



PHYSICS

BOOKS - OSWAAL PHYSICS (KANNADA ENGLISH)

ELECTRICITY

Topic 1 Multiple Choice Questions

1. What is the SI unit of electric current?

A. Ampere

B. Ohm

C. Volt

D. Watt

Answer: A



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2. No current flows between two charged bodies when connected if they have same .

A. capacity

B. potential

C. charge


D. none of the above

Answer: A::C



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Topic 1 Match The Column

	Column A		Column B
1.	Unit of electric potential	(a)	algebraically
2.	Potential difference is measured by	(b)	Ohm's law
3.	Current carriers in a conductor are	(c)	—()—
4.	Have positive charge	(d)	Volt
5.	Charge on a body exists in	(e)	—(A)—
6.	Number of electrons in 1 C charge	(f)	Protons
7.	Charges can be added	(g)	Voltmeter
8.	A battery	(h)	
9.	$V \propto I$	(i)	6.25×10^{18}
10.	Symbol of rheostat	(j)	integral multiple of magnitude of charge on an electron
11.	Open switch	(k)	electrons
12.	Ammeter	(l)	does work in moving electrons through a conductor.

1.



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Topic 1 Very Short Answer Type Questions

1. Define one volt (IV) potential difference.



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



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3. What does an electric circuit mean ?



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4. State the relationship between 1 ampere and 1 coulomb.



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5. What is meant by potential difference between two points ?



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6. Name the physical quantity which is same in all the resistors when they are connected in series.



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7. Name the physical quantity whose unit is volt/ ampere.



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8. A charge of 150 coulomb flows through a wire in one minute. Find the electric current flowing through it



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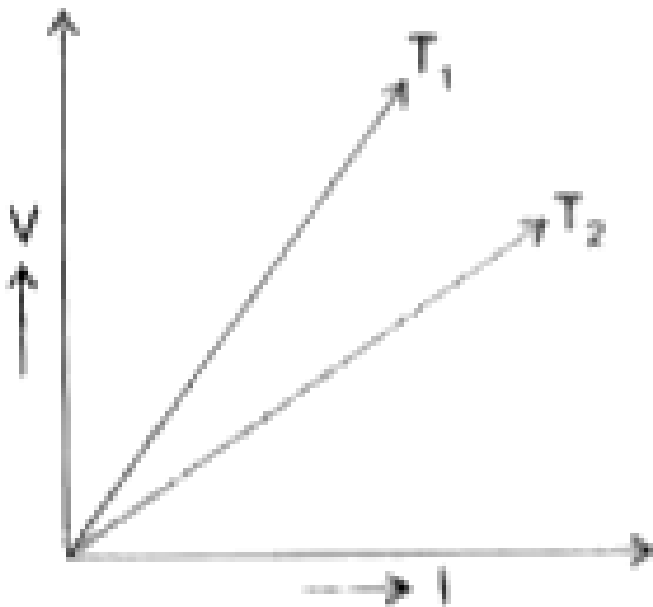
9. Calculate the number of electrons constituting one coulomb of c.harge. (charge on 1 electron = 1.6×10^{-19} C)



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10. The voltage-current (V-I) graph of a metallic conductor at two different temperatures T_1 and T_2 is shown below. At which temperature

is the resistance higher ?



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11. A given length of a wire is doubled of itself and this process is repeated once again. By

what factor does the reeutance of the wire changes ?



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12. 400 J of heat is produced in 4 s in a 4Ω resistor. Find potential difference across the resistor.



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13. State in brief the meaning of a variable resistor. Draw a circuit diagram to illustrate its function specially in the study of variation in current with the potential difference across a resistor.



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14. What happens to the resistance of a conductor when its area of cross-section is increased ?





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15. Through which of the two wires, the electric current will flow more easily :

(i) a thick wire or (ii) a thin wire of the same material, and of the same length when connected to the same source ?



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16. 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 through it.



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Topic 1 Short Answer Type Questions I

1. State the factors on which at a given temperature the resistance of a cylindrical conductor depends, State the S.I unit of resistivity.



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2. Define electric current. Name the particles that constitute electric current flowing through the metallic wires.



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3. State the relation between work, charge and potential difference for an electric circuit. Calculate the potential difference between the two terminals of the battery if 100 joules of

work is required to transfer 20 coulombs of charge from one terminal of the battery to the other.



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4. State the physical quantity which is equal to the ratio of potential difference and current. Define its SI unit.



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5. List in a tabular form two differences between a voltmeter and an ammeter.



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6. Draw a schematic diagram of an electric circuit comprising of 3 cells and an electric bulb, ammeter, plug-key in the ON mode and another with same components but with two bulbs in parallel and a voltmeter across the combination.





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7. 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.



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8. Calculate the resistance of a metal wire of length 2 m and area of cross section

$1.55 \times 10^{-6} \text{ m}^2$, if the resistivity of the metal be $2.8 \times 10^{-8} \Omega \text{ m}$?



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9. A battery of 12 V is connected to a series combination of resistors 3Ω , 4Ω , 5Ω and 12Ω . How much current would flow through the 12 W resistor ?



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10. Calculate the work done in moving a charge of 2 coulombs across two points having a potential difference of 12 V.



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11. Calculate the electrical energy consumed by a 1200 W toaster in 30 minutes.



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12. What will be the cost of using the same for 1 month if one unit of electricity costs ₹ 4 ?

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13. Draw a schematic circuit diagram for a circuit in which three resistors R_1 , R_2 and R_3 a plug key under closed condition, an ammeter are joined in series with a 5V battery. Also a voltmeter is connected to measure the potential difference across the resistor R_1





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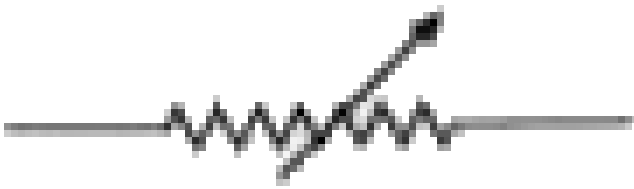
Topic 1 Short Answer Type Questions li

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



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2. What do the symbols given below represent in a circuit ? Write one function of each.



