Series D4CBA/4

Set-3

प्रश्न-पत्र कोड
Q.P. Code **31/4/3**

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 **27** हैं ।	(I)	Please check that this question paper contains **27** 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 **ङ** ।*

(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 ङ** – प्रश्न संख्या **37** से **39** तक 3 स्रोत-आधारित/प्रकरण-आधारित इकाइयों के मूल्यांकन के **4** 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** तक के प्रत्येक प्रश्न में दिए गए चार विकल्पों में से सबसे उचित विकल्प चुनिए और लिखिए । ग़लत उत्तर के लिए कोई ऋणात्मक अंकन नहीं है ।* *20×1=20*

1. 20 Ω प्रतिरोध की कोई विद्युत इस्तरी 5 A धारा लेती है । इस इस्तरी में 30 सेकण्ड में उत्पन्न ऊष्मा है :

(A) 15000 J (B) 6000 J

(C) 1500 J (D) 3000 J

2. पाचन के समय हमारे आमाशय में उत्पन्न अम्ल तथा अपच के समय उत्पन्न अम्ल के आधिक्य के उदासीनीकरण के लिए उपयोग होने वाले क्षारक के नाम क्रमश: हैं :

(A) HCl, $Mg(OH)_2$

(B) HCl, $Ca(OH)_2$

(C) ऐमीनो अम्ल, $Ca(OH)_2$

(D) लैक्टिक अम्ल, $Mg(OH)_2$

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** – Questions No. **1** to **20** are Multiple Choice Questions. Each question carries **1** mark.*

(iv) ***Section B** – Questions No. **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** – Questions No. **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** – Questions No. **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** – Questions No. **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 no. **1** to **20**. There is no negative marking for incorrect response.* *20×1=20*

1. An electric iron of resistance 20 Ω draws a current of 5 A. The heat developed in the iron in 30 seconds is :

(A) 15000 J (B) 6000 J

(C) 1500 J (D) 3000 J

2. The acid produced in our stomach during digestion and the base used to neutralise the excess acid during indigestion respectively are :

(A) HCl, $Mg(OH)_2$

(B) HCl, $Ca(OH)_2$

(C) Amino acids, $Ca(OH)_2$

(D) Lactic acid, $Mg(OH)_2$

3. नर युग्मक और मादा युग्मक के संलयन द्वारा युग्मनज बनता है । किसी मानव के युग्मनज में गुणसूत्रों की संख्या होती है :

(A) 23 (B) 44

(C) 46 (D) 92

4. बीज के अंकुरण के समय खाद्य के स्रोत वाला बीज का भाग है :

(A) बीजपत्र (B) मूलांकुर

(C) प्रांकुर (D) भ्रूण

5. $Zn + 2CH_3COOH \longrightarrow (CH_3COO)_2\ Zn + H_2$

उपर्युक्त अभिक्रिया है :

(A) वियोजन (अपघटन) अभिक्रिया (B) विस्थापन अभिक्रिया

(C) द्विविस्थापन अभिक्रिया (D) संयोजन अभिक्रिया

6. चार अलग-अलग बीकरों में भरे चार विलयनों – ग्लूकोस, ऐल्कोहॉल, हाइड्रोक्लोरिक अम्ल और सल्फ्यूरिक अम्ल, को एक-एक करके किसी विद्युत परिपथ से संयोजित किया गया है जिसमें एक बल्ब भी जुड़ा है । विद्युत धारा प्रवाहित करने पर जिनमें बल्ब जलेगा वह विलयन हैं :

(A) ग्लूकोस और ऐल्कोहॉल

(B) ऐल्कोहॉल और हाइड्रोक्लोरिक अम्ल

(C) ग्लूकोस और सल्फ्यूरिक अम्ल

(D) हाइड्रोक्लोरिक अम्ल और सल्फ्यूरिक अम्ल

7. स्वतंत्र अवस्था और संयुक्त अवस्था दोनों में पाई जाने वाली धातुएँ हैं :

(A) गोल्ड और प्लेटिनम (B) प्लेटिनम और सिल्वर

(C) कॉपर और सिल्वर (D) गोल्ड और सिल्वर

8. परागण के लिए कीटों को आकर्षित करने वाले पुष्प का/के भाग है/हैं :

(A) वर्तिकाग्र और वर्तिका

(B) बाह्यदल और पंखुड़ी (दल)

(C) केवल पंखुड़ी (दल)

