SCIENCE (Theory)

Time allowed : 2½ hours ***Maximum Marks : 60***

GENERAL INSTRUCTIONS :

1. The question paper comprises of **two** sections, A and B. You are to attempt both the sections.
2. All questions are compulsory.
3. There is no overall choice. However, internal choice has been provided in all the three questions of five marks category. Only one option in such questions is to be attempted.
4. All questions of section A and all questions of section B are to be attempted separately.
5. Questions number 1 to 6 in section A and 19 to 21 in section B are short answer type questions. These questions carry one mark each.
6. Questions number 7 to 12 in section A and 22 to 24 in section B are short answer type questions and carry two marks each.
7. Questions number 13 to 16 in section A and 25 to 26 in section B are also short answer type questions and carry three marks each.
8. Questions number 17 and 18 in section A and question number 27 in section B are long answer type questions and carry five marks each.

QUESTION PAPER DELHI (CODE NO. 31/1/1)

SECTION - A

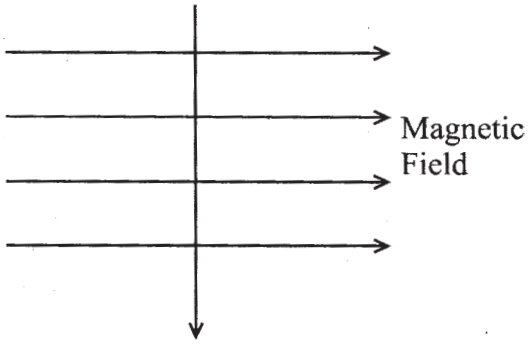
1. What changes in the colour of iron nails and copper sulphate solution do you observe after keeping the iron nails dipped in copper sulphate solution for about 30 minutes? 1

2. State two characteristic features of carbon which when put together give rise to a large number of carbon compounds. 1

3. Explain why a ray of light passing through the centre of curvature of a concave mirror gets reflected along the same path. 1

4. What is the nature of the image formed by a concave mirror if the magnification produced by the mirror is + 3 ? 1

5. A charged particle enters at right angles into a uniform magnetic field as shown. What should be the nature of charge on the particle if it begins to move in a direction pointing vertically out of the page due to its interaction with the magnetic field ? 1

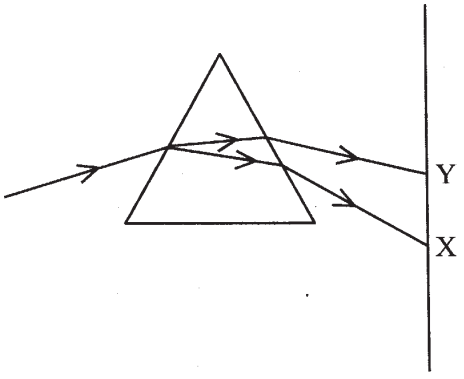


6. Name the part of our eyes that helps us to focus near and distant objects in quick succession. 1

7. What happens when an aqueous solution of sodium sulphate reacts with an aqueous solution of barium chloride? State the physical conditions of reactants in which the reaction between them will not take place. Write the balanced chemical equation for the reaction and name the type of reaction. 2

8. What is the main constituent of biogas ? How is biogas obtained from biomass ? Write any two advantages of using this gas. 2

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



(a) State the colour seen at X and Y.

(b) Why do different colours of white light bend through different angles with respect to the incident beam of light ?

10. What is a solenoid ? Draw the pattern of magnetic field lines of a solenoid through which a steady current flows. What does the pattern of field lines inside the solenoid indicate ? 2

11. A coil of insulated wire is connected to a galvanometer. What would be seen if a bar magnet with its north pole towards one face of the coil is

(i) moved quickly towards it,

(ii) moved quickly away from the coil and

(iii) placed near its one face ?

Name the phenomenon involved. 2

12. Mention any four limitations in harnessing wind energy on a large scale. 2

13. At what distance should an object be placed from a convex lens of focal length 18 cm to obtain an image at 24 cm from it on the other side. What will be the magnification produced in this case ? 3

14. No chemical reaction takes place when granules of a solid, A, are mixed with the powder of another solid, B. However when the mixture is heated, a reaction takes place between its components. One of the products, C, is a metal and settles down in the molten state while the other product, D, floats over it. It was observed that the reaction is highly exothermic.

(i) Based on the given information make an assumption about A and B and write a chemical equation for the chemical reaction indicating the conditions of reaction, physical state of reactants and products and thermal status of the reaction.

(ii) Mention any two types of reactions under which above chemical reaction can be classified. 3

15. Name the functional group of organic compounds that can be hydrogenated. With the help of suitable example explain the process of hydrogenation mentioning the conditions of the reaction and any one change in physical property with the formation

of the product. Name any one natural source of organic compounds that are hydrogenated. 3

16. Atoms of eight elements A, B, C, D, E, F, G and H have the same number of electronic shells but different number of electrons in their outermost shell. It was found that elements A and G combine to form an ionic compound. This compound is added in' a small amount to almost all vegetable dishes during cooking. Oxides of elements A and B are basic in nature while those of E and F are acidic. The oxide of D is almost neutral. Based on the above information answer the following questions:

(i) To which group or period of the periodic table do the listed elements belong ?

(ii) What would be the nature of compound formed by a combination of elements B and F ?

(iii) Which two of these elements could definitely be metals ?

(iv) Which one of the eight elements is most likely to be found in gaseous state at room temperature ?

(v) If the number of electrons in the outermost shell of elements C and G be 3 and 7 respectively, write the formula of the compound formed by the combination of C and G. 3

17. Write the names and symbols of two most reactive metals belonging to group I of the periodic table. Explain by drawing electronic structure how either one of the two metals reacts with a halogen. With which name is the bond formed between these elements known and what is the class of the compound so formed known ?
State any four physical properties of such compounds. 5

Or

What is meant by refining of a metals ? Name the most widely used method of refining impure metals produced by various reduction processes. Describe with the help of a labelled diagram how this method may be used for refining of copper.

18. Derive the expression for the heat produced due to a current *'I'* flowing for a time interval *'t'* through a resistor *'R'* having a potential difference *'V'* across its ends. With which name is the relation known ? How much heat will an instrument of 12W produce in one minute if it is connected to a battery of 12V ? 5

Or

Explain with the help of a labelled circuit diagram how you will find the resistance of a combination of three resistors, of resistance R_1, R_2 and R_3, joined in parallel. Also mention how you will connect the ammeter and the voltmeter in the circuit when measuring the current in the circuit and the potential difference across one of the three resistors of the combination.

Section B

19. Name the green dot like structures in some cells observed by a student when a leaf peel was viewed under a microscope. What is this green colour due to ? 1

20. How is the spinal cord protected in the human body ? 1

21. How is the increasing demand for energy adversely affecting our environment ? 1

22. What are hormones ? Name the hormone secreted by thyroid and state its. function. 2

23. With the help of diagrams show the different stages of binary fission in Amoeba. 2

24. Give one example each of characters that are inherited and the ones that are acquired in humans. Mention the difference between the inherited and the acquired characters. 2

25. Write the full form of DNA. Name the part of the cell where it is located. Explain its role in the process of reproduction of the cell. 3

26. Explain the phenomenon of "biological magnification." How does it affect organisms belonging to different trophic levels particularly the tertiary consumers? 3

27. Explain the process of digestion of food in mouth, stomach and small intestine in human body. 5

Or

(a) List the three events that occur during the process of photosynthesis. Explain the role of stomata in this process.

