



Series Z1XYW/4

SET~2

प्रश्न-पत्र कोड
Q.P. Code

31/4/2

रोल नं.
Roll No.

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परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।

Candidates must write the Q.P. Code on the title page of the answer-book.

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 23 हैं। #
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में 39 प्रश्न हैं।
- कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें।
- इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका में कोई उत्तर नहीं लिखेंगे।
- Please check that this question paper contains 23 printed pages.
- Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains 39 questions.
- Please write down the Serial Number of the question in the answer-book before attempting it.
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

**विज्ञान (सैदूआन्तिक)
SCIENCE (Theory)**

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

GENERAL INSTRUCTIONS :

Read the following instructions very carefully and follow them :

- (i) This question paper consists of 39 questions. All questions are compulsory.
- (ii) Question paper is divided into **FIVE** sections – **Section A, B, C, D and E**.
- (iii) In **section A** – question number 1 to 20 are multiple choice questions (MCQs) carrying 1 mark each.
- (iv) In **section B** – question number 21 to 26 are very short answer (VSA) type questions carrying 2 marks each. Answer to these questions should be in the range of 30 to 50 words.
- (v) In **section C** – question number 27 to 33 are short answer (SA) type questions carrying 3 marks each. Answer to these questions should be in the range of 50 to 80 words.
- (vi) In **section D** – question number 34 to 36 are long answer (LA) type questions carrying 5 marks each. Answer to these questions should be in the range of 80 to 120 words.
- (vii) In **section E** – question number 37 to 39 are of 3 **source based/case based units of assessment** carrying 4 marks each with sub-parts.
- (viii) There is no overall choice. However, an internal choice has been provided in some sections.

SECTION – A
(Multiple Choice Questions)

1. The electron dot structure of chlorine molecule is : 1

(a)

(b)

(c)

(d)

2. The name of the salt used to remove permanent hardness of water is : 1

(a) Sodium hydrogen carbonate (NaHCO_3)
(b) Sodium chloride (NaCl)
(c) Sodium carbonate decahydrate ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$)
(d) Calcium sulphate hemihydrate ($\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$)

3. Sodium hydroxide is termed an alkali while Ferric hydroxide is not because : 1

(a) Sodium hydroxide is a strong base, while Ferric hydroxide is a weak base.
(b) Sodium hydroxide is a base which is soluble in water while Ferric hydroxide is also a base but it is not soluble in water.
(c) Sodium hydroxide is a strong base while Ferric hydroxide is a strong acid.
(d) Sodium hydroxide and Ferric hydroxide both are strong base but the solubility of Sodium hydroxide in water is comparatively higher than that of Ferric hydroxide.





10. Which pair of sex chromosome will determine a male ?

1

- (a) XO
- (b) XX
- (c) XY
- (d) YY

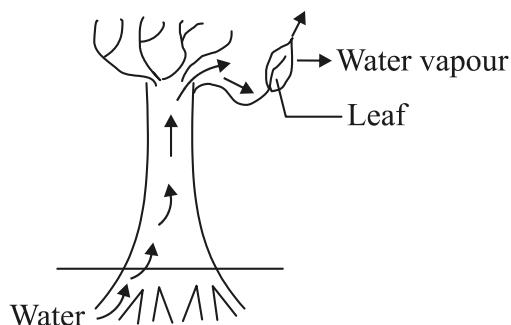
11. One of the events that does not occur during photosynthesis is :

1

- (a) Chlorophyll absorbs solar energy.
- (b) Carbon dioxide is released during the process.
- (c) Oxygen is released during the process.
- (d) Carbon dioxide is absorbed during the process.

12. Observe the following diagram and identify the process and its significance from the following options :

1

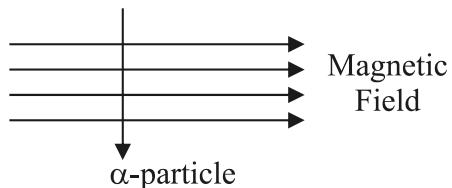


- (a) Evaporation : maintains water contents in leaf cells.
- (b) Transpiration : creates a suction force which pulls water inside the plant.
- (c) Excretion : helps in excreting out waste water from the plant.
- (d) Translocation : helps in transporting materials from one cell to another.

