

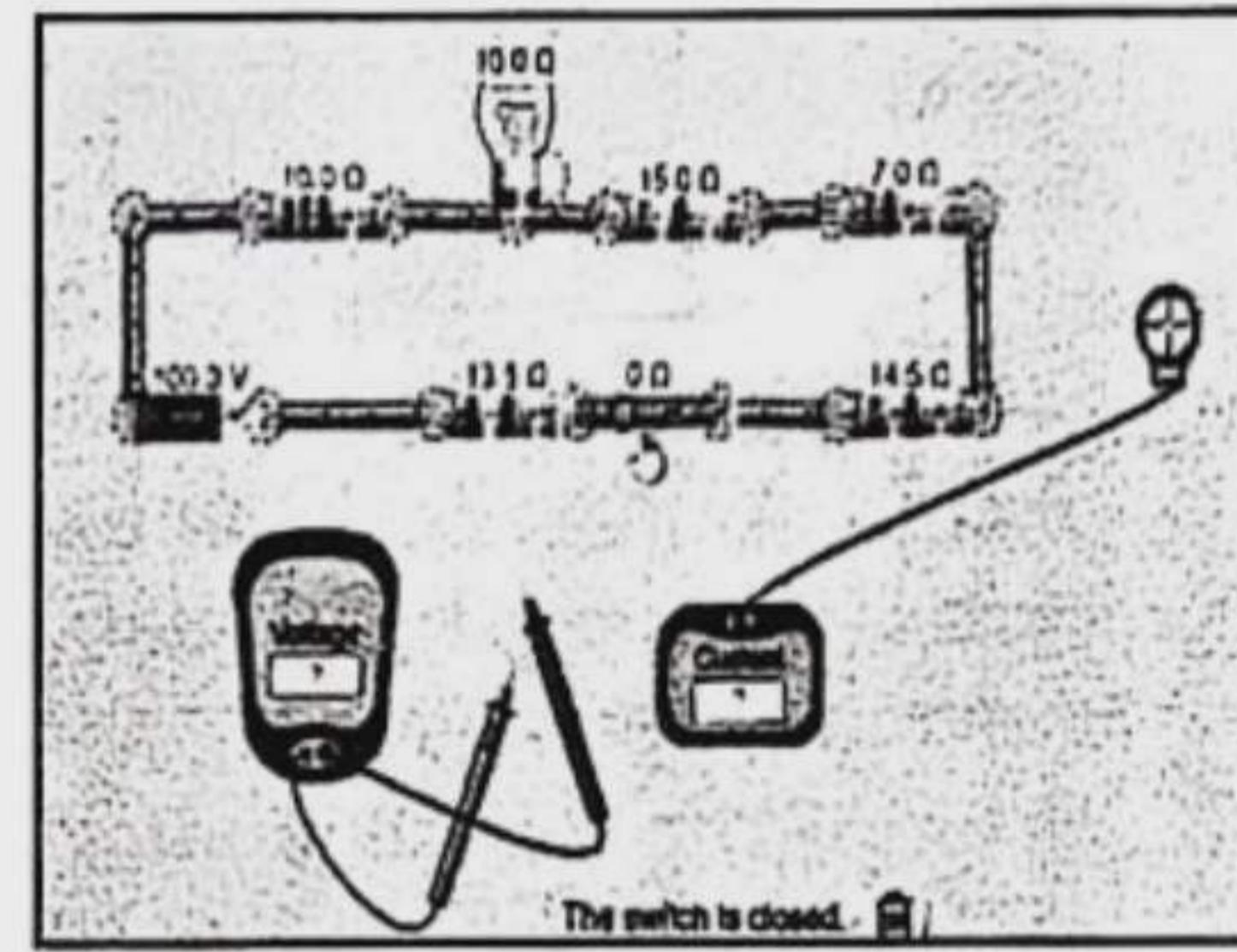
Electric Circuits and Current Electricity

Contents for Discussion

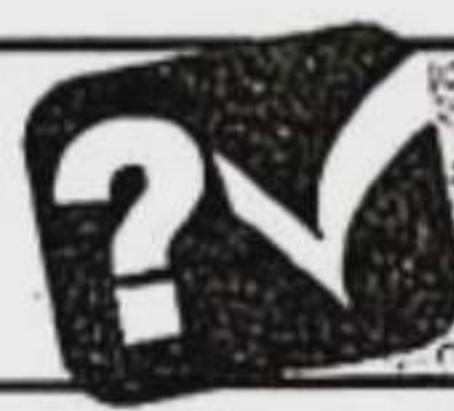
- Electric potential and electric current
- Different types of current flow
- Resistance
- Electric circuit
- Ammeter and voltmeter
- Fuses
- The effective use of electricity and to stop its wastage.

Learning Outcomes : After studying this chapter, I will be able to—

- explain the concepts of electric potential and potential difference;
- explain the idea of AC and DC flow;
- explain the use of resistance, fuse and key in an electric circuit;
- explain the difference between current flow and voltage difference graphically;
- show the difference between current and voltage in series and parallel circuits;
- make proper use of ammeter and voltmeter in the measurements of current and voltage;
- be conscious and make other people conscious about the effective use of electricity and protection against its wastage.



Practice



Multiple Choice, Short & Creative Q/A
following 100% accurate format for best prep.

Dear learners, the Q/A of this chapter have been divided into exercise, multiple choice, short, creative & exercise-based activities in light of the learning outcomes. Practice the questions well to ensure the best preparation in the exam.

Textual Q/A Let's learn the textbook Q/A

Fill in the Blanks

1. If there is — between two conductors, current — will occur.
2. If between the two ends of a conductor — is less, the — will be less.
3. If we use a fuse of — to an electric kettle, this will —.

Ans. 1. potential, difference; 2. potential difference, flow of electricity; 3. 5 ampere, melt.

Short Answer Questions

Question 1. Define Ohm's law.

Ans. Ohm's law : At a fixed temperature the current flowing through a particular wire or conductor is proportional to the voltage difference between the two ends of the conductor.

Explanation : From Ohm's law, we can see that if the voltage between the two ends of a conductor is high, the current flowing through the conductor

will be large and if the voltage is low, the current will be low.

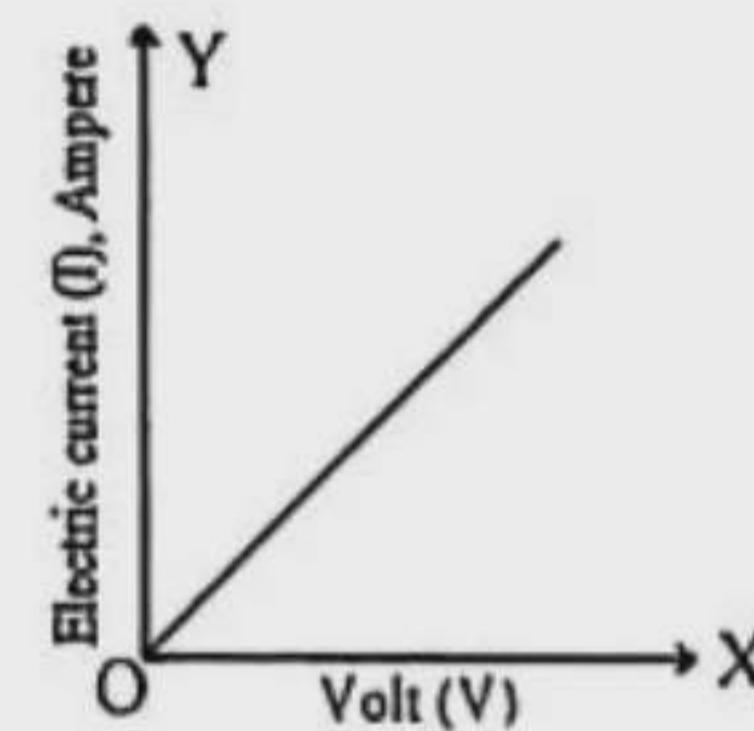


Fig. 9.4: Graphical representation of Ohm's law.

We can write Ohm's law as $I \propto V$ and $I = \frac{V}{R}$, where I is the current, V is the voltage and R is the resistance of the conductor.

Thus in a particular conductor the current flowing through it is inversely proportional to the resistance of the conductor.

Question 2. What is the relation between the resistance and the current flowing through a conductor?

Ans. The relationship between the electric current flowing through a conductor and its resistance is

that electric current is inversely proportional to resistance. That is, for a given conductor, the current flowing through it is inversely proportional to its resistance.

If the potential difference across the two ends of a conductor is V , its resistance is R , and the electric current is I , then :

$$I = \frac{V}{R}$$

This is the relationship between the electric current flowing through a conductor and its resistance.

MCQs with Answers

1. What is the unit of electric current?

- (a) Coulomb (b) Ampere
- (c) Volt (d) Ohm

► **Explanation :** Coulomb is the unit of charge. Ampere is the unit of electric current. Volt is the unit of potential difference. Ohm is the unit of resistance.

2. What is the source of alternating current?

- (a) Battery (b) DC Generator
- (c) Generator (d) Electric Cell

► **Explanation :** The source of alternating current is a generator or dynamo. The source of unidirectional current or non periodic current is an electric cell or battery, DC generator.

■ After reading the following paragraph answer questions no. 3 and 4 :

There are two bulbs and a fan which are connected in the study room of Mina. On the other hand in their dining room two tube lights, a fan and an electric kettle are connected to the circuit.

3. Fuse of which ampere value is to use in the study room of Mina?

- (a) 5 (b) 10 (c) 15 (d) 30

► **Explanation :** Generally, we use fuses of 5 amperes, 15 amperes, 30 amperes and 60 amperes. Different quality fuses are used for different appliances. 5 amperes are used for lamps, fans, TVs, etc. and 15 ampere fuses are used for electric kettles or irons. The main fuse in the house is of 30 or 60 amperes.

4. If a fuse of 5 ampere is used in dining room of Mina's family —

- i. there will be saving of electricity
- ii. there will accidents occurring quite often.
- iii. the fuse will melt, the moment the switch will be made on.

Which of the following is correct?

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

► **Explanation :** 2 tube lights, 1 fan and 1 electric kettle are connected in Mina's study room. A 5 ampere fuse is required for two tube lights, fans and a 15 ampere fuse for two electric kettles. Using a fuse of higher quality than required will not work, meaning electrical accidents cannot be avoided. On the other hand, using a fuse of lower quality than required will cause problems as the fuse repeatedly burns or melts. In this case, if a 5 ampere fuse is used in Mina's study room, the fuse used in the electric kettle will melt as soon as it is switched on, and electrical accidents will often occur.

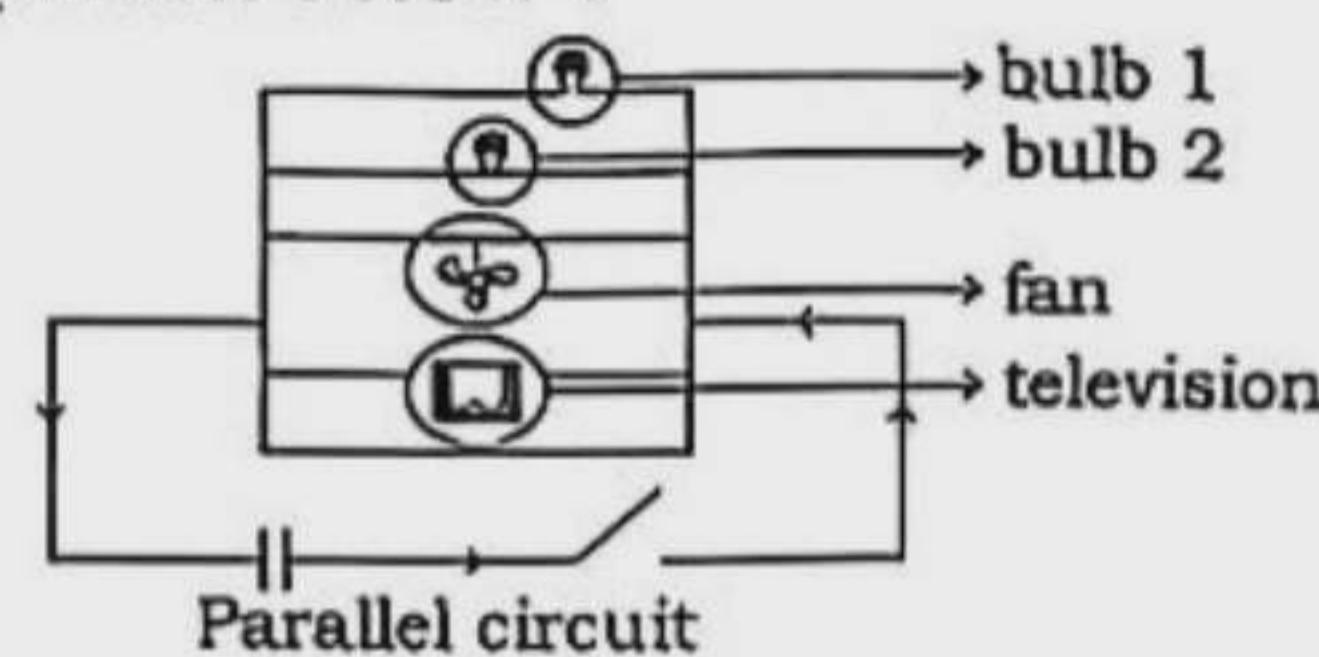
Creative Questions with Answers

Ques. 01 Mr. Haque connected two 60 watt bulbs in his office room but connected a fan and a television in parallel.

- a. What is flow of current? 1
- b. What is meant by 5 ampere fuse? 2
- c. Draw a parallel circuit with the instruments of Mr Haque. 3
- d. Which one of the two circuits is more convenient? Give your opinion after a comparative discussion. 4

Answer to Question No. 01 :

- a Flow of current means flow of electrons.
- b A 5 ampere fuse means a flow of current more than 5 ampere melts the fuse wire. A television set needs a 5 ampere fuse. If we use a 10 ampere fuse for a television set, it will burn the set. So only a fuse of 5 ampere is suitable for a television set.
- c A parallel circuit with the instruments of Mr Haque is drawn below :



- d In a series circuit, same current flows through bulbs, fans and other appliances, if any, connected to the series. But in a parallel circuit, different quantity of current flows through different bulbs, fans and other electric appliances. In case of series circuit, current through the whole circuit stops if one of the appliances is fused, i. e. all other appliances stops working. It does not arise in a parallel circuit because current flows through separate path for each bulb or appliance. In case of series circuit, no appliance can be switched on or off separately. In case of parallel circuit, we do not have to undergo such a severe hazard that a fan

starts moving making us shiver at a winter morning when we need to switch on a bulb only to make a homework. A series circuit also hampers utmost functioning of the appliances. It is not only irritating and disgusting but also causes higher bills. So, from all points of view, I must choose parallel circuits.

Ques. 02 Presently there are problems in electric circuit of Mr Kofi's house. For example, one gets a shock when the switch is made on, the bulb fuses. In such a situation an electrician was called up. He examined the current and the voltage in the circuit by using two instruments and found some faults. He suggested the members of the family about the proper use of electricity.

- What is resistance?
- What is meant by 10 kilo-Ohms?
- Show by diagram how he connected the two instruments.
- If the members of Mr Kofi's family become conscious about the proper use of electricity what effect there will be on the personal level and at the national level? Explain.

Answer to Question No. 02 :

- a The property of a conductor due to which the flow of electricity through it is obstructed is called resistance.
- b 10 kilo Ohm means that the resistance of a certain conductor is $1000 \Omega \times 10 = 10000 \Omega = 10^4 \Omega$. It is the value of voltage divided by quantity of electricity. Ω is a Greek letter called Omega.

It denotes Ohm. The resistance of a certain conductor is $10^4 \Omega$ means that one ampere current passes through the conductor if the potential difference between the two ends of the conductor is 10^4 volt.

- c The two apparatus are ammeter for determining current flow and voltmeter for determining potential difference (voltage).

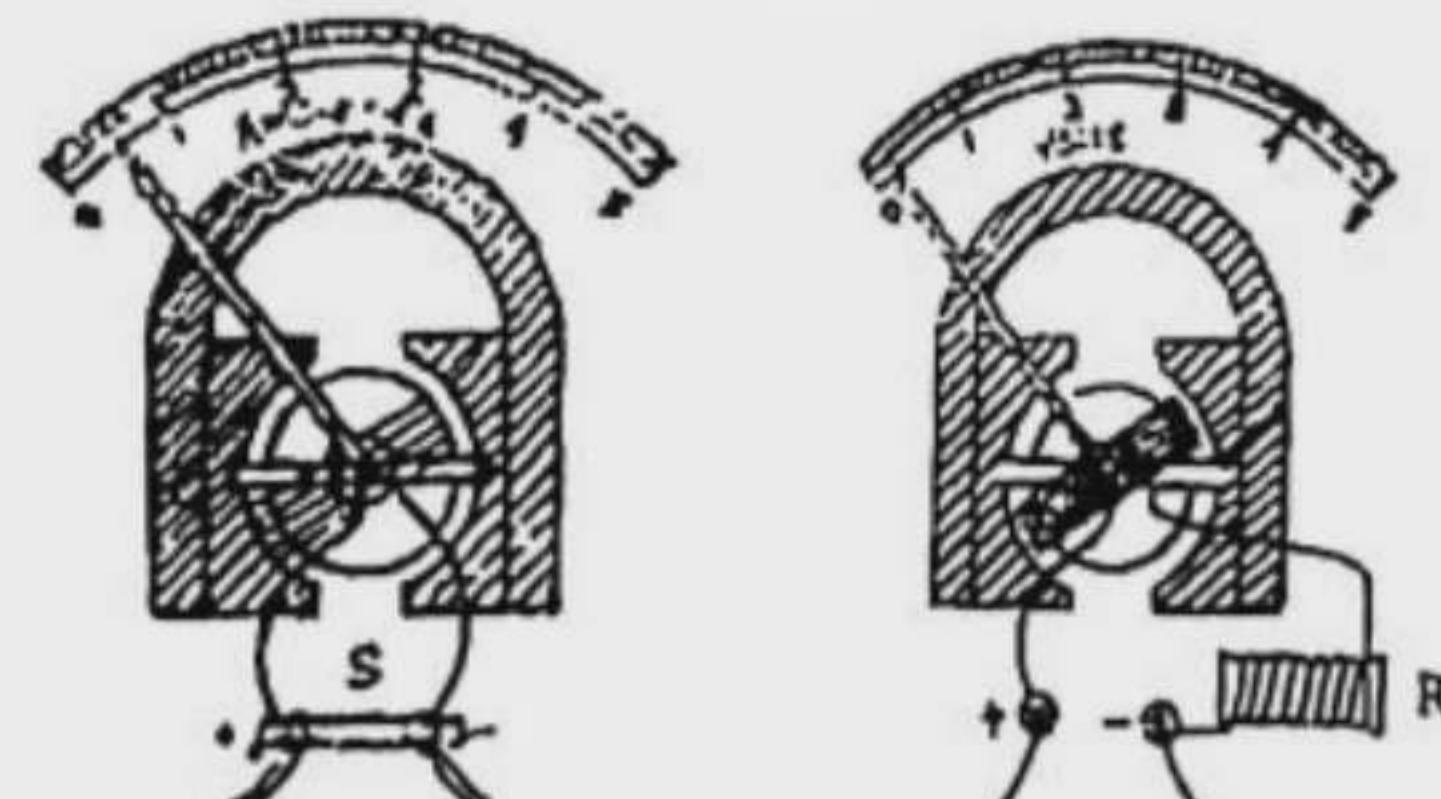


Fig : Ammeter & Voltmeter

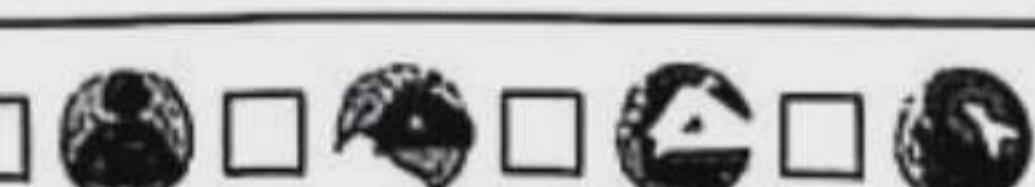
- d If the members of Mr Kofi's family become conscious about reasonable use of electricity, it will be beneficial at both individual and national levels. It will ensure safety from electric shock and fire. It will also lessen their electricity bill. It will also inspire others to be conscious about reasonable use of electricity which may contribute a lot to the national economy. We know, the production of electricity is increasing; still it is quite insufficient to cope up with necessity. Economic use of electricity will reduce wastages to a large extent which will serve many vital purposes. The another benefit the users will get is that their appliances will ensure a much longer service.