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3. Draw symbol of :

(i) Rheostat, (ii) Voltmeter, (iii) Electric bulb

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4. Name and define S.I. unit of resistance.

Calculate the resistance of a resistor if the current flowing through it is 200 mA, when the applied potential difference is 0.8 V.



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5. Define resistance. Write the SI unit of resistance. Match the correct range of resistivity with the materials given :

(i) Conductors (a) $10^{-6} \Omega m$

(ii) Alloys (b) 10^{12} to $10^{17} \Omega m$

(iii) Insulators (c) 10^{-6} to $10^{-8} \Omega m$



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6. Nichrome wire of length l and radius r has resistance of 10Ω . How would the resistance of the wire change when :

(i) Only length of the wire is doubled ?

(ii) Only diameter of the wire is doubled ?

Justify your answer .



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7. Why element of electrical heating devices are made up of alloys ?



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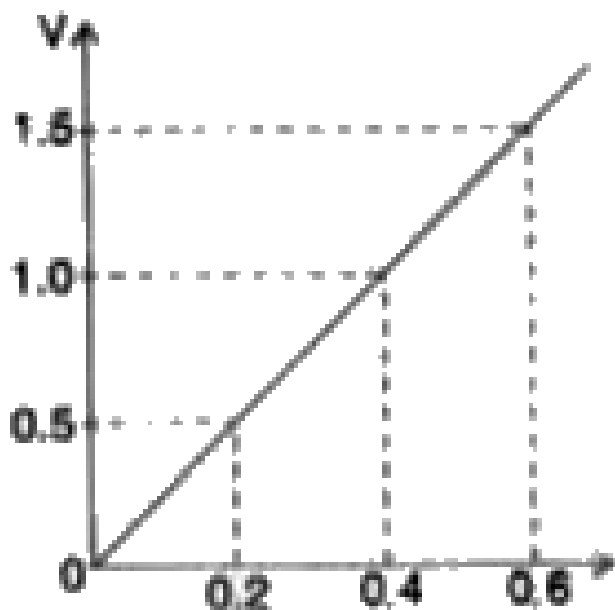
8. A wire of length l and area of cross-section A is drawn into a wire of double its length by melting original resistivity and resistance were ρ and R and resistance ?



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9. An electric circuit consisting of a 0.5 m long nichrome wire XY, an ammeter, a voltmeter, four cells of 1.5V each and a plug key will be set up. Draw a diagram of this circuit in the 'ON' position. Following graph was plotted between the value of potential difference (V) and electric current (I). State the conclusion that you draw about the relation between V

and I from thll graph.



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10. Derive an expression for electric energy consumed in a device in terms of V , I and t ,

where V is the potential difference applied to it, I is the current drawn by it and t is the time for which the current flows?



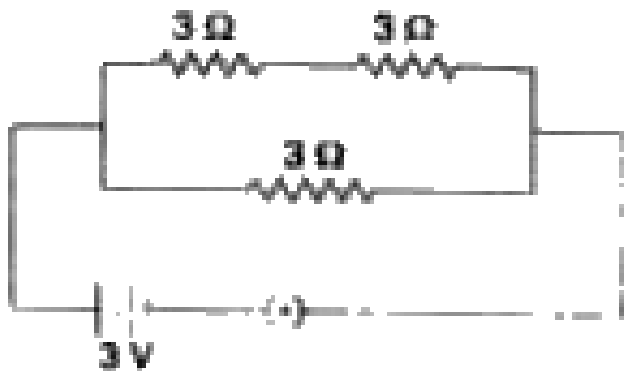
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11. The resistance of a wire of 0.01 cm radius is 10Ω . If the resistivity of the material of the wire is 50×10^{-8} ohm meter, find the length of the wire.



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12. Three resistors of $3\ \Omega$ each are connected to a battery of $3\ \text{V}$ as shown. Calculate the current drawn from the battery.



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13. In an electric field the work done in bringing a $2\ \text{coulomb}$ charge from infinity to a

point A is 10 joules and in bringing the same charge to some another point B is 20 joules. Find the potential difference between two points A and B. What would be the work done if the same charge is brought directly from A to B ?



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14. The resistance per metre length of a wire is 10Ω . If the resistivity of the material of the

wire is 50×10^{-8} ohm metre, find the area of cross-section of the wire.



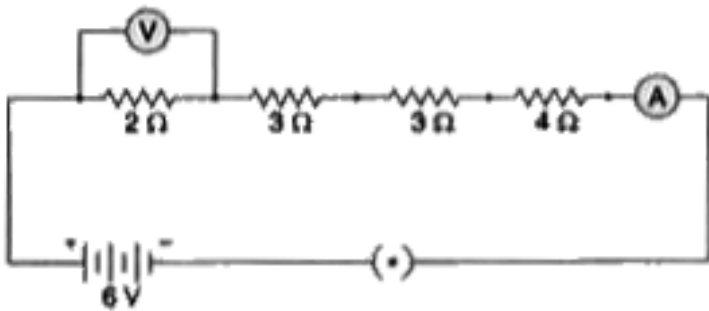
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15. Three resistors of 5Ω , 10Ω and 15Ω are connected in series and the combination is connected to the battery of 30 V. Ammeter and voltmeter are connected in the circuit. Draw a circuit diagram to connect all the devices in proper correct order. What is the

current flowing and potential difference across $10\ \Omega$ resistance ?

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16. Find out the reading of ammeter and voltmeter In the circuit given below :



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17. Draw schematic diagram of a circuit consisting of a battery of five 2V cells, a 5 ohm, a 10 ohm and a 15 ohm resistor and a plug key, all connected in series. Calculate the electric current passing through the above circuit when the key is closed.



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18. An electric bulb is rated at 60W, 240V. Calculate its resistance. If the voltage drops to 192 V, calculate the power consumed and the

current drawn by the bulb. (Assume that the resistance of the bulb remains unchanged).



