CBSE Important Questions for Class 10 Science Chapter 12: CBSE Important Questions for Class 10 Science Chapter 12 Electricity, focuses on fundamental concepts like electric current, potential difference, resistance, Ohm's Law, and factors affecting resistance. Students learn about series and parallel circuits, the heating effect of electric current, and electrical power.

The chapter explains practical applications of electricity in daily life, including electric appliances and safety measures. Important questions from this chapter often revolve around numerical problems, conceptual understanding of circuits, derivations of formulas, and real-life applications of electricity. These questions help students grasp key concepts and prepare effectively for exams.

CBSE Important Questions for Class 10 Science Chapter 12 Overview

The important questions from CBSE Class 10 Science Chapter 12, "Electricity," are crucial as they focus on key topics essential for understanding the concept of electricity and its practical applications. These questions cover core areas such as Ohm's Law, calculating electric current, potential difference, resistance, and their relationships. Students often face numerical problems involving the combination of resistors in series and parallel, which are significant for building a strong conceptual base.

Other important questions relate to the heating effect of electric current, electrical power, and applications in everyday life, like household circuits. By practicing these questions, students not only improve problem-solving skills but also develop a deeper understanding of real-world electrical systems. Mastering these concepts is vital for board exam preparation, as similar questions frequently appear, ensuring better performance and a thorough understanding of electricity's principles.

CBSE Important Questions for Class 10 Science Chapter 12 Electricity

Below we have provided CBSE Important Questions for Class 10 Science Chapter 12 Electricity -

Question 1: Which of the following does not represent electrical power in a circuit?

(a) I^2R

(b) IR^2

(c) VI

(d) V^2/R

Answer: b) IR^2

Explanation:

Electrical power is represented by the expression $P = VI$. (Equation 1)

According to Ohm's law,

$V = IR$

Putting the value of V in (Equation 1), we get

$P = (IR) \times I$

$P = I^2R$

Similarly, from Ohm's law,

$I = V/R$

Putting the value of I in (Equation 1),

$P = V \times V/R = V^2/R$

Thus, it is evident that electrical power in a circuit is not represented by the equation IR2.The rate at which electrical energy is transferred by an electric circuit in a unit of time is known as electric power.

Question 2: An electric bulb is rated 220 V and 100 W. When it is operated on 110 V, the power consumed will be _____.

(a) 75 W

(b) 100 W

(c) 50 W

(d) 25 W

Answer : (d) 25 W

Explanation:

This expression demonstrates how much energy the electric bulb consumes.

$P = VI = V^2/R$

The given formula can be used to calculate the light bulb's resistance:

$R = V^2/P$

Putting the values, we get

R = (220)2/100 = 484 Ω

The resistance generally does not change when the voltage supply is decreased. Consequently, the amount of electricity used can be determined as follows:

$P = V^2/R$

Putting the values, we get

$P = (110)^2$ V/484 Ω = 25 W

As a result, the electric bulb uses 25 W of power when it is operating at 110 V.

Question 3: What is the maximum resistance which can be made using five resistors each of 1/5 Ω?

(a) 5 Ω

(b) 10 Ω

(c) 1/5 Ω

(d) 1 Ω

Answer: (d) 1 Ω

Explanation: Resistance is maximum when resistors are connected in series.

R= 1/5+1/5+1/5+1/5+1/5

R = 5/5

R = 1Ω

Question 4: If the current 'I' through a resistor is increased by 100% (assuming that the temperature remains unchanged), the approximate increase in power dissipated will be

(a) 400 %

(b) 200 %

(c) 300 %

(d) 100 %

Answer: (c) 300 %

Explanation: A resistor generates heat in an inverse relationship with the square of the current. Thus, as the current doubles, the heat loss will multiply by 2=4. There will be a 300% increase as a result.

Question 5: A piece of wire of resistance R is cut into five equal parts. These parts are then arranged in parallel. If the equivalent resistance of this combination is R′, then the ratio R/R′ is _____.

(a) 5

(b) 1/5

(c)1/25

(d) 25

Answer: d) 25

Explanation:

The resistance is divided into five halves, each of which has a resistance of R/5.

