

QUESTION BANK

CURRENT ELECTRICITY

1 mark questions

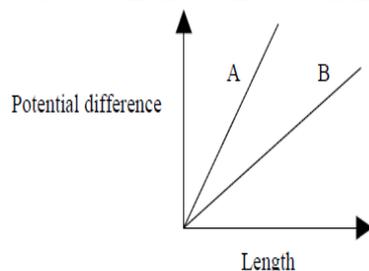
1. Why manganin is used for making standard resistor?
2. The sequence of bands marked on a carbon resistor are: Red, Red, Red, Silver. Write the value of resistance with tolerance.
3. A wire of resistivity ρ is stretched to three times its initial length, what will be its new resistivity.
4. If p.d.v applied across a conductor is increased to $2v$, how will the drift velocity of the electrons change?
5. A 10Ω thick wire is stretched so that its length becomes three times. Assuming that there is no change in its density on stretching. Calculate the resistance of new wire.
6. Give any two applications super conductors.
7. Two wire of equal length one copper and manganin have same resistance , which wire is thicker?.
8. A copper wire of resistivity r is stretched to reduce its diameter to half of its previous value .What will be the new resistances?

OR

A wire of resistance $4R$ is bend in the form of circle .What is the effective resistance between the ends of diameter?.

2 marks questions

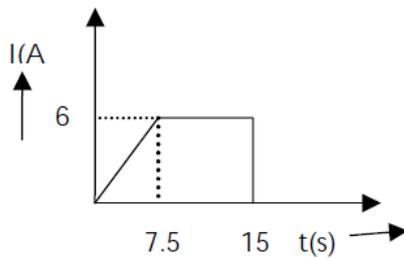
9. You are given 8Ω resistor. What length of wire of resistance $120\Omega\text{m}^{-1}$ should be joined in parallel with it to get a value of 6Ω ?
10. Three resistance $3\Omega, 6\Omega$ and 9Ω are connected to a battery. In which of them will the power dissipation be maximum if
 - a) They all are connected in parallel
 - b) They all are connected in series Give reason.
11. A silver wire has a resistance of 2.1Ω at 27.5°C and a resistance of 2.7Ω at 100°C . Determine the temperature coeff. of resistivity of silver.
12. The variation of potential difference with length in case of two potentiometres A and B is given below. Which of the two is more sensitive.



13. If the length of the wire conductor is doubled by stretching it , keeping potential difference constant by what factor the drift speed of the electron changes.
14. Two 120V light bulbs , one of 25W and another of 200W are connected in series . One bulb burnt out almost instantaneously ?.Which one was burnt and why?.
15. A cylindrical metallic wire is stretched to increase its length by 5% . Calculate the Percentage change in resistances.
16. A wire of resistance $4R$ is bend in the form of circle .What is the effective resistance between the ends of diameter?.
17. Two wires A and B have same lengths and same material, have their cross sectional areas $1:4$, what would be the ratio of heat produced in these wires when the voltage across each is constant.
18. Two bulbs whose resistance are in the ratio of $1:2$ are connected in parallel to a source of constant voltage. What will be the ratio of power dissipation in these?

OR

Plot of current I versus time interval is given below. Find the charge that flows through the wire during this



time period

3 Marks Question

19. A student has two wires of iron and copper of equal length and diameter. He first joins two wires in series and passes electric current through the combination which increases gradually. After that he joins two wires in parallel and repeats the process of passing current. Which wire will glow first in each case?

20. Total resistance of the circuit is $R/3$ in which three identical resistors are connected in parallel. Find the value of each resistance?

21. Amount of charge passing through the cross section of a wire is $q(t) = at^2 + bt + c$. Write the dimensional formula for a , b and c . If the values of a , b and c in SI unit are 6, 4, 2 respectively. Find the value of current at $t=6$ seconds.

22. Prove that current density of a metallic conductor is directly proportional to the speed of electrons.

23. Name the carriers of electric current in

- 1) a bar made of silver
- 2) hydrogen discharge tube
- 3) a germanium semiconductor
- 4) a wire made of alloy nichrome
- 5) superconductor.
- 6) salt water

24. A potential difference V is applied across the ends of length l and diameter D . What is the effect on drift velocity of electrons if

- a) V is doubled
- b) l is doubled
- c) D is doubled

25. Draw a graph showing variation of resistivity with temperature for

- a) nichrome
- b) silicon

26. A uniform wire of resistance " R " is shaped into a regular " n " sided polygon, where " n " is even. Find the equivalent resistance between

- 1) opposite corners of the polygon
- 2) adjacent corners of the polygon.

27. Under what condition is the heat produced in an electric circuit

- 1) directly proportional
- 2) inversely proportional to the resistance of the circuit?

5 Marks Questions

28. State the working principle of potentiometer. Explain with the help of circuit diagram how the emf of two primary cells are compared by using the potentiometer.

