

QUESTION BANK

(Chapter Wise)

CLASS X

SUBJECT SCIENCE (086)

(For CBSE Board Exam 2021)

Dear students, the pattern of CBSE question paper of class X has been changed. CBSE prepared two type of question paper Science (086) since 2020. Keeping in view CBSE Exam 2021 of class X(Standered), the endeavor is made to prepare a collection of chapter wise questions (from 1 to 16) to help you for your better preparation for the examination. This Question Bank contains Sample Question paper issued by CBSE for Board Exam of class X (2020) along with the CBSE Question paper of Main Exam 2020 for forthcoming Board Exam 2021. I feel that this Question Bank will prove to be very useful for all the students who are appearing in CBSE Exam 2021 for class X (Standered) and anticipate that you will come out in flying colours.

BEST OF LUCK.

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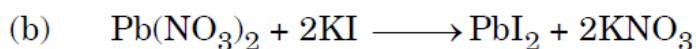
CHAPTER WISE QUESTION FROM 2020 CBSE QUESTION PAPERS

CHPTER 1

CHEMICAL REACTIONS AND EQUATIONS

1. (i) Write two observations when lead nitrate is heated in a test tube. 3
(ii) Name the type of reaction.
(iii) Write a balanced chemical equation to represent the above reaction.
2. Which of the following reactions is an endothermic reaction? 1
i) Burning of coal.
ii) Decomposition of vegetable matter into compost.
iii) Process of respiration.
iv) Decomposition of calcium carbonate to form quick lime and carbon dioxide.
3. A small amount of quicklime is added to water in a glass beaker. 3
(a) Name and define the type of reaction that has taken place.
(b) Write the chemical equation for the above reaction.
(c) List two main observations of this reaction.
4. **For question numbers 13 and 14, two statements are given — one labelled as Assertion (A) and the other labelled as 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 the correct explanation of the assertion (A).
(b) Both (A) and (R) are true, but (R) is **not** the correct explanation of the assertion (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true.
13. **Assertion (A) :** A reaction in which a substance is decomposed into two or more simpler products is known as a decomposition reaction.
Reason (R) : The decomposition of a substance is impossible without supplying energy. 1

5. Identify the type of each of the following reactions stating reason for your answers : 3



6. In the electrolysis of water

(a) Name the gases liberated at anode and cathode.

(b) Why is it that the volume of gas collected on one electrode is two times that on the other electrode ?

(c) What would happen if dil. H_2SO_4 is not added to water ? 3

7. Strong heating of ferrous sulphate leads to the formation of a brown solid and two gases. This reaction can be categorised as 1

(A) displacement and redox.

(B) decomposition and redox.

(C) displacement and endothermic.

(D) decomposition and exothermic.

8. When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution. The reaction is an example of a :

(a) Combination reaction

(b) Displacement reaction

(c) Decomposition reaction

(d) Double displacement reaction

9. 1 g of copper powder was taken in a China dish and heated. What change takes place on heating? When hydrogen gas is passed over this heated substance, a visible change is seen in it. Give the chemical equations of reactions, the name and the color of the products formed in each case.

The correct option is :

11. Mention with reason the colour changes observed when :

 - silver chloride is exposed to sunlight.
 - copper powder is strongly heated in the presence of oxygen.
 - a piece of zinc is dropped in copper sulphate solution.

3

12. In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution :

 - (A) exchange of atoms takes place
 - (B) exchange of ions takes place
 - (C) a precipitate is produced
 - (D) an insoluble salt is produced

The correct option is :

 - (a) (B) and (D)
 - (b) (A) and (C)
 - (c) only (B)
 - (d) (B), (C) and (D)

The correct option is :

13. Complete and balance the following chemical equations :

(i) $\text{NaOH}_{(\text{aq})} + \text{Zn}_{(\text{s})} \rightarrow$

(ii) $\text{CaCO}_{3(\text{s})} + \text{H}_2\text{O}_{(\text{l})} + \text{CO}_{2(\text{g})} \rightarrow$

(iii) $\text{HCl}_{(\text{aq})} + \text{H}_2\text{O}_{(\text{l})} \rightarrow$

3

14. Identify the type of each of the following reactions.

Also write balanced chemical equation for each reaction.

(i) A reaction in which the reaction mixture becomes warm.

(ii) A reaction in which an insoluble substance is formed.

3

15. What happens when food materials containing fats and oils are left for a long time ? List two observable changes and suggest three ways by which this phenomenon can be prevented.

3

16. Lead nitrate solution is added to a test tube containing potassium iodide solution.

(a) Write the name and colour of the compound precipitated.

(b) Write the balanced chemical equation for the reaction involved.

(c) Name the type of this reaction justifying your answer.

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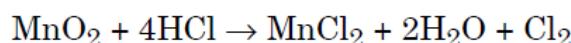
17. List three differentiating features between the processes of galvanisation and alloying.

3

18. For question numbers 13 and 14, two statements are given — one labelled as Assertion (A) and the other labelled as 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 the correct explanation of the assertion (A).
- (b) Both (A) and (R) are true, but (R) is **not** the correct explanation of the assertion (A).
- (c) (A) is true, but (R) is false.
- (d) (A) is false, but (R) is true.

13. Assertion (A) : The reaction



is an example of a redox reaction.

Reason (R) : In this reaction, HCl is reduced to Cl_2 whereas MnO_2 is oxidised to MnCl_2 .

1

14. Assertion (A) : Wing of an insect and wing of a bird are analogous organs.

Reason (R) : The organs which are quite different in fundamental structure and origin but perform same function in different species are called analogous organs.

1

- 19.** When hydrogen sulphide gas is passed through a blue solution of copper sulphate, the colour of the solution fades and a black precipitate is obtained.
- (a) Name the type of reaction mentioned above.
(b) Why does the colour of the solution fade away ?
(c) Write the chemical name of the black precipitate formed.
(d) Give the balanced chemical equation for the reaction involved. 3
- 20.** Lead nitrate solution is added to a test tube containing potassium iodide solution.
- (a) Write the name and colour of the compound precipitated.
(b) Write the balanced chemical equation for the reaction involved.
(c) Name the type of this reaction justifying your answer. 3
- 21.** What happens when food materials containing fats and oils are left for a long time ? List two observable changes and suggest three ways by which this phenomenon can be prevented. 3

CHAPTER 2

ACIDS, BASES AND SALTS

1. A compound 'X' of sodium is used as an antacid and it decomposes on strong heating. 3

- (i) Name the compound 'X' and give its chemical formula.
- (ii) Write a balanced chemical equation to represent the decomposition of 'X'.
- (iii) Give one use of compound 'X' besides an antacid.

OR

You are provided with 90 mL of distilled water and 10 mL of concentrated sulphuric acid to prepare dilute sulphuric acid.

- (i) What is the correct way of preparing dilute sulphuric acid? Give reason.
- (ii) How will the concentration of H_3O^+ ions change on dilution?

2. Identify the basic salt from the following salts: 1

- i) Na_2CO_3
- ii) NH_4Cl
- iii) NaNO_3
- iv) KCl

3. (a) Name the gas liberated when an acid reacts with a metal.
How is the presence of this gas tested ?

- (b) What happens when zinc reacts with (a) HCl , and
(b) NaOH ? Write the chemical equation and name of the salt produced in each case.

- (c) Identify the acid and base for ammonium chloride salt.
Write the nature (acidic/basic/neutral) and pH value of this salt. 5

OR

- (a) Identify the acid and the base whose combination forms the common salt. Write the formula and chemical name of this salt. Name the source from which it is obtained.

- (b) What is rock salt? Mention its colour and the reason it is due to.

- (c) What happens when an electric current is passed through brine? Write the chemical equation for it. 5

4. If 10 mL of H_2SO_4 is mixed with 10 mL of $\text{Mg}(\text{OH})_2$ of the same concentration, the resultant solution will give the following colour with universal indicator :

1

- (A) Red
- (B) Yellow
- (C) Green
- (D) Blue

5. Baking soda is a mixture of :

- (a) Sodium carbonate and acetic acid
- (b) Sodium carbonate and tartaric acid
- (c) Sodium hydrogen carbonate and tartaric acid
- (d) Sodium hydrogen carbonate and acetic acid

6. The chemical formula for plaster of Paris is :

- (a) $\text{CaSO}_4 \cdot 2 \text{H}_2\text{O}$
- (b) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$
- (c) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
- (d) $2 \text{CaSO}_4 \cdot \text{H}_2\text{O}$

7. List the important products of the Chlor-alkali process. Write one important use of each.

8. How is washing soda prepared from sodium carbonate? Give its chemical equation. State the type of this salt. Name the type of hardness of water which can be removed by it?

9. The chemical formula for plaster of Paris is :

- (a) $\text{CaSO}_4 \cdot 2 \text{H}_2\text{O}$
- (b) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$
- (c) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
- (d) $2 \text{CaSO}_4 \cdot \text{H}_2\text{O}$

15. (a) What is 'Water of crystallisation' ?
(b) With the help of equations, state what happens when
(i) baking soda is heated during cooking ?
(ii) gypsum is heated at 373 K ?
16. A compound 'A' is used in the manufacture of cement. When dissolved in water, it evolves a large amount of heat and forms compound 'B'.
(i) Identify A and B.
(ii) Write chemical equation for the reaction of A with water.
(iii) List two types of reaction in which this reaction may be classified.
17. With the help of labelled diagram, show an experimental setup for the reaction of Magnesium with dilute sulphuric acid.
Give equation of the reaction involved.
18. Several factories were pouring their wastes in rivers A and B. Water samples were collected from these two rivers. It was observed that sample collected from river A was acidic while that of river B was basic. The factories located near A and B are
(a) Soaps and detergents factories near A and alcohol distillery near B.
(b) Soaps and detergents factories near B and alcohol distillery near A.
(c) Lead storage battery manufacturing factories near A and soaps and detergents factories near B.
(d) Lead storage battery manufacturing factories near B and soaps and detergents factories near A. 1
19. In which of the following, the identity of initial substance remains unchanged ?
(a) Curdling of milk
(b) Formation of crystals by process of crystallisation
(c) Fermentation of grapes
(d) Digestion of food 1
20. An aqueous solution 'A' turns phenolphthalein solution pink. On addition of an aqueous solution 'B' to 'A', the pink colour disappears. The following statement is true for solution 'A' and 'B'.
(a) A is strongly basic and B is a weak base.
(b) A is strongly acidic and B is a weak acid.
(c) A has pH greater than 7 and B has pH less than 7.
(d) A has pH less than 7 and B has pH greater than 7. 1

21. During electrolysis of brine, a gas 'G' is liberated at anode. When this gas 'G' is passed through slaked lime, a compound 'C' is formed, which is used for disinfecting drinking water.

- (i) Write formula of 'G' and 'C'.
- (ii) State the chemical equation involved.
- (iii) What is common name of compound 'C'? Give its chemical name.

3

22. A cloth strip dipped in onion juice is used for testing a liquid 'X'. The liquid 'X' changes its odour. Which type of an indicator is onion juice? The liquid 'X' turns blue litmus red. List the observations the liquid 'X' will show on reacting with the following :

- (a) Zinc granules
- (b) Solid sodium carbonate

Write the chemical equations for the reactions involved.

5

23. Define water of crystallisation. Give the chemical formula for two compounds as examples. How can it be proved that the water of crystallisation makes a difference in the state and colour of the compounds?

5

24. A cloth strip dipped in onion juice is used for testing a liquid 'X'. The liquid 'X' changes its odour. Which type of an indicator is onion juice? The liquid 'X' turns blue litmus red. List the observations the liquid 'X' will show on reacting with the following :

- (a) Zinc granules
- (b) Solid sodium carbonate

Write the chemical equations for the reactions involved.

5

25. Define water of crystallisation. Give the chemical formula for two compounds as examples. How can it be proved that the water of crystallisation makes a difference in the state and colour of the compounds?

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CHAPTER 3

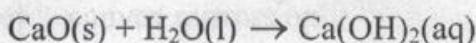
METALS AND NON-METALS

26. (a) What is a cinnabar ? How is metal extracted from it ? Explain briefly.

(b) Define the term alloy. List two advantages of making alloys.

5

27. Calcium oxide reacts vigorously with water to produce slaked lime.



This reaction can be classified as :

- (A) Combination reaction (B) Exothermic reaction
(C) Endothermic reaction (D) Oxidation reaction

Which of the following is a correct option ?

