PHYSICS

NCERT - NCERT PHYSICS(TELUGU)

ELECTRICITY

Examples

1. A current of 0.5 A is drawn by a filament of an electric bulb for 10 minutes. Find the amount of electric charge that flows through the circuit.

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2. How much work is done in moving a charge of 2 C across two points having a potential difference 12 V?

3. (a) How much current will an electric bulb draw from a 220 V source, if the resistance of the bulb filament is 1200 Ω? (b) How much current will an electric heater coil draw from a 220 V source, if the resistance of the heater coil is 100 Ω?

4. The potential difference between the terminals of an electric heater is 60 V when it draws a current of 4 A from the source. What current will the heater draw if the potential difference is increased to 120 V?

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5. Resistance of a metal wire of length 1 m is 26 Ω at $20°$C. If the diameter of the wire is 0.3 mm, what will be the resistivity of the metal at that temperature? Using Table 12.2, predict the material of the wire.
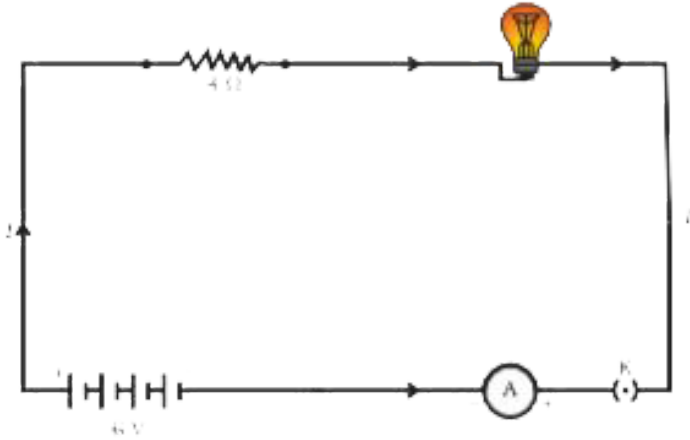
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6. A 4 Ω resistance wire is doubled on it. Calculate the new resistance of the wire.

7. An electric lamp, whose resistance is 20 Ω, and a conductor of 4 Ω resistance are connected to a 6 V battery (Fig. 12.9). Calculate (a) the total resistance of the circuit, (b) the current through the circuit, and (c) the potential difference across the electric lamp and

conductor.

8. In the circuit diagram given in Fig. 12.10, suppose the resistors R_1, R_2 and R_3 have the values $5\Omega, 10\Omega, 30\Omega$, respectively, which have been connected in parallel to a battery of 12 V. Calculate (a) the current through each resistor, (b) the total

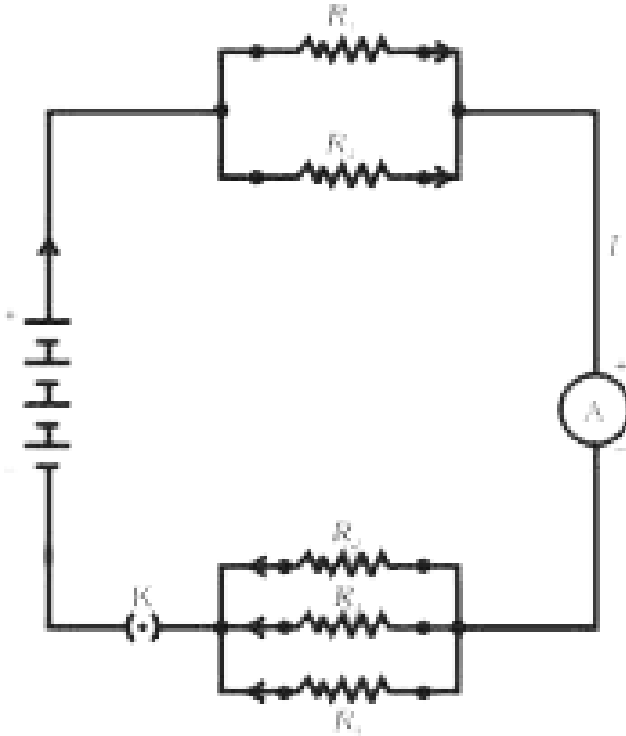current in the circuit, and (c) the total circuit resistance.

9. If in Fig. 12.12, $R_1 = 10\Omega, R_2 = 40\Omega, R_3 = 30\Omega, R_4 = 20\Omega, R_5 = 60\Omega$, and a 12 V battery is connected to the arrangement. Calculate (a) the total resistance in the circuit, and (b)

the total current flowing in the circuit.

10. An electric iron consumes energy at a rate of 840 W when heating is at the maximum rate and 360 W

when the heating is at the minimum. The voltage is 220 V. What are the current and the resistance in each case?

11. 100 J of heat are produced each second in a 4 Ω resistance. Find the potential difference across the resistor.

12. An electric bulb is connected to a 220 V generator. The current is 0.50 A. What is the power of the bulb?

13. An electric refrigerator rated 400 W operates 8 hour/day. What is the cost of the energy to operate it for 30 days at Rs 3.00 per kW h?

Question

1. what does an electric circuit mean ?

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 component 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.** Which metal is the best conductor of electricity?

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12. Draw a schematic diagram of a circuit consisting of a battery of three cells of 2 V each, a 5 Ω resistor,

an 8 Ω resistor, and a 12 Ω resistor, and a plug key, all connected in series.

13. In the given circuit , the two cells have no internal resistance. Calculate the potential difference across the 20Ω resistor .
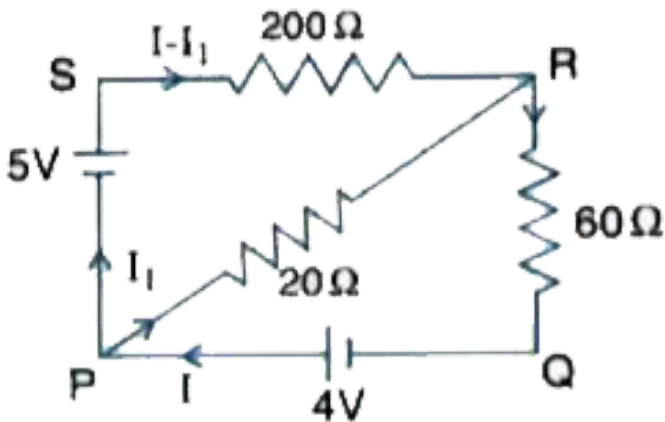
14. Judge the equivalent resistance when the following are connected in parallel – (a) 1 Ω and $10^6\Omega$, $(b)1\Omega$ and $10^3\Omega$, and $10^6\Omega$.

15. An electric lamp of 100 Ω, a toaster of resistance 500 Ω, and a water filter of resistance 500 Ω 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?

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 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 20 Ω takes a current of 5 A. Calculate the heat developed in 30 s.

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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. $1/25$

B. $1/5$

C. 5

D. 25

Answer:

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

A. i^2R

B. IR^2

C. VI

D. V^2/R

Answer:

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:

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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:

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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 0.5 mm and resistivity of $1.6 \times 10^{-8}\Omega$ 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?

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 –

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.

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.

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

10. How many 176 Ω resistors (in parallel) are required

to carry 5 A on a 220 V line?

11. Show how you would connect three resistors, each

of resistance 6 Ω, so that the combination has a

resistance of (i) 9 Ω, (ii) 4 Ω.

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 24 Omega` resistance, which may be used separately, in series, or in parallel. What are the currents in the three cases?

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.

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?

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 8 Ω 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. 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 resistance of a wire vary with its area of cross-section?

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