VIVA QUESTIONS FOR CLASS 12 PHYSICS

1. Define Ohm's law.
Answer: Ohm's law states that the current flowing through a conductor is directly proportional to the voltage across it, as long as the temperature and other physical conditions remain constant.

2. What is the formula of Ohm's law?
Answer: The formula for Ohm's law is:

$$V=IRV$$

Here, V is voltage, I is current, and R is resistance.

3. What is the unit of resistance?
Answer: The unit of electrical resistance is the **Ohm (Ω)**.

4. What is the SI unit of potential difference?
Answer: The SI unit of potential difference is **volt (V)**.

5. What is the unit of current?
Answer: The unit of electric current is **ampere (A)**.

6. Does resistance depend on temperature?
Answer: Yes, resistance increases as the temperature of the conductor rises.

7. Does resistance depend on the dimensions of the conductor?
Answer: Yes, resistance depends on the length and cross-sectional area of the conductor.

8. What is specific resistance?
Answer: Specific resistance, or resistivity, is the resistance offered by a material per unit length and unit cross-sectional area under an applied voltage.

9. What is the SI unit of resistivity?
Answer: The SI unit of resistivity is **ohm-metre (Ω·m)**.

10. What is electrical conductivity?
Answer: Electrical conductivity measures how easily a material allows an electric current to pass through it.

11. Define a rheostat.
Answer: A rheostat is a variable resistor with two terminals. It is used to adjust the current flowing through a circuit.

12. What material is used in a rheostat's wire?
Answer: The wire in a rheostat is usually made of **constantan** or **manganin**.

13. What is a metre bridge?
Answer: A metre bridge, or slide wire bridge, is a device based on the Wheatstone bridge principle. It is used to measure the unknown resistance of a conductor.

14. How does temperature affect resistance?
Answer: As the temperature increases, the resistance of a conductor also increases.

15. What is superconductivity?
Answer: Superconductivity is a state where certain materials exhibit zero resistance when cooled below a specific temperature.

16. How is a galvanometer converted into (a) a voltmeter and (b) an ammeter?
Answer:
(a) To convert a galvanometer into a voltmeter, a high resistance is connected in series with it.
(b) To convert it into an ammeter, a low resistance is connected in parallel with it.

17. What is the difference between potential difference and emf?
Answer:

- **Potential difference** is the work done to move a unit charge between two points in a circuit.
- **Emf** is the potential difference across the terminals of a cell when no current is flowing.

18. Why are connecting wires thick and covered with cotton?
Answer: Thick wires have very low resistance, and the cotton covering prevents short-circuiting.

19. In a series combination of resistors, how is the total resistance calculated?
Answer: In a series combination, the total resistance R_T is the sum of the individual resistances:

$RT=R_1+R_2+R_3+...+Rn$

20. What happens if a voltmeter is connected in series?
Answer: A voltmeter, which measures potential difference, has high resistance. Connecting it in series greatly reduces the current in the circuit, which can affect its operation.

21. Is Ohm's law universal?
Answer: No, Ohm's law is not universal. It does not apply to semiconductors or materials at extremely low temperatures.

Questions and Answers on Wheatstone Bridge and Metre Bridge

22. What is a Wheatstone bridge?
A Wheatstone bridge is a type of electrical circuit used to measure an unknown resistance by balancing two legs of the bridge circuit. One leg contains the unknown resistor.

23. What is the balanced condition of a Wheatstone bridge?
The Wheatstone bridge is balanced when no current flows through the galvanometer. This happens when the known and variable resistances are adjusted correctly.

24. What principle does the metre bridge follow?
The metre bridge works on the principle of the Wheatstone bridge.

25. What is the use of a metre bridge?
A metre bridge is used to measure the resistance of a resistor precisely.

26. What material is used to make the wire in a metre bridge?
Materials like nichrome, constantan, or manganin are used because they have high resistance and a low temperature coefficient, meaning their resistance doesn't change much with temperature.

27. When is the metre bridge most sensitive?
The metre bridge is most sensitive when all four resistors in the circuit have equal resistance.

28. What are the limitations of a Wheatstone bridge?
A Wheatstone bridge becomes less accurate when measuring very low resistances because the resistance of leads and contacts affects the results.

29. What is Ohmic resistance?
Ohmic resistance is resistance that follows Ohm's law.

30. What are some examples of Ohmic resistance?
Examples of Ohmic resistance include silver, aluminium, and copper.

31. What is non-ohmic resistance?
Non-ohmic resistance is resistance that does not follow Ohm's law.

32. What are some examples of non-ohmic resistance?
Vacuum tube diodes and transistors are examples of non-ohmic resistance.

33. Is a semiconductor diode an ohmic or non-ohmic resistance?
A semiconductor diode is a non-ohmic resistance.

34. What is meant by the e.m.f of a cell?
The e.m.f of a cell is the maximum potential difference between its terminals when no current is flowing through the circuit.

