



PHYSICS

BOOKS - FULL MARKS PHYSICS (TAMIL ENGLISH)

ELECTRICITY

Textual Solved Problems

1. A charge of 12 coulomb flows through a bulb in 5 second. What is the current through the

bulb ?



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2. The work done in moving a charge of 10 C across two points in a circuit is 100 J. What is the potential difference between the points ?



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3. Calculate the resistance of a conductor through which a current of 2A passes, when

the potential difference between its ends is 30V.



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4. The resistance of a wire of length 10 m is 2 ohm. If the area of cross section of the wire is $2 \times 10^{-7} m^2$, determine its (i) resistivity (ii) conductance and (iii) conductivity



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5. Three resistors of resistance 5 ohm, 3 ohm and 2 ohm are connected in series with 10 V battery. Calculate their effective resistance and the current flowing through the circuit.



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6. An electric heater of resistance 5Ω is connected to an electric source. If a current of 6 A flows through the heater, then find the amount of heat produced in 5 minutes.





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7. Two bulbs are having the ratings as 60 W, 220 V and 40 W, 220 V respectively. Which one has a greater resistance?



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8. Calculate the current and the resistance of a 100W, 200V electric bulb in an electric circuit.



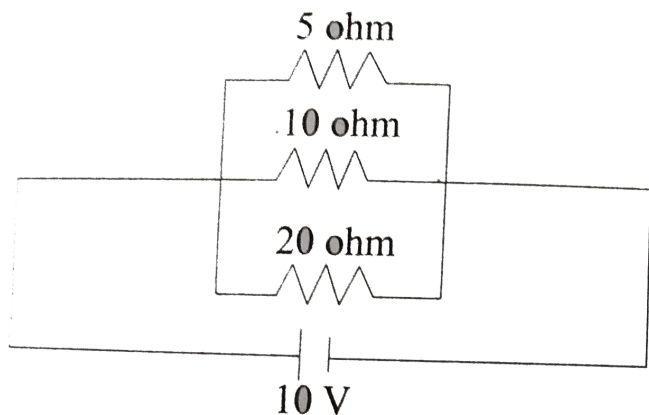
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9. In the circuit diagram given below, three resistors R_1 , R_2 and R_3 of 5Ω , 10Ω and 20Ω respectively are connected as shown.

(A) Current through each resistor

(B) Total current in the circuit

(c) Total resistance in the circuit



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10. Three resistors of 1Ω , 2Ω and 4Ω are connected in parallel in a circuit. If a 1Ω resistor draws a current of 1A , find the current through the other two resistors.



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Textual Evaluation I Choose The Best Answer

1. Which of the following is correct ?

A. Rate of change of charge is electrical power.

B. Rate of change of charge is current.

C. Rate of change of energy is current.

D. Rate of change of current is charge.

Answer: B



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2. SI unit of resistance is

A. mho

B. joule

C. ohm

D. ohm meter

Answer: C



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3. In a simple circuit, why does the bulb glow when you close the switch ?

- A. The switch produces electricity.
- B. Closing the switch completes the circuit
- C. Closing the switch breaks the circuit
- D. The bulb is getting charged.

Answer: B



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4. Kilowatt hour is the unit of

- A. resistivity

B. conductivity

C. electrical energy

D. electrical power

Answer: C



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Textual Evaluation II Fill In The Blanks

1. Fill in the blanks:

(i) The amount of work done to move charge

from one point to another is called_____.

(ii) When a circuit is open,_____ cannot pass through it.



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2. The ratio of the potential difference to the current is known as _____.



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3. The wiring in a house consists of _____ circuit.



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4. The power of an electric device is a product of _____ and _____.



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5. LED stands for _____.



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Textual Evaluation iii State Whether The Following Statements Are True Or False If False Correct The Statement

1. Ohm's law states the relationship between power and voltage.



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2. MCB is used to protect house hold electrical appliances.



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3. Define th SI unit of electric current. (or)

What is one second in SI system of units? (or)

Define one ampere (S.I standard for current)



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4. One unit of electrical energy consumed is equal to 1000 kilowatt hour.



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5. The effective resistance of three resistors connected in series is lesser than the lowest of the individual resistances.



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Textual Evaluation Iv Match The Items In Column I To The Items In Column Ii

- | | | |
|-------|----------------------|---------------|
| 1. | Electric current | (a) Volt |
| 2. | Potential difference | (b) Ohm meter |
| 1. 3. | Specific resistance | (c) Watt |
| 4. | Electrical power | (d) Joule |
| 5. | Electrical energy | (e) Ampere |



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Textual Evaluation V Assertion And Reason Type Question

1. Assertion: Electric appliances with a metallic body have three wire connections.

Reason: Three pin connections reduce heating of the connecting wires.