(b) Describe an experiment to show that "sunlight is essential for photosynthesis."

QUESTION PAPER DELHI (CODE NO. 31/1)
SECTION - A

1. What change in colour is observed when white silver chloride is left exposed to sunlight ? State the type of chemical reaction in this change. 1

2. Which bases are called alkalis ? Give an example of alkalis. 1

3. Write the names and chemical formula of the products formed by the action of chlorine on slaked lime. 1

4. A person is advised to wear spectacles with concave lenses. What type of defect of vision is he suffering from ? 1

5. What will be the observed colour of the sky on a planet where there is no atmosphere ? Why ? 1

6. Name the component of white light that deviates the least and the component that deviates the most while passing through a glass prism. 1

7. When the powder of a common metal is heated in an open china dish, its colour turns black. However, when hydrogen is passed over the hot black substance so formed, it regains its original colour. Based on the above information answer the following questions:

   (i) What type of chemical reaction takes place in each of the two given steps ?

   (ii) Name the metal initially taken in the powder form. Write balanced chemical equations for both reactions. 2

8. Write the name and molecular formula of an organic compound having its name suffixed with '- ol' and having two carbon atoms in the molecule. With the help of a balanced chemical equation indicate what happens when it is heated with excess of conc. H_2SO_4. 2

9. What happens when wood is burnt in a limited supply of oxygen ? Name the residue left behind after the reaction and state two advantages of using this residue as a fuel over wood. 2

10. In an experiment with a rectangular glass slab, a student observed that a ray of light incident at an angle of 55° with the normal on one face of the slab, after refraction

strikes the opposite face of the slab before emerging out into air making an angle of 40° with the normal. Draw a labelled diagram to show the path of this ray.' What value would you assign to the angle of refraction and angle of emergence? 2

11. In an experiment to study the relation between the potential difference across a resistor and the current through it, a student recorded the following observations:

Potential difference V (volts)	1.0	2.2	3.0	4.0	6.4
Current I (amperes)	0.1	0.2	0.6	0.4	0.6

On examining the above observations the teacher asked the student to reject one set of readings as the values were out of agreement with the rest. Which one of the above sets of readings can be rejected ? Calculate the mean value of resistance of the resistor based on the remaining four sets of readings. 2

12. State in brief the reaction involved in harnessing nuclear energy from uranium. Mention any two environmental hazards involved in harnessing nuclear energy. 2

13. An ester has the molecular formula $C_4H_8O_2$. Write its structural formula. What happens when this ester is heated in the presence of sodium hydroxide solution ? Write the balanced chemical equation for the reaction and name the products. What is a saponification reaction ? 3

14. Atoms of seven elements A, B, C, D, E, F and G have a different number of electronic shells but have the same number of electrons in their outermost shells. The elements A and C combine with chlorine to form an acid and common salt respectively. The oxide of element A is liquid at room temperature and is a neutral substance, while the oxides of the remaining six elements are basic in nature. Based on the above information answer the following questions:

(i) What could the element A be ?

(ii) Will elements A to G belong to the same period or same group of the periodic table ?

(iii) Write the formula of the compound formed by the reaction of the element A with oxygen.

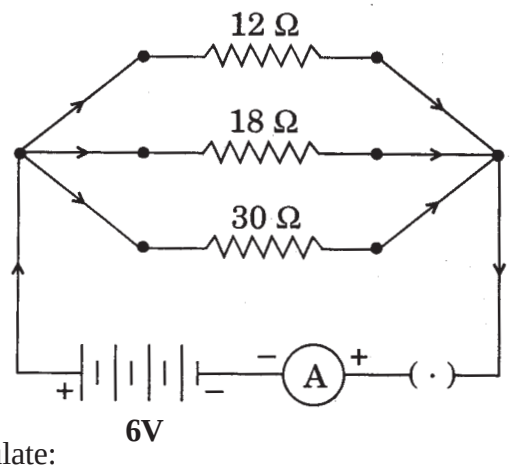
(iv) Show the formation of the compound by a combination of element C with chlorine with the help of electronic structure.

(v) What would be the ratio of number of combining atoms in a compound formed by the combination of element A with carbon ?

(vi) Which one of the given elements is likely to have the smallest atomic radius ? 3

15. How far should an object be placed from a convex lens of focal length 20 cm to obtain its image at a distance of 30 cm from the lens ? What will be the height of the image if the object is 6 cm tall ? 3

16. For the circuit shown in the diagram given below:



Calculate:

(i) the total effective resistance of the circuit,

(ii) the total current drawn from the battery, and

(iii) the value of current through each resistor. 3

17. What happens when an iron strip is put into separate beakers containing aqueous solutions of copper sulphate and zinc sulphate ? Where is iron placed in the activity series with respect to copper and zinc ? Describe the steps involved in the extraction of zinc from its sulphide and carbonate ores. Support your answer with balanced chemical equation for the chemical reactions involved in the process. 5

OR

(a) Give an example of a metal which

(i) is a liquid at room temperature.

(ii) is kept immersed in kerosene for storing.

(iii) is both malleable and ductile.

(iv) is the best conductor of heat.

(b) Name the process of obtaining a pure metal from an impure metal through electrolysis. Suppose you have to refine copper using this process, then explain with the help of a labelled diagram the process of purification, mentioning in brief the materials used as (i) anode, (ii) cathode and (iii) electrolyte. 5

18. Describe an activity to (i) demonstrate the pattern of magnetic field lines around a straight conductor carrying current, and (ii) find the direction of the field produced for a given direction of current in the conductor. Name and state the rule to find the direction of magnetic field associated with a current carrying conductor. Apply this rule to determine the direction of the magnetic field inside and outside a current carrying circular loop lying horizontally in the plane of a table. Assume that the current through the loop is clockwise. 5

OR

What is electromagnetic induction ? State different ways of inducing current in a coil. Suggest the most convenient situation for inducing current in a coil. State the situation in which the induced current in the coil is found to be the highest. Name and state the rule used to know the direction of the induced current. 5

SECTION B

19. State any one difference between autotrophic and heterotrophic modes of nutrition. 1

20. Give one reason why multicellular organisms require special organs for exchange of gases between their body and their environment. 1

21. Mention one example of chemotropism. 1

22. Name the two main organs of our central nervous system. Which one of them plays a major role in sending command to muscles to act without involving thinking process ? Name the phenomenon involved. 2

23. With the help of an example show that 'reuse' strategy is better than 'recycling'. 2

24. Construct an aquatic food chain showing four trophic levels. 2

25. Explain the process of breakdown of glucose in a cell (i) in the presence of oxygen, (ii) in the absence of oxygen. 3

26. Explain the mechanism of sex determination in humans. 3

27. (a) Draw a longitudinal section of a flower and label the following parts:

(i) Part that produces pollen grain

(ii) Part that transfers male gametes to the female gametes

(iii) Part that is sticky to trap the pollen grain

(iv) Part that develops into a fruit

(b) Differentiate between pollination and fertilization. 5

OR

(a) Explain the role of placenta in the development of human embryo.