35. What is terminal voltage?
Terminal voltage is the potential difference across a cell's terminals when it is supplying current.

36. What is a potentiometer?
A potentiometer is a device used to measure small potential differences accurately and compare the e.m.f of different cells.

37. What is the principle of a potentiometer?
The principle of a potentiometer states that the potential drop along a uniform wire carrying a steady current is directly proportional to the length of the wire.

38. What is meant by a potential gradient?
A potential gradient is the change in potential per unit length of the potentiometer wire.

39. Why is a potentiometer preferred over a voltmeter for measuring e.m.f?
A potentiometer is better for measuring e.m.f because it takes no current from the cell during measurement, ensuring an accurate reading.

40. How is an ammeter connected in a circuit?
An ammeter is always connected in series in the circuit.

41. How is a voltmeter connected in a circuit?
A voltmeter is always connected in parallel with the component being measured.

42. How is a galvanometer converted into an ammeter?
A galvanometer is turned into an ammeter by connecting a low resistance wire (shunt) in parallel with it.

43. How is a galvanometer converted into a voltmeter?
A galvanometer is converted into a voltmeter by connecting a high resistance in series with it.

44. Give an example of a substance whose resistance decreases as temperature increases.
A semiconductor is a good example, as its resistance reduces when the temperature rises.

45. Is a voltmeter used for measuring the e.m.f.?

No, the voltmeter takes electric current from the cell.

46. What is the reason behind the null point?

The null point is acquired because the cell's e.m.f. is balanced by the potential variation along a particular length of the connected potentiometer wire.

47. What is meant by a cell's internal resistance?

The resistance applied by the cell's electrolyte is known as the cell's internal resistance.

48. What is meant by a primary cell?

A primary cell is a type of cell which cannot be recharged.

49. What is meant by a secondary cell?

A secondary cell is a type of cell which can be recharged.

50. Why does a secondary cell give more electric current than a primary cell of the identical e.m.f.?

A secondary cell gives more electric current than a primary cell because a secondary cell possesses a very low internal resistance.

51. Which type of cells (primary cells or secondary cells) is employed in automobiles?

Secondary cells are typically used in automobiles because they provide the needed large beginning current due to this cell's relatively low internal resistance.

52. Is sensitivity impacted by potential gradients?

Yes, the lesser the potential gradients, the higher will be the sensitivity.

53. How is the potentiometer's sensitivity affected by the length of the wire?

The sensitivity of the potentiometer rises with the increase in the wire's length.

54. On what constraints does the cell's internal resistance depend?

In the case of a cell, internal resistance depends on:

- nature of the electrolyte
- the concentration of the electrolyte nature

of the electrodes

- distance between the plates temperature
- area of the plates inside the electrolyte

55. Can a potentiometer be used to calculate the secondary cell's internal resistance? No, a secondary cell possesses very little internal resistance. Due to the low value, it has no considerable effect on the potential difference.

56. What can be the reason for one-sided deflection in galvanometers?

(a) The primary cell's e.m.f. may surpass that of the main circuit cell.

(b) Circuit connections may be incorrect or loose.

57. What is electrical resistance?

Electrical resistance is the hindrance provided by a material in the flow of current; it is the physical property of a substance which allows it to oppose the flow of electrons, that is, current. Resistance is inversely proportional to the cross-sectional area of the material and directly proportional to the temperature and length of the material.

58. What is direct current?

Direct current is the current whose direction remains the same. From a region of high electron density to a region of low electron density, the flow of electrons in a direct current is constant. Direct current is widely used in applications that involve a battery and many household appliances.

59. Why is Ohm's law not applicable to semiconductors?

The semiconductors are nonlinear devices, and this is the reason why Ohm's law is not applicable to semiconductors. This means that for variations in voltage, the ratio of voltage to current doesn't remain constant.

60. When does Ohm's law fail?

When semiconductors and unilateral devices such as diodes come into play, Ohm's law fails to give the desired result because, in these materials, the physical conditions, such as temperature or pressure, do not remain constant.

61. What is the unit to measure electric current?

Answer: Ampere is the unit used to measure the electric current.

62. Define ampere.

Answer: An ampere is a unit of measure of the rate of electron flow or current in an electrical conductor.

63. On the galvanometer scale, why is zero placed in the middle?

Answer: Zero is placed in the middle of the galvanometer since the galvanometer needle can deflect on both sides.

64. Are there positive and negative terminals in the galvanometer?

Answer: There are no positive and negative terminals in the galvanometer.

65. A galvanometer is known as the fundamental electrical measuring tool. Why?

Answer: A galvanometer is known as the fundamental electrical measuring tool because it is designed to measure voltage and current.

