



Series Z1XYW/1

SET ~ 2

प्रश्न-पत्र कोड

Q.P. Code

31/1/2

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 31 हैं।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी 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 परीक्षार्थी केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।
- Please check that this question paper contains 31 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 candidates will read the question paper only and will not write any answer on the answer-book during this period.

विज्ञान

SCIENCE

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80



31/1/2

106 B

- 1 -

P.T.O.



General Instructions :

Read the following instructions carefully and strictly follow them :

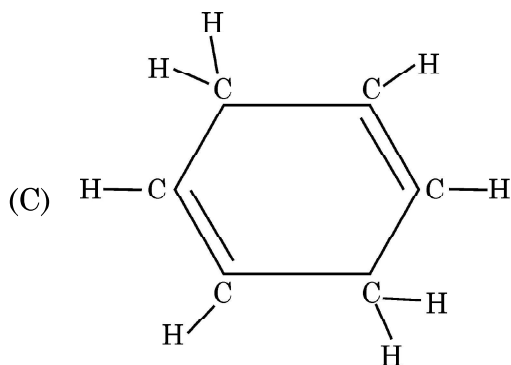
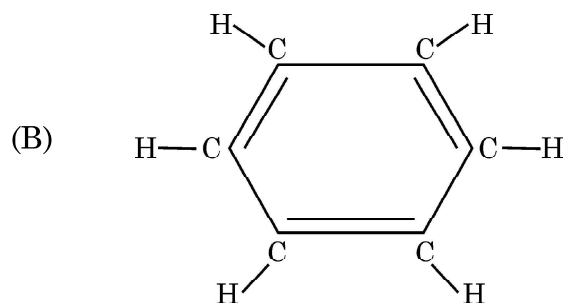
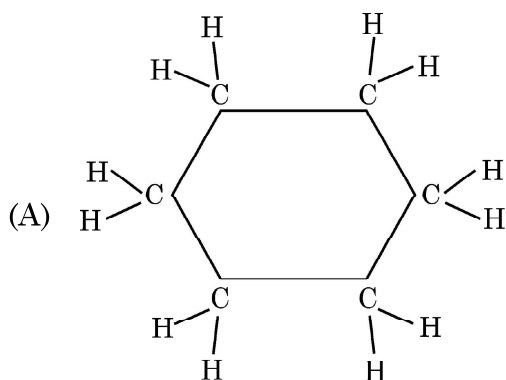
- (i) *This question paper consists of **39** questions. **All** questions are compulsory.*
- (ii) *Question paper is divided into **FIVE** sections viz. Section **A, B, C, D** and **E**.*
- (iii) *In Section **A** - question number **1** to **20** are Multiple Choice Questions (MCQs) carrying **1** 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

Select and write one most appropriate option out of the four options given for each of the questions 1 – 20 :

1. Consider the structures of the three cyclic carbon compounds A, B and C given below and select the correct option from the following : 1



- (a) A and C are isomers of hexane and B is benzene.
(b) A is an isomer of hexane, B is benzene and C is an isomer of hexene.
(c) A is a saturated cyclic hydrocarbon and B and C are unsaturated cyclic hydrocarbons.
(d) A is cyclohexane and B and C are the isomers of benzene.



2. Select washing soda from the following : 1

- (a) NaHCO_3 (b) $\text{Na}_2\text{CO}_3 \cdot 5\text{H}_2\text{O}$
(c) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ (d) NaOH

3. Copper is used for making cooking utensils. Which of the following physical properties of copper is NOT responsible for the same ? 1

- (a) Malleability (b) High melting point
(c) Thermal conductivity (d) High reactivity

4. The table below has information regarding pH and the nature (acidic/basic) of four different solutions. Which one of the options in the table is correct ? 1

Option	Solution	Colour of pH paper	Approximate pH value	Nature of solution
(a)	Lemon juice	Orange	3	Basic
(b)	Milk of magnesia	Blue	10	Basic
(c)	Gastric juice	Red	6	Acidic
(d)	Pure water	Yellow	7	Neutral

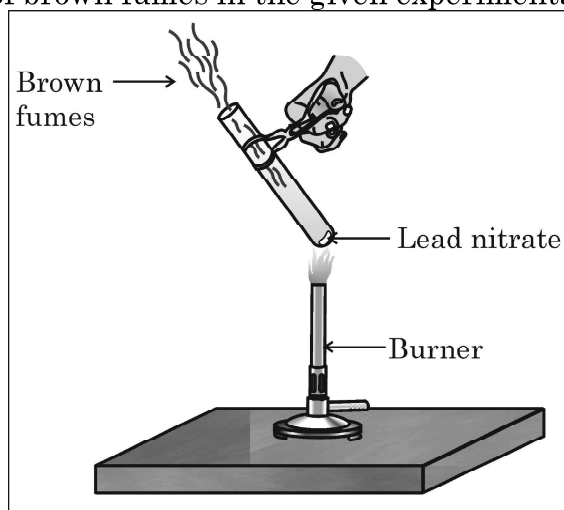
5. $\text{MnO}_2 + x \text{HCl} \rightarrow \text{MnCl}_2 + y \text{H}_2\text{O} + z \text{Cl}_2$ 1