(D) केवल बाह्यदल

3. A zygote is formed by the fusion of a male gamete and a female gamete. The number of chromosomes in the zygote of a human is :

(A) 23 (B) 44

(C) 46 (D) 92

4. The part of seed which is a source of food during germination of seed is :

(A) Cotyledon (B) Radicle

(C) Plumule (D) Embryo

5. $Zn + 2CH_3COOH \longrightarrow (CH_3COO)_2 Zn + H_2$

The above reaction is a :

(A) Decomposition reaction (B) Displacement reaction

(C) Double displacement reaction (D) Combination reaction

6. Four solutions, namely glucose, alcohol, hydrochloric acid and sulphuric acid filled in four separate beakers are connected one by one in an electric circuit with a bulb. The solutions in which the bulb will glow when current is passed are :

(A) Glucose and alcohol

(B) Alcohol and hydrochloric acid

(C) Glucose and sulphuric acid

(D) Hydrochloric acid and sulphuric acid

7. The metals which are found in both free state as well as combined state are :

(A) Gold and platinum (B) Platinum and silver

(C) Copper and silver (D) Gold and silver

8. The part of the flower which attracts insects for pollination is/are :

(A) Stigma and style

(B) Sepals and petals

(C) Petals only

(D) Sepals only

9. मानवों में, जब पाचन की प्रक्रिया पूर्ण हो जाती है तब (i) प्रोटीन, (ii) कार्बोहाइड्रेट, और (iii) वसा अंतिमत: परिवर्तित हो जाते हैं क्रमश: :

(A) (i) ऐमीनो अम्ल, (ii) ग्लूकोस और (iii) वसीय अम्ल में

(B) (i) ऐमीनो अम्ल, (ii) ग्लूकोस, (iii) वसीय अम्ल और ग्लिसरॉल में

(C) (i) ग्लूकोस, (ii) वसीय अम्ल और ग्लिसरॉल, (iii) ऐमीनो अम्ल में

(D) (i) शर्करा, (ii) ऐमीनो अम्ल, (iii) वसीय अम्ल और ग्लिसरॉल में

10. बेन्ज़ीन (C_6H_6) के अणु में उपस्थित एकल आबन्ध और द्विआबन्ध की संख्या क्रमश: है :

(A) 6 और 6 (B) 9 और 3

(C) 3 और 9 (D) 3 और 3

11. पत्तियों के मुरझाने का कारण है वृद्धि संदमक करने वाला पादप हॉर्मोन जिसे कहते हैं :

(A) ऑक्सिन (B) साइटोकाइनिन

(C) ऐब्सिसिक अम्ल (D) जिबरेलिन

12. नीचे कुछ अपशिष्ट दिए गए हैं :

(i) बगीचे का अपशिष्ट

(ii) बॉल प्वॉइन्ट पेन के रिफिल

(iii) दवाइयों की खाली काँच की बोतल

(iv) फलों और सब्ज़ियों के छिलके

(v) पुरानी सूती कमीज़

इनमें से अजैव-निम्नीकरणीय अपशिष्ट हैं :

(A) (i) और (ii)

(B) (ii) और (iii)

(C) (i), (iv) और (v)

(D) (i), (iii) और (iv)

9. In human beings, when the process of digestion is completed, the (i) proteins, (ii) carbohydrates, and (iii) fats are respectively finally converted into :

(A) (i) Amino acids, (ii) glucose and (iii) fatty acids

(B) (i) Amino acids, (ii) glucose, (iii) fatty acids and glycerol

(C) (i) Glucose, (ii) fatty acids and glycerol, (iii) amino acids

(D) (i) Sugars, (ii) amino acids, (iii) fatty acids and glycerol

10. The number of single and double bonds present in a molecule of benzene (C_6H_6) respectively, are :

(A) 6 and 6 (B) 9 and 3

(C) 3 and 9 (D) 3 and 3

11. A plant growth inhibitor hormone which causes wilting of leaves is called :

(A) Auxin (B) Cytokinin

(C) Abscisic acid (D) Gibberellin

12. Some wastes are given below :

(i) Garden waste

(ii) Ball point pen refills

(iii) Empty medicine bottles made of glass

(iv) Peels of fruits and vegetables

(v) Old cotton shirt

The non-biodegradable wastes among these are :

