

CURRENT ELECTRICITY

LEVEL A QUESTIONS

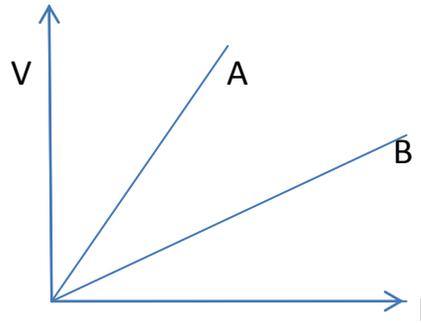
1. Define electric current and give its SI unit. (1)
2. Define current density and give its SI unit. (1)
3. State Ohm's law . (1)
4. Derive an expression for resistivity..Mention its SI unit. (2)
5. What is drift velocity? Derive an expression for the same. (2)
6. Obtain an expression for the conductance in terms of number density of electrons & average collision time. (2)
7. Define electron mobility. Give its SI unit.(1)
8. What are non-ohmic conductors?Give any one example.(1)
9. Define temperature coefficient of resistance & give its SI unit. (1)
10. Show graphically the temperature dependence of resistivity in
i.)metals,ii.)alloys&iii.)semiconductors. (3)
11. Give expressions for the equivalent resistance in the series & parallel combination of three resistances. (1)
12. Distinguish between emf& terminal potential difference.(2)
13. Give the expression for the equivalent emf when cells are connected in series. (1)
14. Write the expression for the terminal voltage when two cells of emf E_1 & E_2 are connected in parallel. (1)
15. State Kirchoff's junction rule& loop rule. (2)
16. Explain the principle of Wheatstone bridge with the help of a circuit diagram. .(2)
17. What is the principle on which metre bridge works?With the help of a circuit diagram explain how an unknown resistance can be measured by using a metre bridge. (2)

18. Give the principle of potentiometer. (1)
19. Explain the procedure with the help of a circuit diagram for comparing the emfs of the two cells using potentiometer. (3)
20. Explain the procedure with the help of a circuit diagram for determining the internal resistance of a primary cell using potentiometer. (3)

LEVELB QUESTIONS

1. How can a current in a circuit be kept continuous? (1)
2. Why electric current is not a vector quantity? (1)
3. Is a wire carrying current charged? (1)
4. Name the metal which has the largest conductivity. (1)
5. Two wires of equal length, one of copper & the other of mangning have same resistance. Which one is thicker? (1)
6. A copper wire of resistivity ρ is stretched to reduce its diameter to half. What will be its new resistivity? (1)
7. Why are copper wires used as connecting wires? (1)
8. What is the order of drift velocity? (1)
9. Though the drift velocity of electrons is very small, yet an electric bulb lights up almost instantly when switched on. Why? (2)
10. If a current of one ampere flows through a conductor, find the number of electrons passing through the wire in 1.6 seconds. (1)
11. Of metals & alloys, which has largest value of temperature coefficient of resistance? (1)
12. For a carbon resistor of $47\text{k}\Omega$ write the sequence of colours on its rings. (1)
13. If the potential difference across a conductor is doubled, how will it affect the drift velocity of the electrons? (1)
14. Two electric bulbs A & B are marked 220V, 60W and 220V, 100W respectively. Which one of the two has greater resistance? (2)

15. The voltage V versus current I graph for a parallel & series combination of two metallic resistors is shown. Which graph shows the parallel combination? Justify your answer. (2)



16. When ' n ' identical resistors, each of resistance R are put in series, effective resistance is X ohm & when they are connected in parallel the effective resistance is Y ohm. Obtain a relation connecting X, Y & R . (2)

17. A p.d ' V ' is applied across the ends of a conductor of length ' L ' & diameter ' D '. How are the electric field E and the resistance R of the conductor are affected when:

a.) V is halved b.) L is halved c.) D is doubled. (3)

18. A steady current flows through a metallic conductor of non uniform cross section. Which of these quantities is constant along the conductor?

a.) current b.) current density c.) electric field d.) drift velocity. (2)

19. Three bulbs of rating 40, 60 & 100 W are designed to work on 220V mains. Which bulb will glow most brightly if they are connected in series across the mains? (2)

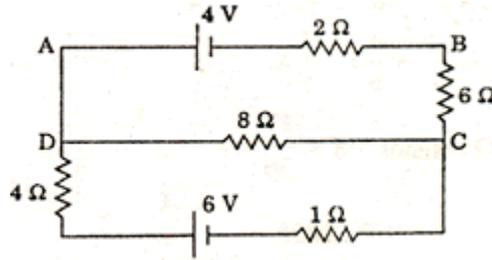
20. Why do we prefer potentiometer for measuring emf of a cell rather than a voltmeter? (1)

21. Why should the emf of a driver cell in a potentiometer be more than the emf of a cell which is to be determined? (1)

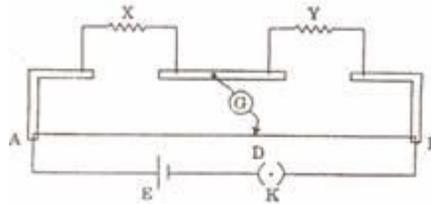
22. When is a potentiometer said to be more sensitive? How can its sensitivity be increased? (2)

23. Why is it advised to obtain a null point in the middle of the metre bridge wire? (1)

24. State Kirchoff's laws of an electrical network. Using Kirchoff's laws, calculate the potential difference across the 8 ohm resistor.