In order to balance the above chemical equation, the values of x , y and z respectively are :

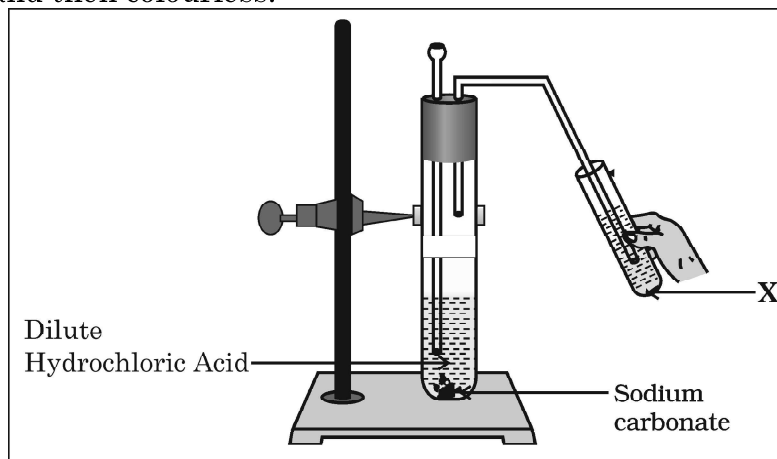
- (a) 6, 2, 2 (b) 4, 1, 2
(c) 4, 2, 1 (d) 2, 2, 1



6. The emission of brown fumes in the given experimental set-up is due to 1



- (a) thermal decomposition of lead nitrate which produces brown fumes of nitrogen dioxide.
(b) thermal decomposition of lead nitrate which produces brown fumes of lead oxide.
(c) oxidation of lead nitrate forming lead oxide and nitrogen dioxide.
(d) oxidation of lead nitrate forming lead oxide and oxygen.
7. In the experimental setup given below, it is observed that on passing the gas produced in the reaction in the solution 'X' the solution 'X' first turns milky and then colourless. 1



The option that justifies the above stated observation is that 'X' is aqueous calcium hydroxide and

- (a) it turns milky due to carbon dioxide gas liberated in the reaction and after sometime it becomes colourless due to formation of calcium carbonate.



- (b) it turns milky due to formation of calcium carbonate and on passing excess of carbon dioxide it becomes colourless due to formation of calcium hydrogen carbonate which is soluble in water.
- (c) it turns milky due to passing of carbon dioxide through it. It turns colourless as on further passing carbon dioxide, sodium hydrogen carbonate is formed which is soluble in water.
- (d) the carbon dioxide liberated during the reaction turns lime water milky due to formation of calcium hydrogen carbonate and after some time it turns colourless due to formation of calcium carbonate which is soluble in water.
8. Select endothermic reaction from the following : 1
- (a) Decomposition of vegetable matter into compost.
- (b) Decomposition of calcium carbonate to form quick lime and carbon dioxide.
- (c) Burning of a candle.
- (d) Process of respiration.
9. Select from the following the correct statement about tropic movement in plants : 1
- (a) It is due to stimulus of touch and temperature.
- (b) It does not depend upon the direction of stimulus received.
- (c) It is observed only in roots and not in stems.
- (d) It is a growth related movement.
10. The statement that correctly describes the characteristic(s) of a gene is : 1
- (a) In individuals of a given species, a specific gene is located on a particular chromosome.
- (b) A gene is not the information source for making proteins in the cell.
- (c) Each chromosome has only one gene located all along its length.
- (d) All the inherited traits in human beings are not controlled by genes.



11. Consider the following statements about small intestine and select the one which is NOT correct : 1
- (a) The length of the small intestine in animals differs as it depends on the type of food they eat.
 - (b) The small intestine is the site of complete digestion of food.
 - (c) The small intestine receives secretions from liver and pancreas.
 - (d) The villi of the small intestine absorb water from the unabsorbed food before it gets removed from the body via the anus.
12. An organism which breaks down the food material outside the body and then absorbs it is 1
- (a) a plant parasite, Cuscuta.
 - (b) an animal parasite, Tapeworm.
 - (c) a bacteria, Rhizobium.
 - (d) a fungi, Rhizopus.
13. The resultant magnetic field at point 'P' situated midway between two parallel wires (placed horizontally) each carrying a steady current I is 1
- The diagram shows two parallel horizontal wires, labeled AB and CD. Both wires have arrows pointing to the right, indicating the direction of current flow. Point P is marked with a dot and labeled 'P' at the midpoint between the two wires.
- (a) in the same direction as the current in the wires.
 - (b) in the vertically upward direction.
 - (c) zero
 - (d) in the vertically downward direction.