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Topic 1 Long Answer Type Questions

1. What does an electric circuit mean ? Name a device that helps to maintain a potential difference across a conductor in a circuit. When do we say that the potential difference across a conductor is 1 volt ? Calculate the amount of

work done in shifting a charge of 2 coulombs from a point A to B having potentials 110 V and 25 V respectively.



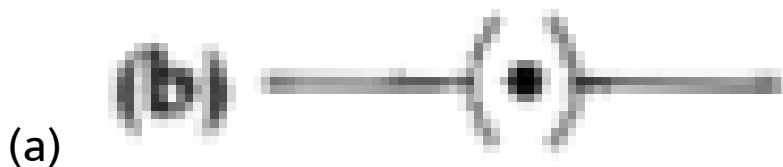
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2. Name an instrument that measures electric current in a circuit. Define unit of electric current.



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3. What the following symbols mean in an electric circuit.



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4. Draw a closed circuit diagram consisting of 0.5 m long nichrome wire XY, an ammeter, a voltmeter, four cells of 1.5 V and a plug key.



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5. Draw a labelled circuit diagram to study a relationship between potential difference (V) across the two ends of a conductor and the current (I) flowing through it. State the formula to show how I in a conductor varies when V across it is increased stepwise. Show this relationship also on a schematic graph.

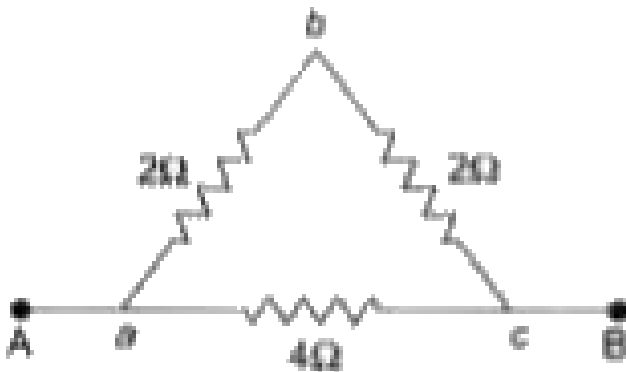


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6. Calculate the resistance of a conductor if the current flowing through it is 0.25 A when the applied potential difference is 1.0 V.



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7.

With the help of a circuit diagram prove that

when a number of resistors are connected in parallel, the reciprocal of equivalent resistance of the combination is equal to the sum of the reciprocals of the individual resistances of the resistors. Find the resistance between A and B in the following network.



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8. Two identical resistors each of resistance 10 ohm are connected in (i) series, (ii) parallel to a battery of 6V. Calculate the ratio of power

consumed by the combination of resistor in the two cases.



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9. i] State Ohm's law

ii] Explain the factors on which the resistance of a conductor depends.



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10. Give any two differences between an ammeter and a voltmeter.



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11. How will you convert a given set of resistors so that the equivalent resistance is increased ?
Give reason for your answer.



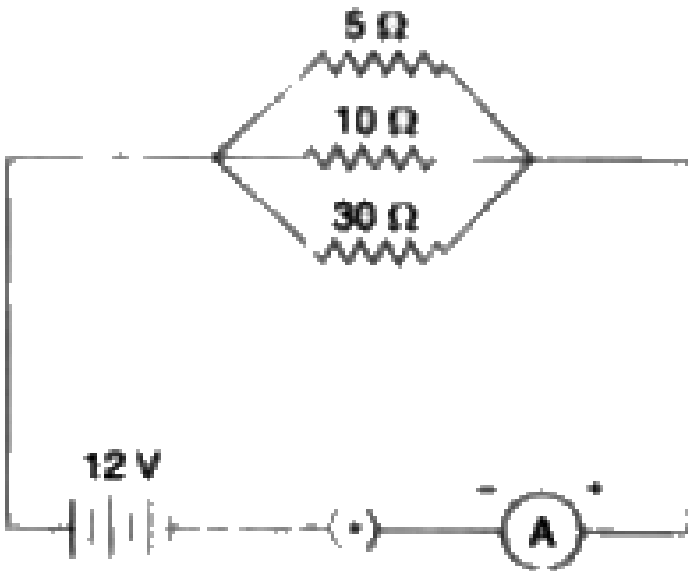
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12. In the given circuit diagram, calculate :

(a) the value of current through each resistor

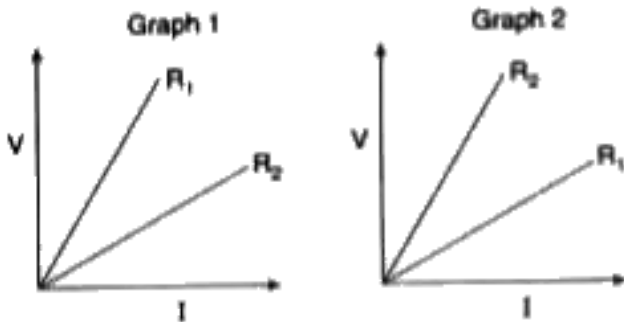
(b) the total current in the circuit

(c) the total effective resistance of the circuit.



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13. Two students perform experiments on two given resistors R_1 and R_2 and plot the following V-I graphs. If $R_1 > R_2$ which of the two diagrams correctly represent the situation on the plotted curves? Justify your answer.



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14. An electric lamp of $24\ \Omega$ and a conductor of $6\ \Omega$ are connected in parallel to a $12\ \text{V}$ battery.

Calculate :

(i) Total resistance

(ii) Total current in the circuit

Potential difference across the conductor.



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15. Draw a circuit diagram for a circuit consisting of a battery of five cells of $2\ \text{volts}$

each, a $5\ \Omega$ resistor, a $10\ \Omega$ resistor and a $15\ \Omega$ resistor, an ammeter and a plug key, all connected in series. Also connect a voltmeter to record the potential difference across the $15\ \Omega$ resistor and calculate :

- (i) the electric current passing through the above circuit and
- (ii) potential difference across $5\ \Omega$ resistor when the key is closed.