Multiple Choice Q/A



Designed as per topic



- Electric Potential and Electric current** ▶ Textbook Page 93
- What is electric current?** (Knowledge) *[Ideal School and College, Motijheel, Dhaka]*
 - Flow of energy
 - Flow of electrons
 - Flow of protons
 - Flow of neutrons
 - Which of the following allows electricity to flow?** (Knowledge)
 - Flow of neutrons
 - Flow of protons
 - Flow of electrons
 - Resistance of the conductor
 - Which of the following helps in the flow of electricity?** (Comprehension)
 - Electron
 - Proton
 - Neutron
 - Positron

- What happens to electric current if the cross-sectional area of a conductor decreases?** (Comprehension)
 - Decreases
 - Increases
 - Remains unchanged
 - Unrelated to cross-section
- Which of the following equations is correct?** (Application)
 - $I = \frac{t}{q}$
 - $I = qt$
 - $I = \frac{q}{t}$
 - $t = ql$
- What is the unit of electric current?** (Knowledge) [DB '19, '16; CB '17; CtgB '16; SB '16]
 - Ampere
 - Newton
 - Ohm
 - Volt

7. What is the international practical unit of potential difference? (Knowledge)
 @ Volt Ⓛ Coulomb
 Ⓛ Watt Ⓛ Ampere
8. Which of the following must be present for an electric current to flow? (Comprehension)
 @ Potential difference Ⓛ Electron flow
 Ⓛ Periodic flow Ⓛ Unidirectional flow
- Answer the following questions (9 and 10) based on the given information :
 A and B are two metallic conductors. The potential of A is lower than that of B. The conductors contain free charge carriers of a specific nature.
9. What is the nature of the charge of the free carriers in the conductors? (Comprehension)
 [BB '17; DjB '16; JB '15; SB '15]
 Ⓛ + Ⓛ -
 Ⓛ ± Ⓛ ∞
10. What happens when conductors are joined by wire?
 i. Free particle transport will occur
 ii. Transport of particle from A to B will occur
 iii. Transport of particle from B to A will occur
 Which one is correct? (Comprehension)
 Ⓛ i & ii Ⓛ ii & iii
 Ⓛ i & iii Ⓛ i, ii & iii
-  **Different types of current flow**
- Textbook Page 94
11. How many types of electric current are there? (Knowledge)
 Ⓛ 2 Ⓛ 3
 Ⓛ 4 Ⓛ 5
12. The source of non-periodic current is— (Comprehension)
 Ⓛ Generator Ⓛ Transmitter
 Ⓛ Power plant Ⓛ Battery
13. What type of electric current is obtained from a torch battery? (Knowledge)
 Ⓛ Periodic Ⓛ Alternating current
 Ⓛ Static electricity Ⓛ Non-periodic current
14. Which of the following provides DC electricity? (Knowledge)
 Ⓛ Electric cell Ⓛ Dynamo
 Ⓛ Generator Ⓛ Refrigerator
15. In which of the following does non-periodic current generate? (Knowledge)
 Ⓛ DC generator and battery
 Ⓛ DC generator and generator
 Ⓛ Electric cell and generator
 Ⓛ Battery and generator

16. What is the source of periodic current? (Knowledge)
 Ⓛ Generator Ⓛ DC generator
 Ⓛ Electric cell Ⓛ Battery
17. Which of the following is a source of periodic current? (Knowledge)
 Ⓛ Dry cell Ⓛ Lead storage cells
 Ⓛ DC generator Ⓛ Dynamo
18. How many times per second does periodic current change direction in the United States? (Knowledge)
 Ⓛ 40 Ⓛ 50
 Ⓛ 60 Ⓛ 70
-  **Resistance** ► Textbook Page 95
19. When electrons flow toward a high potential, their motion is obstructed. Which of the following is related to this phenomenon? (Comprehension)
 Ⓛ Resistance Ⓛ Fuse
 Ⓛ Electromotive force Ⓛ Potential difference
20. The property of a conductor that hinders the flow of electricity through — (Comprehension)
 Ⓛ Resistance Ⓛ Volt
 Ⓛ Ohm Ⓛ Coulomb
21. Which scientist discovered Ohm's law? (Knowledge)
 Ⓛ Georg Simon Ⓛ Newton
 Ⓛ Gilbert Ⓛ Ibn Sina
22. If the potential difference between two ends of a conductor increases, what will happen? (Comprehension)
 Ⓛ The electric current will increase
 Ⓛ The electric current will decrease
 Ⓛ No electric current will flow
 Ⓛ Resistance will become highly effective
23. If the potential difference between two ends of a conductor is V, its resistance is R, and the electric current is I, which of the following is correct? (Application)
 Ⓛ $V = \frac{R}{I}$ Ⓛ $R = \frac{1}{V}$
 Ⓛ $I = \frac{V}{R}$ Ⓛ $V = \frac{1}{R}$
24. A bulb of 100 volt is connected to an electric circuit of 5 ampere. What is the resistance of the circuit? (Application) [DB '19]
 Ⓛ 0.05 Ohm Ⓛ 20 Ohm
 Ⓛ 105 Ohm Ⓛ 500 Ohm
25. If the voltage difference between the two ends of a conductor is 10 volt and current flowing through it is 5 ampere, what will be the resistance of the conductor? (Higher ability) [RB '19]
 Ⓛ 2 Ohms Ⓛ 5 Ohms
 Ⓛ 10 Ohms Ⓛ 50 Ohms

26. In Bangladesh, what is the frequency of alternating current per second? (Application) [JB '19]
- (a) 40 cycles (b) 50 cycles (c) 60 cycles (d) 70 cycles
27. Read the following stem and answer the questions no. 27 and 28 :
- In the bedroom of Esha's house, there are two tube lights and one fan connected in parallel. A fuse of 10 ampere is used in the circuit of bedroom. [CB '19]
28. What is the appropriate fuse for the second element? (Higher ability)
- (a) 5 ampere (b) 10 ampere (c) 15 ampere (d) 30 ampere
29. If an electric kettle is used in that room— (Higher ability)
- i. the wire of the fuse will melt when the switch will be on
 - ii. tube light and fan will be damaged
 - iii. there is a possibility of electric accident
- Which one is correct?
- (a) (i) & (ii) (b) (ii) (c) (ii) & (iii) (d) (i), (ii) & (iii)
30. 3 ampere electric current is passing through the 5 Ohm resistance. What is the potential difference? (Application) [SB '19]
- (a) 0.6 volt (b) 1.6 volt (c) 8 volt (d) 15 volt
31. What is the value of electric current passes through a resistance of 5 Ohm which is kept at the potential difference of 10 volt? (Application) [BB '19]
- (a) 0.5 ampere (b) 2 ampere (c) 5 ampere (d) 15 ampere
32. The voltage between the two ends of a conductor is 20 volt and the flow of current is 2 ampere. What is the resistance? (Application) [DB '18]
- (a) 5 Ohm (b) 10 Ohm (c) 15 Ohm (d) 20 Ohm
33. What percentage of electricity is saved by the cooking of pressure cooker? (Higher ability) [RB '18]
- (a) 25 (b) 28 (c) 30 (d) 32
34. The fuse of which value is suitable for television? (Application) [RB '18]
- (a) 5 ampere (b) 10 ampere (c) 15 ampere (d) 20 ampere
35. How much current will flow when the voltage difference is 120 volt and the resistance of a wire is 20 Ohm? (Higher ability) [CB '18]
- (a) 240 ampere (b) 140 ampere (c) 100 ampere (d) 6 ampere

35. If the voltage difference of the two ends of a conductor is 20 volt and flow of current is 2 amperes' what will be the resistance? (Higher ability) [BB '18]

- (a) 20 Ohm (b) 15 Ohm (c) 10 Ohm (d) 5 Ohm

36. $1 \text{ Ohm} = ?$ (Application)

[Rajuk Uttara Model College, Dhaka]

$$(a) 1 \text{ Ohm} = \frac{1V}{1A} \quad (b) 1 \text{ Ohm} = \frac{1A}{1V}$$

- (c) $1 \text{ Ohm} = 1A \times 1\Omega$ (d) None of the above

Electric circuit

► Textbook Page 96

37. In a series circuit, how is the potential difference across all parts? (Comprehension)

- (a) The same
(b) Increases gradually
(c) Decreases gradually
(d) Not equal

38. How many switches are there for all bulbs in a series circuit? (Knowledge)

- (a) One (b) Two
(c) Separate for each (d) Many switches

39. Which type of circuit is generally used to light electric lamps in houses? (Knowledge)

- (a) Series circuit (b) Open circuit
(c) Parallel circuit (d) Mixed circuit

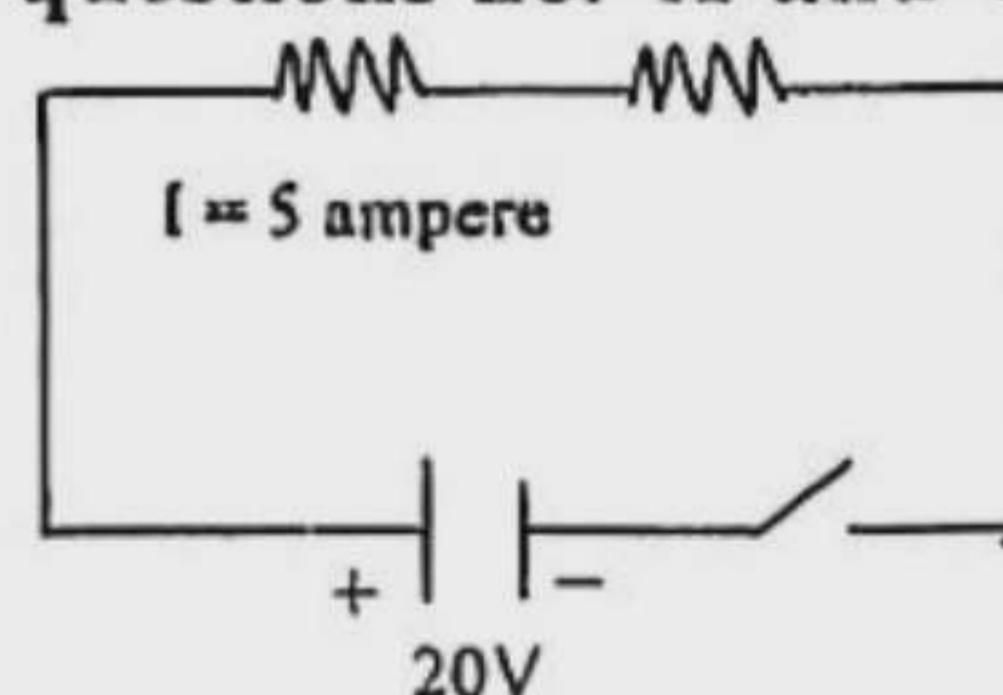
40. In a series circuit—(Application)

- An ammeter is used
- Potential difference varies
- A voltmeter is used

Which one is correct?

- (d) (i) & (ii) (b) (i) & (iii) (c) (ii) & (iii) (d) (i), (ii) & (iii)

41. On the basis of the stem, answer the questions no. 41 and 42 :



[MB '19]

41. What is the resistance of the circuit? (Application)

- (a) 0.25 Ohms (b) 4 Ohms
(c) 25 Ohms (d) 100 Ohms

42. The circuit is— (Higher ability)

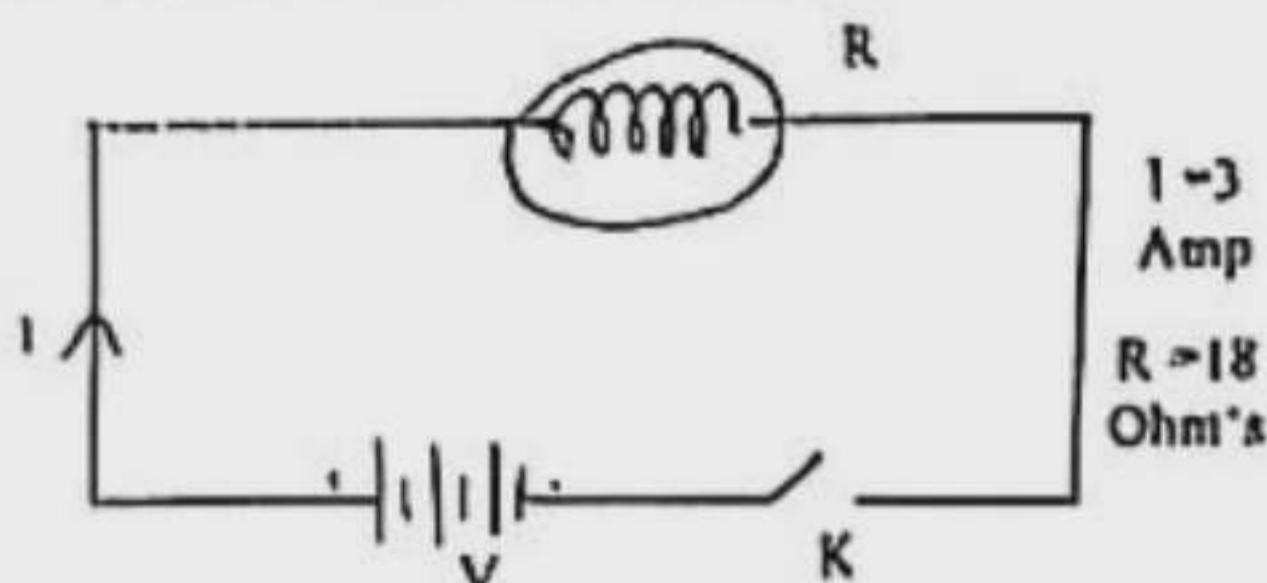
- more convenient as domestic uses
- a series circuit
- capable to flow the same current in all the compounds

Which one is correct?

- (c) (i) & (ii) (b) (i) & (iii) (c) (ii) & (iii) (d) (i), (ii) & (iii)



- According to the above stem answer the questions no. 43 and 44 :



[CtgB '18]

43. What is the voltage difference of the circuit? (Application)

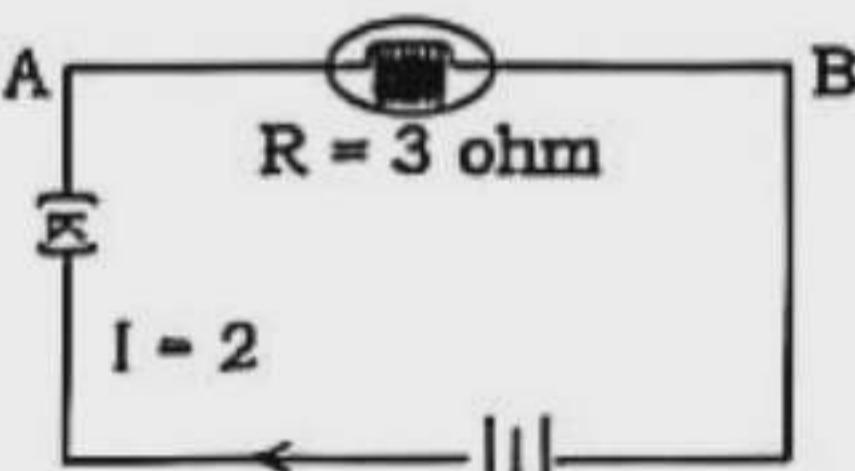
Ⓐ 6 volt Ⓑ 15 volt
Ⓒ 21 volt Ⓒ 54 volt

44. According to the circuit of the stem — (Higher ability)

- Current flow when key is open.
- If voltage is high, the current flowing will be large.
- The same current flowing through all part of the circuit.

Which one of the following is correct?

Ⓐ Ⓐ i & ii Ⓑ ii & iii Ⓒ i & iii Ⓓ i, ii & iii



45. How much volt of the potential difference of the two end of the circuit in the switch (k) of condition? (Application)

Ⓐ 1 Ⓑ 5
Ⓒ 6 Ⓒ 9

Ammeter and voltmeter

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46. How many ends does an ammeter have? (Knowledge)

Ⓐ 1 Ⓑ 2
Ⓑ 3 Ⓒ 4

47. The colors of the terminals of an ammeter are— (Comprehension)

Ⓐ Red and white Ⓑ White and black
Ⓒ Red and yellow Ⓒ Red and black

48. What is the color of the positive terminal of an ammeter? (Knowledge)

Ⓐ Black Ⓑ White
Ⓒ Red Ⓒ Blue

49. Which instrument is used to measure the potential difference between two points in a circuit? (Knowledge)

Ⓐ Voltmeter Ⓑ Ammeter
Ⓒ Galvanometer Ⓒ Generator

Fuses

► Textbook Page 98

50. What is used in a circuit to prevent electrical accidents? (Knowledge)

Ⓐ Ammeter
Ⓑ Fuse wire
Ⓒ Voltmeter
Ⓓ Galvanometer

51. Which two elements are used to make a fuse? (Knowledge)

Ⓐ Lead and zinc
Ⓑ Zinc and tin
Ⓒ Lead and iron
Ⓓ Lead and tin

► Explanation : A special safety measure is taken in circuits to prevent electrical accidents. This safety measure involves a fuse wire. A fuse is usually made of a thin wire composed of an alloy of tin and lead.

52. What amperage fuse is used in a television? (Knowledge)

Ⓐ 60 Ampere Ⓑ 30 Ampere
Ⓑ 15 Ampere Ⓒ 5 Ampere

53. What is the suitable fuse rating for an electric kettle? (Knowledge)

Ⓐ 5 Ampere Ⓑ 10 Ampere
Ⓑ 15 Ampere Ⓒ 30 Ampere

The effective use of electricity and to stop its wastage

► Textbook Page 99

54. How much electricity is saved (in percentage) when cooking with a pressure cooker? (Knowledge) [DB '14; RB '18; CtgB '19; DjB '17]

Ⓐ 25% Ⓑ 28%
Ⓑ 30% Ⓒ 32%

55. Which of the following requires self-initiative to use? (Knowledge)

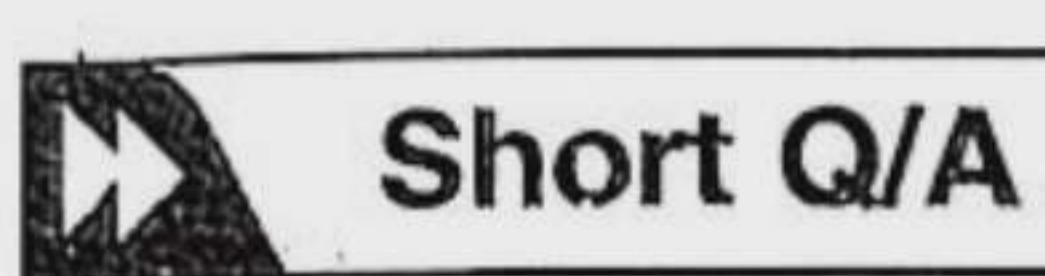
Ⓐ Air cooler Ⓑ Solar power
Ⓒ Electric fan Ⓒ Hunting wild animals

56. In an energy-saving bulb— (Application)

[Ideal School and College, Motijheel, Dhaka]
i. Electricity is wasted
ii. Electricity is saved
iii. It works like a regular bulb

Which one is correct?