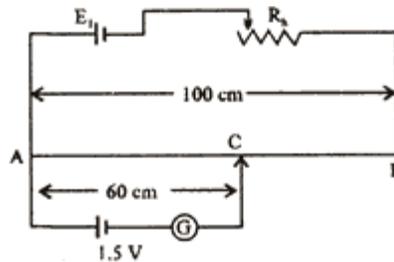


25. A metre bridge, the balance point is found to be at 39.5 cm from the end A, when the resistor Y is of 12.5 ohm. Determine the resistance of X. Why are the connections between resistors in a metre bridge made of thick copper strips? What happens if the galvanometer and cell are interchanged at the balance point of the bridge? Would the galvanometer show any current?

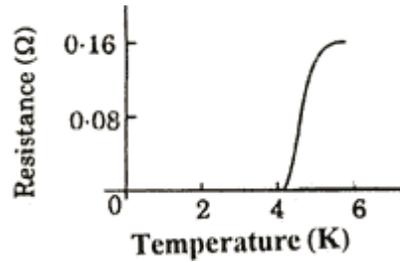


LEVELC QUESTIONS

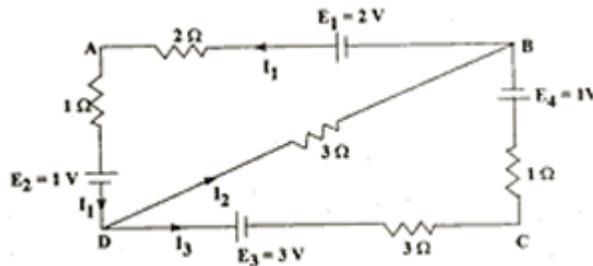
- What is meant by the sensitivity of a potentiometer? A battery E_1 of 4 V and a variable resistance R_h are connected in series with the wire AB of the potentiometer. The length of the wire of the potentiometer is 1 metre. When a cell E_2 of e.m.f. 1.5 volt is connected between points A and C, no current flows through E_2 Length of AC = 60 cm.
 - Find the potential difference between the ends A and B of the potentiometer,
 - Would the method work, if the battery E_1 is replaced by a cell of e.m.f. of 1 V? (3)



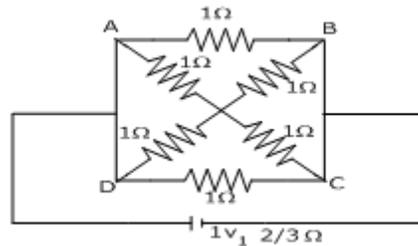
2. The given graph shows the variation of resistance of mercury in the temperature range $0 < T < 4$ K. Name the phenomenon shown by the graph. (1)



3. In the given network, find the values of the currents, I_1 , I_2 and I_3 . (3)



4. Find the current drawn from a cell of emf $4V$ and internal resistance $2/3\Omega$ connected to the network shown in the figure. $E = 1V$ $r = 2/3\Omega$

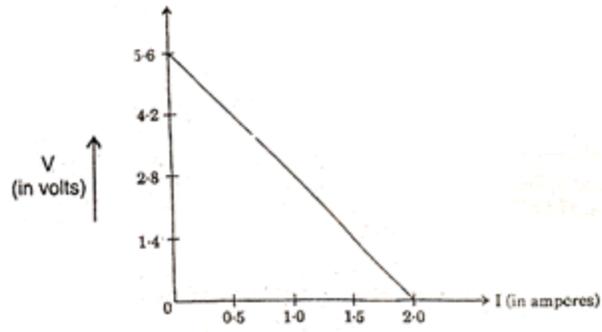


(3)

5. A wire of resistance $4R$ is bent in the form of a circle. What is the effective resistance between the ends of the diameter? (1)

6. A given copper wire is stretched to reduce its diameter to half of its previous value. What is its new resistance? (2)

7. 4 cells of identical emf E , internal resistance r , are connected in series to a variable resistor. The following graph shows the variation of terminal voltage of the combination with the current output:



- (i) What is the emf of each cell used?
- (ii) For what current from the cells, does maximum power dissipation occur in the circuit?
- (iii) Calculate the internal resistance of each cell.