Series D3CBA/1 **Set-2**

प्रश्न–पत्र कोड
Q.P. Code **31/1/2**

रोल नं.
Roll No.

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.

विज्ञान
SCIENCE

निर्धारित समय : 3 घण्टे *अधिकतम अंक : 80*
Time allowed : 3 hours *Maximum Marks : 80*

नोट	**Note**
(I) कृपया जाँच कर लें कि इस प्रश्न–पत्र में मुद्रित पृष्ठ **23** हैं।	(I) Please check that this question paper contains **23** printed pages.
(II) कृपया जाँच कर लें कि इस प्रश्न–पत्र में **39** प्रश्न हैं।	(II) Please check that this question paper contains **39** questions.
(III) प्रश्न–पत्र में दाहिने हाथ की ओर दिए गए प्रश्न–पत्र कोड को परीक्षार्थी उत्तर–पुस्तिका के मुख–पृष्ठ पर लिखें।	(III) 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.
(IV) **कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर–पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें।**	(IV) **Please write down the Serial Number of the question in the answer-book before attempting it.**
(V) 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 पर कोई उत्तर नहीं लिखेंगे।	(V) 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.

सामान्य निर्देश :

निम्नलिखित निर्देशों को बहुत सावधानी से पढ़िए और उनका सख़्ती से पालन कीजिए :

*(i) इस प्रश्न-पत्र में कुल **39** प्रश्न हैं। **सभी** प्रश्न अनिवार्य हैं।*

*(ii) यह प्रश्न-पत्र **पाँच** खण्डों में विभाजित किया गया है - **क, ख, ग, घ** एवं **ड़।***

*(iii) **खण्ड क** - प्रश्न संख्या **1** से **20** तक बहुविकल्पीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न **1** अंक का है।*

*(iv) **खण्ड ख** - प्रश्न संख्या **21** से **26** तक अति लघु-उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न **2** अंकों का है। इन प्रश्नों के उत्तर 30 से 50 शब्दों में दिए जाने चाहिए।*

*(v) **खण्ड ग** - प्रश्न संख्या **27** से **33** तक लघु-उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न **3** अंकों का है। इन प्रश्नों के उत्तर 50 से 80 शब्दों में दिए जाने चाहिए।*

*(vi) **खण्ड घ** - प्रश्न संख्या **34** से **36** तक दीर्घ-उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न **5** अंकों का है। इन प्रश्नों के उत्तर 80 से 120 शब्दों में दिए जाने चाहिए।*

*(vii) **खण्ड ड़** - प्रश्न संख्या **37** से **39** तक 3 स्रोत-आधारित/प्रकरण-आधारित इकाइयों के मूल्यांकन के **चार-चार** अंकों के प्रश्न (उप-प्रश्नों सहित) हैं।*

(viii) प्रश्न-पत्र में समग्र विकल्प नहीं दिया गया है। यद्यपि, कुछ खण्डों में आंतरिक विकल्प दिए गए हैं। इस प्रकार के प्रश्नों में केवल एक ही विकल्प का उत्तर दीजिए।

खण्ड - क

प्रश्न संख्या 1 से 20 में दिए गए चार विकल्पों में से सर्वाधिक उपयुक्त विकल्प का चयन कीजिए। गलत उत्तर के ऋणात्मक अंक नहीं है।

1. निम्नलिखित में से एक वियोजन (अपघटन) अभिक्रिया चुनिए जिसमें वियोजन के लिए ऊर्जा का स्रोत प्रकाश हो : **1**

(a) $2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$

(b) $2H_2O \rightarrow 2H_2 + O_2$

(c) $2AgBr \rightarrow 2Ag + Br_2$

(d) $CaCO_3 \rightarrow CaO + CO_2$

2. ऐलुमिनियम और जिंक के ऑक्साइड होते हैं : **1**

(a) अम्लीय

(b) क्षारकीय

(c) उभयधर्मी

(d) उदासीन

General Instructions :

Read the following instructions very carefully and strictly follow them :

*(i) This question paper comprises **39** questions. **All** questions are compulsory.*

*(ii) This question paper is divided into **five** sections – **A, B, C, D** and **E**.*

*(iii) **Section A** – Question Nos. **1** to **20** are multiple choice questions. Each question carries **1** mark.*

*(iv) **Section B** – Question Nos. **21** to **26** are very short answer type questions. Each question carries **2** marks. Answer to these questions should be in the range of 30 to 50 words.*

*(v) **Section C** – Question Nos. **27** to **33** are short answer type questions. Each question carries **3** marks. Answer to these questions should in the range of 50 to 80 words.*

*(vi) **Section D** – Question Nos. **34** to **36** are long answer type questions. Each question carries **5** marks. Answer to these questions should be in the range of 80 to 120 words.*

*(vii) **Section E** – Question Nos. **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. Only one of the alternatives has to be attempted in such questions.

SECTION – A

Select and write the most appropriate option out of the four options given for each of the questions 1-20. There is no negative mark for the incorrect response.

1. Select from the following a decomposition reaction in which source of energy for decomposition is light : **1**

(a) $2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$

(b) $2H_2O \rightarrow 2H_2 + O_2$

(c) $2AgBr \rightarrow 2Ag + Br_2$

(d) $CaCO_3 \rightarrow CaO + CO_2$

2. Oxides of aluminium and zinc are : **1**

(a) acidic

(b) basic

(c) amphoteric

(d) neutral

3. नीचे दिए गए यौगिकों पर विचार कीजिए :

$FeSO_4$; $CuSO_4$; $CaSO_4$; Na_2CO_3

इनमें से किस यौगिक के क्रिस्टलीय रूप में एक अणु में क्रिस्टलन जल के अणुओं की संख्या अधिकतम है ? **1**

(a) $FeSO_4$

(b) $CuSO_4$

(c) $CaSO_4$

(d) Na_2CO_3

4. ऐल्काइनों की समजातीय श्रेणी के तीसरे सदस्य का नाम और सूत्र है : **1**

(a) प्रोपाइन C_3H_6

(b) प्रोपाइन C_3H_4

(c) ब्यूटाइन C_4H_8

(d) ब्यूटाइन C_4H_6

5. कक्ष ताप पर द्रव अवस्था में पायी जाने वाली एक धातु और एक अधातु क्रमशः हैं : **1**

(a) ब्रोमीन और मरकरी

(b) मरकरी और आयोडीन

(c) मरकरी और ब्रोमीन

(d) आयोडीन और मरकरी

6. $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

उपरोक्त अभिक्रिया रेडॉक्स अभिक्रिया है क्योंकि इसमें : **1**

(a) MnO_2 उपचयित और HCl अपचयित हो रहा है।

(b) HCl उपचयित हो रहा है।

(c) MnO_2 अपचयित हो रहा है।

(d) MnO_2 अपचयित हो रहा है और HCl उपचयित हो रहा है।

7. जब किसी परखनली में दानेदार जिंक के कुछ टुकड़ों में 2 mL सोडियम हाइड्रॉक्साइड विलयन मिलाकर उसे गर्म किया जाता है, तो होने वाली रासायनिक अभिक्रिया को संतुलित रासायनिक समीकरण के रूप में इस प्रकार लिखा जा सकता है : **1**

(a) $NaOH + Zn \rightarrow NaZnO_2 + H_2O$

(b) $2NaOH + Zn \rightarrow Na_2ZnO_2 + H_2$

(c) $2NaOH + Zn \rightarrow NaZnO_2 + H_2$

(d) $2NaOH + Zn \rightarrow Na_2ZnO_2 + H_2O$

3. Consider the following compounds :

$FeSO_4$; $CuSO_4$; $CaSO_4$; Na_2CO_3

The compound having maximum number of water of crystallisation in its crystalline form in one molecule is : **1**

(a) $FeSO_4$

(b) $CuSO_4$

(c) $CaSO_4$

(d) Na_2CO_3

4. The name and formula of third member of homologous series of alkyne is : **1**

(a) Propyne C_3H_6

(b) Propyne C_3H_4

(c) Butyne C_4H_8

(d) Butyne C_4H_6

5. A metal and a non-metal that exists in liquid state at the room temperature are respectively : **1**

(a) Bromine and Mercury

(b) Mercury and Iodine

(c) Mercury and Bromine

(d) Iodine and Mercury

6. $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

The reaction given above is a redox reaction because in this case : **1**

(a) MnO_2 is oxidised and HCl is reduced.

(b) HCl is oxidised.

(c) MnO_2 is reduced.

(d) MnO_2 is reduced and HCl is oxidised.

7. When 2 mL of sodium hydroxide solution is added to few pieces of granulated zinc in a test tube and then warmed, the reaction that occurs can be written in the form of a balanced chemical equation as : **1**

(a) $NaOH + Zn \rightarrow NaZnO_2 + H_2O$

(b) $2NaOH + Zn \rightarrow Na_2ZnO_2 + H_2$

(c) $2NaOH + Zn \rightarrow NaZnO_2 + H_2$

(d) $2NaOH + Zn \rightarrow Na_2ZnO_2 + H_2O$

8. नीचे दिया गया कौनसा कथन सही **नहीं** है ? **1**

(a) DNA जनकों से अगली संतति को लक्षणों की आनुवंशिकता के लिए सूचनाएं पहुंचाता है।

(b) DNA प्रोटीनों के निर्माण के लिए सूचना स्रोत है।

(c) सूचना में परिवर्तन से भिन्न प्रोटीन बनती है।

(d) प्रोटीन भिन्न होने पर भी लक्षण समान रहते हैं।

9. किसी तंत्रिका का वह स्थल जहाँ विद्युत आवेश रासायनिक सिगनल में परिवर्तित होता है उसे कहते हैं : **1**

(a) तंत्रिकाक्ष

(b) द्रुमिका

(c) तंत्रिकापेशीय संधि

(d) कोशिका–काय

10. गुणसूत्र :

(i) आनुवंशिक सूचना को जनकों से अगली संतति तक ले जाते हैं।

(ii) किसी जन्तु कोशिका के केन्द्रक के भीतर धागेनुमा संरचना होती है।

(iii) मानव जनन तंत्र में सदैव युग्मों में विद्यमान होते हैं।

(iv) कोशिका विभाजन में सम्मिलित होते हैं।

इनमें सही कथन हैं : **1**

(a) (i) और (ii)

(b) (iii) और (iv)

(c) (i), (ii) और (iv)

(d) (i) और (iv)

11. रंध्र तब बंद होता है जब :

(i) प्रकाश संश्लेषण के लिए कार्बनडाइऑक्साइड की आवश्यकता होती है।

(ii) प्रकाश संश्लेषण के लिए कार्बनडाइऑक्साइड की आवश्यकता नहीं होती है।

(iii) द्वार कोशिकाओं से पानी बाहर चला जाता है।

(iv) द्वार कोशिकाओं में पानी भीतर चला जाता है।

इस प्रक्रिया में सही कारण है/हैं : **1**

(a) केवल (i)

(b) (i) और (iii)

(c) (ii) और (iii)

(d) (ii) और (iv)

8. Which one of the following statements is **NOT** true ? **1**

(a) DNA carries the information for inheritance of features from parents to the next generation.

(b) DNA is the information source for making proteins.

(c) Change in the information leads to different proteins.

(d) Features will remain the same even if the protein changes.

9. In a nerve cell, the site where the electrical impulse is converted into a chemical signal is known as : **1**

(a) Axon

(b) Dendrites

(c) Neuromuscular junction

(d) Cell body

10. Chromosomes :

(i) carry hereditary information from parents to the next generation.

(ii) are thread like structures located inside the nucleus of an animal cell.

(iii) always exist in pairs in human reproductive cells.

(iv) are involved in the process of cell division.

The correct statements are : **1**

(a) (i) and (ii)

(b) (iii) and (iv)

(c) (i), (ii) and (iv)

(d) (i) and (iv)

11. A stomata closes when :

(i) it needs carbon dioxide for photosynthesis.

(ii) it does not need carbon dioxide for photosynthesis.

(iii) water flows out of the guard cells.

(iv) water flows into the guard cells.