29. State Kirchhoff's law in an electrical network. Using Kirchhoff's laws deduce the condition for balance in the Wheatstone bridge.

30. State the working principle of potentiometer. Explain with the help of circuit diagram how the potentiometer is used to determine the internal resistance of the given primary cell.

MAGNETIC EFFECTS OF CURRENT & MAGNETISM

One mark questions

1. One alpha particle and a deuteron entered perpendicularly in a uniform magnetic field with same velocity. Which one follows the greater circle?

2. Out of Voltmeter and Millivoltmeter, which has the higher resistance?

3. Proton is moving along the axis of a solenoid carrying current of 2 A and 50 number of

turns per unit length. What will be the force acting on the particle.

4. Out of Ammeter and Mille ammeter, which has the higher resistance?

5. The pole of a magnet is brought near to a stationary charge. What will be the force experienced by pole?

6. Current 'I' flows along the length of an infinitely long straight thin walled pipe. What is the magnetic field at any point on the axis of pipe?

7. The Earth's core contains iron but geologists do not regard this as a source of Magnetic Field, Why?

8. A Magnetic Field dipole placed in a Magnetic Field experiences a net force. What can you say about the Nature of Magnetic Field?

Two marks questions

9. Suppose a helical spring is suspended from the roof of a room and very small weight is attached to its lower end what will happen to the spring when a current is passed through it? Give reason to support your answer?

10. Can a Moving Coil Galvanometer can be used to detect an A.C. in a circuit .Give reason.

11. Two wires of equal length are bent in the form of two loops. One loop is square whereas the other is circular. These are suspended in same magnetic field and same current is passed through them. Explain with reason which will experience greater torque?

12. A charge particle moving in a magnetic field penetrates a layer of lead and thereby losses half of its kinetic energy. How does the radius of curvature of its path change?

13. Earth's Magnetic Field does not affect working of moving Coil Galvanometer. Why?

14. A proton is about 1840 times heavier than an electron. What will be its kinetic energy when it is accelerated by a potential difference of 1KV?

15 What is the work done by a magnetic field on moving a charge? Give reason

16 Why does the kinetic energy of the charge not change while moving in the magnetic field.

17 If B is the magnetic field produced at the centre of a circular coil of one turn of length L carrying current I then what is the magnetic field at the centre of the same coil which is made into 10 turns?

18. Find the magnetic moment of a wire of length l carrying current I bent in the form of a circle.

Three mark questions

19. A Voltmeter, an ammeter and a resistance are connected in series with a battery. There is some deflection in voltmeter but the deflection of ammeter is zero. Explain why?

How does a ferromagnetic material change its Magnetic properties if it is heated beyond its curie temperature?

20. Two long straight wires are set parallel to each other. Each carries a current I in the same direction and the separation between them is 2r. What is the intensity of the magnetic field mid way between them?

21. A circular loop of radius R carrying current I ,lies in X-Y plane with its centre at origin.What is the total magnetic flux through X-Y plane?

22. A circular current carrying coil has a radius R. What is the distance from the centre of the coil on its axis where the magnetic field is 1/8 th of its value at the centre?

23. A magnetic needle suspended freely in a uniform magnetic field experiences torque but no net force. A nail made up of iron kept near a bar magnet experience a force of attraction and torque .Give reason.

24.A particle with charge q moving with velocity v in the plane of the paper enters a uniform magnetic field B acting perpendicular to the plane of the paper. Deduce an expression for the time period of the charge as it moves in a circular path in the field .

25. What is the magnetic field produced at the centre of curvature of an arc of wire of radius r carrying current I subtends an angle $P/2$ radians at its centre.

26. When current is flowing through two parallel conductors in the same direction they attract while two beams of electrons moving in the same direction repel each other. Why?

27. Draw diagrams to show behavior of magnetic field lines near a bar of (i) Alluminium (ii) copper and (iii) mercury cooled to a very low temperature 4.2 K

Five mark questions

28, a) An electron travelling west to east enters a chamber having a uniform electrostatic field in north to south direction. Specify the direction in which the uniform magnetic field should be set up to prevent the electron from deflecting from its straight line path.

b) A straight horizontal conducting rod of length 0.5 m and mass 50 g is suspended by two vertical wires at its ends. A current of 5A is set up in the rods through the wires. (i) What magnetic field should be set up normal to the conductor in order that the tension in the wires is zero? (ii) What will be the tension in the wire if the direction of current is reversed keeping the magnetic field same as before? (neglect the mass ; $g=10\text{m/s}^2$)

29. Draw a neat and labelled diagram of a cyclotron . State the underlying principle and explain how a positively charged particle will get accelerated. Show mathematically the cyclotron frequency does not depend upon speed of the particle.

30. With the help of a labelled diagram the underlying principle and working of a moving coil galvanometer. What is the function of

i) uniform radial field

ii) soft iron core in such a device.