14. An electric iron of 1500 W, 200 V and a flash light of 500 W, 200 V are used in homes. The rating of fuse to be used should be 1
- (a) 5 A (b) 10 A
(c) 15 A (d) 20 A
15. In domestic electric circuits the wiring with 15 A current rating is for the electric devices which have 1
- (a) higher power ratings such as geyser.
(b) lower power ratings such as fan.
(c) metallic bodies and low power ratings.
(d) non-metallic bodies and low power ratings.
16. If four identical resistors, of resistance 8 ohm, are first connected in series so as to give an effective resistance R_s , and then connected in parallel so as to give an effective resistance R_p , then the ratio $\frac{R_s}{R_p}$ is 1
- (a) 32 (b) 2
(c) 0.5 (d) 16

Q. No. 17 to 20 are Assertion – Reason 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) :** The strength of the magnetic field produced at the centre of a current carrying circular coil increases on increasing the number of turns in it. 1

Reason (R) : The current in each circular turn has the same direction and the magnetic field due to each turn then just adds up.

18. **Assertion (A) :** The anaerobic respiration which takes place in yeast, has one of the end products as an acid. 1

Reason (R) : During anaerobic respiration, there is incomplete breakdown of glucose.

19. **Assertion (A) :** Genes inherited from the parents decide the sex of a child. 1

Reason (R) : X chromosome in a male child is inherited from his father.

20. **Assertion (A) :** The colour of aqueous solution of copper sulphate turns colourless when a piece of lead is added to it. 1

Reason (R) : Lead is more reactive than copper, and hence displaces copper from its salt solution.

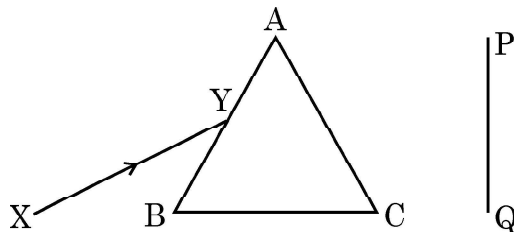
SECTION – B

Q. No. 21 to 26 are very short answer questions.

21. List two reasons to show that the existence of decomposers is essential in an ecosystem. 2



22. (a) A narrow beam XY of white light is passing through a glass prism ABC as shown in the diagram : 2



Trace it on your answer sheet and show the path of the emergent beam as observed on the screen PQ.

Name the phenomenon observed and state its cause.

OR

- (b) It is observed that the power of an eye to see nearby objects as well as far off objects diminishes with age. 2
- (i) Give reason for the above statement.
 - (ii) Name the defect that is likely to arise in the eyes in such a condition.
 - (iii) Draw a labelled ray diagram to show the type of corrective lens used for restoring the vision of such an eye.
23. Name the part of the human excretory system where nephrons are found. Write the structure and function of nephrons. 2
24. A knife which is used to cut a fruit was immediately dipped into water containing drops of blue litmus solution. If the colour of the solution is changed to red, what inference can be drawn about the nature of the fruit and why ? 2
25. Write the sequence of events that involve response of a person when a dust particle is inhaled through the nose by him. 2



26. (a) (i) A compound 'X' which is prepared from gypsum has the property of hardening when mixed with proper quantity of water. 2
- Identify 'X' and write its chemical formula.
- (ii) State the difference in chemical composition between baking soda and baking powder.

OR

- (b) Write balanced chemical equation for the reaction that occurs when : 2
- (i) blue coloured copper sulphate crystals are heated and
- (ii) Sodium hydrogen carbonate is heated during cooking.

SECTION – C

Q. No. 27 to 33 are short answer questions.

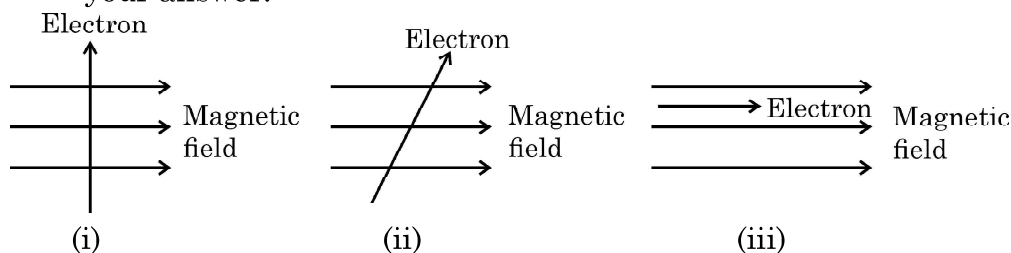
27. (a) (i) Why does a kitchen garden called an artificial ecosystem while a forest is considered to be a natural ecosystem ? 3
- (ii) While designing an artificial ecosystem at home, write any two things to be kept in mind to convert it into a self-sustaining system. Give reason to justify your answer.

OR

- (b) (i) Construct a food chain of four trophic levels comprising the following : 3
- Hawk, snake, plants, rat.
- (ii) 20,000 J of energy was transferred by the producers to the organism of second trophic level. Calculate the amount of energy that will be transferred by organisms of the third trophic level to the organisms of the fourth trophic level.



28. (a) (i) State the rule used to find the force acting on a current carrying conductor placed in a magnetic field. 3
- (ii) Given below are three diagrams showing entry of an electron in a magnetic field. Identify the case in which the force will be (1) maximum and (2) minimum respectively. Give reason for your answer.