66. Should the galvanometers possess a high or low resistance?

Answer: Galvanometers should possess a low resistance.

67. What is the main procedure to convert a galvanometer into a voltmeter?

Answer: A galvanometer is usually changed into a voltmeter by joining a large resistance in series with it.

68. Should voltmeters possess low resistance or high resistance? Why?

Answer: Voltmeters should always possess a large resistance; if not, it will decrease the potential difference it is intended to measure.

69. What is the resistance value of ideal voltmeters?
Answer: Ideal voltmeters have infinite resistance.

70. Should ammeters have high or low resistance? Why?
Answer: Ammeters should always possess a low resistance; otherwise, they will decrease the current it is intended to calculate.

71. A galvanometer is transformed into a milliammeter and an ammeter. Which of the two devices will have better resistance?
Answer: The milliammeter will possess better resistance.

72. What is the resistance value of ideal ammeters?
Answer: Ideal ammeters have zero resistance.

73. What do you mean by a galvanometer's figure of merit?
Answer: A galvanometer's figure of merit is the electric current needed to generate a one-division deflection in the galvanometer.

74. What is shunt resistance?
Answer: Shunt resistance is a low-value resistance connected in parallel with an ammeter to extend its range or measure the load current when connected in series.

75. What is the reduction factor?
Answer: The reduction factor is the current required to produce a 45° deflection in a tangent galvanometer. It is measured in amperes and denoted by K.

76. Why is an ammeter always connected in series?
Answer: Since the internal resistance of an ammeter is low, it is always connected in series. There is a high risk of short-circuiting if connected in parallel.

77. How does current electricity differ from static electricity?
Answer: Current electricity involves the continuous flow of charges, while static electricity is the result of separated charges that remain stationary until discharged.

78. What is static electricity?
Answer: Static electricity occurs when positive and negative charges are separated, creating a build-up of charge on a surface. It is often caused by friction.

79. What is a voltmeter?
Answer: A voltmeter is a device used to measure the potential difference or voltage between two points in an electrical circuit.

80. What is the working principle of a voltmeter?
Answer: A voltmeter works on the principle that it must be connected in parallel with the circuit. Its high resistance ensures that the measured voltage is not affected.

81. What is a sonometer?
Answer: A sonometer is a device used to study the relationship between the frequency of sound produced by a plucked string and its length, tension, and mass per unit length.

82. What is alternating current (AC)?
Answer: Alternating current is a type of electrical current that changes its magnitude and polarity at regular intervals.

83. What is direct current (DC)?
Answer: Direct current flows in a single direction with a constant magnitude. For example, a mobile battery supplies DC.

84. List two uses of a sonometer.
Answer: A sonometer is used to determine the frequency of a tuning fork and measure the tension in a string.

85. Can the frequency of alternating current be found using the sonometer?
Answer: Yes, the frequency of alternating current can be determined using a sonometer.

86. What is the unit of frequency of alternating current?
Answer: The unit of frequency of alternating current is hertz (Hz).

87. Define an electromagnet.
Answer: An electromagnet is a magnet that can be magnetised using an electric current.

88. What is the formula to calculate the percentage of error?
Answer: The percentage of error is given by the formula:

Percentage error=(DifferenceActual Value)×100%

89. How is direct current different from alternating current?
Answer: Direct current has a constant magnitude and flows in one direction, while alternating current varies in magnitude and direction periodically.

90. What is the spherical mirror used in this experiment?
Answer: A concave mirror is used in this experiment.

91. What are the two types of spherical mirrors?
Answer: The two types of spherical mirrors are convex mirrors and concave mirrors.

92. Which type of mirror always generates a virtual image?
Answer: Convex and plane mirrors always generate virtual images.

93. What is the aperture of a spherical mirror?
Answer: The aperture is the diameter of the circular rim of the spherical mirror.

94. Define the pole of a concave mirror.
Answer: The pole is the centre of the reflecting surface of the concave mirror, denoted by PPP.

95. Define the centre of curvature on a concave mirror.

Answer: The centre of curvature is the centre of the sphere of which the concave mirror is a part, denoted by C.

96. Define the centre of curvature on a spherical mirror.
Answer: The centre of the sphere from which the spherical mirror is made is called the centre of curvature.

97. What is the correlation between the radius of curvature (R) and focal length (F) of a concave mirror?
Answer: The relationship is given by $F=R/2$.

98. Define the principal axis of a spherical mirror.
Answer: The principal axis is the imaginary line that passes through the pole and the centre of curvature of the spherical mirror.

99. What is the radius of curvature of a concave mirror?
Answer: The radius of curvature is the radius of the sphere from which the concave mirror is derived.

100. Define the principal focus on a concave mirror.
Answer: The principal focus is the point on the principal axis where parallel rays converge after reflecting from a concave mirror.