

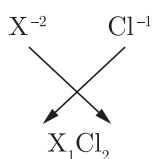
**CLASS X (2020-21)**  
**SCIENCE (CODE 086)**  
**SAMPLE PAPER-7**

**Time : 3 Hours****Maximum Marks : 80****General Instructions :**

- (i) The question paper comprises four sections A, B, C and D. There are 36 questions in the question paper. All questions are compulsory.
- (ii) Section–A – question no. 1 to 20 - all questions and parts thereof are of one mark each. These questions contain multiple choice questions (MCQs), very short answer questions and assertion - reason type questions. Answers to these should be given in one word or one sentence.
- (iii) Section–B – question no. 21 to 26 are short answer type questions, carrying 2 marks each. Answers to these questions should be in the range of 30 to 50 words.
- (iv) Section–C – question no. 27 to 33 are short answer type questions, carrying 3 marks each. Answers to these questions should be in the range of 50 to 80 words.
- (v) Section–D – question no. 34 to 36 are long answer type questions carrying 5 marks each. Answer to these questions should be in the range of 80 to 120 words.
- (vi) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
- (vii) Wherever necessary, neat and properly labelled diagrams should be drawn.

## Section-A

1. An element 'X' is in group 2 of the periodic table. What will be the formula of its chloride? [1]

**Ans :**or  $XCl_2$ .**or**

How would the tendency to lose electrons change as we go from left to right across a period of the periodic table?

**Ans :**

In moving from left to right in a period, the tendency of atoms to lose electrons decreases.

2. What is a homologous series of carbon compounds? [1]

**Ans :**

Homologous series is a series of organic compounds which have the same functional group and similar chemical properties.

3. Name a sexually transmitted disease which damages the immune system of human body. [1]

**Ans :**

AIDS damages the immune system of human body.

4. What is the magnification of the images formed by plane mirrors and why? [1]

**Ans :**

The magnification of the images formed by plane mirrors is 1 because the size of the image is equal to the size of object.

5. Why are danger signal lights red in colour? [1]

**Ans :**

It is because red is least scattered by fog or smoke. Therefore, it can be seen in the same colour even from a distant place.

6. Define 1 dioptre of power of a lens. [1]

**Ans :**

1 dioptre is the power of a lens of focal length 1 metre.

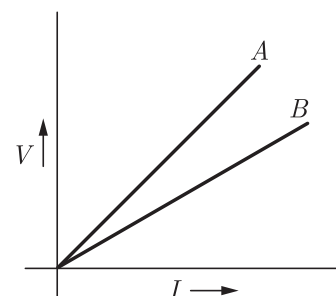
**or**

A mirror has magnification 0.4. What type of the mirror is it and what type of the image is formed?

**Ans :**

It is a convex mirror since the magnification is positive as well as less than one. The image formed is diminished and erect.

7.  $V-I$  graph for two wires  $A$  and  $B$  are shown in the figure. If both wires are of same length and same thickness, which of the two is made of a material of high resistivity? [1]

**Ans :**

From the graph, slope of wire  $A$  is greater. Hence, wire  $A$  has greater resistance.

For the wires of same length and same thickness, resistance depends on the nature of material of the wire, i.e.,

$$R_1 = \rho_1 \frac{l}{A}$$

and  $R_2 = \rho_2 \frac{l}{A}$

$$\frac{R_1}{R_2} = \frac{\rho_1}{\rho_2}$$

or  $R \propto \rho$

Hence, wire 'A' is having the material of high resistivity.

8. When a magnetic needle is brought near a current carrying conductor, it deflects. Why? [1]

**Ans :**

When a magnetic needle is brought near a current-carrying conductor, it deflects because a magnetic force is exerted by a magnetic field.

9. Name the physical quantity whose unit is  $JC^{-1}$ . [1]

**Ans :**

It is the unit of potential difference or e.m.f. The other name of the unit is volt.

**or**

A wire of resistance  $2\ \Omega$  has been connected to a source of 50 V as its two ends. What is the current flowing through the wire?

**Ans :**

Zero, because current flows due to potential difference only.

10. In a bisexual flower, inspite of the young stamens being removed artificially, the flower produces fruit. Provide a suitable explanation for the above situation. [1]

**Ans :**

In the absence of stamens, self-pollination is not possible but cross-pollination occurs leading to fertilisation and formation of fruit.