OR

- (b) (i) Draw the pattern of magnetic field lines of 3
- (1) a current carrying solenoid
- (2) a bar magnet
- (ii) List two distinguishing features between the two fields.
29. A person is suffering from an eye defect in which the far point of the eye is nearer than infinity. Identify the defect. List two main causes of this defect. 3
- Draw a ray diagram to show how this defect is corrected by using a suitable lens.
30. (a) The image of an object formed by a lens is of same size but inverted. If the object distance is 30 cm, calculate 3
- (i) The distance between the object and its image.
- (ii) Focal length of the lens.
- (b) Draw a ray diagram to show the image formed in above case.
31. (a) (i) State the role of ATP in cellular respiration. 3
- (ii) What ensures sufficient exchange of gases in plants ?
- (iii) State the conditions on which the direction of diffusion of gases in plant depend upon.
- OR**
- (b) (i) What is the internal energy reserve in plants and animals ? 3
- (ii) How desert plants perform photosynthesis if their stomata remain closed during the day ?



32. Write the chemical composition of tooth enamel. Under what conditions of pH it starts corroding ? Explain the reason of tooth decay and suggest one method to prevent it. 3
33. (a) Identify the reducing agent in the following reactions : 3
- (i) $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$
- (ii) $\text{H}_2\text{O} + \text{F}_2 \rightarrow \text{HF} + \text{HOF}$
- (iii) $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$
- (iv) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- (b) Define a redox reaction in terms of gain or loss of oxygen.

SECTION – D

Q. No. 34 to 36 are long answer questions.

34. (a) An electric iron consumes energy at a rate of 880 W when heating is at the maximum rate and 330 W when the heating is at the minimum. If the source voltage is 220 V, calculate the current and resistance in each case. 5
- (b) What is heating effect of electric current ?
- (c) Find an expression for the amount of heat produced when a current passes through a resistor for some time.
35. (a) What happens when the egg is not fertilised ? 5
- (b) How is sperm genetically different from a human egg / ova ?
- (c) List any three contraceptive methods practised for family planning. Mention how these methods work.



36. (a) A saturated organic compound 'A' belongs to the homologous series of alcohols.

5

On heating 'A' with concentrated sulphuric acid at 443 K, it forms an unsaturated compound 'B' with molecular mass 28 u.

The compound 'B' on addition of one mole of hydrogen in the presence of Nickel, changes to a saturated hydrocarbon 'C'.

- Identify A, B and C.
- Write the chemical equations showing the conversion of A into B.
- What happens when compound C undergoes combustion ?
- State one industrial application of hydrogenation reaction.
- Name the products formed when compound A reacts with sodium.

OR

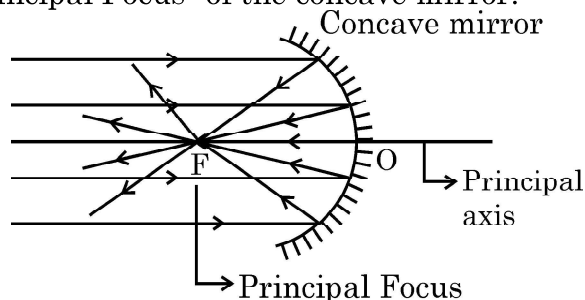
- (b) (i) With the help of diagram, show the formation of micelles, when soap is applied on oily dirt.
- (ii) Take two test tubes X and Y with 10 mL of hard water in each. In test tube 'X', add few drops of soap solution and in test tube 'Y' add a few drops of detergent solution. Shake both the test tubes for the same period.
- In which test tube the formation of foam will be more ? Why ?
 - In which test tube is a curdy solid formed ? Why ?

5

SECTION - E

Q. No. 37 to 39 are case based / data based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts.

37. Hold a concave mirror in your hand and direct its reflecting surface towards the sun. Direct the light reflected by the mirror on to a white card-board held close to the mirror. Move the card-board back and forth gradually until you find a bright, sharp spot of light on the board. This spot of light is the image of the sun on the sheet of paper; which is also termed as "Principal Focus" of the concave mirror.





- (a) List two applications of concave mirror. 1
- (b) If the distance between the mirror and the principal focus is 15 cm, find the radius of curvature of the mirror. 1
- (c) Draw a ray diagram to show the type of image formed when an object is placed between pole and focus of a concave mirror. 2

OR

- (c) An object 10 cm in size is placed at 100 cm in front of a concave mirror. If its image is formed at the same point where the object is located, find : 2
- (i) focal length of the mirror, and
- (ii) magnification of the image formed with sign as per Cartesian sign convention.

38. In order to trace the inheritance of traits Mendel crossed pea plants having one contrasting character or a pair of contrasting characters. When he crossed pea plants having round and yellow seeds with pea plants having wrinkled and green seeds, he observed that no plants with wrinkled and green seeds were obtained in the F_1 generation. When the F_1 generation pea plants were cross-bred by self-pollination, the F_2 generation had seeds with different combinations of shape and colour also.

