रोल नं.
Roll No.

- 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**

General Instructions :

Read the following instructions carefully and strictly follow them :

(i) *This question paper contains **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. Select the appropriate state symbols of the products given as X and Y in the following chemical equation by choosing the correct option from table given below :   **1**

$$Zn_{(s)} + H_2SO_{4(l)} \longrightarrow ZnSO_{4(X)} + H_{2(Y)}$$
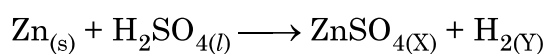
	(X)	(Y)
(a)	(s)	(l)
(b)	(aq)	(g)
(c)	(aq)	(s)
(d)	(g)	(aq)

2. In the given diagram of a closed stomata : (1), (2), (3) and (4) respectively are   **1**
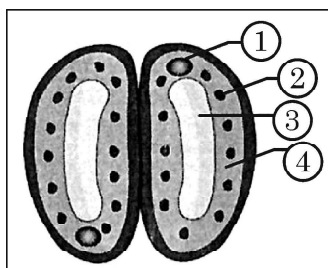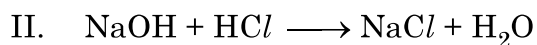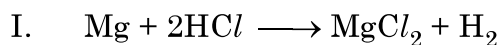

   (a) nucleus, chloroplast, guard cell, vacuole

   (b) nucleus, chloroplast,, vacuole, guard cell

   (c) chloroplast, nucleus, vacuole, guard cell

   (d) vacuole, guard cell, nucleus, chloroplast

3. Consider the following chemical equation I and II   **1**

I. $Mg + 2HCl \longrightarrow MgCl_2 + H_2$

II. $NaOH + HCl \longrightarrow NaCl + H_2O$

The correct statement about these equations is –

(a) 'I' is a displacement reaction and 'II' is a decomposition reaction.

(b) 'I' is a displacement reaction and 'II' is double displacement reaction.

(c) Both 'I' and 'II' are displacement reactions.

(d) Both 'I' and 'II' are double-displacement reactions.

4. There are four solutions A, B, C, and D with pH values as follows :

Solution	A	B	C	D
pH	2.0	7.0	8.0	12.0

Which solution(s) would liberate hydrogen gas with zinc ?   **1**

(a) A only

(b) D only

(c) A and D

(d) B and C

5. Walking in a straight line and riding a bicycle are the activities which are possible due to a part of the brain. Choose the correct location and name of this part from the given table :   **1**

	Part of the Brain	Name
(a)	Fore brain	Cerebrum
(b)	Mid brain	Hypothalamus
(c)	Hind brain	Cerebellum
(d)	Hind brain	Medulla

6. Metal oxides generally react with acids, but few oxides of metal also react with bases. Such metallic oxides are : 1

   I.   MgO

   II. ZnO

   III. Al_2O_3

   IV. CaO

   (a) I and II   (b) II and III

   (c) III and IV   (d) I and IV

7. In torch lights and head lights of vehicles, the bulb is placed 1

   (a) between the pole and the focus of the reflector.

   (b) very near to the focus of the reflector.

   (c) between the focus and centre of curvature of the reflector.

   (d) at the centre of curvature of the reflector.

8. Few drops of aqueous solution of ammonium chloride are put on a universal indicator paper. The paper turns pink.

   Study the following table and choose the correct option. 1

	Nature	Ammonium chloride is a salt of	Range of pH
(a)	acidic	weak acid and strong base	less than 7
(b)	basic	weak acid and strong base	more than 7
(c)	acidic	strong acid and weak base	less than 7
(d)	basic	strong acid and strong base	7

9. Bronze is an alloy of   1

   (a) Copper and Zinc   (b) Aluminium and Tin

   (c) Copper, Tin and Zinc   (d) Copper and Tin

10. Choose the option giving correct matching the items given in Column – I
    & II.   1

Column – I	Column – II
A. Physical environment	(i) Ozone layer depletion
B. Exposure to UV radiation	(ii) Bacteria and Fungi
C. Chlorofluoro Carbon compounds	(iii) Abiotic components
D. Decomposers	(iv) Skin Cancer

	A	B	C	D
(a)	(iii)	(i)	(iv)	(ii)
(b)	(iii)	(iv)	(i)	(ii)
(c)	(iii)	(iv)	(ii)	(i)
(d)	(iii)	(i)	(ii)	(iv)

11. The thread like structures that develop on a moist slice of bread in
    Rhizopus are   1

    (a) Sporangia   (b) Filaments

    (c) Rhizoids   (d) Hyphae


12. The change in the focal length of an eye lens in human beings is caused by
    the action of   1

    (a) optic nerves   (b) ciliary muscles

    (c) retina   (d) cornea

13. The magnetic field inside a long straight current carrying solenoid :   **1**

(a)   is zero.

