PHYSICS

BOOKS - U-LIKE PHYSICS (HINGLISH)

ELECTRICITY

Ncert Questions Question

1. What does an electric circuit mean?

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2. Define the unit of current?

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3. Calculate the number of electrons constituting one coulomb of charge?

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4. Name a device that helps to maintain a potential difference across a conductor.

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5. What is meant by saying that the potential difference two points is 1V?

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6. How much energy is given to each coulomb of charge passing through a 6V battery?

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7. On what factors does the resistance of a conductor depend?

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8. Will current flow more easily through a thick wire of the same material, when connected to the same source? Why?

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9. Let the resistance of an electrical components remains constant while the potential difference across the two ends of the component decreases to half to its former value. What change will occur in the current through it?

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10. Why are the coils of electric toasters and electric irons made of an alloy rather than a

pure metal?

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11. Use the data in table 12.2 to answer the following:

(a) Which among iron and mercury is a better conductor?

(b) Which material is the best conductor?

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12. Draw a schematic diagram of a circuit consisting of a battery of three cells of 2V each, a 5Ω resistor , and 8Ω resistor and a 12Ω resistor and a plug key, all connected in series.

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13. Redraw the circuit of Question 1, putting in an ammeter to measure to current through the resistors and a voltmeter to measure the potential difference across the 12Ω resistor.

What would be the readings in the ammeter and the voltmeter?

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14. Judge the equivalent resistance when the following are connected in parallel:

a) 1Ω and $10^6\Omega$ (b) 1Ω and $10^3\Omega$ and $10^6\Omega$

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15. An electric lamp of 100Ω, a toaster of resistance 50Ω and a water filter of resistance 500Ω are connected in parallel to a 220V 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 through it?

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16. What are the advantages of connecting electrical devices in parallel with the battery instead of connecting them in series?

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17. How can three resistors of resistances $2\Omega, 3\Omega$ and 6Ω be connected to give a total resistance of

(a) $4\Omega (b) 1\Omega$?

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18. What is (a) the highest (b) the lowest total resistance that can be secured by combinations of four coils of resistances $4\Omega, 8\Omega, 12\Omega$ and 24Ω?

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19. Why does the cord of an electric heater not glow while the heating element does?

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20. Compute the heat generated while transferring 96000 coulomb of charge in one hour through a potential difference of 50V.

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21. An electric iron of resistance 20Ω takes a current of 5A. Calculate the heat developed in 30s.

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22. What determines the rate at which energy is delivered by a current?

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23. An electric motor takes 5A from a 220V line. Determine the power of the motor and the energy consumed in 2h.

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Ncert Exercises

1. A piece of wire of resistances R is cut into five equal parts. These parts are then connected in parallel. If the equivalent resistance of this combination is R' then the ratio $\frac{R}{R}$, is

A. $\frac{1}{25}$

B. $\frac{1}{5}$

C. 5

D. 25

Answer:

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2. Which of the following terms does not represent electrical power in a circuit?

A. I^2R

B. IR^2

C. VI

D. $\frac{V^2}{R}$

Answer:

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

A. 100W

B. 75W

C. 50W

D. 25W

Answer:

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4. Two conducting wires have equal lengths equal diameters are first connected in series and then parallel in a circuit across the same potential difference. The ratio of heat produced in series and parallel combinations would be:

A. $1:2$

B. $2:1$

C. $1:4$

D. $4:1$

Answer:

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5. How is a voltmeter connected in a circuit to measure the potential difference between two points ?

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6. A copper wire has diameter 0.5mm and resistivity of $1.6 \times 10^{-8} \Omega . m$ What will be the length of this wire to make its resistances 10Ω ? How much does the resistance change if the diameter is doubled?

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7. The values of current I flowing in a given resistor for the corresponding values of potential difference V across the resistor are

given below:

Plot a graph between V and I and calculate the resistance of that resistor.

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8. When a 12V battery is connected across an unknown resistor, there is a current of 2.5mA in the circuit. Find the value of the resistance of the resistor.

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9. A battery of 9V is connected in series with resistors of 0.2Ω, 0.3Ω, 0.4Ω, 0.5Ω and 0.12Ω respectively. How much current would flow through the 12Ω resistors?

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10. How many 176Ω resistor (in parallel) are requried to carry 5A on a 220V line?

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11. Show how you would connect three resistors, each of resistance 6Ω so that the combination has a resistance of (i) $9\Omega (ii) 4\Omega$

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12. Several electric bulbs designed to be used on a 220V electric supply line, are rated 10W. How many lamps can be connected in parallel with each other across the two wires of 220V line if the maximum allowable current is 5A?

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13. A hot plate of an electric oven connected to a 220V line, has two resistance coils A and B , each of 24Ω resistance, which may be used separately, in series, or in parallel. What are the currents in the three cases?

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14. Compare the power used in the 2Ω resistor in each of the following circuits: (i) a 6V

battery in series with 1Ω and 2Ω resistors, and (ii) a 4V battery in parallel with 12Ω and 2Ω resistors.