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1. Three resistances of 4Ω , 5Ω and 20Ω are connected in parallel. Their combined resistance is :



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2. Three resistors of 1Ω each are connected to form a triangle. The resistance between any two terminals is :

A. 3Ω

B. $\frac{1}{2}\Omega$

C. $\frac{2}{3}\Omega$

D. $\frac{3}{2}\Omega$

Answer: A::B::C



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Topic 2 Match The Column

1. Match the Column:

1.	Resistivity	(a)	Ampere
2.	Energy	(b)	Ohm metre
3.	Resistance	(c)	Kilowatt hour
4.	Current	(d)	Ohm



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Topic 2 Very Short Answer Type Questions

1. The SI unit of resistivity is



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2. What is commercial unit of electric energy ?



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3. On what principle is an electric bulb based ?



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4. What is electric power ? State its SI unit.



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5. Name the instrument used for measuring :

(i) Potential difference (ii) Current



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6. Explain the following

Why is tungsten used almost exclusively for filament of electric lamps?



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7. In a circuit if two resistors of $5\ \Omega$ and $10\ \Omega$ are connected in series, compare the current passing through the two resistors.



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



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



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10. Which is having more resistance - a 220 V, 100 W bulb or a 220 V, 60 W bulb.



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11. Find the minimum resistance that can be made using five resistors, each of 5Ω .



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Topic 2 Short Answer Type Questions I

1. A potential difference of 220 V is applied across a resistance of $440\ \Omega$ in an electrical appliance. Calculate the current drawn and heat energy produced in 20 seconds.



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2. Define least count with one example.



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3. Name the physical quantity that determines the rate at which energy is delivered by an electric current. State and define the unit of this physical quantity.



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4. State the factors on which the heat produced in a current carrying conductor depends. Give one practical application of this effect.



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5. Why are electric bulbs filled with chemically inactive nitrogen or argon ?



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6. What is meant by the statement that the rating of fuse in a circuit is 5A.



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7. Explain two disadvantages of series arrangement for household circuit.



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8. Why are electric bulbs filled with chemically inactive nitrogen or argon ?



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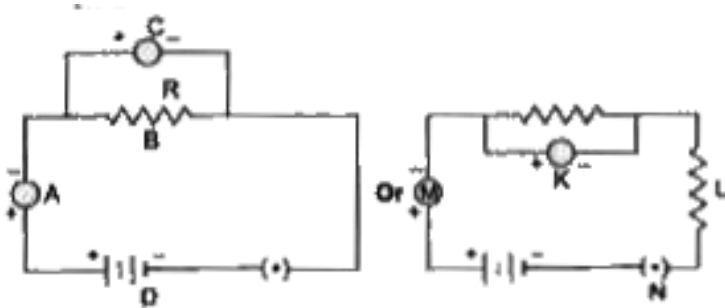
9. Give reason for the

Fuse wire is placed in series with the device.



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10. A student draws the following circuit diagrams for the experiment on studying the dependence of current on potential difference (V) across a resistor. Name the parts labelled as A, B, C and D in the diagram.



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11. While experimentally verifying ohm's law a student observed that pointer of the voltmeter coincide with 15th division when the voltmeter has a least count of 0.05 V. Find the observed reading of voltmeter.



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12. An electric heater rated 800 W operates 6h/day. Find the cost of energy to operate it for 30 days at ₹ 3.00 per unit.





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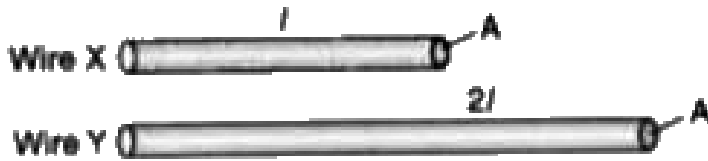
13. How much current will an electric bulb draw from 220 V source if the resistance of the bulb is 1200Ω ? If in place of a bulb, a heater of resistance 100Ω is connected to the sources calculate the current drawn by it .



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14. Out of the two wires X and Y shown below, which one has greater resistance ? Justify your

answer.



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



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Topic 2 Short Answer Type Questions Ii

1. Why are coils of electric toasters and electric irons are made of an alloy rather than a pure metal?



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2. Why is series arrangement not used for domestic circuits?



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3. Why are copper and aluminium wires, usually employed for electricity transmission ?



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4. What is an electric fuse ? What is its role in the electric circuits ? Should it be placed on the neutral wire or on the live wire ? Justify your answer .



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5. Define electric power. A device of resistance R is connected across a source of V voltage and draws a current I . Derive an expression for power in terms of voltage and resistance.



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6. An electric bulb is connected to a 220 V generator. The current is 0.5 A. What is the power of the bulb ?



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7. State one difference between Kilowatt and Kilowatt hour. Express 1 kWh in joules.



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8. A bulb is rated 5V, 500 mA. Calculate the rated power and resistance of the bulb when it glows.



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9. Define electric power. An electric motor is rated at 2kW. Calculate the cost of using it for 2 hours daily for the month of September if each unit costs ₹6.00.



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10. State Ohm's Law. Draw a circuit diagram to verify this law indicating the positive and negative terminals of the battery and the

meters. Also show the direction of current in the circuit .



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11. Give reason for the following :

Why are copper and aluminium wires used as connecting wires ?



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12. Explain the following

Why is tungsten used almost exclusively for filament of electric lamps?



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13. Give reason for the

Why is lead-tin alloy used for fuse wires ?



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14. V-I graph for a conductor is as shown in figure.



(i) What do you infer from this graph ?

(ii) State the law expressed here.

Name the physical quantity represented by the slope of this graph and state its SI unit



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15. Show four different ways in which three resistors of Rohm each may be connected in a circuit. In which case is the equivalent resistance of the combination.

i] Maximum

ii] Minimum



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16. Can you run electric geyser with power rating 2 kW, 220 V on a 5 A line ? Give reason

to justify your answer.



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17. a] Derive an expression for the equivalent resistance of three resistors R_1 , R_2 and R_3 connected in a parallel.

b] Fuse of 3 A, 5 A and 10 A are available, calculate and select the fuse for operating electric iron of 1 kW power at 220 V line.