13. An alpha particle enters a uniform magnetic field as shown. The direction of force experienced by the alpha particle is :

1

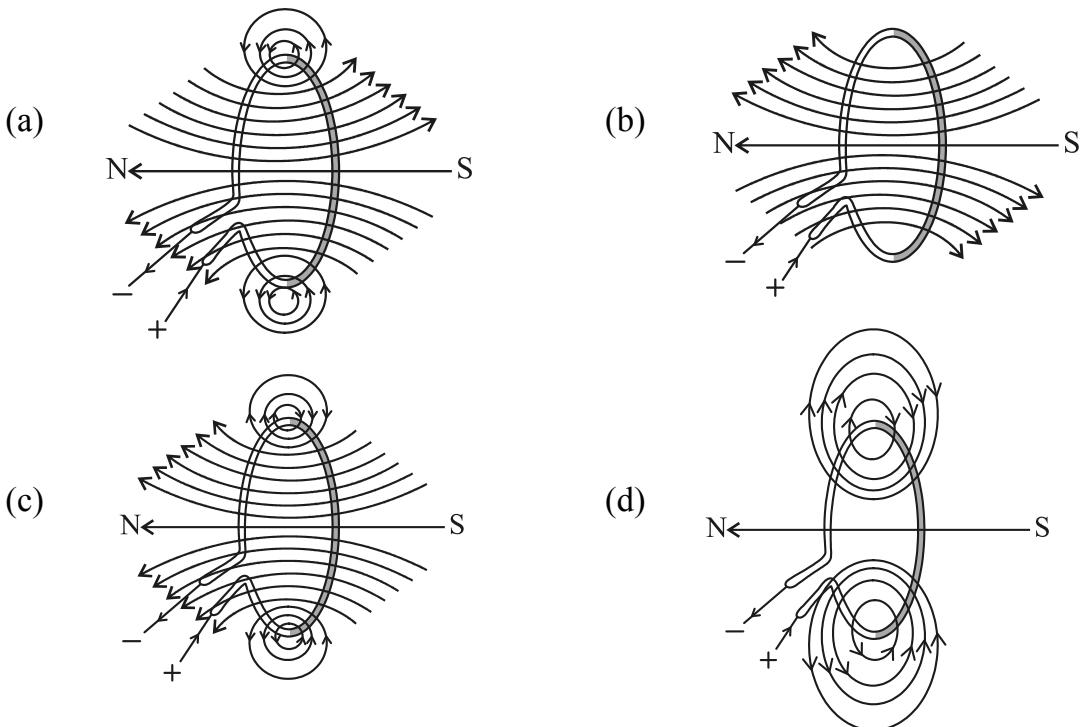
- (a) towards right
- (b) towards left
- (c) into the page
- (d) out of the page



14. The resistance of a resistor is reduced to half of its initial value. If other parameters of the electrical circuit remain unaltered, the amount of heat produced in the resistor will become : 1

1

1



16. Two LED bulbs of 10W and 5W are connected in series. If the current flowing through 5W bulb is 0.005A, the current flowing through 10W bulb is :

1

- (a) 0.02A
- (b) 0.01A
- (c) 0.005A
- (d) 0.0025A

Q. No. 17 to 20 are Assertion – Reasoning based questions.

These consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below.

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



17. **Assertion (A)** : A current carrying straight conductor experiences a force when placed perpendicular to the direction of magnetic field.

Reason (R) : The net charge on a current carrying conductor is always zero. 1

18. **Assertion (A)** : The inner walls of the small intestine have finger like projections called villi which are rich in blood.

Reason (R) : These villi have a large surface area to help the small intestine in completing the digestion of food. 1

19. **Assertion (A)** : In humans, if gene (B) is responsible for black eyes and gene (b) is responsible for brown eyes, then the colour of eyes of the progeny having gene combination Bb, bb or BB will be black only.

Reason (R) : The black colour of the eyes is a dominant trait. 1

20. **Assertion (A)** : Reaction of Quicklime with water is an exothermic reaction.