(b)   decreases as we move towards its end.

(c)   increases as we move towards its end.

(d)   is same at all points.

14. In the following diagram showing dispersion of white light by a glass prism, the colours 'P' and 'Q' respectively are –   **1**
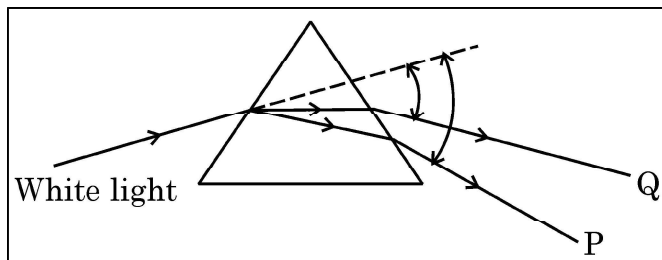
(a)   Red and Violet   (b)   Violet and Red

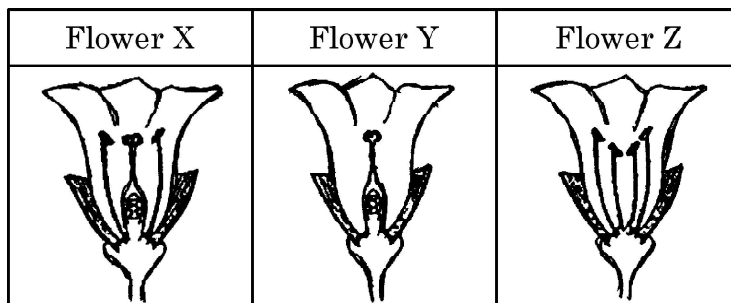(c)   Red and Blue   (d)   Orange and Green

15. In an experiment with pea plants, a pure tall plant (TT) is crossed with a pure short plant (tt). The ratio of pure tall plant to pure short plants in F_2 generation will be   **1**

(a)   1 : 3   (b)   3 : 1

(c)   1 : 1   (d)   2 : 1

16. Consider the following three flowers namely X, Y and Z. Which flower(s) would develop into a fruit ? 1

Flower X	Flower Y	Flower Z

(a) 'X' only   (b) 'Z' only

(c) 'X' and 'Y' only   (d) 'Y' and 'Z'

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

These consists of two statements –

Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below :

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

(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of (A).

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false, but Reason (R) is true.

17. **Assertion (A) :** The energy which passes to the herbivores does not come back to autotrophs. 1

    Reason (R) : The flow of energy in a food chain is unidirectional.

18. **Assertion (A) :** Melting point and boiling point of ethanol are lower than that of sodium chloride. 1

    Reason (R) : The forces of attraction between the molecules of ionic compoünds are very strong.

19. **Assertion (A) :** Testes in human males are located outside the abdominal cavity in scrotum.   1

   Reason (R) : Scrotum provides a lower temperature than the normal body temperature for sperm formation.

20. **Assertion (A) :** It is advised that while diluting an acid one should add water to acid and not acid to water keeping the solution continuously stirred.   1

   Reason (R) : The process of dissolving an acid into water is highly exothermic.