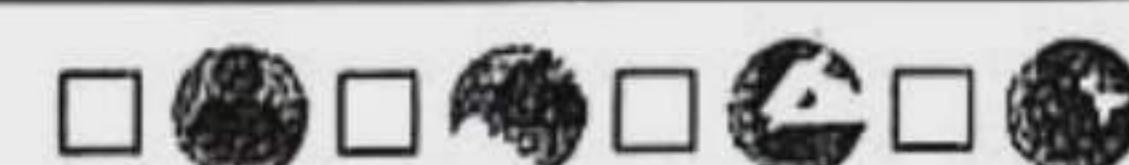
Ⓐ Ⓑ i & ii Ⓒ ii & iii Ⓓ ii & iii Ⓔ i, ii & iii



Short Q/A



Designed as per topic



► Lesson 1 : Electric potential and electric current

► Textbook Page 93

Question 1. What is electric potential? Explain.

Ans. The amount of work required to bring a unit of positive charge from an infinite distance to a point near a charged object is called electric potential. For current to flow between two metallic objects, there must be a potential difference between them. The flow of electrons will continue as long as there is a potential difference between the two metallic objects.

Question 2. What is meant by electric current?

Ans. The amount of charge that flows through any cross-section of a conductor in a given time is called electric current. The flow of electrons is essentially what we call electric current. Free electrons move through a conductor. Electric current refers to the quantity of electrons that flow through any cross-section of a conductor in a unit of time.

Question 3. Write about electric potential difference.

Ans. The amount of work done to move a unit of positive charge from one point in an electric field to another is called electric potential difference. If there is no potential difference between two points, no current will flow, and no work will be done.

Question 4. Why is potential difference necessary for electric current?

Ans. According to modern electron theory, every metallic substance contains some free electrons that can move freely within the substance. When two metallic substances are connected by a wire, electrons will flow only if there is a potential difference between the two metallic objects. The flow of electrons is the electric current. If there is no potential difference, electrons will not flow, meaning there will be no electric current. That's why potential difference is necessary for electric current.

► Lesson 2-3 : Different types of current flow

► Textbook Page 94

Question 5. Why is DC current called unidirectional current?

Ans. DC current stands for Direct Current, in which the direction of the current does not change with time, meaning the current always flows in the same direction. That's why DC current is called unidirectional current.

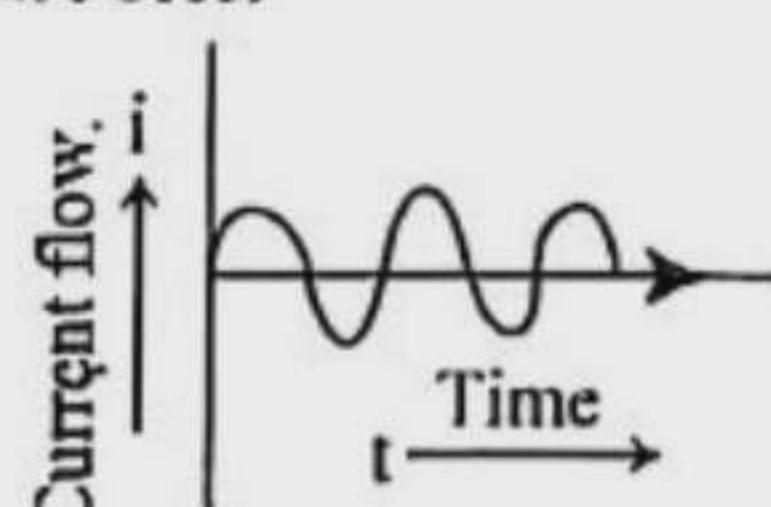


Fig : Unidirectional current

► Lesson 1 : Electric potential and electric current

► Textbook Page 93

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► Lesson 2-3 : Different types of current flow

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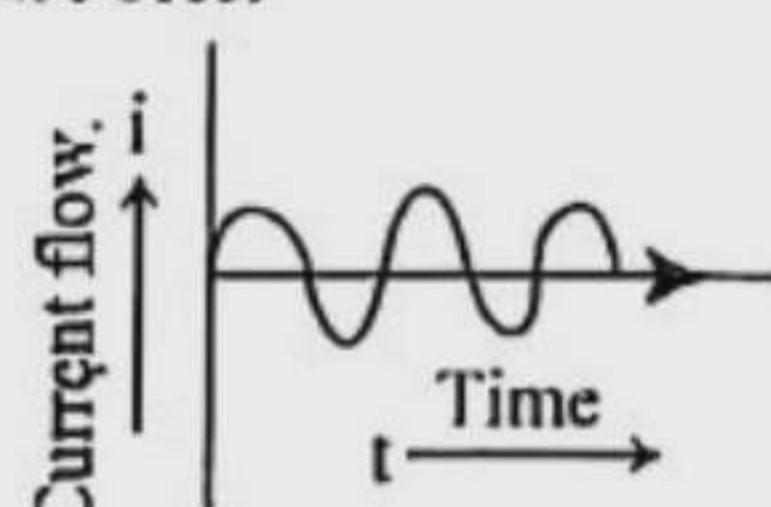


Fig : Unidirectional current

Question 6. What is meant by alternating current?

Ans. If the direction of the electric current changes repeatedly with time, it is called AC current, and if the time interval between the changes of direction remains constant, it is called alternating current. Currently, alternating current is the standard current flow in all countries of the world. It is easy and affordable to generate and supply.

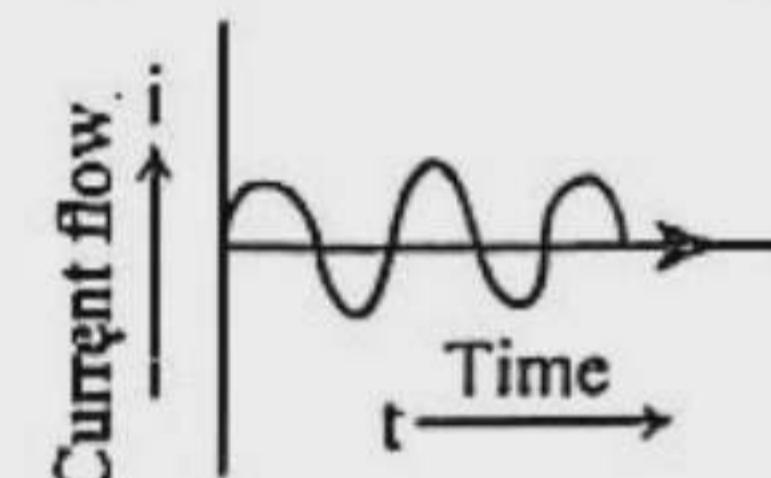


Fig : Alternating current

Question 7. Write the difference between AC and DC current.

Ans. The difference between AC and DC current is :

AC Current	DC Current
1. The direction of the current changes with time.	1. The direction of the current does not change with time but remains the same.
2. AC current is obtained from a dynamo.	2. DC current is obtained from an electric cell or battery.

► Lesson 4-5 : Resistance ► Textbook Page 95

Question 8. What is meant by resistance?

Ans. When there is a potential difference between the two ends of a conductor, electrons flow from the lower potential to the higher potential. This electron flow collides with the molecules and atoms inside the conductor during its journey. As a result, the movement of electrons is hindered, and consequently, the flow of electricity is also disrupted. This property of the conductor to obstruct the flow of electricity is called resistance.

Question 9. What factors does electric current depend on?

Ans. The factors that electric current depends on are :

- Potential difference between the two ends of the conductor
- Resistance of the conductor
- Temperature of the conductor
- Shape and material of the conductor

Question 10. Explain Ohm's law.

Ans. Ohm's law states that when the temperature remains constant, the electric current flowing through a specific conductor is proportional to the potential difference between the two ends of the conductor.



If the potential difference between the two ends of a conductor is V and the electric current is I , then according to the formula, $I = \frac{V}{R}$.

If the potential difference is higher, the electric current will be greater, and if the potential difference is lower, the electric current will be smaller.

Question 11. If the resistance of a conductor is 2Ω and the potential difference between its two ends is 4 volts, what is the electric current?

Ans. We know, $I = \frac{V}{R} = \frac{4}{2} = 2$ ampere

Therefore, the electric current is $4/R$ ampere.

Question 12. What does it mean when the potential difference of a conductor is 4V?

Ans. A potential difference of 4V in a conductor means that the amount of work done to transfer a unit of positive charge from one point in the electric field to another is 4V.

Question 13. How can a continuous flow of electricity be obtained?

Ans. We know,

$$I \propto V,$$

$$\text{or, } I = \frac{V}{R}.$$

If the potential difference (V) between the two metallic objects can be maintained in any way, then a continuous flow of electricity (I) can be obtained.

Question 14. What does an electric current of 10A mean?

Ans. An electric current of 10A means that 10 coulombs of charge flow through any cross-section of a conductor in one second.

► Lesson 6-8 : Electric Circuit

► Textbook Page 96

Question 15. Explain the concept of an electric circuit.

Ans. Just as humans need roads to walk, electricity also needs a specific path to flow. This complete or closed path for current flow is called an electric circuit. When the two ends of a battery are connected to one or more resistors, electrical devices, or equipment, an electric circuit is formed.

Question 16. Why is a switch used in an electric circuit?

Ans. A switch is used in an electric circuit to turn the current on or off. When the switch in the circuit is closed, the circuit is complete, and current flows. When the switch is open, the circuit is incomplete, and current does not flow.

Question 17. In how many ways can resistance be connected in a circuit?

Ans. Resistance can be connected in a circuit in two ways :

1. Series connection
2. Parallel connection

Question 18. What is a series circuit? Explain.

Ans. If resistors, electrical devices, or equipment's are connected in a circuit in such a way that one end of the first component is connected to one end of the second component, the other end of the second component is connected to one end of the third component, and so on, forming a complete circuit, then this connection is called a series circuit.

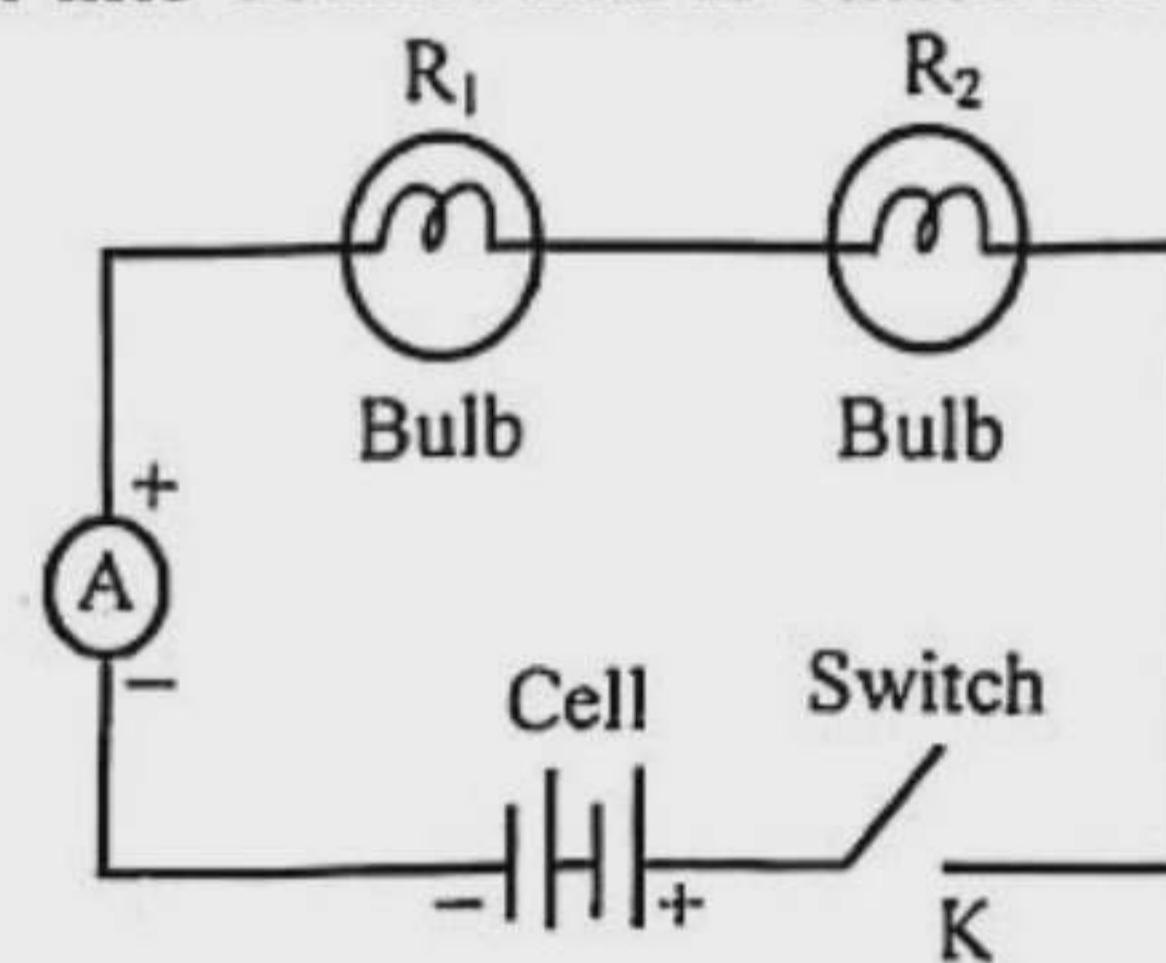


Fig. : Series circuit

Question 19. What is a parallel circuit? Explain.

Ans. If, in a circuit, two or more resistors, electrical devices, or equipment are connected in such a way that one end of each component is connected to a common point, and the other ends of all components are connected to another common point, then this connection is called a parallel circuit.

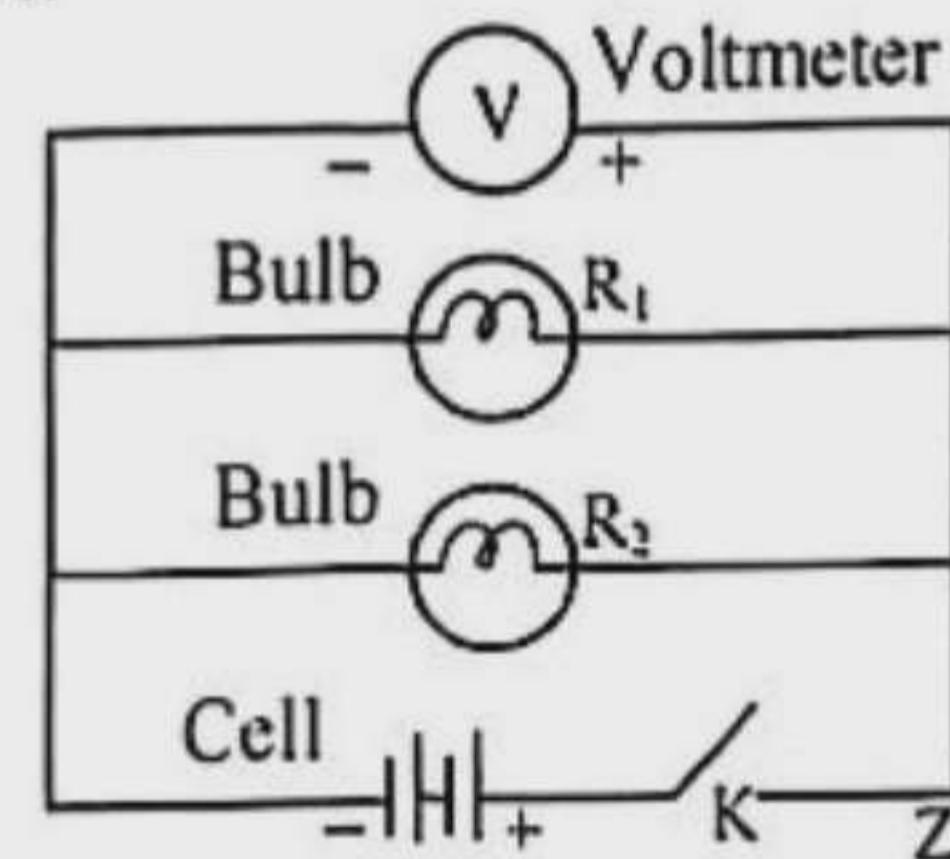


Fig. : Parallel circuit

Question 20. Why do two bulbs glow less brightly in a series connection?

Ans. Two bulbs connected in a series connection glow less brightly. This is because the same electric current flows through both bulbs in a series connection. As a result, the potential difference across each bulb will be different. Therefore, one bulb may glow brightly, but due to the decrease in potential, the next bulb will glow less brightly.

Question 21. Why is parallel connection convenient for household use?

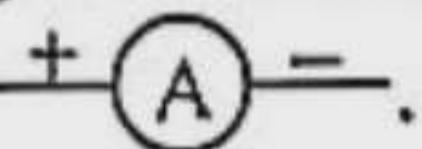
Ans. In a parallel connection, electric current flows through each bulb via different paths. Therefore, even if one bulb burns out, the other will continue

to glow, and each bulb can be turned on or off independently. The potential difference across each bulb remains the same. As a result, each bulb glows with the same brightness. That's why parallel connection is convenient for household use.

Lesson 9-10 : Ammeter and voltmeter

► Textbook Page 98

Question 22. What is meant by ammeter?

Ans. An ammeter is an electrical instrument that directly measures the current in a circuit in amperes. The ammeter is connected in series with the circuit. This instrument contains a moving coil galvanometer. The ammeter is expressed by .

Question 23. What is a voltmeter? Explain.

Ans. A voltmeter is an electrical instrument that measures the potential difference between two points in a circuit in volts. The voltmeter is connected in parallel with the two points where the potential difference is to be measured.

Question 24. Write about the galvanometer.

Ans. A galvanometer is an instrument that detects and measures the current in a circuit. Voltmeters and ammeters contain galvanometers. The primary function of ammeters and voltmeters is performed by the galvanometer.

Lesson 11 : Fuses

► Textbook Page 98

Question 25. What is a fuse? Explain.

Ans. A fuse is a safety device used in a circuit to prevent electrical accidents. It is usually a small wire made of an alloy of tin and lead. It is attached to a ceramic structure.

Question 26. Write about safety fuses.

Ans. In daily life, the electrical appliances we use, such as electric kettles and irons, can be damaged if an excessive amount of current flows through them. If excessive current flows through household

circuits, it can even cause a fire. A special measure is taken to prevent such accidents. This special measure is the use of a fuse wire. This is also called a safety fuse.

Question 27. Explain the necessity of fuses in protecting electrical appliances.

Ans. A fuse is a small wire made of an alloy of tin and lead. The wire is thin and has a low melting point. The fuse is connected in series in the circuit. Therefore, if an excessive amount of current flows through the circuit, the fuse heats up and melts. As a result, the circuit is broken. The electrical appliances are protected due to the interruption of current flow. Therefore, the necessity of fuses in protecting electrical appliances is immense.

Question 28. What is meant by a 30 ampere fuse?

Ans. A 30 ampere fuse means that if more than 30 amperes of current flow through it, the wire will melt.

Lesson 12 : The effective use of electricity and to stop its wastage

► Textbook Page 99

Question 29. Write three steps to prevent the wastage of electricity.

Ans. Three steps to prevent the wastage of electricity are :

1. Take initiatives to use solar electricity.
2. Use energy-saving bulbs instead of regular bulbs.
3. Ensure electricity production in large factories using their generators.

Question 30. Why is the fuse wire connected in parallel with the galvanometer?

Ans. A galvanometer is a sensitive device. If a large amount of current flows through the galvanometer, it can be damaged. It may even burn out. Therefore, to protect the galvanometer, the fuse wire is connected in parallel.