The correct reason(s) in this process is/are : **1**

(a) (i) only

(b) (i) and (iii)

(c) (ii) and (iii)

(d) (ii) and (iv)

12. नीचे दिए गए किस जीव की अलैंगिक जनन की विधि बहुखण्डन है ? 1

(a) यीस्ट
(b) लेस्मानिया
(c) पैरामीशियम
(d) प्लेज़्मोडियम

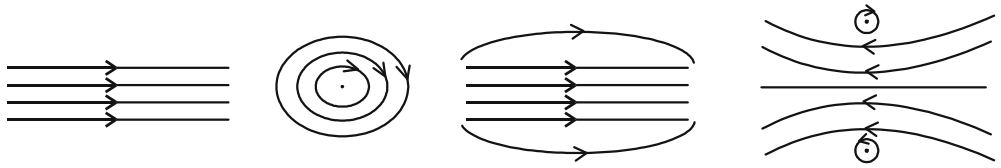
13. किसी बिम्ब को किसी उत्तल लेंस के सामने कितनी दूरी पर रखा जाना चाहिए ताकि पर्दे पर बिम्ब के समान साइज का प्रतिबिम्ब प्राप्त हो ? 1

(a) लेंस की फोकस दूरी की दोगुनी दूरी से अधिक दूरी पर।
(b) लेंस के मुख्य फोकस पर।
(c) लेंस की फोकस दूरी की दोगुनी दूरी पर।
(d) लेंस के प्रकाशिक केन्द्र और मुख्य फोकस के बीच।

14. मानव नेत्र का लेंस-निकाय किसी प्रकाश सुग्राही पर्दे पर प्रतिबिम्ब बनाता है जिसे कहते हैं : 1

(a) कॉर्निया (स्वच्छ मंडल)
(b) पक्ष्माभी पेशियाँ
(c) दृक तंत्रिका
(d) दृष्टि पटल (रेटिना)

15. किसी धारावाही परिनालिका के भीतर उत्पन्न चुम्बकीय क्षेत्र का पैटर्न होता है : 1



(a) (b) (c) (d)

16. निम्नलिखित में से वह आहार शृंखला पहचानिए जिसका द्वितीय पोषी स्तर का जीव विलुप्त है : 1

(a) घास, बकरी, शेर
(b) प्राणिप्लवक, पादपप्लवक, छोटी मछली, बड़ी मछली
(c) बाघ, घास, सांप, मेंढक
(d) टिड्डा, घास, सांप, मेंढक, गरुड़ (उकाब)

12. In which of the following organisms, multiple fission is a means of asexual reproduction ? **1**

(a) Yeast

(b) Leishmania

(c) Paramoecium

(d) Plasmodium

13. At what distance from a convex lens should an object be placed to get an image of the same size as that of the object on a screen ? **1**

(a) Beyond twice the focal length of the lens.

(b) At the principal focus of the lens.

(c) At twice the focal length of the lens.

(d) Between the optical centre of the lens and its principal focus.

14. The lens system of human eye forms an image on a light sensitive screen, which is called as : **1**

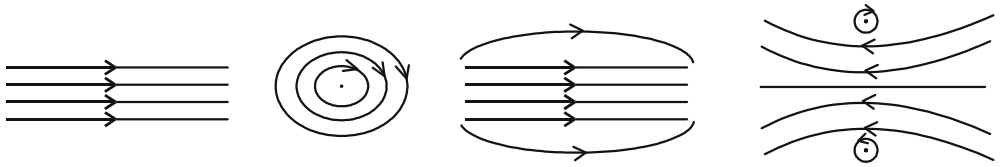
(a) Cornea

(b) Ciliary muscles

(c) Optic nerves

(d) Retina

15. The pattern of the magnetic field produced inside a current carrying solenoid is : **1**



(a) (b) (c) (d)

16. Identify the food chain in which the organisms of the second trophic level are missing : **1**

(a) Grass, goat, lion

(b) Zooplankton, Phytoplankton, small fish, large fish

(c) Tiger, grass, snake, frog

(d) Grasshopper, grass, snake, frog, eagle

प्रश्न संख्या **17 से 20** में दो कथन– एक **अभिकथन (A)** और दूसरा **कारण (R)** दिया गया है। इन प्रश्नों के उत्तर नीचे दिए गए कोड (a), (b), (c) और (d) में से चुनकर दीजिए :

(a) अभिकथन (A) और कारण (R) दोनों सही हैं और कारण (R), अभिकथन (A) की सही व्याख्या करता है।

(b) अभिकथन (A) और कारण (R) दोनों सही हैं, किंतु कारण (R) अभिकथन (A) की सही व्याख्या नहीं करता है।

(c) अभिकथन (A) सही है, परन्तु कारण (R) गलत है।

(d) अभिकथन (A) गलत है, किंतु कारण (R) सही है।

17. **अभिकथन (A) :** स्थलीय जीवों की तुलना में जलीय जीवों की श्वसन–दर अधिक तीव्र होती है।

कारण (R) : वायु में ऑक्सीजन की मात्रा की तुलना में पानी में घुली ऑक्सीजन की मात्रा बहुत अधिक होती है। **1**

18. **अभिकथन (A) :** इन्द्रधनुष आकाश में सूर्य के प्रकाश का प्राकृतिक स्पेक्ट्रम होता है।

कारण (R) : इन्द्रधनुष तभी बनता है जब आकाश में सूर्य सिर के ऊपर होता है तथा वायु में जल की सूक्ष्म बूंदें भी उपस्थित होती हैं। **1**

19. **अभिकथन (A) :** किसी आहार शृंखला के उच्चतम पोषी स्तर के जीवों में हानिकर रसायनों का संग्रहण अधिकतम होता है।

कारण (R) : फसलों को रोगों और पीड़कों से बचाने के लिए उन पर हानिकर रसायनों का छिड़काव किया जाता है। **1**

20. **अभिकथन (A) :** जब जिंक नाइट्रिक अम्ल से अभिक्रिया करता है तो हाइड्रोजन गैस नहीं निकलती है।

कारण (R) : नाइट्रिक अम्ल अभिक्रिया में उत्पन्न हाइड्रोजन गैस को उपचयित करके पानी बनाता है और स्वयं अपचयित हो जाता है। **1**

खण्ड – ख

21. (i) दो चुम्बकीय क्षेत्र रेखाएं एक दूसरे का प्रतिच्छेदन क्यों नहीं करती हैं ? **2**

(ii) किसी दिए गए प्रदेश में एकसमान चुम्बकीय क्षेत्र का निरूपण किस प्रकार किया जाता है ? अपने उत्तर की पुष्टि के लिए आरेख खींचिए।

For Q. Nos. **17 to 20**, two statements are given – One labelled as **Assertion (A)** and the other labelled as **Reason (R)**. Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :

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

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (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 rate of breathing in aquatic organisms is much faster than in terrestrial organisms.

Reason (R) : The amount of oxygen dissolved in water is very high as compared to the amount of oxygen in air. **1**

18. **Assertion (A) :** The rainbow is a natural spectrum of sunlight in the sky.

Reason (R) : Rainbow is formed in the sky when the sun is overhead and water droplets are also present in air. **1**

19. **Assertion (A) :** Accumulation of harmful chemicals is maximum in the organisms at the highest trophic level of a food chain.

Reason (R) : Harmful chemicals are sprayed on the crops to protect them from diseases and pests. **1**

20. **Assertion (A) :** Hydrogen gas is not evolved when zinc reacts with nitric acid.

Reason (R) : Nitric acid oxidises the hydrogen gas produced to water and itself gets reduced. **1**

SECTION – B

21. (i) Two magnetic field lines do not intersect each other. Why ? **2**

(ii) How is a uniform magnetic field in a given region represented ? Draw a diagram in support of your answer.

22. **(A)** यह दर्शाइए कि आप तीन प्रतिरोधकों को जिनमें प्रत्येक का प्रतिरोध 6 Ω है, किस प्रकार संयोजित करेंगे ताकि संयोजन का प्रतिरोध 9 Ω हो। अपने उत्तर की पुष्टि भी कीजिए। **2**

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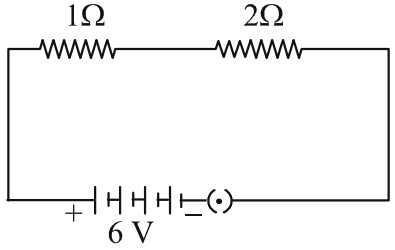
(B) दिए गए परिपथ में 2 Ω प्रतिरोधक में उपभुक्त शक्ति (वाट में) परिकलित कीजिए : **2**



23. कोई प्रकाश किरण किसी कांच के स्लैब के पृष्ठ पर आपतन कोण θ बनाते हुए आपतन करती है। इस किरण के पथ को दर्शाने के लिए नामांकित किरण आरेख खींचिए तथा पार्श्विक विस्थापन अंकित कीजिए। **2**

24. **(A)** मस्तिष्क के किस क्षेत्र में (i) मेडुला और (ii) प्रमस्तिष्क स्थित होते हैं ? प्रत्येक का एक-एक कार्य लिखिए। **2**

अथवा

(B) प्रतान की वृद्धि को प्रोन्नत करने वाले हॉर्मोन का नाम लिखिए। व्याख्या कीजिए कि ये किसी मटर के पौधे को अन्य किसी पौधे पर चढ़ने में किस प्रकार सहायता करते हैं। **2**

25. हमारे शरीर में मूत्र के बनने वाले अंग से प्रारम्भ करके मूत्र के उत्सर्जन तक के मार्ग का उल्लेख कीजिए। यदि वृक्काणु का नलिकाकार भाग उचित प्रकार से कार्य नहीं करता तो क्या होगा ? **2**

26. नीचे दिए गए कथनों को रासायनिक समीकरण के रूप में परिवर्तित करके उन्हें संतुलित कीजिए : **2**

(i) बेरियम क्लोराइड और ऐलुमिनियम सल्फेट के जलीय विलयन परस्पर अभिक्रिया करके अघुलनशील बेरियम सल्फेट और ऐलुमिनियम क्लोराइड का विलयन बनाते हैं।

(ii) ऐलुमिनियम धातु भाप से अभिक्रिया करके ऐलुमिनियम ऑक्साइड और हाइड्रोजन गैस बनाती है।

खण्ड – ग

27. (i) टमाटर के जूस के किसी नमूने का pH 4.6 है। इस जूस का स्वाद कैसा होना चाहिए ? अपने उत्तर का कारण दीजिए। **1**

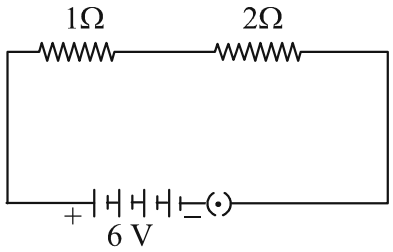
(ii) हम किसी प्रबल अम्ल और दुर्बल क्षारक के बीच विभेदन जलीय विलयनों में आयन बनने के पदों में किस प्रकार करते हैं ? **1**

(iii) अम्लीय वर्षा का जल जलीय जन्तुओं की उत्तर-जीविता को कठिन बना देता है। ऐसा किस प्रकार होता है ? **1**

22. **(A)** Show how you would connect three resistors each of resistance 6 Ω, so that the combination has a resistance of 9 Ω. Also justify your answer. **2**

OR

(B) In the given circuit calculate the power consumed in watts in the resistor of 2 Ω : **2**



23. A ray of light falls making an angle of incidence θ on the surface of a glass slab. Draw a labelled ray diagram to show its path. Also mark lateral displacement on it. **2**

24. **(A)** In which region of the brain is (i) medulla and (ii) cerebrum located ? State one function of each. **2**

OR

(B) Name a hormone that promotes the growth of tendrils and explain how they help a pea plant to climb up other plants. **2**

25. Mention the pathway of urine in our body starting from the organ of its formation to its excretion. What will happen if the tubular part of the nephron does not work properly? **2**

26. Translate the following statements into chemical equations and then balance them : **2**

(i) Solution of barium chloride and aluminium sulphate in water react to give insoluble barium sulphate and the solution of aluminium chloride.