SECTION – B

Q. No. **21** to **26** are Very Short Answer Questions.

21. Let the resistance of an electrical device remain constant, while the potential difference across its two ends decreases to one fourth of its initial value. What change will occur in the current through it ? State the law which helps us in solving the above stated question.   **2**

22. (a) How is an electric impulse created in human nervous system ? Identify the parts of a neuron which helps the nerve impulse to travel   **2**

      (i) towards the cell body

      (ii) away from the cell body

OR

   (b) With the help of an example, explain how does the feedback mechanism regulate the hormone secretion.   **2**

23. A light ray enters from medium A to medium B as shown in the figure.
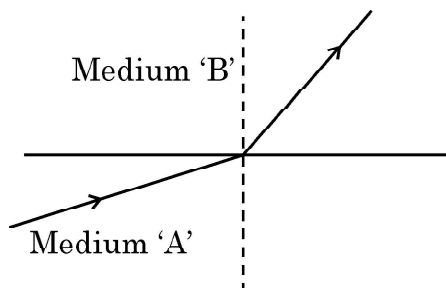
Medium 'B'

Medium 'A'

(a) Which one of the two media is denser w.r.t. other medium ? Justify your answer. **1**

(b) If the speed of light in medium A is v_a and in medium B is v_b, what is the refractive index of B with respect to A. **1**

OR

(a) A ray of light starting from diamond is incident on the interface separating diamond and water. Draw a labelled ray diagram to show the refraction of light in this case. **1**

(b) Absolute refractive indices of diamond and water are 2.42 and 1.33 respectively. Find the value of refractive index of water w.r.t. diamond. **1**

24. State whether the given chemical reaction is a redox reaction or not. Justify your answer. **2**

$$MnO_2 + 4HCl \longrightarrow MnCl_2 + 2H_2O + Cl_2$$
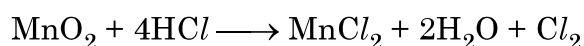
25. Give the name of the enzyme present in the fluid in our mouth cavity. State the gland which produces it. What would happen to the digestion process if this gland stops secreting this enzyme ? **2**

26. Draw magnetic field lines produced around a straight current carrying conductor passing through a cardboard. How will the strength of the magnetic field change when the point where magnetic field is to be determined is moved away from the conductor ? **2**

SECTION – C

Q. No. **27** to **33** are Short Answer Questions.

27. What is a solenoid ? When does a solenoid behave as a magnet ? Draw the pattern of the magnetic field produced inside it showing the directions of the magnetic field lines. **3**

28. (a) (i) What property do acids and bases have in common ? Explain it with an example.

   (ii) A compound which is prepared from gypsum has the property of hardening when mixed with water.

   Identify the compound and write its formula. How is this compound prepared ? Describe it in the form of a chemical equation only. **3**

   OR

   (b) (i) Write the chemical name and Molecular formula of tooth enamel.

   (ii) How does it get corroded ? What is the preventive measure for this ? **3**

29. (a) Write the percentage of (i) solar energy captured by the autotrophs and (ii) energy transferred from autotrophs to the next level in a food chain.

   (b) What are trophic levels ? Why do different food chains in an ecosystem not have more than four to five trophic levels ? Give reason. **3**

30. Explain the process of transport of oxygenated and deoxygenated blood in a human body. **3**

31. A person is unable to see clearly a poster fixed on a distant wall. He however sees it clearly when standing at a distance of about 2 m from the wall.

    (a)   Draw ray diagram to show the formation of image by his eye lens when he is far away from the wall.

    (b)   List two possible reasons of this defect of vision.

   (c)   Draw ray diagram to show the correction of this defect using appropriate lens.   **3**

32.   (a)   Name the gland and the hormone secreted by it in scary situations in human beings. List any two responses shown by our body when this hormone is secreted into the blood.   **3**

<p align="center">OR</p>

    (b)   In the given diagram

        (i)   Name the parts labelled A, B, and C.

        (ii)   Write the functions of A and C.

        (iii)   Reflex arcs have evolved in animals ? Why ?   **3**
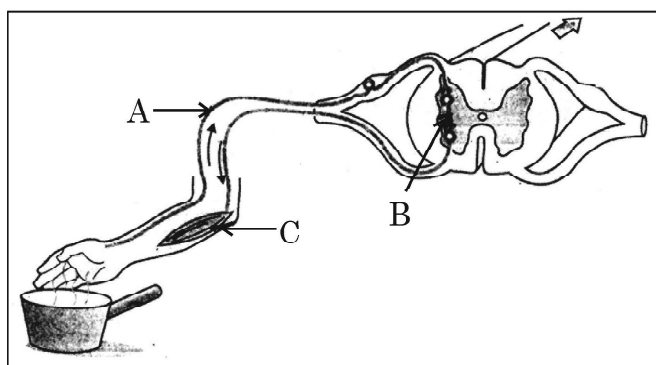
33. State the change in colour observed in each of the following cases mentioning the reason :   **3**

    (a)   Silver chloride is exposed to sunlight.