- (a) Write any two pairs of contrasting characteristics of pea plant used by Mendel other than those mentioned above. 1
- (b) Differentiate between dominant and recessive traits. 1
- (c) State the ratio of the combinations observed in the seeds of F_2 generation (in the above case). What do you interpret from this result ? 2

OR

- (c) Given below is a cross between a pure violet flowered pea plant (V) and a pure white flowered pea plant (v). Diagrammatically explain what type of progeny is obtained in F_1 generation and F_2 generation :
Pure violet flowered plant \times Pure white flowered plant. 2
- (V V) (v v)



39. Almost all metals combine with oxygen to form metal oxides. Metal oxides are generally basic in nature. But some metal oxides show both basic as well as acidic behaviour. Different metals show different reactivities towards oxygen. Some react vigorously while some do not react at all.
- (a) What happens when copper is heated in air ? (Give the equation of the reaction involved). 1
- (b) Why are some metal oxides categorized as amphoteric ? Give one example. 1
- (c) Complete the following equations : 2
- (i) $\text{Na}_2\text{O}_{(s)} + \text{H}_2\text{O}_{(l)} \rightarrow$
- (ii) $\text{Al}_2\text{O}_3 + 2 \text{NaOH} \rightarrow$

OR

- (c) On burning Sulphur in oxygen a colourless gas is produced. 2
- (i) Write chemical equation for the reaction.
- (ii) Name the gas formed.
- (iii) State the nature of the gas.
- (iv) What will be the action of this on a dry litmus paper ?
- _____

Strictly Confidential: (For Internal and Restricted use only)
Secondary School Examination, 2023
Marking Scheme – Science (SUBJECT CODE -086)
(PAPER CODE –31/1/2)

General Instructions: -

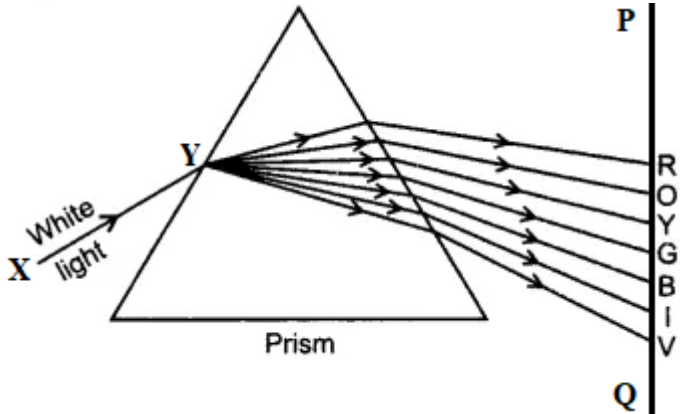
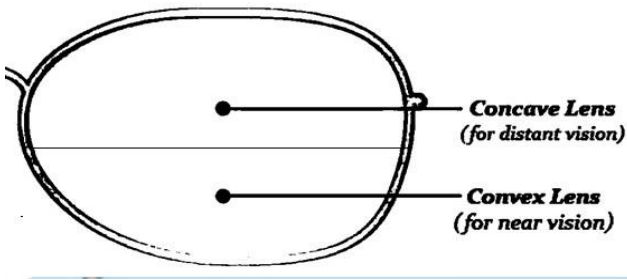
1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested 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($\sqrt{}$) wherever answer is correct. For wrong answer CROSS ‘X’ be marked. Evaluators will not put right (\checkmark)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.

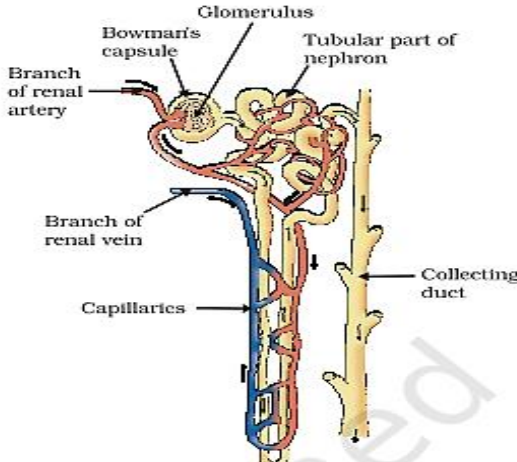
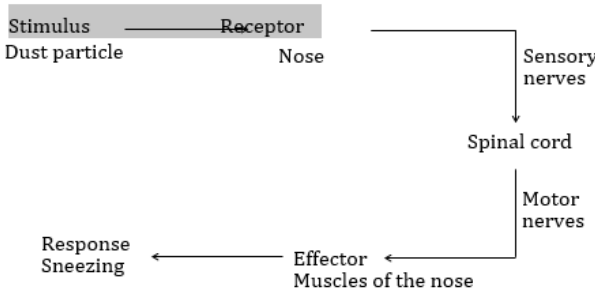
11. A full scale of marks **80** (example 0 to 80/70/60/50/40/30 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.
12. Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 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:31/1/2]

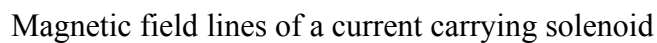
Maximum Marks: 80

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION—A	1	1
1.	(c)	1	1
2.	(c)	1	1
3.	(d)	1	1
4.	(b)	1	1
5.	(c)	1	1
6.	(a)	1	1
7.	(b)	1	1
8.	(b)	1	1
9.	(d)	1	1
10.	(a)	1	1
11.	(d)	1	1
12.	(d)	1	1
13.	(c)	1	1
14.	(b)	1	1
15.	(a)	1	1
16.	(d)	1	1
17.	(a)	1	1
18.	(d)	1	1
19.	(c)	1	1
20.	(a)	1	1
	SECTION B		