11. What will happen to a plant if its xylem is removed? [1]

**Ans :**

Xylem transports water and dissolved mineral nutrients from the roots to all other parts of the vascular plants. So, if xylem is removed from the plant, the water and mineral supply to the plant will stop and therefore, the plant will die.

**or**

What is translocation in a plant?

**Ans :**

Translocation is the transport of soluble products of photosynthesis in the whole plant.

12. We do not clean ponds or lakes, but an aquarium needs to be cleaned. Why? [1]

**Ans :**

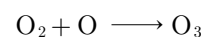
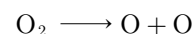
An aquarium is an artificial and incomplete ecosystem as compared to ponds or lakes which are natural, self-sustaining and complete ecosystem and where perfect recycling of materials take place. Therefore, it needs to be cleaned.

**or**

What happens when high energy ultraviolet radiation act on the oxygen at the higher level of the atmosphere?

**Ans :**

When high energy ultraviolet radiation act on oxygen, the production of ozone gas takes place.



13. Define excretion. [1]

**Ans :**

Excretion is the biological process involved in the removal of harmful metabolic wastes from the body.

**For question numbers 14, 15 and 16, two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :**

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

14. **Assertion :** Diamond is a conductor of electricity and heat. [1]

**Reason :** Diamond is soluble in all known solvents.

**Ans :** (d) A is false but R is true.

15. **Assertion :** The enzymes released by micro-organisms help in breaking down biodegradable wastes.

**Reason :** Biodegradable wastes are generally inorganic wastes. [1]

**Ans :** (c) A is true but R is false.

**or**

**Assertion :** Bacteria and fungi are called decomposers.

**Reason :** Bacteria and fungi break down the complex organic substances into simple inorganic substances that enter into the soil and are again used up by the plants.

**Ans :** (a) Both A and R are true and R is correct explanation of the assertion.

16. **Assertion :** Herbivores have longer small intestine than carnivores.

**Reason :** Carnivores can digest cellulose due to the presence of enzyme, cellulase. [1]

**Ans :** (c) A is true but R is false.

17. **Read the following and answer any four question 17.1 to 17.5.**  $1 \times 4$

In human beings, air is taken into the body through the nostrils. From here, the air passes through the throat and into the lungs. Rings of cartilage are present in the throat.

17.1 Which of the following prevent collapsing of trachea?

- (a) Diaphragm (b) Alveoli  
 (c) Rings of cartilage (d) Ribs

**Ans :** (c) Rings of cartilage

17.2 Which is the correct sequence of air passage during inhalation?

- (a) Nostrils → larynx → pharynx → trachea → lungs
- (b) Nasal passage → trachea → pharynx → larynx → alveoli
- (c) Larynx → nostrils → pharynx → lungs
- (d) Nostrils → pharynx → larynx → trachea → alveoli

**Ans :** (d) Nostrils → pharynx → larynx → trachea → alveoli

**17.3** During respiration exchange of gases take place in:

- (a) trachea and larynx
- (b) alveoli of lungs
- (c) alveoli and throat
- (d) throat and larynx

**Ans :** (b) alveoli of lungs

**17.4** Which of the following statement(s) is are true about respiration?

- I. During inhalation, ribs move inward and diaphragm is raised.
  - II. In the alveoli, exchange of gases takes place i.e., oxygen from alveolar air diffuses into blood and carbon dioxide from blood into alveolar air.
  - III. Haemoglobin has greater affinity for carbon dioxide than oxygen.
  - IV. Alveoli increase surface area for exchange of gases.
- (a) I and IV
  - (b) II and III
  - (c) I and III
  - (d) II and IV

**Ans :** (d) II and IV

**17.5** When air is blown from mouth into a test-tube containing limewater, the limewater turned milky due to the presence of:

- (a) oxygen
- (b) carbon dioxide
- (c) nitrogen
- (d) water vapour

**Ans :** (b) carbon dioxide

**18. Read the following and answer any four questions from 18.1 to 18.5. 1 × 4**

An indicator is a special chemical that changes its colour to indicate the presence of a chemical substance. It is used to confirm the presence of an acid, a base or a neutral solution. Litmus paper is the most commonly used indicator. It is a purple dye which is extracted from a plant 'lichen'. Litmus paper comes in two colours-blue and red.