    (b)   A piece of zinc is dipped in ferrous sulphate solution.

    (c)   Copper powder is strongly heated in air.

Q. No. 34 to 36 are Long Answer Questions.

34. (a) (i) What is meant by resistance of a conductor ? Define its SI unit.

(ii) List two factors on which the resistance of a rectangular conductor depends. **5**

(iii) How will the resistance of a wire be affected if its

(1) length is doubled, and

(2) radius is also doubled ?

Give justification for your answer.

OR

(b) In an electric circuit three bulbs of 100 W each are connected in series to a source. In another circuit set of three bulbs of the same wattage are connected in parallel to the same source. **5**

(i) Will the bulb in the two circuits glow with the same brightness ? Justify your answer.

(ii) Now, let one bulb in both the circuits get fused. Will the rest of the bulbs continue to glow in each circuit ? Give reason for your answer.

35. (a) Name the two types of pollination and differentiate between them.

(b) Explain the post fertilization changes that occur in the ovary of a flower.

(c) Given below is a diagram of a germinating seed. Label the parts that **5**

(i) gives rise to future shoot.

(ii) gives rise to future root system.

(iii) stores food.
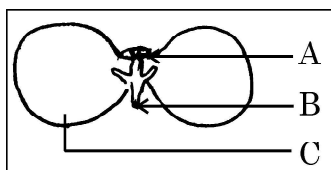
36. (a) (i) A compound 'A' with a molecular formula of $C_2H_4O_2$ reacts with a base to give salt and water. Identify 'A', state its nature and the name of the functional group it possesses. Write chemical equation for the reaction involved.

(ii) When the above stated compound 'A' reacts with another compound 'B' having molecular formula C_2H_6O in the presence of an acid, a sweet smelling compound 'C' is formed.

(1) Identify 'B' and 'C'.

(2) State the role of acid in this reaction.

(3) Write chemical equation for the reaction involved. **5**

OR

(b) (i) Name the compound formed when ethanol is heated at 443 K in the presence of conc.H_2SO_4 and draw its electron dot structure. State the role of conc.H_2SO_4 in this reaction.

(ii) What is hydrogenation ? Explain it with the help of a chemical equation. State the role of this reaction in industry. **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. A student took three concave mirrors of different focal lengths and performed the experiment to see the image formation by placing an object at different distances with these mirrors as shown in the following table. **4**

Case No.	Object-distance	Focal length
I	45 cm	20 cm
II	30 cm	15 cm
III	20 cm	30 cm

Now answer the following questions :

(a) List two properties of the image formed in Case I.

(b) In which one of the cases given in the table, the mirror will form real image of same size and why ?

(c) Name the type of mirror used by dentists. Give reason why do they use such type of mirrors.

OR

(c) Look at the table and identify the situation (object distance and focal length) which resembles the situation in which concave mirrors are used as shaving mirrors ? Draw a ray diagram to show the image formation in this case.

38. All human chromosomes are not paired. Most human chromosomes have a maternal and a paternal copy, and we have 22 such pairs. But one pair called the sex chromosomes, is odd in not always being a perfect pair. Women have a perfect pair of sex chromosomes. But men have a mismatched pair in which one is normal sized while the other is a short one.   4

(a) In humans, how many chromosomes are present in a Zygote and in each gamete ?

(b) A few reptiles rely entirely on environmental cues for sex determination. Comment.

(c) "The sex of a child is a matter of chance and none of the parents are considered to be responsible for it". Justify it through flow chart only.

OR

(c) Why do all the gametes formed in human females have an Xchromosome ?

39. On the basis of reactivity metals are grouped into three categories – 4

(i)   Metals of low reactivity

(ii) Metals of medium reactivity

(iii) Metals of high reactivity

Therefore metals are extracted in pure form from their ores on the basis of their chemical properties.

Metals of high reactivity are extracted from their ores by electrolysis of the molten ore.

Metals of low reactivity are extracted from their sulphide ores, which are converted into their oxides. The oxides of these metals are reduced to metals by simple heating.