A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both the assertion and the reason are true, but reason is not the correct explanation of the assertion.

C. If the assertion is true, but the reason is false.

D. If the assertion is false, but the reason is true.

Answer: C



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2. Assertion: In a simple battery circuit the point of highest potential is positive terminal of the battery.

Reason: The current flows towards the point of the highest potential.

A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both the assertion and the reason are true, but reason is not the correct explanation of the assertion.

C. If the assertion is true, but the reason is false.

D. If the assertion is false, but the reason is true.

Answer: C



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3. Assertion: LED bulbs are far better than incandescent bulbs.

Reason: LED bulbs consume less power than indanescent bulbs.

A. If both the assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both the assertion and the reason are true, but reason is not the correct explanation of the assertion.

C. If the assertion is true, but the reason is false.

D. If the assertion is false, but the reason is true.

Answer: A



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Textual Evaluation Vi Very Short Answer Questions

1. Define the unit of current.



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2. What happens to the resistance, as the conductor is made thicker ?



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3. Why is tungsten metal used in bulbs, but not in fuse wires ?



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4. Name any two devices, which are working on the heating effect of the electric current .



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Textual Evaluation Vii Short Answer Questions

1. Define electric potential and potential difference.



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2. What is the role of the earth wire in domestic circuits ?



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3. State Ohm's law .



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4. Distinguish between the resistivity and conductivity of a conductor .





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5. What connection is used in domestic appliances and why ?



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Textual Evaluation Viii Long Answer Questions

1. With the help of a circuit diagram derive the formula for the resultant resistance of three

resistance connected : (a) in series and (b) in parallel



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2. (a) What is meant by electric current ? Give its direction ?

(b) Name and define its unit.

(c) Which instrument is used to measure the electric current ? How should it be connected in a circuit ?



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3. (a) State Joule's law of heating.

(b) an alloy of nickel and chromium is used as the heating element. Why ?

(c) How does a fuse wire protect electrical appliances ?



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4. Explain about domestic electric circuits.

(circuit diagram not required)



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5. What are the advantages of LED TV over the normal TV ?



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Textual Evaluation Ix Numerical Problems

1. An electric iron consumes energy at the rate of 420 W when heating is at the maximum rate and 180 W when heating is at the

minimum rate. The applied voltage is 220V.

What is the current in each case.



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2. A 100 watt bulb is used for 5 hours daily and four 60 watt bulbs are used for 5 hours daily. Calculate the energy consumed (in kWh) in the month of January.



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3. A touch bulb is rated at 3 V and 600 mA.

Calculate

a) Power

b) Resistance

c) Energy consumed if it is used for 4 hour.



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4. A piece of wire having a resistance R is cut into five equal parts.

a) How will the resistance of each part of the

wire change compared with the original resistance ?

b) If the five parts of the wire are placed in parallel, how will the resistance of the combination change ?

c) What will be the ratio of the effective resistance in series connection to that of the parallel connection ?



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Textual Evaluation Xi Hots

1. Two resistors when connected in parallel give the resultant of 2 ohm, but when connected in series the effective resistance becomes 9 ohm ? Calculate the value of each resistance.



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2. How many electrons are passing per second in a circuit in which there is a current of 5 A ?



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3. A piece of wire of resistance 10 ohm is drawn out so that its length is increased to three times its original length. Calculate the new resistance.



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Additional Questions | Choose The Correct Answer

1. The motion of electric charges through a conductor will constitute

- A. electric current
- B. electric potential
- C. electrical field
- D. none

Answer: A



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2. SI unit of current is _____.

- A. Volt

B. power

C. Ampere

D. newton

Answer: C



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3. A charge of 60 coulomb flows through a bulb in 5 minutes what is the current through the bulb ?

A. 2A

B. 0.2 A

C. 12A

D. 0.12A

Answer: B



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4. The work done in moving a charge of 2C across two points in a circuit is 2J. What is the potential difference between the points ?

A. 1V

B. 10V

C. 100V

D. 0

Answer: A



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5. Unit of electric potential is _____.

A. Ampere

B. Joule

C. Watt

D. Volt

Answer: D



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6. The potential difference V is proportional to the current I , the graph between V and I is a . .

.....

A. straight line

B. parabola

C. ellipse

D. none

Answer: A



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7. SI unit of resistance is

A. volt

B. volt ampere⁻¹

C. ampere

D. Joule

Answer: B



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8. What is the potential difference between the ends of resistor of 15Ω when a current of 2A passes through it ?