- (a) (A) and (C) (b) (C) and (D)
(c) (A), (C) and (D) (d) (A) and (B)

28. Carbon cannot reduce the oxides of sodium, magnesium and aluminium to their respective metals. Why ? Where are these metals placed in the reactivity series ? How are these metals obtained from their ores? Take an example to explain the process of extraction along with chemical equations.

29. The compound obtained on reaction of iron with steam is/are :

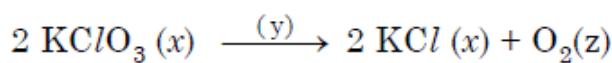
- (a) Fe_2O_3 (b) Fe_3O_4
(c) FeO (d) Fe_2O_3 and Fe_3O_4

30. An element 'X' reacts with O_2 to give a compound with a high melting point. This compound is also soluble in water. The element 'X' is likely to be :

- (a) iron (b) calcium
(c) carbon (d) silicon

31. What is 'rusting'? Describe with a labelled diagram an activity to investigate the conditions under which iron rusts.

32. Identify 'x', 'y' and 'z' in the following reaction :



- (a) x = gas ; y = reaction condition, z = gas
- (b) x = solid ; y = liquid; z = gas
- (c) x = number of moles of KClO_3 ; y = reaction condition; z = no. of molecules of oxygen.
- (d) x = physical state of KClO_3 and KCl ; y = reaction condition; z = physical state of O_2 .

33. For question numbers 13 and 14, two statements are given – one labelled as Assertion (A) and the other labelled as 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 (A) :** The metals and alloys are good conductors of electricity.

Reason (R) : Bronze is an alloy of copper and tin and it is not a good conductor of electricity.

34. (a) How is the method of extraction of metals high up in the reactivity series different from that for metals in the middle ? Why cannot the same process be applied for them ? Name and explain the process of extraction of sodium.

(b) Draw a labelled diagram of electrolytic refining of copper.

35. What happens when (Write the balanced equation involved) –

- (i) Copper is heated in air ?
- (ii) Aluminium oxide is reacted with hydrochloric acid ?
- (iii) Potassium reacts with water ?
- (iv) Cinnabar is heated in air ?
- (v) Aluminium oxide reacts with sodium hydroxide ?

36. For question numbers 13 and 14, two statements are given – one labelled as Assertion (A) and the other labelled as 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.

Assertion (A) : The metals and alloys are good conductors of electricity.

Reason (R) : Bronze is an alloy of copper and tin and it is not a good conductor of electricity.

Assertion (A) : Alloys are commonly used in electrical heating devices like electric iron and heater.

Reason (R) : Resistivity of an alloy is generally higher than that of its constituent metals but the alloys have low melting points than their constituent metals.

1

37. (a) Complete and balance the following chemical equations :
- (i) $\text{Al}_2\text{O}_3 + \text{HCl} \longrightarrow$
 - (ii) $\text{K}_2\text{O} + \text{H}_2\text{O} \longrightarrow$
 - (iii) $\text{Fe} + \text{H}_2\text{O} \longrightarrow$
- (b) An element 'X' displaces iron from the aqueous solution of iron sulphate. List your observations if the element 'X' is treated with the aqueous solutions of copper sulphate, zinc sulphate and silver nitrate. Based on the observations arrange X, Zn, Cu and Ag in increasing order of their reactivities.
38. (a) Name the following :
- (i) Metal that can be cut by knife
 - (ii) Lustrous non-metal
 - (iii) Metal that exists in liquid state at room temperature
 - (iv) Most malleable and ductile metal
 - (v) Metal that is best conductor of electricity
 - (vi) Non-metal that can exist in different forms
- (b) How are alloys better than metals ? Give composition of solder and amalgam.

39. Compare in tabular form the reactivities of the following metals with cold and hot water :
(a) Sodium
(b) Calcium
(c) Magnesium 3
40. For question numbers 1 and 2, two statements are given – one labelled as Assertion (A) and the other labelled as 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.

I Assertion (A) : Following is a balanced chemical equation for the action of steam on iron :



Reason (R) : The law of conservation of mass holds good for a chemical equation.

2. Assertion (A) : The metals and alloys are good conductors of electricity.
Reason (R) : Bronze is an alloy of copper and tin and it is not a good conductor of electricity.

41. Define electropositivity. 1
42. Write balanced chemical equations to explain what happens, when
(i) Mercuric oxide is heated.
(ii) Mixture of cuprous oxide and cuprous sulphide is heated.
(iii) Aluminium is reacted with manganese dioxide.
(iv) Ferric oxide is reduced with aluminium.
(v) Zinc carbonate undergoes calcination. 5

43. (i) By the transfer of electrons, illustrate the formation of bond in magnesium chloride and identify the ions present in this compound.
(ii) Ionic compounds are solids. Give reasons.
(iii) With the help of a labelled diagram show the experimental set up of action of steam on a metal.

5

44. A metal 'M' is stored under kerosene. It vigorously catches fire, if a small piece of this metal is kept open in air. Dissolution of this metal in water releases great amount of energy and the metal catches fire. The solution so formed turns red litmus blue.

- (a) Name the metal 'M'.
(b) Write formula of the compound formed when this metal is exposed to
(c) Why is metal 'M' stored under kerosene ?
(d) If oxide of this metal is treated with hydrochloric acid, what would be the products ?
(e) Write balanced equations for :
(i) Reaction of 'M' with air.
(ii) Reaction of 'M' with water.
(iii) Reaction of metal oxide with hydrochloric acid.

5

OR

- (a) Write electron dot structures of Ca (At. No. 20) and O(At. No. 8).
(b) Show the formation of calcium oxide by transfer of electrons.
(c) Name the ions present in this compound.
(d) List four important characteristics of this compound.

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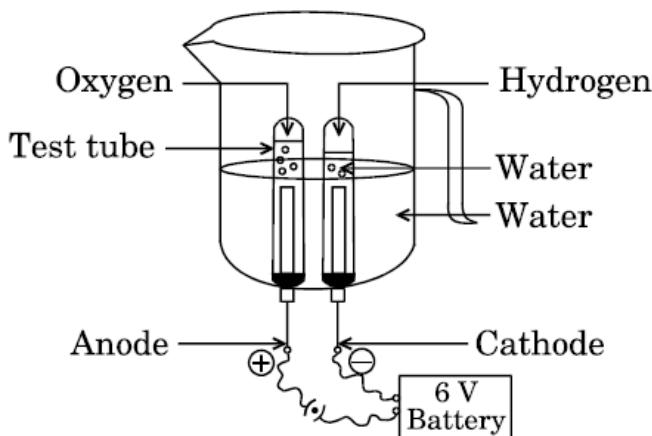
45. Write the number of valence electrons present in a nitrogen atom $\left(^{14}_7\text{N}\right)$.

1

46. (a) (i) Write two properties of gold which make it the most suitable metal for ornaments.
(ii) Name two metals which are the best conductors of heat.
(iii) Name two metals which melt when you keep them on your palm.
(b) Explain the formation of ionic compound CaO with electron-dot structure. Atomic numbers of calcium and oxygen are 20 and 8 respectively.

5

47. Study the figure given below and answer the following questions :



- (a) Name the process depicted in the diagram.
- (b) Write the composition of the anode and the cathode.
- (c) Write the balanced chemical equation of the reaction taking place in this case.
- (d) The reaction does not take place if a few drops of dilute sulphuric acid are not added to water. Why ?

3

48. List three differentiating features between the processes of galvanisation and alloying.

3

49. Compare in tabular form the reactivities of the following metals with cold and hot water :

- (a) Sodium
- (b) Calcium
- (c) Magnesium

3

50. Define an alloy. How is an alloy prepared ? List two advantages of making alloys. Write the composition of stainless steel. Why is steel preferred over iron ? List two reasons.

5

51. For question numbers 13 and 14, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :

14. Assertion (A) : Following is a balanced chemical equation for the action of steam on iron :



Reason (R) : The law of conservation of mass holds good for a chemical equation. 1

52. List three differentiating features between the processes of galvanisation and alloying. 3

53. (a) Define the terms 'alloy' and 'amalgam'. Name the alloy used for welding electric wires together and write its constituents.

(b) Name the constituents of the following alloys :

(i) Brass

(ii) Stainless steel

(iii) Bronze

State one property in each of these alloys which is different from its constituents. 5

54. An element X is forming acidic oxide. Its most probable position in the modern periodic table is 1

- (A) Group 1 and Period 3
- (B) Group 16 and Period 3
- (C) Group 17 and Period 3
- (D) Group 2 and Period 3

55. For question numbers 13 and 14, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below.

- (i) Both (A) and (R) are true and (R) is correct explanation of the assertion (A).
 - (ii) Both (A) and (R) are true, but (R) is **not** the correct explanation of the assertion (A).
 - (iii) (A) is true, but (R) is false.
 - (iv) (A) is false, but (R) is true.
- 14.** Assertion (A) : At high temperatures, metal wires have a greater chance of short circuiting.
Reason (R) : Both resistance and resistivity of a material vary with temperature.
- 15.** A shining metal 'M', on burning gives a dazzling white flame and changes to a white powder 'N'.
(a) Identify 'M' and 'N'.
(b) Represent the above reaction in the form of a balanced chemical equation.
(c) Does 'M' undergo oxidation or reduction in this reaction ? Justify.

56. (a) Explain the formation of ionic compound, Al_2O_3 with electron-dot structure :

(Given : Atomic no. of Al and O are 13 and 8 respectively)

- (b) What happens when (Report only observations)
- (i) a reactive metal reacts with a dilute mineral acid ?
 - (ii) an amphoteric oxide reacts with sodium hydroxide solution ?
 - (iii) a metal of low reactivity is dropped in the salt solution of a metal of high reactivity ?
 - (iv) a metal carbonate is treated with acid ?

57. Two ores X and Y were taken. On heating these ores it was observed that

- (a) ore X gives CO_2 gas, and
- (b) ore Y gives SO_2 gas.

Write steps to convert these ores into metals, giving chemical equations of the reactions that take place.

5

OR

- (a) With the help of a diagram explain the method of refining of copper by electrolysis.
- (b) How are broken railway tracks joined ? Give the name of the process and the chemical equation of the reaction involved.

5

58. Answer question numbers 3(a) – 3(d) on the basis of your understanding of the following paragraph and the related studied concepts.

Taj Mahal, the great wonder of the world, is made of white marble which is composed of calcium carbonate.

About 60 years ago it was discovered that this monument is being eaten away by acid rain. The Archaeological Survey of India, that looks after this building of historical importance is of the opinion that the atmospheric pollution due to vehicular traffic and industries, mainly Mathura Refinery may be a major cause of acid rain in and around the monument. Normal rain is slightly acidic because it absorbs some CO_2 from the atmospheric air. Acid rain is more acidic than normal rain because it also has absorbed oxides of nitrogen and sulphur.

- (a) Write the chemical formula of calcium carbonate. 1
- (b) List two gases that are the main contributors of acid rain. 1

OR

Name the gas that is liberated when acid rain falls on calcium carbonate. 1

- (c) Rain is called acid rain when its pH value is 1
- (A) 3
(B) 5.5
(C) 7.8
(D) 9.7
- (d) Select the correct statement about calcium : 1
- (A) It is a metal and its valency is one.
(B) Its electronic configuration is (2, 8, 8, 2).
(C) It is a non-metal with valency two.
(D) It is more reactive than sodium and potassium.

59. Metal X is found in nature as its sulphide XS. It is used in the galvanisation of iron articles. Identify the metal X. How will you convert this sulphide ore into the metal? Explain with equations. 5

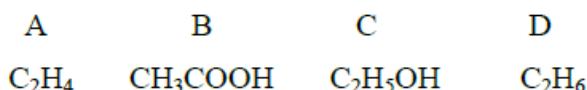
60. State the reason for the following:

- (i) Aluminium oxide is called an amphoteric oxide.
- (ii) An iron strip dipped in a blue copper sulphate solution turns the blue solution pale green.
- (iii) Hydrogen gas is not evolved when most metals react with nitric acid.
- (iv) Calcium does not occur in free state in nature.
- (v) Sodium or potassium metals are kept immersed under kerosene.

CHAPTER 4

CARBON AND ITS COMPOUNDS

- 1.** The formulae of four organic compounds are given below:



5

- (i) Which one of these compounds A, B, C or D is a saturated hydrocarbon?
- (ii) Identify the organic acid and give its structural formula.
- (iii) Which of the above compounds when heated at 443K in the presence of concentrated H_2SO_4 forms ethene as the major product? What is the role played by concentrated H_2SO_4 in this reaction? Also write the chemical equation involved.
- (iv) Give a chemical equation when B and C react with each other in presence of concentrated H_2SO_4 . Name the major product formed and mention one of its important use.