Creative Q/A



Designed as per learning outcomes



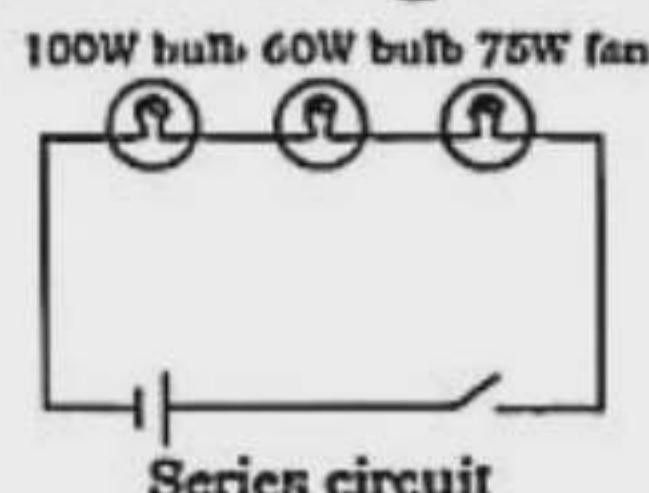
Ques. 01 Abdur Rahman is an SSC examinee. He draws a circuit diagram to his new reading room to connect electricity. According to the circuit diagram, he connects a bulb of 100 W, a tube light of 60 W and a fan of 75 W. He also connects a fuse to the circuit. One day, Rahman noticed that his fan was not moving. The electrician checked the fan and found that there was no fault to it but the 100 W bulb was fused. Rahman changes the circuit diagram and connects electricity to his reading room.

- | | |
|--|---|
| a. What is potential difference? | 1 |
| b. Why did Rahman use a fuse in the circuit? | 2 |
| c. Draw the previous circuit diagram and describe why the fan was not moving. | 3 |
| d. "The new circuit is much better than the previous one."—Evaluate the statement. | 4 |

Answer to Question No. 01 :

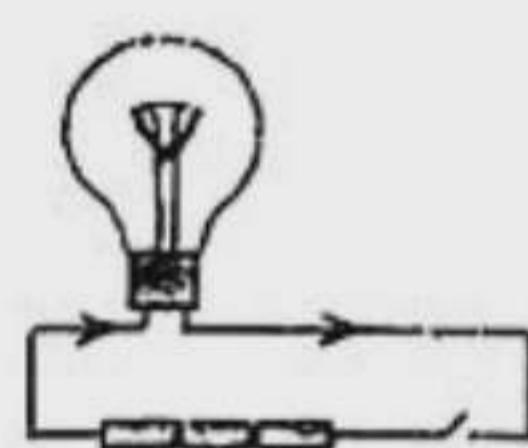
- a** The difference of current flow between two ends of a conductor is called potential difference.
- b** Rahman used a fuse in the circuit to protect the appliances from being damaged. If current more than a certain limit passes through an appliance, it may damage. Stronger flow of current may cause fire.

c The previous circuit diagram was as follows :



The fan was not moving because current through the whole circuit stopped along with the fusing of the 100W bulb. All the appliances belong to a single switching in case of series circuit. If one stops functioning, the others also stop functioning. Such is the matter with Rahman's fan.

d In a series circuit, same current flows through bulbs, fans and other appliances, if any, connected to the series. But in a parallel circuit, different quantity of current flows through different bulbs, fans and other electric appliances. In case of series circuit, current through the whole circuit stops if one of the appliances is fused, i. e. all other appliances stops working. It does not arise in a parallel circuit because current flows through separate path for each bulb or appliance. In case of series circuit, no appliance can be switched on or off separately. In case of parallel circuit, we do not have to such a severe hazard that a fan starts moving making us shiver at a winter morning when we need to switch on a bulb only to make a homework. A series circuit also hampers utmost functioning of the appliances. It is not only irritating and disgusting but also breeds higher bills. So, from all points of view, I must choose parallel circuits.

Ques. 02

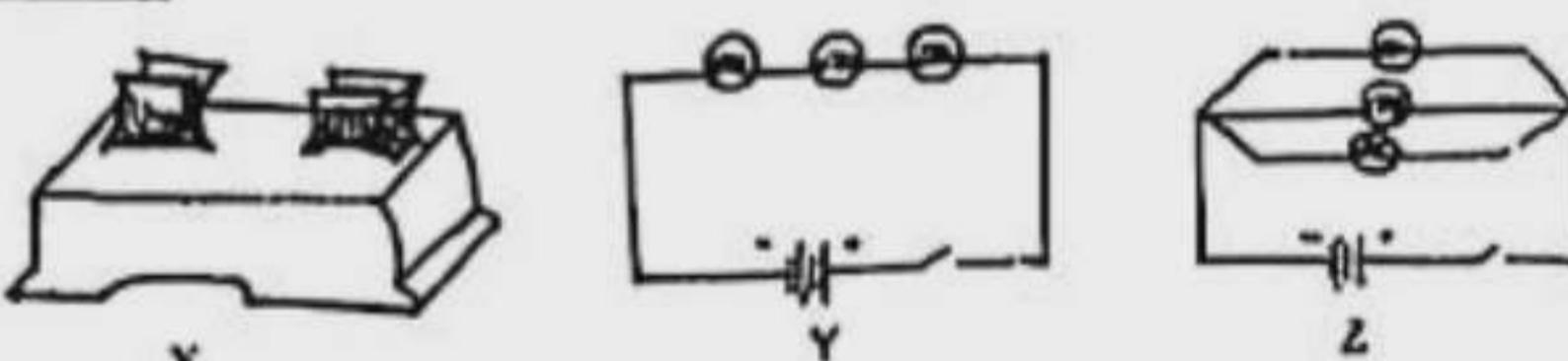
- What is the source of alternate current? 1
- How is I related to R? 2
- Explain the energy change in the circuit. 3
- Excessive flow of electricity will cause financial harm to the householder. Do you agree? Clarify your view. 4

Answer to Question No. 02 :

- a** Generator is the source of alternate current.
- b** I is inversely related to R. Ohm's law states that $I = \frac{V}{R}$, i.e. $I = \frac{1}{R} \times V$
 $\therefore I = R^{-1} \times V$
 Here, I \Rightarrow flow of current
 R \Rightarrow resistance
 V \Rightarrow potential difference (voltage).

c The figure indicates series circuit though the second bulb has not been drawn but has been shown with an arrow mark (\rightarrow) just right to the first bulb. In this case, several successive connections make a complete circuit. Batteries produce current when the circuit is switched on. It reaches bulb-1 and then to bulb-2 and so on. Ammeters are connected successively for measuring current flow. Same current flow is present in all the components of this circuit but the potential drop in each part may differ.

d Yes, I agree that excessive flow of electricity will cause financial harm to the householder. If current flow exceeds a certain limit, the electrical appliances we use (bulb, calling bell, television, calendar, refrigerator, fridge, washing machine, food processor, etc.) will be spoiled. If the current flow is too high, it may also cause a fire incident harming both life and property. In case of bulbs, fans and television sets, a 5-ampere fuse is used because these appliances cannot withstand a current flow more than 5 ampere.

Ques. 03

- What is resistance? 1
- Explain 10 ampere electricity flow. 2
- Why is X used in a circuit? Explain. 3
- Which between Y and Z will be suitable for a house? Analyze. 4

• Dhaka Board 2019

Answer to Question No. 03 :

a The property of a conductor due to which the flow of electricity through it is obstructed is called resistance.

b Current is defined as the rate of flow of charge through any conductor. 10 ampere current flow refers to 10 coulombs of electric charge passing through any conductor in one second.

c 'X' of the stem is fuse.

If the current in an instrument that we use in our day to day life exceeds certain limit, the instrument will be spoiled. In case the current in the electric circuit of our house flows too high, it can cause even fire. To avoid such accidents some special arrangements are made in the circuit. The special arrangement is the use of fuse. Fuse is usually made of thin wire of an alloy of tin and lead. It is fixed over a ceramic structure. The wire is thin and its melting point is low. If a current flows through it beyond a certain limit it gets very hot and melts. As a result the circuit goes off. This is how by stopping the current the fuse protects our instruments. The fuse is connected in series in the circuit.

d In the stem, 'Y' represents a series connection and 'Z' represents a parallel connection of electrical instruments. Between the two connections, parallel connection shown in figure-Z is more convenient for domestic uses. An analytical description to this effect is given below :

When two bulbs are connected to a battery in series the same current will flow in both the bulbs but this current will be lower than the case when one bulb is connected. As a result the intensity of light will be less when the two bulbs are in series compared to the case when only one bulb is used.

When the two bulbs are connected to the battery in parallel, each bulb will experience the same voltage as when one bulb is connected to the battery in series. As a result the brightness of the bulbs will be the same independent of whether one or two bulbs are connected in parallel.

When the bulbs are connected in series and one of the bulbs is fused, the circuit will be broken and the other bulb will go off. In case the two bulbs are connected in parallel and one of the bulbs is fused, the circuit will not be broken and other bulbs will not go off.

Thus in parallel connection we can put off any of the bulbs without disturbing the other bulbs. In our domestic uses, it is more convenient to use parallel circuits.

From above discussion, we understand that we should use parallel circuit for domestic electrification.

Ques. 04

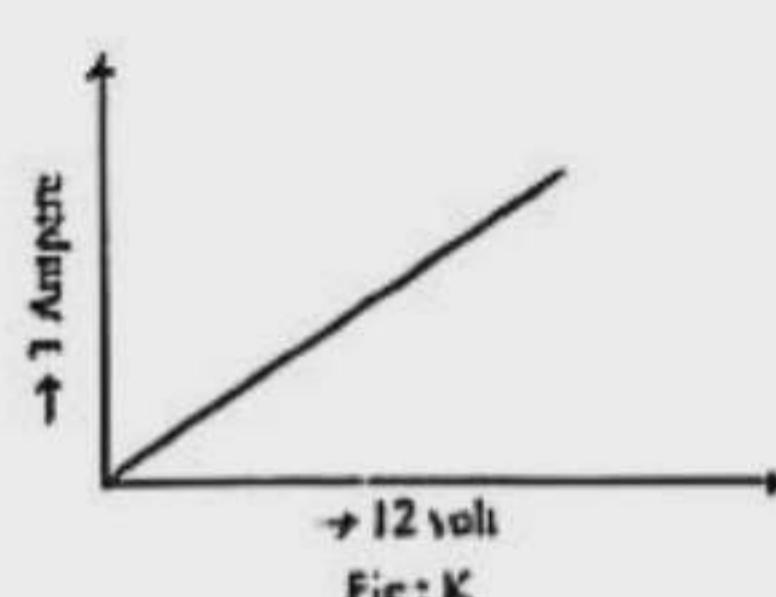
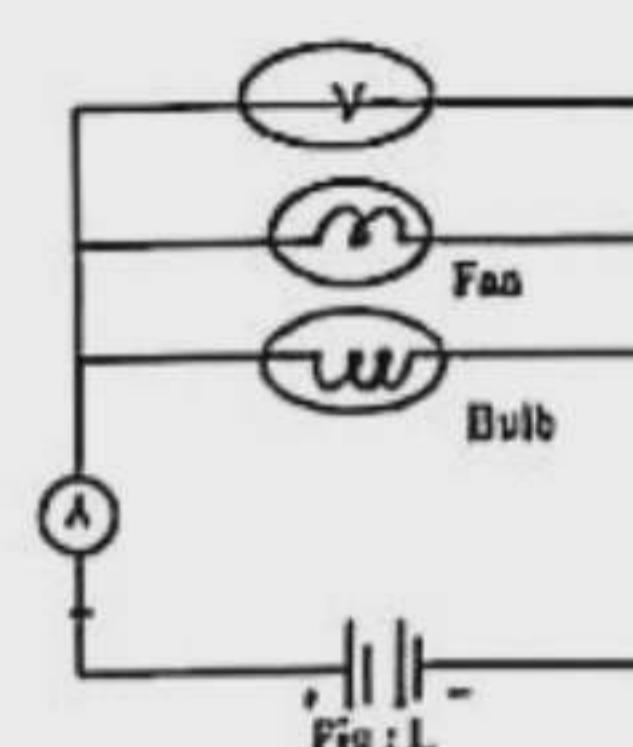


Fig: K



• Rajshahi Board 2019

- What is called alternating current? 1
- Why different fuses are needed for different types of instruments? 2
- Find the value of resistance from Fig-'K'. 3
- If 'A' and 'V' are replaced with each other the activity of 'L' will same?— Analyze with argument. 4

b For different types of instruments different fuses are used. For example— for electric lamps, fans, televisions etc, a 5 ampere fuse is used. For electric kettle or calender a 15 ampere fuse is used. The standard of fuse must be according to the necessity. The use of fuse greater than the needed will not serve the purpose of avoiding accidents. If we use a fuse of value lesser than the needed, it will bum too often. Some people use a number of fuse wires when the fuse wire bums. This should not be done. Because the value of the fuse then increases. For example the use of two fuses of 10 amperes will make the fuse work as a 20 ampere fuse.

c From Ohm's law we know that, $V = IR$, where, V is the voltage, I is the current and R is the resistance of the conductor.

In fig – K, voltage $V = 12$ volt

Current $I = 3$ Ampere

$$\text{So, Resistance } R = \frac{V}{I}$$

$$= \frac{12 \text{ Volt}}{3 \text{ Ampere}} \\ = 4 \text{ Ohm.}$$

d An electric circuit is shown in the stem in which 'A' is ammeter and 'V' is voltmeter. In this circuit ammeter is connected in series and voltmeter is connected in parallel.

Ammeter is an electrical instrument. With the apparatus we can directly measure the current in a circuit. Ammeter is connected to a circuit in series. In this instrument there is a moving coil galvanometer. The galvanometer is an instrument by which one can identify and measure the current in a circuit.

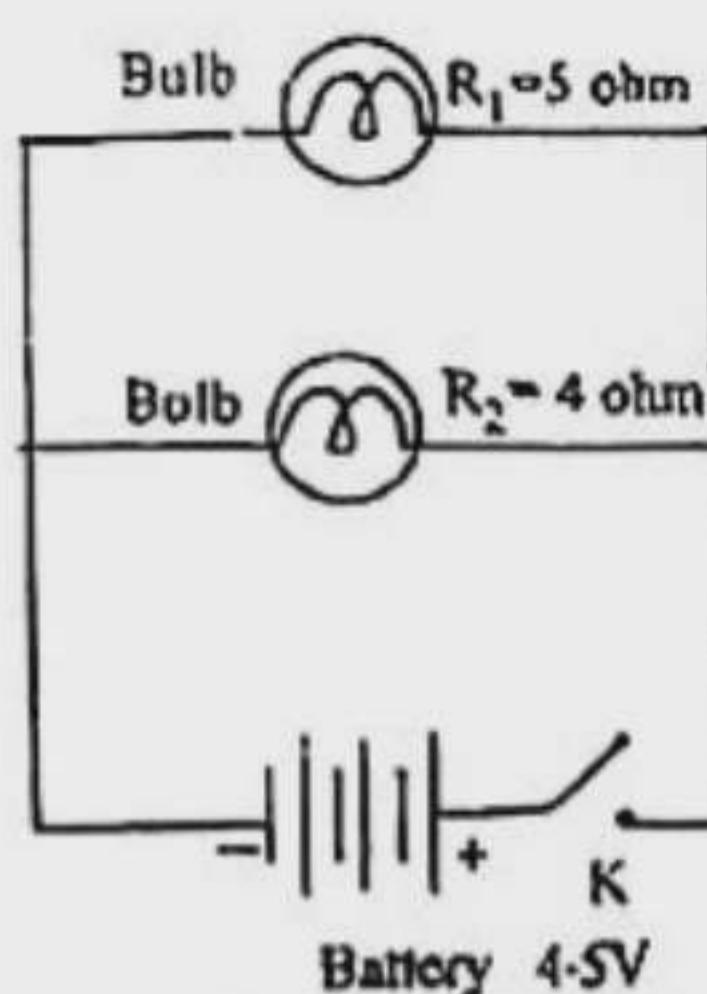
The instrument by which the potential difference between two points in a circuit can be measured in ampere is called a voltmeter. The voltmeter is connected in parallel between the two points which we want to measure the potential difference.

From the above discussions, it is clear that, ammeter should be connected in series and voltmeter should be connected in parallel in an electric circuit. So, if 'A' and 'V' are replaced with each other the activity of 'L' will not be the same.

Answer to Question No. 04 :

- When the flow of current changes its direction periodically, it is called alternating current or AC. At present alternating current is used all over the world.



Ques. 05

- What is voltmeter? 1
- Explain about alternating current. 2
- Calculate the electric current of the circuit when the bulb of R₂-resistance is go off. 3
- Draw a circuit by arranging all the bulbs of the stem in such a way that equal amount of electricity is passed through in every parts of the circuit. 4

• Jashore Board 2019

Answer to Question No. 05 :

- a** A voltmeter is an electrical instrument by means of which potential difference between two points in a circuit can be measured in ampere.
- b** When the flow of current changes its direction periodically, it is called alternating current. At present, alternating current (AC) is used all over the world. The reason is that in the conventional production of electric power using generators AC is economical and easier to produce and is the source of alternating current.
- c** From the Ohm's law, we know that, $V = IR$, where, I is the current, V is the voltage and R is the resistance of the conductor. Now, in the circuit of the stem voltage $V = 4.5$ volt.

Resistance $R = 5$ Ohm (R_2 is off)Current $I = ?$ We can write Ohm's law as $I = \frac{V}{R}$

$$\therefore I = \frac{4.5 \text{ volt}}{5 \text{ Ohm}}$$

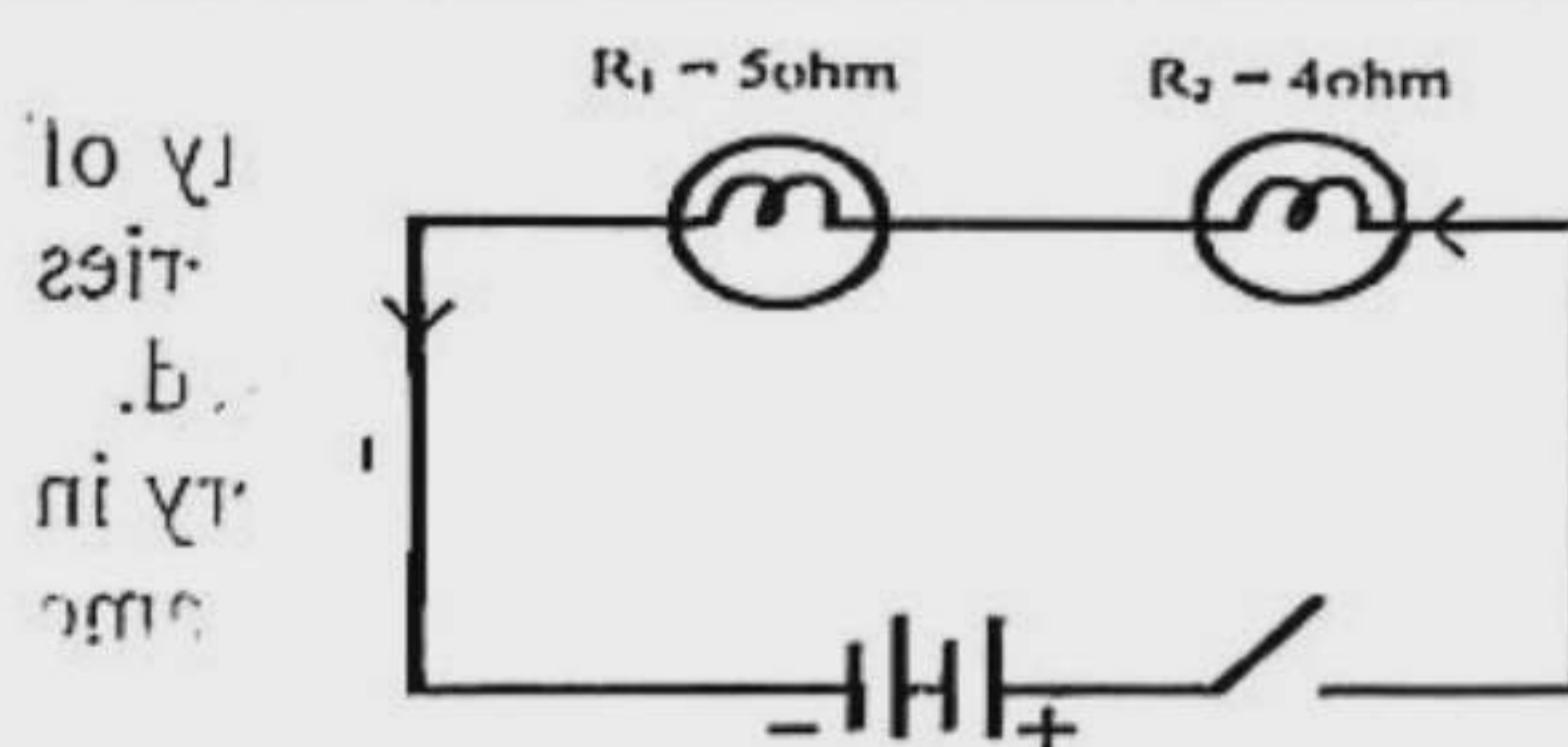
$$= 0.9 \text{ ampere}$$

So, the electric current of the circuit is 0.9 ampere.