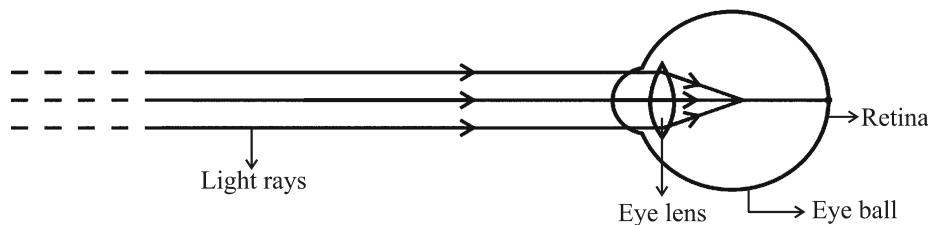
Reason (R) : Quicklime reacts vigorously with water releasing a large amount of heat. 1

SECTION – B (Very Short Answer Questions)

21. (i) State the essential function performed by ozone at the higher levels of the atmosphere. 2

(ii) Why was there a sharp drop in the amount of ozone in the atmosphere in 1980's.

22. (A) Observe the following diagram and answer the questions following it : 2



(i) Identify the defect of vision shown.
(ii) List its two causes.
(iii) Name the type of lens used for the correction of this defect.

OR



(B) The colour of clear sky from the earth appears blue but from the space it appears black. Why ? 2

23. Two green plants are kept separately in oxygen free containers, one in the dark and other in sunlight. It was observed that plant kept in dark could not survive longer. Give reason for this observation. 2

24. Give two reasons, why bile juice is considered to be an important secretion of liver in the process of digestion ? 2

25. Name the hormone secreted in scary situations by animals. Write any three responses which enable the animal body to deal with it. 2

26. (A) A student took a small amount of copper oxide in a conical flask and added dilute hydrochloric acid to it with constant stirring. He observed a change in colour of the solution.
 (i) Write the name of the compound formed and its colour.
 (ii) Write a balanced chemical equation for the reaction involved.

OR

(B) The industrial process used for the manufacture of caustic soda involves electrolysis of an aqueous solution of compound 'X'. In this process, two gases 'Y' and 'Z' are liberated. 'Y' is liberated at cathode and 'Z', which is liberated at anode, on treatment with dry slaked lime forms a compound 'B'. Name X, Y, Z and B. 2

SECTION – C
(Short Answer Questions)

27. Write one difference between biodegradable and non-biodegradable wastes. List two impacts of each type of the accumulated waste on environment if not disposed off properly. 3

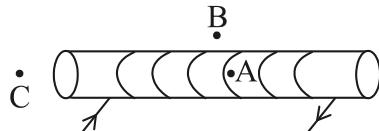
28. (A) (i) Why is an alternating current (A.C.) considered to be advantageous over direct current (D.C.) for the long distance transmission of electric power ? 3
 (ii) How is the type of current used in household supply different from the one given by a battery of dry cells ?
 (iii) How does an electric fuse prevent the electric circuit and the appliances from a possible damage due to short circuiting or overloading.

OR



(B) For the current carrying solenoid as shown, draw magnetic field lines and give reason to explain that out of the three points A, B and C, at which point the field strength is maximum and at which point it is minimum ?

3



29. List two differences in the characteristic properties of the virtual images formed by the two types of spherical lenses (concave and convex). How are these characteristics of the two lenses used in the correction of the two common defects of vision namely myopia and hypermetropia ?

3

30. (A) An object is kept at a distance of 1m from a lens of power +2D : 3
(i) Identify the type of lens.
(ii) Calculate its focal length and distance of the image formed.

OR

(B) Define the following terms in the context of a diverging lens : 3

- (i) Principal focus,
- (ii) Focal length.

Draw a labelled ray diagram to illustrate your answer.

OR

(B) (i) What is double circulation ? 3

(ii) Why is the separation of the right side and the left side of the heart useful ? How does it help birds and mammals ?

32. (i) Why is acidified water considered to be a good conductor of electricity ?

(ii) Write a chemical equation showing the ionic products formed on dissolving potassium hydroxide in water.

(iii) Care must be taken while diluting concentrated nitric acid with water. Why ?