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15. Two lamps one rated 100W at 220V, and the other 60W at 220V, are connected in parallel to electric mains supply. What current is drawn from the line if the supply voltage is 220V?

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16. Which uses more energy, a 250W TV set in 1hour or a 1200W toaster in 10 minutes?

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17. An electric heater of resistance 8Ω draws 15A from the service mains for 2hours. Calculate the rate at which heat is developed in the heater?

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18. Explain the following:

(a) Why is the tungsten used almost exclusively for filament of electric lamps?

(b) Why are the conductors of electric heating devices, such as bread-toasters and electric irons, made of an alloy rather than a pure metal?

(c) Why is the series arrangement not used for domestic circuits?

(d) How does the resistances of a wire vary with its area of cross sections?

(e) Why are copper and aluminium wires usually employed for electricity transmission?

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Case Based Source Based Integrated Questions

1. Answer questio numbers (a)-(d) on the basis of your understanding of the following paragraph and the related studied concepts:

We know that a battery or a cell is a source of electrical energy. The chemical reaction within

the cell generates the potential differences between its two terminals that sets the electrons in motion to flow the current through a resistor or a system of resistors connected to the battery. We also know that to maintain the current, the source has to keep expending its energy. Where does this energy go? A part of the source energy in maintaining the current may be consumed into useful work (like in rotating the blades of an electric fan). Rest of the source energy may be expended in heat to raise the temperature of gadget. We often observe this is our

everyday life. For example, an electric fan becomes warm if used continuously for longer time etc. On the other hand, if the electric circuit is purely resistive, that is, a configuration of resistors only connected to a battery, the source energy continually gets dissipated entirely in the form of heat. This is known as the heating effect of electric current. This effect is utilised in devices such as electric heater, electric iron etc.

How is a current establish through a resistor when it is joined to an electric cell?

(b) Why does an electric fan becomes warm if

used for some time continuously?

(c) What is the amount of heat produced when a current I flows through a resistor R for time t?

(d) Graphs plotted between heat produced (H) and time (T) for resistor A and B joined in series in an electric circuit are shown here. Which has small resistance A or B and why?

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2. Answer a to d on the basis of your understanding of the following table and the related studied concepts.

The table shows that metals have very low resistivity. Resistivity of an alloy is generally higher than that of its constituent metals. Alloys do not oxidise readily at high temperature. Glass and rubber have very high value of resistivity.

What do you mean by resistivity? On which factors does it depend?

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3. Answer a to d on the basis of your understanding of the following table and the related studied concepts.

The table shows that metals have very low resistivity. Resistivity of an alloy is generally higher than that of its constituent metals. Alloys do not oxidise readily at high temperature. Glass and rubber have very high value of resistivity.

Why do we use copper wire coated with rubber for carrying electricity?

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4. Answer a to d on the basis of your understanding of the following table and the related studied concepts.

The table shows that metals have very low resistivity. Resistivity of an alloy is generally higher than that of its constituent metals.

Alloys do not oxidise readily at high temperature. Glass and rubber have very high value of resistivity.

Resistance of a constanton wire of length 10 and cross section are $10^{-6}m^2$ shall be

A. 4.9Ω

B. $4.9 \times 10^{-12}\Omega$

C. 49Ω

D. $4.9 \times 10^{-16}\Omega$

Answer:

View Text Solution

5. Answer questio numbers (a)-(d) on the basis of your understanding of the following paragraph and the related studied concepts:

We know that current flowing through a conductor depends upon its resistance and potential difference across its ends. The resistance of the conductor depends of (i) its length (ii) its area of cross section and (iii)on the nature of its material. PRecise measurements show that resistance of a

uniform metallic conductor is directly proportional to its length (l) and inversely proportional to the area of cross section (A). thus, we can write

$R = \frac{\rho l}{A}$ where p is a constant whose value depends on the material of the conductor.

WHo studied the relation between current flowing through a conductor and potential difference across its ends?

(b) State the relationship between current, resistance and potential difference in a mathematical form.

(c) Name the constant p whose value depends

on the material of the conductor and give its SI unit.

(d) How does value of p governs your choice of material to be used as live wire for electrical fittings in your house? Name two suitable materials.

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Multiple Choice Questions

1. The correct relation between current I and amount of charge flown q during a time t through a conductor is

A. $I = qt$

B. $q = I^2 t$

C. $q = It$

D. $I = \frac{q^2}{t}$

Answer:

View Text Solution

2. SI unit of resistivity is

A. $ohm/metre$

B. ohm-metre

C. $ohm/(metre)^3$

D. $ohm/(metre)^2$

Answer:

View Text Solution

3. If Four resistors each of 1Ω are connected in parallel the effective resistances will be

A. 0.5Ω

B. 0.25Ω

C. 4Ω

D. 2Ω

Answer:

View Text Solution

4. Resistivity of a given conductor depends on

A. length of conductor

B. length as well as cross section of conductor

C. material and dimensions of conductor

D. material of conductor and temperature

Answer:

View Text Solution

5. A combination of three resistances has been shown here. Effective resistance between the points A and B is

A. 8Ω

B. 4Ω

C. 2Ω

D. 1Ω

Answer:

View Text Solution

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6. Which alloy is used to prepare the heating element of an electric iron?