(b) Give example of two bacterial and two viral sexually transmitted diseases.
Name the most effective contraceptive which prevents spread of such diseases. 5

QUESTION PAPER FOR BLIND CANDIDATES
[CODE NO. 31(B)]
SECTION - A

1. Identify the substance that is getting oxidised in the reaction: 1

   $CuO\ (s) + H_2\ (g) \rightarrow Cu\ (s) + H_2O\ (l)$

2. Give an example of a displacement reaction. 1

3. Balance the following reaction equation: 1

   $Fe\ (s) + H_2O\ (g) \quad Fe_3O_4\ (s) + H_2\ (g)$

4. State the position and nature of the image formed when an object is placed at the centre of curvature of a concave mirror. 1

5. Will the flow of an electric current take place more easily through a thick wire or a thin wire of the same material when connected to the same source of electric power ? Why ? 1

6. How is the direction of magnetic field at a point determined ? 1

7. How is charcoal obtained from dry wood ? Write any two criteria for considering charcoal a better fuel than wood. 2

8. What chemical compound is Plaster of Paris ? What happens when it is mixed with some water and allowed to stand ? Write any two uses of Plaster of Paris. 2

9. Give reasons for the following : 2

   (i) Solder, an alloy of lead and tin, is used for joining electrical wires and not the lead or tin.

   (ii) Ionic compounds have usually high melting points.

10. Write SI unit of electric current. How is electric current through a conductor related to the potential difference across its terminals ? What really flows through a copper wire when an electric current flows through it ? 2

11. State the meaning of refraction of light when a ray of light passes obliquely through a rectangular glass slab. State Snell's law of refraction. 2

12. State one limitation each for extracting energy from the following energy sources: 2

(i) Wind

(ii) Tides

13. What is an ore ? Name the steps involved for obtaining zinc metal from its sulphide ore. Write the chemical equations for the reactions involved. 3

14. The atom of an element has an electronic configuration 2, 8, 7. 3

(i) What is the atomic number of this element and in which period of the Modern Periodic Table will it be located ?

(ii) Will this element be a metal or non-metal ? Why ?

(iii) How will it form an ion ? What will be the nature of charge on it ?

15. Three resistors have respective resistances of (a) 2 Ω, (b) 3 Ω and (c) 6 Ω. What will be the effective resistance of their combination if

(i) all the resistors are joined in parallel,

(ii) all the resistors are joined in series, and

(iii) a parallel combination of (b) and (c) is joined in series with (a) ? 3

16. (a) State Fleming's left hand rule.

(b) For what purpose is it used ?

(c) Name two devices where this rule is applicable. 3

17. (a) State two properties of carbon which lead to carbon forming more compounds than any other element.

(b) Name the product formed when ethanoic acid reacts with pure ethanol in the presence of an acid catalyst. Write the chemical equation for the reaction involved.

(c) How would you distinguish experimentally between an alcohol and a carboxylic acid ? 5

OR

(a) (i) What is a homologous series ?

(ii) Why do we see a gradation in physical properties of members of a homologous series as the molecular mass of members increases ?

(iii) Why do chemical properties of members of a homologous series remain more or less the same ?

(b) How are soaps chemically different from detergents ? How is it that detergents are more effective than soaps in hard water ?

18. (a) What is hypermetropia ? List two causes for the development of this defect of vision. How may this defect be corrected ?

(b) A person can distinctly see an object placed beyond 100 cm. Calculate the power of the lens he would require to read a book placed at a distance of 25 cm. 5

OR

(a) What is meant by dispersion of light ? Explain the cause of disperson of light.

(b) A student can see clearly upto 3 m, but he wants to read the instructions written on a board placed at 12 m. Calculate the power of the lens he would require to see the board clearly.

SECTION B

19. State the role of saliva in the digestion of food. 1

20. What are plant hormones ? 1

21. Why is the damage to ozone layer a cause of concern ? 1

22. What type of plants exhibit natural vegetative propagation ? Describe how vegetative propagation takes place in Bryophyllum. 2

23. List in a tabular form two differences between the processes of pollination and fertilisation. 2

24. List any four methods used by plants to get rid of their excretory products. 2

25. What are fossils ? How are fossils formed ? Explain how the age of fossils can be found out. 3

26. Why should there be an equitable distribution of resources ? List any two forces working against an equitable distribution of resources. What is the ultimate motive of these forces ? 3

27. (a) List two differences between aerobic and anaerobic respiration. Give one example each of organisms that use these two types of respiration.

(b) How is (i) oxygen and (ii) carbon dioxide transported in human beings ? 5

OR

(a) List two functions of human heart.

(b) The human heart is separated into the left and right side. How does this help in the difference in their functioning ?

(c) What type of heart is present in fish ?

MARKING SCHEME

GENERAL INSTRUCTIONS

1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. It carries only suggested value points for the answer. These are only guidelines and do not constitute the complete answer. The candidates can have their own expression and if the expression is correct, the marks may be awarded accordingly.

2. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed.

3. If a question has parts, please award marks in the right hand side for each part. Marks awarded for different parts of the question should then be totalled up and written in the left hand margin.

4. If a question does not have any parts, marks be awarded in the left hand side margin.

5. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.

6. Wherever only two/three of a 'given' number of examples/factors/points are expected only the first two/three or expected number should be read. The rest are irrelevant and should not be examined.

7. There should be no effort at 'moderation' of the marks by the evaluating teachers. The actual total marks obtained by the candidate may be of no concern of the evaluators.

8. ½ mark may be deducted if a candidate either does not write units or writes wrong units in the final answer of a numerical problem.

9. A full scale of mark 0 to 100 has to be used. Please do not hestitate to award full marks if the answer deserves it.

10. Some of the questions relate to Higher Order Thinking Skills (HOTS). These questions are to be evaluated carefully so as to judge the candidate's understanding / analytical ability.