- 2.** How is acetic acid prepared from ethanol ?

1

The formula of an ester is $\text{CH}_3\text{COOC}_3\text{H}_7$. Write the name or the formula of the parent alcohol and the parent carboxylic acid from which this ester is prepared.

1

OR

What happens when ethyl ethanoate reacts with sodium hydroxide ?

1

- 3.** Name the type of bonds formed when one carbon atom combines with four hydrogen atoms to form a molecule.

1

OR

Write the name and formulae of the first member of the homologous series of alkenes.

1

A carbon compound is a constituent of beer, whisky and some cough syrups. Identify the compound and write its formula.

1

4. (a) Define isomerism. Draw all possible isomers of butane.
- (b) "A compound 'X' on combustion gives a yellow flame with lots of smoke." What inference would you draw from this statement ?
- (c) State the role of alkaline KMnO_4 in the reaction involving conversion of an alcohol to corresponding carboxylic acid. 5
5. *For question numbers 13 and 14, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below.*
- (i) Both (A) and (R) are true and (R) is correct explanation of the assertion (A).
- (ii) Both (A) and (R) are true, but (R) is **not** the correct explanation of the assertion (A).
- (iii) (A) is true, but (R) is false.
- (iv) (A) is false, but (R) is true.
13. Assertion (A) : Carbon has a strong tendency to either lose or gain electrons to attain noble gas configuration.
Reason (R) : Carbon has four electrons in its outermost shell and has the tendency to share electrons with carbon or other elements. 1
6. Covalent compounds are generally poor conductors of electricity. Why ? 1

7. Name a cyclic unsaturated carbon compound.

8. Incomplete combustion of coal and petroleum :

- (A) increases air pollution.
- (B) increases efficiency of machines.
- (C) reduces global warming.
- (D) produce poisonous gases.

The correct option is :

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

9.

For question numbers **13** and **14**, 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.

13. **Assertion (A)** : Esterification is a process in which a sweet smelling substance is produced.

Reason (R) : When esters react with sodium hydroxide an alcohol and sodium salt of carboxylic acid are obtained.

10.A Name the functional group present in propanone.

11.A 3 mL of ethanol is taken in a test tube and warmed gently in a water bath. A 5% solution of alkaline potassium permanganate is added first drop by drop to this solution, then in excess.

- (i) How is 5% solution of KMnO_4 prepared?
- (ii) State the role of alkaline potassium permanganate in this reaction. What happens on adding it in excess?
- (iii) Write chemical equation of this reaction.

12.A

For question numbers **13** and **14**, 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 the 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.

13. **Assertion (A)** : In a homologous series of alcohols, the formula for the second member is $\text{C}_2\text{H}_5\text{OH}$ and the third member is $\text{C}_3\text{H}_7\text{OH}$.

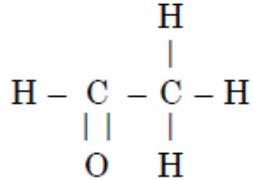
Reason (R) : The difference between the molecular masses of the two consecutive members of a homologous series is 144.

- 13.** When sodium hydrogen carbonate is added to ethanoic acid a gas evolves. Consider the following statements about the gas evolved?
- (A) It turns lime water milky.
 - (B) It is evolved with a brisk effervescence.
 - (C) It has a smell of burning sulphur.
 - (D) It is also a by-product of respiration.
- The correct statements are :
- (a) (A) and (B) only
 - (b) (B) and (D) only
 - (c) (A), (C) and (D)
 - (d) (A), (B) and (D)

14.A Covalent compounds have low melting and boiling point. Why ?

- 15.** The most poisonous product formed by incomplete combustion of fossil fuels is
- (a) Carbon dioxide
 - (b) Nitrogen dioxide
 - (c) Carbon monoxide
 - (d) Sulphur dioxide
- 16.** For question numbers 13 and 14, two statements are given – one labelled as Assertion (A) and the other labelled as 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.
- 13. Assertion (A) :** Ethanoic acid is also known as glacial acetic acid.
- Reason (R) :** The melting point of pure ethanoic acid is 290 K and hence it often freezes during winters in cold climates.

- 17.** (a) What is a homologous series ? Explain with an example.
 (b) Define the following terms giving one example of each.
 (i) Esterification
 (ii) Addition reaction
- 18.** For question numbers 13 and 14, two statements are given – one labelled as Assertion (A) and the other labelled as 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.
- 13** **Assertion (A) :** Following are the members of a homologous series :
 $\text{CH}_3\text{OH}, \text{CH}_3\text{CH}_2\text{OH}, \text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
Reason (R) : A series of compounds with same functional group but differing by $-\text{CH}_2-$ unit is called a homologous series. **1**
- 14.** **Assertion (A) :** Ethanoic acid is also known as glacial acetic acid.
Reason (R) : The melting point of pure ethanoic acid is 290 K and hence it often freezes during winters in cold climates.
- 19.** (a) Compare soaps and detergents on the basis of their composition and cleansing action in hard water.
 (b) What happens when ethanol is treated with sodium metal ? State the behaviour of ethanol in this reaction.
 (c) Draw the structure of cyclohexane.
 (d) Name the following compound.



-
20. For question numbers 1 and 2, two statements are given – one labelled as Assertion (A) and the other labelled as 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.

1. **Assertion (A)** : Ethanoic acid is also known as glacial acetic acid.

Reason (R) : The melting point of pure ethanoic acid is 290 K and hence it often freezes during winters in cold climates.

21. Covalent compounds have low melting and boiling point. Why ?

22. How are covalent bonds formed ?

1

23. (a) Carry out following conversions :

- (i) Ethanol to ethene
- (ii) Ethanol to Ethanoic acid

(b) Differentiate between addition reaction and substitution reaction. Give one example of each.

5

24. Carbon, a member of group 14, forms a large number of carbon compounds estimated to be about three million. Why is this property not exhibited by other elements of this group ? Explain.

3

25. Which oils should be chosen for cooking to remain healthy ?

1

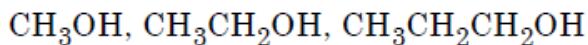
26. Carbon, a member of group 14, forms a large number of carbon compounds estimated to be about three million. Why is this property not exhibited by other elements of this group ? Explain.

3

27. Note : For question numbers 13 and 14, 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.

Assertion (A) : Following are the members of a homologous series :



Reason (R) : A series of compounds with same functional group but differing by $-\text{CH}_2-$ unit is called a homologous series.

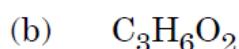
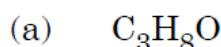
1

28. Draw the structure of a carboxylic acid containing three carbon atoms. 1

29. (a) How is a soap different from a detergent in composition ?
(b) Design an activity to show that a detergent works well with all types of water while a soap does not. 3

30. A chemical compound 'X' is used in the soap and glass industry. It is prepared from brine.
(a) Write the chemical name, common name and chemical formula of 'X'.
(b) Write the equation involved in its preparation.
(c) What happens when it is treated with water containing Ca or Mg salts ? 3

31. Consider the molecular formula of the carbon compounds (a) and (b) given below :



- (i) Identify the functional groups in (a) and (b) and write their structures.
(ii) Are (a) and (b) isomers ? Give reason.
(iii) What happens when alkaline KMnO_4 is added, drop by drop, into a test tube containing warm propanol ? Write the chemical equation for the reaction and state the role of alkaline KMnO_4 in this reaction.

5

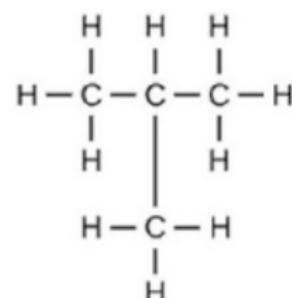
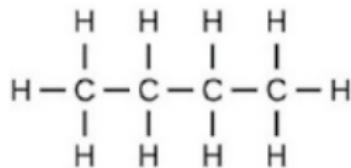
Define catenation.

1

32. 13 **Assertion:** Following are the structural isomers of butane.

1

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Reason: Structural isomers have the same molecular formula but they differ in their structures.

14 **Assertion:** A fuse wire is always connected in parallel with the mainline. 1

Reason: If a current larger than the specified value flows through the circuit, fuse wire melts.

CHAPTER 5

PERIODIC CLASSIFICATION OF ELEMENTS

1. How does valency of an element vary across a period? 1

2. The position of certain elements in the Modern Periodic Table are shown below.

	Group →	1	2	3 to 12	13	14	15	16	17	18
↓ Period										
1	G									H
2	A				I			B		C
3		D				E				F

Using the above table answer the following questions giving reasons in each case :

- (i) Which element will form only covalent compounds?
 - (ii) Which element is a non-metal with valency 2 ?
 - (iii) Which element is a metal with valency 2 ?
 - (iv) Out of H, C and F which has largest atomic size?
 - (v) To which family does H, C and F belong?
3. Define atomic size. Give its unit of measurement. In the modern periodic table what trend is observed in the atomic radius in a group and a period and why is it so?

4. How many metals are present in second period of periodic table ?
5. On the basis of electronic configuration of 9_5X , the group number and period of the element 'X' is :
- (a) Group 15 period 2
 - (b) Group 13 period 2
 - (c) Group 9 period 5
 - (d) Group 13 period 5
6. An element 'X' with atomic number 11 forms a compound with element 'Y' with atomic number 8. The formula of the compound formed is
- (a) XY
 - (b) X_2Y
 - (c) XY_2
 - (d) X_2Y_3

7. From the elements ${}_{19}^{39}\text{A}$, ${}_{14}^{28}\text{B}$, ${}_{8}^{16}\text{C}$ and ${}_{18}^{40}\text{D}$ identify :
- the most electro positive element.
 - a noble gas.
 - a metalloid.
 - an element which will gain 2 electrons to attain nearest noble gas configuration.
 - formula of compound formed between A and C.
 - elements belonging to same period.

8. The position of three elements A, B and C in the Modern periodic table is as follows :

		Group →	1	2	13	14	15	16	17	18
Period ↓										
	1	B								
2								A		
3							C			

- Write formula of compound formed between :
 - B and A ;
 - B and C
- Is any of the three elements a metal ? Give reason to justify your answer.

9. How many metals are present in second period of periodic table ?

10. On the basis of electronic configuration of ${}_{5}^9\text{X}$, the group number and period of the element 'X' is :
- | | |
|-----------------------|-----------------------|
| (a) Group 15 period 2 | (b) Group 13 period 2 |
| (c) Group 9 period 5 | (d) Group 13 period 5 |

11. An element 'X' with atomic number 11 forms a compound with element 'Y' with atomic number 8. The formula of the compound formed is

 - (a) XY
 - (b) X₂Y
 - (c) XY₂
 - (d) X₂Y₃

12. From the elements $^{39}_{19}\text{A}$, $^{28}_{14}\text{B}$, $^{16}_8\text{C}$ and $^{40}_{18}\text{D}$ identify :

 - (a) the most electro positive element.
 - (b) a noble gas.
 - (c) a metalloid.
 - (d) an element which will gain 2 electrons to attain nearest noble gas configuration.
 - (e) formula of compound formed between A and C.
 - (f) elements belonging to same period.

13. The atomic radii of first group elements are given below :

Group-I element	Atomic Radii (pm)
Na	86
K	231
Rb	244
Cs	282

State the reason behind the observed trend in the above elements.

14. An element 'X' is forming an acidic oxide. Its position in modern periodic table will be

- (a) Group 1 and Period 3
- (b) Group 2 and Period 3
- (c) Group 13 and Period 3
- (d) Group 16 and Period 3

1

OR

Consider the following statements about an element 'X' with number of protons 13.

- (A) It forms amphoteric oxide
- (B) Its valency is three
- (C) The formula of its chloride is XCl_3

The correct statement(s) is/are

- (a) only (A)
- (b) only (B)
- (c) (A) and (C)
- (d) (A), (B) and (C)

1

15. Study the data of the following three categories A, B and C.

Category	Name of the element	Atomic Mass
A	Li	7
	Na	23
	K	39
B	N	14
	P	31
	As	74
C	B	10.8
	Al	27
	Ga	69.7

- (i) From the given three categories A, B and C, pick the one which forms Dobereiner's Triads.
- (ii) Why did Mendeleev placed elements of category A, B and C in three different groups ?
- (iii) Is Newland law of octaves applicable to all the three categories ? Give reason to justify your answer.