A. Constanton

B. Tin-lead alloy

C. German silver

D. Nichrome

Answer:

View Text Solution

7. Two electric lamps are rated as 220V,100W and 220V, 40W respectively. Their electric resistances are

A. $484\Omega, 1210\Omega$

B. $2.2\Omega, 5.5\Omega$

C. $45.5\Omega 7.3\Omega$

D. 100W,40W

Answer:

View Text Solution

8. A wire of resistance 8Ω is bent in the form of a closed circle. What is the effective resistances between the two points A and B, at the ends of any diameter of the circle?

A. 8Ω

B. 4Ω

C. 2Ω

D. 1Ω

Answer:

View Text Solution

9. The rheostate is used in the circuit to:

A. increase the magnitude of the current

B. decrease the magnitude of the current

C. increase or deacrese the magnitude of the current

D. change the current in the resistor without charging the potential difference across its two ends.

Answer:

View Text Solution

10. The graph between current I and potential difference V in the experimental verification of Ohm's law were drawn by four students. Which one is correct?

A. 

B. 

C. 

D. 

Answer:

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11. A cell, a resistor R, a key K and an ammeter A are arranged as shown in the figure shown here, The current recorded in the ammeter will

be

A. maximum in (i)

B. maximum in (ii)

C. maximum in (iii)

D. the same in all the cases.

Answer:

View Text Solution

12. Electrical resistivity of a given metallic wire depends upon

A. its length

B. its thickness

C. its shape

D. nature of the material

Answer:

View Text Solution

13. A current of 1A is drawn by a filament of an electric bulb. Number of electrons passing through a cross section of the filament in 16s would be roughly?

A. 10^{20}

B. 10^{18}

C. 10^{16}

D. 10^{23}

Answer:

View Text Solution

14. All elements of an electric circuit are connected in series except:

A. voltmeter

B. ammeter

C. rheostat

D. resistor

Answer:

View Text Solution

15. A resistances wire is stretched so as to double its length. Its new resistivity will have a magnitude

A. 2 times its original value

B. 4 times its original value

C. 8 times its original value

D. same as its original value

Answer:

View Text Solution

16. The resistance of an alloy:

A. increase with temperature

B. decrease with temperature

C. is constant with rise in temperature

D. is zero

Answer:

View Text Solution

17. Three resistor of $1\Omega, 2\Omega, 3\Omega$ are connected in series with a battery of 12V as shown in figure. Values of potential differences V_1, V_2, V_3 across the three resistor have respective values:

A. 2V,4V,6V

B. 6V,4V,2V

C. 3V,2V,1V

D. $\frac{1}{12}V, \frac{2}{12}V, \frac{3}{12}V$

Answer:

View Text Solution

18. The proper representation of series combination of cells obtaining maximum potentail is

A. 

B. 

C. 

D. 

Answer:

View Text Solution

19. A cylindrical conductor of length l and uniform area of cross section A has resistance R. Another conductor of length 2l and resistance R of the same material has an area of cross section

A. $\frac{A}{2}$

B. $\frac{3A}{2}$

C. $2A$

D. $3A$

Answer:

View Text Solution

20. Which of the following represent voltage?

A. $\frac{w \text{ or } kdone}{current \times time}$

B. $w \text{ or } kdone \times charge$

C. $\frac{w \text{ or } kdone \times time}{current}$

D. w or $kdone \times chargetime$

Answer:

View Text Solution

21. The diagram shows a network of four resistors which is connected to an electric source. Identify the resistors which are connected in series in this network:

A. B,A and D

B. B,C and D

C. C,D and A

D. A,B and C

Answer:

View Text Solution

22. A student was given three resistances of $5\Omega, 2\Omega \text{ and } 3\Omega$ He experimentally obtained the equivalent resistance of their series combination. The correct value will be:

A. 0.9Ω

B. 10Ω

C. 1.03Ω

D. 10.9Ω

Answer:

View Text Solution

23. The equivalent resistances of a series combination of two resistances is $X\Omega$. If the

resistances are of 10Ω and 40Ω respectively.

The value of X will be:

A. 10Ω

B. 20Ω

C. 50Ω

D. 40Ω

Answer:

View Text Solution

24. Two resistances wires, when joined in parallel, give an affective resistances of $\frac{6}{5}\Omega$ When one of the resistances wire is disconnected the effective resistances charges to 2Ω. The resistance of the disconnected resistance wire is

A. $\frac{4}{5}\Omega$

B. 2Ω

C. 6Ω

D. 3Ω

Answer:

View Text Solution

25. The SI unit of resistance is:

A. volt

B. ampere

C. ohm

D. joule

Answer:

View Text Solution

26. The resistance of an electric bulb drawing 12A current at 6.0V will be:

A. 0.5Ω

B. 5Ω

C. 0.2Ω

D. 2Ω

Answer:

View Text Solution

27. Which of the following experimental set up is correct for verification of Ohm's law?

A. A

B. B

C. Both A and B

D. Neither A and B

Answer:

View Text Solution

View Text Solution

28. Which is the resistor value in the given circuit.

A. 200Ω

B. $1k\Omega$

C. $2k\Omega$

D. $4k\Omega$

Answer:

View Text Solution

29. Two bulbs of 100W and 40W are connected in series. The current through the 100W bulb is 1A. The current through the 40W bulb will be:

A. $0.4A$

B. $0.6A$

C. $0.8A$

D. 1A

Answer:

View Text Solution

30. The maximum resistance which can be made using four resistors each of resistance $\frac{1}{2}\Omega$ is

A. 2Ω

B. 1Ω

C. 2.5Ω

D. 8Ω

Answer:

View Text Solution

31. IF a person have five resistors each of value $\frac{1}{5}\Omega$ then the maximum resistance he can obtained by connecting them is

A. 1Ω

B. 5Ω

C. 10Ω

D. 25Ω

Answer:

View Text Solution

32. The resistace of a resistor is reduced to half of its initial value, In doing so, other parameters of the circuit remains unchanged. The heating effects in the resistors will become

A. two times

B. half

C. one fourth

D. four times

Answer:

View Text Solution

33. In a circuit four resistors of $1\Omega, 2\Omega, 6\Omega$ and 12Ω respectively are connected in series combination. The maximum resistance that can be obtained is

A. 21Ω

B. 18Ω

C. 6Ω

D. 4Ω

Answer:

View Text Solution

34. In an electric circuit three resistors R_1, R_2 and R_3 are connected in series such that $R_2 = R_3$. IF V_1, V_2 and V_3 are the

voltage across R_1, R_2 and R_3 respectively , then

A. $V_1 = V_2$

B. $V_2 = V_3$

C. $V_1 = V_3$

D. $V_1 = V_2 = V_3$

Answer:

View Text Solution

35. If the resistance in a circuit with constant voltage increases, the current will:

A. increase

B. decrease

C. stay the same

D. not enough information

Answer:

View Text Solution

36. A cylindrical conductor of length l and uniform area of cross section A has resistance R. Another conductor of length 2.5l and resistance 0.5R of the same material has an area of cross section

A. 5A

B. 2.5A

C. 0.5A

D. $\frac{1}{5}A$

Answer:

View Text Solution

37. The values of mA and μA are

A. $10^{-6}A$ and $10^{-9}A$ respectively

B. $10^{-3}A$ and $10^{-6}A$ respectively

C. $10^{-3}A$ and $10^{-9}A$ respectively

D. $10^{-6}A$ and $10^{-3}A$ respectively

Answer:

View Text Solution

38. What is the maximum resistance which can be made using five resistors each of $\frac{1}{5}\Omega$?

A. $\frac{1}{5}\Omega$

B. 25Ω

C. $\frac{1}{10}\Omega$

D. $\frac{1}{25}\Omega$

Answer:

View Text Solution

39. What will happens to current passing through a conductor if potential difference across it is doubled and the resistance is halved?

A. remains unchanged

B. become double

C. becomes halved

D. becomes four times

Answer:

View Text Solution

40. n resistors, each of resistances R are first connected in series so as to give an effective resistance R_s Subsequently these resistors are connected in parallel so as to give an effective resistance R_p. Then the ratio $\frac{R_s}{R_p}$ will be

A. $n:1$

B. $n^2:1$

C. $1:n^2$

D. $1:n$

Answer:

View Text Solution

True Or False

1. Electrons as well as protons are responsible for flow of electric current through a conductor.

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2. A cell is that device which gives voltage but cannot be recharged but a battery can be recharged again and again.

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3. When length of a wire is doubled its resistance as well as resistivity are doubled.

View Text Solution

4. IF potential difference across a given conductor is doubled then its electrical resistance is also doubled.

View Text Solution

5. According to Joule's law the amount of heat produced in a given resistor in a given time is directly proportional to the current I flowing through it.

View Text Solution

6. The resistance of a thin wire is more than that of a thick wire of same length and same material.

View Text Solution

7. In our house hold electric circuit all appliances are connected in series.

View Text Solution

Fill In The Blanks

1. Symbol of a resistor is.....

View Text Solution

2. ..... is used for preparing the filament of an electric bulb.

View Text Solution

3. 1kw h=.....J

View Text Solution

4. SI unit of electrical resistivity is.....

View Text Solution

5. An electric iron of 750W rating is used for 20hours. The amount fo electrical energy consumed is.....units.

View Text Solution

6. Three resistances of $2\Omega, 3\Omega$ and 6Ω are first connected in series and the equivalent resistance is found to be..... Then the three resistances are connected in parallel Now its equivalent resistance is.....

View Text Solution

7. SI unit of electric current is..... And that of the potential difference is.....

View Text Solution

8. In domestic electric circuit all appliances are connected in.....

View Text Solution

9. In a series electric circuit .....is constant throughout the electric circuit.

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Assertion Reason Questons

1. Assertion (A): Copper and aluminium are two metal which are most commonly used for current electricity.

Reason (R): Conductors are those substances in which electric charge can flow freely.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer:

View Text Solution

2. Assertion (A): When a resistance wire is stretched so as to make its length double, its resistance becomes 4 times of its original value.