There are many other natural materials like turmeric, red cabbage leaves, coloured petals of some flowers such as petunia, which indicate the presence of acid or base in a solution. These are called acid-base indicators. These indicators tell us whether a substance is acidic or basic through colour changes.

**18.1** The indicator which turn red in acid solution are:

- (a) turmeric and litmus
- (b) phenolphthalein and methyl orange
- (c) litmus and methyl orange
- (d) phenolphthalein and Litmus

**Ans :** (c) litmus and methyl orange

**18.2** Which of the following is an olfactory indicator?

- (a) Litmus
- (b) Petunia leaves
- (c) Turmeric
- (d) Vanilla essence

**Ans :** (d) Vanilla essence

**19.3** The indicator which produces a pink colour in an

alkaline solution is:

- (a) phenolphthalein
- (b) turmeric
- (c) litmus
- (d) methyl orange

**Ans :** (a) phenolphthalein

**19.4** Litmus is extracted from a plant called:

- (a) Hydrangea
- (b) Lichen
- (c) Geranium
- (d) Petunia

**Ans :** (b) Lichen

**19.5** Which of the following statements is correct about an aqueous solution of an acid and of a base?

- I. Higher the pH, stronger the acid
  - II. Higher the pH, weaker the acid
  - III. Lower the pH, stronger the base
  - IV. Lower the pH, weaker the base
- (a) I and III
  - (b) II and III
  - (c) I and IV
  - (d) II and IV

**Ans :** (d) II and IV

**19. Read the following and answer any four questions from 19.1 to 19.5. 1 × 4**

Ravi wanted to fix the rear-view mirror of his scooter. He knows that rear-view mirror is an essential safety device in the vehicle and allows him to see objects at the backside of his vehicle.



He bought two mirrors  $M_1$  and  $M_2$ , out of which  $M_1$  is curved inwards and  $M_2$  is curved outwards.

**19.1** Based on the given situation, which mirror should Ravi need to fix as his rear-view mirror?

- (a)  $M_1$
- (b)  $M_2$
- (c) Both  $M_1$  and  $M_2$
- (d) None of these

**Ans :** (b)  $M_2$

**19.2** If  $R$  is the radius of curvature of a spherical mirror and  $f$  is its focal length, then:

- (a)  $R = f$
- (b)  $R = 2f$
- (c)  $R = 3f$
- (d)  $R = \frac{f}{2}$

**Ans :** (b)  $R = 2f$

**19.3** What is the formula for magnification obtained with a mirror?

- (a)  $\left(\frac{-\text{Image distance}}{\text{Object distance}}\right)$
- (b)  $2 \times \text{Focal length}$
- (c)  $\left(\frac{\text{Height of object}}{\text{Height of image}}\right)$
- (d) None of these

**Ans :** (a)  $\left(\frac{-\text{Image distance}}{\text{Object distance}}\right)$

**19.4** Ravi did some preliminary experiment with mirror  $M_1$  and found that magnification of the real image of an object placed at 10 cm in front of it is 3, at what distance is the image located?

- (a) 30 cm
- (b)  $\frac{-10}{3}$  cm

- (c)  $\frac{10}{3}$  cm (d)  $-30$  cm

Ans : (d)  $-30$  cm

$$m = -3 \text{ (image is real)}$$

$$u = -10$$

We know that,

$$\text{Magnification, } m = \frac{-v}{u}$$

$$-3 = \frac{-v}{-10}$$

$$v = -30 \text{ cm}$$

19.5 If the magnification of a mirror has a plus sign, then the nature of image formed by it is:

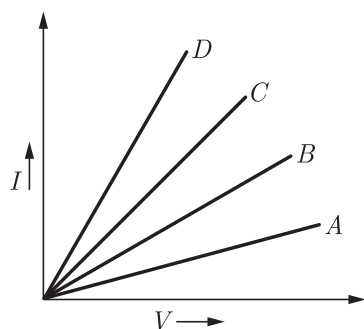
- (a) real and inverted (b) virtual and inverted  
(c) virtual and erect (d) real and erect

Ans : (c) virtual and erect

20. Read the following and answer any four questions from 20.1 to 20.5.  $1 \times 4$

Ohms law gives a relationship between current and potential difference. According to this Law, at constant temperature, the current flowing through a conductor is directly proportional to the potential difference across its ends. The ratio of potential difference applied between the ends of a conductor and the current flowing through it is a constant quantity called resistance.

