

<b>SOLVED PAPER</b>	<b>C.B.S.E. 2020 Class-X Delhi / Outside Delhi Sets</b>	<b>SCIENCE (Theory)</b>
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Time: 3 Hrs.

M.M.: 80

### General Instructions :

Read the following instructions very carefully and strictly follow them :

- (i) Question paper comprises **three** sections – A, B and C. There are **30** questions in the question paper. All questions are compulsory.
- (ii) **Section A** – question no. **1 to 14** – all questions or part thereof are of **one** mark each. These questions comprises multiple choice questions (MCQ), very short answer (VSA), and Assertion-Reason type questions. Answer to these questions should be given in **one word** or **one sentence**.
- (iii) **Section B** – question no. **15 to 24** are short answer type questions, carrying **3** marks each. Answer to these questions should not exceed **50 to 60** words.
- (iv) **Section C** – question no. **25 to 30** are long answer type questions, carrying **5** marks each. Answer to these questions should not exceed **80 to 90** words.
- (v) Answer should be brief and to the point. Also the above mentioned word limit be adhered to as far as possible.
- (vi) There is no overall choice in the question paper. However, an internal choice has been provided in some questions in each Section. Only one of the choices in such questions have to be attempted.
- (vii) In addition to this, separate instructions are given with each section and question, wherever necessary.

Delhi Set - I

31/1/1

### SECTION – A

1. Name a cyclic unsaturated carbon compound. 1
2. The change in magnetic field lines in a coil is the cause of induced electric current in it. Name the underlying phenomenon. 2  
**Answer question numbers 3(a) to 3(d) and 4(a) to 4(d) on the basis of your understanding of the following paragraphs and the related studied concepts.**
3. 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.
  - (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
4. 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.

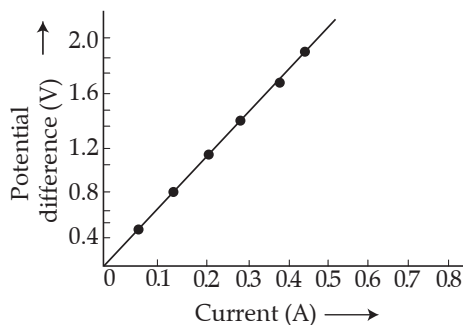
- (a) Why is the maximum concentration of pesticides found in human beings ? 1  
 (b) Give one method which could be applied to reduce our intake of pesticides through food to some extent. 1  
 (c) Various steps in a food chain represent :  
 (a) Food web (b) Trophic level  
 (c) Ecosystem (d) Biomagnification 1  
 (d) With regard to various food chains operating in an ecosystem, man is a :  
 (a) Consumer (b) Producer  
 (c) Producer and consumer (d) Producer and decomposer 1
5. Calcium oxide reacts vigorously with water to produce slaked lime  
 $\text{CaO(s)} + \text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2\text{(aq)}$   
 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) 1
- OR**
- 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 1
6. 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) 1
7. 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 1
8. 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)  $2\text{CaSO}_4 \cdot \text{H}_2\text{O}$  1
9. The laws of reflection hold true for :  
 (a) plane mirrors only (b) concave mirrors only  
 (c) convex mirrors only (d) all reflecting surfaces 1
- OR**
- 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
10. 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 1
- OR**
- 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 :  
 (a) 0.4 A (b) 0.6 A  
 (c) 0.8 A (d) 1 A 1

11. 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
12. 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
- 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. 1
14. **Assertion (A)** : In the process of nuclear fission, the amount of nuclear energy generated by the fission of an atom of uranium is so tremendous that it produces 10 million times the energy produced by the combustion of an atom of carbon from coal.  
**Reason (R)** : The nucleus of a heavy atom such as uranium, when bombarded with low energy neutrons, splits apart into lighter nuclei. The mass difference between the original nucleus and the product nuclei gets converted to tremendous energy. 1

## SECTION – B

15. 1 g of copper powder was taken in a China dish and heated. What change takes place on heating? When hydrogen 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. 3
16. List the important products of the Chlor-alkali process. Write one important use of each. 3
- OR
- 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? 3
17. 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  $\text{KMnO}_4$  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. 3
18. 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
19. Define the term pollination. Differentiate between self pollination and cross pollination. What is the significance of pollination? 3
20. What are homologous structures? Give an example. Is it necessary that homologous structures always have a common ancestor. Justify your answer. 3
21. Why is Tyndall effect shown by colloidal particles? State four instances of observing the Tyndall effect. 3
- OR
- 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
22. 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

23. 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



24. (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

### SECTION – C

25. 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. 5
26. 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. 5

OR

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? 5

27. (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
28. (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
29. 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

OR

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
30. (a) What is an electromagnet ? List any two uses.  
 (b) Draw a labelled diagram to show 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

**Delhi Set - II****31/1/2****SECTION – A**

1. Name the functional group present in propanone. 1
5. The compound obtained on reaction of iron with steam is/are :  
 (a)  $\text{Fe}_2\text{O}_3$  (b)  $\text{Fe}_3\text{O}_4$   
 (c) FeO (d)  $\text{Fe}_2\text{O}_3$  and  $\text{Fe}_3\text{O}_4$  1

OR

An element 'X' reacts with  $\text{O}_2$  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 1
11. In an ecosystem, 10% of energy available for transfer from one trophic level to the next is in the form of :  
 (a) heat energy (b) chemical energy  
 (c) mechanical energy (d) light energy 1
12. Soil fertility determined by its ability to :  
 (a) Decay organic matter (b) Hold organic matter  
 (c) Hold water (d) Support life 1

For question numbers 13, 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)** : 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 14. 1

**SECTION – B**

15. What is 'rusting'? Describe with a labelled diagram an activity to investigate the conditions under which iron rusts. 3
19. (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
23. (a) State the relation correlating the electric current flowing in a conductor and the voltage applied across it. Also draw a graph to show this relationship. 3  
 (b) Find the resistance of a conductor if the electric current flowing through it is 0.35 A when the potential difference across it is 1.4 V. 3

**SECTION – C**

25. (a) What is thernit process ? Where is this process used? Write balanced chemical equation for the reaction involved.  
 (b) Where does the metal aluminium, used in the process, occurs in the reactivity series of metals ?  
 (c) Name the substances that are getting oxidised and reduced in the process. 5

28. (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

**Delhi Set - III****31/1/3****SECTION – A**

2. State an important advantage of using alternating current (a.c.) over direct current (d.c.). 1
7. 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) 1
8. When a small amount of acid is added to water, the phenomena which occur are :  
 (A) Dilution (B) Neutralisation  
 (C) Formation of  $H_3O^+$  ions (D) Salt formation  
 The correct statements are :  
 (a) (A) and (C) (b) (B) and (D)  
 (c) (A) and (B) (d) (C) and (D) 1
9. A real image is formed by the light rays after reflection or refraction when they :  
 (A) actually meet or intersect with each other.  
 (B) actually converge at a point.  
 (C) appear to meet when they are produced in the backward direction.  
 (D) appear to diverge from a point.  
 Which of the above statements are correct?  
 (a) (A) and (D) (b) (B) and (D)  
 (c) (A) and (B) (d) (B) and (C) 1

**OR**

Consider the following properties of virtual images :

- (A) cannot be projected on the screen (B) are formed by both concave and convex lens  
 (C) are always erect (D) are always inverted

The correct properties are :

- (a) (A) and (D) (b) (A) and (B)  
 (c) (A), (B) and (C) (d) (A), (B) and (D) 1

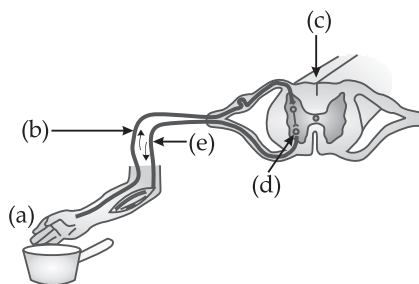
For question numbers 14, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :

- (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.
14. **Assertion (A)** : A solar cooker cooks the meal due to green house effect.  
**Reason (R)** : The plane mirror is responsible for producing the green house effect. 1

**SECTION – B**

17. (a) Draw the structures for (i) ethanol, (ii) ethanoic acid.  
 (b) Why is the conversion of ethanol to ethanoic acid considered an oxidation reaction? Write the oxidising agent used in the reaction involved. 3
18. Name the parts (a) to (e) in the following diagram.





What is the term given to the sequence of events occurring in the diagram ?

3

OR

- (a) What is tropism ?
- (b) How do auxins promote the growth of a tendril around a support? 3
23. The near point of the eye of a person is 50 cm. Find the nature and power of the corrective lens required by the person to enable him to see clearly the objects placed at 25 cm. from the eye. 3

### SECTION – C

27. (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
30. (a) Explain with the help of the pattern of magnetic field lines the distribution of magnetic field due to a current carrying a circular loop.
- (b) Why is it that the magnetic field of a current carrying coil having  $n$  turns, is ' $n$ ' times as large as that produced by a single turn (loop)? 5

### Outside Delhi Set - I

31/3/1

### SECTION – A

1. How are covalent bonds formed? 1
2. Define electropositivity. 1

OR

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. 1

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

The Tehri dam is the highest dam in India and one of the highest in the World. The Tehri dam withholds a reservoir of capacity  $4.0 \text{ km}^3$  and surface area  $52 \text{ km}^2$ . It is used for irrigation, municipal water supply and the generation of 1000 MW of hydro electricity.

The Tehri Dam has been the object of protests. Environment activist Shri Sunder Lal Bahuguna led the "Anti Tehri Dam Movement" from 1980s to 2014. The protest was against the displacement of town inhabitants and environmental consequences of the weak ecosystem. The relocation of more than 1,00,000 people from the area has led to protracted legal battles over resettlement rights and ultimately resulted in the delayed completion of the project.