3

16. An element 'X' is forming an acidic oxide. Its position in modern periodic table will be

- (a) Group 1 and Period 3
- (b) Group 2 and Period 3
- (c) Group 13 and Period 3
- (d) Group 16 and Period 3

1

OR

Consider the following statements about an element 'X' with number of protons 13.

- (A) It forms amphoteric oxide
- (B) Its valency is three
- (C) The formula of its chloride is XCl_3

The correct statement(s) is/are

- (a) only (A)
- (b) only (B)
- (c) (A) and (C)
- (d) (A), (B) and (C)

1

17. Three elements X, Y and Z have atomic numbers 7, 8 and 9 respectively.

- (a) Arrange them in the decreasing order of their atomic radii.
- (b) Which of the three is most electronegative ? Why ?
- (c) Write the formula of compound formed between
 - (i) X and Y
 - (ii) X and Z

3

18. Answer question numbers 3(a) – 3(d) on the basis of your understanding of the following paragraph and the related studied concepts :

Around the year 1800, only 30 elements were known. Dobereiner in 1817 and Newlands in 1866 tried to arrange the then known elements and framed laws which were rejected by the scientists. Even after the rejection of the proposed laws, many scientists continued to search for a pattern that correlated the properties of elements with their atomic masses.

19. The main credit for classifying elements goes to Mendeleev for his most important contribution to the early development of a Periodic table of elements wherein he arranged the elements on the basis of their fundamental property, the atomic mass and also on the similarity of chemical properties. The formulae of their hydrides and oxides were treated as basic criteria for the classification of the elements.

However, Mendeleev's classification also had some limitations as it could not assign the position to isotopes. He also left some gaps in the periodic table.

- | | |
|---|---|
| 3(a) State Mendeleev's Periodic Law. | 1 |
| 3(b) Why did Mendeleev leave some gaps in the Periodic table ? | 1 |
| | |
| 20. 3(c) If the letter 'R' was used to represent any of the elements in the group, then the hydride and oxide of carbon would respectively be represented as | 1 |
| (i) RH_4 , RO | |
| (ii) RH_4 , RO_2 | |
| (iii) RH_2 , RO_2 | |
| (iv) RH_2 , RO | |
| | |
| 3(d) Isotopes are | 1 |
| (i) Atoms of an element with similar chemical properties but different atomic masses. | |
| (ii) Atoms of different elements with similar chemical properties but different atomic masses. | |
| (iii) Atoms of an element with different chemical properties but same atomic masses. | |
| (iv) Atoms of different elements with different chemical properties but same atomic masses. | |

- 21.** Answer question numbers 3(a) – 3(d) on the basis of your understanding of the following paragraph and the related studied concepts :
- Around the year 1800, only 30 elements were known. Dobereiner in 1817 and Newlands in 1866 tried to arrange the then known elements and framed laws which were rejected by the scientists. Even after the rejection of the proposed laws, many scientists continued to search for a pattern that correlated the properties of elements with their atomic masses.
-
- 22.** State the common characteristic of the following elements : 1
Boron, Silicon, Germanium and Arsenic
- 23.** State the Periodic Law on which the Modern Periodic Table is based. 1
- 24.** An element X with atomic number 12 forms a compound with element Y with atomic number 17. The formula of the compound formed is 1
(A) XY
(B) XY₂
(C) X₂Y
(D) X₂Y₃
- 25.** From the elements Li, K, Mg, C, Al, S identify the 3
(a) elements belonging to the same group.
(b) element which has the tendency to lose two electrons.
(c) element which prefers sharing of electrons to complete its octet.
(d) most metallic element.
(e) element that forms acidic oxide.
(f) element that belongs to group 13.

26.

The main credit for classifying elements goes to Mendeleev for his most important contribution to the early development of a Periodic table of elements wherein he arranged the elements on the basis of their fundamental property, the atomic mass and also on the similarity of chemical properties. The formulae of their hydrides and oxides were treated as basic criteria for the classification of the elements.

However, Mendeleev's classification also had some limitations as it could not assign the position to isotopes. He also left some gaps in the periodic table.

- 3(a) State Mendeleev's Periodic Law. 1
- 3(b) Why did Mendeleev leave some gaps in the Periodic table ? 1
- 3(c) If the letter 'R' was used to represent any of the elements in the group, then the hydride and oxide of carbon would respectively be represented as 1
- (i) RH_4 , RO
 - (ii) RH_4 , RO_2
 - (iii) RH_2 , RO_2
 - (iv) RH_2 , RO
- 3(d) Isotopes are 1
- (i) Atoms of an element with similar chemical properties but different atomic masses.
 - (ii) Atoms of different elements with similar chemical properties but different atomic masses.
 - (iii) Atoms of an element with different chemical properties but same atomic masses.
 - (iv) Atoms of different elements with different chemical properties but same atomic masses.

27. An element X is forming acidic oxide. Its most probable position in the modern periodic table is

1

- (A) Group 1 and Period 3
- (B) Group 16 and Period 3
- (C) Group 17 and Period 3
- (D) Group 2 and Period 3

28. (a) List any two distinguishing features between Mendeleev's Periodic Table and the Modern Periodic Table.

(b) With the help of an example, explain Dobereiner's Triads.

(c) State Modern Periodic Law.

3

29. From the elements Li, K, Mg, C, Al, S identify the

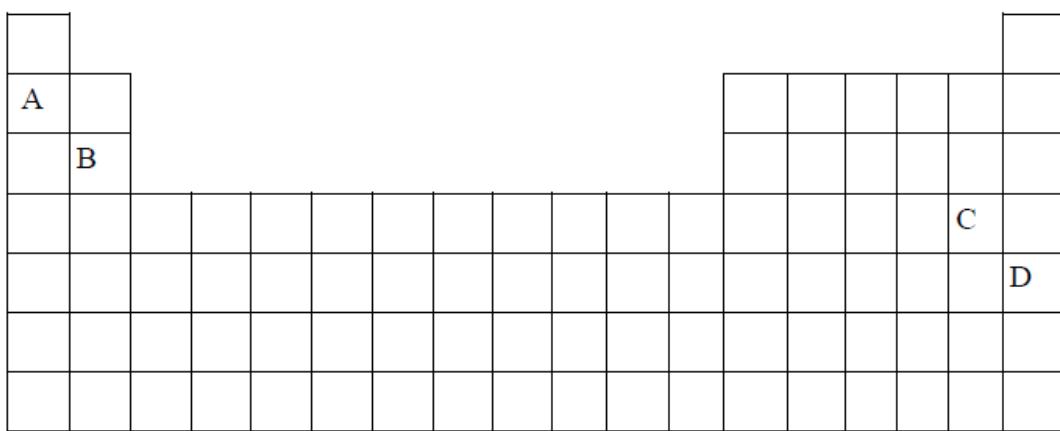
- (a) elements belonging to the same group.
- (b) element which has the tendency to lose two electrons.
- (c) element which prefers sharing of electrons to complete its octet.
- (d) most metallic element.
- (e) element that forms acidic oxide.
- (f) element that belongs to group 13.

3

30. State the Modern Periodic Law. In how many groups and periods is the Modern Periodic Table of elements divided ? The atomic number of an element is 16. Write its period and valency.

3

- 31.** The positions of four elements A, B, C and D in the modern periodic table are shown below. Which element is most likely to form an acidic oxide? 1



- i) A
- ii) B
- iii) C
- iv) D

OR

Elements P, Q, R and S have atomic numbers 11, 15, 17 and 18 respectively. Which of them are reactive non-metals?

- i) P and Q
- ii) P and R
- iii) Q and R
- iv) R and S

- 32.** Two elements X and Y have atomic numbers 12 and 16 respectively. To which period of the modern periodic table do these two elements belong? What type of bond will be formed between them and why? Also give the chemical formula of the compound formed. 3

Class-X

BIOLOGY

CHAPTER 6-LIFE PROCESSES

1. Which one of the following statements is correct about the human circulatory system ?
(A) Blood transports only oxygen and not carbon dioxide.
(B) Human heart has five chambers.
(C) Valves ensure that the blood does not flow backwards.
(D) Both oxygen-rich and oxygen-deficient blood gets mixed in the heart.

 2. Anaerobic process
(A) takes place in yeast during fermentation.
(B) takes place in the presence of oxygen.
(C) produces only energy in the muscles of human beings.
(D) produces ethanol, oxygen and energy.
- OR**
- Most of the digestion and absorption of the food takes place in the
- (A) small intestine.
 - (B) liver.
 - (C) stomach.
 - (D) large intestine.
-
3. In the excretory system of human beings, some substances in the initial filtrate such as glucose, amino acids, salts and water are selectively reabsorbed in
(A) Urethra
(B) Nephron
(C) Ureter
(D) Urinary bladder

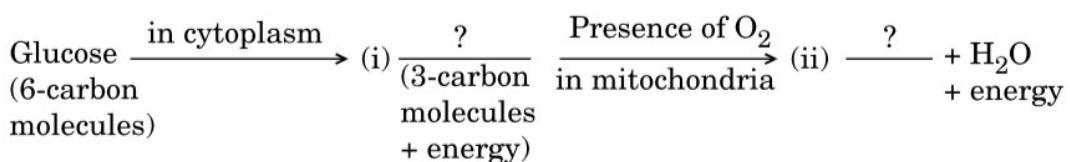
4. Which one of the following statements is correct about the human circulatory system ? 1
- Blood transports only oxygen and not carbon dioxide.
 - Human heart has five chambers.
 - Valves ensure that the blood does not flow backwards.
 - Both oxygen-rich and oxygen-deficient blood gets mixed in the heart.
5. Name three kinds of blood vessels of the human circulatory system and write one function of each in a tabular form. 3
6. Complete the following flow chart as per the given instructions :
- ```

 graph TD
 A[Gastric Glands Present in the wall of Stomach] -- Secretions --> B[a]
 A -- Secretions --> C[b]
 A -- Secretions --> D[c]
 B -- Function --> E[d]
 C -- Function --> F[e]
 D -- Function --> G[f]

```

3

7. (a) State the role played by the following in the process of digestion.
- Enzyme trypsin
  - Enzyme lipase
- (b) List two functions of finger like projections present in the small intestine. 3
8. (a) In the process of respiration, state the function of alveoli.
- (b) Rate of breathing in aquatic organisms is much faster than that in terrestrial organisms. Give reasons.
- (c) Complete the following pathway showing the breakdown of glucose : 3



9. Name the organ and site of photosynthesis in green plants. What are the raw materials essential for this process ? How are they obtained by a green plant ? 3

**OR**

"Respiration is an exothermic process." Justify this statement giving the chemical equation for the reaction involved. How is respiration different from breathing ? 3

10. (a) Why is there a difference in the rate of breathing between aquatic organisms and terrestrial organisms? Explain.  
(b) Draw a diagram of human respiratory system and label – pharynx, trachea, lungs, diaphragm and alveolar sac on it. 5

**OR**

- (a) Name the organs that form the excretory system in human beings.  
(b) Describe in brief how urine is produced in human body. 5

11. (a) A gas is released during photosynthesis. Name the gas and also state the way by which the gas is evolved.  
(b) What are stomata? What governs the opening and closing of stomata ? 5

**OR**

- (a) Draw a diagram of human alimentary canal and label – gall bladder, pancreas, liver and small intestine on it.  
(b) Give two reasons to explain why absorption of digested food occurs mainly in the small intestine. 5

12. Design an activity to show that chlorophyll is essential for photosynthesis. 5

- 13.** (a) "Blood circulation in fishes is different from the blood circulation in human beings." Justify the statement.  
(b) Describe "blood circulation" in human beings. 5
- 14.** (a) Draw a diagram of human excretory system and label on it the following parts :  
(i) Kidney  
(ii) Ureter  
(iii) Urinary bladder  
(iv) Urethra  
(b) Write one main function each of the labelled parts. 5
- 15.** (a) Write the correct sequence of steps followed during journey of oxygen rich blood from lungs to various organs of human body.  
(b) What happens when the system of blood vessels develop a leak ? 5
- 16.** (a) How do leaves of plants help in excretion ? Explain briefly.  
(b) Describe the structure and function of a nephron. 5
- 17.** (a) Why is nutrition necessary for the human body ?  
(b) What causes movement of food inside the alimentary canal ?  
(c) Why is small intestine in herbivores longer than in carnivores ?  
(d) What will happen if mucus is not secreted by the gastric glands ? 5

18. Give reasons :

- (a) Ventricles have thicker muscular walls than atria.
- (b) Transport system in plants is slow.
- (c) Circulation of blood in aquatic vertebrates differs from that in terrestrial vertebrates.
- (d) During the daytime, water and minerals travel faster through xylem as compared to the night.
- (e) Veins have valves whereas arteries do not.