Since we are aware that each component is linked to the others in parallel, we can compute the equivalent resistance as follows:

R’ = 5/R + 5/R + 5/R + 5/R +5/R

R’ = (5 + 5+ 5+ 5+ 5)/R = 25/R

RR’ = 25

The ratio of R/R′ is 25.

Question 6: The correct representation of the series combination of cells (Figure 12.4) obtaining maximum potential is

(a) (i)

(b) (ii)

(c) (iii)

(d) (iv)

Answer: (a)

Explanation:

The negative terminal of one cell must be connected to the positive terminal of the adjacent cell. Case I represents the appropriate cell combination.

Question 7: Two pieces of conducting wire of the same material and of equal lengths and the equal diameters are first connected in series and then changed to parallel in a circuit across the same potential difference. The ratio of heat produced in both series and parallel combinations would be _____.

(a) 1:2

(b) 4:1

(c) 1:4

(d) 2:1

Answer 7: (c)

Let *Rs* and *Rp* represent the wires' respective equivalent resistances when linked in series and parallel.

The ratio of heat generated in the circuit is provided by

$Hs/Hp = (V^2/Rs)t/(V^2/Rp)/t = Rp/Rs$

The equivalent resistance (Rs) of resistors connected in series is R + R = 2R

The equivalent resistance (Rp) of resistors connected in parallel is 1/R + 1/R = 2/R

Hence, the estimated ratio of the heat produced in series and parallel combinations would be

Hs/Hp = 2R/(R/2) = 1/4

Thus, the ratio of heat produced is 1:4.

Question 8: What is the minimum resistance which can be made using five resistors, each of 1/5 Ω?

(a) 1/5 Ω

(b) 1/25 Ω

(c) 1/10 Ω

(d) 25 Ω

Answer: (b) 1/25 Ω

Explanation:

Resistance is the minimum when resistors are connected in parallel

1/R= 1/(1/5) + 1/(1/5) + 1/(1/5) + 1/(1/5) + 1/(1/5) = 25 Ω

R = 125Ω

Question 9: A person carries out an experiment and thus plots the V-I graph of three taken samples of nichrome wire with different resistances *R*1, *R*2 and *R*3, respectively (Figure.12.5). Which one of the following is true?

(a) *R*1 = *R*2 = *R*3

(b) *R*1 > *R*2 > *R*3

(c) *R*3 > *R*2 > *R*1

(d) *R*2 > *R*3 > *R*1

Answer 9: (c)

Because the potential difference (V) is plotted on the x-axis and the current (I) is plotted on the y-axis, the graph's slope is 1/R. It suggests that the slope gets steeper the less resistance there is. Consequently, R1 will represent the lowest and R3 the maximum.

Question 10: Two resistors of resistance 2 Ω and 4 Ω, when connected to a battery, will have

(a) the same potential difference across them when connected in series

(b) same current flows through them when connected in series

(c) same current flowing through them when connected in parallel

(d) different p

Answer: (b) same current flowing through them when connected in series

Explanation:

Since the resistor gets a common current in a series arrangement, the current is not split into branches.

Question 11: What does an electric circuit mean?

Answer: A continuous, closed path or loop made up of electrical parts that allows electric current to flow through it is called an electric circuit. A basic circuit consists of conductors, cells, switches, and loads.

Question 12: An electric lamp of 100 Ω, a toaster of resistance 50 Ω and a water filter of resistance 500 Ω resistances are connected in parallel to a 220 V source. What is the resistance of an electric iron connected to the same source that takes as much current as all three appliances, and what is the current that flows through it?

Answer:

R1 = 100 , R2 = 50 , R3 = 500

All the devices are in parallel, so

1/R = 1/R1 + 1/R2 + 1/R3

1/R = 1/100 + 1/50 + 1/500 = (5 + 10 + 1)/500 = 16/500

R = 500/16 = 31.25

Current, through all the appliances

I = **V/R = 220 / 31.25 = 220 X 31.25 =** 7.04 A

Now, if only electric iron is connected to the same source such that it takes as much current as all three appliances, i.e. I = 7.04 A, its resistance should be equal to 31.25 .