21.	<ul style="list-style-type: none"> • They help in the breakdown of organic matter/ dead and decaying matter into simple inorganic raw materials. • Help in natural replenishment of nutrient in soil. • Help in keeping the environment clean. <p style="text-align: right;">(Any two)</p>	1,1	2
22.	<p>(a)</p>  <ul style="list-style-type: none"> • Dispersion of white light • Cause: Different colours of light bend through different angles w.r.t. the incident ray. / Different colours have different wavelengths. <p style="text-align: center;">OR</p> <p>(b) (i) It is due to gradual weakening of the ciliary muscles and diminishing flexibility of the eye lens.</p> <p>(ii) Presbyopia/ Presbyopia + Myopia</p> <p>(iii) Bifocal /Concave + Convex lens/ Diagram</p> 	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$, $\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	2
23.	<ul style="list-style-type: none"> • Kidneys <ul style="list-style-type: none"> • Structure: A cluster of thin-walled capillaries (glomerulus) associated with cup-shaped end of a tube called Bowman's capsule. This further extends into a tubular part which ends in collective ducts. / 	<p>$\frac{1}{2}$</p> <p>1</p>	

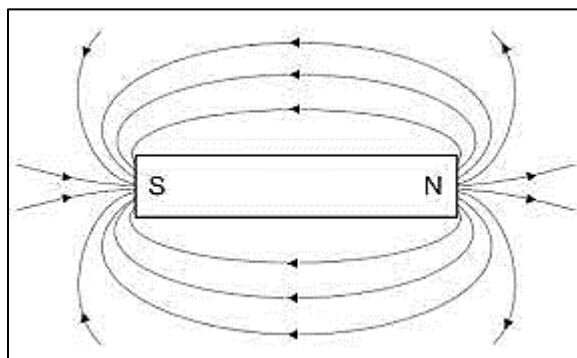
	 <p> • Function: Filtration of nitrogenous waste from blood to form urine. / Reabsorption of useful materials from the filtrate. / Osmoregulation (Any one function) </p>	1/2	2
24.	Fruit is acidic in nature because acid turns blue litmus red.	1,1	2
25.	<p>•</p>  <p>Or explained in the form of paragraph.</p>	2	2
26.	<p>(a) (i) X: Plaster of Paris/Calcium sulphate hemihydrate.</p> <p>• $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$</p> <p>(ii) • Baking Soda – NaHCO_3 /Sodium hydrogen carbonate/ Sodium bicarbonate</p> <p>• Baking Powder – A mixture of NaHCO_3 /Baking soda + Tartaric acid/any mild edible acid</p> <p>OR</p> <p>(b) (i) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \xrightarrow{\text{heat}} \text{CuSO}_4 + 5\text{H}_2\text{O}$</p> <p>(ii) $2\text{NaHCO}_3 \xrightarrow{\text{heat}} \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$</p>	1/2 1/2 1/2 1/2 1 1	2

	SECTION C		
27.	<p>(a) (i) Kitchen Garden → A man made ecosystem / non-sustainable Forest → Ecosystem maintained by nature / self-sustainable</p> <p>(ii) In a jar containing water we can provide oxygen through a pump and add a few aquatic plants and animals to make it a self-sustaining system.</p> <p>Justification –</p> <ul style="list-style-type: none"> • Oxygen is replenished continuously. • Aquatic plants serve as food. <p style="text-align: right;"><i>(or any other example)</i></p> <p style="text-align: center;">OR</p> <p>(b) (i) Plants → Rats → Snakes → Hawks</p> <p>(ii) Energy available at second trophic level = 20,000 J Energy transferred from second to third trophic level = 2000 J Energy transferred from third to fourth trophic level = 200 J</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	3
28.	<p>(a) (i) Flemings left-hand rule: Stretch the forefinger, the central finger and the thumb of your left hand in mutually perpendicular directions. If the forefinger shows the direction of the magnetic field and the central finger that of the current, then the thumb will point towards the direction of motion of the conductor or direction of force /</p> <div data-bbox="499 1276 967 1556" data-label="Image"> </div> <p>(ii) (1) Force on electron is maximum in Fig (i) because the direction of motion of electron/current is at right angle/perpendicular to that of magnetic field.</p> <p>(2) Force on electron is minimum in Fig (iii) because the electron is moving along / parallel to the direction of magnetic field</p> <p style="text-align: center;">OR</p> <p>(b) (i) (1)</p>	<p>1</p> <p>$\frac{1}{2}, \frac{1}{2}$</p> <p>$\frac{1}{2}, \frac{1}{2}$</p>	



1

(2)



Magnetic field lines of a bar magnet

1

(ii)

Magnetic field of a solenoid	Magnetic field of a bar magnet
1. The strength of the magnetic field can be changed by changing the current.	1. The strength of the magnetic field for a bar magnet cannot be changed.
2. The direction of magnetic field can be reversed by reversing the direction of current.	2. The direction of magnetic field for a bar magnet cannot be changed.
3. It is a temporary magnetic field.	3. It is a permanent magnetic field.