(ii) Aluminium metal reacts with steam to give aluminium oxide and hydrogen gas.

SECTION – C

27. (i) The pH of a sample of tomato juice is 4.6. How is this juice likely to be in taste ? Give reason to justify your answer. **1**

(ii) How do we differentiate between a strong acid and a weak base in terms of ion-formation in aqueous solutions ? **1**

(iii) The acid rain can make the survival of aquatic animals difficult. How ? **1**

28. निम्नलिखित में प्रत्येक की रासायनिक अभिक्रिया के लिए एक-एक रासायनिक समीकरण दीजिए : **3**

(i) रंग में परिवर्तन

(ii) ताप में परिवर्तन

(iii) अवक्षेप का बनना

समीकरण के साथ रंग में परिवर्तन/ताप में परिवर्तन (बढ़ना/घटना)/अवक्षेपित यौगिक का उल्लेख भी कीजिए।

29. प्रतिवर्ती क्रिया की परिभाषा लिखिए। प्रवाह आरेख की सहायता से छींकने जैसी प्रतिवर्ती क्रिया का पथ दर्शाइए। **3**

30. ''प्रकाश संश्लेषण के लिए क्लोरोफिल आवश्यक है।'' इस कथन के संदर्भ में नीचे दिए गए प्रश्नों के उत्तर दीजिए : **3**

(i) शबलित पत्ती किसे कहते हैं? कोई उदाहरण दीजिए।

(ii) जब पत्ती को ऐल्कोहॉल में उबालते हैं तो पत्ती के रंग और विलयन के रंग का क्या होता है?

(iii) पौधे में उत्पन्न कार्बोहाइड्रेट किस रूप में संचित होता है ? प्रकाश संश्लेषण के लिए क्लोरोफिल आवश्यक क्यों है ?

31. (A) पादप $\rightarrow$ हरिण (मृग) $\rightarrow$ शेर

उपरोक्त आहार शृंखला में दूसरे पोषी स्तर के सभी जीवों को हटाने का प्रभाव पहले और तीसरे पोषी स्तर पर क्या होगा? यदि तीसरे पोषी स्तर के सभी जीव आहार-जाल में उपस्थित होते तो उन पर क्या यही प्रभाव होता जो उपरोक्त आहार शृंखला में हुआ है? पुष्टि करें। **3**

अथवा

(B) कोई गैस 'X' जो एक घातक विष है, वायुमण्डल के ऊपरी स्तर में पायी जाती है और एक आवश्यक प्रकार्य का संपादन करती है।

इस गैस का नाम और वायुमण्डल में इस गैस के प्रकार्य का उल्लेख कीजिए। इस गैस के स्तर के घटने से किस रसायन का नाम जुड़ा है? इस गैस की परत की क्षति को रोकने के लिए किसी अन्तर्राष्ट्रीय संगठन द्वारा क्या कदम उठाए गए हैं ? **3**

28. Write one chemical equation each for the chemical reaction in which the following have taken place : **3**

(i) Change in colour

(ii) Change in temperature

(iii) Formation of precipitate

Mention colour change/temperature change (rise/fall)/compound precipitated along with equation.

29. Define reflex action. With the help of a flow chart show the path of a reflex action such as sneezing. **3**

30. In the context of the statement "chlorophyll is necessary for photosynthesis" answer the following questions : **3**

(i) What are variegated leaves? Give an example.

(ii) When leaf is boiled in alcohol, what happens to the colour of the leaf and the colour of the solution ?

(iii) In what form is the carbohydrate produced, stored in the plant? Why is chlorophyll necessary for photosynthesis ?

31. **(A)** Plants $\rightarrow$ Deer $\rightarrow$ Lion

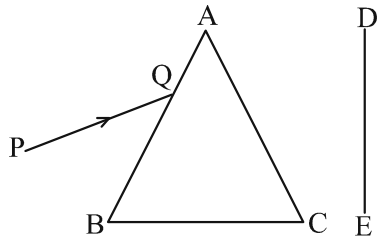
In the given food chain, what will be the impact of removing all the organisms of second trophic level on the first and third trophic level? Will the impact be the same for the organisms of the third trophic level in the above food chain if they were present in a food web? Justify. **3**

OR

(B) A gas 'X' which is a deadly poison is found at the higher levels of atmosphere and performs an essential function.

Name the gas and write the function performed by this gas in the atmosphere. Which chemical is linked to the decrease in the level of this gas? What measures have been taken by an international organization to check the depletion of the layer containing this gas ? **3**

32. आरेख में दर्शाए अनुसार श्वेत प्रकाश का कोई महीन पुन्ज कांच के प्रिज़्म ABC से गुजर रहा है।



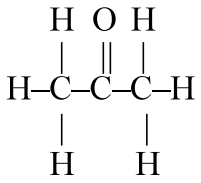
प्रकाश किरण आरेख खींचकर पर्दे DE पर पड़ने वाले निर्गत प्रकाश का पथ दर्शाइए। होने वाली परिघटना का नाम और उसका कारण भी लिखिए। अपवर्तन के दूसरे नियम का उपयोग करके उल्लेख कीजिए कि प्रकाश के सात वर्णों में से किस वर्ण (रंग) का अपवर्तनांक अधिकतम होना चाहिए। **3**

33 (i) विद्युत परिपथों एवं साधित्रों में सामान्यतः उपयोग किए जाने वाले दो सुरक्षा उपायों के नाम लिखिए। **3**

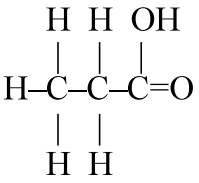
(ii) किसी विद्युत भट्टी का शक्ति–अनुमतांक 220 V; 2 kW है। यदि इसे 5A धारा अनुमतांक के घरेलू परिपथ में उपयोग किया जाता है, तो इससे अपेक्षित परिणाम क्या हो सकता है? आवश्यक परिकलनों सहित अपने उत्तर की पुष्टि कीजिए।

खण्ड – घ

34 **(A)** (i) प्रकार्यात्मक समूह की परिभाषा दीजिए। नीचे दिए गए कार्बन यौगिकों में उपस्थित प्रकार्यात्मक समूहों की पहचान कीजिए : **5**



(I)



(II)

(ii) क्या होता है जब एथेनॉल अम्लीकृत पोटैशियम डाइक्रोमेट विलयन से अभिक्रिया करता है ? अभिक्रिया के लिए रासायनिक समीकरण लिखिए। इस अभिक्रिया को उपचयन अभिक्रिया क्यों माना जाता है ?

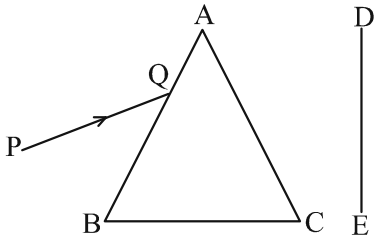
(iii) एथेनॉइक अम्ल की सोडियम हाइड्राक्साइड से अभिक्रिया का रासायनिक समीकरण लिखिए।

अथवा

(B) (i) साबुन बनाने की विधि का वर्णन, होने वाली रासायनिक अभिक्रिया का, रासायनिक समीकरण देकर कीजिए। **5**

(ii) साबुन की सफाई प्रक्रिया की क्रियाविधि की आरेख खींचकर व्याख्या कीजिए।

32. A narrow beam, PQ of white light is passing through a glass prism ABC as shown in the diagram.



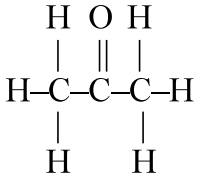
Draw a ray diagram to show the emergent beam as it falls on the screen DE. Also write the phenomenon involved and its cause. Using the second law of refraction state which colour of light must have the highest value of refractive index amongst seven visible colours of light. Justify your answer. **3**

33. (i) Name two safety measures commonly used in electric circuits and appliances. **3**

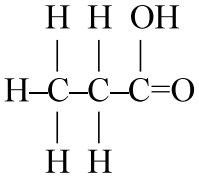
(ii) The power rating of an electric oven is 220 V; 2 kW. If it is used in a domestic electric circuit of current rating of 5A, what result do you expect ? Justify your answer with necessary calculations.

SECTION – D

34. **(A)** (i) Define the term functional group. Identify the functional groups present in the following carbon compounds : **5**



(I)



(II)

(ii) What happens when ethanol reacts with acidified potassium dichromate solution ? Write chemical equation for the reaction. Why is this reaction considered an oxidation reaction ?

(iii) Write chemical equation for the reaction of ethanoic acid with sodium hydroxide.

OR

(B) (i) Describe method of preparation of soap giving chemical equation for the reaction involved. **5**

(ii) Explain with diagram the mechanism of the cleansing action of soaps.

35. (A) (i) विद्युत शक्ति की परिभाषा लिखिए। इसे विभवान्तर (V) और प्रतिरोध (R) के पदों में व्यक्त कीजिए। **5**

(ii) किसी विद्युत भट्टी की अभिकल्पना उसे 220 V के मेन्स पर कार्य करने के लिए की गयी है। यह भट्टी 5 घन्टे में 11 यूनिट विद्युत ऊर्जा उपभुक्त करती है। परिकलित कीजिए :

(a) भट्टी का शक्ति–अनुमतांक

(b) भट्टी द्वारा ली जाने वाली विद्युत धारा

(c) भट्टी का प्रतिरोध जब वह लाल तप्त है

अथवा

(B) (i) किसी बेलनाकार धात्विक सिलिण्डर जिसकी लम्बाई l तथा अनुप्रस्थ काट क्षेत्रफल A है, के प्रतिरोध R और उसके पदार्थ की वैद्युत प्रतिरोधकता ρ के बीच संबंध लिखिए। इस प्रकार वैद्युत प्रतिरोधकता का SI मात्रक व्युत्पन्न कीजिए। **5**

(ii) 3 m लम्बाई और 4×10^{-7} m^2 अनुप्रस्थ काट क्षेत्रफल के किसी तार का प्रतिरोध 60 Ω है। इस तार की वैद्युत प्रतिरोधकता परिकलित कीजिए।

(iii) यदि इस तार (भाग 'ii') को खींचकर इसकी लम्बाई दोगुनी कर दी जाए तो इसकी वैद्युत प्रतिरोधकता किस प्रकार प्रभावित होगी? अपने उत्तर की पुष्टि कीजिए।

36. (A) (i) मानव मादाओं के गर्भधारण को रोकने के लिए उपयोग की जाने वाली तीन तकनीकों/युक्तियों के नाम लिखिए। प्रत्येक के विपरीत प्रभाव का उल्लेख कीजिए। **5**

(ii) क्या होगा यदि किसी मानव मादा में (a) निषेचन होता है, (b) अण्ड का निषेचन नहीं होता है ?

अथवा

(B) (i) राइजोपस में बीजाणु समासंघ को आरेख खींचकर दर्शाइए तथा उन भागों को नामांकित कीजिए (a) जो जनन के भाग हैं और (b) जो जनन के भाग नहीं हैं। राइजोपस शुष्क रोटी के टुकड़े पर विकसित क्यों नहीं होते हैं ? **5**

(ii) उस विधि का नाम और व्याख्या कीजिए जिसके द्वारा हाइड्रा जनन करता है।

35. (A) (i) Define electric power. Express it in terms of potential difference (V) and resistance (R). **5**

(ii) An electric oven is designed to work on the mains voltage of 220 V. This oven consumes 11 units of electrical energy in 5 hours. Calculate :

(a) power rating of the oven

(b) current drawn by the oven

(c) resistance of the oven when it is red hot

OR

(B) (i) Write the relation between resistance R and electrical resistivity ρ of the material of a conductor in the shape of cylinder of length *l* and area of cross-section A. Hence derive the SI unit of electrical resistivity. **5**

(ii) The resistance of a metal wire of length 3 m is 60 Ω. If the area of cross-section of the wire is 4×10^{-7} m^2, calculate the electrical resistivity of the wire.

(iii) State how would electrical resistivity be affected if the wire (of part 'ii') is stretched so that its length is doubled. Justify your answer.