- d** A circuit is shown in the stem in which two bulbs are arranged in parallel connection.

Equal amount of electricity is passed through in every parts of the circuit of the circuit of stem if all the bulbs are arranged in series connection.

By arranging all the bulbs in series connection, the circuit is drawn below –



Q1

Fig : A series circuit

- Ques. 06** There are three bulbs and two fans in a series connection in Arik's house, On the other hand there are two bulbs and two Fans in a parallel connection in Adrit's house, In addition an electric kettle is also connected in that series connection. For the electric kettle a fuse of 5 ampere is added. But the wire of the fuse burn repeatedly.
- What is resistance? 1
 - What type of flow of electricity is found in a battery? Explain. 2
 - Explain the cause of burning of the fuse wire. 3
 - Which of the two circuits used n Arik and Adrita's house would be appropriate for in office? Write with logic. 4

• Cumilla Board 2019

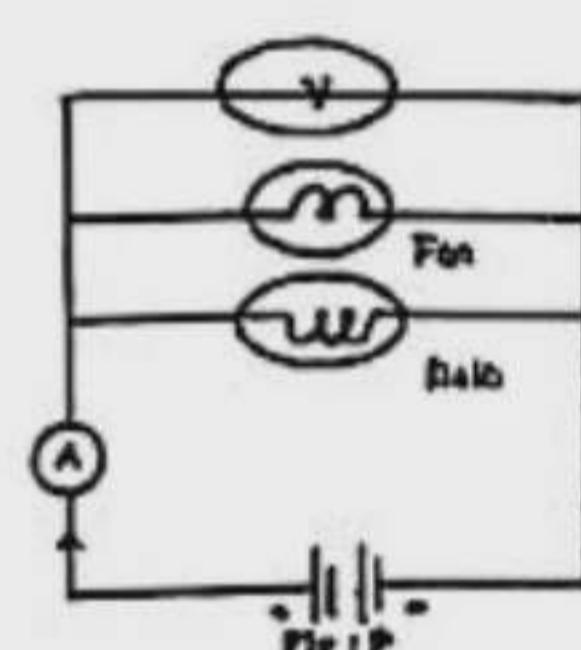
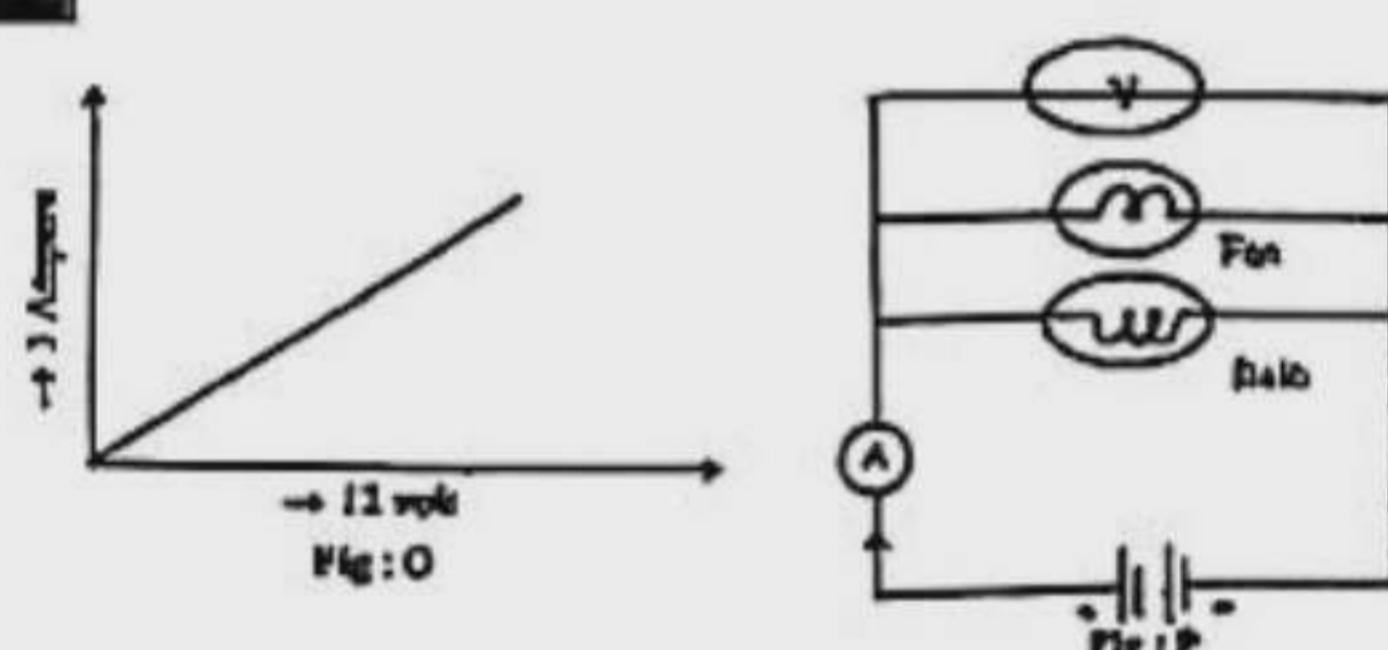
Answer to Question No. 06 :

- a** The property of a conductor due to which the flow of electricity through it is obstructed is called resistance.
- b** We get unidirectional current or DC current from an electric cell or battery. If there is no change in the direction of the flow of current with time, it is called unidirectional or direct current.
- c** Fuse is usually made of thin wire of an alloy of tin and lead. If a current flows through it beyond a certain limit, it gets very hot and melts. As a result, the circuit goes off. This is how by stopping the current the fuse protects our instruments. The fuses can be with different current carrying limits. Usually fuses of 5 ampere, 15 ampere, 30 ampere and 60 ampere are used deepening on the necessity. A 5 ampere fuse means, no current above 5 ampere can pass through it because it will then melt and make the circuit off. For electric kettle 15 ampere fuse is used. The standard of fuse must be according to the necessity. The use of fuse greater than the needed will not serve the purpose. If we use a fuse of value less than the needed, it will burn too often. This is the cause of burning of the fuse wire.

- d** The two circuits used in Arik and Adrita's house are series circuit and parallel circuit respectively. Between the two parallel circuit world be appropriate for an office. When two bulbs are connected to a battery in series the same current will flow in both the bulbs

but this current will be lower than the case when one bulb is connected. As a result the intensity of light will be less when the two bulbs are in series compared to the case when only one bulb is used. When the two bulbs are connected to the battery in parallel, each bulb will experience the same voltage as when one bulb is connected to the battery in series. As a result the brightness of the bulbs will be the same independent of whether one or two bulbs are connected in parallel.

When the bulbs are connected in series and one of the bulbs is fused, the circuit will be broken and the other bulb will go off. In case the two bulbs are connected in parallel and one of the bulbs is fused, the circuit will not be broken and other bulbs will not go off. Thus in parallel connection we can put off any of the bulbs without disturbing the other bulbs. Thus, parallel circuit is more convenient for an office.

Ques. 07


- What is called alternating current? 1
- Why it is needed different fuses for different types of instruments? 2
- Count the value of resistance from Fig 'O'. 3
- If 'A' and 'V' are replaced with each other the activity of 'P' will same—Analyze with argument. 4

• Chattogram Board 2019

Answer to Question No. 07 :

- When the flow of current changes its direction periodically, it is called alternating current or AC.
- For different types of instruments different fuses are used. For example for electric lamps, fans, televisions etc. a 5 ampere fuse is used. For electric kettle or calendar a 15 ampere fuse is used. The standard of fuse must be according to the necessity. The use of fuse greater than the needed will not serve the purpose of avoiding accidents. If we use a fuse of value lesser than the needed, it will burn too often. Some people use a number of fuse wires when the fuse wire burns. This should not be done. Because the value of the fuse then increases. For example the use of two fuses of 10 amperes will make the fuse work as a 20 ampere fuse.

- From Ohm's law we know that, $V = IR$, where, V is the voltage, I is the current and R is the resistance of the conductor.

In fig – O, voltage $V = 12$ volt

Current $I = 3$ ampere

$$\text{So, Resistance } R = \frac{V}{I}$$

$$= \frac{12 \text{ volt}}{3 \text{ ampere}}$$

$$= 4 \text{ Ohm.}$$

d An electric circuit is shown in the stem in which 'A' is ammeter and 'V' is voltmeter. In this circuit voltmeter is connected in parallel—Ammeter is an electrical instrument. With the apparatus we can directly measure the current in a circuit. Ammeter is connected to a circuit in series. In this instrument there is a moving coil galvanometer. The galvanometer is an instrument by which one can identify and measure the current in a circuit.

The instrument by which the potential difference between two points in a circuit can be measured in ampere is called a voltmeter. The voltmeter is connected in parallel between the two points which we want to measure the potential difference.

From the above discussions, it is clear that, ammeter should be connected in series and voltmeter should be connected in parallel in an electric circuit. So, if 'A' and 'V' are replaced with each other the activity of 'P' will not be the same.

Ques. 08 A 10 ampere fuse is used for an electric bulb in Diba's room. For this the bulb has fused, v On the other hand Mr. Zahid takes die decision to connect the electrical equipments with parallel circuit in his new house.

- What is resistance? 1
- Explain the Ohm's law. 2
- Explain the reason to be fused the bulb of Diba's room. 3
- How much logical the decision taken by Mr. Zahid? Analyze. 4

• Sylhet Board 2019

Answer to Question No. 08 :

- The property of a conductor due to which the flow of electricity through it is obstructed is called resistance.

- The Ohm's law is given below :

At a fixed temperature, the current flowing through a particular wire or conductor is proportional to the voltage difference between the two ends of the conductor. Ohm's law can be expressed as

$$I = \frac{V}{R}, \text{ where } I \text{ is the current}$$

V is the voltage and

R is the resistance of conductor.



c According to the stem, Diba used a 10 ampere fuse in her room. Fuse is a special device in the circuit to avoid accidents. The fuses can be with different current carrying limits. For different types of instruments different fuses are used. For electric bulb, fan, television etc. a 5 ampere fuse is used.

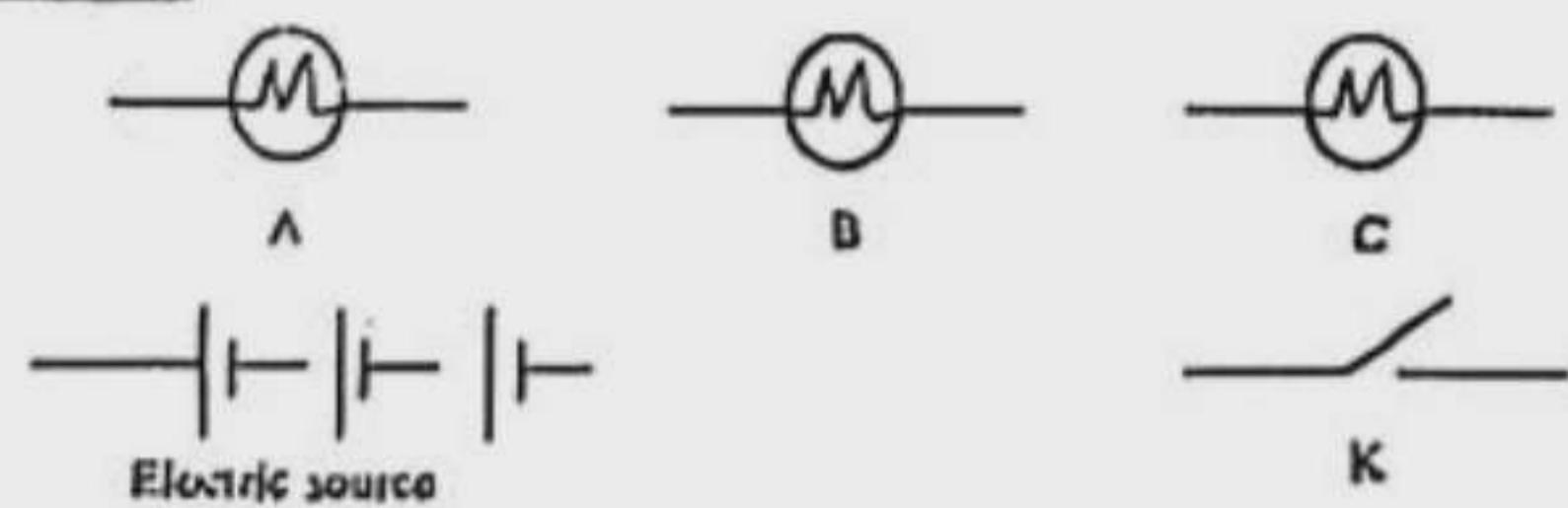
The Standard of fuse must be according to the necessity. The use of fuse greater than the needed will not serve the purpose of avoiding accidents. If we use a fuse of value less than the needed, it will burn too often. Some people use a number of fuse wires when the fuse wire burns. This should not be done. Because the value of the fuse then increases. For example the use of two fuses of 10 amperes will make the fuse work as a 20 ampere fuse.

This is why the bulb of Diba's room has fused.

d In the stem, Mr. Zahid took decision to connect the electrical equipments with parallel circuit in his new house. Parallel circuit is more convenient for house wiring than series circuit.

When the two bulbs are connected to the battery in parallel, each bulb will experience the same voltage as when one bulb is connected to the battery in series. As a result the brightness of the bulbs will be the same independent of whether one or two bulbs are connected in parallel.

When the bulbs are connected in series and one of the bulbs is fused, the circuit will be broken and the other bulb will go off. In case the two bulbs are connected in parallel and one of the bulbs is fused, the circuit will not be broken and other bulbs will not go off. Thus in parallel connection we can put off any of the bulbs without disturbing the other bulbs. So, the decision taken by Mr. Zahid was logical.

Ques. 09

The resistance of bulb A is 20 Ohm and flow of current is 2 ampere.

- What is called flow of current? 1
- Why is resistance created in the conductor during the flow of current? 2
- What will be the potential difference between the two ends of bulb A? 3
- Using the stem draw a circuit that is suitable for household use and analyze its usefulness. 4

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Answer to Question No. 09 :

- a** Flow of electron through a conductor is known as flow of current.

b The electric current is produced due to flow of electrons. When there is a difference in the potential between two points of a conductor the free electron are subjected to an electric force and electrons move from the low potential to high potential. But during this journey the electrons come into collision with the ions in the metallic conductor results the flow of charge. The property of creating obstacle to the flow of current is called resistance.

c From Ohm's law, we know that, the potential difference between two ends of a conductor $V = IR$, where, I = current, R = Resistance of the conductor. Now, according to the stem.

The resistance of bulb A, $R = 20 \text{ Ohm}$.

Flow of current $I = 2 \text{ ampere}$
potential difference

between two ends of bulb V = ?

$$V = IR = 2 \text{ ampere} \times 20 \text{ Ohm} \\ = 40 \text{ volt}$$

So, the potential difference between the two ends of bulb A = 40 volt

d The circuit that is suitable for household use is parallel circuit. A parallel circuit is drawn below using the instruments of the stem :

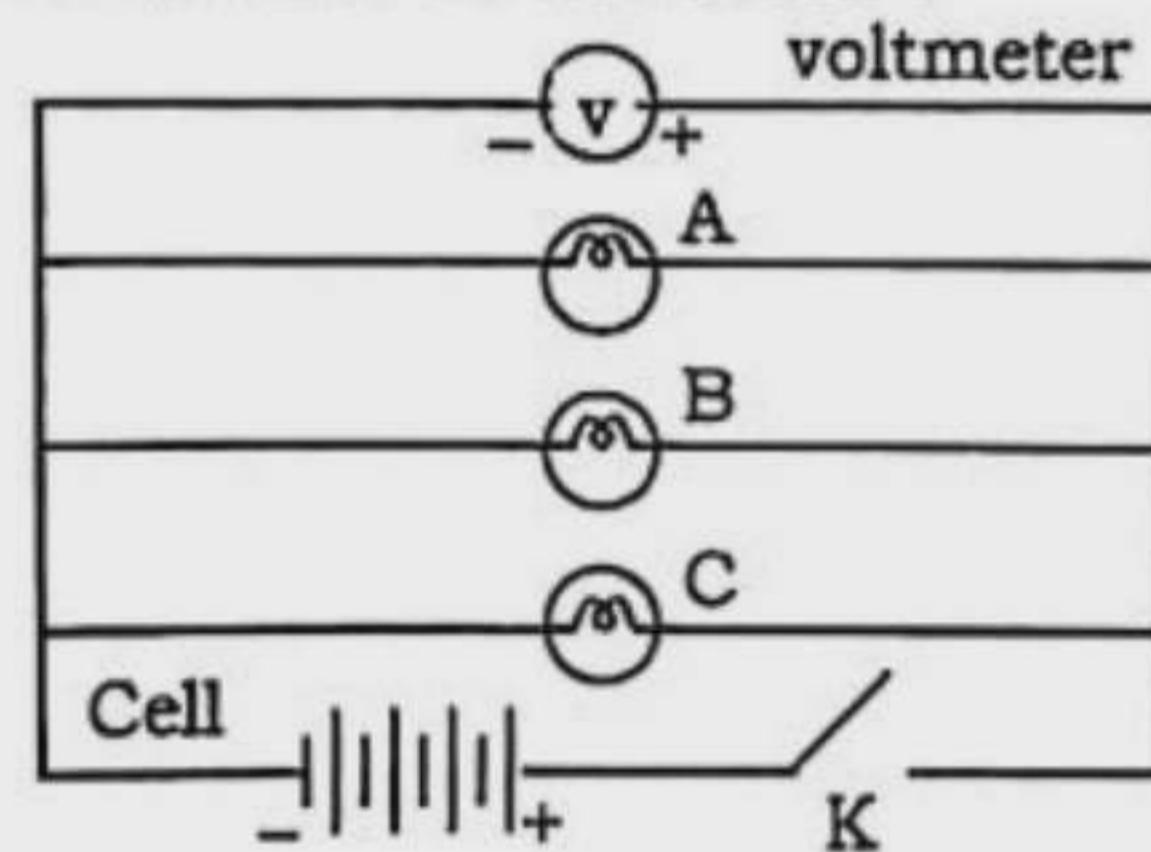


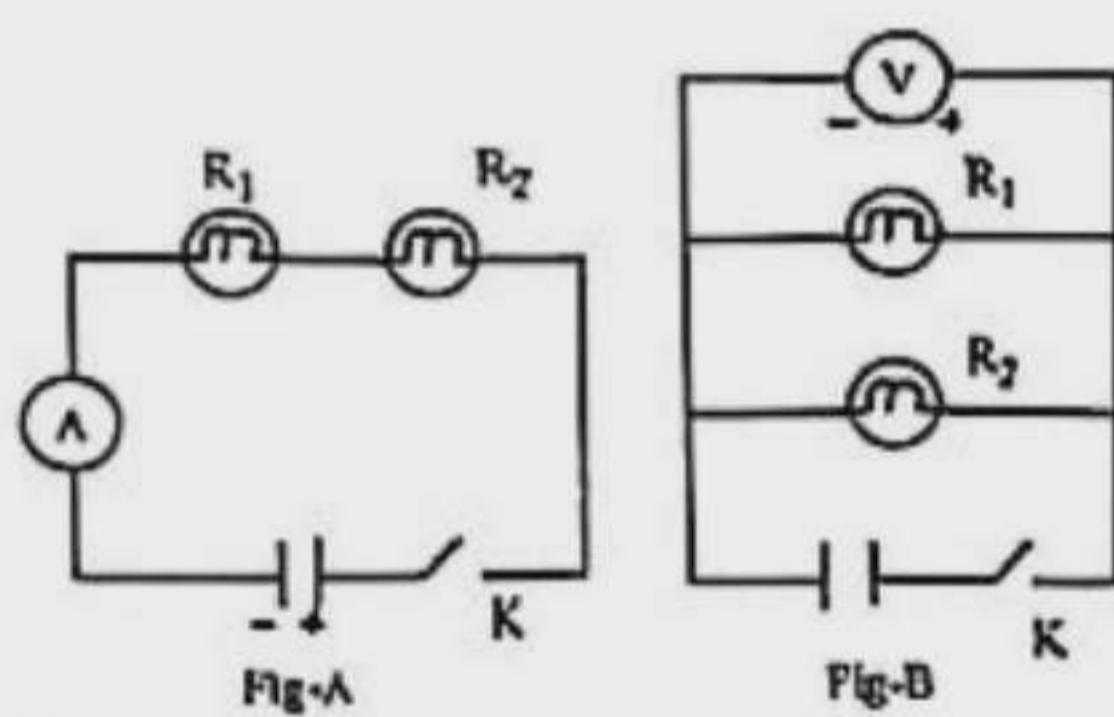
Fig. : Parallel Circuit

If in a circuit more than one resistance or electric component are connected in such a way that one end of each of them are connected to one common end of a battery and other ends of all the components are connected to the other end of the battery. Then such an arrangement forms a parallel circuit. In a parallel circuit different currents may flow through the individual components but the voltage will be the same between the two terminals of each components.