MARKING SCHEME
CODE NO. 31/1/1
SECTION - A

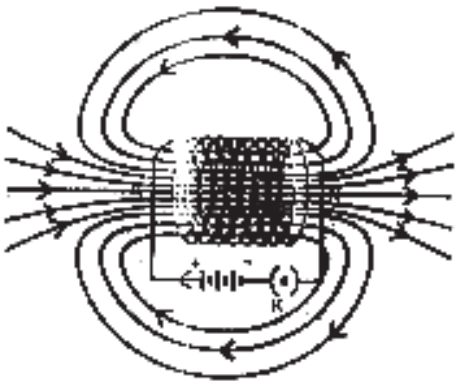
1.	Iron nails get coated with a reddish brown substance.	½	
	Copper sulphate solution becomes light green	½	1
2.	Catenation / Tetravalency / Ability to form multiple bonds / Carbon – Carbon bond is very stable. (Any two)	½, ½	1
3.	Because the angle of incidence is 0^0 / Ray passing through the centre of curvature is incident normally to the mirror.	1	1
4.	Virtual / Erect	1	1
5.	Positive charge / Proton	1	1
6.	Ciliary muscles	1	1
7.	(i) A white precipitate / Insoluble substance is formed.	½	
	(ii) If the reactants are in solid state.	½	
	(iii) $Na_2SO_4 + BaCl_2 \longrightarrow 2\ NaCl + BaSO_4$	½	
	(iv) Double displacement / Double decomposition / Precipitation	½	2
8.	(i) Methane / CH_4	½	
	(ii) By anaerobic decomposition of biomass in the presence of micro-organisms.	½	
	(iii) It is a clean fuel.		
	It burns without smoke.		
	It leaves no residue.		
	Its heat capacity / calorific value is high.		
	It is used for lighting purpose.		
	Safe and efficient method of waste disposal.		
	slurry left behind can be used as an excellent manure. (Any two)	½, ½	2

9. a) X – Violet ½

Y – Red ½

b) Due to difference in speed of different colours / Difference in wavelength and frequency / Refractive index of glass is different for different colours of light. 1 2

10. Solenoid is a coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder. ½



Pattern ½

Direction ½

Pattern indicates that the magnetic field is uniform at all points inside the solenoid. ½ 2

11. (i) Momentary deflection in the galvanometer to one side. ½

(ii) Momentary deflection in the galvanometer, now in the opposite direction. ½

(iii) No deflection in the galvanometer. ½

Phenomenon involved is electromagnetic induction. ½ 2

12. Any four of the following :

(i) It can be used only at those places where wind blows for the greater part of the year.

(ii) Wind speed should be higher than 15 km/h to rotate the turbine at the required speed.

(iii) Need of a back up facility when there is no wind.

(iv) Requires large area for setting up wind energy farms.

(v) Tower and blades require a high level of maintenance.

(Any other point) ½x4 2

13. $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ ½

$\frac{1}{u} = \frac{1}{24} - \frac{1}{18}$ ½

$= \frac{3-4}{72} = \frac{-1}{72}$

$\therefore \quad u = -72$ cm

Object should be placed at a distance of 72 cm from the lens. 1

$m = \frac{v}{u}$ ½

$= \frac{+24}{-72}$

$\therefore \quad m = \frac{-1}{3}$ ½ 3

14. A : Fe_2O_3; B : Al ½, ½

(i) $Fe_2O_3(s) + 2\,Al\,(s) \xrightarrow{heat} 2\,Fe\,(l) + Al_2O_3(s) + heat$ ½

condition of the reaction, physical state of reactants and products,

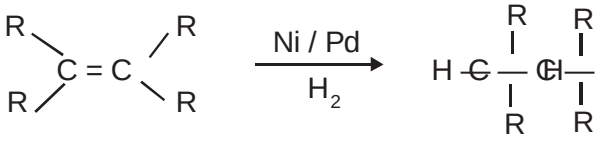
thermal status. ½

(ii) Displacement Reaction

Redox Reaction

Exothermic Reaction (Any two) 1 3

15. Double covalent bond / Alkenes / Triple covalent bond / Alkynes / Unsaturated compounds ½

Example : 

Or

Unsaturated fat + $H_2 \xrightarrow{Ni / Pd}$ saturated fat 1

Condition : Presence of Nickel / Palladium as catalyst ½

Change : The liquid reactant changes to solid product ½

Natural source : Vegetable oil ½ 3

16. (i) Third Period / Group – 1, 2, 13, 14, 15, 16, 17, 18 respectively. ½

(ii) Ionic / Electrovalent ½

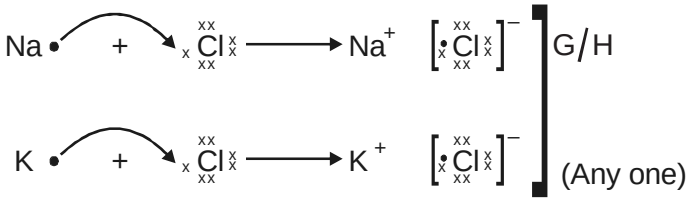
(iii) A and B ½, ½

(iv) ½

(v) CG_3 ½ 3

17. Sodium / Na, Potassium / K, Rubidium / Rb, Cesium / Cs

(Any two) ½, ½



1

Ionic / Electrovalent bond ½

Salts / Ionic compounds ½

Physical properties :-

(i) Crystalline solid at room temperature

(ii) Brittle, hard solid

(iii) Soluble in water

(iv) Have high melting and boiling point

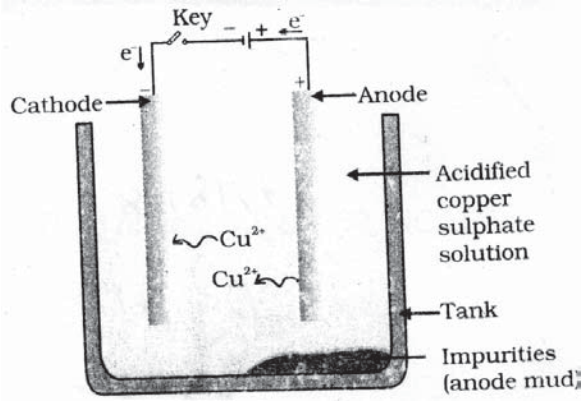
(v) Conduct electricity in aqueous / molten form

(Any four) 4x½ 5

OR

Removal of impurities from a crude metal is called refining of metals 1

Electrolytic refining 1



Drawing 1

Any 2 labels 1

Description :

On passing the current through the electrolyte, the pure metal from the anode dissolves into the electrolyte. An equivalent amount of pure metal from the electrolyte is deposited on the cathode. The soluble impurities go into the solution, whereas, the insoluble impurities settle down at the bottom of the anode and are known as anode mud. 1

18. (i) Work done in moving the charge $W = VQ$

Power input, $P = \frac{VQ}{t}$

$= V I$

$\therefore$ Energy, $E = P \times t = V I t$

This energy gets dissipated in the form of heat.