33. (i) While electrolysing water before passing the current some drops of an acid are added. Why ? Name the gases liberated at cathode and anode. Write the relationship between the volume of gas collected at anode and the volume of gas collected at cathode. 3

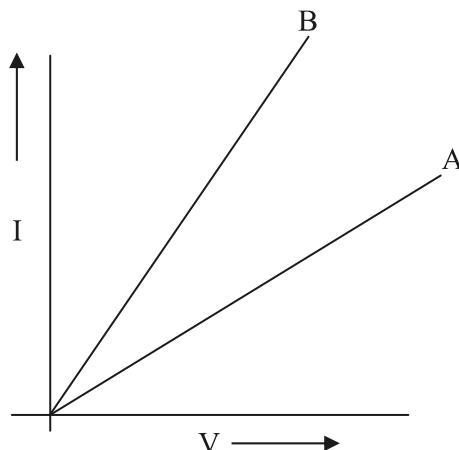
(ii) What is observed when silver chloride is exposed to sunlight ? Give the type of reaction involved.

SECTION – D
(Long Answer Questions)

34. (i) How is electric current related to the potential difference across the terminals of a conductor ? 5
Draw a labelled circuit diagram to verify this relationship.

(ii) Why should an ammeter have low resistance ?

(iii) Two V - I graphs A and B for series and parallel combinations of two resistors are as shown. Giving reason state which graph shows (a) series, (b) parallel combination of the resistors.



35. (i) Name and explain the two modes of asexual reproduction observed in hydra. 5

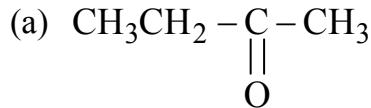
(ii) What is vegetative propagation ? List two advantages of using this technique.

36 (A) (i) It is observed that covalent compounds are bad conductors of 5 electricity. Give reason.

(ii) Carbon can neither form C^{4+} cation nor C^{4-} anion. Why ?

(iii) Draw electron dot structure of Ethanol.

(iv) Identify hetero atom(s) in the following compounds :



OR

(B) (i) What are soaps ? Explain the mechanism of cleansing action of 5 soap with the help of a labelled diagram.

(ii) Detergents are better than soaps. Justify.

SECTION – E
(Source Based/Case Based Questions)

37. The ability of a medium to refract light is expressed in terms of its optical 4 density. Optical density has a definite connotation. It is not the same as mass density. On comparing two media, the one with the large refractive index is optically denser medium than the other. The other medium with a lower refractive index is optically rarer. Also the speed of light through a given medium is inversely proportional to its optical density.

(i) Determine the speed of light in diamond if the refractive index of diamond with respect to vacuum is 2.42. Speed of light in vacuum is 3×10^8 m/s. 1

(ii) Refractive indices of glass, water and carbon disulphide are 1.5, 1.33 and 1.62 respectively. If a ray of light is incident in these media at the same angle (say θ), then write the increasing order of the angle of refraction in these media. 1



(iii) (A) The speed of light in glass is 2×10^8 m/s and in water is 2.25×10^8 m/s. 2

(a) Which one of the two is optically denser and why ?

(b) A ray of light is incident normally at the water-glass interface when it enters a thick glass container filled with water. What will happen to the path of the ray after entering the glass ? Give reason.

OR

(iii) (B) The absolute refractive indices of water and glass are $4/3$ and $3/2$ respectively. If the speed of light in glass is 2×10^8 m/s, find the speed of light in (i) vacuum and (ii) water. 2

38. The most obvious outcome of the reproductive process is the generation of individuals of similar design, but in sexual reproduction they may not be exactly alike. The resemblances as well as differences are marked. The rules of heredity determine the process by which traits and characteristics are reliably inherited. Many experiments have been done to study the rules of inheritance. 4

(i) Why an offspring of human being is not a true copy of his parents in sexual reproduction ? 1

(ii) While performing experiments on inheritance in plants, what is the difference between F_1 and F_2 generation ? 1

(iii) (A) Why do we say that variations are useful for the survival of a species over time ? 2

OR

(iii) (B) Study Mendel's cross between two plants with a pair of contrasting characters. 2

RRYY	\times	rryy
Round Yellow		Wrinkled Green

He observed 4 types of combinations in F_2 generation. Which of these were new combinations ? Why do new features which are not present in the parents, appear in F_2 generation ?



