

# IMPORTANT SHORT QUESTIONS

**Q2. Give short Answers.**

**1. Define electric current.**

**Answer**

The rate of flow of electric charge through any cross-sectional area is called electric current.

Mathematically,

Electric current =  $\frac{\text{electric charge}}{\text{time}}$

$$I = \frac{Q}{t}$$

$$I = \frac{Q}{t}$$



**2. What is the SI unit of electric current?**

**Answer**

The SI unit of current is coulomb per second, called ampere.

**Ampere:**

It is current due to the flow charge at the rate of one coulomb per second.

$$1A = \frac{1C}{1\text{sec}}$$

### 3. What are the charge carriers in electrolyte?

#### Answer

The charge carriers in electrolyte are positive and negative ions.

### 4. Explain the flow of current through electrolyte?

#### Answer

When current flows through electrolyte, it splits into negative and positive ions and current flows through it.

### 5. What is the mechanism of flow of current through a conductor?

#### Answer

When electric charges are moving across any surface then we say that an electric current is flowing through that surface.



### 6. What does conventional current mean?

#### Answer

The current, which is produced due to the flow of positive: free charges, is known as conventional current.

OR

Such current, which flows from the positive terminal to the negative terminal of the battery, is known as conventional current.

**7. What are charge carriers in the filament of a bulb?**

**Answer**

The current through the filament of a bulb is only due to the flow of negative charge i.e. free electrons.

**8. Explain the actual flow of current through any closed circuit?**

**Answer**

In experimental fact that the amount of positive charge flowing in one direction is exactly equal to the same amount of charge flowing in the opposite direction under the effect of external electric field.

**9. What are the charge carriers in gases?**

**Answer**

In gases, the charge carriers are electrons and ions.

**10. What is an electromotive force?**

**Answer**

The electromotive force of a battery or cell is the total energy supplied in driving one coulomb of charge round a complete circuit in which the cell is connected.

**11. Is emf is a force?**

**Answer**

Electromotive force (emf) is not a force and we do not measure it in Newton.

**12. What is difference between electromotive force and potential difference?****Answer**

- The electromotive force of a battery or cell is the total energy supplied in driving one coulomb of charge round a complete circuit in which the cell is connected.
- The potential difference determines the energy between any two points of the circuit, which is required in moving a charge from one point to another.

Both electromotive force and potential difference are measured in volts.

**13. State Ohm's law.****Answer**

The value of current passing through a conductor is directly proportional to the potential difference applied across its ends, provided the temperature and the physical state of the conductor does not change.

Mathematically,

$$V \propto I$$

Where

$$V = IR$$

$V$  = potential difference across the ends of a

**14. Differentiate between cathode and anode.****Answer**

- The electrode connected with the positive terminal of the battery is called cathode.
- The electrode connected with the negative terminal of the battery is called anode.

### 15. What are the limitations of Ohm's law?

#### Answer

- Ohm's law is applicable only in metallic conductor when temperature and physical conditions are kept constant.
- Ohm's law is applicable even when potential difference across the metallic conductors is reversed. Such conductors are called Ohmic conductors.
- Ohm's law is applicable to metallic conductors and is invalid for semiconductor diodes.

### 16. Distinguish between ohmic and non-ohmic substance.

#### Answer

- A substance, which obeys Ohm's law, is called ohmic substance.
- A substance, which does not obey Ohm's law, is called non-ohmic substance.

### 17. What is the graph of Ohm's law?

#### Answer

The V-I graph of Ohm's law is a straight line.



The graph shows that

"The value of current passing through a conductor is directly proportional to the potential difference applied across its ends, provided the temperature and the physical state of the conductor does not change."

### 18. Define resistance.

#### Answer

"The opposition offered by a conductor to the flow of current is termed as resistance of that conductor."

Mathematically,

$$R = \frac{V}{I}$$

From above equation resistance may also be defined as:

"The ratio between the potential difference across the ends of the conductor to the amount of current flowing through it."

### 19. What is the SI unit of resistance?

#### Answer

The SI unit of resistance is called ohm and denoted by  $\Omega$ .

The resistance of conductor is 1 ohm, if a potential difference of 1 volt across its ends maintains current of 1 ampere in it.

$$1\Omega = \frac{1V}{1A}$$

## 20. On what factors the resistance of a conductor depends?

### Answer

The resistance of a conductor depends upon the following factors.