The following graph is obtained by a researcher while doing an experiment to study Ohm's law. The  $I-V$  graph for four conductors  $A, B, C$  and  $D$  having resistance  $R_A, R_B, R_C$  and  $R_D$  respectively are shown in the graph.



20.1 If all the conductors are of same length and same material, which is the thickest ?

- (a)  $C$  (b)  $D$   
(c)  $A$  (d)  $B$

Ans : (b)  $D$

20.2 If all the conductors are of same thickness and of same material, which is the longest ?

- (a)  $B$  (b)  $C$   
(c)  $A$  (d)  $D$

Ans : (c)  $A$

20.3 Which one of the following relations is true for these conductors ?

- (a)  $R_A > R_B > R_C > R_D$  (b)  $R_A = R_B < R_C < R_D$   
(c)  $R_A < R_B < R_C < R_D$  (d)  $R_A = R_B = R_C = R_D$

Ans : (a)  $R_A > R_B > R_C > R_D$

20.4 If conductors  $A$  and  $B$  are connected in series and  $I-V$  graph is plotted for the combination, its slope would be:

- (a) more than that of  $A$  (b) between  $A$  and  $B$   
(c) more than that of  $D$  (d) less than that of  $A$

Ans : (d) less than that of  $A$

20.5 If conductors  $C$  and  $D$  are connected in parallel and  $I-V$  graph is plotted for the combination, its slope would be:

- (a) between  $C$  and  $D$  (b) lesser than that of  $A$   
(c) more than that of  $D$  (d) between  $B$  and  $C$

Ans : (c) more than that of  $D$

## Section-B

21. Write any two differences between the two ways of oxidation of glucose in organisms. [2]

Ans :

The two differences between the two ways of oxidation of glucose in organisms are as follows:

	Basis of Difference	Aerobic Respiration	Anaerobic Respiration
1.	Oxidation of food	When oxidation of food nutrients occurs in the presence of molecular oxygen, it is called aerobic respiration.	When oxidation of food nutrients occurs without the utilisation of molecular oxygen, it is called anaerobic respiration.
2.	Energy produced	More energy is produced as oxidation is complete.	Lesser amount of energy is produced as oxidation is not complete.

or

- (i) State two functions of stomata.  
(ii) How do guard cells regulate the opening and closing of stomatal pore?

Ans :

- (i) Functions of Stomata:  
(a) Gaseous exchange takes place.  
(b) Serves as site for photosynthesis.  
(ii) The guard cells swell when water flows into them causing the stomatal pore to open. Similarly, the pore closes if the guard cells shrink.

22. (i) Trace the movement of oxygenated blood in the body.

(ii) Write one structural difference between the composition of artery and vein. [2]

Ans :

- (i) Movement of oxygenated blood in the body is as follows:  
Pulmonary veins  $\rightarrow$  Left atrium  $\rightarrow$  Left ventricle  
 $\rightarrow$  Systemic aorta  $\rightarrow$  All parts of the body.  
(ii) Artery has thick elastic wall whereas vein is thin

walled as blood is under less pressure in veins.

23. What is the difference between displacement and double displacement reactions? Write equations for these reactions. [2]

**Ans :**

In a displacement reaction, a more reactive element displaces a less reactive element from its compound.

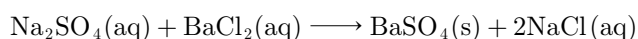
While, in a double displacement reaction, two atoms or a group of atoms interchange their positions to form new compounds.

**For example :**

**Displacement reaction :**



**Double displacement reaction :**

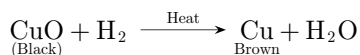


**or**

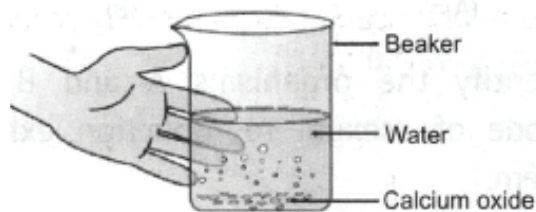
What happens when hydrogen gas is passed over the heated copper oxide? Write the chemical equation involved in this reaction.