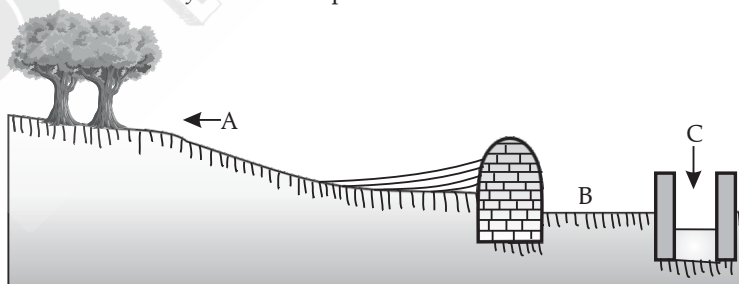
- (a) How is hydropower harnessed? 1
- (b) Define 1 MW. 1
- (c) Mention two disadvantages of constructing Tehri Dam. 1
- (d) What happens when water from great heights is made to fall on blades of turbine? 1

4. 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 6% 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 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
5. The sky appears dark to passengers flying at very high altitudes mainly because : 1
- (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
6. 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 1
- (a)  $\frac{A}{2}$
- (b)  $\frac{3A}{2}$
- (c)  $2A$
- (d)  $3A$  1
7. The maximum resistance which can be made using four resistor each of resistance  $\frac{1}{2} \Omega$  is 1
- (a)  $2 \Omega$
- (b)  $1 \Omega$
- (c)  $2.5 \Omega$
- (d)  $8 \Omega$  1
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 Catchment 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 monoculture 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. 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
10. 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
11. 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
12. 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  $XC l_3$

The correct statement(s) is/are

(a) only (A)

(b) only (B)

(c) (A) and (C)

(d) (A), (B) and (C) 1

**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 and (R) is 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 :



**Reason (R) :** A series of compounds with same functional group but differing by  $-CH_2-$  unit is called a homologous series. 1

14. **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

## SECTION – B

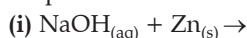
15. Mention with reason the colour changes observed when :

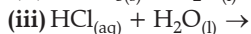
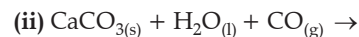
(i) Silver chloride is exposed to sunlight.

(ii) copper powder is strongly heated in the presence of oxygen.

(iii) a piece of zinc is dropped in copper sulphate solution. 3

16. Complete and balance the following chemical equations :





3

OR

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

17. 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 place elements of category A, B and C in three different groups?

(iii) Is Newland's law of octaves applicable to all the three categories?

Give reason to justify your answer.

3

18. (a) From the following groups of organisms create a food chain which is the most advantageous for Human being in terms of energy.

Hawk, Rat, cereal plant,  
Goat, Snake, Human Being

(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

19. (a) State the role played by the following in the process of digestion :

(i) Enzyme trypsin

(ii) Enzyme lipase

(b) List two functions of finger-like projections present in the small intestine.

3

20. (a) Classify the following as homologous or analogous pairs :

(i) Broccoli and Cabbage

(ii) Ginger and Raddish

(iii) Fore limbs of birds and lizard

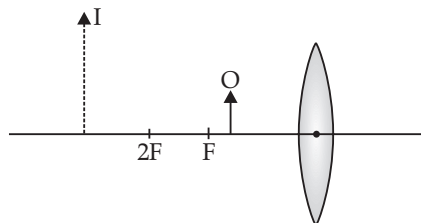
(iv) Wings of a bat and Wings of a bird

(b) State the main feature that categorises a given pair of organs as homologous or analogous.

3

21. A green stemmed rose plant denoted by GG and a brown stemmed rose plant denoted by gg are allowed to undergo a cross with each other.

- (a) List your observations regarding
- Colour of stem in their  $F_1$  progeny
  - Percentage of brown stemmed plants in  $F_2$  progeny if  $F_1$  plants are self pollinated.
  - Ratio of GG and Gg in the  $F_2$  progeny.
- (b) Based on the finding of this cross, what conclusion can be drawn ? 3
22. The diagram given below shown an object O and its image I

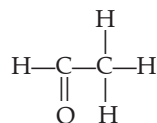


Without actually drawing the ray diagram state the following :

- Type of lens (Converging / Diverging)
  - Name two optical instruments where such an image is obtained.
  - List three characteristic 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 ' $\frac{f}{2}$ ' in front of the mirror. 3
23. Give reasons for the following :
- There is either a convergence or a divergence of magnetic field lines near the ends of a current carrying straight solenoid.
  - The current carrying solenoid when suspended freely rest along a particular direction.
  - The burnt out fuse should be replaced by another fuse of identical rating. 3
24. (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. 3
- (b) What would happen if this beam is replaced by a narrow beam of white light ? 3
- OR
- A person is suffering from both myopia and hypermetropia
    - What kind of lenses can correct this defect ?
    - 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

### SECTION - C

25. Write balanced chemical equations to explain what happens, when
- Mercuric oxide is heated.
  - Mixture of cuprous oxide and cuprous sulphide is heated.
  - Aluminium is reacted with manganese dioxide.
  - Ferric oxide is reduced with aluminium.
  - Zinc carbonate undergoes calcination. 5
- OR
- By the transfer of electrons, illustrate the formation of bond in magnesium chloride and identify the ions present in this compound.
  - Ionic compounds are solids. Give reasons.
  - With the help of a labelled diagram show the experimental set up of action of steam on a metal. 5
26. (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.



5

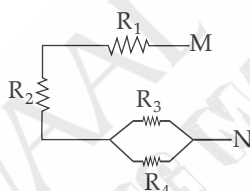
27. (a) Write the correct sequence of steps followed during journey of oxygen rich blood from lungs to various organs of human body.
- (b) What happens when the system of blood vessels develop a leak ?
28. (a) Draw a diagram showing germination of pollen on stigma of a flower and mark on it the following organs/parts :
- Pollen grain
  - Pollen tube
  - Stigma
  - Female germ cell
- (b) State the significance of pollen tube.
- (c) Name the parts of flower that develop after fertilization into
- Seed
  - 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)
29. (a) For the combination of resistors shown in the following figure, find the equivalent resistance between M & N.

5



- (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 ?
30. (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

5

OR

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 hold at a distance of 5 cm from the palm, use lens formula to find the position and size of the image.

5

## Outside Delhi Set - II

31/3/2

### SECTION - B

17. Three elements X, Y and Z have atomic numbers 7, 8 and 9 respectively.
- Arrange them in the decreasing order of their atomic radii.
  - Which of the three is most electronegative ? Why ?
  - Write the formula of compound formed between
    - X and Y
    - X and Z
19. (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 belongs to ?

3

3

OR

- (a) Explain the role of UV radiation in producing ozone layer. 3  
 (b) Mention the reaction involved.  
 (c) Why is excessive use of CFCs a cause of concern ?
20. List three factors that could lead to speciation. Which of these cannot be a major factor in the speciation of a self-pollinating plant species and why ? 3
22. (a) Water has refractive index 1.33 and alcohol has refractive index 1.36. Which of the two medium is optically denser ? Give reason for your answer.  
 (b) Draw a ray diagram to show the path of a ray of light passing obliquely from water to alcohol.  
 (c) State the relationship between angle of incidence and angle of refraction in the above case. 3

**SECTION – C**

26. (a) Carry out following conversions :  
 (i) Ethanol to ethane  
 (ii) Ethanol to Ethanoic acid  
 (b) Differentiate between addition reaction and substitution reaction. Give one example of each. 5
27. (a) How do leaves of plants help in excretion ? Explain briefly.  
 (b) Describe the structure and function of a nephron. 5
29. (a) Define Power and state its SI unit.  
 (b) A torch bulb is rated 5 V and 500 mA. Calculate Its  
 (i) Power  
 (ii) Resistances  
 (iii) Energy consumed when it is lighted for 2½ hours. 5

**Outside Delhi Set - III****31/3/3****SECTION – B**

15. 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
18. (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

22. (a) State Snell's law of refraction of light.  
 (b) When a ray of light travelling in air enters obliquely into a glass slab, it is observed that the light ray emerges parallel to the incident ray but it is shifted sideways slightly. Draw a labelled ray diagram to illustrate it. 3

**SECTION – C**

26. 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 air.  
 (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. 5
28. (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

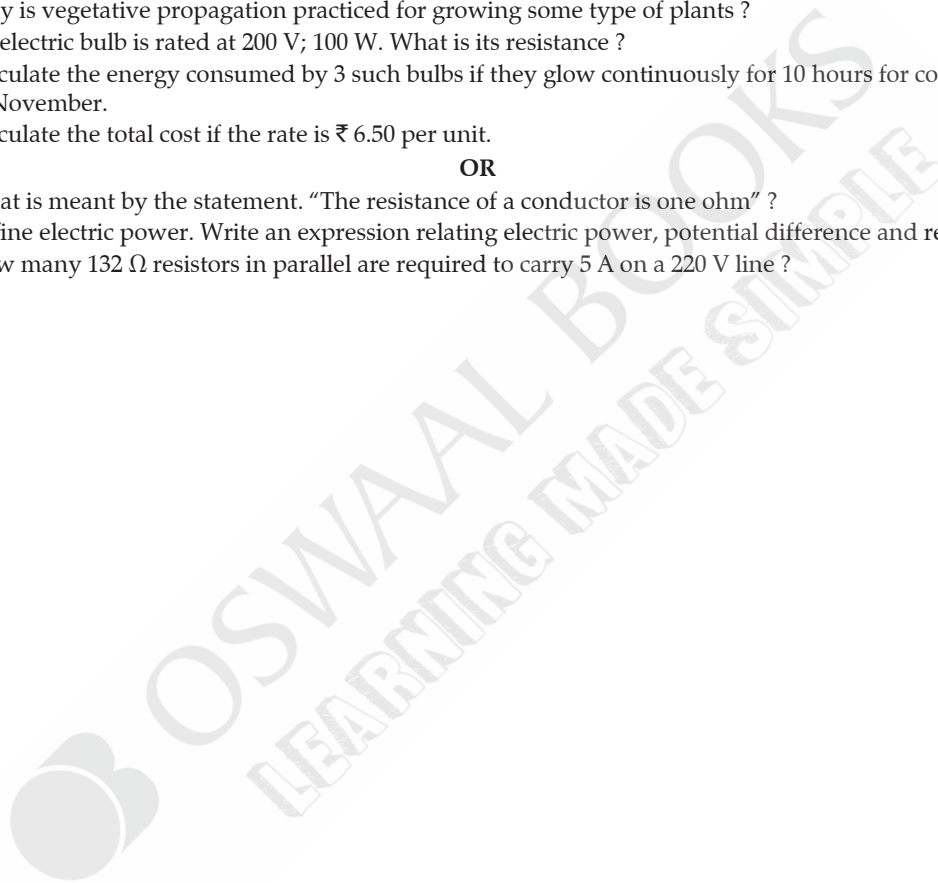
**OR**

- (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
30. (a) An electric bulb is rated at 200 V; 100 W. What is its resistance ?  
(b) Calculate the energy consumed by 3 such bulbs if they glow continuously for 10 hours for complete month of November.  
(c) Calculate the total cost if the rate is ₹ 6.50 per unit. 5

