b) 1 A.



$$R_T = R_{AB} + R_{CD} = 4 + 4 = 8 \Omega$$

$$I = \frac{V}{R_T} = \frac{8}{8} = 1A$$

(c) 4 V.

$$V = I R_{AB} = 1 \times 4 = 4V$$

(d) 4 W.

$$P = I^2 R_{AB} = 1^2 \times 4 = 4W$$

(e) No difference.

*As same current flows through each element in a series circuit.*