(a)   Name the process of reduction used for a metal that gives vigorous reaction with air and water both.

(b)   Carbon cannot be used as a reducing agent to obtain aluminium from its oxide ? Why ?

(c)   Describe briefly the method to obtain mercury from cinnabar. Write the chemical equation for the reactions involved in the process.

OR

(c)   Differentiate between roasting and calcination giving chemical equation for each.

———

Secondary School Examination, 2023
Marking Scheme – Science (SUBJECT CODE -086)
(PAPER CODE –31/6/3)

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
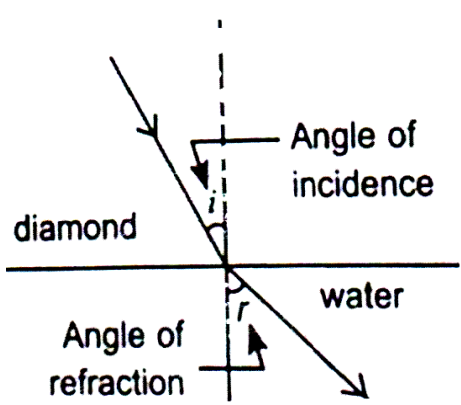
Secondary School Examination, 2023
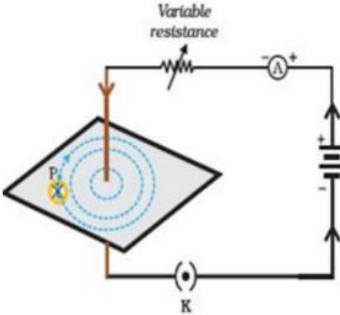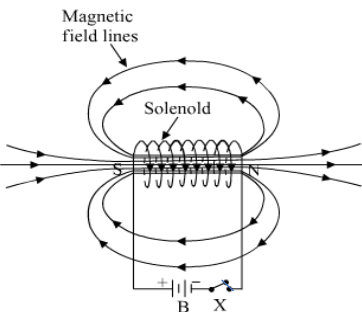
SCIENCE (Subject Code–086)

[Paper Code:31/6/3]
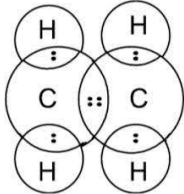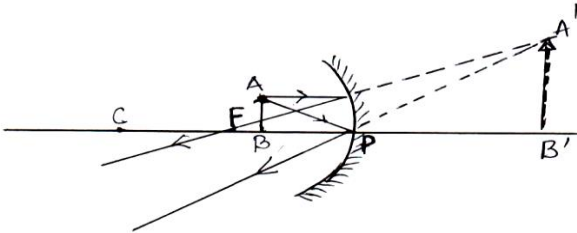
Maximum Marks: 80

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

		SECTION B		
21.	• Current becomes one fourth of its original value.	1	
	•According to the Ohm's law – potential difference is directly proportional to the current flowing through the conductor provided temperature remains constant. /	1	
	$\quad$ V $\propto$ I (Temperature remaining constant for a given conductor)		2
22.	(a) The information acquired at the end of a dendritic tip of a nerve cell sets off a chemical reaction that creates an electrical impulse.	1	
	(i) dendrite	½	
	(ii) axon	½	
	OR		
	(b) The timing and amount of hormone released are regulated by $\quad$ feedback mechanisms	1	
	If the sugar level in blood rise more insulin is produced.	½	
	As the blood sugar level falls, insulin secretion is reduced.	½	2
23.	(a) Medium B	½	
	$\quad$ In medium B ray of light bends towards normal . $\angle$ r $<$ $\angle$ i	½	
	(b) Refractive index of Medium ′B′ with respect of Medium ′A′ is		
	$$n_{BA} = \frac{v_a}{v_b}$$	1	
	OR		
	(a) (Credit marks for $\angle$ i , $\angle$ r and arrows.)	1	