36. (A) (i) Name three techniques/devices used by human females to avoid pregnancy. Mention the side effects caused by each. **5**

(ii) What will happen if in a human female (a) fertilisation takes place, (b) an egg is not fertilised ?

OR

(B) (i) Draw a diagram showing spore formation in Rhizopus and label the (a) reproductive and (b) non-reproductive parts. Why does Rhizopus not multiply on a dry slice of bread ? **5**

(ii) Name and explain the process by which reproduction takes place in Hydra.

खण्ड – ड़

प्रश्न संख्या 37–39 स्रोत–आधारित/प्रकरण–आधारित प्रश्न हैं जिनके दो से तीन उप भाग हैं, जिनमें से एक उप भाग में आन्तरिक चयन प्रदान किया गया है :

37. नीचे दिए गए आँकड़ों का अध्ययन कीजिए जिनमें तीन अवतल दर्पणों A, B और C की फोकस दूरी तथा उनके सामने स्थित बिम्ब की सापेक्ष दूरी दी गयी है :

प्रकरण	दर्पण	फोकस दूरी (cm)	बिम्ब–दूरी (cm)
1	A	20	45
2	B	15	30
3	C	30	20

(i) उपरोक्त प्रकरणों में से किसमें दर्पण द्वारा बने प्रतिबिम्ब का साइज बिम्ब के साइज से छोटा होगा? अपने उत्तर की पुष्टि कीजिए। **1**

(ii) प्रकरण 2 में बने प्रतिबिम्ब के दो गुणों की सूची बनाइए। **1**

(iii) (A) दर्पण C द्वारा बने प्रतिबिम्ब की प्रकृति और साइज क्या है? अपने उत्तर की पुष्टि के लिए किरण आरेख खींचिए। **2**

अथवा

(iii) (B) कोई बिम्ब 12 cm फोकस दूरी के अवतल दर्पण के ध्रुव से 18 cm की दूरी पर स्थित है। इस प्रकरण में प्रतिबिम्ब की स्थिति ज्ञात कीजिए। **2**

38. मेंडल ने मटर के दिखाई देने वाले कई विपर्यासी लक्षणों का उपयोग करके आनुवंशिकता के नियमों पर कार्य किया। उन्होंने मटर के पौधों के एक अथवा दो विपर्यासी लक्षणों के युग्मों के साथ संकरण कराकर कई प्रयोग किए। अपने प्रेक्षणों के आधार पर उन्होंने कुछ व्याख्याएं कीं जिन्होंने आनुवंशिकता की क्रियाविधि के अध्ययन में सहायता की।

(i) जब मेंडल ने F_1 संतति प्राप्त करने के लिए मटर के शुद्ध लम्बे और शुद्ध बौने लक्षणों वाले पौधों के बीच संकरण कराया तो F_1 संतति के पौधों में उन्होंने कौनसे दो प्रेक्षण किए ? **1**

(ii) प्रभावी और अप्रभावी लक्षणों के बीच एक अन्तर लिखिए। **1**

(iii) (A) विपर्यासी लक्षणों के दो युग्मों के किसी संकरण में

RRYY × rryy
(गोल पीले) (झुर्रीदार हरे)

मेंडल ने F_2 संतति में 4 प्रकार के संयोजनों का प्रेक्षण किया। किस विधि द्वारा उन्होंने F_2 संतति के पौधे प्राप्त किए थे? प्राप्त जनकीय संयोजनों का अनुपात लिखिए तथा उल्लेख कीजिए कि इस प्रयोग से क्या निष्कर्ष निकलता है। **2**

SECTION – E

Q. Nos. 37-39 are source-based/case-based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts :

37. Study the data given below showing the focal length of three concave mirrors A, B and C and the respective distances of objects placed in front of the mirrors :

Case	Mirror	Focal Length (cm)	Object Distance (cm)
1	A	20	45
2	B	15	30
3	C	30	20

(i) In which one of the above cases the mirror will form a diminished image of the object ? Justify your answer. **1**

(ii) List two properties of the image formed in case 2. **1**

(iii) (A) What is the nature and size of the image formed by mirror C ? Draw ray diagram to justify your answer. **2**

OR

(iii) (B) An object is placed at a distance of 18 cm from the pole of a concave mirror of focal length 12 cm. Find the position of the image formed in this case. **2**

38. Mendel worked out the rules of heredity by working on garden pea using a number of visible contrasting characters. He conducted several experiments by making a cross with one or two pairs of contrasting characters of pea plant. On the basis of his observations he gave some interpretations which helped to study the mechanism of inheritance.

(i) When Mendel crossed pea plants with pure tall and pure short characteristics to produce F_1 progeny, which two observations were made by him in F_1 plants ? **1**

(ii) Write one difference between dominant and recessive trait. **1**

(iii) (A) In a cross with two pairs of contrasting characters

RRYY × rryy

(Round Yellow) (Wrinkled Green)

Mendel observed 4 types of combinations in F_2 generation. By which method did he obtain F_2 generation ? Write the ratio of the parental combinations obtained and what conclusions were drawn from this experiment. **2**

अथवा

(iii) (B) इस कथन की पुष्टि कीजिए :

''यह संभव है कि कोई लक्षण वंशानुगत तो हो जाए परन्तु व्यक्त न हो पाए।'' **2**

39. अपचयन की विभिन्न प्रक्रियाओं द्वारा उत्पन्न धातुएं बहुत शुद्ध नहीं होती हैं। इनमें अशुद्धियाँ होती हैं। शुद्ध धातुएं प्राप्त करने के लिए इन अशुद्धियों को दूर किया जाता है। धातुओं को शुद्ध करने की सबसे अधिक प्रचलित विधि विद्युत अपघटनी परिष्करण है।

(i) इस प्रक्रिया द्वारा कॉपर के परिष्करण के लिए कैथोड और ऐनोड किसके बने होते हैं ? **1**

(ii) उपरोक्त प्रक्रिया में उपयोग किए जाने वाले विलयन का नाम और उसका सूत्र लिखिए। **1**

(iii) (A) जब इस विद्युत अपघटनी सेल में विद्युत धारा प्रवाहित की जाती है तो कॉपर का परिष्करण किस प्रकार हो जाता है ? **2**

अथवा

(iii) (B) आपके पास दो बीकरों 'A' और 'B' में कॉपर सल्फेट विलयन भरा है। यदि आप बीकर 'A' में जिंक की पत्री और बीकर 'B' में सिल्वर की पत्री डुबो दें तो लगभग दो घन्टे के पश्चात् आप क्या प्रेक्षण करेंगे। प्रत्येक प्रकरण के प्रेक्षण का कारण दीजिए। **2**

OR

(iii) (B) Justify the statement :

"It is possible that a trait is inherited but may not be expressed." **2**

39. The metals produced by various reduction processes are not very pure. They contain impurities, which must be removed to obtain pure metals. The most widely used method for refining impure metals is electrolytic refining.

(i) What is the cathode and anode made of in the refining of copper by this process ? **1**

(ii) Name the solution used in the above process and write its formula. **1**

(iii) (A) How copper gets refined when electric current is passed in the electrolytic cell ? **2**

OR

(iii) (B) You have two beakers 'A' and 'B' containing copper sulphate solution. What would you observe after about 2 hours if you dip a strip of zinc in beaker 'A' and a strip of silver in beaker 'B'? Give reason for your observations in each case. **2**

Marking Scheme
Strictly Confidential
Secondary School Examination, 2024
SUBJECT NAME SCIENCE (086) (Q.P. CODE 31/1/1)

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 delibration 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 0 – 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 an answer. 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.
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.

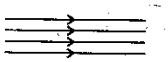
MARKING SCHEME

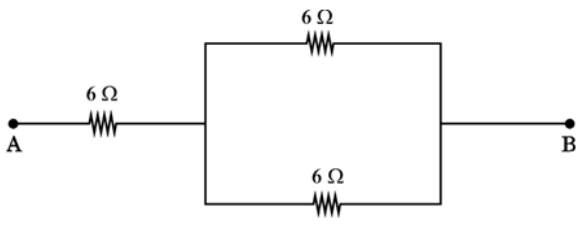
Secondary School Examination, 2024

SCIENCE (Subject Code–086)

[Paper Code: 31/1/1]

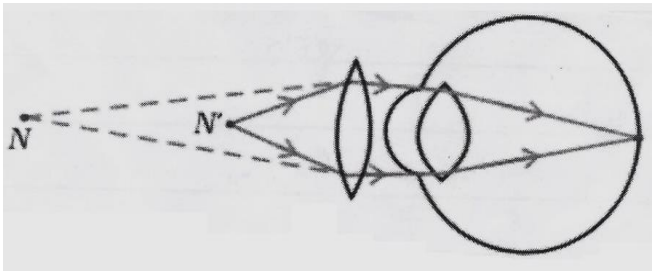
Maximum Marks: 80

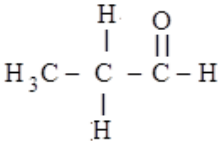
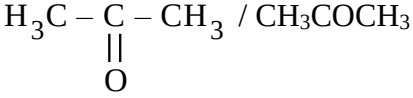
Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION A		
1	(b) / $2\ NaOH + \ Zn \longrightarrow \ Na_2ZnO_2 \ + \ H_2$	1	1
2	(c) / $2\ AgBr \longrightarrow 2\ Ag + Br_2$	1	1
3	(c) /Mercury and Bromine	1	1
4	(c) / (ii) and (iv)	1	1
5	(d) / Na_2CO_3	1	1
6	(c) /amphoteric	1	1
7	(d) / MnO_2 is reduced and HCl is oxidised	1	1
8	(b) / (ii) and (iv)	1	1
9	(d) / (i) and (iv)	1	1
10	(c) /Neuromuscular junction	1	1
11	(c) / (ii) and (iii)	1	1
12	(c) /At twice the focal length of the lens	1	1
13	(d) /Retina	1	1
14	(a) / 	1	1
15	(c) /Tiger, grass, snake, frog	1	1
16	(d) / Plasmodium	1	1
17	(a) /Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).	1	1
18	(b) / Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of Assertion (A).	1	1
19	(c) /Assertion (A) is true, but Reason (R) is false.	1	1
20	(c) /Assertion (A) is true, but Reason (R) is false.	1	1
	SECTION B		
21	Combination reaction – Single product is formed (or any other) $CaO(s) + H_2O(l) \longrightarrow Ca(OH)_2(aq) + Heat$ Quick lime Slaked lime/Calcium hydroxide	½ +½ 1	2
22	Role of: (i) Hydrochloric acid: Creates an acidic medium for facilitating the action of enzyme / kills microorganisms. (ii) Villi: Increases the surface area for absorption of digested food. (iii) Anal Sphincter: Exit of waste material from anus is regulated.	½ ½ ½	

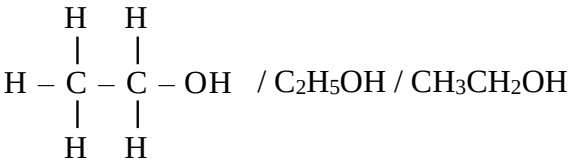
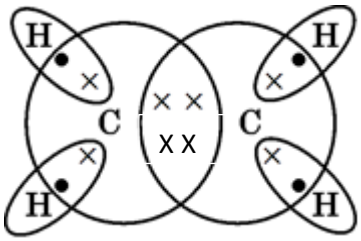
	(iv) Lipase: Breakdown / digestion of emulsified fats or lipids	½	2
23	(A) **Movement of leaves of sensitive plant** / **Downward movement of roots** (i) Stimulus is touch. / Stimulus is gravity. (ii) No growth is involved in the movement. / Growth is involved in the movement (iii) Non directional / Directional **(Any two)** **(Any other suitable difference)** **OR** (B) • Thyroxine • Thyroid gland • Iodine is necessary for thyroid gland to make thyroxine hormone. Deficiency of iodine in our diet causes goitre.	1+1 ½ ½ 1	2
24	u = - 10cm; f = +15 cm $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$ $\frac{1}{15} = \frac{1}{v} + \frac{1}{-10\ cm}$ $\frac{1}{v} = \frac{1}{15\ cm} + \frac{1}{10\ cm}$ $v = +6\ cm$ Image is formed behind the mirror.	½ ½ 1	2
25	(A) When two 6 Ω resistances are connected in parallel and the third resistance of 6Ω is connected in series combinations to this, then equivalent resistance will be 9 Ω /  	1	