**OR**

- (a) What is meant by the statement. "The resistance of a conductor is one ohm" ?  
(b) Define electric power. Write an expression relating electric power, potential difference and resistance.  
(c) How many  $132 \Omega$  resistors in parallel are required to carry 5 A on a 220 V line ? 5

□□□





# SOLUTIONS

## Delhi Set - I

31/1/1

### SECTION – A

1. Benzene. 1
2. Electromagnetic induction. 1
3. **Common signs for sexual maturation in boys and girls are :**
  - (a) (i) Broadening of shoulder and chest in boys and development of mammary gland or breast in girls.
  - (ii) Appearance of hairs on body parts like pubic area, armpits and face.
- (b) The number of females will become low in comparison to males. Hence, there will be huge imbalance between male and female ratio in the population.
- (c) Chemical method of contraception e.g. Oral pills.
- (d) Factors are : Birth rate and death rate. 1+1+1+1
4. (a) It is because humans are at the top of the food chain and due to biomagnification, the concentration of pesticides increases as one goes up the trophic levels.
- (b) Organic farming should be done or more bio-pesticides should be used.
- (c) (b) Trophic level
- (d) (a) Consumer 1+1+1+1
5. (d) (A) and (B) 1  

OR

 (d) Double displacement reaction 1
6. (d) (B), (C) and (D)  

$$\text{Na}_2\text{SO}_4(\text{aq}) + \text{BaCl}_2(\text{aq}) \rightarrow \text{BaSO}_4(\text{s}) + 2\text{NaCl}(\text{aq})$$
1
7. (c) Sodium hydrogen carbonate and tartaric acid. 1
8. (c)  $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$  1
9. (d) All reflecting surfaces 1  

Or

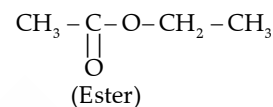
 (d) Virtual and erect 1
10. (d) increases heavily. 1  

Or

 (d) 1 A 1
11. (d) Afforestation 1
12. (b) (A) and (D) 1
13. (b) **Esterification** is a reaction in which alcohol like ethanol reacts with carboxylic acids to form esters and water in the presence of sulphuric acid. Esters are generally sweet smelling substances.



(Ethanoic acid) (Ethanol)



1

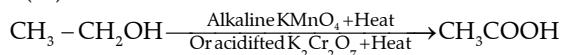
14. (a) Both A and R are true and R is the correct explanation of the Assertion. 1

### SECTION – B

15. The black colour substance is formed by the reaction of copper with oxygen is Copper (II) oxide (CuO).  
**Chemical Reaction :**  $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$   
 Hydrogen gas is passed over this heated material (CuO) the black coating on the surface turns brown as the reverse reaction takes place and copper is obtained.
- $$\text{CuO} + \text{H}_2 \xrightarrow{\text{Heat}} \text{Cu} + \text{H}_2\text{O} \quad \text{1+1+1}$$
16. **Products of chlor-alkali process are :** Sodium hydroxide (NaOH), Chlorine gas (Cl<sub>2</sub>) and Hydrogen gas (H<sub>2</sub>).  
**Uses of sodium hydroxide :**  
 (i) In the manufacture of paper.  
 (ii) In making soaps and detergents.  
**Uses of chlorine gas :**  
 (i) In the production of bleaching powder  
 (ii) To make plastics (PVC), pesticides, chloroform, paints etc.  
**Uses of hydrogen gas :**  
 (i) As fuel for rockets  
 (ii) In the hydrogenation of oils to obtain vegetable ghee. 1+1+1
- OR
- Washing soda is prepared from sodium carbonate by recrystallisation.  

$$\text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O} \rightarrow \text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$$
 Washing soda is a basic salt. It is used for removing permanent hardness of water. 1+1+1
17. (i) Preparation of 5 g of KMnO<sub>4</sub> : By dissolving 5 g potassium permanganate in 100 mL of water.  
 (ii) Alkaline KMnO<sub>4</sub> acts as oxidizing agent as it adds oxygen to alcohol and convert it into an acid.  
 Initially, when we add potassium permanganate all potassium permanganate is used up in the reaction. After completion of the reaction, there is no more ethanol in the solution. Adding more potassium permanganate after this endpoint makes the solution red.

(iii)



1+2

18. Adrenaline hormone will be secreted in the body as the squirrel is in scary situation.

This will result in :

- Speeding up of heartbeat
- Rise in blood pressure
- Release of more glucose in the blood. 1+3

OR

Chemical communication is better than electrical impulses because chemical communication is mediated through hormones which can diffuse to different regions of the body, thereby allowing cells to communicate even without interacting with each other. Moreover, this type of communication can be maintained at a steady rate and is easy to regulate. 3

19. The transfer of pollen grains from the anther to the stigma of a flower is known as pollination.

**The two types of pollination :**

- (a) **Self pollination :** When the pollen grains from the stamens of a flower fall on the stigma of the same flower, then it is called self pollination.
- (b) **Cross pollination :** When pollen grains from the stamens of a flower fall on the stigma of another flower, it is called cross pollination.

**Significance of pollination :**

- (i) It is a significant event because it precedes fertilization.
- (ii) It brings the male and female gametes closer for the process of fertilization.
- (iii) Cross-pollination introduces variations in plants because of the mixing of different genes. These variations further increase the adaptability of plants towards the environment or surroundings. (Any one) 1+1+1

20. **Homologous Structures:** Structure That are similar in origin but perform different functions. For e.g. forelimbs of humans and the wings of birds perform different functions but their skeletal structures are similar.

Yes, homology indicates common ancestry. Homologous organs follow the same basic plan of organization during their development but in the adult condition, these organs are modified to perform different functions as an adaptation to different environments. 1+1+1

21. Tyndall effect is shown by colloidal particles because the colloidal particles size are roughly equal to the wavelength of the light.

**Four instances of observing tyndall effect are :**

- (i) In fog
- (ii) When light passes through canopy in forest.
- (iii) Blue colour of the sky
- (iv) When light passes through the milk 1+2

OR

**Difference between glass slab and glass prism :**

Glass slab	Glass prism
It is rectangular in shape.	It has two triangular sides, two inclined rectangular sides and one rectangular base.
In this, the direction of incident ray and emergent ray of light are parallel to each other .	In this, the direction of incident ray and emergent ray of light are not parallel to each other.

**When a narrow beam of monochromatic light passes through :**

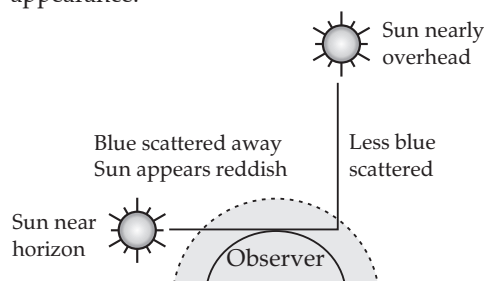
- (a) **Glass slab :** It has deviated from the actual path but the direction of the incident ray and the emergent ray are parallel to each other.
- (b) **Glass of sprism :** It has deviated from the actual path but the direction of the incident ray and the emergent ray are not parallel to each other.

**When a narrow beam of white light passes through :**

- (a) Glass slab, it does not split into its constituent colour. The direction of incident ray and emergent ray of light are parallel to each other.
- (b) Glass prism, it splits into its constituent seven colour. The direction of incident ray and emergent ray of light are not parallel to each other. 1+2

22. (i) Reddish appearance of the sun at the sunrise and sunset :

At sun-rise and sun-set most of the blue light and shorter wavelengths are scattered away by the particles in the atmosphere as the light from the sun near the horizon passes through thick layers of air and larger distance. The light that reaches us is of longer wavelength (red colour) giving a reddish appearance.



- (ii) White appearance of the sun at noon when it is overhead: At noon, the sun is nearly overhead. The sunlight has to pass through much smaller portion of Earth's atmosphere. The scattering is much less and the Sun looks white. 1+1+1

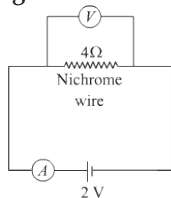
23. Graph between V and I is a straight line. So, this infers that the flow of current (I) in the conductor is directly proportional to the potential difference (V) established across it. This is ohm's law.

Resistance of the wire can be calculated as :

$$R = \frac{V}{I} = \frac{0.8}{0.2} = 4 \text{ ohm}$$

This means nichrome wire has a constant value of the resistance 4 ohm.