$\therefore H = V I t$

Applying Ohm's law, we get

$H = I^2Rt$ 2

(ii) The relation is known as Joule's law of heating. 1

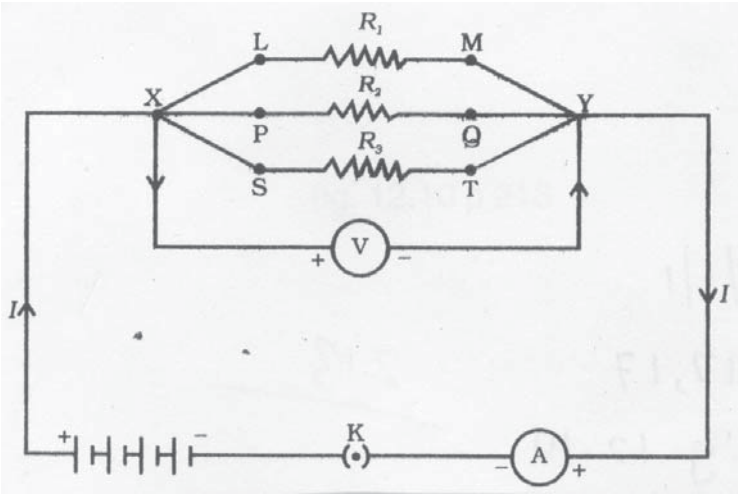
(iii) P = 12 W t = 1 minute = 60s

$H = P \times t$ ½

$= 12\ W \times 60s$ ½

$H = 720\ J$ 1 5

OR



• Resistances in parallel ½

• Placement of ammeter ½

• Direction of current ½

• Terminals to be marked ½

From the circuit, voltmeter and ammeter readings to be noted down. The ratio of V and I gives the resistance 1

By using the formula $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

resistance of the combination can be found.

Ammeter is connected in series with the resistor. 1

Voltmeter is connected in parallel with the resistor. 1

SECTION - B

19. Chloroplast, chlorophyll ½, ½ 1

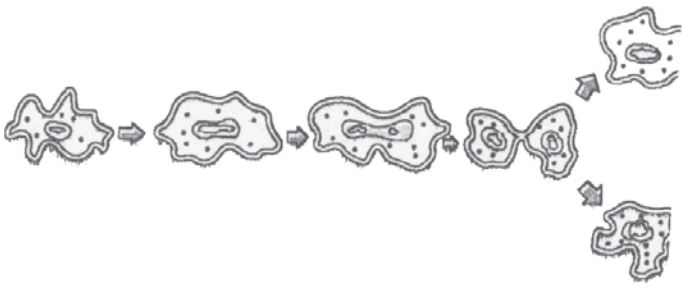
20. Vertebral column / Back bone 1

21. Excessive use of natural resources / Causes pollution 1

22. Chemical compounds which are poured into blood, help to control and coordinate 1

Thyroxin ½

Regulates carbohydrate, protein and fat metabolism ½ 2

23.  ½×4 2

24.

Inherited	Acquired
Passed on to the next generation. Example shape of ear lobe / colour of eye / skin	Not passed on to the next generation but are acquired. Example obesity / acquiring knowledge / skills

(Any one example)

25. Deoxyribose Nucleic Acid 1

Nucleus 1

Contains information for inheritance of features from parents to next generation. 1 3

26. • Non-biodegradable chemicals (toxic substances) which get accumulated progressively at each trophic level of a food chain. 1

• Accumulation is progressive at each trophic level 1

• Maximum accumulation (concentration) is found in tertiary consumers. 1 3

27. MOUTH : Salivary amylase secreted by salivary glands breaks starch to sugar. ½

STOMACH : Pepsin digests proteins and ½
HCl facilitates action of enzyme pepsin and creates acidic meduim. ½

SMALL INTESTINE : Receives secretions from liver and pancreas.

Pancreas : Trypsin digests proteins ½

Lipase digests fats ½

Liver : Bile juice emulsifies fat ½

Bile juice makes the medium basic (for the action of pancreatic enzymes) ½

: Intestinal juice converts proteins to aminoacids, carbohydrates to glucose, fats to fatty acids and glycerol. ½,½,½ 5

OR

a) (i) Absorption of light energy by chlorophyll. ½

(ii) Conversion of light energy to chemical energy and splitting of water into hydrogen and oxygen. ½

(iii) Reduction of carbondioxide to carbohydrates. ½

• Massive amounts of gaseous exchange takes place through stomata. ½

b) • Take a destarched potted plant. ½

• Cover part of a leaf with black paper and keep it in the sunlight for about 6 hrs. ½

• Decolorize the leaf by boiling in water and then alcohol in a water bath. ½

• Dip the leaf in dilute solution of iodine for a few minutes. ½

• Part of the leaf covered with black paper does not turn blue black, while uncovered portion of leaf turns blue black. ½

• Covered portion does not synthesize starch, uncovered portion synthesizes starch. ½

MARKING SCHEME
CODE NO. 31/1
SECTION - A

1.	White colour changes to grey	½	
	Decomposition reaction	½	1
2.	Water soluble bases are called alkalis	½	
	NaOH / KOH / $Ca(OH)_2$ / $Mg(OH)_2$ (Any one)	½	1
3.	Calcium Oxychloride / Bleaching Powder	½	
	$CaOCl_2$	½	1
4.	Myopia / Nearsightedness / Shortsightedness	1	1
5.	Dark / Black / No colour	½	
	Scattering of light does not take place	½	1
6.	Least deviated – red component	½	
	Most deviated – violet component	½	1
7.	(i) Oxidation / Combination reaction	½	
	Reduction / Displacement reaction	½	
	(ii) Copper	½	
	$2\,Cu + O_2 \longrightarrow 2\,CuO$		
	$CuO + H_2 \longrightarrow Cu + H_2O$	½	2
	(½ mark to be awarded for any one of the above equations)		
8.	Ethanol, C_2H_5OH / C_2H_6O	½, ½	
	$C_2H_5OH \xrightarrow[-H_2O]{\text{conc. } H_2SO_4} H_2C = CH_2 / C_2H_4$	1	2
9.	Water and volatile material get expelled and a residue is left	½	
	Charcoal	½	

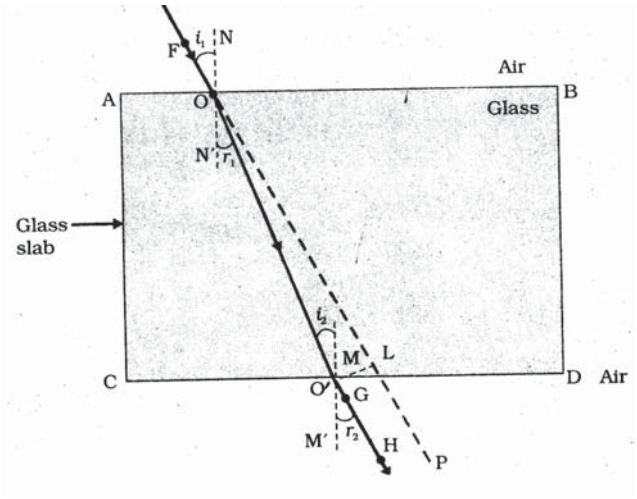
Two advantages :

(i) It burns without smoke. / Cause no pollution.

(ii) It has a higher calorific value. / higher heat generation efficiency.