	(b) $$n_{21} = \frac{n_{2a}}{n_{1a}}$$ $$\frac{1 \cdot 33}{2 \cdot 42} \quad \text{or} \quad 0 \cdot 55$$	½ ½	2
24.	Yes HCl is oxidised to Cl_2 MnO_2 is reduced to $MnCl_2$	1 ½ ½	2
25.	Salivary amylase / Ptyalin – Enzyme. Salivary gland The breakdown of starch into sugar will not take place.	½ ½ 1	2
26.	• • Decreases **Note- if ammeter and rheostat are not drawn → do not deduct marks.**	1 1	2
	SECTION C		
27.	• A solenoid is a coil of many turns of insulated copper wires wrapped closely in the shape of a cylinder • When electric current is passed through it **(Deduct ½ mark if direction of current or magnetic field is not marked.)**	1 1 1	3
28.	(a) (i) Acids produce H^+ ions and bases produce OH^- ions when added in water. / $HCl + H_2O \rightarrow H_3O^+ + Cl^-$		

	$NaOH \xrightarrow{H2O} Na^+ + OH^-$	1	
	(ii) • Plaster of Paris/Calcium sulphate hemihydrate		
	• $(CaSO_4 . \frac{1}{2} H_2O)$	½ ½	
	$CaSO_4.2H_2O \xrightarrow{373\,K} CaSO_4.\frac{1}{2}H_2O + 1\frac{1}{2}H_2O$	1	
	OR		
	(b) (i) Calcium phosphate / Calcium hydroxyapatite $(Ca_3(PO_4)_2)$	½ ½	
	(ii) Tooth decay starts when the pH of the mouth is lower than 5.5. Bacteria present in the mouth produces acid by degrading sugar and food particles. Using Toothpaste / Cleaning the mouth after every meal.	1 1	3
29.	(a) (i) 1% (ii) 10% energy	½ ½	
	(b)• Every step of a food chain where transfer of energy occurs. •Since the amount and available energy keeps on becoming less as we move to higher trophic level, very little usable energy remains after four trophic levels.	1 1	3
30.	• Oxygen rich blood from the lungs comes to the left atrium of heart. •It then contracts and the blood is transferred to left ventricle. • Left ventricle in turn contracts and the blood is pumped out to the body. • Deoxygenated blood from the body enters the right atrium. • On its contraction, blood enters into right ventricle • Right ventricle pumps it to the lungs for oxygenation	½ ½ ½ ½ ½ ½	3
31.	(a) *(b) Myopic Eye*	1	
	(b) • Excessive curvature of the eye lens •Elongation of the eyeball	½ ½	
	(c) *(c) Correction for myopia*	1	3
32.	(a) •Adrenal gland ; Adrenaline hormone • Response- • Heart beats faster resulting in supply of more oxygen to muscles	½ , ½	

	• Breathing rate increases
	• Blood supply to digestive system and skin gets reduced.
	• Blood supply diverted to skeletal muscles.
	 (any two) **OR**
	(b)
	(i) A - Sensory neuron
	     B -Relay Neuron
	     C- Effector organ/Muscle
	
	(ii) A- Carries impulse from receptor to spinal cord
	     C- Responds to stimulus
	(iii) The thinking process of the brain is not fast enough / Reflex arcs are more efficient in functioning in the absence of true thought processes
		1 , 1
		
		½
		½
		½
		
		½
		½
		
		½
			
			3

33.	(a) white to grey due to formation of Ag (b) $ZnSO_4$ is formed which is colourless change in color – Pale green ($FeSO_4$) to colourless ($ZnSO_4$) (c) Copper (Brown) oxidises to copper (II) oxide (Black)	½ , ½ ½ , ½ ½ , ½	 3
	SECTION D		

34.	(a) (i) The property of conductor to resist the flow of charges through it.
	 If Potential difference across the two ends of a conductor is 1V and the current through it is 1A, then resistance 'R' of the conductor is 1Ω.
	
	Alternate answer
	$$1\Omega = \frac{1 \text{ volt}}{1 \text{ ampere}} \quad / \quad \frac{1\,V}{1A}$$
	
	(ii)
	    • Length of the conductor
	    • Area of cross-section of the conductor
	    • Nature of the material
	    • Temperature **(any two)**
	(iii) (1) The resistance will become one half of its original value.
	$$R = \rho\frac{l}{A} = \rho\frac{l}{\pi r^2}$$
	
	$$R' = \frac{\rho.\,2L}{\pi(2r)^2}$$
	   (2)
	$$R' = \frac{\rho.\,l}{\pi(2r)^2}\cdot\frac{2}{4} = \frac{R}{2}$$
	Resistance will reduce to one half.
	 OR
		1
		