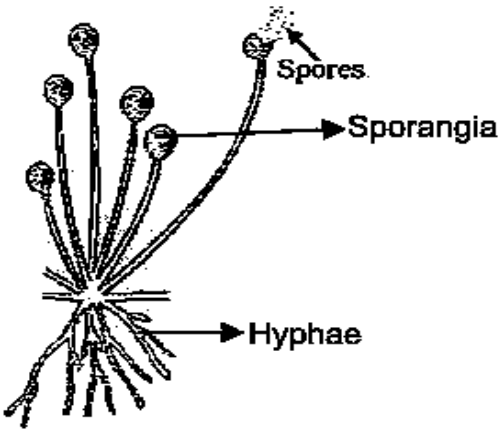
	[Award marks for writing the statement or drawing the diagram] $\frac{1}{R_P} = \frac{1}{6\,\Omega} + \frac{1}{6\,\Omega}$ $\therefore\ R_P = 3\,\Omega$ Rs = 6 + 3 = 9Ω **OR** (B) Equivalent resistance = $R_1 + R_2 = 1\,\Omega + 2\,\Omega = 3\,\Omega$ $I = \frac{V}{R}$ $= \frac{6\text{ V}}{1\,\Omega + 2\,\Omega} = \frac{6\text{ V}}{3\,\Omega} = 2\text{ A}$ Electric power, $P = I^2R$ $= (2A)^2 \times 2\,\Omega = 4 \times 2\text{ W} = 8\text{ W}$	1 ½ ½ ½ ½	2
26	(i) If they intersect then at the point of intersection, there would be two directions of magnetic field or compass needle would point towards two directions, which is not possible. (ii) Uniform magnetic field is represented by equidistant parallel straight lines → → → →	1 ½ ½	2
	SECTION C		
27	(i) Change in colour: The solution will become green in colour. $Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4 + Cu(s)$ Blue Green (**or any other reaction** which shows change in colour) (ii) Change in temperature: The temperature will increase. $NaOH(aq) + HCl(aq) \longrightarrow NaCl(aq) + H_2O(l) + Heat$	½ ½ ½ ½	

	(**or any other reaction** which shows change in temperature) (iii) Formation of precipitate: Yellow precipitate of PbI_2 is formed. $Pb(NO_3)_2\ (aq) + 2\ KI(aq) \longrightarrow PbI_2(s) + 2\ KNO_3(aq)$ Yellow (**or any other reaction** which shows formation of precipitate)	½ ½	3
28	(i) The taste of tomato juice will be slightly **sour**; The pH 4.6 indicates that tomato juice is **an acid** and acids are sour in taste. (ii) Acids that give **more H^+ ions / H_3O^+** are Strong Acids Bases that give **less OH^- ions** are Weak Bases. (iii) Living animals can survive within a **pH range of 7·0 to 7·8**. So, if the pH of river water becomes low due to **acid rain (pH < 5·6)**, then survival of aquatic animals becomes difficult.	½ ½ ½ ½ 1	3
29	(i) **Diffusion /Diffusion pressure** alone **cannot take care of oxygen** delivery to all parts of the body. (ii) Reasons: (a) To ensure that the air-passage **does not collapse**. (b) There is **sufficient time for oxygen** to be **absorbed** and for the **carbon dioxide** to be **released**. (c) **Chest cavity** becomes **larger**. (d) Because **exchange of gases** takes place in the alveoli.	1 ½ ½ ½ ½	3
30	Reflex action is a **sudden/spontaneous/immediate** action **in response to** the **environment/stimulus** e.g. sneezing. Stimulus → Receptors (Nose) → Sensory neuron → Spinal cord → Motor neuron → Effector (Muscles) → Response (Relay neuron) **(any other example)**	1 2	3
31	(i) Hypermetropia or Far-sightedness. Reason – Image is formed behind the retina. / Near point for the person is farther away from the normal near point (25 cm)	½ ½	

	(ii) • Focal length of the eye lens is too long. • The eyeball has become too small. (iii)  N = Near point of a hypermetropic eye N'= Near point of a normal eye	½ ½ 1	3
32	(i) • Right - Hand Thumb Rule • If the wire carrying current is held in our **right hand** such that the **Thumb** points towards the **Direction of Current**, then the **fingers wrap around the conductor** in the **direction of field lines of the magnetic field.** (ii) • Fleming's Left - Hand Rule • Stretch the thumb, forefinger and middle finger of **left hand mutually perpendicular** to each other, such that **first finger** points in the direction of **Magnetic Field**, **second finger** in the direction of **Current,** then **thumb** in the **direction of motion or force** acting on the conductor.	½ 1 ½ 1	3

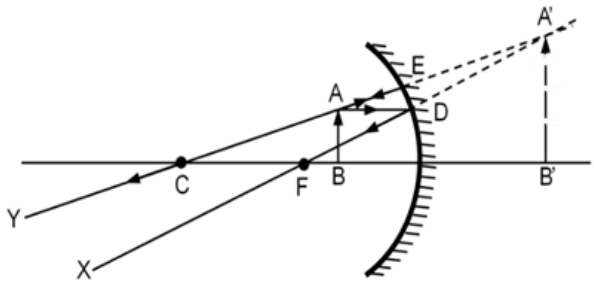
33	(A) • Number of **plants/organisms** of **first trophic level** will **increase.** • Number of **lions**/ **organisms** of **third trophic level** will **decrease**. • No • As the organisms of that level will **find alternative foods** and will **not starve** to death / food web is more stable where other animals as prey may be available. **OR** (B) • Gas 'X' is **Ozone** • Ozone **shields** the surface of the earth from **ultra-violet (UV) radiations** from the sun. • CFCs (Chlorofluorocarbons) • Succeeded in forging an agreement to freeze CFC production at 1986 levels / Manufacturing of CFC free refrigerators	1 1 ½ ½ 1 1 ½ ½	3
	SECTION D		
34	(A) (i) A series of carbon compounds in which the same functional group substitutes for hydrogen in a carbon chain / Series of compounds having same functional group and similar chemical properties. (ii) Because melting point and boiling point increase with molecular mass. (iii) Because chemical properties of organic compounds are solely determined by their functional group which remains same in a homologous series. (iv) (i) Aldehyde: Propanal  / CH_3CH_2CHO (ii) Ketone: Propanone  **OR**	1 1 1 ½ ½ ½ ½	

	(B) (i) Ethanol Structure:  $H-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-OH$ / C_2H_5OH / CH_3CH_2OH (ii) Ethene is formed $C_2H_5OH \xrightarrow{Conc.H_2SO_4\ 443K\ (Heat)} H_2C = CH_2 + H_2O$ *Ethanol* Ethene Water **[Note: Deduct ½ mark if the conditions required are not mentioned in the equation]** • Concentrated Sulphuric acid acts as a dehydrating agent. (iii) Ethene  	½ 1 ½ 1 ½ ½ 1	5
35	(A) (i) • Chemical Method/Oral pills Side effects: Change the hormonal balance of the body. • Barrier method / Loop / Copper–T Side effects: Irritation in uterus. • Surgical method / Fallopian tube in female is blocked; Side effects – may cause infections. (ii) (a) Fertilized egg/zygote gets implanted in the lining of uterus and starts dividing. (b) If the egg is not fertilized, the thick and spongy lining of the uterus breaks and comes out through the vagina as blood and mucous. **OR**	½ ½ ½ ½ ½ ½ 1 1	

	(B) (i)  (a) Reproductive part – Sporangia (b) Non-reproductive part – Hypha/Hyphae. • Dry slice of bread does not provide moisture and nutrients necessary for the germination and multiplication of Rhizopus. (ii) • Budding: • Hydra uses regenerative cells for reproduction. A bud develops as an outgrowth due to repeated cell division at one specific site and develop into tiny individuals. On maturation, these buds detach from the parent and become new individuals. ***Alternate answer:*** • Regeneration: • It is carried out by specialised cells. If hydra is cut or broken into many pieces, many of these pieces grow into separate individuals. **[Note: Award marks for either of the processes and its explanation]**	1 ½ ½ 1 1 1	5
36	(A) (i) • Electric power : Rate at which electrical energy is dissipated or consumed / Rate of supplying energy to maintain the flow of current through a circuit. • $P = \frac{V^2}{R}$ (ii) (a) (1 unit = 1kWh) Power, $P = \frac{Electrical\ energy\ consumed}{Time}$ $= \frac{11kWh}{5h} = 2.2kW$ **or** 2200 W (b) $I = \frac{P}{V}$	1 1 ½ ½ ½	

	$= \frac{2200}{220} = 10A$	½	
	(c) $R = \frac{V^2}{P}$	½	
	$= \frac{(220)^2}{2200} = 22\ \Omega$	½	
	(Alternate formula can be used)		
	OR		
	(B)		
	(i) $R = \rho \frac{l}{A}$	1	
	$\rho = \frac{R \times A}{l}$		
	$= Ohm \times \frac{(metre)^2}{metre}$		
	= ohm metre/ Ωm	1	
	(ii) Here l = 3 m, A = 4×10^{-7} m^2, R = 60 Ω		
	$\rho = \frac{R \times A}{l}$		
	$= \frac{60 \times 4 \times 10^{-7}}{3}$		
	$= 80 \times 10^{-7}$ Ωm	1	
	(iii)		
	• Resistivity will not change.	1	
	• because Resistivity does not depend on the dimension of the conductor / It only depends on the nature of the material.	1	
			5
	SECTION E		
37			
	(i) Cathode – Pure copper	½	
	Anode – Impure copper	½	
	(ii) Acidified Copper Sulphate; $CuSO_4$	½ + ½	

	(iii) (A) • Pure copper from the anode dissolves into electrolyte and an equivalent amount of pure metal from the electrolyte is deposited on cathode / At anode : $Cu \longrightarrow Cu^{++} + 2e^{-}$ At cathode : $Cu^{++} + 2e^{-} \longrightarrow Cu$ Pure • The soluble impurities go into the solution whereas insoluble impurities settle down at the bottom of the anode. **[Note: Award marks if explained with a suitable labelled diagram]** **OR** (iii) (B) In Beaker A : • The blue colour of the solution fades (or becomes colourless) • Reason – Zn is more reactive than copper In Beaker B: • No change in colour. • Reason – Silver is less reactive than Copper	1 1 ½ ½ ½ ½	4
38	(i) • In F_1 generation, all plants were tall / No short plants were observed • No medium height plants / No halfway characteristics were observed / Only dominant parental traits were seen and not the mixture of the two. (ii) **Dominant trait** / **Recessive trait** Single copy of dominant trait is enough to get it expressed/always expressed / Only expressed when present in pair. **(Any other point)** (iii) (A) • Self-pollination / Self-fertilisation / Selfing of F_1 plants • Ratio – Round Yellow : Wrinkled Green 9 : 1 • Traits are inherited independently.	½ ½ 1 ½ ½ 1	

	OR (iii) (B) If pea plants with yellow seeds are crossed with plants of green seeds, it is found that in F_1 generation all the plants have yellow seeds. When F_1 plants are self-pollinated, it is found that in F_2 generation, plants with yellow seeds and plants with green seeds are obtained. This shows that both the traits are inherited but only one trait is visible in F_1 progeny while the other remains unexpressed. **[Note: Award marks if explained by taking one characteristic / Or explained the same diagrammatically]**	2	4
39	(i) • Mirror A. • as the object is placed beyond the centre of curvature of the mirror. (ii) Same size/ Real / Inverted (Any two) (iii) (A) Nature-Virtual and erect Size-magnified  **(Deduct ½ mark if direction of rays are not marked)** **OR** (iii) (B) Here $f = -12$ cm, $u = -18$ cm, $v = ?$ Mirror formula $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$ or $\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$ $\frac{1}{v} = \frac{1}{-12} - \frac{1}{-18}$ v = - 36cm In front of the mirror at a distance of 36 cm from the pole of the mirror.	½ ½ ½ + ½ ½ ½ 1 ½ ½ 1	4

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Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2024
SUBJECT: SCIENCE (086) (Q.P. 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 delibration 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 0 – 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 an answer. 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.
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.