5

## CHAPTER 7- CONTROL AND COORDINATION

1. Answer question numbers 4(a) to 4(d) on the basis of your understanding of the following information and related studied concepts.

Thyroid gland is a bilobed structure situated in our neck region. It secretes a hormone called thyroxine. Iodine is necessary for the thyroid gland to make thyroxine. Thyroxine regulates carbohydrate, protein and fat metabolism in the body. It promotes growth of body tissues also. When there is an excess of thyroxine in the body, a person suffers from hyperthyroidism and if this gland is underactive it results in hypothyroidism. Hyperthyroidism is diagnosed by blood tests that measure the levels of thyroxine and Thyroid Stimulating Hormone (TSH). Hypothyroidism is caused due to the deficiency of iodine in our diet resulting in a disease called goitre. Iodised salt can be included in our diet to control it.

- (a) Where is thyroid gland situated in our body ? 1
  - (b) State the function of thyroxine in human body. 1
  - (c) What is hyperthyroidism ? 1
  - (d) How can we control hypothyroidism ? 1
2. Write in tabular form the location and function of the hormones secreted by each of the following glands present in the human body :
- (a) Pituitary gland
  - (b) Thyroid gland
  - (c) Pancreas

3

3. Questions numbers 4(a) to 4(d) are based on table given below. Study the table in which the levels of Thyroid Stimulating Hormone (TSH) in women are given and answer the questions that follow on the basis of understanding of the following paragraph and the related studied concepts.

| Age Range     | Normal (mU/L)    | Low (mU/L)  |
|---------------|------------------|-------------|
| 18 – 29 years | 0.4 – 2.34 mU/L  | < 0.4 mU/L  |
| 30 – 49 years | 0.4 – 4.0 mU/L   | < 0.4 mU/L  |
| 50 – 79 years | 0.46 – 4.68 mU/L | < 0.46 mU/L |

Women are at greater risk for developing abnormal TSH levels during menstruation, while giving birth and after going through menopause. Around 5% of women in the United States have some kind of thyroid problem compared to 3% of men. Despite claims that high TSH increases your risk for heart disease, a 2013 study found no link between high TSH and heart diseases. But a 2017 study showed that older women are especially at risk for developing thyroid cancer if they have high TSH levels along with thyroid nodules.

- (a) A 35 year old woman has TSH level 6.03 mU/L. What change should she bring in her diet to control this level ? 1  
(b) When do women face a greater risk of abnormal TSH level ? 1  
(c) State the consequence of low TSH level. 1  
(d) Name the mineral that is responsible for synthesis of hormone secreted by thyroid gland. 1

4. A squirrel is in a scary situation. Its body has to prepare for either fighting or running away. State the immediate changes that take place in its body so that the squirrel is able to either fight or run? 3

OR

Why is chemical communication better than electrical impulses as a means of communication between cells in a multi-cellular organism? 3

5. Define geotropism. Draw a labelled diagram of a plant showing geotropic movements of its parts. 3

6. A cheetah, on seeing a prey, moves towards him at a very high speed. What causes the movement of his muscles ? How does the chemistry of cellular components of muscles change during this event ? 3

7. Question numbers 4(a) – 4(d) are based on the table and related information in the passage given below.

Thyroid Stimulating Hormone (TSH) stimulates thyroid gland to produce thyroxine. Study the table given below.

*Table : TSH levels during pregnancy*

| Stage of pregnancy | Normal<br>(mU/L) | Low<br>(mU/L) | High<br>(mU/L) |
|--------------------|------------------|---------------|----------------|
| First trimester    | 0·2 – 2·5        | < 0·2         | 2·5 – 10       |
| Second trimester   | 0·3 – 3·0        | < 0·3         | 3·01 – 4·5     |
| Third trimester    | 0·8 – 5·2        | < 0·8         | > 5·3          |

It is important to monitor TSH levels during pregnancy. High TSH levels and hypothyroidism can especially affect chances of miscarriage. Therefore, proper medication in consultation with a doctor is required to regulate/control the proper functioning of the thyroid gland.

- 4(a) Give the full form of TSH. 1
- 4(b) State the main function of TSH. 1
- 4(c) Why do TSH levels in pregnant women need to be monitored ? 1
- 4(d) A pregnant woman has TSH level of 8·95 mU/L. What care is needed for her ? 1
8. Reflex action is controlled by 1
- (A) nerves
- (B) brain
- (C) spinal cord
- (D) dendrite

## CHAPTER 8- HOW DO ORGANISMS REPRODUCE?

1. Fertilisation is the process of 1
- (A) transfer of male gamete to female gamete.
  - (B) fusion of nuclei of male and female gamete.
  - (C) adhesion of male and female reproductive organs.
  - (D) the formation of gametes by a reproductive organ.
2. Which of the following statements is **not** true about a 'bud' in 'Hydra' ? 1
- (A) It is an outgrowth.
  - (B) It forms due to repeated cell division at one specific site.
  - (C) It detaches from the parent body as soon as it is produced.
  - (D) It becomes a new independent individual.
3. Pseudopodia are 1
- (A) small hair-like structures present on unicellular organisms.
  - (B) false feet developed in some unicellular organisms.
  - (C) long, tube-like structures coming out of the mouth.
  - (D) suckers which are attached to the walls of the intestines.
4. The growing size of the human population is a cause of concern for all people. The rate of birth and death in a given population will determine its size. Reproduction is the process by which organisms increase their population. The process of sexual maturation for reproduction is gradual and takes place while general body growth is still going on. Some degree of sexual maturation does not necessarily mean that the mind or body is ready for sexual acts or for having and bringing up children. Various contraceptive devices are being used by human beings to control the size of population. 1
- (a) List two common signs of sexual maturation in boys and girls. 1
  - (b) What is the result of reckless female foeticide ? 1
  - (c) Which contraceptive method changes the hormonal balance of the body ? 1
  - (d) Write two factors that determine the size of a population. 1

5. Define the term pollination. Differentiate between self pollination and cross pollination. What is the significance of pollination?

3

6. (a) List in tabular form two differences between binary fission and multiple fission.  
(b) What happens when a mature Spirogyra filament attains considerable length.

3

7. What is pollination ? Name any two agents of pollination. How does pollination lead to fertilisation ?

3

**OR**

- (a) Give one function of each of the following parts in a flower :  
(i) Ovary  
(ii) Stigma  
(iii) Anther
- (b) Name any three parts of a flower which may fall off after fertilisation.

3

What is placenta ? List its two roles during pregnancy.

3

8. (a) What is genetics ?  
(b) What are genes? Where are the genes located?  
(c) State and define three factors responsible for the rise of a new species.

5

9. (a) List three different categories of contraception methods.  
(b) Why has Government of India prohibited prenatal sex determination by law ? State its benefits in the long run.  
(c) Unsafe sexual act can lead to various infections. Name two bacterial and two viral infections caused due to unsafe sex.

5

**OR**

- (a) In the female reproductive system of human beings, state the functions of  
(i) ovary (ii) oviduct
- (b) Mention the changes which the uterus undergoes, when  
(i) it has to receive a zygote.  
(ii) no fertilization takes place.
- (c) State the function of placenta.

5

10. (a) Draw a diagram showing germination of pollen on stigma of a flower and mark on it the following organs/parts :  
(i) Pollen Grain  
(ii) Pollen tube  
(iii) Stigma  
(iv) Female germ cell  
(b) State the significance of pollen tube.  
(c) Name the parts of flower that develop after fertilization into  
(i) Seed  
(ii) Fruit

5

**OR**

- (a) "Use of a condom is beneficial for both the sexes involved in a sexual act." Justify this statement giving two reasons.  
(b) How do oral contraceptive help in avoiding pregnancies ?  
(c) What is sex selective abortion ? How does it affect a healthy society ?  
(State any one consequence)

5

11. (a) Suggest any two categories of contraceptive methods to control the size of human population which is essential for the prosperity of a country. Also explain about each method briefly.  
(b) Name two bacterial and two viral infections each that can get sexually transmitted.  
(c) List two advantages of using condom during sexual act.

5

**OR**

- (a) Draw a diagram to show spore formation in Rhizopus.  
(b) With the help of an example differentiate between the process of Budding and Fragmentation.  
(c) Why is vegetative propagation practiced for growing some type of plants ?

5

12. Draw a neat diagram showing fertilisation in a flower and label (a) Pollen tube, (b) Male germ cell and (c) Female germ cell, on it. Explain the process of fertilisation in a flower. What happens to the (i) ovary and (ii) ovule after fertilisation ?

5

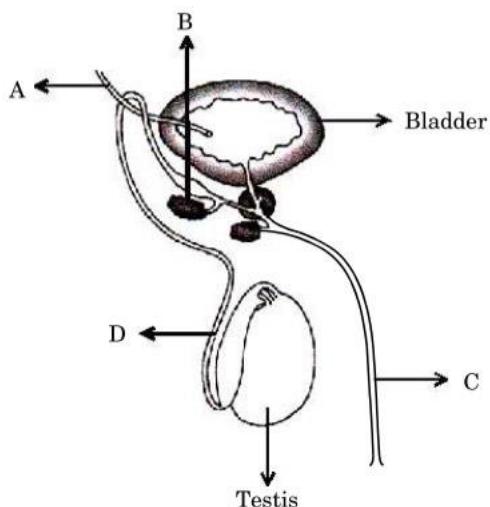
**OR**

- (a) What is puberty ?  
(b) Describe in brief the functions of the following parts in the human male reproductive system :  
(i) Testes  
(ii) Seminal vesicle  
(iii) Vas deferens  
(iv) Urethra  
(c) Why are testes located outside the abdominal cavity ?  
(d) State how sperms move towards the female germ cell.

5

13. (a) List the sequence of events in the uterus of a human female from fertilisation of egg till childbirth.
- (b) State the changes that are observed in the uterus if fertilisation of egg does not occur. 5
- OR**
- (a) What is vegetative propagation ? List three of its advantages. Name two methods employed to grow new plants through vegetative propagation.
- (b) Explain, giving reason, why more complex organisms cannot give rise to new individuals through regeneration. 5
- 

14. Based on the given diagram answer the questions given below :



- (a) Label the parts A, B, C and D.
- (b) Name the hormone secreted by testis and mention its role.
- (c) State the functions of B and C in the process of reproduction. 5

**OR**

- (a) Name the mode of reproduction of the following organisms and state the important feature of each mode :
- Planaria
  - Hydra
  - Rhizopus
- (b) We can develop new plants from the leaves of Bryophyllum. Comment.
- (c) List two advantages of vegetative propagation over other modes of reproduction. 5

15. (a) List two reasons of using contraceptive methods by married couples.
- (b) Write in proper sequence the processes going on in the different organs of the reproductive system of a human female starting from the time of egg production to childbirth. 5

**OR**

- (a) Identify the modes of asexual reproduction in each of the following organisms :
- (i) Hydra
  - (ii) Planaria
  - (iii) Amoeba
  - (iv) Spirogyra
  - (v) Rhizopus
- (b) List three advantages of vegetative propagation.
- (c) Why can fertilisation not take place in flowers if pollination does not occur ? 5

~ ~

# CHAPTER 9- HEREDITY AND EVOLUTION

7. (a) What are fossils ?  
(b) Describe two methods of determining the age of fossils. 3
- (a) Why did Mendel carry out an experiment to study inheritance of two traits in garden-pea ?  
(b) What were his findings with respect to inheritance of traits in  $F_1$  and  $F_2$  generation ?  
(c) State the ratio obtained in the  $F_2$  generation in the above mentioned experiment. 3
8. (a) Why is the  $F_1$  progeny always of tall plants when a tall pea plant is crossed with a short pea plant ?  
(b) How is  $F_2$  progeny obtained by self-pollination of  $F_1$  progeny different from  $F_1$  progeny ? Give reason for this observation.  
(c) State a conclusion that can be drawn on the basis of this observation. 3
9. Define the term evolution. "Evolution cannot be equated with progress." Justify this statement. 3

**OR**

"During the course of evolution, organs or features may be adapted for new functions." Explain this fact by choosing an appropriate example. 3

10. Define the term variation. Why is variation beneficial to a species ? List two reasons for the appearance of variations among the progeny formed by sexual reproduction. 3

**OR**

List two distinguishing features between inherited and acquired characters. Also give one example for each type. 3

11. (a) What provides nutrition to human sperms ? State the genetic constitution of a sperm.  
(b) Mention the chromosome pair present in zygote which determines the sex of (i) a female child, and (ii) a male child. 3
12. Define the following :  
(a) Speciation  
(b) Natural Selection  
(c) Genetic Drift 3

13.