When the bulbs are in series the same current will flow in both the bulbs but this current will be lower than the case when one bulb is connected. As a result the intensity of light will be less when the two bulbs are in series compared to the case when only one bulb is used.

When the two bulbs are connected to the battery in parallel, each bulb will experience the same voltage as when one bulb is connected to the battery in series. As a result the brightness of the bulbs will be the same independent of whether one or two bulbs are connected in parallel.

When the bulbs are connected in series and one of the bulbs is fused, the circuit will be broken and the other bulb will go off. In case the two bulbs are connected in parallel and one of the bulbs is fused, the circuit will not be broken and other bulbs will not go off. Thus in parallel connection we can put off any of the bulbs without disturbing the other bulbs. In our domestic uses, it is more convenient to use parallel circuits.

Ques. 10

- What is flow of current? 1
- Why is the resistance units of a conductor is 4 Ohm? 2
- What kind of electric circuit is in the fig-B of the stem? Discuss. 3
- Which one is convenient between the two circuits of the stem?— Discuss. 4

• Dhaka Board 2018

Answer to Question No. 10 :

a Flow of electron through a conductor is known as flow of current.

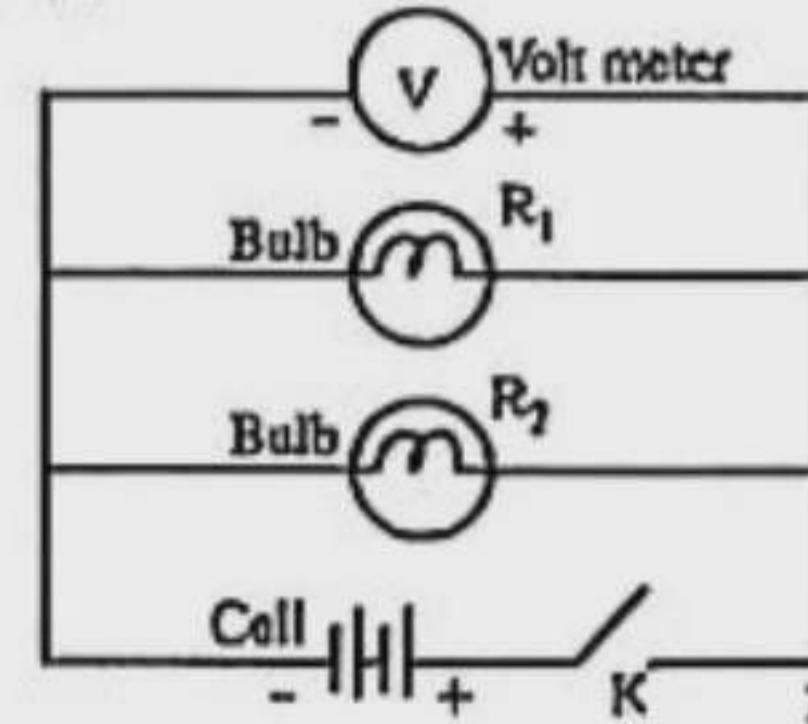
b The property of creating obstacle to the flow of current is called resistance.

From Ohm's law we know that, Resistance $R = \frac{V}{I}$, where I is the current and V is the voltage. So, if the voltage difference between the two ends of a conductor is 4 volt and the current flowing through it is 1 ampere, the resistance of the conductor will be 4 Ohm.

c In the fig-B of the stem, a parallel circuit is shown. If in a circuit more than one resistance or electric component are connected in such a way that one end of each of them are connected to one common end of a battery and other ends of all the components are connected to the other end of the battery, such an arrangement forms a parallel circuit. In a parallel circuit different currents may flow through the individual components but the voltage will be the same between the two terminals of each components.

In the figure the resistance R_1 , R_2 and the voltmeter are- v + parallelly connected each other. This is why with a voltmeter the bulb- R_1 is connected in parallel to a resistance. The positive terminal of the voltmeter marked + must be connected to the

positive end of the battery; otherwise the instrument may go out of order.



d In the stem, figure-A represents a series connection while figure-B represents a parallel connection of electrical instruments. Between the two connections, parallel connection shown in figure-B is more convenient for domestic uses. An analytical description to this effect is given below : When two bulbs are connected to a battery in series the same current will flow in both the bulbs but this current will be lower than the case when one bulb is connected. As a result the intensity of light will be less when the two bulbs are in series compared to the case when only one bulb is used. When the two bulbs are connected to the battery in parallel, each bulb will experience the same voltage as when one bulb is connected to the battery in series. As a result, the brightness of the bulbs will be the same independent of whether one or two bulbs are connected in parallel.

When the bulbs are connected in series and one of the bulbs is fused, the circuit will be broken and the other bulb will go off. In case the two bulbs are connected in parallel and one of the bulbs is fused, the circuit will not be broken and other bulbs will not go off.

Thus in parallel connection we can put off any of the bulbs without disturbing the other bulbs. In our domestic uses, it is more convenient to use parallel circuits.

Ques. 11 Mr. Rakib, connected the electrical instruments of his first room in such a way that one end of the device is connected with the another end and the potential difference is 12 volt of that room. The devices of second room are connected in such a way that one end of every device connected at a common point and other parts are connected to another common point.

- What is called alternating current? 1
- What do you mean by 15 ampere fuse? 2
- If the resistance of the circuit in first room is 20 Ohm, how much electricity will flow in the circuit? 3
- Which one is more suitable circuit of the two rooms in the stem for domestic electrification? Give your opinion with comparative analysis. 4

• Rajshahi Board & Jashore Board 2018

Answer to Question No. 11 :

a When the flow of current changes its direction periodically, it is called alternating current.



b A 15- ampere fuse means, no current above 15 ampere can pass through it because it will then melt and make the circuit off.

c From Ohm's law, we know that,

$$I = \frac{V}{R}$$

Here,
V = Potential difference
I = Current
R = Resistance

According to the stem,

Potential difference of two end of device in the first room $V = 12$ volt.

The resistance of the circuit in first room $R = 20$ Ohm.

$$\therefore \text{Flow of current } I = \frac{12}{20} \text{ ampere} \\ = 0.6 \text{ ampere}$$

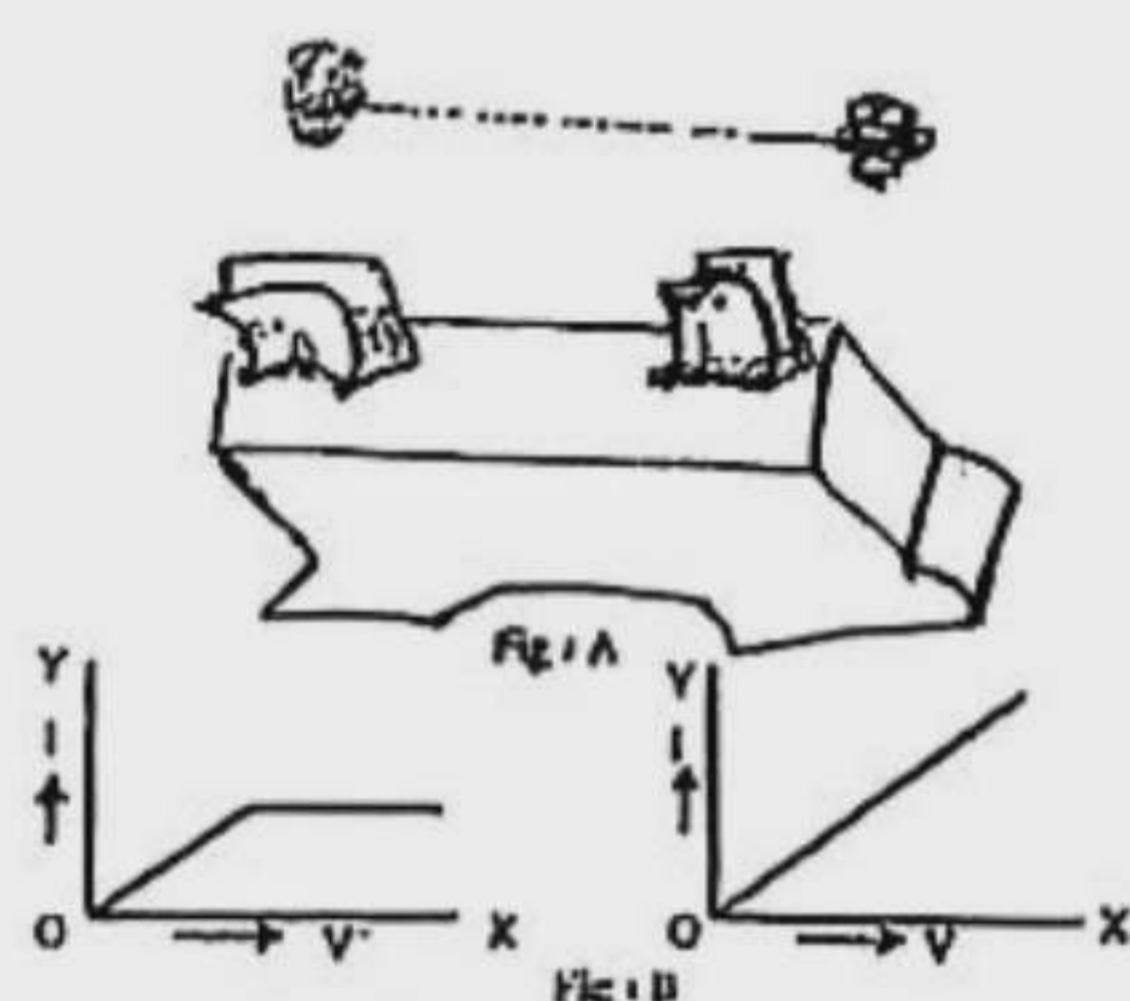
So, 0.6 ampere of electricity will flow in the circuit.

d According to the stem, the electric circuit of the first room is series circuit and that of the second room is parallel circuit. Between the two, parallel circuit of the second room is more suitable for domestic electrification.

When the bulbs are in series the same current will flow in both the bulbs but this current will be lower than the case when one bulb is connected. As a result the intensity of light will be less when the two bulbs are in series compared to the case when only one bulb is used.

When the two bulbs are connected to the battery in parallel, each bulb will experience the same voltage as when one bulb is connected to the battery in series. As a result the brightness of the bulbs will be the same independent of whether one or two bulbs are connected in parallel.

When the bulbs are connected in series and one of the bulbs is fused, the circuit will be broken and the other bulb will go off. In case the two bulbs are connected in parallel and one of the bulbs is fused, the circuit will not be broken and other bulbs will not go off. Thus in parallel connection we can put off any of the bulbs without disturbing the other bulbs. In our domestic uses, it is more convenient to use parallel circuits.

Ques. 12

- What is electric circuit? 1
- Why does the resistance of a conductor become 2 Ohms? 2
- Explain figure A of the stem. 3
- Do both the figures of B maintain the law of Ohm? Give your opinion. 4

Answer to Question No. 12 :

a The complete path for the flow of electricity is called an electric circuit.

b If the potential difference is 2 volt and amount electric current passing through the conductor is 14, amperethe resistance of the conductor is 2 Ohms.

c Fig A in the stem refers to a fuse.

If the current in an instrument that we use in our day to day life exceeds certain limit, the instrument will be spoiled. In case the current in the electric circuit of our house flows too high, it can cause even fire. To avoid such accidents some special arrangements are made. The special arrangement is the use of fuse. Fuse is usually made of thin wire of an alloy of tin and lead. If a current flows through it beyond a certain limit it gets very hot and melts. As a result the circuit goes off. This is how by stopping the current the fuse protects our instruments. The fuse is connected in series in the circuit.

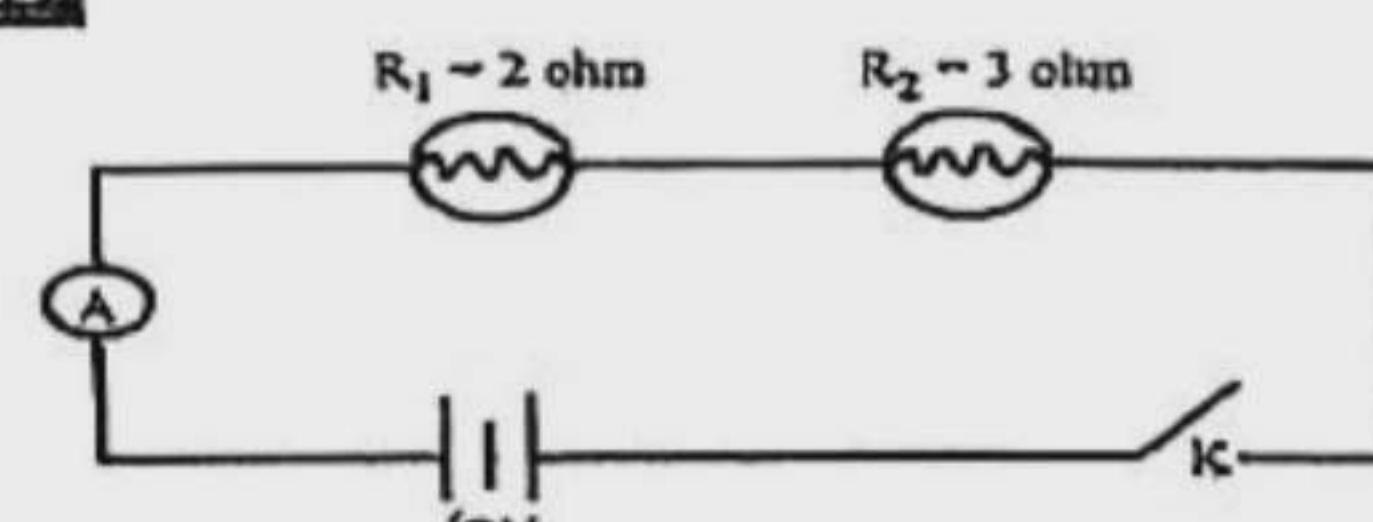
The fuses can be with different current carrying limits. Usually fuses of 5 ampere, 15 ampere, 30 ampere and 60 ampere are used depending on the necessity. A ten ampere fuse means, no current above 10 ampere can pass through it because it will then melt and make the circuit off. For different types of instruments different fuses are used. For electric lamps, fans, televisions etc. a 5 ampere fuse is used. The main fuse of the house may be 30 or 60 ampere.

d At a fixed temperature the current flowing through a particular wire or conductor is proportional to the voltage difference between the two ends of the conductor.

From Ohm's law, we notice that if the voltage between the two ends of a conductor is high, the current flowing through the conductor will be large and if the voltage is low, the current will be low.

The second figure of B, indicates the Ohm law, with the increase of potential difference V , the current is also increased.

But the first diagram does not refer to Ohm's law with the increase of potential difference, the current becomes constant at one stage.

Ques. 13

- What is electric circuit? 1
- Explain Ohm's law. 2
- Calculate the value of the electric current of the above stem's circuit. 3
- Is the above stem's circuit is more convenient in our domestic uses? Give your opinion. 4

Answer to Question No. 13 :

a The electrical pathway through which electron can move is called an electric circuit.

b Ohm's law is written below :

At a fixed temperature the current flowing through a particular wire or conductor is proportional to the voltage difference between the two ends of the conductor. Ohm's law can be expressed as

$$I = \frac{V}{R}, \text{ where } I \text{ is the current}$$

V is the voltage and

R is the resistance of conductor

c Here,

1st Resistance, $R_1 = 2 \text{ Ohm}$

2nd Resistance, $R_2 = 3 \text{ Ohm}$

\therefore The equivalent resistance of the circuit,

$$R = R_1 + R_2 = 2 \text{ Ohm} + 3 \text{ Ohm}$$

$$= 5 \text{ Ohm}$$

The P.d (V) = 12 V

The electric current, I = ?

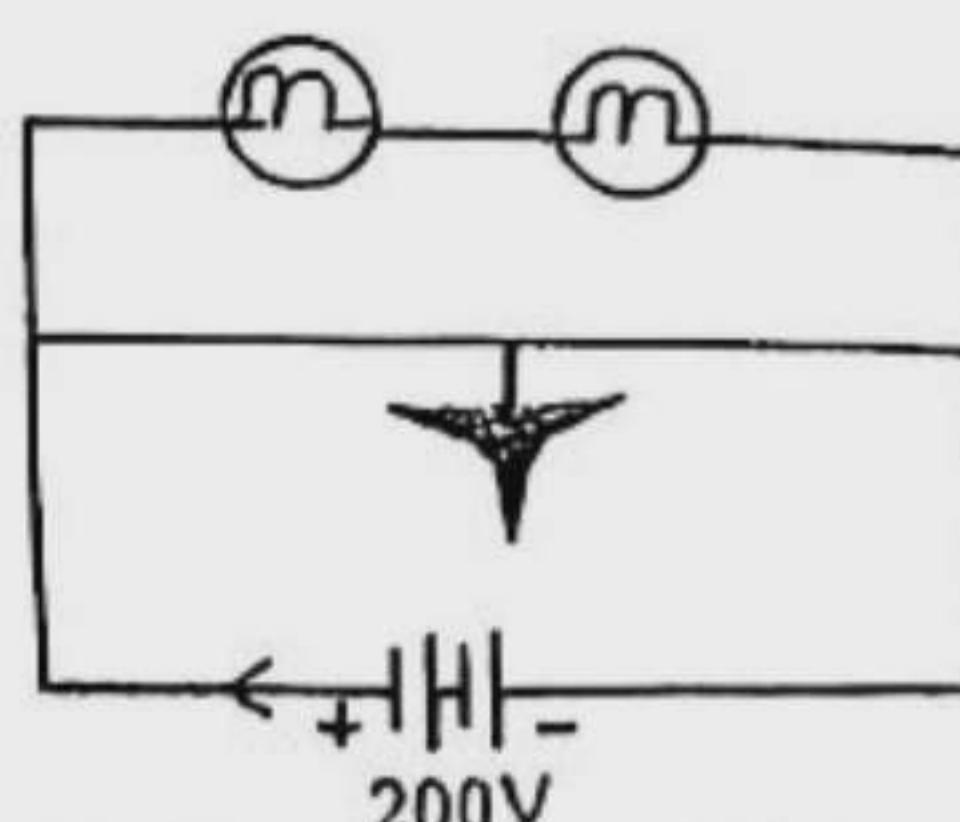
We know that,

$$V = IR \Rightarrow I = \frac{V}{R} = \frac{12 \text{ V}}{5 \Omega} = 2.4 \text{ A}$$

d In the stem, the resistance is connected in series combination. It is not more convenient in domestic uses. The reason is discussed below :

When the bulbs are in series the same current will flow in both the bulbs but this current will be lower than the case when one bulb is connected. As a result the intensity of light will be less when the two bulbs are in series compared to the case when only one bulb is used.