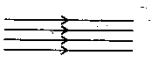
MARKING SCHEME

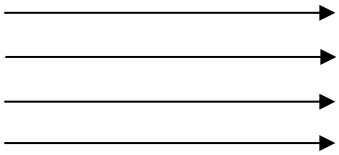
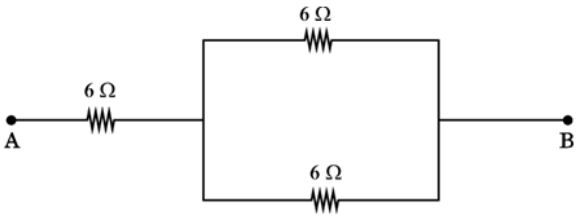
Secondary School Examination, 2024

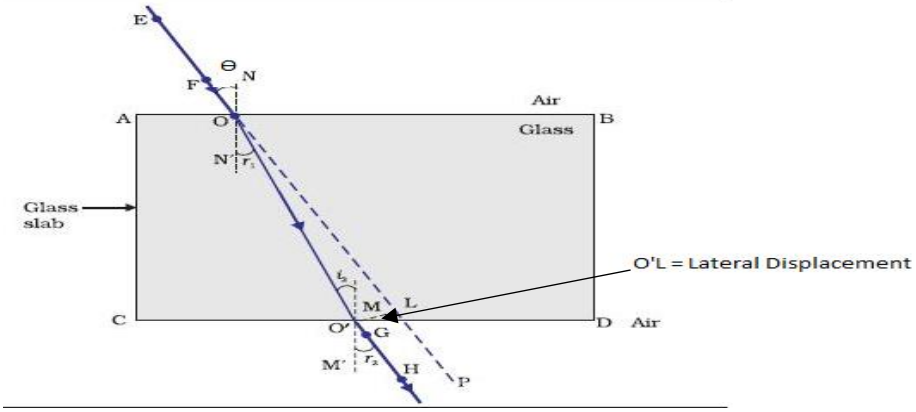
SCIENCE (Subject Code–086)

[Paper Code: 31/1/2]

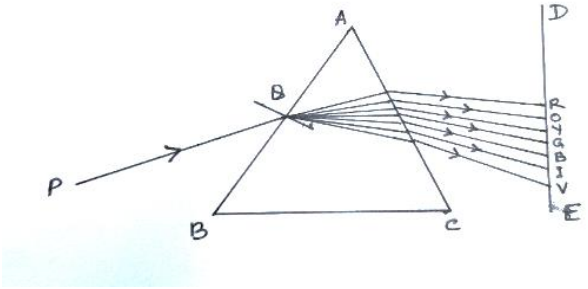
Maximum Marks: 80

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION A		
1	(c) / $2\ AgBr \longrightarrow 2\ Ag + Br_2$	1	1
2	(c) /amphoteric	1	1
3	(d) / Na_2CO_3	1	1
4	(d) /Butyne, C_4H_6	1	1
5	(c) /Mercury and Bromine	1	1
6	(d) / MnO_2 is reduced and HCl is oxidised	1	1
7	(b) / $2\ NaOH + Zn \longrightarrow Na_2ZnO_2 + H_2$	1	1
8	(d) / Features will remain the same even if the protein changes.	1	1
9	(c) /Neuromuscular junction	1	1
10	(d) / (i) and (iv)	1	1
11	(c) / (ii) and (iii)	1	1
12	(d) / Plasmodium	1	1
13	(c) /At twice the focal length of the lens	1	1
14	(d) /Retina	1	1
15	(a) / 	1	1
16	(c) /Tiger, grass, snake, frog	1	1
17	(c) /Assertion (A) is true, but Reason (R) is false.	1	1
18	(c) /Assertion (A) is true, but Reason (R) is false.	1	1
19	(b) / Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of Assertion (A).	1	1
20	(a) /Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).	1	1
	SECTION B		
21	(i) If they intersect then at the point of intersection, there would be two directions of magnetic field or compass needle would point towards two directions, which is not possible. (ii) Uniform magnetic field is represented by equidistant parallel straight lines	1 ½	

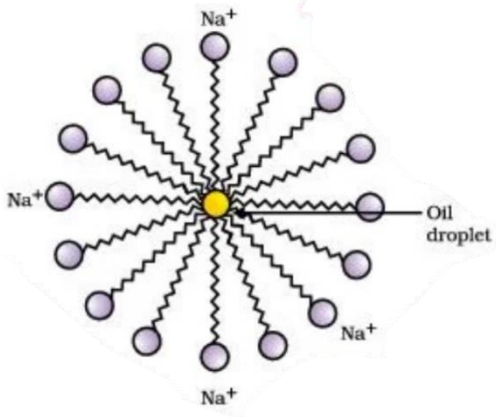
		½	2
22	(A) When two 6 Ω resistances are connected in parallel and the third resistance of 6Ω is connected in series combinations to this, then equivalent resistance will be 9 Ω /  **[Award marks for writing the statement or drawing the diagram]** $\frac{1}{R_P} = \frac{1}{6\,\Omega} + \frac{1}{6\,\Omega}$ $\therefore\ R_P = 3\,\Omega$ Rs = 6 + 3 = 9Ω **OR** (B) Equivalent resistance = $R_1 + R_2 = 1\,\Omega + 2\,\Omega = 3\,\Omega$ $I = \frac{V}{R} = \frac{6\text{ V}}{1\,\Omega + 2\,\Omega} = \frac{6\text{ V}}{3\,\Omega} = 2\text{ A}$ Electric power, $P = I^2R$ $= (2A)^2 \times 2\,\Omega = 4 \times 2\text{ W} = 8\text{ W}$	1 1 ½ ½ ½ ½	2

23	 Lateral displacement labelling	1½ ½	2
24	(A) Medulla – Hindbrain Function– Control blood pressure/salivation/vomiting or any other Cerebrum – Forebrain Function–Thinking/intelligence/memory (any other) **OR** (B)Auxins • When tendril of pea plant comes in contact with any support, the part of the tendril in contact with the object does not grow as rapidly as part of the tendril away from it. This causes the tendril to circle around the object and cling to it.	½ ½ ½ ½ 1 1	2
25	Kidney ⟶ Ureter ⟶ Urinary bladder ⟶ Urethra • Reabsorption of nutrients/amino acids, glucose and water will not take place	1 1	2
26	(i) $3BaCl_2\,(aq) + Al_2(SO_4)_3\,(aq) \longrightarrow 3BaSO_4\,(s) + 2\,AlCl_3\,(aq)$ Equation Balancing (ii) $2\,Al(s) + 3\,H_2O(g) \longrightarrow Al_2O_3(s) + 3\,H_2\,(g)$ Equation Balancing	½ ½ ½ ½	2

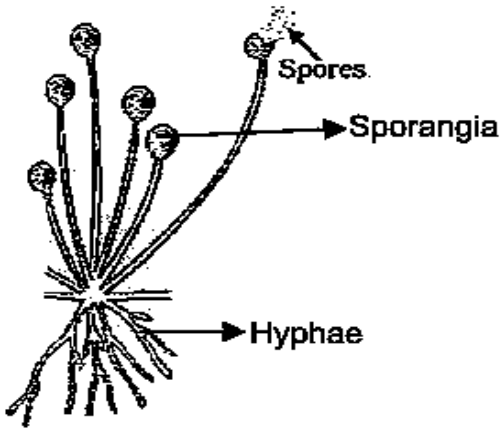
	SECTION C		
27	(i) The taste of tomato juice will be slightly **sour**; The pH 4.6 indicates that tomato juice is **an acid** and acids are sour in taste. (ii) Acids that give **more H^+ ions / H_3O^+** are Strong Acids Bases that give **less OH^- ions** are Weak Bases. (iii) Living animals can survive within a **pH range of 7·0 to 7·8**. So, if the pH of river water becomes low due to **acid rain (pH < 5·6)**, then survival of aquatic animals becomes difficult.	½ ½ ½ ½ 1	3
28	(i) Change in colour: The solution will become green in colour. $Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4 + Cu(s)$ Blue Green (**or any other reaction** which shows change in colour) (ii) Change in temperature: The temperature will increase. $NaOH(aq) + HCl(aq) \longrightarrow NaCl(aq) + H_2O(l) + Heat$ (**or any other reaction** which shows change in temperature) (iii) Formation of precipitate: Yellow precipitate of PbI_2 is formed. $Pb(NO_3)_2(aq) + 2\,KI(aq) \longrightarrow PbI_2(s) + 2\,KNO_3(aq)$ Yellow (**or any other reaction** which shows formation of precipitate)	½ ½ ½ ½ ½ ½	3
29	Reflex action is a **sudden/spontaneous/immediate** action **in response to** the **environment/stimulus** e.g. sneezing. Stimulus → Receptors (Nose) → Sensory neuron → Spinal cord (Relay neuron) → Motor neuron → Effector (Muscles) → Response **(any other example)**	1 2	3
30	(i) Leaves with green (Chlorophyll) and non-green patches (white or yellow patches) e.g. croton/money plant/ any other (ii) Leaf becomes colorless;	½ ½ ½	

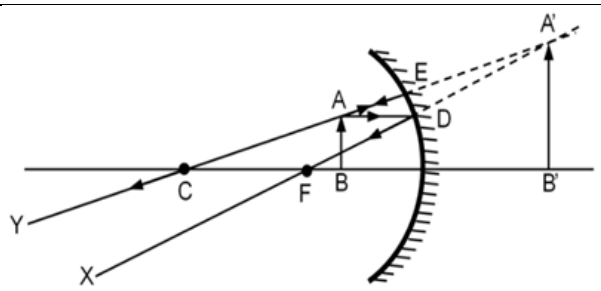
	The solution becomes green (iii) Starch. Chlorophyll helps the plant to absorb energy of the sunlight for the process of photosynthesis	½ ½ ½	3
31	(A) • Number of **plants/organisms** of **first trophic level** will **increase.** • Number of **lions**/ **third trophic level** will **decrease**. • No • As the organisms of that level will **find alternative foods** and will **not starve** to death / food web is more stable where other animals as prey may be available. **OR** (B) • Gas 'X' is **Ozone** • Ozone **shields** the surface of the earth from **ultra-violet (UV) radiations** from the sun. • CFCs (Chlorofluorocarbons) • Succeeded in forging an agreement to freeze CFC production at 1986 levels / Manufacturing of CFC free refrigerators	1 1 ½ ½ 1 1 ½ ½	3
32	 • Phenomenon: Dispersion of light • Cause : Different colours of white light bend through different angles with respect to incident ray./ Different colours of white light have different wavelength therefore bend by different angles. • Refractive index of glass is highest for violet colour. • Justification :For same $\angle i$ the $\angle r$ is minimum for the violet light. $\left(\frac{Sin\ i}{Sin\ r}\right)$ *or* refractive index *is highest*	1 ½ ½ ½	3
33	(i) • Electric fuse and Earth wire (ii) I = P/V	½+½ ½	