- (a) What is the law of dominance of traits ? Explain with an example.
- (b) Why are the traits acquired during the life time of an individual not inherited? Explain.

5

14. **For question numbers 13 and 14, two statements are given — one labelled as Assertion (A) and the other labelled as 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 the correct explanation of the assertion (A).
- (b) Both (A) and (R) are true, but (R) is **not** the correct explanation of the assertion (A).
- (c) (A) is true, but (R) is false.
- (d) (A) is false, but (R) is true.

*Assertion (A) : Wing of an insect and wing of a bird are analogous organs.*

*Reason (R) : The organs which are quite different in fundamental structure and origin but perform same function in different species are called analogous organs.* 1

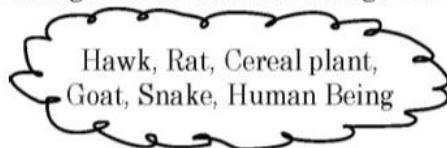
*Assertion (A) : The sex of a child in human beings will be determined by the type of chromosome he/she inherits from the father.*

*Reason (R) : A child who inherits 'X' chromosome from his father would be a girl (XX), while a child who inherits a 'Y' chromosome from the father would be a boy (XY).* 1

## CHAPTER 15-OUR ENVIRONMENT

1. Human body is made up of five important components, of which water is the main component. Food as well as potable water are essential for every human being. The food is obtained from plants through agriculture. Pesticides are being used extensively for a high yield in the fields. These pesticides are absorbed by the plants from the soil along with water and minerals and from the water bodies these pesticides are taken up by the aquatic animals and plants. As these chemicals are not biodegradable, they get accumulated progressively at each trophic level. The maximum concentration of these chemicals gets accumulated in our bodies and greatly affects the health of our mind and body.
- (a) Why is the maximum concentration of pesticides found in human beings ? 1
- (b) Give one method which could be applied to reduce our intake of pesticides through food to some extent. 1
- (c) Various steps in a food chain represent : 1
- (a) Food web (b) Trophic level
- (c) Ecosystem (d) Biomagnification
- (d) With regard to various food chains operating in an ecosystem, man is a : 1
- (a) Consumer (b) Producer
- (c) Producer and consumer (d) Producer and decomposer 1
2. How much of the net primary productivity of a terrestrial ecosystem is eaten and digested by herbivores ? 1
- (A) 100%  
(B) 10%  
(C) 1%  
(D) 0.1%
3. In an ecosystem, 10% of energy available for transfer from one trophic level to the next is in the form of : 1
- (a) heat energy (b) chemical energy  
(c) mechanical energy (d) light energy
- Soil fertility is determined by its ability to : 1
- (a) Decay organic matter (b) Hold organic matter  
(c) Hold water (d) Support life

4. (a) From the following group of organisms create a food chain which is the most advantageous for Human beings in terms of energy.



- (b) State the possible disadvantage if the cereal plant is growing in soil rich in pesticides.

- (c) Construct a food web using the organisms mentioned above.

3

**OR**

- (a) Write two harmful effects of using plastic bags on the environment. Suggest alternatives to the usage of plastic bags.

- (b) List any two practices that can be followed to dispose off the waste produced in our homes.

3

5. (a) State one important function of ozone layer at the higher level in the atmosphere.

- (b) How is ozone formed ?

- (c) It has been observed that ozone layer is getting depleted. Name the compound responsible for ozone depletion.

3

**OR**

What are decomposers ? List two consequences of their absence in the ecosystem.

3

6. (a) State with reason the consequence of decrease in number of carnivores in an ecosystem.

- (b) In a food chain, state the trophic level at which the concentration of harmful chemicals is maximum. Why is it so ?

3

**OR**

How is ozone layer formed ? State its importance to all life forms on earth ? Why the amount of ozone in the atmosphere dropped sharply in the 1980s ?

3

7. (a) Define ecosystem.

- (b) Autotrophs are at the first level of food chain. Give reason.

- (c) In a food chain of frogs, grass, insects and snakes assign trophic level to frogs. To which category of consumers do they belong to ?

3

**OR**

- (a) Explain the role of UV radiation in producing ozone layer.

- (b) Mention the reaction involved.

- (c) Why is excessive use of CFCs a cause of concern ?

3

8. (a) Construct a terrestrial food chain comprising four trophic levels.  
(b) What will happen if we kill all the organisms in one trophic level ?  
(c) Calculate the amount of energy available to the organisms at the fourth trophic level if the energy available to the organisms at the second trophic level is 2000 J.

3

**OR**

- (a) Complete the following table :

|                              | Oxygen      | Ozone               |
|------------------------------|-------------|---------------------|
| Formula                      | (i) _____   | (ii) _____          |
| Benefits to biotic component | (iii) _____ | (iv) _____<br>_____ |

- (b) How is ozone formed at the higher levels of atmosphere ?

3

9. Choose the **incorrect** statement from the following :

1

- (A) Ozone is a molecule formed by three atoms of oxygen.  
(B) Ozone shields the surface of the Earth from ultraviolet radiations.  
(C) Ozone is deadly poisonous.  
(D) Ozone gets decomposed by UV radiations.

10. The biggest source of energy on Earth's surface is

1

- (A) Biomass  
(B) Solar radiations  
(C) Tides  
(D) Winds

Food web is constituted by

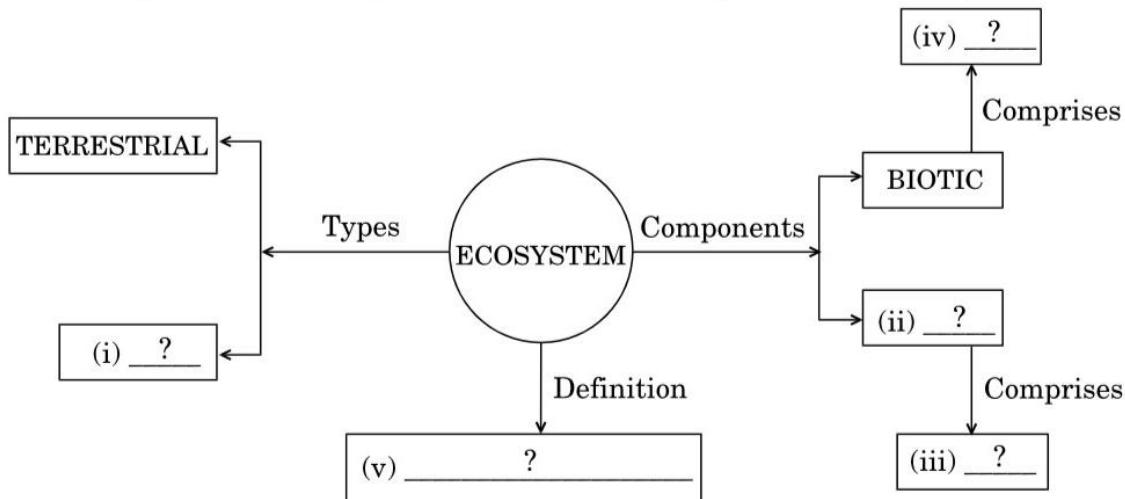
1

- (A) relationship between the organisms and the environment.  
(B) relationship between plants and animals.  
(C) various interlinked food chains in an ecosystem.  
(D) relationship between animals and environment.

11. 8. What is meant by trophic level in a food chain ? Construct a terrestrial food chain with four trophic levels. The energy flow in a food chain is always unidirectional. Why ? 3

**OR**

- Complete the following flow chart based on ecosystem and its components. 3



9. (a) Create a food chain of the following organisms :

Insect, Hawk, Grass, Snake, Frog

- (b) Name the organism at the third trophic level of the created food chain.  
(c) Which organism of this food chain will have the highest concentration of non-biodegradable chemicals ?  
(d) Name the phenomenon associated with it.  
(e) If 10,000 joules of energy is available to frogs, how much energy will be available to snakes in this food chain ? 3

**OR**

- (a) What is an ecosystem ?  
(b) List any two natural ecosystems.  
(c) We do not clean ponds or lakes, but an aquarium needs to be cleaned regularly. Why ? 3

10. Which one of the following is an artificial ecosystem ? 1

- (A) River  
(B) Crop field  
(C) Forest  
(D) Ocean

## CHAPTER 16 - MANAGEMENT OF NATURAL RESOURCES

1. Which one of the following is responsible for the sustenance of underground water?

- (a) Loss of vegetation cover
- (b) Diversion for high water demanding crops
- (c) Pollution from urban wastes
- (d) Afforestation

1

Incomplete combustion of coal and petroleum :

- (A) increases air pollution.
- (B) increases efficiency of machines.
- (C) reduces global warming.
- (D) produce poisonous gases.

The correct option is :

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

1

2. Which one of the following is responsible for the sustenance of underground water?

- (a) Loss of vegetation cover
- (b) Diversion for high water demanding crops
- (c) Pollution from urban wastes
- (d) Afforestation

1

Incomplete combustion of coal and petroleum :

- (A) increases air pollution.
- (B) increases efficiency of machines.
- (C) reduces global warming.
- (D) produce poisonous gases.

The correct option is :

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

1

3. Which of the following are water intensive crops ?

- (a) Wheat and rice
- (b) Wheat and sugarcane
- (c) Sugarcane and rice
- (d) Wheat and gram

1

**OR**

The most poisonous product formed by incomplete combustion of fossil fuels is

- (a) Carbon dioxide
- (b) Nitrogen dioxide
- (c) Carbon monoxide
- (d) Sulphur dioxide

1

4. Bandharas and Tals are age old water harvesting concepts / structures found in
- (a) Bihar
  - (b) Maharashtra
  - (c) Tamil Nadu
  - (d) Rajasthan

1

- 
5. The Reni village of Garhwal is famous for
- (A) Monocultures of pine, teak and eucalyptus.
  - (B) Chipko Movement.
  - (C) Extensive biodiversity.
  - (D) Participation of local people in efficient management of forests.
6. Consider the following criticisms that are generally addressed when a new project is launched :
- I. Displacement of peasants and local tribals without compensation.
  - II. Swallowing up large amount of public money without any benefits.
  - III. Deforestation and loss of biodiversity.
- The criticisms about large dams in particular are
- (A) I and II
  - (B) II and III
  - (C) I and III
  - (D) I, II and III

**OR**

- Switching off unnecessary lights and fans and repairing leaking taps correctly defines which term of 5R's ?
- (A) Recycle
  - (B) Reuse
  - (C) Repurpose
  - (D) Reduce

1

7. Sustainable development means sustainable management of  
(A) industrial units.  
(B) dams and bridges.  
(C) resources.  
(D) power plants and research laboratories.

1

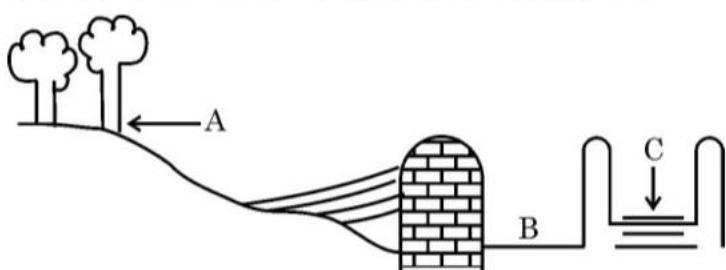
The important message conveyed by the “Chipko Movement” is that the Government should

1

- (A) cut down forest trees for developmental activities.  
(B) have the unquestionable right to order destruction of trees in forests.  
(C) ignore the local community in forest conservation efforts.  
(D) involve the local community in forest conservation efforts.