(or any other) ½, ½ 2

10



Deviation of rays ½

Direction of rays ½

Angle of refraction = 40^0 ½

Angle of emergence = 55^0 ½ 2

11. Reading to be rejected in the table is (3.0, 0.6) 1

$$R_1 = \frac{1.0\ V}{0.1\ A} = 10\ \Omega\ ;\ R_2 = \frac{2.2\ V}{0.2\ A} = 11\ \Omega\quad R_3 = \frac{4.0\ V}{0.4\ A} = 10\ \Omega\ ;\ R_4 = \frac{6.4\ V}{0.6\ A} = 10.6\ \Omega$$

$\therefore$ Mean R = (10 + 11 + 10 + 10.6) Ω

= 10.4Ω

Calculations ½

Answer ½ 2

12. Reaction involved is : Nuclear fission ½

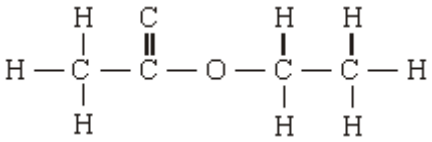
Nucleus of uranium, when bombarded with low energy neutrons, splits into lighter nuclei releasing tremendous amount of energy. ½

Environmental hazards – (Any two of the following)

(i) Improper nuclear waste storage and disposal results in environmental contamination.

(ii) Risk of accidental leakage of nuclear radiations affects the environment.

(iii) Genetic mutation / Skin cancer ½, ½ 2

13. 

½

It changes into an alcohol / ethanol and a carboxylic acid / ethanoic acid.

OR Saponification takes place. ½

$CH_3COOC_2H_5 \xrightarrow{NaOH} CH_3COOH + C_2H_5OH$ ½

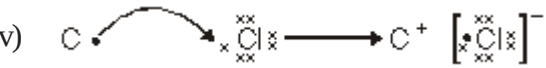
Products : Ethanol and Ethanoic acid ½

Saponification : Reaction of an ester with an acid or a base to give an alcohol and a carboxylic acid. 1 3

14. (i) Hydrogen

(ii) Same group

(iii) A_2O / H_2O

(iv) 

(v) 4 : 1

(vi) A 6x½ 3

15. $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ ½

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

$= \frac{1}{(+30)} - \frac{1}{(+20)}$ ½

$= \frac{1}{30} - \frac{1}{20} = \frac{2-3}{60} = \frac{-1}{60}$

$\therefore \quad u = -60$ cm 1

$m = \frac{h'}{h} = \frac{v}{u}$ ½

$\therefore \quad h' = \frac{v}{u} \times h$

$= \frac{(+30)}{(-60)} \times (+6)$

$h' = -3$ cm ½ 3

16. (i) $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ ½

$= \frac{1}{12} + \frac{1}{8} + \frac{1}{30} = \frac{31}{180}$ ½

$\therefore \quad R = \frac{180}{31}\ \Omega \text{ or } 5.8\ \Omega$ ½

(ii) $I = \frac{V}{R} = \frac{6\text{ V}}{5.8\ \Omega} = 1.03\text{ A}$ ½

(iii) $I_1 = \frac{V}{R_1} = \frac{6\text{ V}}{12\ \Omega} = 0.5\text{ A}$

$I_2 = \frac{V}{R_2} = \frac{6\text{ V}}{18\ \Omega} = 0.33\text{ A}$

$I_3 = \frac{V}{R_3} = \frac{6\text{ V}}{30\ \Omega} = 0.2\text{ A}$ 1 3

17. Colour of copper sulphate solution changes from blue to light green. / Reddish brown substance is deposited on the iron nail. ½

No change is observed in zinc sulphate solution. ½

Iron is above copper and below zinc. / Iron is between copper and zinc in the reactivity series of elements. 1

Roasting : $2\ ZnS + 3\ O_2 \xrightarrow{\text{heat}} 2\ ZnO + 2\ SO_2$ 1

Calcination : $ZnCO_3 \xrightarrow{\text{heat}} ZnO + CO_2$ 1

Reduction : $ZnO + C \longrightarrow Zn + CO$ 1 5

OR

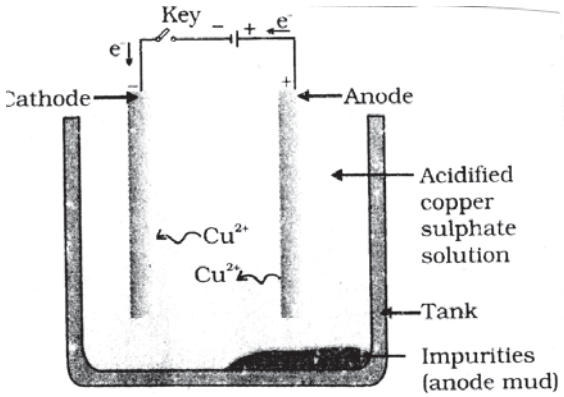
a) (i) Mercury / Hg ½

(ii) Na / K ½

(iii) Cu / Zn / Al / Au / Ag (or any other) ½

(iv) Ag / Cu ½

b) Electrolytic refining ½



1

Description :

On passing current through the electrolyte, the pure metal from anode dissolves and an equivalent amount of pure metal from electrolyte is deposited on the cathode. Insoluble impurities settle down at the bottom.

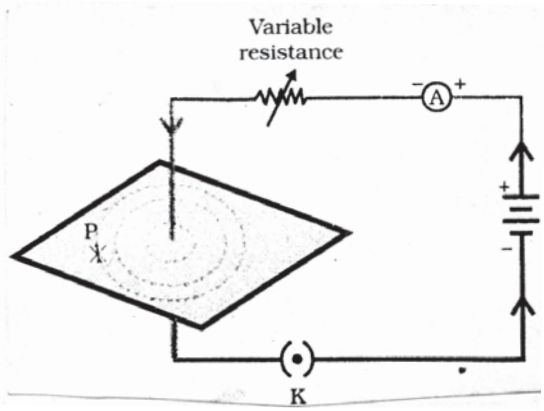
(Note : The description should mention the following:)

Cathode : Pure copper

Anode : Impure copper

Electrolyte : Acidified copper sulphate solution 1½ 5

18.



(i) A thick copper wire is passed through a cardboard and the ends of the wire are attached to the battery and key. When current is passed through

the wire as shown, the iron filings on tapping the cardboard align themselves in the form of concentric circles whose centre lies on the wire. On placing a compass needle at a point (say P) the direction of the north pole of the needle gives the direction of field at the point P.

(ii) When the direction of current is downwards the direction of magnetic field lines is clockwise. 2

Rule : Right hand thumb rule 1

Statement : Imagine that you are holding a current-carrying straight conductor in your right hand, such that the thumb points towards the direction of the current, then your fingers will wrap around the conductor in the direction of magnetic field lines. 1

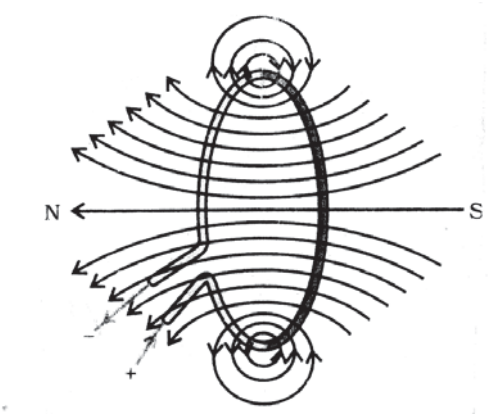


Diagram with direction / Explanation. 1 5

OR

Electromagnetic induction is the process by which :- a changing magnetic field in a conductor induces a current in another conductor / motion of a magnet with respect to the coil produces an induced potential difference which sets up an induced electric current in the circuit. 1

