

Maxprap. Chapter wise Series Class 10th - Physics

Class : 10th

Topic : Electricity

Max. Marks : 50

Duration : 2 Hrs

Sections: A (MCQs), B (Short Answer-I), C (Short Answer-II), D (Long Answer), E (Case-Based).

General Instructions:

- All questions are compulsory.
- This question paper contains 23 questions divided into five Sections A, B, C, D and E. (iii). Section A comprises of 10 MCQs of 1 mark each. Section B comprises of 5 questions of 2 marks each. Section C comprises of 4 questions of 3 marks each. Section D comprises of 2 question of 5 marks each and Section E comprises of 2 Case Study Based Questions of 4 marks each.
- There is no overall choice.

Section A

Questions 1 to 10 carry 1 mark each

1. The commercial unit of energy is:

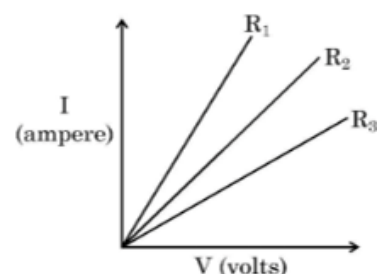
- a) Watt b) Kilowatt - hour c) Kilo - joule d) Watt - hour

2. A cylindrical conductor of length l and uniform area of cross section A has resistance R . The area of cross section of another conductor of same material and same resistance but of length $2l$ is

- a) $\frac{3A}{2}$ b) $3A$ c) $\frac{A}{2}$ d) $2A$

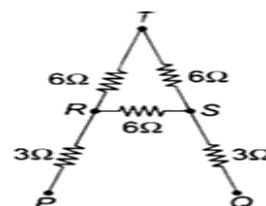
3. Study the I - V graph for three resistors of resistances R_1 , R_2 and R_3 and select the correct statement from the following:

- a) $R_1 = R_2 = R_3$ b) $R_3 > R_2 > R_1$
c) $R_1 > R_2 > R_3$ d) $R_2 > R_3 > R_1$



4. What is the equivalent resistance between points P and Q in the given circuit diagram?

- a) $\frac{10}{3} \Omega$ b) 10Ω c) 4Ω d) 5Ω



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

- a) 25 W b) 100 W c) 50 W d) 75 W

6. Electrical resistivity of a given metallic wire depends upon

- a) its thickness b) its length c) its shape d) nature of the material

7. Match the column I with column II and select the correct option from the codes given.

- a) (a) - (iii), (b) - (iv), (c) - (i), (d) - (ii)
 b) (a) - (iv), (b) - (i), (c) - (ii), (d) - (iii)
 c) (a) - (iii), (b) - (i), (c) - (ii), (d) - (iv)
 d) (a) - (iv), (b) - (ii), (c) - (i), (d) - (iii)

Column I	Column II
(a) Electric current	(i) volt
(b) emf	(ii) ohm
(c) Resistance	(iii) ohm-metre
(d) Resistivity	(iv) ampere

8. If a person has five resistors each of value $\frac{1}{5}\Omega$, then the maximum resistance he can obtain by connecting them is

- a) 1Ω b) 25Ω c) 10Ω d) 5Ω

Assertion(A)/Reason(R) Based (9-10): In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- a) Both A and R are true and R is the correct explanation of A.
 b) Both A and R are true but R is not the correct explanation of A.
 c) A is true but R is false.
 d) A is false but R is true.

9. **Assertion (A):** Alloys are used in making electric irons, toasters etc.

Reason (R): Because the resistivity of alloys is lower than its constituent metals.

10. **Assertion (A):** Longer wires have greater resistance and the smaller wires have lesser resistance.

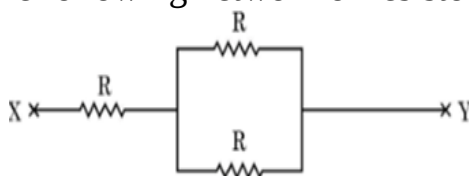
Reason (R): Resistance is inversely proportional to the length of the wire.

SECTION – B

Questions 11 to 15 carry 2 marks each

11.

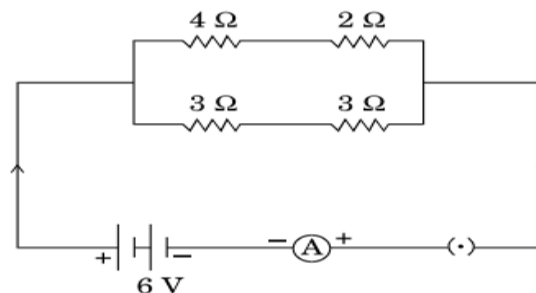
- a) State Ohm's law. Write formula for the equivalent resistance R_p of the parallel combination of three resistors of values R_1 , R_2 and R_3 .
 b) Find the resistance of the following network of resistors:



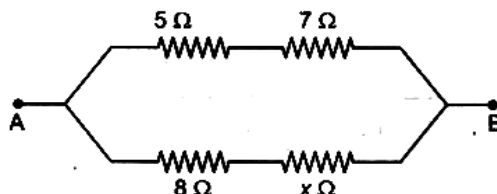
12. What is meant by electric current? Write its SI unit. Calculate the amount of charge that flows through a conductor when a current 5A flows through it for 2 min.