**Circuit diagram :**



1+2

24. (a) Mathematical expression of Joule's law of heating is :  $H = I^2Rt$

Where, H = Produced Heat

I = Current flowing through the device

t = Time taken

**r = resistance of the appliance**

(b) Given, Charge (Q) = 96000 C, Time (t) = 2 h,

Potential difference (V) = 40 V

Heat generated,  $H = VI t$

Or  $H = V \times \frac{Q}{t} \times t$

Or  $H = V \times Q$

Or  $H = 40 \times 96000$

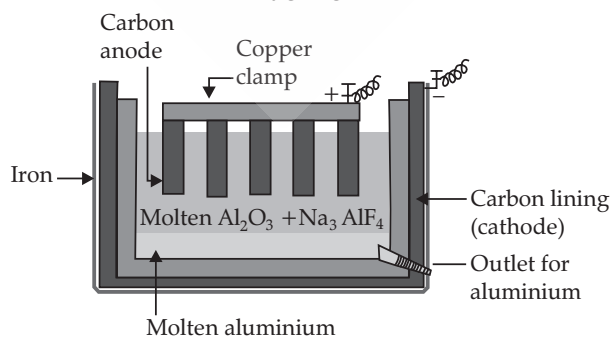
Or  $H = 3840000 \text{ J}$  1+2

### SECTION – C

25. Metals which are placed high in the reactivity series such as sodium, calcium, magnesium, aluminium etc. are very reactive. These metals have high affinity for oxygen than carbon. Therefore these metals cannot be obtained by reduction with carbon.

For such metals, electrolytic reduction process is used for obtaining metal.

**Electrolytic reduction of aluminium :** Molten aluminium oxide is electrolysed to produce pure aluminium at the cathode while oxygen gas is produced at the anode.



**Electrolytic cell for the extraction of aluminium**

1+1+1+2

26. (i) Element E is Silicon. It will form covalent bond only as it has four electrons in its outermost orbit and need only four more electrons to become stable.

(ii) Non-metal with valency 2 is B, which is oxygen.

(iii) Element D is a metal with valency 2. Element D is Magnesium. Due to its low electro negativity, it has a higher tendency to donate electrons.

(iv) Element F has the largest atomic size. Element F is argon. Argon occupies 3 energy shells compared to elements H and C, which occupies one and two energy shells. Due to this, the atomic radius of argon is the largest.

(v) Elements H, C and F belong to Group number 18, which means according to their electronic configuration, their octet is complete and thus these elements are stable. They have very low tendency to react with other elements. Group 18 elements belong to noble gas family.

1+1+1+1+1

**OR**

The distance from centre of nucleus to outermost shell of an atom is atomic radius.

Atomic size is measured in Angstroms, where 1 Angstroms =  $10^{-10}$  metres.

Along the period from left to right : Atomic radius decreases

**Reason :** Nuclear charge increases which tends to pull the electrons closer to the nucleus.

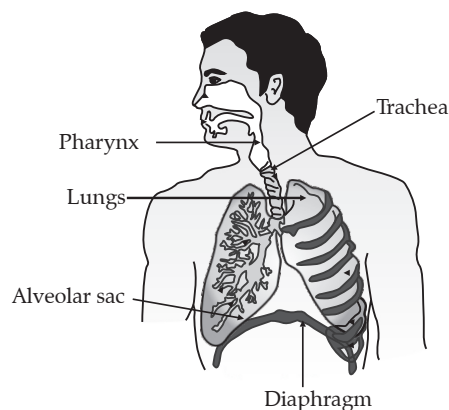
Down the group : Atomic radius increases

**Reason :** Number of shells increases on going down the group.

1+1+ 1 ½ + 1 ½

27. (a) Terrestrial organism can obtain oxygen directly from the air and have slow breathing rate but; aquatic organisms have to obtain oxygen for respiration which is dissolved in water. Since, the amount of oxygen dissolved in water is fairly low as compared to the amount of oxygen in air; the rate of breathing in aquatic organisms is much faster.

(b) **Diagram of human respiratory system :**



2 + 3

**OR**

(a) **Human excretory system comprises :** a pair of kidneys, a pair of ureters, a urinary bladder and a urethra.

(b) **Urine formation involves three steps :**

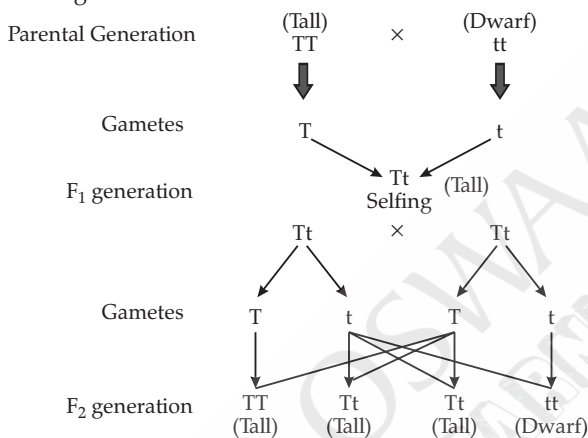
(i) **Glomerular filtration :** Nitrogenous wastes, glucose, water, amino acids filter from the blood into Bowman's capsule of the nephron.

(ii) **Tubular reabsorption** : Useful substances from the filtrate are reabsorbed back by capillaries surrounding the nephron.

(iii) **Secretion** : Urea, extra water and salts are secreted in the tubule which open up into the collecting duct and then into the ureter. 2+3

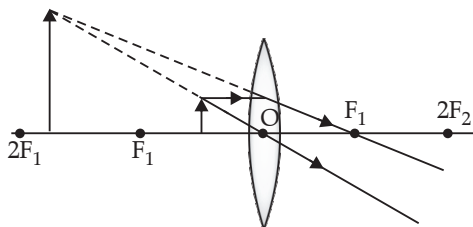
28. (a) **Law of dominance of traits**: It states that “When parents having pure contrasting characters are crossed then only one character expresses itself in  $F_1$  generation. This character is the dominant character and the character which cannot express itself is called recessive character”.

Let us take an example of tall and dwarf in pea plant. When pure line tall (TT) plants were crossed with pure line dwarf (tt) plants, offspring were all heterozygous tall (Tt). The appearance of all Tall plants in the  $F_1$  generation shows that tallness is the dominant character while dwarfness is the recessive character. The ratio of Tall to Dwarf in  $F_2$  generation is 3 : 1.



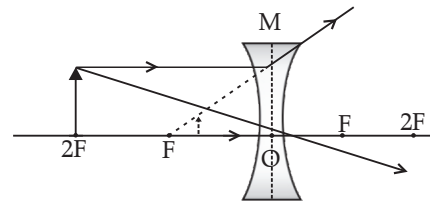
(b) Characters that a person acquires during one’s life time are known as acquired characters/traits. Such changes do not occur in the reproductive tissues. Changes in the non-reproductive tissues are not passed on to the DNA of the germ cells and therefore not inherited by the next generation. 3+2

29. (i) **When object is placed between optical centre and principal focus of a convex lens :**



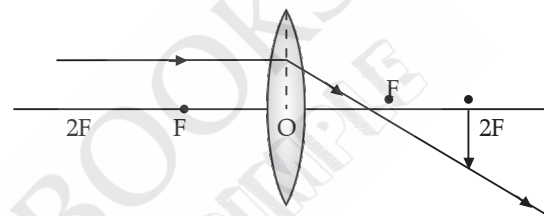
The image formed is virtual and erect, so the sign of magnification will be positive. Also, since, image formed is magnified, so value of magnification will be greater than one.

(ii) **When object is placed anywhere in front of a concave lens :**



The image formed is virtual and erect, so the sign of magnification will be positive. Also, since, image formed is diminished, so value of magnification will be less than one.

(iii) **When an object is placed at  $2F$  of a convex lens :**



2+2+1

OR

Given, Height of object ( $h_0$ ) = 4 cm  
 Object distance ( $u$ ) = -25 cm  
 Focal length (convex lens) ( $f$ ) = +15 cm

(i) By applying mirror formula,

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

Or 
$$\frac{1}{v} = \frac{1}{-15} - \frac{1}{-25}$$

Or 
$$\frac{1}{v} = \frac{-5+3}{75}$$
  

$$v = \frac{-75}{2} = -37.5 \text{ cm}$$

Negative sign indicates that the image is formed in front of the mirror. Therefore, the screen must be placed in front at a distance of 37.5 cm.

(ii) As per magnification formula,  $m = \frac{-v}{u} = \frac{h_i}{h_o}$

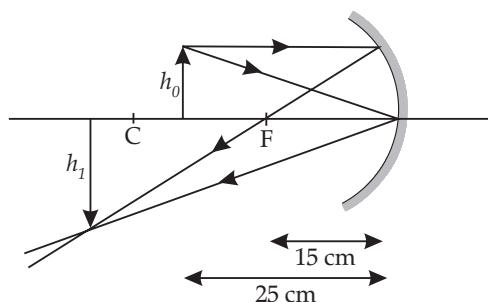
Or 
$$m = \frac{-(-75)}{-25} = \frac{h_i}{4}$$

Or 
$$h_i = \frac{-75}{(2 \times 25) \times 4}$$
  

$$h_i = -6 \text{ m}$$

Negative sign indicates that the image is below the principal axis. Therefore, the size of the image is 6 cm.

(iii) **Ray diagram :**



2+2+1

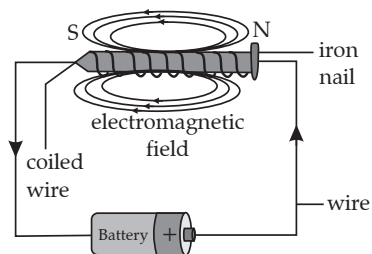
30. (a) **Electromagnet** : Magnet formed by producing magnetic field inside a solenoid.

**Uses of electromagnet :**

Inside TVs, sound speakers and radios.

Inside a generator to transform mechanical energy to electrical energy.

(b) **Labelled diagram to show how an electromagnet is made :**



An electromagnetic field is formed when a current passes through the wire.

(c) Soft iron rod increases the magnetism of solenoid by a thousand fold. When the solenoid current is switched off, the magnetism is effectively switched off since the soft iron core has low retentivity.