39. The melting points and boiling points of some ionic compounds are given below :

4

Compound	Melting Point (K)	Boiling Point (K)
NaCl	1074	1686
LiCl	887	1600
CaCl ₂	1045	1900
CaO	2850	3120
MgCl ₂	981	1685

These compounds are termed ionic because they are formed by the transfer of electrons from a metal to a non-metal. The electron transfer in such compounds is controlled by the electronic configuration of the elements involved. Every element tends to attain a completely filled valence shell of its nearest noble gas or a stable octet.

(i) Show the electron transfer in the formation of magnesium chloride. 1

(ii) List two properties of ionic compounds other than their high melting and boiling points. 1

(iii) (A) While forming an ionic compound say sodium chloride how does sodium atom attain its stable configuration ? 2

OR

(iii) (B) **Give reasons :** 2

(i) Why do ionic compounds in the solid state not conduct electricity ?

(ii) What happens at the cathode when electricity is passed through an aqueous solution of sodium chloride ?



Strictly Confidential: (For Internal and Restricted use only)
Secondary School Examination, 2023
Marking Scheme – Science (SUBJECT CODE -086)
(PAPER CODE –31/4/2)

General Instructions: -

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2. **“Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its’ leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc may invite action under various rules of the Board and IPC.”**
3. 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. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In class-X, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.**
4. The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after deliberation and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
6. Evaluators will mark(✓) wherever answer is correct. For wrong answer CROSS ‘X’ be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
7. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
8. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.

9. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note “**Extra Question**”.
10. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11. A full scale of marks **80** (example 0 to 80/70/60/50/40/30 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.
12. Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines). This is in view of the reduced syllabus and number of questions in question paper.
13. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
 - Leaving answer or part thereof unassessed in an answer book.
 - Giving more marks for an answer than assigned to it.
 - Wrong totaling of marks awarded on a reply.
 - Wrong transfer of marks from the inside pages of the answer book to the title page.
 - Wrong question wise totaling on the title page.
 - Wrong totaling of marks of the two columns on the title page.
 - Wrong grand total.
 - Marks in words and figures not tallying / not same.
 - Wrong transfer of marks from the answer book to online award list.
 - Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
 - Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
14. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.
15. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
16. The Examiners should acquaint themselves with the guidelines given in the “**Guidelines for spot Evaluation**” before starting the actual evaluation. Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.
17. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
18. The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

MARKING SCHEME
Secondary School Examination, 2023
SCIENCE (Subject Code-086)
[Paper Code:31/4/2]

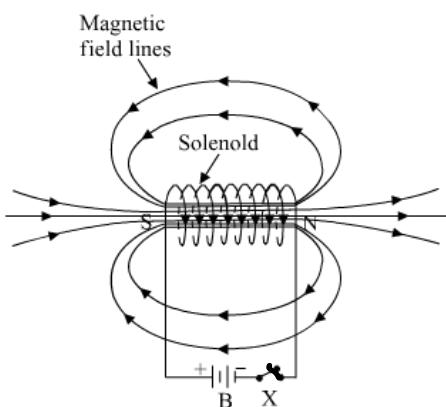
Maximum Marks: 80

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION A		
1.	(c)	1	1
2.	(c)	1	1
3.	(b)	1	1
4.	(d)	1	1
5.	(b)	1	1
6.	(b)	1	1
7.	(c)	1	1
8.	(d)	1	1
9.	(a)	1	1
10.	(c)	1	1
11.	(b)	1	1
12.	(b)	1	1
13.	(d)	1	1
14.	(b)	1	1
15.	(c)	1	1
16.	(c)	1	1
17.	(b)	1	1
18.	(c)	1	1
19.	(d)	1	1
20.	(a)	1	1
	SECTION B		
21	(i) It shields the surface of the earth from harmful ultraviolet radiations of the Sun. (ii) It was due to CFCs (Chlorofluorocarbons) which are used as refrigerants/ fire extinguishers / aerosols.	1 1	2
22	(A) (i) Myopia / Short Sightedness (ii) • Excessive curvature of eye lens • Elongation of eye ball (iii) Concave lens /Diverging Lens OR (B) • Size of particles in the atmosphere is smaller than the wavelength of visible light, so they scatter light of shorter wavelengths i.e. blue. • In space, there is no scattering of light due to absence of particles. (no atmosphere)	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 1	2
23	• The plant kept in dark is unable to carry out photosynthesis and due to absence of oxygen it cannot respire. • But the plant kept in light is able to photosynthesize converting CO_2 into oxygen which it can use for respiration.	1 1	2
24	• The bile juice makes the food alkaline so that pancreatic enzymes can act	1	