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18. Electrical resistivities of some substances, In ohm-meter, at 20°C are given as follows :

Silver	1.60×10^{-8}
Copper	1.62×10^{-8}
Tungsten	5.2×10^{-8}
Mercury	94×10^{-8}
Iron	10×10^{-8}
Nichrome	10×10^{-6}

(i) Out of the silver and copper, which is a better conductor of electric current and why ?



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19. Electrical resistivities of some substances,

In ohm-meter, at 20° C are given as follows :

Silver	1.60×10^{-8}
Copper	1.62×10^{-8}
Tungsten	5.2×10^{-8}
Mercury	94×10^{-8}
Iron	10×10^{-8}
Nichrome	10×10^{-6}

Which substance is preferred to be used for electrical transmission lines ? Give reason.



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20. Electrical resistivities of some substances,

In ohm-meter, at 20° C are given as follows :

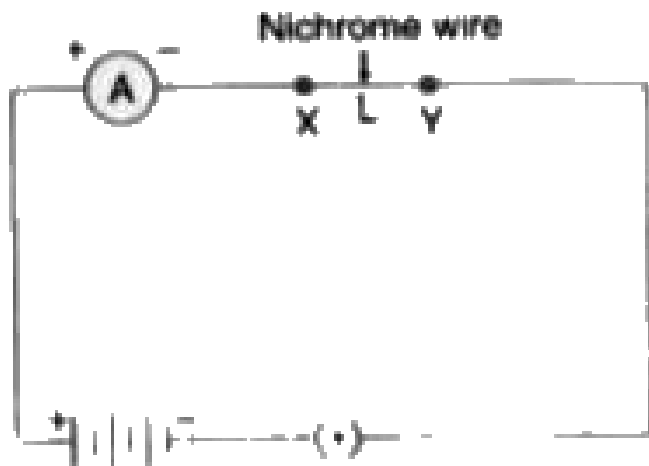
Silver	1.60×10^{-8}
Copper	1.62×10^{-8}
Tungsten	5.2×10^{-8}
Mercury	94×10^{-8}
Iron	10×10^{-8}
Nichrome	10×10^{-6}

Name the material that you would advise to be used in the heater elements of electric heating , device and why ?



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21. In the above circuit, connect a nichrome wire of length ' l ' between points X and Y and note the ammeter reading.



(i) When this experiment is repeated by inserting another nichrome wire of the same thickness but twice the length ($2L$), what changes are observed in the ammeter reading ?

(ii) State the changes that are observed in the ammeter reading if we double the area of cross-section without changing the length in the above experiment. Justify your answer in both the cases.



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



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23. Two devices of ratings 44W, 200V and 11W, 220V are connected in series. The combination is connected across a 440V mains. The fuse of which of the two devices is likely to burn when switch is on ? Justify your answer.



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24. Obtain an expression for equivalent resistance of two resistors connected in a series combination.



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25. Semi-conductors are certain type, of metals which allow only partial current to pass through them in one direction only. In a solar cell, the pieces(wafers) of semi-conductor materials containing impurities are so arranged that potenti,ll difference develops between two regions of the semi-conductors when light falls on it . A lead storage battery is connected in the circuit which gets charged and can be used as and when desired.

(i) How does conductivity of semi-conductors

increases ?

(ii) Name any four materials which act as a semiconductor .



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26. A bulb is rated at 200V -40W. What is its resistance ? 5 such bulbs are lighted for 5 hours. Calculate the electrical energy consumed ? Find the cost if the rate is 5.10 per KWh.



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27. Three resistors of $10\ \Omega$, $15\ \Omega$ and $20\ \Omega$ are connected in series in a circuit. If the potential drop across the $15\ \Omega$ resistor is $3\ \text{V}$, find the current in the circuit and potential drop across the $10\ \Omega$ resistor.



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28. A circuit has a line of $5\ \text{A}$. How many lamps of rating $40\ \text{W}$, $200\ \text{V}$ can simultaneously run on this line safely ?



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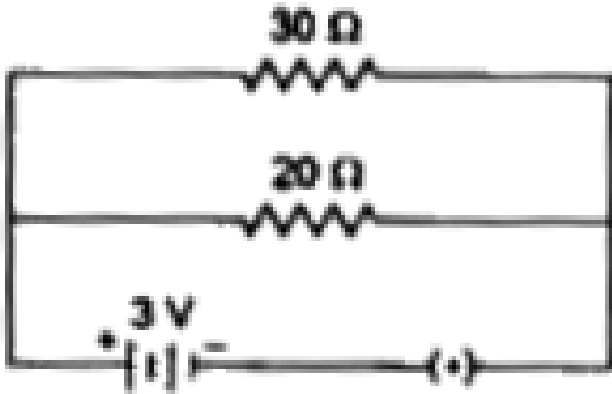
29. Calculate the resistance of a 1 Km long copper wire of area of cross section $2 \times 10^{-2} \text{ cm}^2$. The resistivity of copper is 1.623×10^{-8} ohm-meter.



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30. Study the following electric circuit and calculate the energy drawn from the battery in

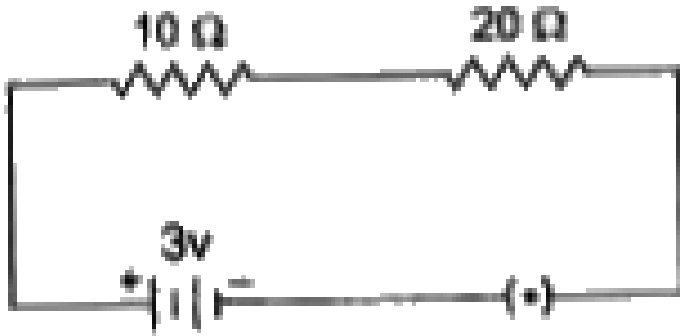
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- 31.** Study the following electric circuit (i)
Calculate the current flowing in the circuit and
(ii) Calculate the potential difference across

10Ω resistor



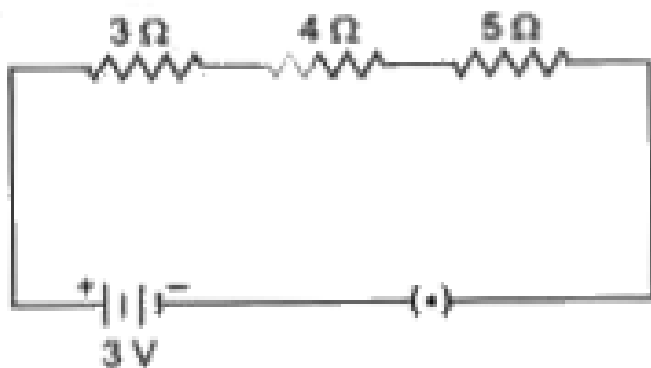
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32. Calculate the amount of heat generated while transferring 90000 coulombs of charge between the two terminals of a battery of 40 V in one hour. Also determine the power expended in the process.