Reason (R): Resistance of a conductor is directly proportional to its length and inversely proportional to its cross section area.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer:

View Text Solution

3. Assertion (A): In series grouping of resistances the equivalent resistance is greater than even the biggest resistance

joined in series.

Reason (R): In series arrangement the equivalent resistance Rs is given as per the relation $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + ...$

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer:

View Text Solution

4. Assertion (A): Two bulbs A and B are rated as 100W,220V, and 40W,220V respectively. Resistance of bulb A is more than that of bulb B.

Reason (R): For a given potential difference the power consumed in a resistor is inversely proportional to its resistance.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer:

View Text Solution

5. Assertion (A): Flow of 6.25×10^{18} electrons per second through a cross section of a conductor constitutes an electric current of one ampere.

Reason (R): Charge on an electron $= 1.6 \times 10^{-18} C$

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer:

View Text Solution

6. Assertion (A): No current can flow so long as an electric circuit is open.

Reason (R): Resistance of an open circuit is infinite.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer:

View Text Solution

7. Assertion (A): Alloys are commonly used is electrical heating devices like electric iron and heater.

Reason (R): Resistivity of an alloy is generally higher than that of its constituent metals but the alloy have lower melting point then their constituent metals.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer:

View Text Solution

8. Assertion (A): All the appliances in household electric circuit are connected invariably in parallel arrangement.

Reason (R): In parallel combination electricity consumption is less.

A. Both (A) and (R) are true and (R) is correct explanation of the assertion

B. Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer:

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Very Short Answer Questions

1. Give symbols of (i) an electric cell, (ii) battery of cells.

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2. Identify the following symbols of commonly used components in a circuit diagram.

View Text Solution

3. Define electric current?

View Text Solution

4. State the SI unit of electric current and define it.

View Text Solution

5. In an electric circuit state the relationship between the direction of conventional current in the direction of flow of electrons.

View Text Solution

6. Define potential difference between two points in a conductor.

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7. What is meant by the statement " potential difference between points A and B in an electric field is 1 volt"

View Text Solution

8. When do we say that the potential difference between two points of a circuit in 1 volt?

View Text Solution

9. What is the name of physical quantity which is equal to $\frac{V}{I}$?

View Text Solution

10. Define resistance. Give its SI unit?

View Text Solution

11. When do you say that the resistance of a wire is 1Ω?

View Text Solution

12. The potential difference across the terminals of a cell is 1.5 volt.It is connected with a resistance of 30ohms. Calculate the current flowing through the circuit.

View Text Solution

13. State ohm's law

View Text Solution

14. The following table gives the value of electrical resistivity of some materials.

Which one is the best conductor of electricity out of them.

View Text Solution

15. What is meant by electric resistance of a conductor?

View Text Solution

16. What is the shape of V-I graph for a metallic wire? Why?

View Text Solution

17. The resistance of a resistor is kept constant and the potential difference across its two ends is decreased to half of its former value. State the change that will occur in the current flowing through it.

View Text Solution

18. Keeping the potential difference constant, the resistance of an electric circuit is doubled. State the change in the reading of an ammeter connected in the circuit.

View Text Solution

19. The length of a wire is doubled and its cross sectional area is also doubled. What is the change in its resistivity?

View Text Solution

20. What is electrical resistivity? What is SI unit?

View Text Solution

21. On what factors does the resistance of a conductor depend?

View Text Solution

22. On what factors does the resistance of a conductor depend?

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23. How are two resistors with resistances $R_1\Omega$ and $R_2\Omega$ are to be connected to a battery of emf 3 volts to obtain maximum current flowing through it?

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24. What potential difference is needed to send a current of 5A through the electrical appliance having a resistance of 18Ω?

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25. You have two metallic wires of resistances 6Ω and 3Ω. How will you connect these wires to get the effective resistance of 2Ω?

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26. What happens to the resistance of a conductor when the length of the conductor is reduced to half?

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27. What happens to resistance of a conductor when its temperature is increased?

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28. In which arrangement, series on parallel, are various electrical devices connected in the domestic lighting circuit?

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29. How does the resistance of a wire depend on its radius?

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30. A given length of a wire is doubled on itself. By what factors does the resistance of the wire change?

View Text Solution

31. What is the effective resistance in the given circuit?

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32. Draw a schematic diagram of an electric circuit consisting of a battery of two cells each of 1.5V, 5Ω, 10Ω, 15Ω resistors and a plug key, all connected in series.

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33. Name a instrument /device used to measure electric current in a circuit?

View Text Solution

34. How is an ammeter connected in a circuit to measure current flowing through it?

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35. What is a voltmeter?

View Text Solution

36. Name the instrument used to measure (i) electric current in a circuit, (ii) potential

difference between two points in a circuit.

View Text Solution

37. In a circuit if resistors of 5Ω and 10Ω are connected in series, compare the current passing through the two resistors.

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38. Two resistors of 30Ω and 60Ω are connected in parallel in an electric circuit. How

does the current passing through the two resistors compare?