**Ans :**

If hydrogen gas is passed over heated copper oxide, the black coating on the surface turns brown as the reaction takes place and copper is obtained.



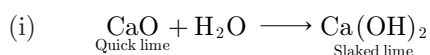
24. In order to illustrate a combination reaction, a teacher take about 2 g to 3 g of calcium oxide in a glass beaker and pour water over it very slowly.



Based on the given information:

- Write the chemical reaction involved in this process.
- One of the student observed that water started boiling even when the solution was not being heated. Give reason for his observation. [2]

**Ans :**



- Since the reaction is highly exothermic, the solution started boiling although it was not being heated.

25. A student observes a dish antenna which is used to receive television signals from a satellite. What is the nature of the curved dish? Where should the antenna be positioned to receive the strongest possible signals? [2]

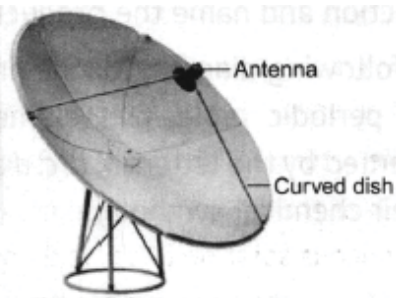


Figure: A dish Antenna

**Ans :**

The curved dish should be concave in nature and the antenna should be positioned at the focus of the curved dish to receive the strongest possible signals.

26. What is meant by periodicity of properties of elements? Why are the properties of elements placed in the same group of the periodic table similar? [2]

**Ans :**

The repetition of similar properties of elements after a regular interval is called periodicity of properties of elements.

The properties of elements placed in same group are similar due to same number of valence electrons.

## Section-C

27. In a monohybrid cross between tall pea plants (TT) and short pea plants (tt) a scientist obtained only tall pea plants (Tt) in the  $F_1$  generation. However, on selfing the  $F_1$  generation pea plants, he obtained both tall and short plants in  $F_2$  generation. On the basis of above observation with other angiosperms also, can the scientist arrive at a law? If yes, explain the law, if not, give justification for your answer. [3]

**Ans :**

On the basis of the experiment, the scientists can arrive at a law i.e., law of dominance. The conclusions of this law are given as follows:

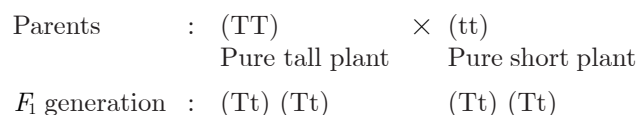
- Both the parents should be contributing a copy of the same gene.
- For each trait, a plant is having two copies, one from each parents.
- If the copies of the traits are not same, the dominant trait shall get expressed.
- When  $F_1$  generation is self-crossed, the recessive trait of  $F_1$  generation in the  $F_2$  generation is in ratio of 3 : 1.

**or**

Explain Mendel's experiment with peas on inheritance of characters, considering only one visible contrasting character.

**Ans :**

Mendel crossed tall pea plants with dwarf pea plants.



Selfing of  $F_1$  : (Tt) × (Tt)  
 $F_2$  generation : (TT) (Tt) (Tt) (tt)

**Observations:**

**$F_1$  generation :** No ‘intermediate-height’ plants were found in  $F_1$  generation. All plants were tall. Only one of the parental traits was seen, not a mixture of the two.

**$F_2$  progeny :** Not all plants were tall. Only 25% of them were short. This indicates that both the tallness and shortness traits were inherited in the  $F_1$  plants, but only the tallness trait was expressed while shortness trait was hidden. Mendel proposed that something was being passed from generation to generation which he called factor.

28. Give reason to justify the following: [3]

- (i) The existence of decomposers is essential in a biosphere.
- (ii) Flow of energy in a food chain is unidirectional.

**Ans :**

- (i) Role of decomposers in the environment are as follows:
  - (a) Decomposers, by the process of decomposition, return the nutrients to the nutrient pool.
  - (b) They help in completing the different bio-geochemical cycles and maintain balance in the ecosystem.
- (ii) The energy flow through different steps in the food chain is unidirectional. It means that energy captured by autotrophs does not revert back to the solar input and it passes to the herbivores, i.e., it moves progressively from producers to consumers in single direction only.