(d) **Ways to increase the strength of an electromagnet if the material of the electromagnet is fixed are :**

(i) By increasing the amount of current flowing in the solenoid

(ii) By increasing the number of turns in the solenoid.

2+2+1

**Delhi Set - II**

31/1/2

**SECTION – A**

1. Ketone 1

5. (b)  $Fe_3O_4$   
 $3Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4(s) + 4H_2(g)$  1

OR

(b) Calcium reacts with oxygen and form CaO which has high melting point and is water soluble. 1

11. (b) chemical energy 1

12. (d) Support life 1

13. (c) In homologous series of alcohols, the formula for the second member is  $C_2H_5OH$  and the third member is  $C_3H_7OH$ . The difference between the molecular masses of the two consecutive members of a homologous series is 14. 1

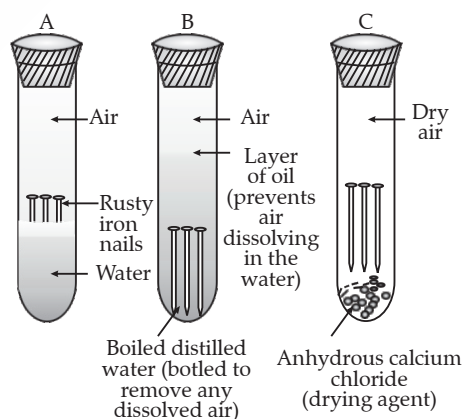
**SECTION – B**

15. **Rusting** : The process of acquiring a coating of a brown flaky substance called rust on iron when it is exposed to moist air for a long time.

**Activity :**

- Take three test tubes and label them as A, B and C.
- In each tube, place clean iron.
- Pour some water in test tube A and cork it.
- Pour distilled water in test tube B, add about 1 ml of oil and cork it.

- Put some anhydrous calcium chloride in test tube C and cork it.
- Leave the test tube for few days.



**Observation** : Iron nail rusts in test tube A but they do not rust in test tubes B and C.

**Explanation :**

- It is because, in the test tube A, the nails are exposed to both air and water.
- In test tube B, the nails are exposed to only water because the oil prevents the air from dissolving in water.
- In test tube C, the nails are exposed to dry air because  $CaCl_2$  will absorb the moisture from the air.

**Conclusion** : Air and water both are essential conditions for rusting. 1+2



19. (a) **Difference between binary fission and multiple fission :**

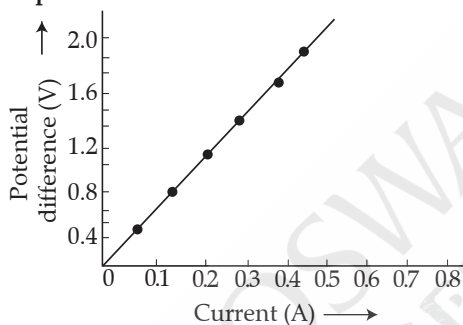
Binary fission	Multiple fission
It is the division of one organism into two similar identical organisms.	It is the division of one organism into multiple organisms.
The nucleus first divides amitotically into two, followed by division of the cytoplasm.	The nucleus divides repeatedly producing many nuclei and many daughter cells are produced.
<i>e.g. Amoeba.</i>	<i>e.g. Plasmodium.</i>

(b) *Spirogyra* reproduces asexually by fragmentation. In this, the body breaks up into two or more small pieces of fragments upon maturation. These fragments grow into new *Spirogyra*. **2+1**

23. (a) The flow of current (I) in the conductor is directly proportional to the potential difference (V) established across it provided the physical conditions remain same.

Or  $V = IR$

Graph :



(b) Given :

Potential Difference (V) = 1.4 V

Current (I) = 0.35 A

As per formula,  $V = IR$

So,  $R = \frac{V}{I} = \frac{1.4}{0.35} = 4 \text{ ohm}$

**2+1**

## SECTION – C

25. (a) **Thermite reaction :** Reaction in which iron oxide reacts with aluminium to produce molten iron. It is an exothermic process.



The thermite reaction is used to join railway tracks or cracked machine parts. This process is called thermite welding.

(b) As aluminium is more reactive than iron, so it is placed above iron in the reactivity series.

(c) Aluminium is getting oxidized to aluminium oxide and iron oxide is getting reduced to iron. **3+1+1**

28. (a) **Genetics :** Branch of biology that deals with the study of genes and heredity in organisms.

(b) Genes are basic unit of heredity. They are linear segments of DNA which codes for a gene product. Genes are located on chromosomes.

(c) **Factors responsible for the rise of a new species (speciation) are :**

(i) **Geographic isolation :** wherein geographic barrier prevents interaction between species. Over a period of time, the sub-populations become more and more diversified from one another and finally form two different species.

(ii) **Genetic drift :** The accidental change in frequency of genes in a small population is called genetic drift.

(iii) **Natural selection :** It is the process that results in the increased survival and reproductive success of individuals that are well suited to their environment. **1+1+3**

Delhi Set - III

31/1/3

## SECTION – A

2. **Advantage of AC:** It can be transmitted over long distance without much loss of energy. **1**

7. (d) (A), (B) and (D). The gas evolved is carbon dioxide with brisk effervescence. It turns lime water milky. It is also a by-product of respiration. **1**

8. (a) (A) and (C) **1**

9. (c) (A) and (B) **1**

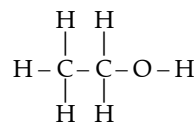
OR

(c) (A), (B) and (C) **1**

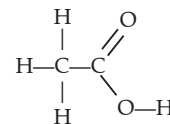
14. (c) A solar cooker cooks the meal due to greenhouse effect. The glass sheet that covers the box is responsible for producing the greenhouse effect. Plane mirror maximize the amount of light entering the solar cooker. **1**

## SECTION – B

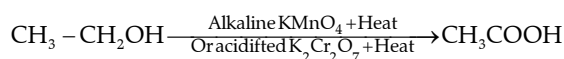
17. (a) Structure of ethanol :



Structure of ethanoic acid :



(b) Conversion of ethanol to ethanoic acid is an oxidation reaction because oxygen is added to ethanol to convert it to ethanoic acid.





In the above reaction alk.  $\text{KMnO}_4$ /acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  add oxygen to ethanol hence they are called oxidising agent. **1+1+1**

18. a- Receptor, b- Sensory neuron, c- Spinal cord, d- Relay neuron, e- Effector.

The term given to the sequence of events occurring in diagram is reflex arc. **2+1**

Or

(a) **Tropism** : It is the directional growth movement of a plant organ in response to an external stimulus.

(b) Auxins produced in the shoot tip move downwards in the plant. These auxins cause cell elongation in the growing tissues. In the tendrils, auxins move away from the point of contact with the supporting object. More growth occurs on the side away from the support. As a result of unequal growth on the two sides, the tendril coils around the support. **1+2**

23. Given,

Object distance,  $u = -25$  cm

Image distance,  $v = -50$  cm

Focal length,  $f = ?$

Using lens formula,

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$= \frac{1}{-50} - \frac{1}{-25}$$

$$= -\frac{1}{50} + \frac{1}{25}$$

$$= \frac{-1+2}{50} = \frac{1}{50}$$

$$\therefore f = 50 \text{ cm.}$$

$$\text{Power of the lens, } P = \frac{1}{f(\text{in m})} = \frac{100}{f(\text{in cm})}$$

$$\Rightarrow P = \frac{100}{50} = +2\text{D}$$

Hence, the corrective lens is convex, because power of lens is positive. **3**

## SECTION - C

27. (a) The gas released during the process of photosynthesis is oxygen. Oxygen liberated during photosynthesis comes from water.

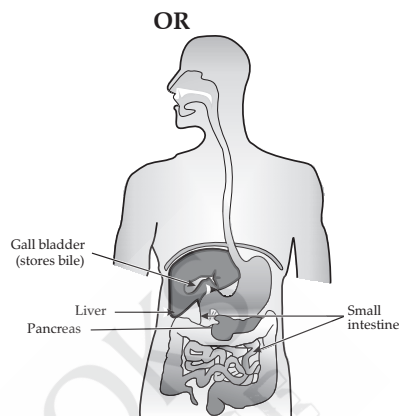
During photosynthesis, plants absorb carbon dioxide and sunlight to produce carbohydrates. The solar energy trapped by chlorophyll breaks down water molecules by the process of photolysis. Photolysis of water releases oxygen. This released oxygen gets emitted in the atmosphere.

- (b) Stomata are tiny pores present on the surface of the leaves.

The opening and closing of stomatal pores are controlled by the turgidity of guard cells. When guard cells uptake water from surrounding cells,

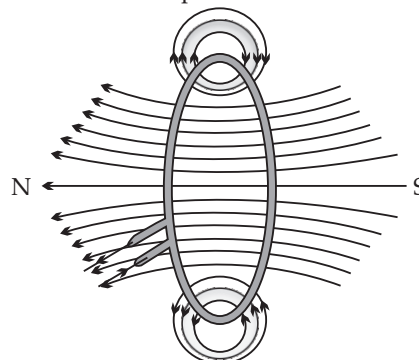
they swell to become a turgid body. This enlarges the pore in between and causing stomatal opening. When water is released, they become flaccid. This closes the pore in between causing stomatal closing. **2 + 3**

- (a)



- (b) Absorption of digested food occurs mainly in the small intestine because it has finger like projections called villi which help in absorption of food into blood. Villus contains a lymph capillary called lacteal in the center. Lacteal in turn is surrounded by a network of thin and small blood vessels called blood capillaries close to its surface. As the food moves slowly between, over and around the villi, the surface of villi absorbs the digested food materials into blood flowing through them. Blood, in turn, carries the absorbed food materials to all the parts of the body. In the cells food is used for energy, repair and growth. The process is known as assimilation. **2+3**

30. (a) **Magnetic field due to current through a circular Loop** : It can be represented by concentric circle at every point. Circles become larger and larger as we move away. Every point on wire carrying current would rise to magnetic field appearing as straight line at centre of the loop. The direction of magnetic field inside the loop is same.