	on it. • It breaks down large globules of fat into smaller globules / Emulsification of fat takes place.	1	2				
25	• Adrenaline • Three responses:- (1) It increases the heartbeat. (2) Blood to the digestive system is reduced. (3) Breathing rate increases . (4) Blood to the skin reduced. (Any three points)	$\frac{1}{2}$					
26	(A) (i) • Copper (II) chloride / Copper chloride / Cupric chloride / CuCl_2 • colour- blue-green. (ii) $\text{CuO} + 2\text{HCl} \rightarrow \text{CuCl}_2 + \text{H}_2\text{O}$ OR (B) X : Sodium Chloride / NaCl Y : Hydrogen / H_2 Z : Chlorine / Cl_2 B : Bleaching powder / CaOCl_2	$\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2				
SECTION C							
27	• <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th style="text-align: center;">Biodegradable</th><th style="text-align: center;">Non-biodegradable</th></tr></thead><tbody><tr><td>Biodegradable wastes can be broken down by biological processes.</td><td>Non-biodegradable wastes cannot be broken down by biological processes.</td></tr></tbody></table> • Impact of accumulated biodegradable wastes: (i) Foul smell (ii) Breeding place for carriers of diseases (or any other) • Impact of accumulated non-biodegradable wastes: (i) Biological Magnification (ii) Affect soil fertility. (or any other)	Biodegradable	Non-biodegradable	Biodegradable wastes can be broken down by biological processes.	Non-biodegradable wastes cannot be broken down by biological processes.	1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3
Biodegradable	Non-biodegradable						
Biodegradable wastes can be broken down by biological processes.	Non-biodegradable wastes cannot be broken down by biological processes.						
28	(A) (i) Alternating current can be transmitted over long distances without much loss of electric energy. (ii) Household supply – Alternating current (AC) Battery of Dry cell – Direct current (DC) (iii) It melts and breaks the circuit when a current of higher value than its rating flows through it.	1 $\frac{1}{2}$ $\frac{1}{2}$ 1					

OR

(B) •



1

[Deduct ½ mark if direction of current or magnetic field is not marked]

- Maximum at A

Magnetic field lines are crowded. /

Magnetic field adds up due to 'n' number of turns of a solenoid.

- Minimum at B

Magnetic field lines are far apart.

½

½

½

½

3

29

Concave lens	Convex lens
• Diminished image / $m < 1$	• Magnified image / $m > 1$
• $v < u$ / image distance < object distance	• $v > u$ / image distance > object distance

½

½

½

½

3

- Myopia / Short Sightedness
 - diverging lens / concave lens
 - brings image back to retina
- Hypermetropia / Far Sightedness
 - converging lens / convex lens
 - brings image back to retina

30

(A) (i) Convex lens / Converging lens

(ii) Power, $P = +2D$

$$f(m) = \frac{1}{P}$$

$$f = \frac{1}{2} = 0.5 \text{ m} = 50\text{cm}$$

$$u = -100\text{cm}$$

½

½

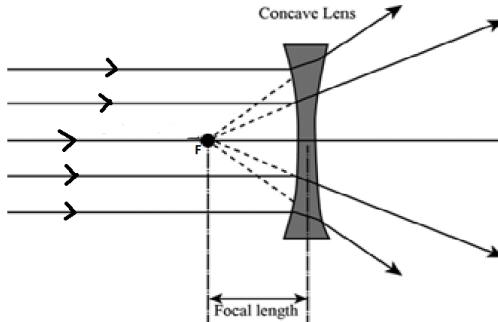
½

½

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

$$\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{50} - \frac{1}{100} = \frac{1}{100}$$