29. What are the different ways in which glucose is oxidised to provide energy in various organisms? [3]

**Ans :**

The break down of glucose takes place in the cell cytoplasm into a three-carbon molecule called pyruvate which is further broken down and provide energy as shown below:

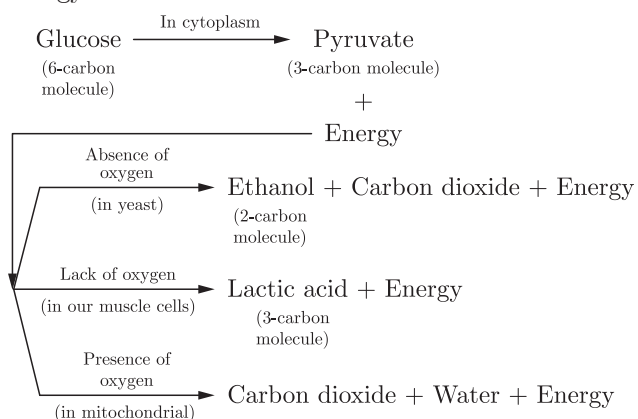


Figure: Breakdown of Glucose by Various Pathways

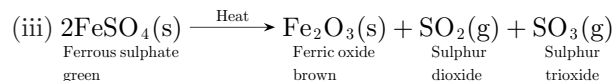
30. 2 g ferrous sulphate crystals are heated in a dry boiling tube. [3]

- (i) List any two observations.
- (ii) Name the type of chemical reaction taking place.
- (iii) Write balanced chemical equation for the reaction

and name the products formed.

**Ans :**

- (i)
  - (a) The green colour of ferrous sulphate changes to brown due to the formation of ferric oxide.
  - (b) A smell of burning sulphur is obtained due to the formation of sulphur dioxide gas.
- (ii) Decomposition reaction carried out by heat is known as thermal decomposition.



31. In the following diagram for the first three periods of the periodic table, five elements have been represented by the letters *a, b, c, d* and *e* (which are not their chemical symbols): [3]

1							18
	2	13	14	15	16	17	
			<i>a</i>			<i>b</i>	
	<i>c</i>				<i>d</i>		<i>e</i>

- (i) Select the letter which represents a halogen.
- (ii) Select the letter which represents a noble gas.
- (iii) What type of bond is formed between *a* and *b*?

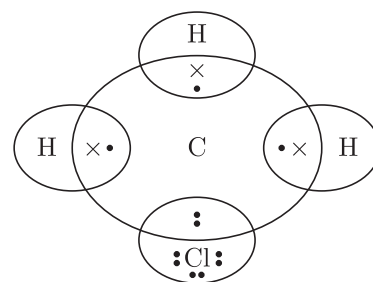
**Ans :**

- (i) The halogens are placed in group 17. So ‘*b*’ represents a halogen.
- (ii) The noble gases are placed in group 18, so element ‘*e*’ is a noble gas.
- (iii) Since ‘*a*’ and ‘*b*’ both are non-metals. So, a covalent bond is formed between ‘*a*’ and ‘*b*’.

32. Explain the nature of the covalent bond using the bond formation in  $\text{CH}_3\text{Cl}$ . [3]

**Ans :**

Carbon completes its octet by sharing of electrons only because neither it can loose nor gain electrons because of requirement of large amount of energy. So, the bond formed is called a covalent bond.



Hence, carbon requires 4 electrons to complete its octet, while each hydrogen atom requires one electron to complete its duplet. Also, chlorine requires an electron to complete the octet. Therefore, all of these share the electrons and as a result, carbon forms 3 bonds with hydrogen and one with chlorine.

33. A convex lens of focal length 25 cm and a concave lens of focal length 10 cm are placed in close contact with one another. [3]

- (i) What is the power of this combination?
- (ii) What is the focal length of this combination?
- (iii) Is this combination converging or diverging?