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33. Study the following electric circuit and calculate the potential difference across 5Ω resistor.



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34. An electric heater is used on 220 V supply and takes a current of 5A. What is its power ? Calculate the per hour cost of using the heater if 1 unit costs Rs 6.0.



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35.

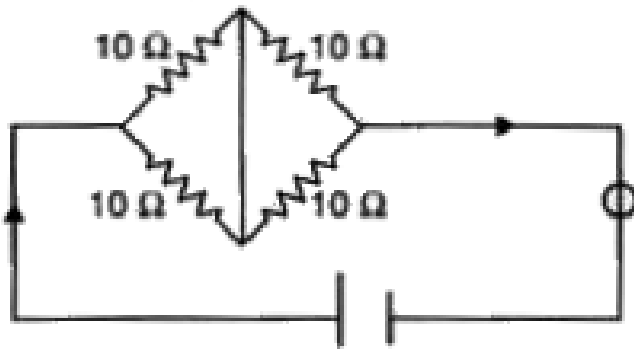
Find the effective resistance between the points A and B in the network shown in the figure.



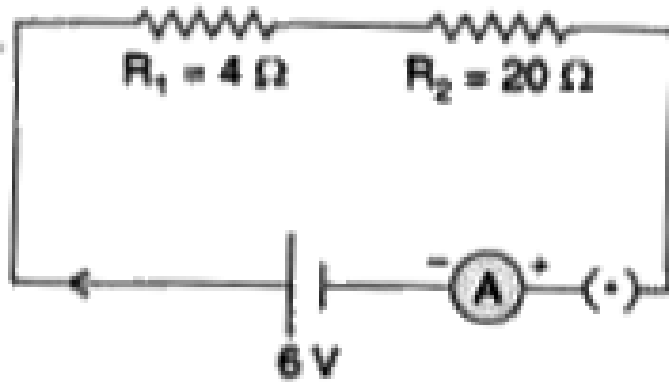


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36. Find the current drawn from the battery by the network of four resistors shown in the figure .



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37.

In the given circuit, calculate :

(i) the total resistance of the circuit

(ii) the current through the circuit, and (iii) the

potential difference across R_1 and R_2



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



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39. A lamp rated 60W and an electric iron rated 800W are used for 6 hours everyday. Calculate the total energy consumed in 30 days.





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40. Draw a diagram to show how two resistors R_1 and R_2 are connected in parallel.



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41. In a circuit if two resistors of 4Ω and 8Ω are connected in parallel, find out the ratio of current passing through the two resistors.



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42. A wire of resistance R is cut into five equal parts. These parts are then connected in parallel. If the equivalent resistance of this combination is R' . Calculate the ratio R/R' . Draw a circuit diagram to show two resistors R_1 and R_2 connected in parallel along with a battery, by an ammeter and voltmeter.



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43. Amongst iron, silver, nichrome, tungsten, copper, which metal / alloy should be used to make the

(i) Heating element of electric geysers

(ii) Filament of Incandescent bulbs.

An electric iron has rating of 750W, 220V.

Calculate:

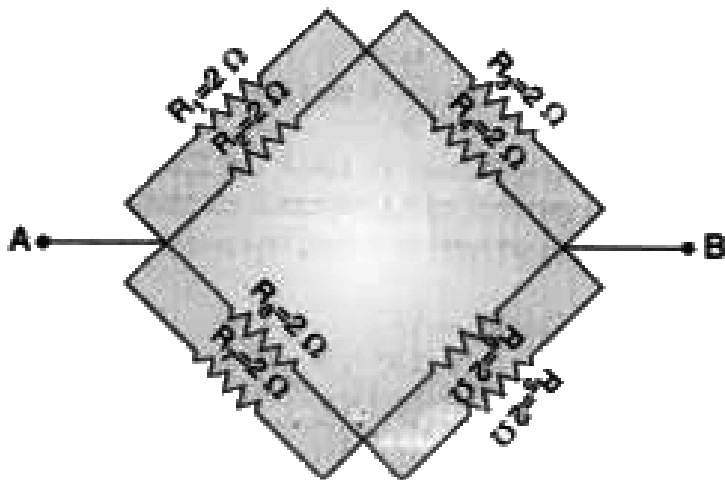
(i) Current required and

(ii) Its resistance when it is in use.



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44. Find the equivalent resistance across the two ends A and B of this circuit.



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45. Calculate the amount of heat generated when 7200 coulombs of charge is transferred

in one hour through a potential difference of 50 V.