		1
		
		½ , ½
		
		½
		
		½
		
		½
		½	

	(b) (i) No
	  • In series combination overall resistance will increase hence decreasing the current . Potential difference also divides. Therefore power consumption is less by each bulb and glows with less brightness.
	  • In parallel combination each bulb will get the required potential difference hence the required current and will glow with its normal brightness.
	(ii) None of the bulb glows in series combination as the circuit gets broken and current stops flowing.
	In parallel combination the other two bulbs will glow with same brightness as the same voltage is available to them.
		1
		
		1
		
		1
		
		1
		
		1
			5

35.	(a) Two types of pollination:
	  • Self pollination
	  • Cross pollination
	
		Self pollination	**Cross pollination**

---	---

Transfer of pollen grains from stamen to the stigma of pistil of the same flower or another flower of the same plant.	Transfer of pollen grain occurs from one flower to another flower of a different plant. |
	
	(b)
	• Zygote divides several times to form an embryo within the ovule.
	• The ovule develops a tough coat and is converted into a seed.
	• The ovary grows rapidly and ripens to form a fruit
	• Sepals, petals stamens dry and fall off.
	 (any three)
	(c) A → Plumule
	    B → Radicle
	    C → Cotyledon
		½
		½
		
		1
		
		½ × 3
		
		½
		½
		½
			5

36.	(a) (i) A = CH_3COOH / (Ethanoic acid) / Acetic acid
	Nature = acidic
	Functional group = – COOH / (carboxylic acid)
	
	$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$
	
	(ii) (1) B – Ethanol / Ethyl alcohol / C_2H_5OH
	      C – Ester / Ethyl ethanoate / Ethyl acetate
	    (2) Acid acts as a Catalyst in this reaction
	
	    (3) $CH_3COOH + C_2H_5OH \xrightarrow{\text{acid}} CH_3COOC_2H_5 + H_2O$
	 OR
	(b) (i) Ethene/C_2H_4
		½
		½
		½
		1
		
		½
		½
		
		½
		
		1
		
		½	

• As a dehydrating agent | 1

½ | |
| | (ii) • The process in which unsaturated hydrocarbons/compounds react with hydrogen in the presence of a catalyst (Ni / Pd) to give saturated hydrocarbon.

Used in the hydrogenation of vegetable oils which are converted into fats with saturated carbon chains. | 1

1

1 | 5 |
| | **SECTION E** | | |
| **37.** | (a) Real, inverted, diminished (Any two)
(b) Case II

Because focal length of mirror is 15 cm, object distance is 30cm which means the object is placed at C.
(c) Dentists use concave mirrors
Because concave mirror forms erect and enlarged image
OR

(c) Case III

(Deduct ½ mark if direction of ray is not marked.) | ½ , ½
½
½

1
1

1

1 | 4 |
| **38.** | (a) Zygote – 23 pairs / 46 chromosomes.
    Gamete – 23 chromosomes.
(b) The temperature at which fertilised eggs are kept determines whether the animals developing in the eggs are male or female. | ½
½

1 | |

	(c) **Sex determination in Human beings** **OR** (c) The 23rd pair or the sex chromosome in human females contains 'XX' chromosome. At the time of gamete formation, each gamete gets one X-chromosome.		2 2	4
39.	(a) By electrolytic reduction (b) Carbon cannot reduce the oxides of highly reactive metals / these metals have more affinity for oxygen than carbon. (c) When Cinnabar is heated in the presence of air, it is first converted into mercuric oxide. / This is then reduced to mercury. $$2HgS + 3O_2 \xrightarrow{heat} 2HgO + 2SO_2$$ $$2HgO \xrightarrow{heat} 2Hg + O_2$$ **OR** (c)		1 1 1 ½ ½	
		Roasting	Calcination		
	A process in which sulphide ores are converted into oxides by heating strongly in the presence of excess air $2ZnS + 3O_2 \xrightarrow{heat} 2ZnO + 2SO_2$	A process in which carbonate ores are heated in limited supply air. $ZnCO_3 \xrightarrow{heat} ZnO + CO_2$ **(or any other)**	2	4

* **