- Length of conductor
- Area of conductor
- Area of cross-section
- Temperature
- Nature of conductor

## 21. What is specific resistance?

### Answer

"The resistance of a conductor having a length of 1m and cross-sectional area of 1 m<sup>2</sup> is referred to as specific resistance of that conductor"

OR

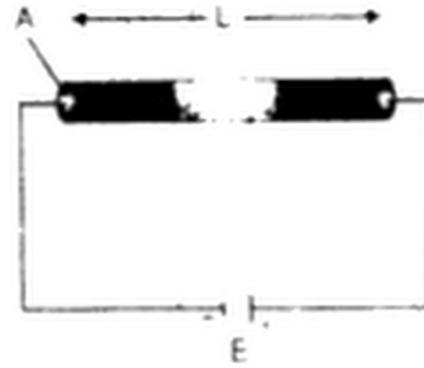
"The resistance of one metre cube of a substance is equal to the specific resistance" Mathematically,

$$P = \frac{RA}{L}$$

It is also called resistivity of the conductor. It depends~ upon the nature of that conductor.

### Unit

The unit of resistivity is Ohm-meter ( $\Omega\text{m}$ ).



**22. What is the SI unit of specific resistance?**

**Answer**

The SI unit of specific resistance is ohm-meter (em).

**23. What is temperature coefficient of resistance?**

**Answer**

The rate of increase in resistance per ohm per Kelvin is known as the temperature coefficient of resistance.

Mathematically,

$$\alpha = \frac{R_t - R_0}{R_0 t}$$

The SI unit of temperature coefficient of resistance is  $K^{-1}$ .

**24. What is the practical use of effect of temperature upon resistance?**

**Answer**

The property of conductors that their resistance changes continuously with the rise of temperature is used as thermometric property. Hence, a thermometer can be constructed using this property, which is called "resistance thermometer."

**25. Why does the resistance of a conductor rise with temperature?****Answer**

The resistance of a conductor is due to the collision of free electrons with atoms of the conductor. When conductor is heated, its atoms begin to vibrate with larger amplitudes and so the collisions are increased which increases the resistance of the conductor.

**26. What is the cause of an electric current?****Answer**

The electric current is due to the motion of electric charge. The motion of electric charge is due to the flow of charge carriers. These charge carriers are different in different materials.

**27. Give the direction of conventional current.****Answer**

The direction in which positive charges flow is taken as direction of conventional current. The reason is that the positive charges move in one direction, has same external effect as a negative charge moving in opposite direction.

**28. Why without battery current is zero? Explain.****Answer**

Consider a part of metallic wire and observe the motion of free electrons through it. It is noticed that the rate at which the free electrons pass through it from right to left are same as the rate at which they pass from left to right. The

total number of electrons passing through it is zero. Therefore, the current through the wire is zero.

**29. Define drift velocity.**

**Answer**

A uniform velocity that the electrons acquire in the presence of electric field of the battery is called drift velocity. The drift velocity is of the order of  $10^{-2} \text{ ms}^{-1}$ .

**30. Differentiate between electrolyte and electrolysis.**

**Answer**

**Electrolyte:**

The liquid, which conducts electric current, is known as electrolyte.

**Electrolysis:**

Certain liquids conduct electricity due to chemical reactions that take place within them. This process is called electrolysis.

**31. What happens to the total resistance when the resistances are connected in parallel?**

**Answer**

Total resistance or equivalent resistance of parallel circuit is always less than each of the resistance of the combination.

**32. When the resistors are said to be connected in series?**

**Answer**

If the same current passes through all the resistors then they are to be connected in series.

### 33. When the resistors are said to be connected in parallel?

#### Answer

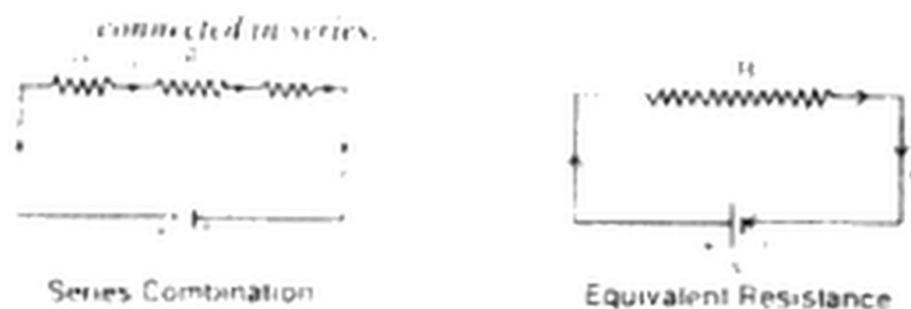
If the potential difference across all the resistors be the same then they are said to be connected in parallel.

