

# NTSE

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PHYSICS – Electricity



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## NCERT ANNEXURE

Given below are subjective type questions and answers for your reference:

**1. Define the unit of current.**

**Ans.** The S.I. unit of electric current is ampere (A). Electric current flowing through a conductor is said to be one ampere if one coulomb of electric charge flows through any cross section of a conductor in one second.

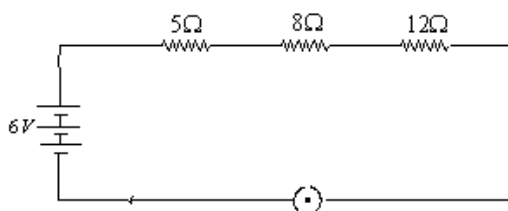
**2. Why are coils of electric toasters and electric irons made of an alloy rather than a pure metal?**

**Ans.** The heating elements of electrical heating appliances are usually made up of an alloy rather than a pure metal because the resistivity of an alloy is much higher than that of pure metal due to which more heat will be produced on passing current.

Secondly, they do not get oxidized even at high temperatures, so they can be kept red-hot without melting or breaking.

**3. 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.**

**Ans.** Three cells of potential 2V, each connected in series, is equivalent to a battery of potential  $2\text{ V} + 2\text{ V} + 2\text{ V} = 6\text{ V}$ . The following circuit diagram shows three resistors of resistances  $5\Omega$ ,  $8\Omega$  and  $12\Omega$  respectively connected in series and a battery of potential 6 V.



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

**Ans.** Parallel combination is superior over series combination because of the following reasons.

(i) In case of parallel combination if one electric appliance stops working due to any reason then, all other appliances keep on working normally, while in case of series combination, all other appliances also stop working because the whole circuit gets broken.

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- (ii) In parallel circuits, each electrical appliance can be operated with its own switch without affecting others while, in series combination, all the appliances can be governed by only one switch.
- (iii) In parallel combination, each device gets the same voltage which is equal to the power supply line while, in series arrangement each appliance does not get the same voltage as that of the power supply line.
- (iv) In parallel combination the total resistance of the circuit is reduced due to which current flow is high. While in series, current supply is low due to increase in total resistance of the circuit.

**5. Explain the following.**

- (a) Why is 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 aluminum wires usually employed for electricity transmission?**

- Ans.**
- (a) Tungsten is almost invariably used in making the filament of electric bulbs because its melting point is very high ( $3380^{\circ}\text{C}$ ) due to which it can be kept white hot without melting. Secondly, its resistivity is high.
  - (b) The heating elements of electrical heating appliances are usually made up of an alloy rather than a pure metal because the resistivity of an alloy is much higher than that of pure metal due to which more heat will be produced on passing current. Secondly, they do not get oxidized even at high temperatures, so they can be kept red-hot without melting or breaking.
  - (c) The series arrangement is not used for domestic circuit because :
    - (i) All the electrical appliances do not get the same voltage as that of the power supply line. So, they do not work properly.
    - (ii) The total resistance increases so much that the current flowing through the circuit is low.
    - (iii) If one appliance is switched off or damaged then all other appliances will also stop working.
    - (iv) All the electrical appliances can have only one switch therefore, they can not be operated independently
  - (d) The resistance of a wire is inversely proportional to its cross-sectional area. So, the resistance of a wire decreases with an increase in cross-sectional area. That's why a thin wire has more resistance than a thick wire of the same dimensions at a given temperature.
  - (e) It is because Cu and Al wires are good conductors of electricity. Due to low resistance heat production is negligible so, power loss is also negligible in electricity transmission.

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*I still wonder how one man has such a deep understanding of an examination. It becomes the truth what ever Vipin Sir says about NTSE.*

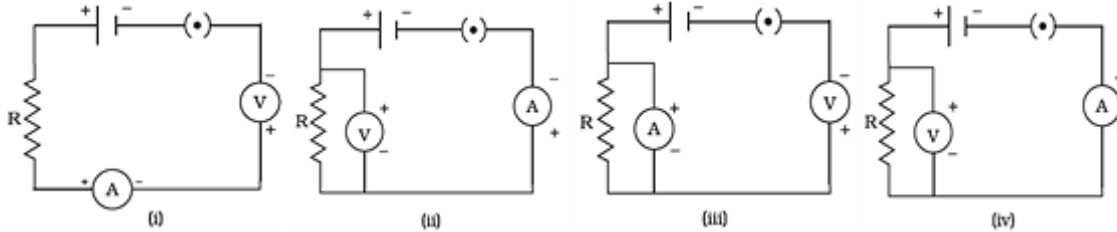
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## NCERT EXEMPLAR

1. Identify the circuit (Figure) in which the electrical components have been properly connected.



(A) (i)

(B) (ii)

(C) (iii)

(D) (iv)

Ans. (B) (ii)

2. 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 area of cross section

(A)  $A/2$

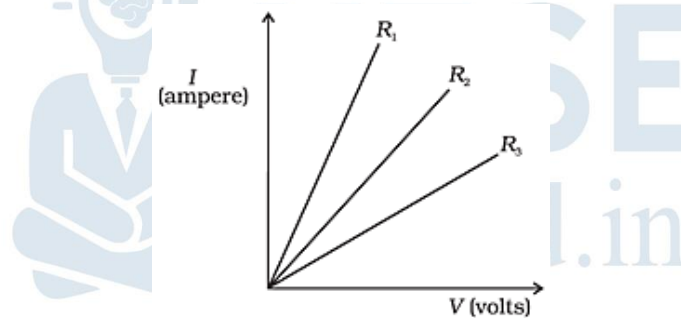
(B)  $3A/2$

(C)  $2A$

(D)  $3A$

Ans. (C)  $2A$

3. A student carries out an experiment and plots the V-I graph of three samples of nichrome wire with resistances  $R_1$ ,  $R_2$  and  $R_3$  respectively (Figure.). Which of the following is true?



(A)  $R_1 = R_2 = R_3$

(B)  $R_1 > R_2 > R_3$

(C)  $R_3 > R_2 > R_1$

(D)  $R_2 > R_3 > R_1$

Ans. (C)  $R_3 > R_2 > R_1$

4. The resistivity does not change if

(A) The material is changed

(B) The temperature is changed

(C) The shape of the resistor is changed

(D) Both material and temperature are changed

Ans. (C) The shape of the resistor is changed

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5. In an electrical circuit three incandescent bulbs A, B and C of rating 40 W, 60 W and 100 W respectively are connected in parallel to an electric source. Which of the following is likely to happen regarding their brightness?
- (A) Brightness of all the bulbs will be the same
  - (B) Brightness of bulb A will be the maximum
  - (C) Brightness of bulb B will be more than that of A
  - (D) Brightness of bulb C will be less than that of B
- Ans.** (C) Brightness of bulb B will be more than that of A

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