When the bulbs are connected in series and one of the bulbs is fused, the circuit will be broken and the other bulb will go off. In case the two bulbs are connected in parallel and one of the bulbs is fused, the circuit will not be broken and other bulbs will not go off. Thus in parallel connection we can put off any of the bulbs without causing disconnection to the other bulbs. In our domestic uses, it is more convenient to use parallel circuits.

Ques. 14

- a. What is voltmeter? 1
- b. Why does the resistance of a conductor become 2 Ohms? 2
- c. Explain the fault of the circuit drawn in the stem. 3
- d. What type of the circuit of the stem will be convenient for using in our residence? Analyse. 4

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Answer to Question No. 14 :

a A voltmeter is an electrical instrument by means of which potential difference between two points in a circuit can be measured in ampere.

b From Ohm's law we know that resistance of a conductor,

$$R = \frac{V}{I}, \text{ Where } V = \text{Voltage difference,}$$

$$I = \text{Current flow}$$

So, if the voltage difference between the two ends of a conductor is 2 (two) volt and the current flowing through it is 1 ampere, the resistance of the conductor will be 2 Ohms.

c An electric circuit is shown in the stem. The faults of the circuit are explained below —

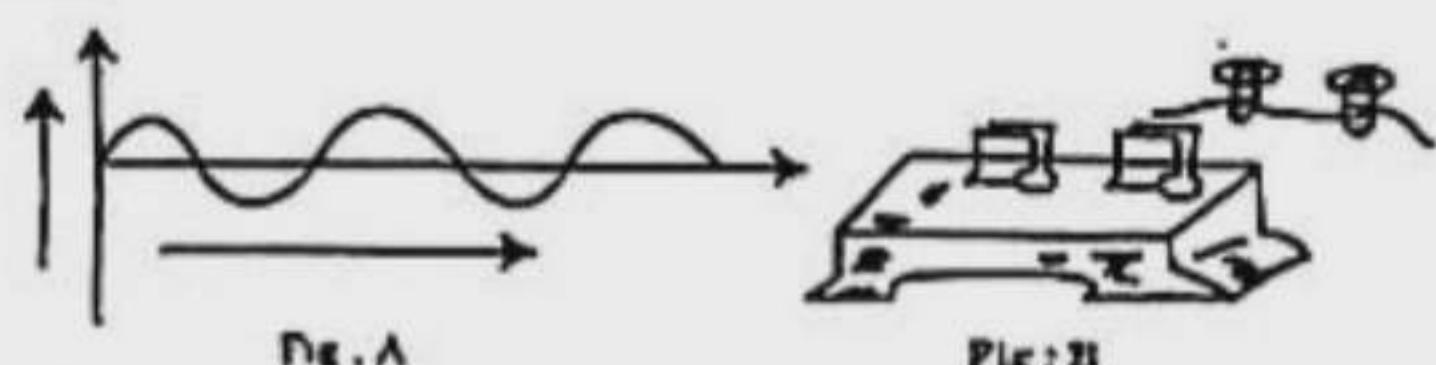
- i. There are no switch and ammeter in the circuit.
- ii. From the circuit it is noticed that two bulbs are connected in series circuit and one fan is connected in parallel circuit. When the bulbs are in series the same current will flow in both the bulbs but this current will be lower than the case when one bulb is connected. As a result the intensity of light will be less when the two bulbs are in series compared to the case when only one bulb is used.
- iii. When the bulbs are connected in series and one of the bulbs is fused, the circuit will be broken and the other bulb will go off.

d In the circuit of the stem, two types of circuits are shown. One is series circuit and another is parallel circuit. Between the two circuits, parallel circuit is more convenient for house wiring.

When the bulbs are in series the same current will flow in both the bulbs but this current will be lower than the case when one bulb is connected. As a result the intensity of light will be less when the two bulbs are in series compared to the case when only one bulb is used.

When the two bulbs are connected to the battery in parallel, each bulb will experience the same voltage as when one bulb is connected to the battery in series. As a result the brightness of the bulbs will be the same independent of whether one or two bulbs are connected in parallel.

When the bulbs are connected in series and one of the bulbs is fused, the circuit will be broken and the other bulb will go off. In case the two bulbs are connected in parallel and one of the bulbs is fused, the circuit will not be broken and other bulbs will not go off. Thus in parallel connection we can put off any of the bulbs without disturbing the other bulbs. Therefore, in the light of the above discussion, it is felt that for our domestic uses, it is more convenient to use parallel circuits.

Ques. 15

- a. What is the unit of current? 1
- b. What do you mean by resistance? 2
- c. What kind of current flow in figure 'A'? Explain. 3
- d. Explain the role of figure 'B' to avoid electrical accident. 4

• Dhaka Board 2017

Answer to Question No. 15 :

- a The unit of current is ampere and it is denoted by A which is the flow of the coulomb of charge per second through a conductor at a given rate.
- b The electric current is produced by the flow of electrons. When there is a difference in the potential between two points of a conductor the free electron are subjected to an electric force and electrons move from the low potential to high potential. But during this journey the electrons come into collision with the ions in the metallic conductor results the flow of charge. The property of creating obstacle to the flow of current is called resistance.

- c Figure 'A' indicates 'Alternating Current'.

When the flow of current changes its direction periodically, it is called alternating current. At present, alternating current (AC) is used all over the world. The reason is that in the conventional production of electric power using generators AC is economic and easier to produce and distribute. However, the recent development of solar cells to produce electricity may change this situation in the future.



Power generators in our country are being used to produce alternating current. The frequency of AC is different in different countries. In Bangladesh the frequency is 50 cycles/sec and in United States it is 60 cycle/sec.

d Figure- B indicates 'Fuses'. The role of figure 'B' is very great to avoid electrical accident. If the current in an instrument that we use in our day to day life exceeds certain limit, the instrument will be spoiled. In case the current in the electric circuit of our house flows too high, it can cause even fire. To avoid such accidents some special arrangements are made. The special arrangement is the use of fuse. Fuse is usually made of thin wire of an alloy of tin and lead. If a current flows through it beyond a certain limit it gets very hot and melts. As a result the circuit goes off. This is how by stopping the current the fuse protects our instruments. The fuse is connected in series in the circuit.

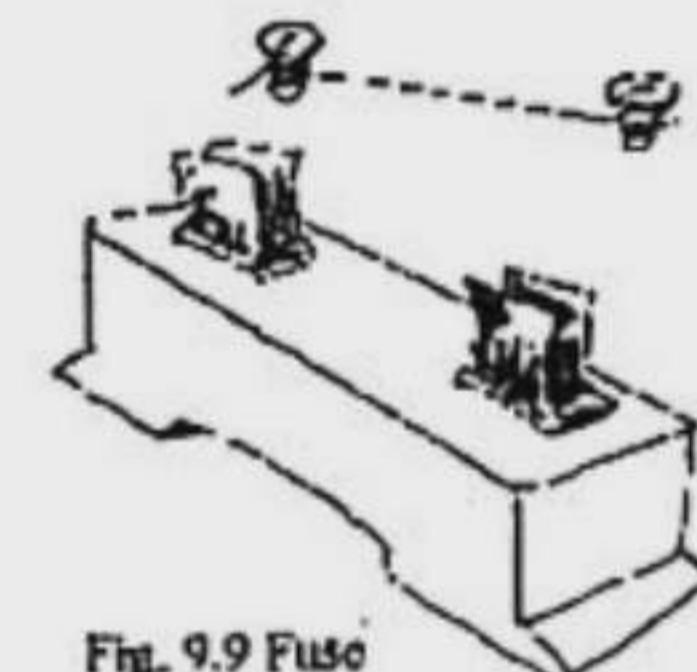
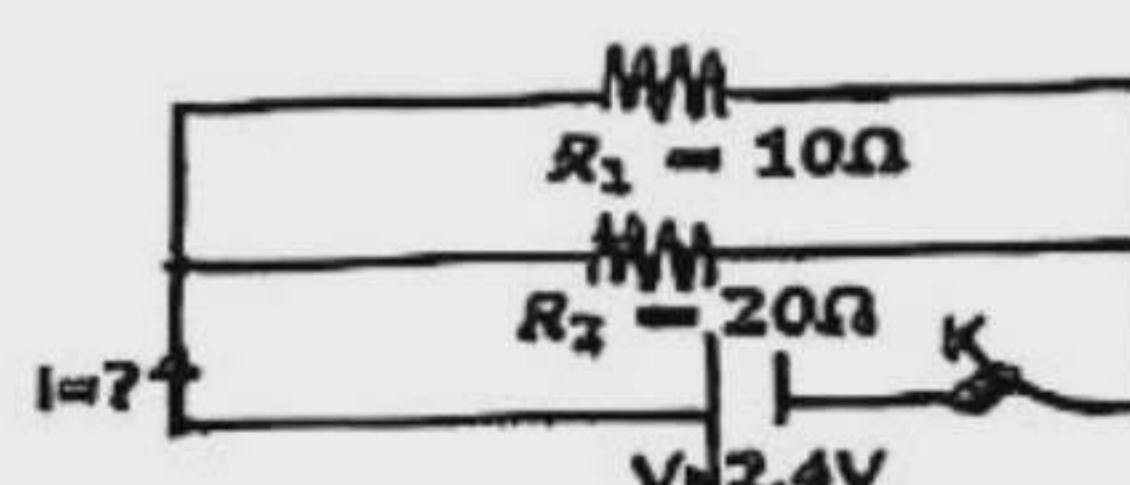


Fig. 9.9 Fuse

The fuses can be with different current carrying limits. Usually fuses of 5 ampere, 15 ampere, 30 ampere and 60 ampere are used depending on the necessity. A ten ampere fuse means, no current above 10 ampere can pass through it because it will then melt and make the circuit off. For different types of instruments different fuses are used. For electric lamps, fans, televisions etc. a 5 ampere fuse is used. The main fuse of the house many be 30 or 60 ampere.

Ques. 16

- a. What is called resistance? 1
- b. Explain why temperature is kept constant in Ohms law? 2
- c. Find the total current in the above circuit. 3
- d. In parallel circuit the voltage drop remains same at each of the resistor- justify the statement mathematically. 4

• Rajuk Uttara Model College, Dhaka

Answer to Question No. 16 :

- a** The property of creating obstacle by conductor is resistance.
- b** At a fixed temperature the current flowing through a particular wire or conductor is proportional to the voltage difference between the two ends of the conductor. Temperature remains constant in Ohm's law because of the resistance of any material varies with the change in temperature.

c Given,

$$\text{resistance-1, } R_1 = 10 \Omega$$

$$\text{resistance-2, } R_2 = 20 \Omega$$

As the resistances are connected in parallel connection if equivalent resistance is R then;

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\text{or, } \frac{1}{R} = \frac{1}{10} + \frac{1}{20}$$

$$\text{or, } \frac{1}{R} = \frac{2+1}{20}$$

$$\text{or, } \frac{1}{R} = \frac{3}{20}$$

$$\text{or, } R = \frac{20}{3}$$

$$= 6.67 \Omega$$

Given,

$$\text{Voltage, } V = 2.4 \text{ V}$$

$$\text{Total current, } I = ?$$

We know,

$$V = IR$$

$$\therefore I = \frac{V}{R} = \frac{2.4}{6.67} \text{ A} = 0.36 \text{ A}$$

∴ Total current in the above circuit is 0.36A.

d If in a circuit more than one resistance or electric component are connected in such a way that one end of each of them are connected to one common end of a battery and other ends of all the components are connected to the other end of the battery. Then such an arrangement forms a parallel circuit. In a parallel circuit different currents may flow through the individual components but the voltage will be the same between the two terminals of each components.

In the above mentioned circuit,

$$\text{resistance-1, } R_1 = 10 \Omega$$

$$\text{resistance-2, } R_2 = 20 \Omega$$

$$\text{current, } I = 6.67 \text{ A}$$

$$\text{electromotive force, } E = 2.4 \text{ V}$$

$$\therefore \text{Current flow through resistance-1, } I_1 = \frac{V}{R_1} \\ = \frac{2.4}{10} \text{ A}$$

$$= 0.24 \text{ A} \\ \therefore \text{Current flow through resistance-2, } I_2 = \frac{V}{R_2} \\ = \frac{2.4}{20} \text{ A}$$

$$= 0.12 \text{ A} \\ \therefore \text{Voltage across resistance-1, } V_1 = I_1 R_1 \\ = 0.24 \times 10 \text{ V}$$

$$= 2.4 \text{ V} \\ \therefore \text{Voltage across resistance-2, } V_2 = I_2 R_2 \\ = 0.12 \times 20 \text{ V} \\ = 2.4 \text{ V}$$

So, voltage drop remains same at each of the resistor.



Knowledge & Comprehension-based Q/A

Designed as per topic



Preparatory Knowledge-based Q/A

Question 1. What is electric current?

Ans. The flow of electrons is called electric current.

Question 2. What are the types of electric current?

Ans. There are two types of electric current. Such as : Direct current and alternating current.

Question 3. What is the unit of measurement of electric current?

Ans. Ampere is the unit of measurement of electric current.

Question 4. What is the factor for which flow of electrons take place?

Ans. The factor named potential difference causes flow of electrons.

Question 5. What is the reason of using alternating current (AC) all over the world?

Ans. Alternating current is conventionally produced and distributed economically and easily using generator and as such alternating current is presently used all over the world.

Question 6. What is the frequency of AC in Bangladesh?

Ans. The frequency of AC in Bangladesh is 50 cycles/sec.

Question 7. What is the unit of resistance in SI unit?

Ans. Ohm is the unit of resistance in SI.

Question 8. How many ways are there for connecting electric equipments in an ordinary circuit?

Ans. There are two ways like series connection and parallel connect of electric equipment in an ordinary circuit.

Question 9. For what purpose is a voltmeter used?

Ans. A voltmeter is used to measure the potential difference if two points in a circuit.

Question 10. What should be limit of a fuse used in a TV?

Ans. The limit of a fuse used in a TV should be 5 ampere.

Question 11. What percent of energy can be saved avoiding the use of electricity for cooking and using pressure cooker?

Ans. 25% energy can be saved avoiding the use of electricity for cooking and using pressure cooker.

Preparatory Comprehension-based Q/A

Question 1. What do you mean by direct current (DC) and alternating current (AC)?

Ans. We have two types of electric current like direct current and alternating current in use.

Direct Current (DC) : When the current flows in a single direction all the time, it is called direct current. On the other hand, when the current changes its direction periodically it is called alternating current.

Question 2. What will happen if a fuse of more than 5 ampere is used for electric lamps, fans, television, etc.?

Ans. A 5 ampere fuse means no current above 5 ampere can pass through it, because it will then melt disconnecting the circuit and saving electrical substances in the circuit. A television, an electric

bulb, an electric fan, etc. can bear the highest load of 5 ampere and above 5 ampere, they will surely be burnt. So a fuse of above 5 ampere is not a safe device for electrical goods in a circuit for it can burn them.

Question 3. What are the genuine factors that has created an additional pressure on the demand of electricity in our country?

Ans. Ours is a developing country. There is an increase of the number of offices, houses, shopping centres, big buildings with air-conditioners and elevators which consume a huge amount of electricity continuously. Moreover, construction works, irrigation in crop fields, newly constructed mills and factories of different types are going to increase the demand of electricity. All the genuine factors stated above have created an additional pressure on the demand of electricity in our country.

Question 4. How can you define Ohms law?

Ans. Ohms law states that the magnitude of electric current through a conductor depends on the factors like the difference in voltage between its two ends as well as on the property of the conductor called resistance. Thus Ohms law can be formulated as under :

$I = \frac{V}{R}$, where I denotes the magnitude of current, V denotes potential difference between two ends of the conductor and R denotes.



Super Suggestions



Super Suggestions with 100% preparatory questions selected by the Master Trainer Panel

Dear learners, important multiple choice, short, creative, knowledge & comprehension-based questions of this chapter selected by Master Trainer Panel for Half-Yearly and Annual Exams are presented below. Learn the answers to the mentioned questions well to ensure 100% preparation.

Question Pattern	7★	5★
● MCQs with Answers	Learn each MCQs in this chapter thoroughly.	
● Short Q/A	1, 2, 6, 8, 10, 18, 19, 22, 23, 25, 27	3, 7, 12, 14, 15, 21, 24, 26, 29, 30
● Creative Q/A	1, 3, 5, 7, 8, 9, 11, 12	2, 4, 6, 10, 14, 15
● Knowledge-based Q/A	1, 4, 5, 6, 8, 11	2, 3, 7, 9
● Comprehension-based Q/A	1, 4	2, 3

Exclusive Tips ► Master the solutions to all the activities in this chapter along with exercise and other Q/A to develop the creative thinking and assess your talent.



Assessment & Evaluation



A question bank presented in the form
of a class test to assess the preparation

Class Test

Time : 3 hours

Science

Full marks : 100

Class : Eight

Multiple Choice Questions (Each question carries 1 mark)

$1 \times 30 = 30$

[N.B. : Answer all the questions. Each question carries one mark. Block fully, with a ball-point pen, the circle of the letter that stands for the correct/best answer in the "Answer Sheet" for Multiple Choice Question Type Examination.]