Question 13: How is the resistivity of alloys compared with those of pure metals from which they may have been formed?

Answer: An alloy often has a higher resistivity than the individual metals that make up the alloy.

Question 14: Write the relation between the resistance (R) of the filament of a bulb, its power (P) and a constant voltage V applied across it.

Answer: The relation between resistance (R) of the filament of a bulb, its power (P) and a constant voltage V applied across it can be represented as follows:

$P = V^2/R$

Question 15: How does the use of a fuse wire protect electrical appliances?

Answer: The fuse wire is more resistant than the main wiring. Melting fuse wire breaks the circuit if there is a sudden spike in electric current. This prevents harm to electrical equipment.

Question 16: Why are copper wires used as connecting wires?

Answer: Given that copper has a low electrical resistance, copper wires are utilised as connecting wires.It is a cheap, ductile, and very effective electrical conductor.

Question: Define the SI unit of current.

Answer: The SI unit of current is ampere. An ampere is defined by the flow of one coulomb of Charge per second.

Question 18: How can three resistors of resistances 2 Ω, 3 Ω and 6 Ω be connected to give a total resistance of (a) 4 Ω (b) 1 Ω?

Answer: In order to get 4 Ω, resistance 2 Ω should be connected in series with the parallel combination of 3 Ω and 6 Ω.

$1/R_{CD} = 1/3 + 1/6 = (2 + 1)/6$

$= 3/6 = 1/2$

$\mathbf{R_{CD} = 2 , R_{AB} = 2}$

$\mathbf{R_{AD} = R_{AB} + R_{CD}}$

$\mathbf{= 2 + 2 = 4}$

Therefore, the total resistance of the circuit is R= **4**

(b) In order to get 1 , all three resistors should be connected in parallel as

$\mathbf{1/R = 1/2 + 1/3 + 1/6 = (3 + 2 + 1)/6 =}$ 1

Therefore, the net equivalent resistance of the circuit is R = 1

Question 19: A rectangular block of iron has dimensions L x L x b. What will be the resistance of the block measured between the two square ends? Given p resistivity.

Answer: We know that the dimensions of a rectangular iron block are l x l x b. The resistance of the block, as measured between its two square ends, must be determined.

The resistance is given by the below formula as follows :

R = pL/A

L is length of block

A is area of cross section

In this case,

Length of the rectangular block is l and area of block is l x b. So, resistance of the block measured between the two square ends is :

$R = pb/l^2$

So, the resistance of the block measured between the two square ends इस $R = pb/l^2$

Question 20: Ammeter burn out when connected in parallel. Give reasons.

Answer: A large amount of current flows through a low resistance wire when it is linked in parallel, eventually burning it out or short-circuiting it.

Question 21: Should the resistance of an ammeter be low or high? Give reason(s).

Answer: The resistance of an ammeter should be zero, as the ammeter should not affect the flow of current in a circuit.

Question 22: Why does the connecting rod of an electric heater not glow, but the heating element does?

Answer: The connecting rod of an electric heater does not glow because its resistance is lower than that of the heating element. As a result, the heating element glows and generates more heat than the connected cord.

Question 23: The power of a lamp is 60 W. Find the energy in joules consumed by it in 1s.

Answer: Here, given the power of the lamp, P = 60 W time,

t= 1 s

So, energy consumed = power x time = (60 x 1) J = 60 J

Question 24: A wire of resistivity ‘p’ is stretched to double its length. What will be its new resistivity?

Answer: Since resistivity is dependent on the type of material, it tends to stay constant when a wire with resistivity p is stretched to double its length.

Question 25: What is the resistance of any connecting wire?

Answer: Good conductors have very low resistance, and joining wires made of them are thought to have zero resistance. They may thus be employed in connections with ease and emit less heat.

Question 26: A number of n resistors each of resistance 'R' are first connected in series and then in parallel connection. What is the ratio of the total effective resistance of the circuit in series combination and parallel combination?