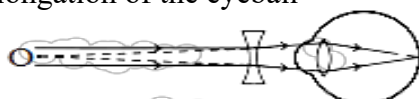
 $\frac{1}{2}, \frac{1}{2}$

3

(Any two)

29.

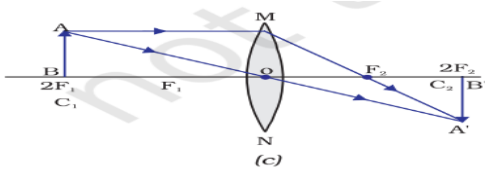
- Defect : Myopia/Short sightedness
- Two Causes :
 - Excessive curvature of the eye lens
 - Elongation of the eyeball



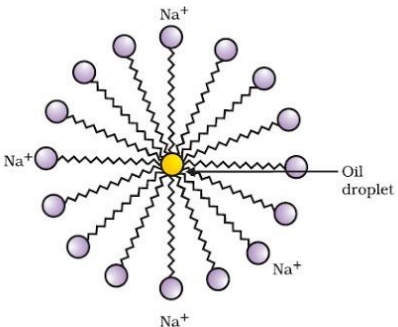
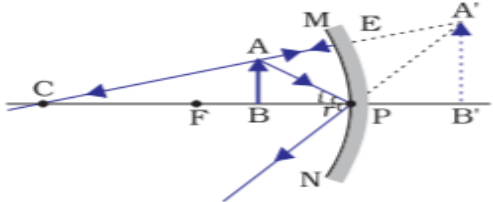
1

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

1

	(Deduct ½ mark if arrows are not drawn.)		3
30.	<p>(a)</p> <p>(i) As the image is of same size \therefore Object distance = $2F = 30\text{ cm}$ \therefore The image will be formed on the right side of lens at $2F' = 30\text{ cm}$ The distance between the object and its image = 60 cm</p> <p>(ii) $f = 15\text{ cm}$</p> <p>(iii)</p> 	<p>½</p> <p>½</p> <p>1</p> <p>1</p>	3
31.	<p>(a) (i) Energy currency for cellular processes / ATP breaks down to give a fixed amount of energy which can drive the endothermic reactions taking place in the cell.</p> <p>(ii) Stomata and surface of leaves, stems and roots.</p> <p>(iii) Environmental conditions Requirements of the plant.</p> <p style="text-align: center;">OR</p> <p>(b) (i) Plants -Starch Animals- Glycogen</p> <p>(ii) Desert plants take up carbon dioxide at night and prepare an intermediate compound which is acted upon by the energy absorbed by the chlorophyll during the day.</p>	<p>1</p> <p>1</p> <p>½</p> <p>½</p> <p>1</p> <p>1</p> <p>1</p>	3
32.	<p>Calcium phosphate / Calcium hydroxyapatite $(\text{Ca}_3(\text{PO}_4)_2)$</p> <p>Tooth decay starts when the pH of the mouth is lower than 5.5.</p> <p>Bacteria present in the mouth produces acid by degrading sugar and food particles.</p> <p>Using Toothpaste / Cleaning the mouth after every meal.</p>	<p>½</p> <p>½</p> <p>1</p> <p>1</p>	3
33.	<p>(a) (i) NH_3 (ii) H_2O (iii) CO (iv) H_2</p> <p>(Award full mark if part (ii) of (a) is attempted)</p> <p>(b) A reaction in which the gain or loss of oxygen takes place simultaneously is called a redox reaction.</p>	<p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>1</p>	3

	SECTION D		
34	<p>(a) When heating is at maximum rate.</p> <p>Power, $P = 880 \text{ W}$</p> <p>Voltage, $V = 220 \text{ V}$</p> <p>Current, $I = \frac{P}{V} = \frac{880}{220} = 4 \text{ A}$</p> <p>Resistance, $R = \frac{V}{I} = \frac{220}{4} = 55 \Omega$</p> <p>When heating is at minimum rate</p> <p>Power, $P = 330 \text{ W}$</p> <p>Voltage, $V = 220 \text{ V}$</p> <p>Current, $I = \frac{P}{V} = \frac{330}{220} = \frac{3}{2} = 1.5 \text{ A}$</p> <p>Resistance, $R = \frac{V}{I} = \frac{220}{1.5} = 146.6 \Omega$</p> <p>(b) When electric current is passed through a resistor, electrical energy is dissipated and appears as heat energy. This is known as the heating effect or electric current.</p> <p>(c) $H = I^2 R t$ / $H = V I t$</p>	<p>$\frac{1}{2}, \frac{1}{2}$</p> <p>$\frac{1}{2}, \frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>1</p>	5
35.	<p>(a) The lining of uterus breaks down and comes out through vagina in the form of blood and mucus.</p> <p>(b) The sex chromosome in sperm is either X or Y while the sex chromosome in a human egg is only X.</p> <p>(c) (i). Surgical Method - In prevents sperm transfer and fertilisation. (ii). Barrier Method - Sperm does not reach the egg/prevents STD's (iii). Use of oral pills - Eggs are not released because hormonal balance is changed. (or any other)</p>	<p>1</p> <p>1</p> <p>$\frac{1}{2}, \frac{1}{2}$</p> <p>$\frac{1}{2}, \frac{1}{2}$</p> <p>$\frac{1}{2}, \frac{1}{2}$</p>	5
36.	<p>(a) (i) A: $\text{CH}_3\text{CH}_2\text{OH}$ / Ethanol / Ethyl alcohol B: $\text{CH}_2 = \text{CH}_2$ / Ethene C: $\text{CH}_3 - \text{CH}_3$ / Ethane</p> <p>(ii)</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> $\underset{\text{A}}{\text{CH}_3\text{CH}_2\text{OH}} \xrightarrow[443 \text{ K}]{\text{conc. H}_2\text{SO}_4} \underset{\text{B}}{\text{CH}_2 = \text{CH}_2} + \text{H}_2\text{O}$ </div>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p>	