**Ans :**

- (i)  $f_1 = + 25 \text{ cm} = + 0.25 \text{ m}$   
 $P_1 = \frac{1}{f(m)} = \frac{1}{+0.25} = + 4D$   
 $f_2 = - 10 \text{ cm} = - 0.10 \text{ m}$   
 $P_2 = \frac{1}{f(m)} = \frac{1}{-0.10} = - 10D$   
 $P = P_1 + P_2 = + 4 - 10 = - 6D$
- (ii)  $f = \frac{1}{P} = \frac{1}{-6} \text{ m}$
- or  $\frac{100}{-6} \text{ cm} = - 16.66 \text{ cm}$
- (iii) The combination is diverging in nature.

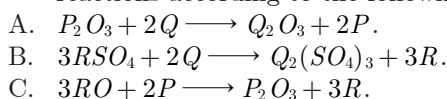
## Section-D

34. (i) The electronic configurations of some elements are given below:

Element	Electronic configuration		
	K	L	M
A	2	8	7
B	2	8	1
C	2	8	8
D	2	8	2
E	1		

Which of these are metals?

- (ii)  $P, Q$  and  $R$  are 3 elements which undergo chemical reactions according to the following equations:



Answer the following question :

- (a) Which element is most reactive?  
 (b) Which element is least reactive?  
 (c) State the type of reaction listed above. [5]

**Ans :**

- (i) We know that metals have 1 to 3 electrons in their outermost shells. The inspection of electronic configurations of these elements shows that  $B$  and  $D$  are metals.  $E$  (Hydrogen) is a not metal, though it contains 1 electron. It is an exception.
- (ii)
- Most reactive metal is  $Q$  as it has displaced both  $P$  and  $R$  from their compounds.
  - Element  $R$  is least reactive as it has been displaced by both  $P$  and  $Q$ .
  - Displacement reaction.

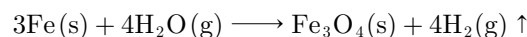
**or**

Write equations for the reactions, if any, between:

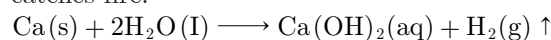
- iron and steam.
- calcium and potassium with water.
- zinc and silver nitrate solution.
- magnesium and iron(II) chloride solution.

**Ans :**

- (i) Iron does not react with cold or hot water. It reacts with steam to form Iron oxide and hydrogen.

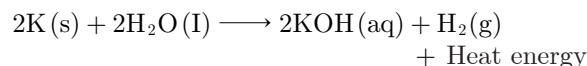


- (ii) The reaction of calcium with water does not evolve such amount of heat that hydrogen gas catches fire.

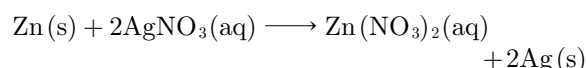


Calcium starts floating because the bubbles of hydrogen gas formed stick to the surface of the metal.

On the other hand, potassium reacts with cold water and its reaction is so violent and exothermic that the evolved hydrogen immediately catches fire.



- (iii) Zinc is more reactive than silver. It will displace silver from silver nitrate solution.



- (iv) Magnesium is more reactive than iron. It will displace iron from iron (II) chloride solution.



35.



- Identify the organisms  $A$  and  $B$  and the mode of asexual reproduction exhibited by them.
- How will an organism be benefited if it reproduces through spores?
- Mention the two asexual methods by which Hydra can reproduce. Explain briefly any one such method. [5]

**Ans :**

- (i)

	Organism	Mode of Reproduction
A	Bryophyllum	Vegetative propagation
B	Plasmodium	Multiple fission

- (ii) Spores are tiny, spherical asexual reproductive bodies. They are covered with a hard protective wall which enables them to survive in unfavourable conditions and can only germinate and produce new plant under favourable conditions, thereby benefitting the organism from dying out.
- (iii) Two asexual methods are budding and regeneration. Budding is a process in which a bud develops as an outgrowth due to repeated cell divisions at a specific site. This bud develops, gets matured and detaches from the parent cell to become a new individual.

36. With the help of a diagram of experimental set-up describe an activity to show that the force acting on a

current carrying conductor placed in a magnetic field increase with increase in field strength. [5]

**Ans :**

**Objective :** To show through an activity that force acting on a current-carrying conductor placed in a magnetic field increases with increase in the field strength.

**Material Required :** Aluminium rod, two horseshoe magnets of different intensities, a clamp stand, a cell, a key and connecting wires, etc.

**Procedure :**

- (i) Firstly, the experimental set-up is arranged as shown in figure.