$$v = 100 \text{ cm} = 1 \text{ m}$$

	<p>Alternate answer only for image distance Since object is at $2f$, image will be formed at $2f$. Therefore, image distance is 100 cm. as $f = 50 \text{ cm}$, $u = 1\text{m}$ or $100 \text{ cm} = 2f$ $\therefore u = v = 1\text{m}$</p> <p style="text-align: center;">OR</p> <p>(B) (i) It is a point on the principal axis of a diverging lens from where the rays parallel to principal axis appear to diverge. (ii) The distance between the optical centre and the principal focus of the lens.</p> 		
31	<p>(A) (i) Food enters through a specific spot with the help of movement of cilia. (ii)</p> <p>(a) Creates an acidic medium which facilitates the action of enzyme / kills microorganisms ingested with the food. (b) Digestion of proteins (c) Mixing the food thoroughly with digestive juices. / pushes food forward by peristalsis. (d) Conversion of starch into sugar</p> <p style="text-align: center;">OR</p> <p>(B) (i) Blood goes through the heart twice during each cycle. (ii) • To prevent oxygenated and deoxygenated blood from mixing for efficient supply of oxygen to the body. • It helps birds and mammals who have high energy needs and constantly use energy to maintain their body temperature.</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>1</p> <p>1</p>	3
32	<p>(i) Acidified water has more ions than pure water. (ii) $\text{KOH}(\text{s}) \xrightarrow{\text{H}_2\text{O}} \text{K}^+(\text{aq}) + \text{OH}^-(\text{aq})$ (iii) The process is highly exothermic / may cause excessive heating /heat is released and may cause harm / mixture may splash out</p>	<p>1</p> <p>1</p> <p>1</p>	3
33	<p>(i) • To increase the conductivity of water • Hydrogen – cathode Oxygen – anode • Anode : Cathode $1 : 2$ /Volume of hydrogen liberated at cathode is twice that of oxygen liberated at anode.</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}, \frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	

	(ii) • White silver chloride turns grey • Decomposition reaction / Photolytic Decomposition	$\frac{1}{2}$ $\frac{1}{2}$	3
	SECTION D		
34	(i) Current flowing through a conductor is directly proportional to the potential difference. / $V \propto I$ / $I \propto V$	1	
	(Any one diagram)	1	
	(ii) Since ammeter is connected in series, it should not increase the resistance of the circuit. / should allow maximum current to flow through the circuit.	1	
	(iii) • Series combination - Graph A Less slope and more resistance • Parallel combination - Graph B More slope and less resistance	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	5
35	(i) The two modes of asexual reproduction observed in hydra are: • <u>Budding</u> : A bud develops as an outgrowth. These buds develop into tiny individuals. When fully matured it detaches from the parent body and become new independent individual. • <u>Regeneration</u> : Hydra can be cut into any number of pieces and each piece grows into a complete organism. (ii) • Definition: When any vegetative part of plants like root, stem or leaf is used to grow new plants. • Advantages: - 1. Plants can bear flowers and fruits earlier than those produced from seeds. 2. It enables the propagation of plants such as banana, orange, rose and jasmine which have lost the capacity to produce seeds. 3. The plants produced are genetically similar enough to the parent plant to have all the characteristics.	$\frac{1}{2}$, 1 $\frac{1}{2}$, 1 1 $\frac{1}{2}$, $\frac{1}{2}$	
	(Any two)		5
36	(A) (i) Covalent compounds do not have free ions / electrons (ii) • It does not form C^{4+} cation, as the removal of four valence electrons will require a huge amount of energy. • Carbon does not form C^{4-} anion as the nucleus with six protons will not be able to hold ten electrons due to its small size.	1 1 1	