**Fig : Magnetic field lines due to a current through a circular loop**

- (b) Magnetic field is directly proportional to number of turns in the coil. As the number of turns in the coil increase, the magnetic strength at the centre increases, because the current in each circular turn is having the same direction, thus the field due to each turn adds up. **3+2**

## Outside Delhi Set - I

31/3/1

**SECTION – A**

1. Covalent bonds are formed by the sharing of electrons between the atoms. 1
2. Electropositivity is the tendency of an element to lose electrons and form positive ions in chemical reactions. 1

OR

In a group, as we move from top to bottom, the number of shells increases. Hence, the atomic radius increases. 1

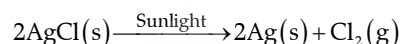
3. (a) High rise dams are constructed on the river to obstruct the flow of water and thereby collect water in large reservoirs. The water level rises and in this process the kinetic energy of flowing water gets transformed into potential energy. The water from the high level in the dam is carried through pipes to the turbines, at the bottom of the dams and converted to electricity. 1
- (b)  $1 \text{ MW} = 1 \times 10^6 \text{ W}$
- (c) (i) Displacement of large number of people from their original settlement to other locations. 1+1+1+1  
(ii) Environmental instability due to deforestation and loss of floral and fauna biodiversity.
- (d) Potential energy gets converted into kinetic energy into turbine. Rotating turbine in magnetic field produces electricity. 1+1+1+1
4. (a) She should take more iodine in her diet which would bring thyroxine levels to normal. 1+1+1+1  
(b) During menstruation, while giving birth and after going through menopause.  
(c) Low level of TSH causes – Goitre disease  
(d) Iodine. 1+1+1+1
5. (a) Scattering of light is not enough at such heights. 1
6. (c) 2A. 1
7. (a) Maximum resistance in series  $= 4 \times \frac{1}{2} = 2 \text{ ohm}$  1
8. (a) This is an ideal setting of the Khadin system and A= Catchment area, B= Saline area, and C = Shallow dugwell. 1

OR

- (b) local people whose basic needs can no longer be met from such forests. 1
  9. (c) Lead storage battery manufacturing factories near A and soaps and detergents factories near B. 1
  10. (b) Formation of crystals by process of crystallization 1
  11. (c) A has pH greater than 7 and B has pH less than 7 1
  12. (d) Group 16 and Period 3. 1
- OR
- (d) (A), (B) and (C) 1
  13. (a) Both A and R are true and R is the correct explanation of A. 1
  14. (c) A is true but R is false. 1

**SECTION – B**

15. (i) When silver chloride is exposed to sunlight, it decomposes to give silver metal and chlorine gas. In this reaction white colour of silver chloride changes to grayish white due to the formation of silver metal. This is a photochemical decomposition reaction.

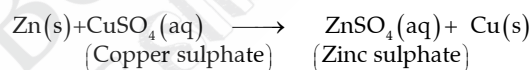


- (ii) When copper powder is heated in the presence of oxygen, the surface of copper powder becomes coated with black copper oxide.



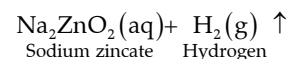
This is an oxidation reaction .

- (iii) Zinc being more reactive than copper, displaces copper from its compound and forms new product. This is a displacement reaction.



1+1+1

16. (i)  $\text{Zn(s)} + 2\text{NaOH(aq)} \xrightarrow{\text{Heat}}$



- (ii)  $\text{CaCO}_3(\text{aq}) + \text{H}_2\text{O(l)} + \text{CO}_2(\text{g}) \rightarrow \text{Ca(HCO}_3)_2(\text{aq})$

- (iii)  $\text{HCl} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{Cl}^-$  1+1+1

OR

Bleaching powder is produced by the action of chlorine on dry slaked lime  $\text{Ca(OH)}_2$ . Chlorine is produced during the electrolysis of aqueous sodium chloride.

- (i) G:  $\text{Cl}_2$ , C:  $\text{CaOCl}_2$

- (ii)  $\text{Ca(OH)}_2 + \text{Cl}_2 \rightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$

- (iii) Bleaching powder. 1+1+1

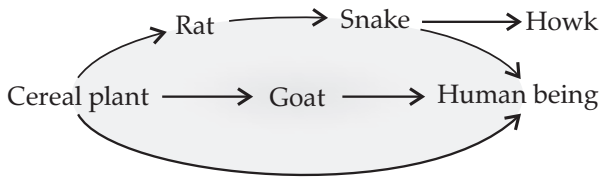
17. (i) Category A (Li Na K) show Dobereiner's triads.
- (ii) Mendeleev arranged the elements in increasing order of atomic mass and grouped them as per similar chemical property. The elements in A, B and C are similar among themselves but have different chemical properties.
- (iii) No, Newland law of Octaves is not applicable because in the three categories every eighth element will not show same property as first. Also, Newland Octaves law is applicable only upto calcium. 1+1+1

18. (a) Short food chains are more efficient in terms of energy. The shorter the food chain is, more is the available amount of energy.

Cereal Plant → Human being

(b) Harmful for human consumption as the traces of pesticide will be carried by food.

(c)



1+1+1

OR

(a) Harmful effects of plastic bags :

- (i) Plastics do not undergo degradation, thus stay in soil for many years. This may affect the soil fertility and degrades the soil quality.
- (ii) When plastic artifacts enter the drainage and sewerage system, they block the pipes and drains causing water logging.
- (ii) Littering of plastics in open spaces creates unhygienic conditions, as it act as breeding ground for insects and mosquitoes.

(Any two)

We can reduce the use of plastic bags and carry jute bags and paper bags to carry items from the market.

(b) Measures taken for proper disposal of waste produced at our homes are :

- Prepare a compost pit for kitchen wastes.
- Safe disposal of plastic bags.
- Segregation of biodegradable and non-biodegradable wastes.
- Fruit peels can be placed near trees or plants, which on decomposition will enrich the soil with nutrients.
- Recycling of paper wastes. (Any two) 2+1

19. (a) (i) Trypsin acts upon proteins and converts it into peptids and amino acids

(ii) Lipase is an enzyme that breaks down dietary fats into smaller molecules called fatty acids and glycerol.

(b) Functions of villi :

- (i) Villi are richly supplied with blood vessels which take the absorbed food to each and every cell of the body.
- (ii) It also absorbs water.
- (iii) They increase the surface area for the absorption of food. (Any one) 2+1

20. (a) (i) Analogous structure

(ii) Analogous structures

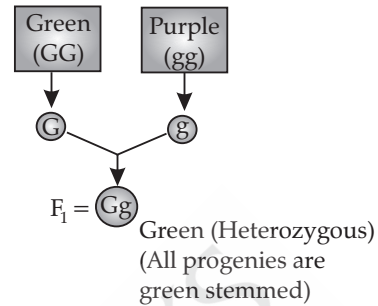
(iii) Homologous structures

(iv) Analogous structures

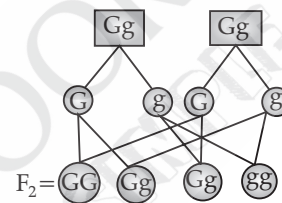
(b) Homologous organs are defined as the organs which have same structure but different functions

while analogous organs are defined as the organs which have same functions but different structure. 2+1

21. (a) (i) Colour of the stem in F<sub>1</sub> progeny : All green



(ii) Percentage of brown stem : 25 %



(iii) GG : Gg is 1 : 2

(b) Based on the above cross, it can be concluded that green colour is dominant and get expressed in F<sub>1</sub> generation. The brown stem, which does not get express itself in the F<sub>1</sub> generation, is the recessive character. This is the law of dominance. 2+1

22. (i) Converging lens

(ii) Microscope and Telescope

(iii) Characteristic of the image formed are :

(a) Virtual image

(b) Magnified image

(c) Image behind the mirror

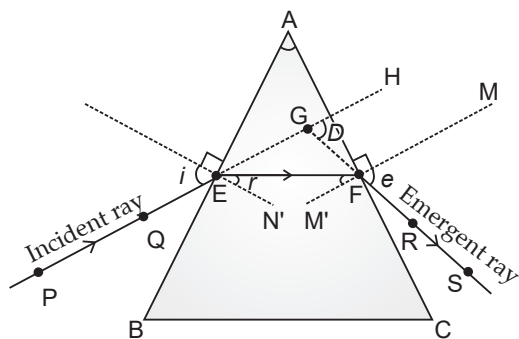
1+1+1

23. (i) Divergence or degree of closeness of magnetic field lines near the ends of a current carrying straight solenoid indicates a increase in the strength of the magnetic field near the ends of the solenoid.

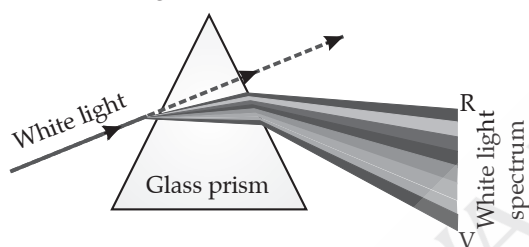
(ii) A current carrying solenoid acts as a bar magnet. We know that a freely suspended bar magnet aligns itself in the North-South direction. So, a freely suspended current carrying solenoid also aligns itself in the North-South direction.

(iii) Burnt out fuse cannot be re-used. Also, a fuse wire works because of its lower melting point. If the fuse with larger rating is used with an appliance, the fuse wire shall not melt and hence would fail to serve the required purpose. So, new fuse of same rating should be used for electrical safety. 1+1+1

24. (a) In case of monochromatic light, the ray will bend due to refraction but it will not show dispersion of light.



- (b) If narrow beam of monochromatic light is replaced with beam of white light, a combination of narrow beam of seven colour will come out. The phenomenon of splitting of white light into its seven constituent colours when it passes through a glass prism is called dispersion of white light. The various colours seen are Violet, Indigo, Blue, Green, Yellow, Orange and Red. The different component colour of light bends at a different angle w.r.t the incident angle.