	$= \frac{200\not{\Omega}\ \text{W}}{22\not{\Omega}\ \text{V}} = 9{\cdot}09\ \text{A}$ Since, current drawn by the oven is greater than the rated value of current, (9·09A > 5A), the fuse wire melts/ the electric oven stops working.	½ 1	3
	SECTION-D		
34	(A) (i)Functional Group: A hetero atom or group of atoms attached to the carbon chain, which gives specific properties to the carbon compounds. (I) Ketone (II) Carboxylic acid (ii)Ethanoic acid is formed $C_2H_5OH \xrightarrow[\text{Acidified } K_2Cr_2O_7 + \text{Heat}]{} CH_3COOH$ • oxygen is added to ethanol and converts /oxidises ethanol to ethanoic acid. (iii) $CH_3COOH + NaOH \longrightarrow CH_3COONa + H_2O$ **OR** (B) (i) Soaps are prepared by heating an ester (animal fat / vegetable oil) with a base such as sodium hydroxide. $CH_3COOC_2H_5 \xrightarrow{NaOH} CH_3COONa + C_2H_5OH$ Sodium ethanoate (ii) Ionic (hydrophilic) end of the soap interacts with water while the carbon chain(hydrophobic) interacts with oil. Thus micelles are formed. Emulsion is formed in the water. Soap micelles pull out the dirt and oil in water.	1 ½ ½ ½ 1 ½ 1 1 1 2	

		1	5
35	(A) (i) • Electric power : Rate at which electrical energy is dissipated or consumed / Rate of supplying energy to maintain the flow of current through a circuit. • $P = \frac{V^2}{R}$ (ii) (a) (1 unit = 1kWh) Power, $P = \frac{Electrical\ energy\ consumed}{Time}$ $= \frac{11kWh}{5h}$ = 2.2kW **or** 2200 W (b) $I = \frac{P}{V}$ $= \frac{2200}{220}$ = 10A (c) $R = \frac{V^2}{P}$ $= \frac{(220)^2}{2200}$ = 22 Ω **(Alternate formula can be used)** **OR**	1 1 ½ ½ ½ ½ ½ ½	

	(B) (i) $R = \rho \frac{l}{A}$ $\rho = \frac{R \times A}{l}$ $= \text{Ohm} \times \frac{(\text{metre})^2}{\text{metre}}$ = ohm meter / Ωm (ii) Here l = 3 m, A = 4×10^{-7} m^2, R = 60 Ω $\rho = \frac{R \times A}{l}$ $= \frac{60 \times 4 \times 10^{-7}}{3}$ $= 80 \times 10^{-7}$ Ωm (iii) • Resistivity will not change. • because Resistivity does not depend on the dimension of the conductor / It only depends on the nature of the material.	1 1 1 1 1	5
36	(A) (i) • Chemical Method/Oral pills Side effects: Change the hormonal balance of the body. • Barrier method / Loop / Copper–T Side effects: Irritation in uterus. • Surgical method / Fallopian tube in female is blocked; Side effects – may cause infections. (ii) (a) Fertilized egg/zygote gets implanted in the lining of uterus and starts dividing. (b) If the egg is not fertilized, the thick and spongy lining of the uterus breaks and comes out through the vagina as blood and mucous. **OR**	½ ½ ½ ½ ½ ½ 1 1	

	(B) (i)  (a) Reproductive part – Sporangia (b) Non-reproductive part – Hypha/Hyphae. • Dry slice of bread does not provide moisture and nutrients necessary for the germination and multiplication of Rhizopus. (ii) • Budding: • Hydra uses regenerative cells for reproduction. A bud develops as an outgrowth due to repeated cell division at one specific site and develop into tiny individuals. On maturation, these buds detach from the parent and become new individuals. ***Alternate answer:*** • Regeneration: • It is carried out by specialised cells. If hydra is cut or broken into many pieces, many of these pieces grow into separate individuals. **[Note: Award marks for either of the processes and its explanation]**	1 ½ ½ 1 1 1 1	5
	SECTION E		
37	(i) • Mirror A. • as the object is placed beyond the centre of curvature of the mirror. (ii) Same size/ Real / Inverted (Any two) (iii) (A) Nature-Virtual and erect Size-magnified	½ ½ ½ + ½ ½ ½	

<table>
<tr>
<td></td>
<td>


(Deduct ½ mark if direction of rays are not marked)

OR
(iii) (B) Here $f = -12$ cm, $u = -18$ cm, ν = ?
Mirror formula $\frac{1}{f} = \frac{1}{\nu} + \frac{1}{u}$ or $\frac{1}{\nu} = \frac{1}{f} - \frac{1}{u}$
$\frac{1}{v} = \frac{1}{-12} - \frac{1}{-18}$
v = - 36cm
In front of the mirror at a distance of 36 cm from the pole of the mirror.
</td>
<td>1

½
½

1</td>
<td>4</td>
</tr>
<tr>
<td>38</td>
<td>(i)
• In F_1 generation, all plants were tall / No short plants were observed
• No medium height plants / No halfway characteristics were observed / Only dominant parental traits were seen and not the mixture of the two.
(ii)
<table>
<tr><th>Dominant trait</th><th>Recessive trait</th></tr>
<tr><td>Single copy of dominant trait is enough to get it expressed/always expressed</td><td>Only expressed when present in pair.</td></tr>
</table>
(Any other point)
(iii) (A)
• Self-pollination / Self-fertilisation/ Selfing of F_1 plants
• Ratio – Round Yellow : Wrinkled Green
9 : 1
• Traits are inherited independently.</td>
<td>½

½

1

½

½
1</td>
<td></td>
</tr>
</table>

	OR (iii) (B) If pea plants with yellow seeds are crossed with plants of green seeds, it is found that in F_1 generation all the plants have yellow seeds. When F_1 plants are self-pollinated, it is found that in F_2 generation, plants with yellow seeds and plants with green seeds are obtained. This shows that both the traits are inherited but only one trait is visible in F_1 progeny while the other remains unexpressed. **[Note: Award marks if explained by taking one characteristic / Or explained the same diagrammatically]**	2	4
39	(i) Cathode – Pure copper Anode – Impure copper (ii) Acidified Copper Sulphate; $CuSO_4$ (iii) (A) • Pure copper from the anode dissolves into electrolyte and an equivalent amount of pure metal from the electrolyte is deposited on cathode / At anode : $Cu \longrightarrow Cu^{++} + 2e^-$ At cathode : $Cu^{++} + 2e^- \longrightarrow Cu$ (Pure) • The soluble impurities go into the solution whereas insoluble impurities settle down at the bottom of the anode. **[Note: Award marks if explained with a suitable labelled diagram]** **OR** (iii) (B) In Beaker A : • The blue colour of the solution fades (or becomes colourless) • Reason – Zn is more reactive than copper In Beaker B: • No change in colour. • Reason – Silver is less reactive than Copper	½ ½ ½ + ½ 1 1 ½ ½ ½ ½	4

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Marking Scheme
Strictly Confidential
Secondary School Examination, 2024
SUBJECT NAME SCIENCE (086) (Q.P. CODE 31/1/3)

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 delibration 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 0 – 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 an answer. 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.
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.

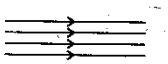
MARKING SCHEME

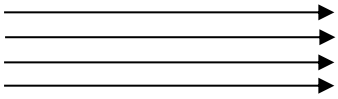
Secondary School Examination, 2024

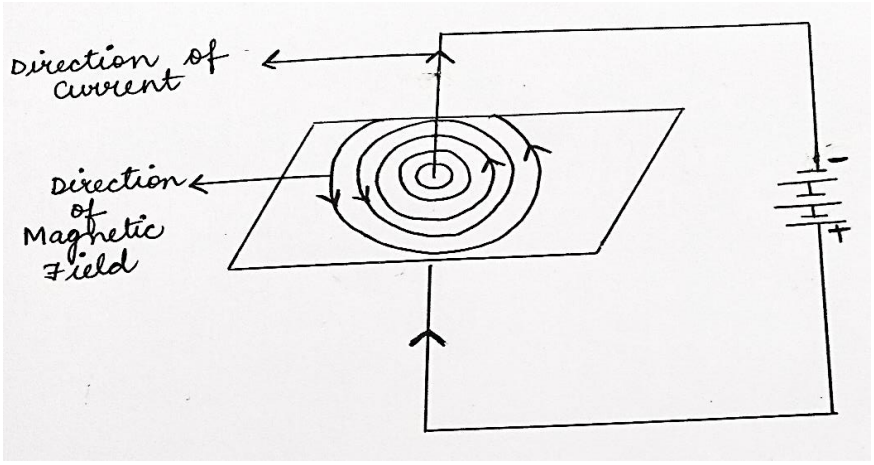
SCIENCE (Subject Code–086)

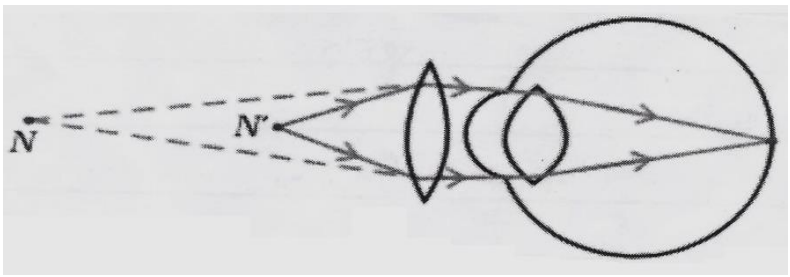
[Paper Code: 31/1/3]

Maximum Marks: 80

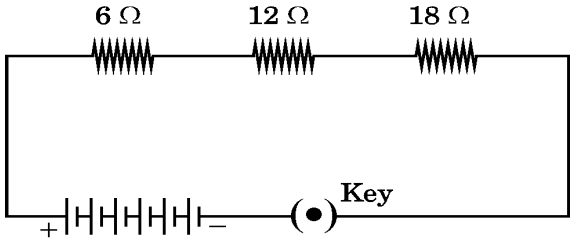
Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION A		
1	(c) / 2 AgBr $\longrightarrow$ 2 Ag + Br_2	1	1
2	(b) / 2 $NaOH + Zn \longrightarrow Na_2ZnO_2 + H_2$	1	1
3	(d) / MnO_2 is reduced and HCl is oxidised	1	1
4	(d) / Na_2CO_3	1	1
5	(c) /Neuromuscular junction	1	1
6	(c) /Mercury and Bromine	1	1
7	(c) /At twice the focal length of the lens	1	1
8	(c) / (ii) and (iv)	1	1
9	(c) /amphoteric	1	1
10	(d) / (i) and (iv)	1	1
11	(b)/ (ii) and (iv)	1	1
12	(c)/ Vas deferens	1	1
13	(d) / Plasmodium	1	1
14	(d)/ The upper portion is of concave lens for the distant vision and lower part is of convex lens for the near vision.	1	1
15	(a) / 	1	1
16	(c) /Tiger, grass, snake, frog	1	1
17	(c) /Assertion (A) is true, but Reason (R) is false.	1	1
18	(a) /Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).	1	1
19	(b) / Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of Assertion (A).	1	1
20	(c) /Assertion (A) is true, but Reason (R) is false.	1	1
	SECTION-B		
21	(A) (i)The communication between the central nervous system and the other parts of the body is facilitated by the peripheral nervous systems. (ii) protected in a bony box/skull//cranium/fluid filled balloon like structure which provides shock absorption. **OR**	1 1	

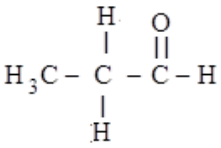
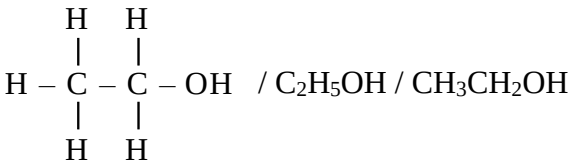
	(B) Chemotropism ; eg. growth of pollen tubes towards the ovules. Hydrotropism ; eg. growth of roots towards water.	½ ½ ½ ½	2
22	(i) Herbivores eating grass need a longer small intestine to allow the cellulose to be digested. Meat is easier to digest. Hence carnivores have shorter small intestine. (ii) **Pepsin** / **Trypsin** i. Secreted by the gastric glands present in the walls of stomach / Secreted in pancreas ii. Acts in acidic medium / Acts in alkaline medium **(Any one)**	1 1	2
23	$2\,BaCl_2(aq) + Al_2(SO_4)_3\,(aq) \longrightarrow 2\,AlCl_3(aq) + 3\,BaSO_4\,(s)$ It is a **precipitation reaction** because **insoluble $BaSO_4$** is formed and gets **precipitated / double displacement** reaction because in this **exchange of ions** takes place **between the reactants**. Name of the chemical reaction Reason	1 ½ ½	2
24	(i) If they intersect then at the point of intersection, there would be two directions of magnetic field or compass needle would point towards two directions, which is not possible. (ii) Uniform magnetic field is represented by equidistant parallel straight lines 	1 ½ ½	2