### 34. Write some characteristics of series combination of resistors?

#### Answer

Some characteristics of series combination of resistors are given as:

- There is only path for the flow of current.
- The same quantity of current passes across each resistor.
- The potential difference across each resistor is different.
- Equivalent resistance is equal to the sum of all the resistances connected in series.



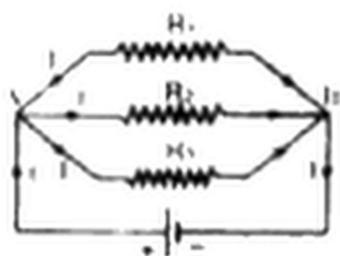
### 35. Write some characteristics of parallel combination of resistors?

#### Answer

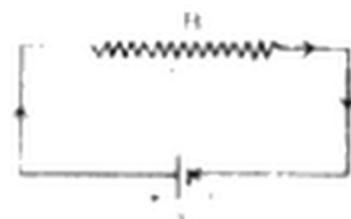
Some characteristics of parallel combination of resistors are given as:

- All the resistances connected in parallel have the same potential difference across them.

- There are many paths for the flow of current.
- The magnitude of current across each resistance is different.
- The equivalent resistance of the combination of a parallel circuit is always less than the value of each individual resistance.



Parallel Combination



Equivalent Resistance

**36. Find the equivalent resistance in case of series combination?**

**Answer**

If n-resistors are combined in series, the equivalent capacitance of the combination is given by

$$R_e = R_1 + R_2 + R_3 + R_n$$

Generally, resistors are connected in series to increase the value of resistance.

**37. Find the equivalent resistance in case of parallel combination?**

**Answer**

If n-resistors are combined in parallel, the equivalent resistance of the combination is given by

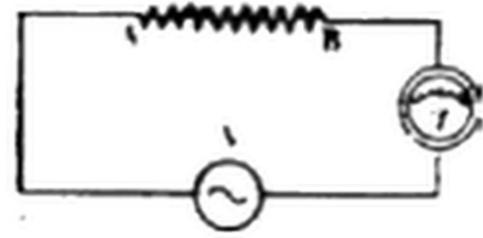
$$\frac{1}{R_e} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots + \frac{1}{R_n}$$

This shows that when resistors are connected in parallel, their equivalent resistance decreases.

**38. What is galvanometer?**

**Answer**

Galvanometer is very sensitive instrument by which we can detect the presence of current in a circuit.

**39. What is shunt resistance?****Answer**

A shunt is low resistance wire connected in parallel with the galvanometer to convert it into an ammeter.

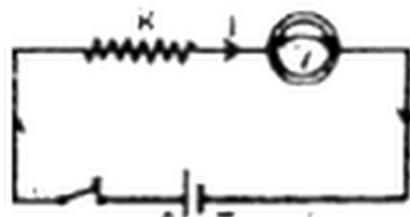
**40. What are the two main uses of a galvanometer?****Answer**

Galvanometer is used:

- To detect current connected in series in the circuit.
- To indicate potential difference between two points of a circuit.

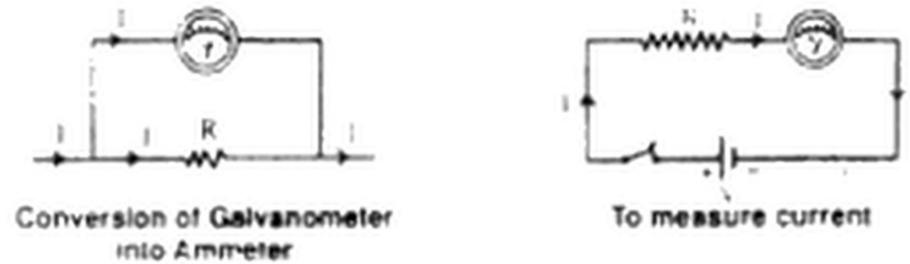
**41. What is an ammeter?****Answer**

Ammeter is an instrument, which is used to measure a current in a circuit. It is connected in series to measure current in a circuit.



**42. How can you convert a galvanometer into an ammeter?****Answer**

A galvanometer is converted into ammeter by introducing a small parallel resistance called shunt resistance to the galvanometer.