8. A diagram of traditional water harvesting system is given below :

The statement which defines the system and its parts is



- (a) This is an ideal setting of the Khadin system and A = Catchment area; B = Saline area & C = Shallow dugwell  
(b) This is an ideal setting of the Shallow dugwell system and A = Catchment area; B = Saline area and C = Khadin  
(c) This is an ideal setting of Catchement area and A = Khadin, B = Saline area and C = Shallow dugwell  
(d) This is showing Saline area and A = Catchment area; B = Khadin and C = Shallow dugwell

1

OR

The major ill effect of mono culture practice in forests is on the

- (a) biodiversity which faces large destruction  
(b) local people whose basic needs can no longer be met from such forests  
(c) industries  
(d) forest department

1

9. Answer question numbers 4(a) – 4(d) on the basis of your understanding of the following paragraph and the related studied concepts :

India today is facing the problem of overuse of resources, contamination of water and soil and lack of methods of processing the waste. The time has come for the world to say goodbye to “single-use plastics”. Steps must be undertaken to develop environment-friendly substitutes, effective plastic waste collection and methods of its disposal.

Indore treated 15 lakh metric tonnes of waste in just 3 years, through biomining and bioremediation techniques. Bioremediation involves introducing microbes into a landfill to naturally ‘break’ it down and biomining involves using trommel machines to sift through the waste to separate the ‘soil’ and the waste component. The city managed to chip away 15 lakh metric tonnes of waste at a cost of around ₹ 10 crore. A similar experiment was successfully carried out in Ahmedabad also.

- |                                                                                                                        |   |
|------------------------------------------------------------------------------------------------------------------------|---|
| 4(a) State two methods of effective plastic waste collection in your school.                                           | 1 |
| 4(b) Name any two uses of “single-use plastic” in daily life.                                                          | 1 |
| 4(c) If we discontinue the use of plastic, how can an environment-friendly substitute be provided ?                    | 1 |
| 4(d) Do you think microbes will work similarly in landfill sites as they work in the laboratory ? Justify your answer. | 1 |

# CLASS – X

## PHYSICS

### QUESTION BANK

1.

#### Chapter 10 : Light – Reflection and Refraction

1. The laws of reflection hold true for :

- |                         |                             |
|-------------------------|-----------------------------|
| (a) plane mirrors only  | (b) concave mirrors only    |
| (c) convex mirrors only | (d) all reflecting surfaces |

1

2. When an object is kept within the focus of a concave mirror, an enlarged image is formed behind the mirror. This image is :

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

1

3. It is desired to obtain an erect image of an object, using concave mirror of focal length of 12 cm. 3

- What should be the range of the object distance in the above case?
- Will the image be smaller or larger than the object? Draw a ray diagram to show the formation of image in this case.
- Where will the image of this object be, if it is placed 24 cm in front of the mirror?

4. (i) A lens produces a magnification of -0.5. Is this a converging or diverging lens? If the focal length of the lens is 6 cm, draw a ray diagram showing the image formation in this case. 5

- (ii) A girl was playing with a thin beam of light from a laser torch by directing it from different directions on a convex lens held vertically. She was surprised to see that in a particular direction, the beam of light continues to move along the same direction after passing through the lens. State the reason for her observation. Draw a ray diagram to support your answer.

5. (i) On entering in a medium from air, the speed of light becomes half of its value in air. Find the refractive index of that medium with respect to air?

- (ii) A glass slab made of a material of refractive index  $n_1$  is kept in a medium of refractive index  $n_2$ .

A light ray is incident on the slab. Draw the path of the rays of light emerging from the glass slab, if (i)  $n_1 > n_2$  (ii)  $n_1 = n_2$  (iii)  $n_1 < n_2$

6. Differentiate between a glass slab and a glass prism. What happens when a narrow beam of (i) a monochromatic light, and (ii) white light passes through  
(a) glass slab and (b) glass prism?

3

7. Draw a ray diagram in each of the following cases to show the formation of image, when the object is placed :

- (i) between optical centre and principal focus of a convex lens.
- (ii) anywhere in front of a concave lens.
- (iii) at  $2F$  of a convex lens.

State the signs and values of magnifications in the above mentioned cases (i) and (ii).

5

8. An object 4.0 cm in size, is placed 25.0 cm in front of a concave mirror of focal length 15.0 cm.

- (i) At what distance from the mirror should a screen be placed in order to obtain a sharp image?
- (ii) Find the size of the image.
- (iii) Draw a ray diagram to show the formation of image in this case.

5

9. What happens after refraction, when :

- (i) a ray of light parallel to the principal axis passes through a concave lens ?
- (ii) a ray of light falls on a convex lens while passing through its principal focus ?
- (iii) a ray of light passes through the optical centre of a convex lens ?

3

10. (a) A concave mirror of focal length 10 cm can produce a magnified real as well as virtual image of an object placed in front of it. Draw ray diagrams to justify this statement.

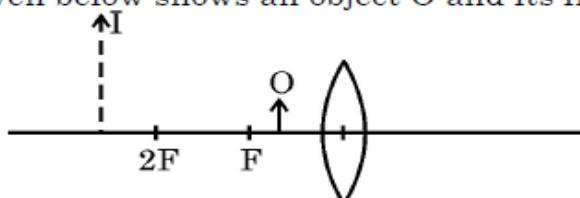
- (b) An object is placed perpendicular to the principal axis of a convex mirror of focal length 10 cm. The distance of the object from the pole of the mirror is 10 cm. Find the position of the image formed.

5

11. (a) Define the following terms :
- Power of a lens
  - Principal focus of a concave mirror
- (b) Write the relationship among the object distance ( $u$ ), image distance ( $v$ ) and the focal length ( $f$ ) of a
- Spherical lens
  - Spherical mirror
- (c) An object is placed at a distance of 10 cm from optical centre of a convex lens of focal length 15 cm. Draw a labelled ray diagram to show the formation of image in this case.

5

12. The diagram given below shows an object O and its image I.



Without actually drawing the ray diagram, state the following :

- Type of lens (Converging / Diverging)
- Name two optical instruments where such an image is obtained.
- List three characteristics of the image formed if this lens is replaced by a concave mirror of focal length 'f' and an object is placed at a distance ' $f/2$ ' in front of the mirror.

3

13. (a) A security mirror used in a big showroom has radius of curvature 5 m. If a customer is standing at a distance of 20 m from the cash counter, find the position, nature and size of the image formed in the security mirror.
- (b) Neha visited a dentist in his clinic. She observed that the dentist was holding an instrument fitted with a mirror. State the nature of this mirror and reason for its use in the instrument used by dentist.

5

14. Rishi went to a palmist to show his palm. The palmist used a special lens for this purpose.
- State the nature of the lens and reason for its use.
  - Where should the palmist place/hold the lens so as to have a real and magnified image of an object ?
  - If the focal length of this lens is 10 cm and the lens is held at a distance of 5 cm from the palm, use lens formula to find the position and size of the image.

5

15. A concave mirror is used for image formation for different positions of an object. What inferences can be drawn about the following when an object is placed at a distance of 10 cm from the pole of a concave mirror of focal length 15 cm ?

- (a) Position of the image
- (b) Size of the image
- (c) Nature of the image

Draw a labelled ray diagram to justify your inferences.

3

16. The refractive index of a medium 'x' with respect to a medium 'y' is  $\frac{2}{3}$  and the refractive index of medium 'y' with respect to medium 'z' is  $\frac{4}{3}$ . Find the refractive index of medium 'z' with respect to medium 'x'. If the speed of light in medium 'x' is  $3 \times 10^8 \text{ ms}^{-1}$ , calculate the speed of light in medium 'y'.

3

17. Draw ray diagram in each of the following cases to show what happens after reflection to the incident ray when

- (a) it is parallel to the principal axis and falling on a convex mirror.
- (b) it is falling on a concave mirror while passing through its principal focus.
- (c) it is coming oblique to the principal axis and falling on the pole of a convex mirror.

3

18. (a) Draw a labelled ray diagram to show the path of a ray of light incident obliquely on one face of a glass slab.

(b) Calculate the refractive index of the material of a glass slab. Given that the speed of light through the glass slab is  $2 \times 10^8 \text{ m/s}$  and in air is  $3 \times 10^8 \text{ m/s}$ .

(c) Calculate the focal length of a lens, if its power is  $-2.5 \text{ D}$ .

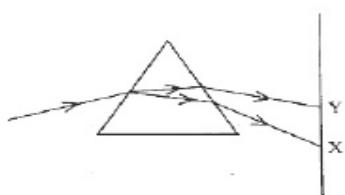
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19. (a) Define the principal focus of a concave mirror. It is desired to obtain an erect image of an object using a concave mirror of focal length 12 cm. What should be the range of the object distance in the above case ?  
(b) Why do we prefer a convex mirror as a rear-view mirror in vehicles ? List two reasons. 3
20. An object is kept at a distance of 30 cm in front of a concave mirror of focal length 20 cm. Use mirror formula to determine the position and magnification of the image produced. 3
21. An object is kept at a distance of 18 cm in front of a convex lens of focal length 12 cm. Use lens formula to determine the image distance and magnification of the image produced. 3

## **Chapter 11: The human eye and the colourful world**

1. When we enter a dark room coming from outside, immediately the things inside the room do not appear clear to our eyes. This is because 1  
i) pupils do not open at all in the dark.  
ii) pupils take time to adjust.  
iii) light travels slower in a dark room.  
iv) pupils open very quickly in the dark.
2. The phenomena of light responsible for the working of the human eye is  
i) reflection  
ii) refraction  
iii) power of accommodation  
iv) persistence of vision 1

3. In the figure given below, a narrow beam of white light is shown to pass through a triangular glass prism. After passing through the prism, it produces a spectrum XY on the screen. 3



- (i) Name the phenomenon.
- (ii) State the colours seen at X and Y.
- (iii) Why do different colours of white light bend at different angles through a prism?

4. (i) What is visible spectrum?  
(ii) Why is red used as the stopping light at traffic signals?  
(iii) Two triangular glass prisms are kept together connected through their rectangular side. A light beam is passed through one side of the combination. Will there be any dispersion? Justify your answer.

5. Draw a labelled diagram to show (i) reddish appearance of the sun at the sunrise or the sunset and (ii) white appearance of the sun at noon when it is overhead. 3

6. (a) List two causes of hypermetropia.  
(b) Draw ray diagrams showing (i) a hypermetropic eye and (ii) its correction using suitable optical device. 3

7. Consider the following reasons for the reddish appearance of the sun at the sunrise or the sunset :  
A. Light from the sun near the horizon passes through thinner layers of air.  
B. Light from the sun covers larger distance of the earth's atmosphere before reaching our eyes.  
C. Near the horizon, most of the blue light and shorter wavelengths are scattered away by the particles.  
D. Light from the sun near the horizon passes through thicker layers of air.