Answer : Total effective resistance of the circuit in series combination is Rs = nR

And for parallel combination is Rp = R/n and

Rs/Rp = nR/R/n

= n2

The ratio will be n2.

Question 27: Calculate the total number of electrons constituting one coulomb of charge.

Answer:

We know,

The Charge of an electron = 1.6×10^{-19} C.

According to the concept of charge quantisation,

Q = nqe, where we suppose '*n'* is the number of electrons and similarly '*qe'* is the Charge of the electron.

Substituting these values in the said equation, the number of electrons constituting one coulomb of Charge can be calculated as follows:

$1C = n X 1.6 X 10^{-19}$

$n= 11.6 X 10^{-19} = 6.25 X 10^{18}$

Therefore, the number of electrons in one coulomb of Charge = $6. 25 \times 10^{18}$.

Question 28: How much current will an electric iron draw from a 220 V source if the resistance of its element when hot is 55 ohms? Calculate the wattage of the electric iron when it operates on 220 volts.

Answer:

Here, V = 220V , R = 55

By Ohm's law, V = IR

Therefore, 220 = 7 x 55 or I = 4A

The wattage of electric iron = Power

= V^2R = (220)255 = 880 W

Question 29: A current of 1 ampere flows in a circuit of series connection containing an electric lamp and a conductor of 5 Ω and connected to a 10 V battery. Calculate the resistance of the given electric lamp.

Therefore, if the resistance of 10 Ω is connected in parallel with this series combination, what type of change (if any) in current flowing through the 5 Ω conductor and potential difference across the lamp will take place? Give reasons.

Answer:

Let Rlamp represent the resistance of the lamp.

Current (*I*) = 1 A

Resistance of conductor (Rconductor) = 5 Ω

The potential difference of battery (*V)* = 10 V

Given that the lamp and conductor are linked in series, the same amount of current 1 A will flow through them both.

Using Ohm's law,

Rnet = VI

Rnet =10 क्त 1

Rnet = 10

We know, in series connection

Rnet = Rlamp + RConductor

10 = Rlamp + 5

Rlamp = 5

The potential difference across lamps,

Rlamp = I x Rlamp

= 1 x 5 = 5 V

When a resistor of 10 Ω resistor connected parallel to the series combination of lamp and conductor

(Rnet = 5 + 5 = 10) then the equivalent resistance,

1/Req = 1/10 + 1/10 = 2/10 = 1/5

Req = 5

Using Ohm's law,

I'= V/Req

I'= 10/5

I'= 2A

Equal distribution of current will occur in two parallel parts.

Thus, I'/2 = 1A current will pass through both the lamp and the resistor of 5 (because they are connected in series).

The potential difference across the lamp (Rlamp = 5).

V'lamp = 1×5 = 5 V

Therefore, the current flowing through the conductor of resistance 5 and the potential difference across the bulb won't change.

Question 30: What is electrical resistivity? In a particular series electrical circuit comprising a resistor made up of a metallic wire, the ammeter generally reads 5 A. The previous reading of the ammeter decreases to half in case the length of the wire is doubled. Why?

Answer:

One characteristic of a conductor that stops electric current flow is called resistivity. A given material has a unique resistance. Resistance is inversely proportional to current flow and directly proportional to conductor length.

The resistance doubles and the current flow is cut in half when the length doubles. This is the reason for the decrease in the ammeter value.

Benefits of CBSE Important Questions for Class 10 Science Chapter 12

The benefits of CBSE Important Questions for Class 10 Science Chapter 12, "Electricity," are significant in helping students understand and apply the concepts effectively:

Focused Learning: These questions target key topics such as electric current, Ohm’s Law, resistance, and power, allowing students to focus on the most critical areas.

Better Exam Preparation: Practicing these questions improves familiarity with the types of problems that frequently appear in exams, boosting confidence and efficiency.

Conceptual Clarity: Solving these questions enhances understanding of practical applications of electricity, such as circuits and electrical devices, making complex ideas simpler.

Numerical Practice: These questions provide ample practice for solving numerical problems, which are essential for scoring well in board exams.

Time Management: Regular practice of important questions improves speed and accuracy, helping students manage their time better during exams.