	<p>(iii) Carbon dioxide and water are produced and a large amount of heat is released /</p> $\text{C}_2\text{H}_6 + \text{O}_2 \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O} + \text{Heat}$ <p>(Award full marks even if equation is not balanced.)</p> <p>(iv) Conversion of vegetable oil into fats.</p> <p>(v) Sodium ethoxide and hydrogen</p> <p style="text-align: center;">OR</p> <p>(b) (i)</p>  <p>(ii) (1) • Test tube 'Y'. • Detergents are effective in hard water.</p> <p>(2) • Test tube 'X' • Reaction between soap and calcium and magnesium salts of hard water form insoluble scum / due to formation of scum / insoluble ppt.</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>2</p> <p>$\frac{1}{2}+1$</p> <p>$\frac{1}{2}+1$</p> <p>5</p>	
	SECTION E		
37.	<p>(a) Torches, search light, vehicles head lights, shaving mirrors, dentist's mirror, Solar furnaces. (any two)</p> <p>(b) $f = 15\text{cm}$ $R = 2f$ $R = 2 \times 15\text{ cm} = 30\text{ cm}$</p> <p>(c)</p>  <p>(Note: $\frac{1}{2}$ mark to be deducted for not drawing the arrows.)</p> <p style="text-align: center;">OR</p> <p>(c)</p> <p>(i) $h = +10\text{cm}$</p>	<p>$\frac{1}{2}, \frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>2</p>	

	<p> $u = -100 \text{ cm}$ $v = -100 \text{ cm}$ $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$ $\frac{1}{100} - \frac{1}{100} = \frac{1}{f}$ $\frac{-2}{100} = \frac{1}{f}$ $f = -50 \text{ cm}$ </p> <p>Alternate Answer for (i)</p> <p>Since $u = v$</p> <p>Therefore, object is placed at centre of curvature (C)</p> <p> $f = \frac{R}{2}$ $f = \frac{-100}{2}$ $f = -50 \text{ cm}$ </p> <p>(ii) $m = \frac{-v}{u} = \frac{-(-100)}{100} = -1$</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}, \frac{1}{2}$</p>	<p>4</p>
<p>38.</p>	<p>(a) Tall – Dwarf (Height of plant)</p> <p>White – Purple (Colour of flower) <i>(or any other)</i></p> <p>(b) Dominant Trait – are expressed even if one copy of dominant trait exists.</p> <p>Recessive Trait – Whose expression is suppressed by a dominant gene/ Expressed when two copies of recessive traits are present.</p> <p>(c) 9 : 3 : 3 : 1</p> <p>Interpretation: Traits are independently inherited.</p> <p style="text-align: center;">OR</p> <p>(c)</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;"> $VV \times vv$ VIOLET WHITE ↓ Vv → F₁ Generation (VIOLET) ↓ $Vv \times Vv$ (self Pollination) ↓ VV, Vv, Vv, vv → F₂ Generation 3 Violet 1 white </p> </div>	<p>$\frac{1}{2}, \frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>1</p> <p>$\frac{1}{2} \times 4$</p>	<p>4</p>

(or with punnet square diagram)

39	(a) $2\text{Cu} + \text{O}_2 \longrightarrow 2\text{CuO}$	1	4
	(b) • Because they react with both acids and bases to produce salt and water.	$\frac{1}{2}$	
	• $\text{Al}_2\text{O}_3 / \text{ZnO}$ <i>(any one)</i>	$\frac{1}{2}$	
	(c) (i) $\text{Na}_2\text{O}(\text{s}) + \text{H}_2\text{O}(\text{l}) \longrightarrow 2\text{NaOH}(\text{aq})$	1	
	(ii) $\text{Al}_2\text{O}_3 + 2\text{NaOH} \longrightarrow 2\text{NaAlO}_2 + \text{H}_2\text{O}$	1	
	OR		
	(c) (i) $\text{S} + \text{O}_2 \longrightarrow \text{SO}_2$	$\frac{1}{2}$	
	(ii) Sulphur dioxide	$\frac{1}{2}$	
	(iii) Acidic	$\frac{1}{2}$	
	(iv) No change	$\frac{1}{2}$	