The correct reasons are

- |                  |                  |
|------------------|------------------|
| (a) A and C only | (b) B, C and D   |
| (c) A and B only | (d) C and D only |

1

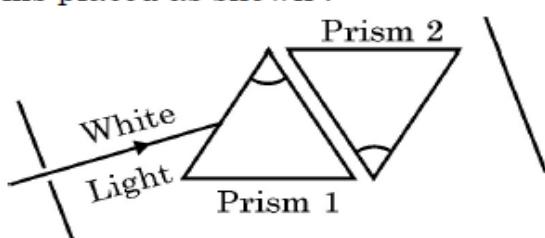
8. Person suffering from cataract has
- (a) elongated eyeball
  - (b) excessive curvature of eye lens
  - (c) weakened ciliary muscles
  - (d) opaque eye lens
- 1

- 9.
- (a) With the help of labelled ray diagram show the path followed by a narrow beam of monochromatic light when it passes through a glass prism.
  - (b) What would happen if this beam is replaced by a narrow beam of white light ?
- 3

10. A person is suffering from both myopia and hypermetropia.
- (i) What kind of lenses can correct this defect ?
  - (ii) How are these lenses prepared ?
- A person needs a lens of power + 3D for correcting his near vision and -3D for correcting his distant vision. Calculate the focal lengths of the lenses required to correct these defects.
- 3

11. The sky appears dark to passengers flying at very high altitudes mainly because :
- (a) Scattering of light is not enough at such heights.
  - (b) There is no atmosphere at great heights.
  - (c) The size of molecules is smaller than the wavelength of visible light.
  - (d) The light gets scattered towards the earth.
- 1

- 12.
- (a) State the relation between colour of scattered light and size of the scattering particle.
  - (b) The apparent position of an object, when seen through the hot air, fluctuates or wavers. State the basic cause of this observation.
  - (c) Complete the path of white light when it passes through two identical prisms placed as shown :



3

13. A person may suffer from both myopia and hypermetropia defects.
- (a) What is this condition called ?
- (b) When does it happen ?
- (c) Name the type of lens often required by the persons suffering from this defect. Draw labelled diagram of such lenses. 3
14. How will you use two identical glass prisms so that a narrow beam of white light incident on one prism emerges out of the second prism as white light ? Draw and label the ray diagram. 3
15. The image distance from the eye lens in the normal eye when we increase the distance of an object from the eye 1
- (A) increases.
- (B) decreases.
- (C) remains unchanged.
- (D) depends on the size of the eyeball.
16. A student uses spectacles of focal length – 2·5 m.
- (a) Name the defect of vision he is suffering from.
- (b) Which lens is used for the correction of this defect ?
- (c) List two main causes of developing this defect.
- (d) Compute the power of this lens. 3
17. Give reasons : 3
- (a) Red colour is selected for danger signals.
- (b) The sky appears dark in space.
- (c) The time difference between actual sunset and apparent sunset is about 2 minutes.
18. (a) A person suffering from myopia (near-sightedness) was advised to wear corrective lens of power - 2·5 D. A spherical lens of same focal length was taken in the laboratory. At what distance should a student place an object from this lens so that it forms an image at a distance of 10 cm from the lens ?
- (b) Draw a ray diagram to show the position and nature of the image formed in the above case. 5

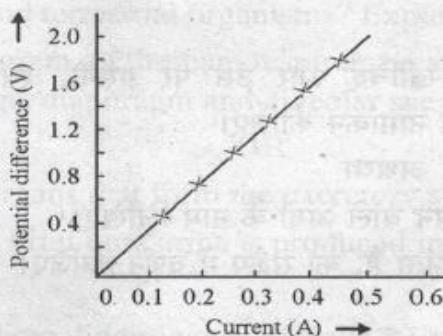
19. (a) A student is unable to see the words written on the blackboard placed at a distance of approximately 5 m from him clearly. Name the defect of vision the student is suffering from. State the possible causes of this defect and explain in brief the method of correcting this defect.
- (b) Why does the Sun appear reddish during sunrise and sunset ? Will this phenomenon be observed by an astronaut on the moon ? Give reasons to justify your answer. 5

## **Chapter 12 : Electricity**

1. When a 4V battery is connected across an unknown resistor there is a current of 100 mA in the circuit. The value of the resistance of the resistor is:
- 4  $\Omega$
  - 40  $\Omega$
  - 400  $\Omega$
  - 0.4  $\Omega$
2. Unit of electric power may also be expressed as: 1
- volt-ampere
  - kilowatt-hour
  - watt-second
  - joule-second
3. At the time of short circuit, the electric current in the circuit :
- |                           |                       |
|---------------------------|-----------------------|
| (a) vary continuously     | (b) does not change   |
| (c) reduces substantially | (d) increases heavily |
4. Two bulbs of 100 W and 40 W are connected in series. The current through the 100 W bulb is 1 A. The current through the 40 W bulb will be : 1
- |           |           |
|-----------|-----------|
| (a) 0.4 A | (b) 0.6 A |
| (c) 0.8 A | (d) 1 A   |

5. (a) Write the mathematical expression for Joule's law of heating.  
 (b) Compute the heat generated while transferring 96000 coulomb of charge in two hours through a potential difference of 40 V. 3

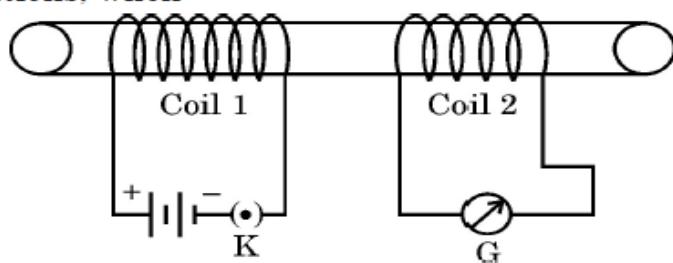
6. A V-I graph for a nichrome wire is given below. What do you infer from this graph? Draw a labelled circuit diagram to obtain such a graph. 3



7. (i) Consider a conductor of resistance ' $R$ ', length ' $L$ ', thickness ' $d$ ' and resistivity ' $\rho$ '. Now this conductor is cut into four equal parts. What will be the new resistivity of each of these parts? Why? 5  
 (ii) Find the resistance if all of these parts are connected in:  
 (a) Parallel  
 (b) Series  
 (iii) Out of the combinations of resistors mentioned above in the previous part, for a given voltage which combination will consume more power and why?

8. The maximum resistance which can be made using four resistors each of  $2\ \Omega$  is  
 (a)  $2\ \Omega$   
 (b)  $4\ \Omega$   
 (c)  $8\ \Omega$   
 (d)  $16\ \Omega$  1

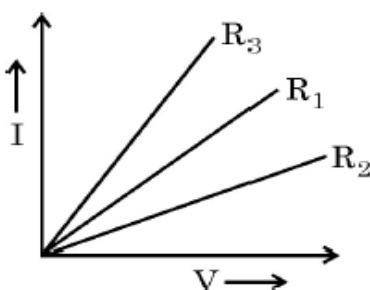
9. Two coils of insulated copper wire are wound over a non-conducting cylinder as shown. Coil 1 has comparative large number of turns. State your observations, when



- (i) Key K is closed.  
 (ii) Key K is opened.

Give reason for each of your observations. 3

10. A student plots V-I graphs for three samples of nichrome wire with resistances  $R_1$ ,  $R_2$  and  $R_3$ . Choose from the following the statement that holds true for this graph.



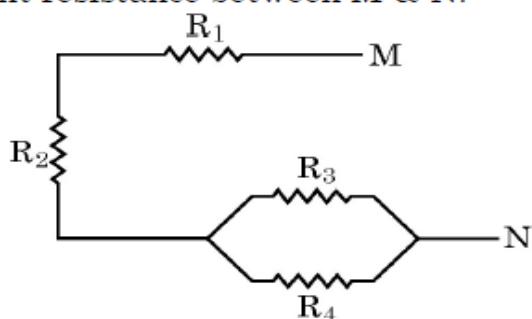
- (a)  $R_1 = R_2 = R_3$  1  
(b)  $R_1 > R_2 > R_3$   
(c)  $R_3 > R_2 > R_1$   
(d)  $R_2 > R_1 > R_3$

11. (a) Find the ratio of resistances of two copper rods X and Y of lengths 30 cm and 10 cm respectively and having radii 2 cm and 1 cm respectively.  
(b) A current of 500 mA flows in a series circuit containing an electric lamp and a conductor of  $10 \Omega$  when connected to 6 V battery. Find the resistance of the electric lamp. 5

12. The maximum resistance which can be made using four resistors each of resistance  $\frac{1}{2} \Omega$  is  
(a)  $2 \Omega$   
(b)  $1 \Omega$   
(c)  $2.5 \Omega$   
(d)  $8 \Omega$  1

13. A cylindrical conductor of length ' $l$ ' and uniform area of cross section 'A' has resistance 'R'. The area of cross section of another conductor of same material and same resistance but of length ' $2l$ ' is  
(a)  $\frac{A}{2}$   
(b)  $\frac{3A}{2}$   
(c)  $2A$   
(d)  $3A$  1

14. (a) For the combination of resistors shown in the following figure, find the equivalent resistance between M & N.



- (b) State Joule's law of heating.  
(c) Why we need a 5 A fuse for an electric iron which consumes 1 kW power at 220 V?  
(d) Why is it impracticable to connect an electric bulb and an electric heater in series?

5

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

1

- (A)  $1 \Omega$   
(B)  $5 \Omega$   
(C)  $10 \Omega$   
(D)  $25 \Omega$

16. The resistance of a resistor is reduced to half of its initial value. In doing so, if other parameters of the circuit remain unchanged, the heating effects in the resistor will become

1

- (A) two times.  
(B) half.  
(C) one-fourth.  
(D) four times.

17. Draw a schematic diagram of a circuit consisting of a battery of 3 cells of 2 V each, a combination of three resistors of  $10\ \Omega$ ,  $20\ \Omega$  and  $30\ \Omega$  connected in parallel, a plug key and an ammeter, all connected in series. Use this circuit to find the value of the following :

- (a) Current through each resistor
- (b) Total current in the circuit
- (c) Total effective resistance of the circuit

5

18. Two identical resistors, each of resistance  $15\ \Omega$ , are connected in (i) series, and (ii) parallel, in turn to a battery of 6 V. Calculate the ratio of the power consumed in the combination of resistors in each case.

5

19. A cylindrical conductor of length ' $l$ ' and uniform area of cross-section 'A' has resistance 'R'. Another conductor of length  $2.5 l$  and resistance  $0.5 R$  of the same material has area of cross-section

1

- (A)  $5\text{ A}$
- (B)  $2.5\text{ A}$
- (C)  $0.5\text{ A}$
- (D)  $\frac{1}{5}\text{ A}$

20. (a) Two lamps rated  $100\text{ W}, 220\text{ V}$  and  $10\text{ W}, 220\text{ V}$  are connected in parallel to  $220\text{ V}$  supply. Calculate the total current through the circuit.

(b) Two resistors X and Y of resistances  $2\ \Omega$  and  $3\ \Omega$  respectively are first joined in parallel and then in series. In each case the voltage supplied is 5 V.

- (i) Draw circuit diagrams to show the combination of resistors in each case.
- (ii) Calculate the voltage across the  $3\ \Omega$  resistor in the series combination of resistors.

5

21. Two resistors A and B of resistances  $10\ \Omega$  and  $40\ \Omega$  respectively are first joined in series and then in parallel with two terminals of a battery. In each case the voltage applied is 5 V.
- (a) Find the ratio of currents through the resistors A and B (i.e.  $I_A/I_B$ ) in each case.
  - (b) Find the ratio of voltages across the resistors A and B (i.e.  $V_A/V_B$ ) in each case.
  - (c) Find the heat produced each second in the series combination of resistors.
- 5

22. (a) Define the term Potential Difference and state its SI unit.
- (b) Name a device that helps to (i) maintain a potential difference across a resistor, and (ii) change current flowing through a resistor.
- (c) Calculate the (i) highest, and (ii) lowest resistance that can be obtained by the combination of three resistors of resistances  $20\ \Omega$ ,  $30\ \Omega$  and  $60\ \Omega$ .
- 5

## **Chapter 13: Magnetic effects of electric current**

1. The change in magnetic field lines in a coil is the cause of induced electric current in it. Name the underlying phenomenon. 1
2. Suppose your parents have constructed a two room house and you want that in the living room there should be a provision of one electric bulb, one electric fan, a refrigerator and a plug point for appliances of power up to 2 kilowatt. Draw a circuit diagram showing electric fuse and earthing as safety devices. 3
3. (a) What is an electromagnet ? List any two uses.  
(b) Draw a labelled diagram to show how an electromagnet is made.  
(c) State the purpose of soft iron core used in making an electromagnet.  
(d) List two ways of increasing the strength of an electromagnet if the material of the electromagnet is fixed. 5
4. Define the term induced electric current. 1
5. What is overloading and short circuiting ? State the function of earth wire in a domestic circuit. 3
6. Give reasons for the following :
  - (i) There is either a convergence or a divergence of magnetic field lines near the ends of a current carrying straight solenoid.
  - (ii) The current carrying solenoid when suspended freely rests along a particular direction.
  - (iii) The burnt out fuse should be replaced by another fuse of identical rating. 3
7. Fleming's Right-hand rule gives 1
  - (A) magnitude of the induced current.
  - (B) magnitude of the magnetic field.
  - (C) direction of the induced current.
  - (D) both, direction and magnitude of the induced current.

8. (a) State Fleming's Left-hand rule.
- (b) List three characteristic features of the electric current used in our homes.
- (c) What is a fuse ? Why is it called a safety device ?
- (d) Why is it necessary to earth metallic electric appliances ? 5
9. (a) A coil of insulated wire is connected to a galvanometer. What would be observed if a strong bar magnet with its south pole towards one face of the coil is
- (i) moved quickly toward it ?
- (ii) moved quickly away from it ?
- (iii) held stationary near it ?
- (b) Name the phenomena involved.
- (c) State the conclusion based on the observations in (i), (ii) and (iii). 3
10. What is a solenoid ? What does the magnetic field pattern inside the solenoid indicate ? State how this field can be utilised to make an electromagnet. 3