A. 30 V

B. 7.5 V

C. 3 V

D. 300 V

Answer: A



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9. Electrical resistivity for a given material is ..

.....

A. zero

B. constant

C. both (a) and (b)

D. only (b)

Answer: B



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10. The unit of conductance is _____.

A. ohm^{-1}

B. Volt⁻¹ ampere

C. both (a) and (b)

D. ohm

Answer: C



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11. What is the SI unit of electrical conductivity?

A. ohm - metre

B. $\text{ohm}^{-1}\text{metre}^{-1}$

C. volt Ampere⁻¹

D. ohm

Answer: B



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12. The resistance of a wire of length 10 cm is 2 ohm, then its conductance is

A. 0.5 ohm

B. 5 ohm^{-1}

C. 0.5 ohm^{-1}

D. 20 ohm^{-1}

Answer: C



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13. The resistivity of a material is $4 \times 10^{-8} \Omega \text{ m}$

and its conductivity

A. $25 \times 10^{-8} \text{ mho m}^{-1}$

B. $0.25 \times 10^{-8} \text{ mho m}^{-1}$

C. $25 \times 10^8 \text{ mho m}^{-1}$

D. $0.25 \times 10^8 \text{ mho m}^{-1}$

Answer: D



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14. When two 2Ω resistors are connected in parallel, the effective resistance is

A. 4Ω

B. 1Ω

C. 0.5Ω

D. 5Ω

Answer: B



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15. When two 2Ω resistors are connected in series, the effective resistance is

A. 1Ω

B. 4Ω

C. 5Ω

D. 2Ω

Answer: B



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16. When n resistors of equal resistance (R) are connected in series, the effective resistance is

A. nR

B. $\frac{n}{R}$

C. $\frac{R}{n}$

D. none of these

Answer: A



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17. When three resistors are connected in parallel then the value of the effective resistance is _____

A. nR

B. $\frac{n}{R}$

C. $\frac{R}{n}$

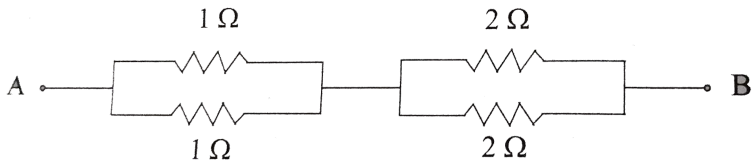
D. none of these

Answer: C



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18. The effective resistance for the given circuit in AB



A. $1\ \Omega$

B. $2\ \Omega$

C. $3\ \Omega$

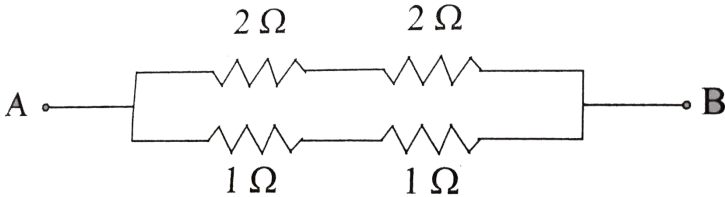
D. $1.5\ \Omega$

Answer: D



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19. The effective resistance between AB in the given circuit



A. $\frac{1}{4}\ \Omega$

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

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

D. $\frac{4}{3}\ \Omega$

Answer: D





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20. Nichrome is

A. a conductor

B. an insulator

C. an alloy

D. none of these

Answer: C



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21. Tungsten material is used in

A. Fuse wire

B. bulbs

C. batteries

D. none

Answer: B



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22. The heat produced in an electric heater of resistance 2Ω is connected to an electric source, when a current of 6A flows for 5 minutes

A. $216 \times 10^2 J$

B. $2160J$

C. $900J$

D. $150J$

Answer: A



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23. The SI unit of power is _____.

A. Volt - ampere

B. Watt

C. both (a) and (b)

D. only (b)

Answer: C



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24. One horse power is

A. 764 watt

B. 746 watt

C. 647 watt

D. 674 watt

Answer: B



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25. Kilowatt hour is the unit of

A. $3.4 \times 10^6 J$

B. $36 \times 10^6 J$

C. $3.6 \times 10^5 J$

D. $36 \times 10^5 J$

Answer: A



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26. To protect the house hold electrical appliances from overloading due to excess current

A. Fuse wire

B. MCB

C. both (a) and (b)

D. none

Answer: C



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27. In India, domestic circuits are supplied with frequency of

A. 60 Hz

B. 50 Hz

C. 220 Hz

D. 230 Hz

Answer: B



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28. Due to short circuit, effective resistance in the circuit becomes

A. large

B. very small

C. very large

D. zero

Answer: B



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29. The colour of LED will depend on the type of Used.