2+1

Or

- (a) (i) The type of lens required by such person to improve the vision is bifocal lens.  
 (ii) A bifocal lens consists of both convex lens and concave lenses. The convex lens used in bifocal lens is used to correct hypermetropia (far-sightedness) and concave lens is used to correct myopia (shortsightedness).

- (b) 
$$P = \frac{1}{f}$$

$$P_1 = +3D = \frac{1}{f_1}$$

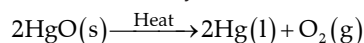
$$F_1 = \frac{1}{3} \text{ m} = +0.33 \text{ m (Convex lens)}$$

$$P_2 = -3D = \frac{1}{f_2}$$

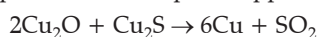
$$F_2 = -\frac{1}{3} \text{ m} = -0.33 \text{ m (Concave lens)}$$
 1+2

### SECTION - C

25. (i) When mercury oxide is heated strongly, it reduces the mercury oxide to mercury metal.



- (ii) When a mixture of copper oxide and copper sulphide is heated, pure copper is obtained.



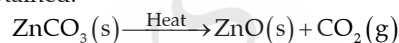
- (iii) When aluminium powder is heated with manganese dioxide, the following reaction takes place :



- (iv) Reaction of ferric oxide with aluminium. In this reaction, a lot of heat is produced along with molten iron. This process of metal oxide to form metal by using aluminium powder as a reducing agent is known as thermite reaction.



- (v) Heating of carbonate ores in the limited supply of air is known as calcination. During the process, carbon dioxide gas is released and metal oxide is obtained.



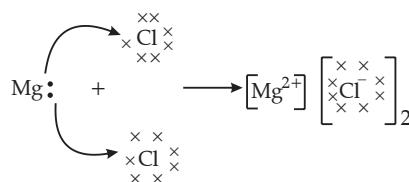
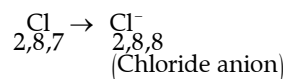
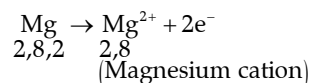
1+1+1+1+1

OR

- (i) **Formation of magnesium chloride** : Here, magnesium is a metal and chlorine is a non-metal. Magnesium atom loses two electrons to attain noble gas configuration and results in the formation of magnesium cation  $\text{Mg}^{2+}$ .

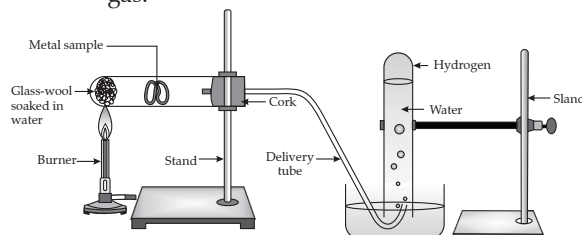
Similarly, chlorine atom gain electron to complete its octet and results in the formation of chloride anion  $\text{Cl}^-$ .

When magnesium reacts with chlorine, two electrons lost by magnesium atom are gained by two chlorine atom.  $\text{Mg}^+$  and  $\text{Cl}^-$  being oppositely charged, attract each other and held by strong electrostatic forces of attraction to exist as  $\text{MgCl}_2$ .



- (ii) Due to the strong force of attraction between the positive and negative ions, ionic compounds are solid.

- (iii) **Reaction with steam** : Metals like iron, zinc and aluminium react with steam to form corresponding hydroxide and hydrogen gas.



2+1+2





because they need currents of widely different values to operate properly. Another major disadvantage of a series circuit is that when one component fails the circuit is broken and none of the components works. **2+1+1+1**

30. (a) Given,  $R = 5 \text{ m}$ ,  $f = \frac{5}{2} \text{ m}$ ,  $u = -20 \text{ m}$  and  $V = ?$

Hence, on applying the values,

$$\frac{2}{R} = \frac{1}{V} + \frac{1}{u}$$

$$\frac{2}{5} = \frac{1}{V} - \frac{1}{20}$$

$$\frac{1}{V} = \frac{2}{5} + \frac{1}{20}$$

$$\frac{1}{V} = \frac{8+1}{20}$$

$$\frac{1}{V} = \frac{9}{20}$$

$$V = \frac{20}{9}$$

Or  $V = 2.8 \text{ m}$

**Nature of the image :** Erect, virtual, small and diminished.

(b) Mirror used by dentist is : Concave mirror

Reason : It produces enlarged, erect and virtual images of the object, so it is used to see the large image of teeth of patients. **3+2**

OR

(i) Nature of the lens used is convex lens because it produces a magnified image of the palm.

(ii) Real and magnified image of the object can be obtained in convex lens, when the object is placed between focus and center of curvature of the lens.

(iii) Given,  $f = +10 \text{ cm}$

$$u = -5 \text{ cm}$$

$$v = ?$$

By lens formula,  $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$$\text{Or } \frac{1}{10} = \frac{1}{v} - \left(-\frac{1}{5}\right)$$

$$\text{Or } \frac{1}{v} = \frac{1}{10} - \frac{1}{5}$$

$$\text{Or } \frac{1}{v} = \frac{-1}{10}$$

$$\text{Or } v = -10 \text{ cm}$$

By using magnification formula,  $m = \frac{v}{u}$

$$\text{Or } m = \frac{-10}{-5}$$

$$m = 2 \text{ cm}$$

Image is formed twice the size of the object.

**2+1+2**

## Outside Delhi Set - II

31/3/2

### SECTION - B

17. (a)  $X > Y > Z$

(b) Z because electronegativity increase across the period.

(c) (i)  $X_2Y_3$ .

(ii)  $XZ_3$ . **1+1+1**

19. (a) **Ecosystem :** It is the functional unit of the environment comprising living and non-living components.

(b) The first trophic level in a food chain is always producers (plants) because they have the ability to trap solar energy with the help of chlorophyll. As a result, they produce food by photosynthesis.

(c) Frogs are secondary consumers. **1+1+1**

OR

(a) Ozone is formed in the upper atmosphere when solar UV radiation dissociates molecules of oxygen ( $O_2$ ) and then this oxygen atom ( $O$ ) combines with an oxygen molecule.

(b) Reaction involved :  $O_2 \rightarrow O + O$   
 $O + O_2 \rightarrow O_3$

(c) When CFC's reach upper layers of the atmosphere, they cause depletion of ozone layer, and allow harmful UV radiations to reach the surface of the earth to create health hazards.

**1+1+1**

20. Factors which can lead to speciation are :

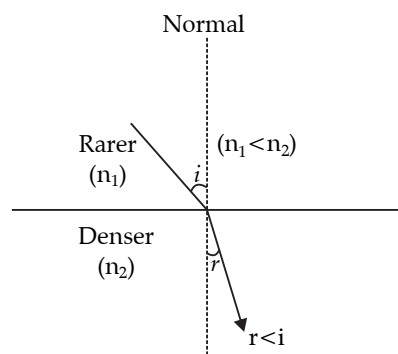
- (a) Genetic drift  
(b) Mutation / Drastic change in the genes or DNA  
(c) Natural selection  
(d) Geographical isolation

Geographical isolation cannot be a major factor in the speciation of a self-pollinating plant species.

**Reason :** Physical barrier cannot be created in self pollinating plants. **2+1**

22. (a) Refractive index of alcohol > refractive index of water. So, alcohol is optically denser than water.

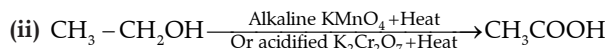
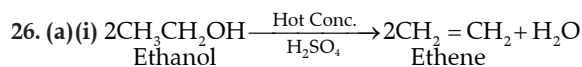
(b) When a ray of light enters from water to alcohol, it bends towards the normal.





- (c) Angle of incidence is greater than angle of refraction. 1+1+1

### SECTION - C



- (b) Differences between addition reaction and substitution reaction :

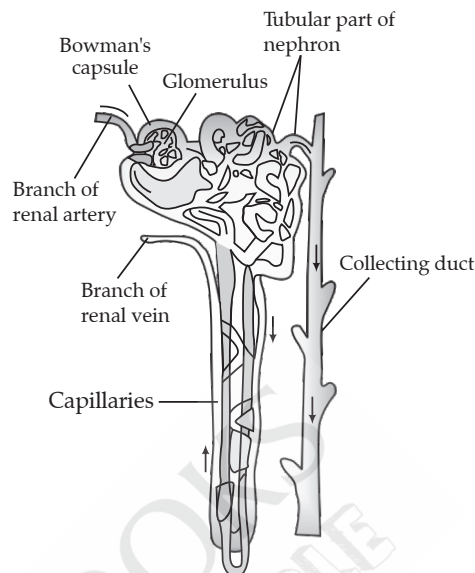
Addition reaction	Substitution reaction
A type of reaction in which two or more molecules combine with each other to form a single substance.	A type of reaction in which one type of atom or a group of atom replaces another atom in a compound.
It is a characteristic property of unsaturated hydrocarbons.	It is a characteristic property of saturated hydrocarbons
E.g. Hydrogenation of oil.	E.g. Halogenation of alkane.

2+3

27. (a) Leaves of plants helps in excretion in many ways :

- (i) Excess of water in plants is removed by the process of transpiration and guttation.
- (ii) Carbon dioxide and oxygen that can be considered as waste products of respiration and photosynthesis respectively are excreted out with the help of stomata present on leaves.
- (iii) Leaves help in excretion through a process abscission that is falling off and yellow of leaves. By the help of this process, plants get rid off toxins etc.

- (b) **Structure of a Nephron** : Each kidney contains many filtration units called as nephrons. Nephrons are made up of cluster of thin walled capillaries called glomerulus which is associated with a cup like structure called Bowman's capsule and the long tube which terminates through this capsule. The artery which takes blood to the glomerulus is called afferent arteriole and the one receiving blood from the glomerulus is called efferent arteriole.