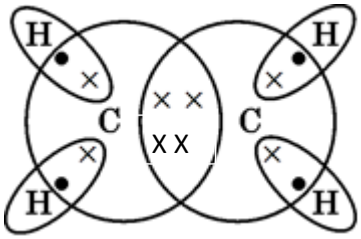
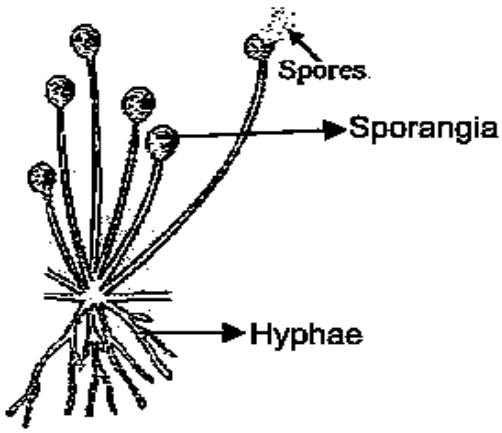
25	 **Direction of current** **Direction of Magnetic Field Lines**	1 ½ ½	2
26	u = - 10cm; f = +15 cm $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$ $\frac{1}{15} = \frac{1}{v} + \frac{1}{-10\ cm}$ $\frac{1}{v} = \frac{1}{15\ cm} + \frac{1}{10\ cm}$ $v = +6\ cm$ Image is formed behind the mirror.	½ ½ 1	2
	SECTION-C		
27	(A) • Number of **plants/organisms** of **first trophic level** will **increase.** • Number of **lions**/ **third trophic level** will **decrease**. • No • As the organisms of that level will **find alternative foods** and will **not starve** to death / food web is more stable where other animals as prey may be available. **OR** (B) • Gas 'X' is **Ozone** • Ozone **shields** the surface of the earth from **ultra-violet (UV) radiations** from the sun. • CFCs (Chlorofluorocarbons)	1 1 ½ ½ 1 1 ½	

	• Succeeded in forging an agreement to freeze CFC production at 1986 levels / Manufacturing of CFC free refrigerators	½	3
28	(i) • Right - Hand Thumb Rule • If the wire carrying current is held in our **right hand** such that the **Thumb** points towards the **Direction of Current**, then the **fingers wrap around the conductor** in the **direction of field lines of the magnetic field.** (ii) • Fleming's Left - Hand Rule • Stretch the thumb, forefinger and middle finger of **left hand mutually perpendicular** to each other, such that **first finger** points in the direction of **Magnetic Field**, **second finger** in the direction of **Current,** then **thumb** in the **direction of motion or force** acting on the conductor.	½ 1 ½ 1	3
29	(i) Hypermetropia or Far-sightedness. Reason – Image is formed behind the retina. / Near point for the person is farther away from the normal near point (25 cm) (ii) • Focal length of the eye lens is too long. • The eyeball has become too small. (iii)  N = Near point of a hypermetropic eye N'= Near point of a normal eye	½ ½ ½ ½ 1	3
30	Reflex action is a **sudden/spontaneous/immediate** action **in response to** the **environment/stimulus** e.g. sneezing. Stimulus → Receptors (Nose) → Sensory neuron → Spinal cord (Relay neuron) → Motor neuron → Effector (Muscles) → Response **(any other example)**	1 2	3
31	(i)Amphibians - frogs / Reptiles - lizards	½	

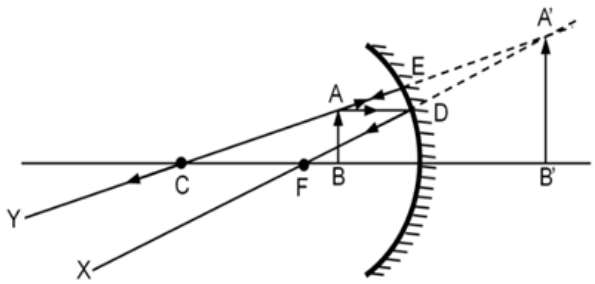
	• The body temperature depends on the temperature in the environment. Therefore they can tolerate some mixing of the oxygenated and de-oxygenated blood streams. (ii) Two functions: • Lymph carries digested and absorbed fat from intestine • Drains excess fluid from extra cellular space back into the blood.	½ 1 1	3
32	(i) Plaster of Paris ; Calcium Sulphate hemihydrate (ii) $CaSO_4 \cdot 2\,H_2O \xrightarrow{373\,K} CaSO_4 \cdot \frac{1}{2}H_2O + 1\frac{1}{2}\,H_2O$ (iii)Two uses : • Used for making toys • Materials for decoration • Making surfaces smooth • Supporting fractured bones **(Any two)** **(Any other alternate answer)**	½ + ½ 1 ½ + ½	3
33	(i) A reaction in which a single substance on absorption of energy. decomposes to give two or more substances. $2\,Pb(NO_3)_2 \xrightarrow{Heat} 2\,PbO + 4\,NO_2 + O_2$ (ii) Cathode : Anode (Mass ratio) 1 : 8	1 1 1	3
	SECTION-D		
34	(A)(i)(a) same current and same potential difference. (b) same current and same potential difference (c) same current but different potential difference (d) different current but same potential difference. (ii) (a)Minimum resistance – When resistors are in parallel $\frac{1}{R} = \frac{1}{24} + \frac{1}{24}$	½ x4 ½	

	$\therefore\ R_P\ =\ 12\,\Omega$	½	
	Power consumed $P_1\ =\ \frac{V^2}{R_P}$ $=\ \frac{6\,V\ \times\ 6\,V}{12\ \Omega}$ $=\ 3\,W$	½ ½	
	(b) $\therefore\ R_s\ =\ 24\,\Omega\ +\ 24\,\Omega\ =\ 48\,\Omega$ Power consumed $P_2\ =\ \frac{V^2}{R_s}$ $=\ \frac{6\,V\ \times\ 6\,V}{48\ \Omega}$ $=\ \frac{3}{4}W$ $from\ P_1\ and\ P_2$ $\therefore\ \frac{P_1}{P_2}\ =\ \frac{3}{\frac{3}{4}}=\ \frac{4}{1}$ $\Rightarrow\ P_p\ :\ P_s\ =\ 4\ :\ 1$	½ ½	
	OR		
	(B)  **12 V (Six cells of 2 V each)** (i)Current = $\frac{V}{R}\ =\ \frac{12}{(6+12+18)\,\Omega}\ =\ \frac{1}{3}\,A$ (ii)Potential difference across 18 Ω resistor = I × R = $\frac{1}{3}A\ \times 18\,\Omega\ =$ $6\,V$ (iii) Power consumed in 18 Ω resistor = V × I = $6\,V\ \times\ \frac{1}{3}A\ =\ 2\,W$	2 1 1 1	5
35	(A)		

	(i) A series of carbon compounds in which the same functional group substitutes for hydrogen in a carbon chain / Series of compounds having same functional group and similar chemical properties.	1	
	(ii) Because melting point and boiling point increase with molecular mass.	1	
	(iii) Because chemical properties of organic compounds are solely determined by their functional group which remains same in a homologous series.	1	
	(iv) (i) Aldehyde: Propanal	½	
	 / CH_3CH_2CHO	½	
	(ii) Ketone: Propanone	½	
	$H_3C-\underset{\underset{O}{\|\|}}{C}-CH_3$ / CH_3COCH_3	½	
	OR		
	(B) (i) Ethanol Structure:	½	
	 / C_2H_5OH / CH_3CH_2OH	1	
	(ii) Ethene is formed	½	
	$C_2H_5OH \xrightarrow{\text{Conc.}H_2SO_4\ 443K\ (Heat)} H_2C = CH_2 + H_2O$ *Ethanol* Ethene Water	1	
	[Note: Deduct ½ marks if the conditions required are not mentioned in the equation]		
	• Concentrated Sulphuric acid acts as a dehydrating agent.	½	

	(iii) Ethene  	½ 1	5
36	(A) (i) • Chemical Method/Oral pills Side effects: Change the hormonal balance of the body. • Barrier method / Loop / Copper–T Side effects: Irritation in uterus. • Surgical method / Fallopian tube in female is blocked; Side effects – may cause infections. (ii) (a) Fertilized egg/zygote gets implanted in the lining of uterus and starts dividing. (b) If the egg is not fertilized, the thick and spongy lining of the uterus breaks and comes out through the vagina as blood and mucous. **OR** **(B)** (i)  (a) Reproductive part – Sporangia (b) Non-reproductive part – Hypha/Hyphae.	½ ½ ½ ½ ½ ½ 1 1 1 ½ ½	

	• Dry slice of bread does not provide moisture and nutrients necessary for the germination and multiplication of Rhizopus. (ii) • Budding: • Hydra uses regenerative cells for reproduction. A bud develops as an outgrowth due to repeated cell division at one specific site and develop into tiny individuals. On maturation, these buds detach from the parent and become new individuals. ***Alternate answer:*** • Regeneration: • It is carried out by specialised cells. If hydra is cut or broken into many pieces, many of these pieces grow into separate individuals. **[Note: Award marks for either of the processes and its explanation]**	1 1 1	5
	SECTION E		
37	(i) • In F_1 generation, all plants were tall / No short plants were observed • No medium height plants / No halfway characteristics were observed / Only dominant parental traits were seen and not the mixture of the two. (ii) **Dominant trait** / **Recessive trait** Single copy of dominant trait is enough to get it expressed/always expressed / Only expressed when present in pair. **(Any other point)** (iii) (A) • Self-pollination / Self-fertilisation/Selfing of F_1 plants • Ratio – Round Yellow : Wrinkled Green 9 : 1 • Traits are inherited independently. **OR** (iii) (B) If pea plants with yellow seeds are crossed with plants of green seeds, it is found that in F_1 generation all the plants have yellow seeds. When F_1	½ ½ 1 ½ ½ 1	

	plants are self-pollinated, it is found that in F_2 generation, plants with yellow seeds and plants with green seeds are obtained. This shows that both the traits are inherited but only one trait is visible in F_1 progeny while the other remains unexpressed. **[Note: Award marks if explained by taking one characteristic / Or explained the same diagrammatically]**	2	4
38	(i) • Mirror A. • as the object is placed beyond the centre of curvature of the mirror. (ii) Same size/ Real / Inverted (Any two) (iii) (A) Nature-Virtual and erect Size-magnified  **(Deduct ½ mark if direction of rays are not marked)** **OR** (iii) (B) Here $f = -12$ cm, $u = -18$ cm, $v = ?$ Mirror formula $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$ or $\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$ $\frac{1}{v} = \frac{1}{-12} - \frac{1}{-18}$ v = - 36cm In front of the mirror at a distance of 36 cm from the pole of the mirror.	½ ½ ½ + ½ ½ ½ 1 ½ ½ 1	4
39	(i) Cathode – Pure copper Anode – Impure copper	½ ½	

	(ii) Acidified Copper Sulphate; $CuSO_4$	½ + ½	
	(iii) (A) • Pure copper from the anode dissolves into electrolyte and an equivalent amount of pure metal from the electrolyte is deposited on cathode / At anode : $Cu \longrightarrow Cu^{++} + 2e^-$ At cathode : $Cu^{++} + 2e^- \longrightarrow Cu$ (Pure)	1	
	• The soluble impurities go into the solution whereas insoluble impurities settle down at the bottom of the anode. **[Note: Award marks if explained with a suitable labelled diagram]**	1	
	OR		
	(iii) (B) In Beaker A : • The blue colour of the solution fades (or becomes colourless)	½	
	• Reason – Zn is more reactive than copper	½	
	In Beaker B: • No change in colour.	½	
	• Reason – Silver is less reactive than Copper	½	4

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