13. In the given circuit, find:

- a) Total resistance of the network of resistors
 b) Current through ammeter A
 c) Potential difference across 3Ω and 4Ω resistors



14. In the circuit given below, calculate the value of x , if the equivalent resistance between the points A and B is 6Ω .



15. What is Joule's heating effect? How can it be demonstrated experimentally? List its four applications in daily life.

SECTION – C

Questions 16 to 19 carry 3 marks each

16. Three resistors of 2Ω , 3Ω and 6Ω are connected in (i) series, and (ii) parallel. Draw the arrangements of the resistors and find the equivalent resistance of each arrangement.

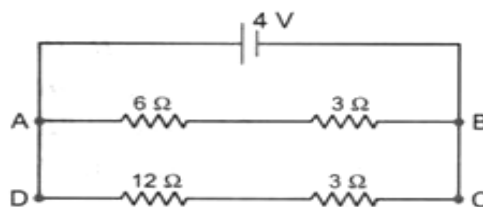
17. For a heater, rated 4 kW and 220 V, calculate the following:

- The current
- Energy consumed in 2 hours
- If 1 kWh is priced at ₹ 4.50, then the cost of energy consumed

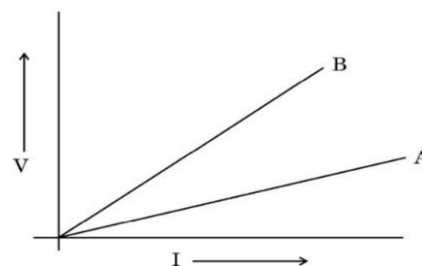
18. For the circuit shown in the given diagram:

What is the value of

- current through 6Ω resistor?
- potential difference across 12Ω resistor?



19. V - I graph for two conducting wires A and B are as shown. If both wires are of the same length and same diameter, which of the two is made of a material of high resistivity? Give reasons to justify your answer.



SECTION – D

Questions 20 to 21 carry 5 marks each

20. What is meant by resistance of a conductor? Name and define its SI unit. List the factors on which the resistance of a wire is affected, if (i) its length is doubled, (ii) its radius is doubled?

21.

- Define Power and state its SI unit.
- A torch bulb is rated 5 V and 500 mA. Calculate its

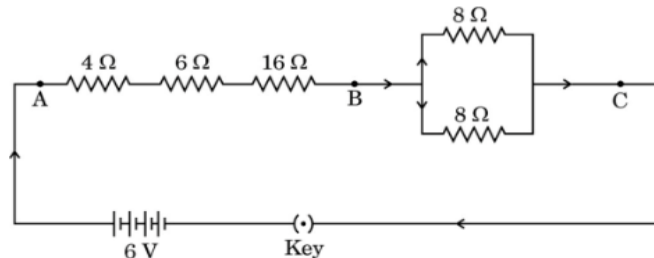
- Power
- Resistances
- Energy consumed when it is lighted for $2\frac{1}{2}$ hours.

SECTION – E (Case Study Based Questions)

Questions 22 & 23 carry 4 marks each

22. Read the following text carefully and answer the questions that follow:

Study the following circuit:



On the basis of this circuit, answer the following questions:

- Find the value of total resistance between the points A and B. (1)
- Find the resistance between the points B and C. (1)
- Calculate the current drawn from the battery, when the key is closed. (2)

OR

In the above circuit, the 16Ω resistor or the parallel combination of two resistors of 8Ω , which one of the two will have more potential difference across its two ends? Justify your answer. (2)

23. Read the following text carefully and answer the questions that follow:

The heating effect of current is obtained by transformation of electrical energy into heat energy. Just as mechanical energy used to overcome friction is covered into heat, in the same way, electrical energy is converted into heat energy when an electric current flows through a resistance wire. The heat produced in a conductor, when a current flows through it is found to depend directly on (a) strength of current (b) resistance of the conductor (c) time for which the current flows.

The mathematical expression is given by $H = I^2 Rt$.

The electrical fuse, electrical heater, electric iron, electric geyser etc. all are based on the heating effect of current.

- What are the properties of heating element? (1)
- What are the properties of electric fuse? (1)
- When the current is doubled in a heating device and time is halved, what will be the heat energy produced? (2)

OR

A fuse wire melts at 5 A. It is desired that the fuse wire of same material melt at 10 A. Find the new radius of the wire? (2)

Electricity Paper Details – Analysis		
Objective Questions		
MCQ	1 marks x 8 question = 8	
Assertion Reason	1 marks x 2 question = 2	
Subjective		
Short type I	2 marks x 5 question = 10	
Short type II	3 marks x 4 question = 12	
Long Type	5 marks x 2 question = 10	
Case Studies Based		
Case 1	4 marks	
Case 2	4 marks	

Total = 50 marks Your Score =