#### Functioning of a Nephron :

- The blood enters the kidney through the renal artery, which branches into many capillaries associated with glomerulus.
- The water and solute are transferred to the nephron at Bowman's capsule.
- In the proximal tubule, some substances such as amino acids, glucose, and salts are selectively reabsorbed and unwanted molecules are added in the urine.
- The filtrate then moves down into the loop of Henle, where more water is absorbed.
- From here, the filtrate moves upwards into the distal tubule and finally to the collecting duct. Collecting duct collects urine from many nephrons.
- The urine formed in each kidney enters a long tube called ureter. From ureter, it gets transported to the urinary bladder and then into the urethra.

2+3

29. (a) **Power** : It is the amount of electric energy consumed in a circuit per unit time.

$$P = \frac{W}{t}$$

Its S.I unit is Watt (W).

- (b) (i)  $P = V \times I = 5 \text{ V} \times 0.5 \text{ A} = 2.4 \text{ W}$

(ii) Resistance  $R = \frac{V}{I} = \frac{5}{0.5} = 10 \text{ ohms}$

(iii) Energy consumed =  $P \times t$   
 $= 2.4 \text{ W} \times 2.5 \text{ h}$   
 $= 6.25 \text{ Wh}$

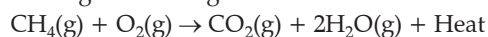
2+3

### Outside Delhi Set - III

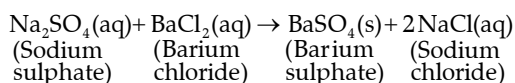
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### SECTION - B

15. (i) **Exothermic reaction** : Reaction in which heat is released along with formation of products. E.g. Burning of natural gas.



- (ii) **Precipitation reaction** : When sodium sulphate solution is added to barium chloride solution, a white precipitate of barium sulphate is formed along with sodium chloride solution. Since, white precipitate of  $\text{BaSO}_4$  is formed, so it is called precipitation reaction.



1½ + 1½

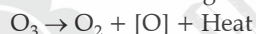
18. (a) The carnivores keep the populations of other carnivores and herbivores in check. If there were no carnivores, the herbivore populations would explode and they will rapidly consume large amounts of plants and fungi, growing until there is not enough food to sustain them. Eventually, the herbivores would starve, leaving only those plants that were distasteful or poisonous to them. Species diversity would, therefore, drop dramatically.

(b) The increase in concentration of harmful chemical substances like pesticides in the body of living organisms at each trophic level of a food chain is called biological magnification. The level of biomagnification would increase as the trophic level increases and would be highest for topmost trophic level. It is because certain harmful substances, usually ones not found in nature but introduced by man, may get into plants and/or animals. These poisonous substances may not be broken down in the body or excreted easily, efficiently and quickly. Instead, they accumulate in the tissues, and as the living organism eats more, the concentration of these substances increases and they pass from one trophic level to the next. The maximum concentration is accumulated at the top carnivore's level.

1½ + 1½

OR

**Formation of ozone in Atmosphere :** Ozone is continuously formed by the action of UV rays on molecular oxygen, and also degraded into molecular oxygen in the stratosphere. The high energy ultraviolet radiations split ozone into molecular and atomic oxygen with large amount of heat. This heat is used in warming the stratosphere.



This oxygen atom then recombine with oxygen ( $\text{O}_2$ ) molecule to form ozone molecule.



The ozone layer acts as a protective blanket around the earth which shields the entire earth from harmful ultraviolet radiations that come from the sun.

Ozone depletion is the reduction in concentration of ozone layer. It is formed due to an increased concentration of ozone-depleting substances such as chlorofluorocarbons (CFCs). CFCs are used as refrigerants, ACs, fire extinguishers, aerosols spray etc.

1+1+1

22. (a) Snell's Law: The ratio of the sine of angle of incidence to the sine to angle of refraction is a constant for a light of given colour and for a given pair of media.

$$\frac{\sin i}{\sin r} = \text{Constant}$$

(b) When a light ray enters a glass slab, then the emergent ray is parallel to the incident ray but is

shifted sideward slightly. In this case, refraction takes place twice, first when ray enters glass slab from air and second when exits from glass slab to air.

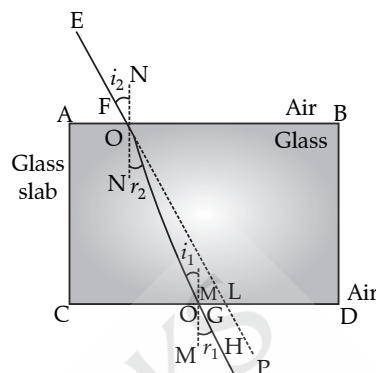


Fig : Refraction of light through a rectangular glass slab

1+2

26. (a) Name of the metal is sodium (Na).

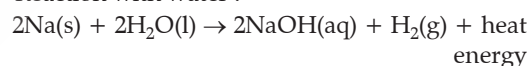
(b) Formula of the compound formed is  $\text{Na}_2\text{O}$ .

(c) Metals like sodium and potassium react with oxygen so fast that they can catch fire if kept open. Since, they are most reactive metals; they are always kept immersed in kerosene oil to prevent accidental fire.

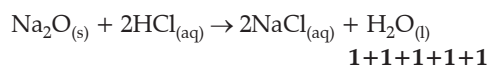
(d) Sodium oxide reacts with hydrochloric acid to produce sodium chloride and water.

(e) Reaction with air :  $4\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O}$

Reaction with water :



Reaction of sodium oxide with HCl :



1+1+1+1+1

OR

(a) Ca = 2, 8, 8, 2      O = 2, 6

(b)  $\text{Ca} \times + \text{O} \times \times \rightarrow \text{Ca}^{2+} \times \times \text{O}^{2-}$

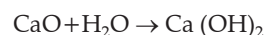
(c) Calcium ions ( $\text{Ca}^{2+}$ ) and oxygen ions ( $\text{O}^{2-}$ )

(d) Characteristics of calcium oxide ( $\text{CaO}$ ) :

(i) Quick lime is an amorphous white solid with a high melting point of  $2600^\circ$ .

(ii) It is a very stable compound and withstands high temperatures.

(iii) In the presence of water, it forms slaked lime. This process is called the slaking of lime.



(iv) It is an oxide that is basic in nature and forms salts when it comes in contact with an acid.



28. (a) **Methods of contraception :**

(i) Barrier method or mechanical method/ Condom/ Diaphragm, to prevent the meeting of sperms and ova.

- (ii) Chemical method/ Oral pills : Changes the hormonal balance of the female partner so that the eggs are not released.
- (iii) **Surgical method** : to block the vas deferens in males/ vasectomy or the fallopian tube (oviduct) in females/ tubectomy, to prevent the transfer of sperms or egg and hence no fertilization takes place. **(Any two)**
- (b) **Bacterial infections** : Syphilis and Gonorrhoea  
**Viral infections** : Human papillomavirus (HPV), HIV
- (c) (i) Prevents meeting of sperm and ova  
(ii) Protects against sexually transmitted diseases **2+2+1**

OR

- (a) Spore formation in *Rhizopus* : **2**
- (b) **Differences between Budding and Fermentation** :

Budding	Fermentation
In budding, a small part of the body of the parent grows out as a bud which then detaches and become a new organism.	In this, the body breaks up into one or more small pieces of fragments grow into new individual.
<i>Hydra</i> reproduces by budding using the regenerative cells.	It takes place in multi-cellular organisms with simple body organisation such as <i>Spirogyra</i> .

$\frac{1}{2} + \frac{1}{2}$

- (c) **Vegetative propagation is practiced for growing some type of plant because** :
  - (i) Only one parent is required for reproduction; this eliminates the need of special mechanisms (pollination) and fusion of gametes *i.e.*, fertilization.
  - (ii) Many plants are able to tide over unfavourable conditions because of the presence of vegetative reproductive parts like tubers, corms and bulbs.
  - (iii) Plants that do not produce seeds can be propagated by this method, *e.g.*, sugarcane and potato.
  - (iv) Vegetative propagation is a cheaper, easier

and rapid method of propagation in plants than growing plants from seeds. For example, lilies grow very slowly and take us to seven years to develop flowers when their seeds are grown, but when grown vegetatively, flowers are produced only after a year or two.

- (v) The trait (character) of the parent plant is preserved and the offspring are genetically identical. **(Any two) 1+1**

30. (a) Given,  $V = 200$  volts and  $P = 100$  watt

$$\text{As } P = \frac{V^2}{R} \text{ Or } R = \frac{V^2}{P} = \frac{(200)^2}{100 \text{ W}} = \frac{40000}{100 \Omega} = 400 \Omega$$

- (b) Electrical energy consumed,  $E = \text{number of units} \times \text{Power of each unit} \times \text{time} \times \text{total days}$   
Here,  $n = 3$ ,  $P = 100 \text{ W}$ ,  $t = 10$  hours,  $\text{Days} = 30$   
So,  $E = 3 \times 100 \text{ W} \times 10 \text{ h} \times 30 = 90,000 \text{ Wh}$   
 $= 90 \text{ kWh}$
- (c) Total cost of electricity = Total unit of energy consumed  $\times$  Cost per unit  
 $= 90 \text{ kWh} \times 6.50 = ₹ 585$  **2+2+1**

OR

- (a) The resistance of a conductor is said to be 1 ohm if a current of 1 ampere flows through it when the potential difference across it is 1 volt.
- (b) **Electric power** : It is the amount of electric energy consumed in a circuit per unit time.  
Expression :  $P = \frac{V^2}{R}$

- (c) Given,  $V = 220 \text{ V}$ ,  $I = 5 \text{ A}$   
 $V = IR$   
Or  $R = \frac{V}{I}$

In parallel combination, let the no. of resistors =  $x$

$$\frac{132}{x} = \frac{220}{5}$$

$$\frac{132}{x} = 44$$

$$x = \frac{132}{44}$$

$$x = 3$$

The number of resistors = 3

**1+2+2**