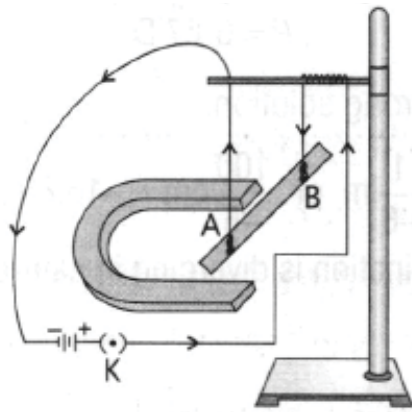


Figure: A Current-Carrying Rod AB

- (ii) Plug the key, for the given set-up. The current will flow through the rod from A to B and note the displacement of rod.
- (iii) In this step, the key is unplugged and the first horseshoe magnet is removed. Now, place the second horseshoe magnet of a higher magnetic field strength in a similar manner as the first one.
- (iv) Now, plug the key. The current again flow through the rod from A to B. Again observe the deflection of the rod.
- (v) Now, bring both the magnets closer together (to ensure greater magnetic field than that of previous case). Again observe the motion of the rod.

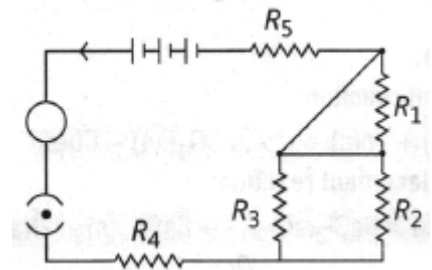
**Observation :** Every time, the conductor moves faster than that of previous one. It is possible only when the conductor gets more accelerated every time which requires more applied force.

Thus, if the magnetic field strength is increased, the rod will exert Ora greater force and move even faster.

**Conclusion :** The force working on a current-carrying conductor kept in a magnetic field increases with increase in the strength of field.

or

Deduce the expression for the equivalent resistance of the parallel combination of three resistors  $R_1, R_2$  and  $R_3$ .

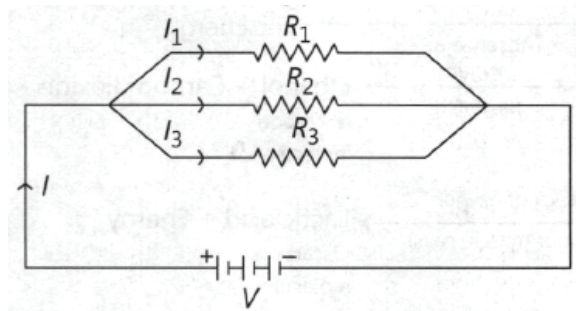


Consider the following electric circuit:

- (i) Which two resistors are connected in series?
- (ii) Which two resistors are connected in parallel?
- (iii) If every resistor of the circuit is of  $2\Omega$ , what current will flow in the circuit?

**Ans :**

Let us consider the following parallel circuit as shown in figure:



Let  $I_1, I_2$  and  $I_3$  be the amount of current flowing through the resistors  $R_1, R_2$  and  $R_3$  which are connected in parallel. By using Ohm's law, current through each resistor will be,

$$I_1 = \frac{V}{R_1}, I_2 = \frac{V}{R_2}$$

and

$$I_3 = \frac{V}{R_3}$$

Let their equivalent resistance be  $R_p$ , then

$$V = IR_p$$

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

Total current through the circuit will be,

$$I = I_1 + I_2 + I_3$$

or

$$\frac{V}{R_p} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$$

or

$$\frac{V}{R_p} = V\left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right)$$

For the given circuit:

or

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

- (i)  $R_5$  and  $R_4$  with parallel combination of  $R_2$  and  $R_3$  are in series.

- (ii)  $R_2$  and  $R_3$  are connected in parallel.

- (iii)  $R_2$  and  $R_3$  connected in parallel give

$$R_p = \frac{2 \times 2}{2 + 2} = \frac{4}{4} = 1\Omega$$

$R_p, R_5$  and  $R_4$  are connected in series.

So,

$$R_{eq} = 1 + 2 + 2 = 5\Omega$$

$R_1$  is not to be taken as it will be shorted.

Thus, current flowing will be,



$$I = \frac{V}{R_{\text{eq}}} = \frac{5}{5} = 1 \text{ A}$$

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