Different ways of inducing current :

(i) by moving a coil in a magnetic field ½

(ii) by changing the magnetic field around a coil ½

Most convenient situation :

To move the coil in the magnetic field. 1

Condition for maximum induced current :

When the direction of motion of the coil is at right angles to the magnetic field. 1

Fleming's right hand rule : Stretch the thumb, forefinger and middle finger of right hand so that they are perpendicular to each other such that the forefinger points in the direction of the magnetic field, the thumb shows the direction of motion of conductor, then the middle finger will show the direction of induced current. 1

SECTION - B

19. The process of synthesising their own food. ½

Obtaining food from others directly or indirectly. ½ 1

(Any other difference)

20. All the cells of multicellular organisms are not in direct contact with the surrounding environment. 1 1

21. Growth of pollen tube towards ovary. 1 1

22. (i) Brain ½

(ii) Spinal cord ½

(iii) Spinal cord ½

(iv) Reflex action ½ 2

23. Two examples – Paper, plastic bottles (any other examples) ½, ½

Recycling uses some energy. ½

Recycling needs to segregate wastes. ½ 2

24. Phytoplanktons ⟶ Zooplanktons ⟶ Small fish ⟶ Big fish

(½ mark for each trophic level) ½×4 2

Note : Start the food chain with Phytoplanktons.

Stop marking whereever the trophic level goes wrong.

(Any other example)

25. Glucose ⟶ Pyruvate 1

Pyruvate $\xrightarrow[\text{of oxygen}]{\text{In presence}}$ $CO_2 + H_2O$ + Energy 1

(½ mark each for CO_2 and H_2O).

Pyruvate $\xrightarrow[\text{of oxygen}]{\text{in absence}}$ $C_2H_5OH + CO_2$ + Energy

(½ mark each for C_2H_5OH and CO_2) 1 3

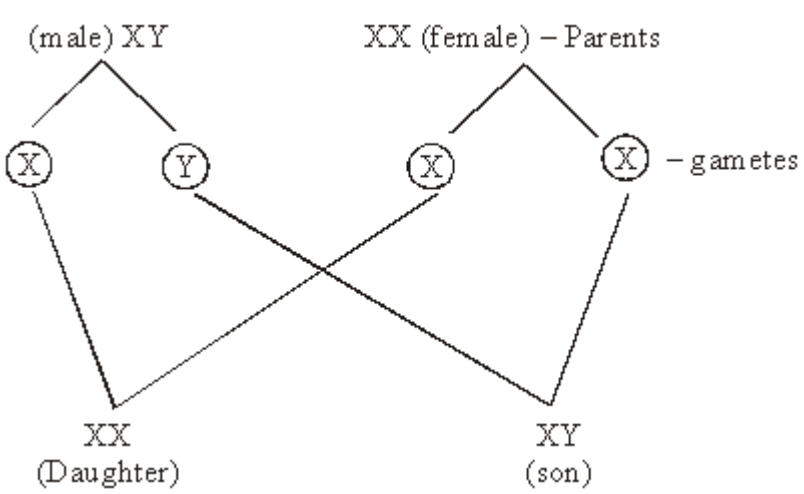
26. Male X Y ½

Female X X ½

Gametes (X), (Y) ½, ½

Zygote (X X), (X Y) ½,½ 3

Alternatively

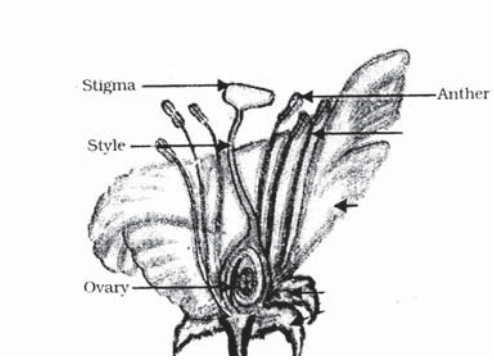


½, ½

½, ½

½, ½

27. a) 1



i) Anther ½×4

ii) Style

iii) Stigma

iv) Ovary

b)

Pollination	Fertilisation
1) Transfer of pollen grains from anther of a flower to stigma of same or different flower.	1) Fusion of male and female gametes
2) Occurs in plants only	2) Occurs in plants and animals
3) Needs agents	3) No agents are needed
	(Any two differences) 1+1

5

Note : To be marked only when corresponding differences are given.

OR

a) Role of placenta :

1) Embryo gets nutrition from mother's blood with the help of placenta.

2) Provides large surface area for glucose and oxygen to pass from mother to the embryo.

3) Removal of wastes

(Any two) 1+1

b) Two bacterial diseases – gonorrhoea, syphilis. ½, ½

Two viral diseases – warts, HIV - AIDS ½, ½

Condom 1

MARKING SCHEME

CODE NO. 31(B)

SECTION - A

1.	Hydrogen / H_2	1	1
2.	$Zn + 2\ HCl \rightarrow ZnCl_2 + H_2$ (or any other example)	1	1
3.	$3\ Fe(s) + 4\ H_2O\ (g) \rightarrow Fe_3O_4(s) + 4\ H_2\ (g)$	1	1
4.	**Position:** At the centre of curvature ; **Nature:** Real / Inverted	½, ½	1
5.	Thicker wire as it provides easier path for the electrons flow (or $R \propto 1/A$)	½, ½	1
6.	By placing a magnetic needle at the point; the direction of north pole of the needle will give the direction of the mganetic field.	½, ½	1
7.	By heating wood in limited sypply of Oxygen/Destructive distillation of wood.	1	
	Criteria for considering charcoal a better fuel than wood (Any Two):		
	(i) Higher calorific value / high heat generation capacity		
	(ii) Leave no ash / residue		
	(iii) Produces less smoke		
	(iv) Less polluting	2×½	2
8.	Calcium sulphate hemihydrate / $CaSO_4 . ½\ H_2O$	½	
	It sets into a hard mass	½	
	Uses : (i) For plastering fractured bones		
	(ii) For making statues / decorative articles		
	(iii) For making system air tight		
	(iv) For making designs on the walls and Ceilings (Any Two)	2×½	2
9.	(i) Solder has comparatively lower melting point.	1	
	(ii) Because of strong attraction between + ve and – ve ions.	1	2

10. ampere (symbol A) ½

Electric current ∝ potential difference or $V \propto I$ or $V = IR$ 1

Electrons/negative charges ½ 2

11. Bending of ray of light towards normal while entering from air to glass 1

Snell's law : The ratio of sine of angle of incidence to the sine of angle of refraction for a given set of media and for light of a given colour is a constant. (or sin i/sin r = constant) 1 2

12. **Limitation for extracting energy from wind :** **Any One**

- Wind should blow at that place for the greater part of the year.
- Wind speed - higher than 15 km/h
- Need for a back up facility when wind speed is low
- High cost of establishment of wind energy farms
- High cost of maintenance 1

