PHYSICS (CBSE XII) ELECTRIC CURRENT (OHM'S LAW & RESISTANCE)-I DPP-5

Level: A

1. A heating element using nichrome connected to a 230V supply draws an initial current of 3.2A, which settles after a few second to a steady value 2.8A. What is the steady temperature of the heating element if the room temperature is 27.0 ^{0}C? Given $\alpha = 1.7 \times 10^{-4}$ $^0C^{-1}$. [867.2^{0}C]
2. Fig.LA-2 represents a part of closed circuit. What is potential difference b/n points A&B? [9V]
3. In the circuit shown in Fig.LA-3 find the potential difference across the capacitor. [12V]
4. Find the effective resistance between points (i) A&B. and (ii) C&D in Fig.LA-4 [27.5Ω, 30Ω]
5. Find the effective resistance between points A&B of a hexagonal circuit. Fig.LA-5 [0.5r]
6. Calculate the current shown by the ammeter A in the circuit. Fig.LA-6 [3.6A]
7. Determine the current drawn from 6V supply with no internal resistance by the infinite network, which is constructed with resistors of 1Ω and 2Ω. (Fig.LA-7) [1.5A]
8. In circuit (Fig.LA-8), find the potential difference b/n points A&B. Assume that both the batteries have zero internal resistance. [11V]
9. What is drift velocity of electron and relaxation time of free electron in a metallic conductor carrying a current? Establish a relation b/n them.
10. Describe the phenomenon of current flow in a conductor and derive the relation b/n current and drift velocity.
11. Define resistance of a conductor. What is its cause? Explain the factors on which the resistance of a conductor depends?
12. Discuss the effect of temperature on the resistance of (i) metals (ii) semi-conductors (iii) insulators. Also draw the graphs showing variation of resistance with temperature.
13. What happens to the drift velocity of electrons and the resistance if the length of a conductor is doubled keeping potential difference unchanged? [Drift velocity is halved but resistance is doubled]
14. A steady current flows in a metallic conductor of non-uniform cross-section. Explain which of these quantities is constant along the conductor: current, current density, electric field and drift velocity?
15. Manganin or Eureka used for making standard resistance coils. Why?
16. Does the value temperature coefficient of resistance always positive? Of metal and alloys, which has greater value of temperature coefficient of resistance?
17. A steady current is flowing in a cylindrical conductor. Is there any electric field within the conductor?
18. What is terminal potential difference of cell? Can its value be grater than the e.m.f. Of cell? Explain.
19. What is super conductivity? Writes its two applications. What are thermistors? Explains its use in brief.
20. A wire is drawn into double its length and half its original cross section. What will be increase in (i) resistance (ii) resistivity?
21. A voltage of 200V is applied across a colour coded carbon resistor with first, second and third ring of blue, black and yellow colours. What is the current following through the resistor? [3.33×10^{-4} A]

22. A wire is stretched 50%, calculate percentage change in its resistance. [125%]
23. Find the effective resistance between points A&B. in (Fig.LA-23(a,b&c). [7.5Ω,3R,R]
24. Find the magnitude of the current supplied by the battery in the circuit. Also find the potential difference between the points A&B.Fig.LA-24 [8A, 12V]
25. A battery of emf. E and internal resistance r gives a current of 0.4A with an external resistor of 12Ω , and a current of 0.25A with an external resistor of 20Ω. Calculate internal resistance and emf of the battery. [4/3Ω, 16/3V]
26. You are given several identical resistances each of value 10Ω and each capable of carrying a maximum current of one ampere. It is required to make a suitable combination of these resistances of 5Ω, which can carry, current of 4A. Find the minimum number of resistances that will be required for the job. [8]
27. Find the equivalent resistance of the network shown in fig.LA-27, b/n points A&B. When (i) key K is open (ii) key K is closed. [9 Ω, 8Ω]
28. Find the equivalent resistance of the network shown in fig.LA-28, b/n points A&B. [2Ω]

Level: B

1. Three cells of emf 2.0V, 1.8V and 1.5V are connected in series. Their initial resistances are 0.05 Ω, 0.7 Ω and 1 Ω respectively. If this battery is connected to an external resistance of 4 Ω, calculate (i) the total current flowing in the circuit. (ii) The potential difference across the terminals of the cell of emf 1.5V while in use. Ans:[0.9A, 0.6V]
2. A uniform wire of resistance 12 Ω is cut in to three pieces in the ratio 1:2:3 and three pieces are connected to form a triangle. A cell of e.m.f. 8V and internal resistance 1 Ω is connected across the highest of three resistors. Calculate the current through each part of the circuit. Ans: [1,1, 2A]
3. Two identical cells, whether joined together is series or in parallel give the same current, when connected to external resistance of 1 Ω. Find the internal resistance of each cell. Ans: [1 Ω]
4. 8 cell each of internal resistance 0.5 Ω and e.m.f 1.5V are used to send a current through an external resistance of (a) 200 Ω (b) 0.002 Ω (c) 1.0 Ω. How would you arrange them to get the maxim current in each case. Find the value of current in each case. Ans: [0.59A,23.26A,3A]
5. Determine the potential difference between the point C and D in (Fig.LB-5). Ans:[3.6V] 6. Two resistance R_1 and R_2 are joined as shown in (Fig.LB-6) to two batteries of e.m.f E_1 and E_2 . If E_2 is short circuited , what is current through R_1? Ans:[E_1/ R_1]
7. A non conducting ring of radius r has charge q distributed unevenly over it. what will be the equivalent current if it rotates with angular velocity ω? Ans: [q ω/2π]
8. A and B are two points on a uniform ring of resistance R. The $\angle ACB = \theta$, where C is center of the ring. What is the equivalent resistance between A and B?
9. A current flowing through a copper wire is passed through another copper wire of the same length but of doubled the radios of the first one. How would the drift velocity of free electron changed?

