Ch-11 Electricity

1. What is the difference between a conductor and an insulator?
2. What is the difference between open and closed circuits? Draw diagrams for both.
3. Define parallel connection and series connection.
4. What are the disadvantages of heating effect of current?
5. What are the advantages of heating effect of current?
6. What is electric current?
7. What is potential difference? Give its unit with definition.
8. Find the expression for calculating heat.
9. A wire is 1 m long, 0.2 mm in diameter and has resistance of 10 Ω. Calculate its resistivity.
10. Calculate the area of cross section of a wire of length 2 m, its resistance is 25 Ω and the resistivity of material of wire is 1.84 x 10^{-6} Ω m.
11. Calculate the energy consumed by 120 W toaster in 20 minutes.
12. What is resistance of conductors? Name two metals which are highly resistant.
13. Why is tungsten metal used in bulbs but not in fuse wires?
14. Define the terms Watt and Volt.
15. Define One Ohm.
16. Define Resistivity.
17. Determine the direction of conventional current?
18. What is electrical power? Write its unit.
19. You take two resistors of resistance 2R and 3R and connect them in parallel in an electric circuit. Calculate the ratio of the electrical power consumed by 2R and 3R?
20. A small bulb has a resistance of 2 Ω when cold. It takes up a current of 0.4 A from a source of 4 V and then starts glowing. Calculate –
    a. the resistance of the bulb when it is glowing, and
    b. Elaborate on the reason for the difference in resistance?
21. A bulb is rated at 330 V – 110 W. What do you think is its resistance? Three such bulbs burn for 5 hrs. at a stretch. What is the energy consumed? Calculate the cost in rupees, if the rate is 70 paise per unit?
22. Calculate the resistance of 2 km long copper wire of radius 2 mm. (Resistivity of copper = 1.72 x 10^{-8}).
23. What connection is used in domestic appliances and why?
24. A 250 watt electric bulb is lighted for 5 hours daily and four 6 watt bulbs are lighted for 4.5 hours daily. Calculate the energy consumed (in kWh) in the month of February.
25. A torch bulb is rated at 3 V and 600 mA. Calculate it's –
    a. Power,
    b. Resistance, and
    c. Energy consumed if it is lighted for 4 Hrs.
26. State and derive joule's law. An electric iron consumes energy at rate of 420 W when heating is at maximum rate and 180 W when heating is at minimum. The voltage is 220 V. What is the current and resistant in each case?
27. A piece of wire having a resistance R is cut into five equal parts.

    a. How will the resistance of each part of the wire compare with the original resistance?

    b. If the five parts of the wire are placed in parallel, how will the resistance of the combination compare with the resistance of the original wire? What will be ratio of resistance in series to that of parallel?

28. What are the two types of electric charges?

29. What do you understand by potential difference?

30. The direction of current is the same as that of the flow of electrons. Explain with a circuit diagram. Is this statement true or false?

31. Answer the following –

    a. Calculate the energy transferred when 2 A current flows through a 10 Ω resistor for 30 minutes.

    b. Calculate the amount of charge that would flow in one hour through the element of an electric iron drawing a current of 0.4 amps.

32. Draw a circuit diagram showing a cell, a bulb and a closed switch.

33. Answer the following –

    a. How much work is done in moving a charge of 3 C from a point at the 115 V to a point at 125 V?

    b. Ammeter burns out when connected in parallel. Give reasons.

34. Given n resistors each of resistance R. How will you combine them to get the –

    a. Maximum, and

    b. minimum effective resistance?

  What is the ratio of the maximum to minimum resistance?

35. Answer the following –

    a. A wire of length L and resistance R is stretched so that its length it's doubled. How will the –

       i. Resistance change, and

      ii. Resistivity change?

    b. In an experiment the current flowing through a resistor and potential difference across it are measured. The values are given below. Show that these values confirm Ohm's Law.

I (A)	1.0	1.0	2	1.5	2.0	2.0	2.5	2.5	3.0	3.0
V (V)	4.0	4.0	6.0	6.0	8.0	8.0	10.0	10.0	12.0	12.0

36. Answer the following –

    a. A tube light draws 0.1 A current from a 220 V supply. What current will this tube light draw when it is connected to a 110 V supply?

    b. An electric wire is stretched to increase its length by 25%. By what % will the resistance be increased and what will be increase in its resistivity?

37. 2 resistances of 4 Ω and 8 Ω are connected in parallel. What would be the combined resistance of the system?

38. Two identical resistors each of resistance 2 Ohm are connected in turn

    a. in series, and

    b. in parallel,

  to a battery of 12 V. Calculate the ratio of power consumed in both the cases.

39. Answer the following –
   a. A household uses the following electric appliances –
      i. Refrigerator of rating 400 W for ten hours each day.
      ii. Two electric fans of rating 80 W each for twelve hours each day.
      iii. Six electric tubes of rating 18 W each for 6 hours each day.
      Calculate the electricity bill of the household for the month of June if the cost per unit of electric energy is Rs. 3.00.
   b. An electric iron of resistance 20 Ω takes a current of 5 A. Calculate the heat developed in 30 sec.

40. Derive the following –
   a. An expression for Joules' law of heating.
   b. A formula for four equivalent resistances connected in series.

41. Answer the following –
   a. The electric power consumed by a device may be calculated by using either of the two expressions $P = I^2 R$ or $P = \dfrac{V^2}{R}$. The first expression indicates that it is directly proportional to R whereas the second expression indicates inverse proportionality. How can the seemingly different dependence of P on R in these expressions be explained?
   b. A 100 W electric bulb is connected to 220 V mains power supply. Calculate the strength of the electric current passing through the bulb.
   c. If the same bulb is taken to U.S.A where the main power supply is 110 V, how much electric current will pass through the bulb when connected to mains?