Limitation of Using Tidal Energy : **Any One**

- Limitation of location for its use
- Power output is variable due to variation in tidal range
- Power generation is not large 1 2

13. **Ore :** A mineral from which a metal can by extracted profitably 1

Steps for obtaining zinc from its sulphide ore :

(i) Roasting $ZnS + O_2 \xrightarrow{\text{heating}} ZnO + SO_2$ ½, ½

(ii) Reduction $ZnO + C \xrightarrow{\text{heating}} Zn + CO$ ½, ½ 3

14. (i) Atomic number = 17 ; Period – Third (III) ½, ½

(ii) Non-metal, because it will gain one electron to acquire noble gas configuration. ½, ½

(iii) It forms an ion by gaining an electron, Negative charge ½ , ½ 3

15. (i) $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ ½

$$= \frac{1}{2} + \frac{1}{3} + \frac{1}{6} = \frac{3+2+1}{6}$$ ½

$\Rightarrow \quad R_p = 1\,\Omega$ ½

(ii) $R_s = R_1 + R_2 + R_3$ ½

$= 2 + 3 + 6 = 11\,\Omega$

(iii) $\frac{1}{R_p} = \frac{1}{3} + \frac{1}{6} = \frac{2+1}{6} = \frac{1}{2} \Rightarrow R_p = 2\,\Omega$ ½

$R = R_p + 2\,\Omega = (2+2)\,\Omega \Rightarrow R = 4\,\Omega$ ½ 3

16. (a) **Fleming's Left Hand Rule :** Stretch the thumb, forefinger and middle finger of your left hand such that they are mutually perpendicular to each other. If the forefinger points in the direction of magnetic field and middle finger points in the direction of current, then the thumb will point in the direction of motion/force on the conducter. 1

(b) For finding the direction of force exerted on a current carrying conductor placed in a magnetic field 1

(c) **Devices:** Electric motor / Electric fan / Electric grinder / Electric meters such as Galvanometer. ammter etc. (Any Two) ½, ½ 3

17. (a) **Properties of Carbon** **(Any Two)**

Catenation / Teravalency / Stability of C – C bond / formation of multiple bonds. 2×½ 1

(b) Ethyl ethanoate / Ester

$CH_3\,COOH + C_2H_5OH \xrightarrow{\text{Conc } H_2SO_4} CH_3COOC_2\,H_5 + H_2O$ 1

(c) Add Na_2CO_3/$NaHCO_3$ to the two samples. The sample in which brisk effervesence occur is carboxylic acid. 2 5

OR

(a) (i) **Homologous Series :** A group of organic compounds having the same functional group in which two successive members differ by a CH_2 group. 1

(ii) The size of the molecule increases gradually / physical preperties depend on the molecular mass 1

(iii) All members of the homologous series have the same functional group. 1

(b) **Soap :** Sodium or potassium salts of long chain of carboxylic acids.

Detergents : Ammonium or Sulphonate salts of long chain of carboxylic acids 1

Detergents are more effective than soaps in hard water because detergents do not form insoluble precipitate with calcium and magnesium ions in hard water. 1

18. (a) **Hypermetropia :** Defect of vision in which a person can see distant objects clearly but can not see distinctly the nearby objects. ½

Causes : (i) Focal length of the eye lens is too long/Low converging power of the eye lens. ½

(ii) Eye ball has become too small. ½

Correction Using a convex lens / Converging lens of appropriate focal length / power. ½

(b) Near point : 100 cm i.e., $v = -100$ cm; $u = -25$ cm ½

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \Rightarrow \frac{1}{f} = \frac{1}{-100} - \frac{1}{-25} \Rightarrow \frac{1}{f} = \frac{1}{-100} + \frac{1}{-25}$$ ½, ½

$$\Rightarrow \frac{1}{f} = \frac{3}{100}$$ ½

$$\therefore \quad f = \frac{100}{3} \text{ cm or } \frac{1}{3} \text{ m}$$

$$\therefore \quad \text{Power} = \frac{1}{f} = \frac{1}{1/3} = 3\,\text{D}$$ ½, ½ 5

OR

(a) **Dispersion :** Splitting of white light into its constituent colours 1

Cause : Different colours of white light bend through defferent angles with respect of the incident ray while passing through a prism. 1

(b) $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ Here $v = -3$ m ; $u = -12$ m ½, ½

$\frac{1}{f} = \frac{1}{-3} - \frac{1}{-12} \Rightarrow \frac{1}{f} = \frac{1}{-3} + \frac{1}{12} \Rightarrow \frac{1}{f} = \frac{-4+1}{12} = \frac{3}{12}$ ½, ½

$\therefore \quad f = -4$ m

$\therefore$ Power $= \frac{1}{f} = -\frac{1}{4\text{m}} = -0.25$ D ½, ½

SECTION B

19. Saliva converts starch to soluble sugar 1 1

20. **Plant hormones :** Chemical compounds which help in growth and development of plants. 1 1

21. Damage to ozone layer may allow harmful uv-radiations causing skin cancer and other harmful diseases. 1 1

22. Plants which have lost the capacity to form seeds or produce non-viable seeds. 1

In Bryophyllum buds are produced in the notches along the leaf margins which fall on the soil and develop into new plants. 1 2

23.

Pollination	Fertilisation
i) Occurs in plants only	i) Occurs both in plants and animals
ii) Transfer of pollen grains from anther of one flower to stigma of same or another flower	ii) Fusion of male and female gamets
iii) Requires agents	iii) No agents are required

Any two difference 2×1 2

24. (i) Excess of water removed by transpiration.
(ii) Excrete some wastes into the soil around them.
(iii) Waste products are stored as resins and gums.
(iv) Waste products are stored in leaves that fall off.
(v) Many plant wastes are stored in cellular vacuoles. (Any four) 4×½ 2

25. • **Fossils :** Preserved traces of living organisms 1

• **Formation of fossils :** When a living organism is not decomposed and buried in earth's surface for several years. 1

• **Finding age of a fossils :** (i) By digging into the earth the fossils found closer to the surface are more recent than the fossil found in deeper layer / By detecing the ratios of different isotopes of same element in the fossil material. 1 3

26. • There should be equitable distribution of resources so that rich and poot both are benefitted.

• Money and power

• Exploit the natural resources and to take maximum share.

27. (a)

Aerobic respiration	Anaerobic respiration
i) Takes place in presence of oxygen	i) Takes place in absence of oxygen
ii) End products are CO_2 and H_2O	ii) End products are CO_2 + ethanol/lactic acid
iii) Releases greater energy	iii) Releases lesser energy
iii) CO_2 evolved is more	iii) CO_2 evolved is less

(Any Two) 2×1

Example - Plants / animals Example - Bacteria / Yeast ½, ½

(b) Oxygen is transported by haemoglobin present in RBC. CO_2 is transported in dissolved form in the blood. 1 5

OR

(a) **Functions of human heart :**

(i) Pumping of blood 1

(ii) To regulate the direction of flow of blood 1

(b) Left side of the heart regulates the flow of oxygenated blood. 1

Right side of the heart regulates the flow of de-oxygenated blood 1

(c) Chambered heart 1