10. Find the resistance of a hollow cylindrical pipe of length 1.0 m whose inner and outer radii are 10 cm and 20 cm respectively. The resistivity of the material is 2×10^{-8} Ωm.

Ans: $[2.1 \times 10^{-7}\Omega]$

11. A uniform wire of length l and radius r has resistance 1000 Ω. It is recast in to a thin wire of (i) length $2l$ (ii) radius $r/2$. Calculate the resistance of new wire in each case.

Ans:[(i) 400 Ω(ii) 1600 Ω]

12. A wire is stretched to increases its length by 5%. Calculate percentage change in its resistance.

Ans: [10.25%]

Figures of Questions

Fig.L-A-(2)

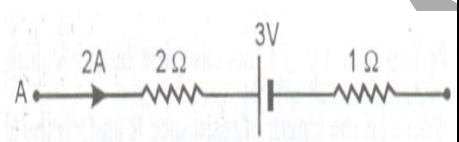

Fig: L-A-(3)

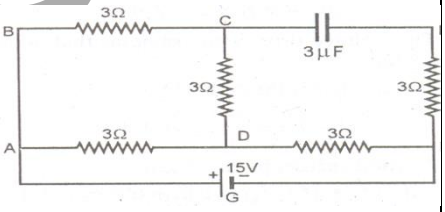

Fig. L-A- (4)

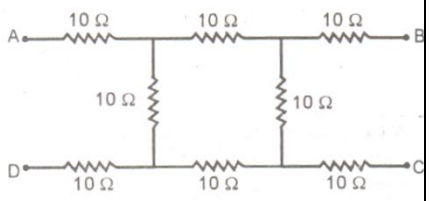

Fig. L-A- (5)

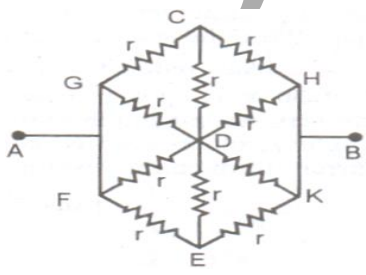

Fig.L-A-(6)

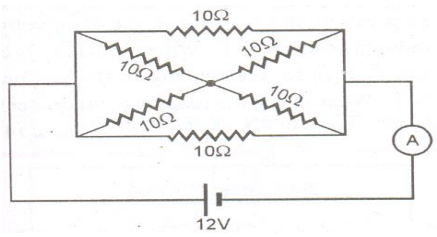

Fig. L-A- (7)

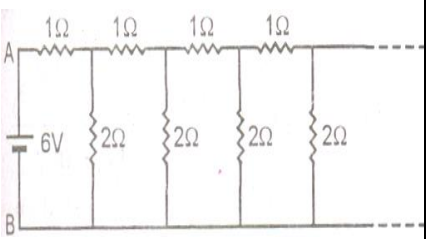

Fig. L-A- (8)

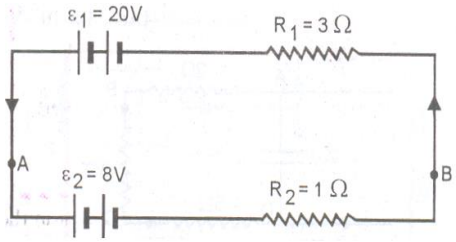

Fig. L-A- (23a)

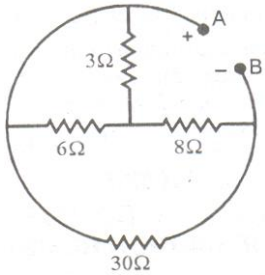

Fig. L-A- (23b)

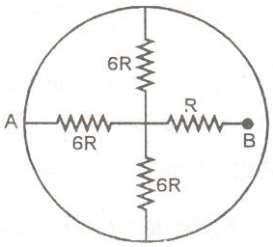

Fig. L-A- (23C)

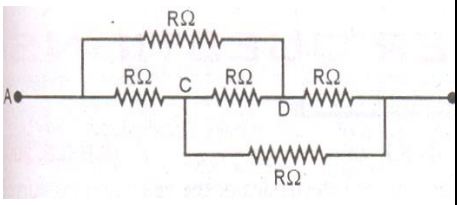

Fig. L-A- (24)

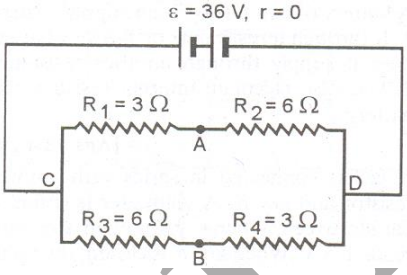

Fig. L-A- (27)

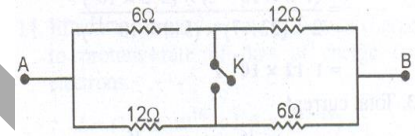

Fig. L-A- (28)

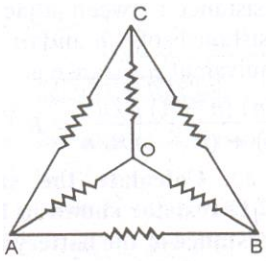

Fig. L-B- (5)

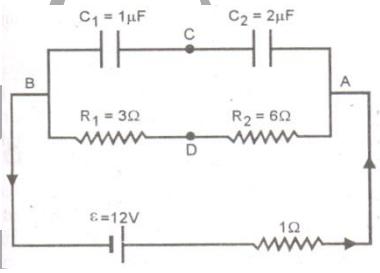

Fig. L-B- (6)