	(iii)		1	
	(iv) (a)	Oxygen / O	$\frac{1}{2}$	
	(b)	Chlorine / Cl	$\frac{1}{2}$	
	OR			
	(B) (i)	<ul style="list-style-type: none"> • The molecules of soap are Sodium or potassium salts of long chain carboxylic acids / RCOO^-Na^+ . • The ionic end of soap interacts with water while the carbon chain interacts with oily dirt. The soap molecules thus form structures called micelles where one end of the molecule is towards the oil droplet while the ionic end faces outside. This forms an emulsion in water. The soap micelles thus helps in pulling out dirt in water and we can wash our clothes clean. 	1	
			2	
	(ii)	Detergents do not form insoluble precipitates (scum) with calcium and magnesium ions present in hard water.	1	5
	SECTION E			
37	(i)	Refractive index of diamond = $\frac{\text{Speed of light in vacuum}}{\text{Speed of light in diamond}}$	$\frac{1}{2}$	
		Speed of light in diamond = $\frac{3 \times 10^8 \text{ m/s}}{2.42} = 1.23 \times 10^8 \text{ m/s}$	$\frac{1}{2}$	
	(ii)	$\angle r$ in carbon disulphide $< \angle r$ in glass $< \angle r$ in water	1	
	(iii) (A)		$\frac{1}{2}$	
	(a)	<ul style="list-style-type: none"> • Glass • The speed of light in water is more than the speed of light in glass. / Refractive index of glass is more than the refractive index of water. 	$\frac{1}{2}$	
	(b)	Light will enter from water to glass without bending (undeviated / straight) because in this case $\angle i = 0$; $\angle r = 0$.	1	
	OR			
	(iii) (B)	$n_{\text{glass}} = \frac{3}{2}$		

	$n_{water} = \frac{4}{3}$ $v_{glass} = 2 \times 10^8 m/s$ $n_{glass} = \frac{\text{speed of light in vacuum}(c)}{\text{speed of light glass}(v_g)}$ $c = n_{glass} \times v_{glass}$ $= \frac{3}{2} \times 2 \times 10^8 m/s$ $= 3 \times 10^8 m/s$ $v_{water} = \frac{c}{n_{water}} = \frac{3 \times 10^8 m/s}{\frac{4}{3}}$ $= \frac{9}{4} \times 10^8 m/s \text{ or } 2.25 \times 10^8 m/s$	1					
38	<p>(i) Sexual reproduction involves the fusion of male and female gametes, which combines the characters of both parents and cause variation.</p> <p>(ii)</p> <table border="1"> <thead> <tr> <th>F₁ generation</th><th>F₂ generation</th></tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> In F₁ generation only the dominant traits are expressed. It refers to the offspring/ plants resulting immediately from a cross between the first set of parents. </td><td> <ul style="list-style-type: none"> In F₂ generation both dominant and recessive traits are expressed. It refers to the offspring/plants resulting from a cross among the plants of F₁ generation. </td></tr> </tbody> </table> <p style="text-align: right;">[Any one]</p> <p>(iii) (A) Because if a niche of population of organisms is altered, the whole population could be wiped out. However, if variation is present in this population they have some chance of survival.</p> <p>[Alternate answer] If there is a population of bacteria living in temperate waters and if water temperature were to be increased by global warming, most of the bacteria would die, but a few variants resistant to heat would survive and grow further. Thus, variations are useful for survival of species over time.</p> <p style="text-align: center;">OR</p> <p>(iii) (B)</p> <ul style="list-style-type: none"> • Wrinkled, yellow Round, green • If two or more traits are involved, their genes are independently inherited irrespective of the combination present in parents. 	F₁ generation	F₂ generation	<ul style="list-style-type: none"> In F₁ generation only the dominant traits are expressed. It refers to the offspring/ plants resulting immediately from a cross between the first set of parents. 	<ul style="list-style-type: none"> In F₂ generation both dominant and recessive traits are expressed. It refers to the offspring/plants resulting from a cross among the plants of F₁ generation. 	1	
F₁ generation	F₂ generation						
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39	<p>(i)</p>	1	
	<p>(ii)</p> <ul style="list-style-type: none"> • They are hard solids • They are soluble in water • They conduct electricity in aqueous solution or molten state <p>[Any other]</p>	$\frac{1}{2}$, $\frac{1}{2}$	
	<p>(iii) (A)</p> <ul style="list-style-type: none"> • Sodium atom has one electron in its outermost shell • It attains its nearest noble gas configuration by losing this electron forming Na^+ ion / $\text{Na} \rightarrow \text{Na}^+ + \text{e}^-$ <p style="text-align: center;">$2,8,1$ $2,8$ stable</p> <p>OR</p> <p>(iii) (B) (i) Because movement of ions in the solid is not possible due to their rigid structure. (ii) H_2 gas is liberated at cathode.</p>	1 1 1 1	4