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39. What is the lowest resistance that can be obtained by combining four coils of resistors of $4\Omega, 8\Omega, 12\Omega$ and 24Ω?

View Text Solution

40. Write the relation between electric power (P) in watt of a device with potential difference (V volt) across it and current (I ampere) flowing through it.

View Text Solution

41. What is heating effect of electric current?

View Text Solution

42. State Joule law of heating

View Text Solution

43. In the circuit shown power dissipated in 12Ωresistance is 6 watt. What is the power dissipated in the 8Ω resistance.

View Text Solution

44. The voltage current (V-I) graph of a metallic circuit at two different temperature T_1 and T_2 is shown in fig.12.21 which of the two temperatures is higher and why?

View Text Solution

45. Define kW h.

View Text Solution

46. How many joules are equals to 1k Wh?

View Text Solution

47. Out of 60W and 40W lamps, which one has a higher electrical resistance when in use?

View Text Solution

48. Power of a lamp is 60W. Find the energy is SI unit consumed by it in 1s.

View Text Solution

49. Out of the two, a toaster of 1kW and an electric heater of 2kW, which has a greater resistance?

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50. Name any two appliances /devices based on heating effect of current.

View Text Solution

51. Nichrome is used to make the element of an electric heater. Why?

View Text Solution

52. Would you connect a fuse in series or in parallel to an electric circuit?

View Text Solution

53. Why do electricians wear rubber hand gloves while working?

View Text Solution

54. Why are metals good conductors of electricity whereas glass is a bad conductor of electricity? Give reason.

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Short Answer Question

1. Define an electric circuit , Draw a labelled, schematic diagram of an electric circuit comprising of a cell, a resistor , an ammeter, a volmeter and a closed switch. Distinguish between an open and a closed circuit.

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2. n electrons, each carrying a charge -e, are flowing across a unit cross section of a metallic wire in unit time from east to west.

Write an expression for electric current and also give its direction of flow. Give reason for your answer.

(b) The charge possessed by an electron is 1.6×10^{-19} coulomb. Find the number of electrons that will flow per second to constitute a current of a 1 ampere.

View Text Solution

3. Define the term 'volt'.

(b) State the relation between work, charge

and potential difference from an electric circuit. Calculate the potential difference between the two terminals of a battery if 100 joules of work is required to transfer 20 coulombs of charge from one terminal of the battery to the other.

View Text Solution

4. Mention the condition under which charges can move in a conductor. Name the device which is used to maintain this condition in an

electric circuit.

(b) A current of 2A passes through a circuit for 1 minute. IF potential difference between the terminals of the circuit is 3V, what is the work done is transferring the charge?

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5. What do you mean by resistance of a conductor? Define its unit.

(b) In an electric circuit with a resistance wire and a cell, the current flowing is I. what would

happen to this current if the wire is replaced by another thicker wire of same material and same length? Give reason.

View Text Solution

6. State ohm's law. How can it verified experimentally? Does it hold good in all conditions? Comment.

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7. List the factors on which the resistance of a cylindrical conductor depends and hence write an expression for its resistance.

(b) How will the resistivity of a conductor change when its length is tripled by stretching it?

View Text Solution

8. Expresss Joule's law of heating mathematically.

What is the resistance of 12m wire having radius $2 \times 10^{-4} m$ and resistivity $3.14 \times 10^{-8} \Omega . m$?

View Text Solution

9. Describe a simple experiment to demonstrate variation of resistance on (i) length (ii) Cross section area and (iii) material of the conductor. What are the conclusions drawn?

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10. Write the relation between resistance and electrical resistivity of the material of a conductor in the shape of cylinder of length l and area of cross section A. Hence derive the SI unit of electrical resistivity.

(b) Resistance of a metal wire of length 5m is 100Ω. IF the area of cross section of the wire is $3 \times 10^{-7} m^2$, calculate the resistivity of the material.

View Text Solution

11. V-I graphs for two wires A and B are shown in the Fig.12.26. If both the wires are made of some material and are of same length, which of the two is thicker? Give justification for your answer.

(b) A wire of length L and resistance R is stretched so that the length is doubled and area of cross section halved. How will (i) resistance charge and (ii) resistivity charge?

View Text Solution

12. Derive the relation $R = R_1 + R_2 + R_3$.

When resistors are joined in series.

View Text Solution

13. Derive the relation $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

when resistors are joined in parallel.

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14. Two lamps rated 100W,220V and 25W,220V are connected in parallel to 220V supply. Calculate the total current through the circuit.

View Text Solution

15. Show how would you join three resistors, each of resistance 9Ω so that the equivalent resistance of the combination is (i) $13.5\Omega (ii) 6\Omega$?

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16. Study the electric circuit of Fig. 12.30 and find (i) the current flowing in the circuit and (ii) the potential difference across 10Ω resistor.

View Text Solution

17. Two wires of equal length, one of copper and the other of manganin (an alloy) have the same thickness. Which one can be used for (i) electric transmission lines, (ii) electrical

heating devices? Why?

(b) Table gives the resistivity of three samples $(In\Omega m)$:

Which of them is a good conductor and which is an insulator. Why?