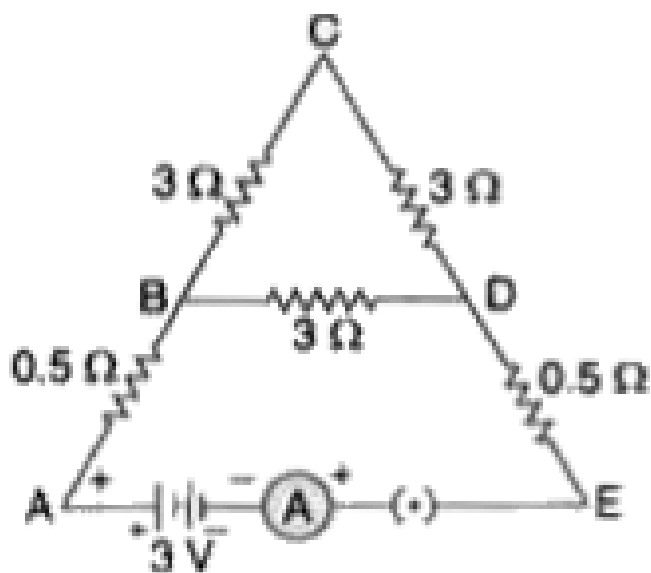
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46. An electric iron consumes energy at a rate of 840W when heating it at the maximum and 360W, when the heating is at the minimum. The voltage at which it is running is 220V. What are the current and resistance values in each case ?



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47. Five resistors are connected in a circuit as shown. Find the ammeter reading when circuit is closed.



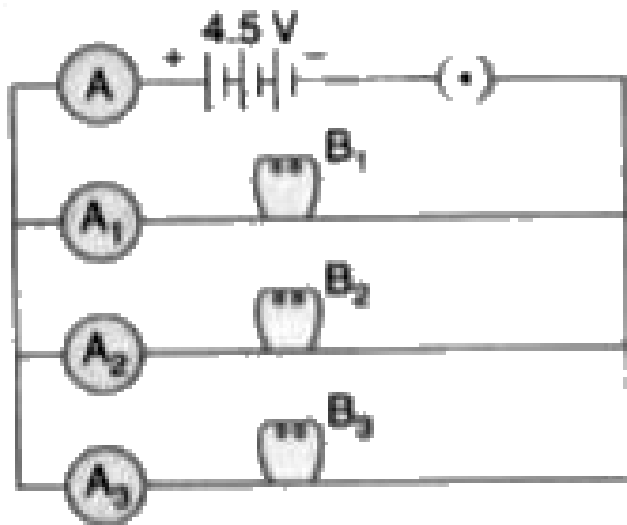
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48. Study the circuit shown in which three identical bulbs B_1 , B_2 and B_3 are connected in parallel with a battery of 4.5 V

(i) What will happen to the glow of other two bulbs if the bulb B_3 gets fused ?

(ii) If the wattage of each bulb is 1.5 W, how much reading will the ammeter A show when all the three bulbs glow simultaneously.

(iii) Find the total resistance of the circuit.



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49. How many resistors of 88Ω are connected in parallel to carry 10 A current on a 220 V line

?



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50. What is the total resistance of n resistors each of resistance 'R' connected in :

(a) Series, (b) Parallel.



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51. Calculate the resultant resistance of 3 resistors 3Ω , 4Ω and 12Ω connected in parallel.



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52. A 400 W refrigerator operates for 16 h per day. Calculate the cost to operate it for 30 days at ₹3.40 per kWh.



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53. The resistance offered by a wire of unit length and unit cross-sectional area is called resistivity. For a material irrespective of length and area, the resistivity is constant. It is also

called specific resistance of the material. Metals and alloys have low resistivity while insulators have high resistivity. Resistivity of two elements A and B are $1.62 \times 10^{-8} \Omega \text{ m}$ and $520 \times 10^{-8} \Omega \text{ m}$ respectively. Out of these two, name the element that can be used to make :

(i) filament of electric bulb.

(ii) wires for electrical transmission lines.



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1. What is meant by electric current ? Name and define S.I. 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 conductor In 1 second. (Charge on electron $1.6 \times 10^{-19} C$)



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2. What is meant by potential difference ?

State its SI unit.



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



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4. What is the lowest total resistance that can be secured by combinations of four coils of resistance 4Ω , 8Ω , 12Ω , 24Ω



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5. 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. Calculate the equivalent resistance of the combination of

three resistors of 2Ω , 3Ω and 6Ω joined in parallel.



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6. Derive an expression for Joule's law of heating.



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7. Give two examples for applications of heating effect of electric current



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8. 100 J of heat is produced each second in a $4\ \Omega$ resistor. Find the potential difference across the resistor.



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9. A wire of resistivity ρ is pulled to double its length. What will be its new resistivity?



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



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11. Two wires of equal length, one of copper and the other of manganin have the same resistance. Which wire is thicker ?



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12. Derive an expression for the equivalent resistance of three resistors R_1 , R_2 and R_3 connected in series.



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13. Fuse of 3A, 5A and 10A are available. Calculate and select the fuse for operating electric iron of 1 kW power at 220 V line.



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14. What is meant by the statement that the resistance of a wire is 1Ω ?



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15. Two identical resistors each of resistance 12Ω are connected (i) in series (ii) in parallel, to a battery of 6 V .

Calculate the ratio of power consumed in the combination of resistors in the two cases.





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



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17. Explain the term : Heating effect of electric current.



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18. Derive an expression for the heat produced by electric current and state Joule's Law.



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19. Why are electric bulbs filled with chemically inactive nitrogen or argon ?



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20. State Ohm's law. Give mathematical relation between potential difference (V), Current (I) and resistance (R) of a conductor . Draw an electric circuit for studying ohm's law.

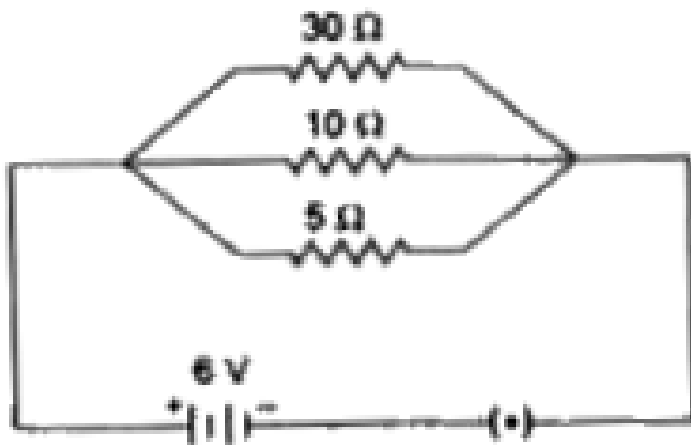


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21. When a 12 V battery is connected across an unknown resistor there is a current of 2.5 mA in the circuit. Find the value of the resistance of the resistor.