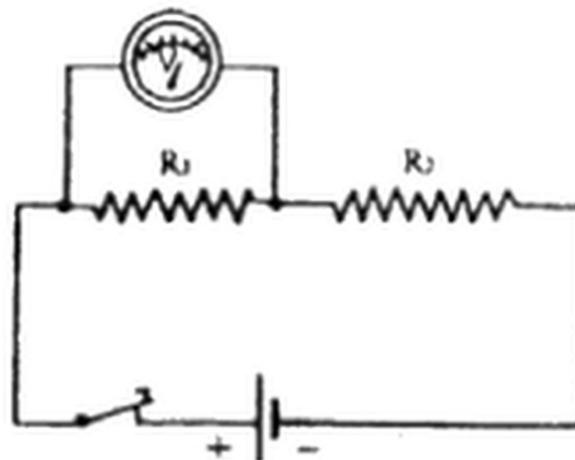
**43. Why ammeter is connected in series to measure current in a circuit?****Answer**

In order to measure current in a circuit, the ammeter is connected in series, so the current flowing in the circuit also passes through the ammeter. As the resistance of ammeter is very small, so its introduction into the circuit does not affect the current of the circuit.

**44. What is a voltmeter?****Answer**

Voltmeter is an instrument used to measure the potential difference between two points.

It is connected in parallel to measure potential difference in a circuit.



**45. Why a voltmeter has high resistance?****Answer**

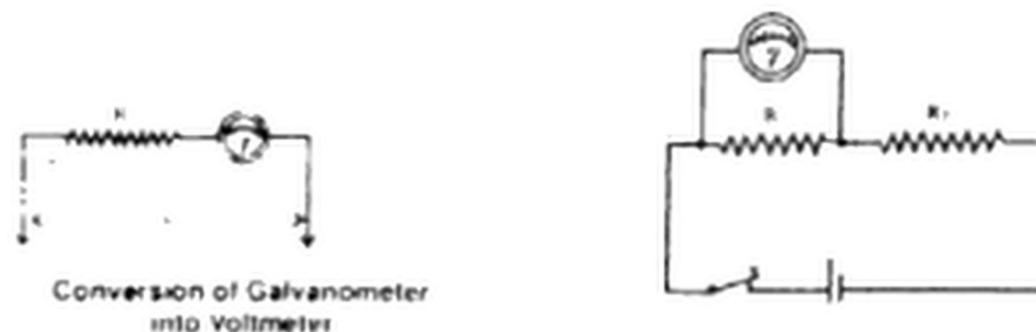
If the resistance of voltmeter is low then it will draw more current from the circuit and drop potential difference across the resistance. Therefore, a good voltmeter must have such a high resistance so that no or very small current passes through it.

**46. Voltmeter is connected in parallel to measure potential difference. Why?****Answer**

Voltmeter is always connected in parallel with the resistance across which the potential difference is to be measured. Higher the resistance of the voltmeter, more reliable is its reading.

**47. How can you convert a galvanometer into a voltmeter?****Answer**

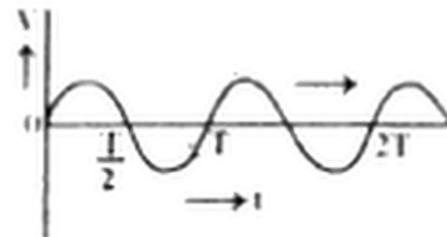
A galvanometer can be converted into voltmeter by connecting a high resistance in series with the galvanometer.

**48. What is sensitivity of galvanometer?****Answer**

A galvanometer, which gives large deflection for small current, is known as sensitive galvanometer.

**49. Differentiate between A.C and D.C currents?****Answer****Alternating current**

The current that changes its direction continuously in a regular pattern is called alternating current.



Variation of Voltage with time

**Direct current**

The current that flows only in one direction is called direct current

**Difference between alternating current and direct current**

Alternating current		Direct current	
1.	The current that changes its direction continuously in a regular pattern is called	1.	The current that flows only in one direction is called direct current.
2.	The graph between alternating current and time is a sinusoidal	2.	The graph. between D.C and time is a straight line parallel to time axis.
3.	There is a particular frequency and time period of A.C.	3.	There is no concept of frequency and time period in
4.	In calculations, its rms value is used.	4.	In calculations, its maximum value is used.
5.	Alternating current is supplied for household and commercial uses.	5.	Direct current is provided by the batteries in automobiles.

**50. State Joule's law.**

**Answer**

**According to Joule's law:**

"The amount of heat energy generated in a resistance due to flow of electric current is equal to the product of the square of the current, resistance and the timer interval." Mathematically,

$$W = I^2 R t$$