View Text Solution

18. Three resistors of 3Ω each are connected to a battery of 3V as shown in Fig.21.31.

Calculate the current drawn from the battery.

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19. Study of the following circuit and answer the questions that follow:

(a) State the type of combination of the two resistors in the circuit

(b) How much current is flowing through (i) 10Ω and $(ii) 15\Omega$ resistors?

(c) What is the ammeter reading?

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20. Two resistors, with resistance $5\Omega \text{ and } 10\Omega$ resistively are to be connected to a battery of emf 6V so as to obtain:

(i) Minimum current flowing (ii) maximum current flowing

(a) How will you connect the resistance in each case?

(b) Calculate the strength of the total current in the circuit in the two cases.

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21. Study the circuit of Fig.12.33 and find out : (i) Current in 12Ω, resistor (ii) difference in the readings of A_1 and A_2 if any

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22. (i) Draw a schematic diagram of a circuit consisting of a battery of five 2V cells, a 5Ω resistor, a10Ω resistor and a 15Ω resistor and a plug key all connected in series.

(ii) Calculate the electric current passing through the above circuit when the key is closed.

(iii) Potential difference across 15Ω resistor.

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23. For the circuit diagram given below in Fig.12.35, calculate : (a) the value of current through each resistor, (b) the total current in the circuit and (c) the total effective resistance of the circuit.

View Text Solution

24. In the circuit diagram shown [Fig.12.36] the two resistance wires A and B are of same

length and same material. But A is thicker than B. Which ammeter A_1 or A_2 will indicate higher reading for current? Give reason.

(b) In the circuit diagram of Fig.12.36 the two resistance wires A and B are of same area of cross section and same material, but A is longer than B. Which ammeter A_1 or A_2 will indicate higher reading for current? Give reason.

View Text Solution

25. Find the equivalent resistance of the following circuit [Fig.12.37]

View Text Solution

26. Why are equivalent bulbs filled with chemically inactive nitrogen or argon gas?

(b) The resistance of a wire of 0.01cm radius is 10Ω. If the resistivity of the material of the wire is $50 \times 10^{-8}\Omega.m$ Find the length of the wire.

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27. Calculate the effective resistance between P and Q in circuit of Fig.12.38.

View Text Solution

28. A wire of resistance 8Ω is bent in the form of a closed circle. What is the effective resistances between the points A and B , at the end of a diameter of the circle? What is

the ammeter reading?

View Text Solution

29. Two identical resistors are first connected in series and then in parallel. Find the ratio of equivalent resistances in two cases.

View Text Solution

30. Find the equivalent resistane across the two ends A and B of the circuit.

View Text Solution

31. A circuit is shown in the diagram given below. Find (a) the value of R (b) the reading of the ammeter, (c) the potential difference across the terminals of battery.

View Text Solution

32. Find the circuit flowing through the following electric circuit:

View Text Solution

33. (a) Define electric power. Express it in terms of V,I and R where V stands for potential difference, R for resistance and I for current

(b) V-I graphs for two wires A and B are shown in fig.12.43 Both of them are connected in

series of a battery. Which of the two will produce more heat per unit time? Give justification for your answer.

View Text Solution

34. Derive the expression for power P consumed by a device having resistance R and potential difference V.

A derive of resistance R is connected across a source of V voltage and draws a current I.

Derive an expression for power in terms for voltage for current and resistance.

View Text Solution

35. B_1, B_2 and B_3 are three identical bulbs connected as shown in the fig.12.44. When al the three bulbs glow, a currents of 3A is recorded by the ammeter A.

(i) What happens to the glow of the other two bulbs when the bulb B_1 gets fused?

(ii) What happens to the reading of

A_1, A_2, A_3 and A when the bulb B_2 gets fused?

View Text Solution

36. A torch bulb is rated 5V and 500mA. Calculate (i) its power, (ii) its resistance and (iii) the energy consumed if the bulb is lighted for 4 hours.

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37. Two identical resistors each of resistance 10Ω are connected (i) in series and then (ii) in parallel, in line to a battery of 6 volts. Calculate the ratio of power consumed in the combination of resistors in the two cases.

View Text Solution

38. A 5Ω resistor is connected across a battery of 6 volts. Calculate:

(i) the current flowing through the resistor.

(ii) the energy that dissipates as heat in 10s.

View Text Solution

39. Calculate the amount of heat generated while transferring 90000 coulombs of charge between the two terminals of a battery of 40V in one hour. Also determine the power expended in the process.

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40. How many 40W,220V lamps can be safety connected to a 220V, 5A line? Justify your answer.

View Text Solution

41. The potential difference between the terminals of an electric heater is 110V, when its draws a current of 5A from the source. What current will the heater draw and what will be its wattage if the potential difference is

increased to 220V. Consider that the resistance of the heater element does not change with temperature.

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42. An electric iron consumes energy at a rate of 840W when heating is at the maximum rate and 360W when the heating is at the minimum. The voltage is 220V. What are the current and the resistance in each case?

View Text Solution

43. An electric kettle of 2kW for 2h daily. Calculate the (i) energy consumed in SI and commerical unit, (ii) cost of running it the month of June at the rate of Rs 3.00 per unit?