22. Two wires X and Y are of equal length and have equal resistances. If the resistivity of X is more than that of Y which wire is thicker and why ? For the electric circuit given below calculate :



(i) Current in each resistor

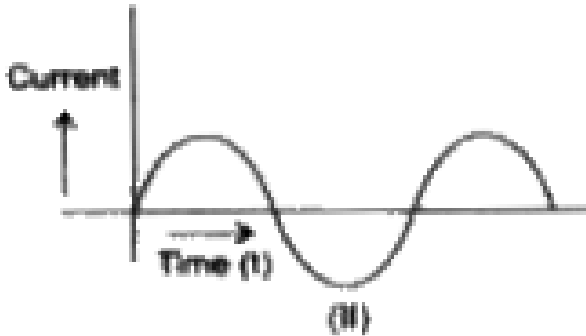
(ii) Total current drawn from the battery and

(iii) Equivalent resistance of circuit



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23. Study the following current time graphs from two different sources.



(i) Use above graphs to list word differences between the current in the two cases.

(ii) Name the type of current in two cases (iii)

Identify one source each for these currents.

(iii) What is meant by the statement that the frequency of current in India is 50 Hz ?

24. Calculate the resistance of the wire using the graph.



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25. How many 176Ω resistors (in parallel) are required to carry 5A on a 220 V line ?



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26. Define electric power. Derive relation between power, potential difference and resistance.



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27. Draw a labelled circuit diagram to study the relationship between the current (I) flowing through a conductor and the potential difference (V) applied across its two ends. State the formula relating the I in a conductor

and the V across it. Also show their relationship by drawing a diagram.

What would be the resistance of a resistor if the current flowing through it is 0.15 A when the potential difference across it is 1.05 V ?



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28. Find out the following in the electric circuit given in the figure.

(i) Effective resistance of two 8Ω resistors in the combination

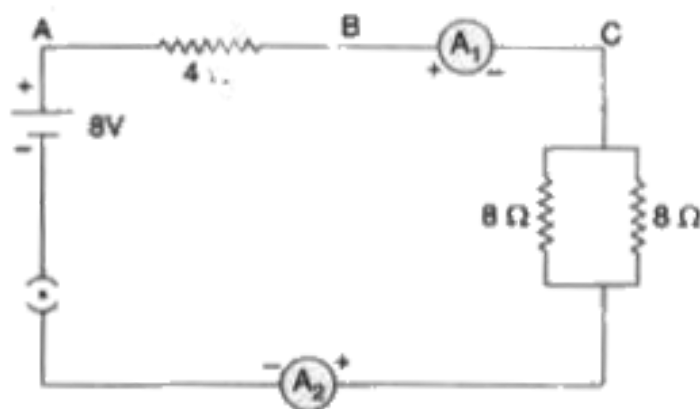
(ii) Current flowing through 4Ω resistor

(iii) Potential difference across 4Ω resistor

(iv) Power dissipated in 4Ω resistor

(v) Difference in reading of ammeter A_1 and

A_2 (if any) .



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

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

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

(iii) In which arrangement will the current through A and B be the same ?

(iv) Calculate the equivalent resistance for each arrangement.



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Ncert Corner Intext Questions

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 between two points is 1 V?



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6. How much energy is given to each coulomb of charge passing through a 6 V 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 or a thin wire of the same material, when connected to the same source? Why?



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



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10. Why are 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, an 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 the current through the resistors and a voltmeter to measure 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 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 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 2Ω , 3Ω and 6Ω be connected to give a total resistance of a] 4Ω . b] 1Ω ?



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18. What is the lowest total resistance that can be secured by combinations of four coils of resistance 4Ω , 8Ω , 12Ω , 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 50 V.



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



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



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1. A piece of wire of resistance 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 R/R' is -

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

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

C. 5

D. 25

Answer: B



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

A. $I^2 R$

B. IR^2

C. VI

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

Answer: B



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

A. 100 W

B. 75 W

C. 50 W

D. 25 W

Answer: B



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4. Two conducting wires of the same material and of equal lengths and 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: A::D



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



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6. A copper wire has diameter 0.5mm and resistivity of $1.6 \times 10^{-8} \Omega\text{m}$. what will be the length of this wire to make its resistance 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 or potential difference V across the resistor are

given below

I (amperes)	0.5	1.0	2.0	3.0	4.0
V (volts)	1.6	3.4	6.7	10.2	13.2

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



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8. When a 12 V battery is connected across an unknown resistor there is a current of 2.5 mA 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 , 3Ω , 0.4Ω and 12Ω respectively. How much current would flow through the 12Ω resistors ?



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



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11. Show how you would connect three resistors, each of resistance 6Ω so that combination has a resistance of

(i) 9Ω (ii) 4Ω



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12. Several electric bulbs designed to be used on a 220 V electric supply line, are rated 10 W. How many lamps can be connected in parallel

with each other across the two wires of 220 V line if the maximum allowable current is 5 A ?



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13. A hot plate of an electric oven connected to a 220 V line has two resistance coils A and B, each of 240 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 6 V battery in series with 1Ω and 2Ω resistors, and (ii) a 4 V battery in parallel with 12Ω and 2Ω resistors.



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15. Two lamps, one rated 100 W at 220 V, and the other 60 W at 220 V, are connected in parallel to electric mains supply. What current

is drawn from the line if the supply voltage is 220 V?



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



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17. An electric heater of resistance 8Ω draws 15 A from the service mains 2 hours. Calculate the

rate at which heat is developed in the heater.



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18. Why is the tungsten used almost exclusively for filament of electric lamps?



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19. Why are the conductors of electric heating devices, such as bread-toaster and electric

irons, made of an alloy rather than a pure metal ?



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20. Why is the series arrangement not used for domestic circuits ?



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21. How does the resistance of a wire vary with its, area of cross-section ?



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22. Why are copper and aluminium wires usually employed for electricity transmission ?



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