A. circuit

B. materials

C. display

D. segment

Answer: B



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30. One way of overcoming the energy crisis is to use more Bulbs.

A. filament

B. glass

C. LCD

D. LED

Answer: D



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31. LED TV screen was developed by James P Mitchell in

A. 1797

B. 1977

C. 2009

D. 1987

Answer: B



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32. The current in the electric bulb of 100 W and 200 V electric circuit is

A. $5A$

B. $0.5 A$

C. $50 A$

D. $500 A$

Answer: B



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Additional Questions li Fill In The Blanks

1. The rate of flow of charges in a conductor is _____.



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2. _____ is used to fix the magnitude of current through a circuit.



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3. _____ is used to select the magnitude of current through a circuit.



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4. Is used to measure electric current.



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5. A _____ is used to measure the potential difference.



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6. Is used to indicate the direction of current.



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7. The electric current in an external circuit flows from the



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8. The electrical resistivity drops to zero for



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9. The reciprocal of resistance is



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10. The reciprocal of electrical resistivity is called





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11. The effective resistance of three resistors connected in series is lesser than the lowest of the individual resistances.



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12. The equivalent resistance in a _____ combination is less than the lowest of the individual resistances.



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13. The heating effect of current is used in devices like and



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14. Nichrome is an alloy of _____ and Chromium.



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15. The filament is made up of a material whose Is very high.



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16. Electric power is the product of
and



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17. The important components of main box are and



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18. LED bulbs is a _____ device.



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19. LCD is



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20. An array of LEDs act as



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21. A Is the display device used to give an output in the form of



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Additional Questions iii Match The Following

1. Match the following

1.	LED	(a) heating device
2.	Fuse wire	(b) alloy
3.	Tungsten	(c) semi conductor device
4.	Nichrome	(d) Filament
5.	Electric heater	(e) MCB



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2. Match the following

1.	Power	(a) $V = IR$
2.	Joule's law	(b) $\rho = \frac{RA}{l}$
3.	Ohm's law	(c) $P = VI$
4.	Specific Resistance	(d) $I = Q/t$
5.	Electric energy	(e) $H = I^2RT$



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3. Match the following

1.	Ammeter	(a) To measure resistance
2.	Voltmeter	(b) Direction of current
3.	Galvanometer	(c) To measure voltage
4.	Ohm meter	(d) To measure current



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4. Match the following

1.	$\rho = \frac{RA}{l}$	(a) watt
2.	$\sigma = \frac{1}{\rho}$	(b) Ωm
3.	$E = P \times t$	(c) coulomb
4.	$P = VI$	(d) $m^{-1}\Omega^{-1}$
5.	$q = It$	(e) Kilowatt hour



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5. Match the following

1.		(a) Ammeter
2.		(b) Voltmeter
3.		(c) Resistor
4.		(d) Diode
5.		(e) Rheostat



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Additional Questions IV State Whether The Following Statements Are True Or False If False Correct The Statement

1. The effective resistance of three resistors connected in series is lesser than the lowest of the individual resistances.



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2. When 'n' number of resistors of equal resistance R connected in series, the equivalent resistance is $R_p = \frac{R}{n}$



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3. When three resistors are connected in series then the value of the effective resistance is



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4. Nichrome is an alloy of copper and chromium.



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5. The fuse wire is made up of a material whose melting point is relatively high.



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Additional Questions V Very Short Answer Questions

1. What is electric circuit ?



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2. Name any two component and its use ?



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3. Unit of electric potential is _____.



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4. Draw a graph between V and I for a conductor by ohm's law ?



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5. Define the unit of resistance ? (or) Define one ohm.



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6. Define the term electric power and circuit its SI units.



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7. Kilowatt hour is the unit of



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8. What is meant by Heating effect of electric current ?



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Additional Questions Vi Short Answer Questions

1. Define electrical resistivity.



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2. Define specific resistance electrical conductivity ? Give its unit.



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3. Explain series and parallel circuit.



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4. What is electric power and electric energy ?





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5. What is meant by overloading and short circuit ?



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6. What is meant by short circuit ?



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7. Define resistance.



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Additional Questions Vii Answer In Details

1. Explain the series connection of parallel resistors.



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2. Explain the parallel connection of series resistors.



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Additional Questions Viii Numerical Problems

1. Show that one ampere is equivalent to a flow of 6.25×10^8 elementary charges per second.



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2. How many electrons pass through a lamp in one minute, if the current is 300 mA ?



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3. Calculate the resistivity of a material of a wire 10 m long. 0.4 mm in diameter and having a resistance of 2.0Ω .



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4. Find the effective resistance between A and B in the given circuit.



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