View Text Solution

44. A bulb is rated 40W,220V. Find the current drawn by it when it is connected to a 220V supply. Also find its resistance.

(b) If the given bulb is replaced by a blub of

rating 25W,220V will there be any change in the value of current and resistance? Justify your answer and determine the change.

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Long Answer Question

1. State Ohm's law Express it mathematically.

(b) Write symbols used in electric circuits to represent:

(i) variable resistance (ii) Voltmeter.

(c) An electric bulb is rated 220V and 100W. When it is operated on 110V,what will be the power consumed?

View Text Solution

2. Draw the symbols of commonly used components in electrical circuit diagrams.

View Text Solution

3. Define electric resistance of a conductor?

(b) List two factors on which resistance of a conductor depends.

(c) Resistance of a metal wire of length 1m is 104Ω at $20^{\circ}C$. IF the diameter of the wire is 0.15mm, find the resistivity of the metal at that temperature.

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4. What is meant by electric current ? Name and define its SI unit. In a conductor electrons are flowing from B to A. What is the direction of conventional current? Give justification for your answer.

A steady current of 1 ampere flows through a conductor. Calculate the number of electrons that flow through any section of the conductor in 1 second. (Charge on electron = 1.6×10^{-19} coulomb)

View Text Solution

5. The values of current I flowing in a given resistor for the corresponding values of potential difference V across the resistor are given below:

(i) Plot a graph between V and I.

(ii) Calculate the resistance of that resistor.

(iii) What does the graph represent?

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6. 3 resistors R_1, R_2 and R_3 are connected in series to a battery. Draw the circuit diagram showing the arrangement. Derive an expression for the equivalent resistance of the combination.

(b) Resistors are given as $R_1 = 10\Omega, R_2 = 20\Omega$ and $R_3 = 30\Omega$. Calculate the effective resistance when they are connected in series . Also calculate the current flowing when the combination is connected to a 6V battery.

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7. Establish a relationship to determine the equivalent resistance R of a combination of three resistors having resistances R_1, R_2 and R_3 connected in series.

(b) Calculate the equivalent resistance R of a combination of three resistors of $2\Omega, 3\Omega$ and 6Ω joined in parallel.

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8. Derive expression for equivalent resistance of a parallel combination of resistances.

(b) Calculate the ratio of equivalent resistance for a series combination of n number of identical resistors to the parallel combination of the same type of n number of resistors.

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9. Three resistors R_1, R_2 and R_3 are connected in parallel and the combination is

connected to a battery, ammeter, voltmeter and key. Draw suitabel circuit diagram and obtain an expression for the equivalent resistance of the combination of the resistors.

(b) Calculate the equivalent resistance of the network shown in Fig.12.47.

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10. (a) Establish a relationship to determine the equivalent resistance R of a combination

of three resistors having resistances R_1, R_2 and R_3 connected in parallel.

(b) Three resistors are connected in an electrical circuit as shown. Calculate the resistance between A and B.

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11. Two resistors with resistance of 10Ω and 15Ω are connected to a battery of 12V so as to obtain and measure (i) minimum

electric current, (ii) maximum electric current .

(a) State the mode of connecting the resistors in each case with the help of a circuit diagram.

(b) Calculate the strength of total electric current in the circuit in each case.

View Text Solution

12. Three resistors of resistances R_1, R_2 and R_3 are connected in (i) series and (ii) parallel. Write expression for the equivalent resistance of the combination in

each case.

(b) Two identical resistance of 12Ω each are connected to a battery of 3V. Calculate the ratio of the power consumed by the resulting combinations with minimum resistance and maximum resistance.

View Text Solution

13. Experimentally prove that in series combination of three resistances:

(a) Current flowing through each resistance is

same , and

(b) total potential difference is equal to the sum of potential differences across individual resistors.

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14. Experimentally prove that in parallel combination of three resistances:

(a) Potential differencr across each resistor is same and

(b) Total circuit current is equal to the sum of currents flowing through individual resistors.

View Text Solution

15. Find out the following in the circuit given in figure.

(a) Effective resistors of two 8Ω resistors in the combination.

(b) Current flowing through 4Ω resistors.

(d) Power dissipated in 4Ω resistor.

(e) Difference in ammeter readings, if any.

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16. What is heating effect of electric current? Find an expression for amount of heat produced. Name some appliances based on heating effect of current.

View Text Solution

17. An electric lamp of resistance 20Ω and a conductor of resistance 4Ω are connected to a 6V battery as shown in the circuit. Calculate.

(a) the total resistance of the circuit

(b) the current through the circuit

(c) the potential difference across the (i) electric lamp, and (ii) conductor, and

(d) power of the lamp.

View Text Solution

18. Two conductors A and B of resistances 5Ω and 10Ω respectively are first joined in parallel and then in series. In each case the voltage applied is 20V.

(a) Draw the circuit diagram to show the combination of these conductors in each case.

(b) In which combination will the voltage across the conductors A and B be the same?

(c) In which arrangement will the current through A and B is the same?

(d) Calculate the equivalent resistance for each arrangement.

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