1. What is the unit of electric current?
Ⓐ Ampere Ⓑ Newton Ⓒ Ohm Ⓓ Volt
 2. Which of the following helps in the flow of electricity?
Ⓐ Electron Ⓑ Proton Ⓒ Neutron Ⓓ Positron
 3. Which of the following is a source of periodic current?
Ⓐ Dry cell Ⓑ Lead storage cells Ⓒ DC generator Ⓓ Dynamo
 4. The property of a conductor that hinders the flow of electricity through—
Ⓐ Resistance Ⓑ Volt Ⓒ Ohm Ⓓ Coulomb
 5. How many types of electric current are there?
Ⓐ 2 Ⓑ 3 Ⓒ 4 Ⓓ 5
 6. Which of the following provides DC electricity?
Ⓐ Electric cell Ⓑ Dynamo Ⓒ Generator Ⓓ Refrigerator
 7. A bulb of 100 volt is connected to an electric circuit of 5 ampere. What is the resistance of the circuit?
Ⓐ 0.05 Ohm Ⓑ 20 Ohm Ⓒ 105 Ohm Ⓓ 500 Ohm
 8. If the voltage difference of the two ends of a conductor is 20 volt and flow of current is 2 amperes what will be the resistance?
Ⓐ 20 Ohm Ⓑ 15 Ohm Ⓒ 10 Ohm Ⓓ 5 Ohm
- Read the following stem and answer the questions no. 9 and 10 :
- In the bedroom of Esha's house, there are two tube lights and one fan connected in parallel. A fuse of 10 ampere is used in the circuit of bedroom.
9. What is the appropriate fuse for the second element?
Ⓐ 5 ampere Ⓑ 10 ampere Ⓒ 15 ampere Ⓓ 30 ampere
 10. If an electric kettle is used in that room—
i. the wire of the fuse will melt when the switch will be on
ii. tube light and fan will be damaged
iii. there is a possibility of electric accident
Which one is correct?
Ⓐ i & ii Ⓑ ii Ⓒ ii & iii Ⓓ i, ii & iii
11. What percentage of electricity is saved by the cooking of pressure cooker?
Ⓐ 25 Ⓑ 28 Ⓒ 30 Ⓓ 32
 12. The fuse of which value is suitable for television?
Ⓐ 5 ampere Ⓑ 10 ampere Ⓒ 15 ampere Ⓓ 20 ampere
 13. What is used in a circuit to prevent electrical accidents?
Ⓐ Ammeter Ⓑ Fuse wire Ⓒ Voltmeter Ⓓ Galvanometer
 14. What is the suitable fuse rating for an electric kettle?
Ⓐ 5 Ampere Ⓑ 10 Ampere Ⓒ 15 Ampere Ⓓ 30 Ampere
 15. Which of the following requires self-initiative to use?
Ⓐ Air cooler Ⓑ Solar power Ⓒ Electric fan Ⓓ Hunting wild animals
 16. The colors of the terminals of an ammeter are—
Ⓐ Red and white Ⓑ White and black Ⓒ Red and yellow Ⓓ Red and black

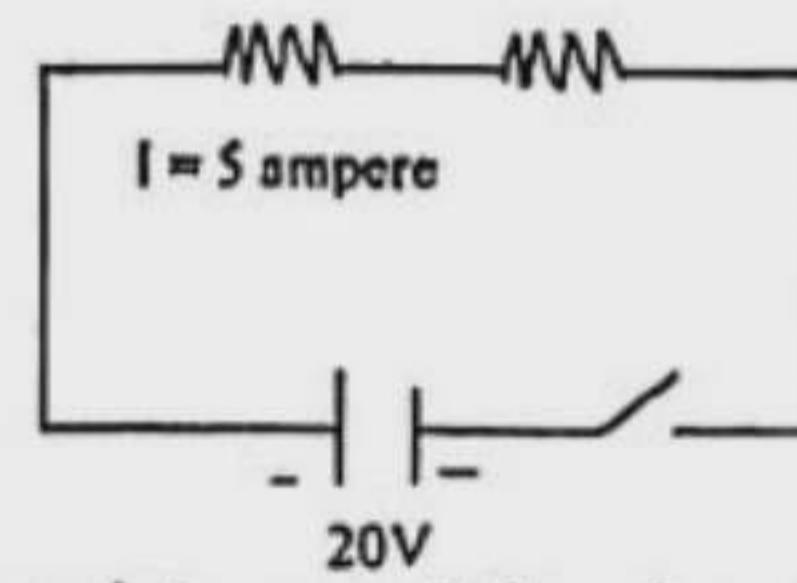
17. Which instrument is used to measure the potential difference between two points in a circuit?
Ⓐ Voltmeter Ⓑ Ammeter Ⓒ Galvanometer Ⓓ Generator

18. How many ends does an ammeter have?
Ⓐ 1 Ⓑ 2 Ⓒ 3 Ⓓ 4

19. How much electricity is saved (in percentage) when cooking with a pressure cooker?
Ⓐ 25% Ⓑ 28% Ⓒ 30% Ⓓ 32%

20. In a series circuit, how is the potential difference across all parts?
Ⓐ The same Ⓑ Increases gradually Ⓒ Decreases gradually Ⓓ Not equal

On the basis of the stem, answer the questions no. 21 and 22 :



21. What is the resistance of the circuit?
Ⓐ 0.25 Ohms Ⓑ 4 Ohms Ⓒ 25 Ohms Ⓓ 100 Ohms

22. The circuit is—

- i. more convenient as domestic uses
- ii. a series circuit
- iii. capable to flow the same current in all the compounds

Which one is correct?

- Ⓐ i & ii Ⓑ i & iii Ⓒ ii & iii Ⓓ i, ii & iii

23. How many times per second does periodic current change direction in the United States?
Ⓐ 40 Ⓑ 50 Ⓒ 60 Ⓓ 70

24. What happens to electric current if the cross-sectional area of a conductor decreases?
Ⓐ Decreases Ⓑ Increases Ⓒ Remains unchanged Ⓓ Unrelated to cross-section

25. Which of the following equations is correct?
Ⓐ $I = \frac{t}{q}$ Ⓑ $I = qt$ Ⓒ $I = \frac{q}{t}$ Ⓓ $t = qI$

26. What is electric current?
Ⓐ Flow of energy Ⓑ Flow of electrons Ⓒ Flow of protons Ⓓ Flow of neutrons

27. What is the international practical unit of potential difference?
Ⓐ Volt Ⓑ Coulomb Ⓒ Watt Ⓓ Ampere

28. What is the source of periodic current?
Ⓐ Generator Ⓑ DC generator Ⓒ Electric cell Ⓓ Battery

29. The source of non-periodic current is—
Ⓐ Generator Ⓑ Transmitter Ⓒ Power plant Ⓓ Battery

30. In Bangladesh, what is the frequency of alternating current per second?
Ⓐ 40 cycles Ⓑ 50 cycles Ⓒ 60 cycles Ⓓ 70 cycles

Answer Sheet ▶ Multiple Choice Questions

1	Ⓐ	2	Ⓑ	3	Ⓐ	4	Ⓐ	5	Ⓐ	6	Ⓐ	7	Ⓐ	8	Ⓒ	9	Ⓐ	10	Ⓐ	11	Ⓐ	12	Ⓐ	13	Ⓓ	14	Ⓐ	15	Ⓒ
16	Ⓐ	17	Ⓐ	18	Ⓐ	19	Ⓐ	20	Ⓐ	21	Ⓐ	22	Ⓒ	23	Ⓒ	24	Ⓐ	25	Ⓐ	26	Ⓑ	27	Ⓐ	28	Ⓐ	29	Ⓐ	30	Ⓐ



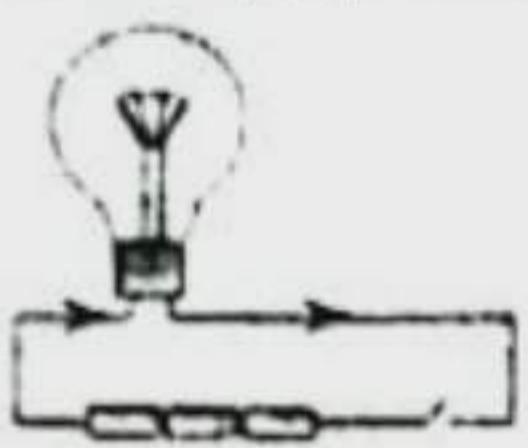
Science

Short-Answer Question (Each question carries 2 marks)**Answer any 10 of the following questions :** $2 \times 10 = 20$

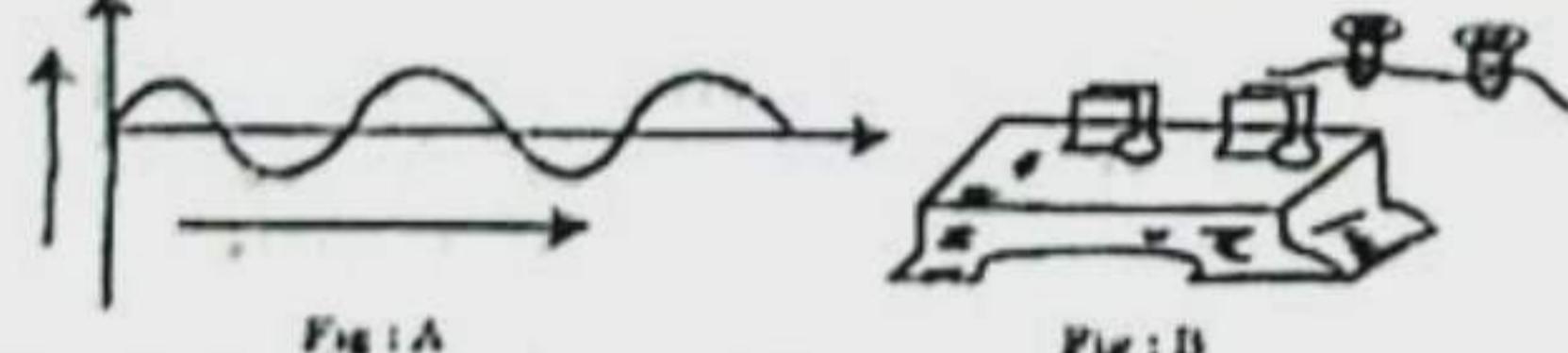
1. What is electric potential? Explain.
2. Write about electric potential difference.
3. Why is DC current called unidirectional current?
4. Write the difference between AC and DC current.
5. What is meant by ammeter?
6. Write about the galvanometer.
7. Write about safety fuses.
8. What is meant by a 30 ampere fuse?

9. What factors does electric current depend on?
10. If the resistance of a conductor is $2\ \Omega$ and the potential difference between its two ends is 4 volts, what is the electric current?
11. How can a continuous flow of electricity be obtained?
12. Explain the concept of an electric circuit.
13. What is a series circuit? Explain.
14. Why do two bulbs glow less brightly in a series connection?
15. Why is the fuse wire connected in parallel with the galvanometer?

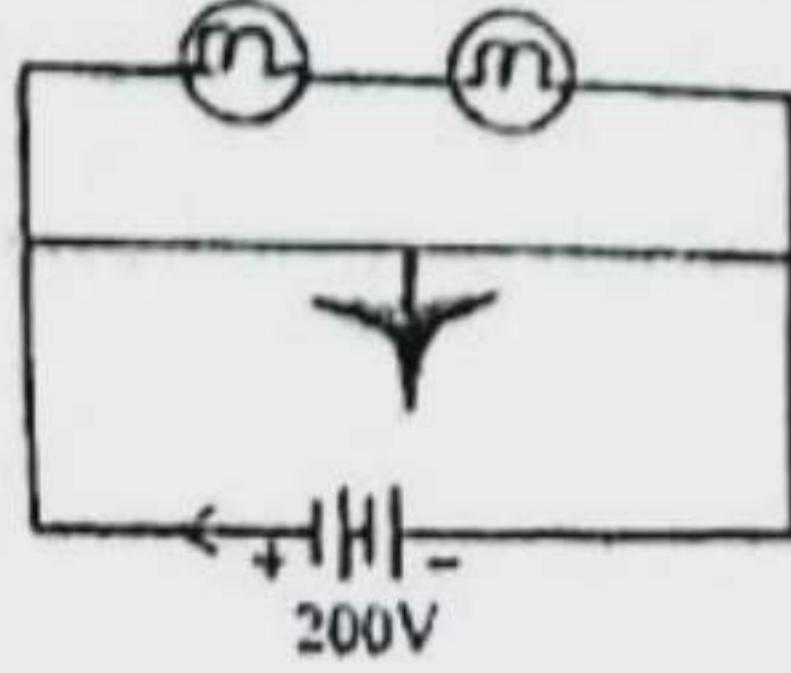
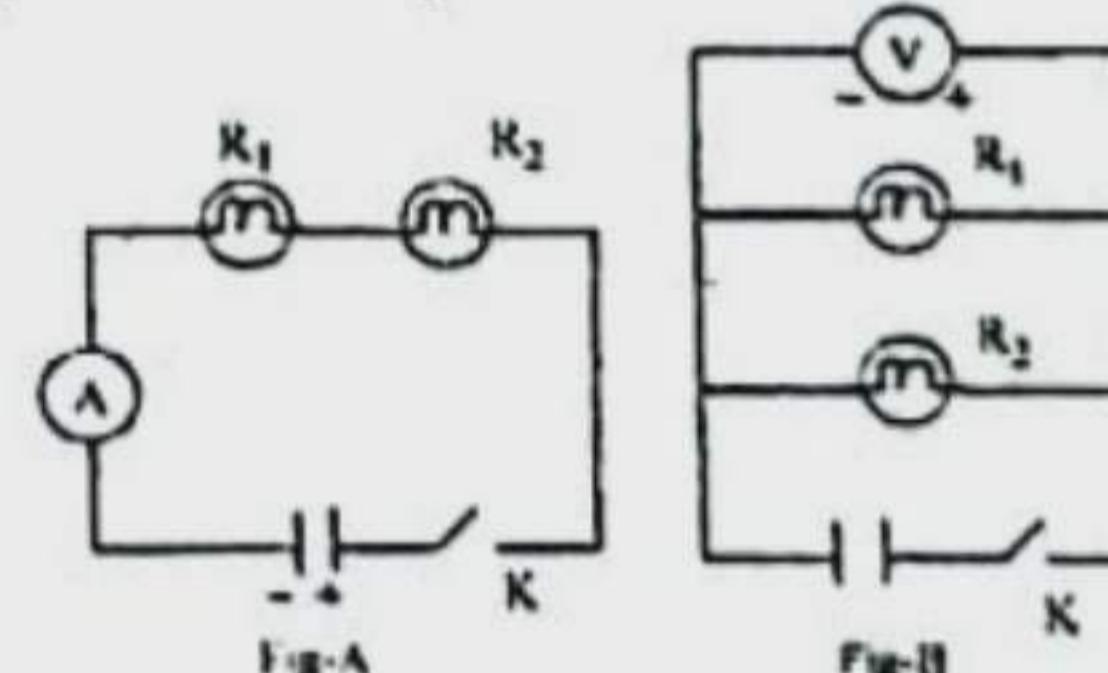
Creative Question (Each question carries 10 marks)**Answer any 5 of the following questions :** $10 \times 5 = 50$

1. 

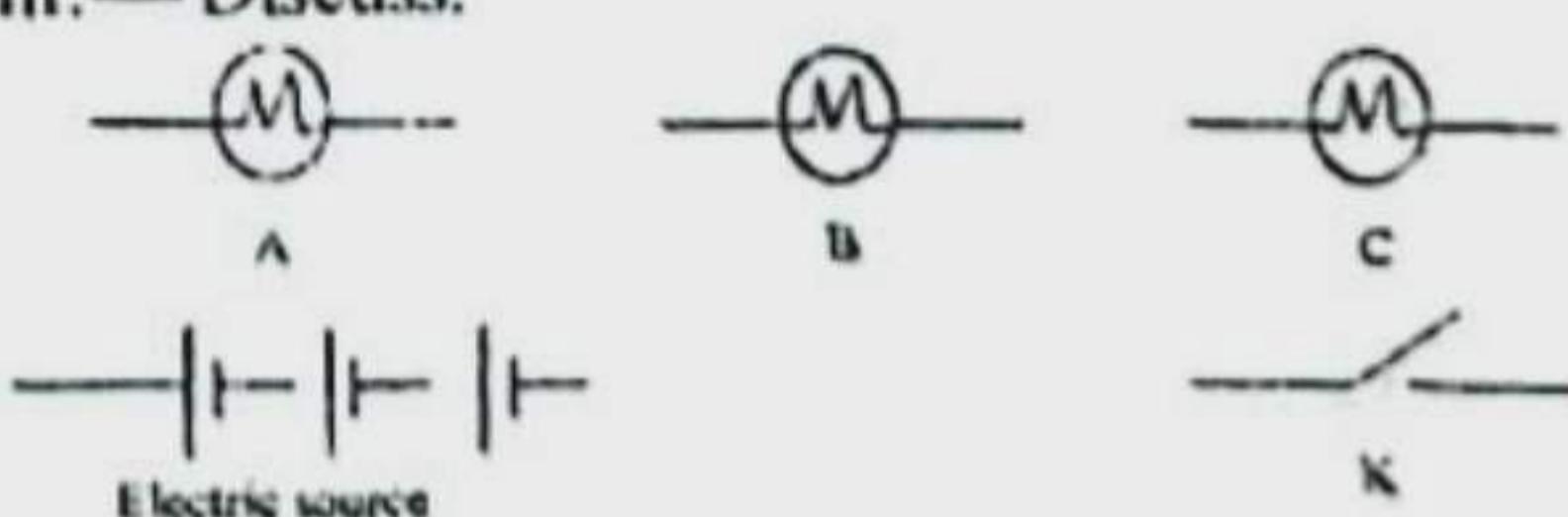
 - a. What is the source of alternate current?
 - b. How is I related to R?
 - c. Explain the energy change in the circuit.
 - d. Excessive flow of electricity will cause financial harm to the householder. Do you agree? Clarify your view.

2. There are three bulbs and two fans in a series connection in Arik's house. On the other hand there are two bulbs and two fans in a parallel connection in Adrita's house. In addition an electric kettle is also connected in that series connection. For the electric kettle a fuse of 5 ampere is added. But the wire of the fuse burn repeatedly.
 - a. What is resistance?
 - b. What type of flow of electricity is found in a battery? Explain.
 - c. Explain the cause of burning of the fuse wire.
 - d. Which of the two circuits used in Arik and Adrita's house would be appropriate for in office? Write with logic.
3. A 10 ampere fuse is used for an electric bulb in Diba's room. For this the bulb has fused. On the other hand Mr. Zahid takes the decision to connect the electrical equipments with parallel circuit in his new house.
 - a. What is resistance?
 - b. Explain the Ohm's law.
 - c. Explain the reason to be fused the bulb of Diba's room.
 - d. How much logical the decision taken by Mr. Zahid? Analyze.
4. 

 - a. What is the unit of current?
 - b. What do you mean by resistance?
 - c. What kind of current flow in figure 'A'? Explain.
 - d. Explain the role of figure 'B' to avoid electrical accident.

5. 
6. Mr. Rakib, connected the electrical instruments of his first room in such a way that one end of the device is connected with the another end and the potential difference is 12 volt of that room. The devices of second room are connected in such a way that one end of every device connected at a common point and other parts are connected to another common point.
 - a. What is called alternating current?
 - b. What do you mean by 15 ampere fuse?
 - c. If the resistance of the circuit in first room is 20 Ohm, how much electricity will flow in the circuit?
 - d. Which one is more suitable circuit of the two rooms in the stem for domestic electrification? Give your opinion with comparative analysis.
7. 

 - a. What is flow of current?
 - b. Why is the resistance units of a conductor is 4 Ohm?
 - c. What kind of electric circuit is in the fig-B of the stem? Discuss.
 - d. Which one is convenient between the two circuits of the stem?— Discuss.

8. 

The resistance of bulb A is 20 Ohm and flow of current is 2 ampere.

- a. What is called flow of current?
- b. Why is resistance created in the conductor during the flow of current?
- c. What will be the potential difference between the two ends of bulb A?
- d. Using the stem draw a circuit that is suitable for household use and analyze its usefulness.

Answering Reference ► Short-Answer Questions

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|--------------------------------|--------------------------------|---------------------------------|---------------------------------|
| 1 ► See this Chapter, Ques. 01 | 5 ► See this Chapter, Ques. 22 | 9 ► See this Chapter, Ques. 09 | 13 ► See this Chapter, Ques. 18 |
| 2 ► See this Chapter, Ques. 03 | 6 ► See this Chapter, Ques. 24 | 10 ► See this Chapter, Ques. 11 | 14 ► See this Chapter, Ques. 20 |
| 3 ► See this Chapter, Ques. 05 | 7 ► See this Chapter, Ques. 26 | 11 ► See this Chapter, Ques. 13 | 15 ► See this Chapter, Ques. 30 |
| 4 ► See this Chapter, Ques. 07 | 8 ► See this Chapter, Ques. 28 | 12 ► See this Chapter, Ques. 15 | |

Answering Reference ► Creative Questions

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| 1 ► See this Chapter, Ques. 02 | 3 ► See this Chapter, Ques. 08 | 5 ► See this Chapter, Ques. 14 | 7 ► See this Chapter, Ques. 10 |
| 2 ► See this Chapter, Ques. 06 | 4 ► See this Chapter, Ques. 15 | 6 ► See this Chapter, Ques. 11 | 8 ► See this Chapter, Ques. 09 |