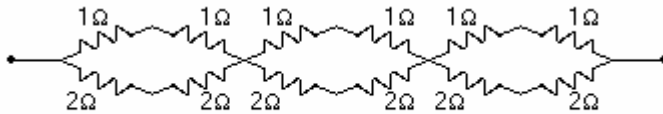
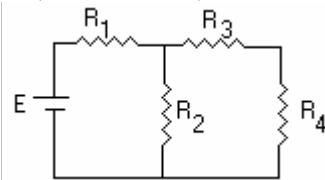


CURRENT ELECTRICITY ASSIGNMENT

1. Explain how does resistivity in metals ,depend on temperature.
2. State Kirchoff's rule, which is based on the law of conservation of energy.
3. Why is
 - a) high resistance put in series in a voltmeter?
 - b) low resistance put in parallel in an ammeter?
4. Explain how the internal resistance of a cell can be found using a potentiometer. Don't forget to draw the circuit diagram.
5. Explain the principle and use of a Wheatstone bridge.
6. Two wires of equal length, one of copper and the other of manganin, have the same resistance. Which wire is thicker?
7. The sequence of bands marked on a certain resistor is red, blue, brown, gold. What is the resistance? What is the tolerance?
8. How will you convert a 1 mA full scale deflection meter of resistance $100\ \Omega$ into
 - a) an ammeter to read 1 A (full scale deflection)
 - b) A voltmeter to read 1 V (full scale deflection).
9. Why are alloys constantan and manganin used to make standard resistances?
10. Find the equivalent resistance of the following combination.

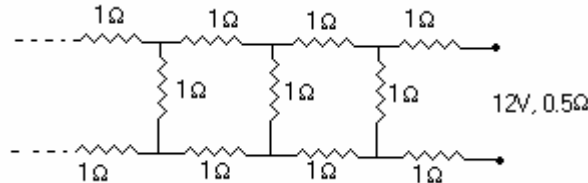


11. Define conductivity and conductance. Give their units.
12. State Ohm's Law. On what factors, does the resistance of wire depend?
13. Find the voltage drop across the resistor R_1 in the circuit given below with $E = 60V$, $R_1 = 50\ \Omega$, $R_2 = 100\ \Omega$, $R_3 = 100\ \Omega$, $R_4 = 300\ \Omega$.

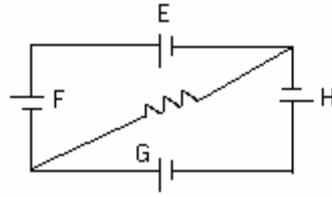


14. A wire has a resistance of $16\ \Omega$
 - a) it is cut up into 4 equal pieces which are then joined in parallel, what is the new resistance?
 - b) 2 pieces are joined in series. This is then joined in parallel with the other pieces. Find new resistance.

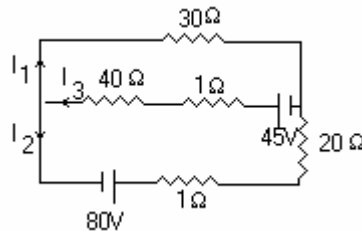
15. A wire has a resistance of 16Ω . It is melted and drawn into a wire of half its original length. Calculate the resistance of the new wire. What is the percentage change in the resistance?
16. Current flowing through a conductor is 2 mA at 50 V and 3 mA at 60 V . Is it an ohmic or non-ohmic conductor?
17. Draw a circuit diagram and explain how the emf of the two primary cells can be compared by using a potentiometer.
18. A nichrome 50 cm long and 1 mm^2 in cross section carries a current of 4 A when connected to a 2 V storage battery. Find the resistivity of nichrome.
19. A copper wire (resistivity = $1.7 \times 10^{-8} \Omega\text{m}$, density = 8900 kg m^{-3}) and an aluminium wire (resistivity = $2.8 \times 10^{-8} \Omega\text{m}$, density = 2700 kgm^{-3}) have the same mass per unit length. What is the ratio of the resistance per unit length of aluminium and copper wire.
20. (i) If an ammeter is connected in parallel
(ii) or a voltmeter is connected in series in a circuit, why can they get damaged?
21. Determine the current drawn from a 12V supply with internal resistance of 0.5Ω by the infinite network shown in the figure. Each resistance has a 1Ω resistance.



22. The temperature coefficient of resistance of wire is 0.00125 K^{-1} . The resistance of the wire is 2Ω at 300 K . What is the resistance at 1100 K ?
23. Two wires of the same material having lengths in the ratio $1 : 2$ and diameters in the ratio $2 : 3$ are connected in series with an accumulator. Compare the ratio of the p.d. across the two series.
24. State Kirchoff's laws for an electrical network and derive the condition for obtaining balance in Wheatstone bridge.
25. Why are alloys constantan and manganin used to make standard resistances?
26. How will you convert a 1 mA full scale deflection meter of resistance 100Ω into an ammeter to read (full scale deflection) and into a voltmeter to read 1 volt (full scale deflection). In each case, find the net resistance of meter.
27. The electrical conductivity of a material increases with rise in temperature. Is it a metal or semi-conductor? Explain temperature dependence of resistivity for both metals and semi-conductors.
28. What are the factors in which the resistance of a conductor depends?
29. How can a galvanometer be converted into an (i) ammeter and (ii) voltmeter. How are an ammeter and voltmeter connected in a circuit?
30. The sequence of bands marked on a resistor is brown, black, brown, gold. What is the value of the resistance? Also give the tolerance.
31. In the circuit shown E,F,G and H are cells of emf 2V , 1V , 3V , and 1V , and their internal resistances are 2Ω , 1Ω , 3Ω , and 1Ω respectively, Calculate a) potential difference between B and D, b) the potential difference across the terminals of cells G and H.



32. Describe with the help of a circuit diagram how a potentiometer can be used to compare emf of two cells.
33. Two wires of equal length one of copper and the other of manganin have the same resistance. Which wire is thicker?
34. Draw the diagram of a Wheatstone bridge. Why does no current flow through the galvanometer when the bridge is balanced.
35. When a battery of emf E and internal resistance r is connected to a resistance R , a current I , flows through it. Give a relation between E , I , r and R .
36. Define conductivity of a material. Give its unit.
37. State the conditions under which Ohm's Law is not obeyed in a conductor.
38. Three resistances P , Q , R are connected in parallel. Derive an expression for the equivalent resistance.
39. A given copper wire is stretched to reduce its diameter to half its previous value. What will be its new resistance?
40. In the circuit given below find all currents:



41. Give the experimental method for determining the resistivity of a metal wire.
42. A dry cell of emf 1.6 V and internal resistance $0.10\ \Omega$ is connected to a resistor of resistance $R\ \Omega$. If the current drawn from the cell is 2 A
- What is the voltage drop across R ?
 - What is the energy dissipation in the resistor?
43. With the help of a circuit diagram explain how would you compare, the resistances of two given resistors using a potentiometer.
44. Draw a circuit diagram for comparing two resistances using a metre bridge. Write the principal of the experiment. Why is this method suitable for the resistances of the same order of magnitude?

Answers

21. $(1+1.732)\ \Omega$, 3.7 A
26. $[0.1001\ \Omega, 0.099\ \Omega, 900\ \Omega, 1000\ \Omega]$
31. $(2/13\text{ V}, 1.615\text{ V}, 0.54\text{ V})$
40. $(-0.86\text{ A}, 2.59\text{ A}, 1.73\text{ A})$