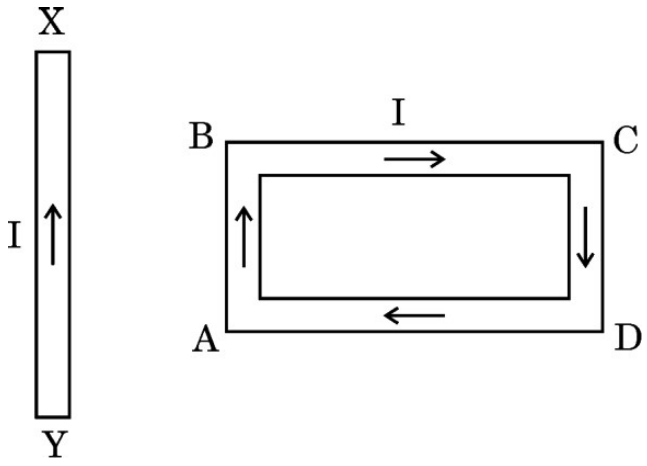
(A) (i) and (ii)

(B) (ii) and (iii)

(C) (i), (iv) and (v)

(D) (i), (iii) and (iv)

13. कोई आयताकार पाश ABCD जिससे धारा I प्रवाहित हो रही है किसी सीधे चालक XY के निकट इस प्रकार स्थित है कि चालक पाश की भुजा AB के समान्तर है तथा पाश के ही तल में है । यदि आरेख में दर्शाए अनुसार चालक में स्थायी धारा I स्थापित कर दी जाए, तो चालक XY :



(A) स्थिर रहेगा ।

(B) पाश की भुजा AB की ओर गति करेगा ।

(C) पाश की भुजा AB से दूर की ओर गति करेगा ।

(D) अपने अक्ष के परित: घूर्णन करेगा ।

14. काँच और जल के निरपेक्ष अपवर्तनांक क्रमश: $\frac{3}{2}$ और $\frac{4}{3}$ हैं । यदि काँच में प्रकाश की चाल 2×10^8 m/s है, तो जल में प्रकाश की चाल है :

(A) $\frac{9}{4} \times 10^8$ m/s

(B) $\frac{5}{2} \times 10^8$ m/s

(C) $\frac{7}{3} \times 10^8$ m/s

(D) $\frac{16}{9} \times 10^8$ m/s

15. जब श्वेत प्रकाश का कोई किरण-पुंज किसी ऐसे क्षेत्र से गुज़रता है जहाँ धूल के अत्यन्त सूक्ष्म कण विद्यमान हैं, तो उस क्षेत्र में मुख्य रूप से प्रकीर्णित होने वाला प्रकाश का वर्ण (रंग) है :

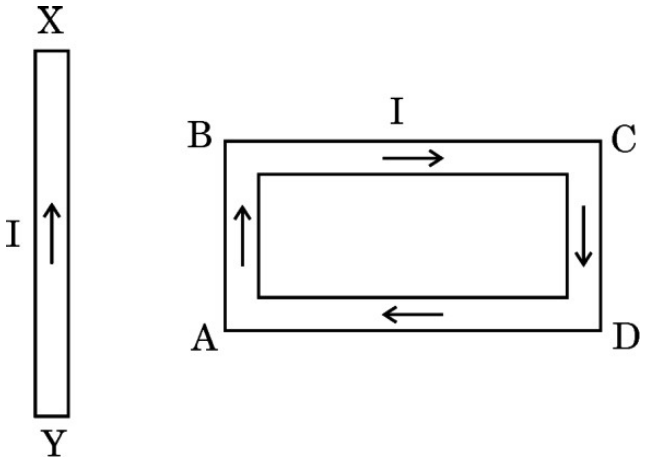
(A) लाल

(B) संतरी

(C) नीला

(D) पीला

13. A rectangular loop ABCD carrying a current I is situated near a straight conductor XY, such that the conductor is parallel to the side AB of the loop and is in the plane of the loop. If a steady current I is established in the conductor as shown, the conductor XY will



(A) remain stationary.

(B) move towards the side AB of the loop.

(C) move away from the side AB of the loop.

(D) rotate about its axis.

14. Absolute refractive index of glass and water is $\frac{3}{2}$ and $\frac{4}{3}$ respectively. If the speed of light in glass is 2×10^8 m/s, the speed of light in water is :

(A) $\frac{9}{4} \times 10^8$ m/s

(B) $\frac{5}{2} \times 10^8$ m/s

(C) $\frac{7}{3} \times 10^8$ m/s

(D) $\frac{16}{9} \times 10^8$ m/s

15. When a beam of white light passes through a region having very fine dust particles, the colour of light mainly scattered in that region is :

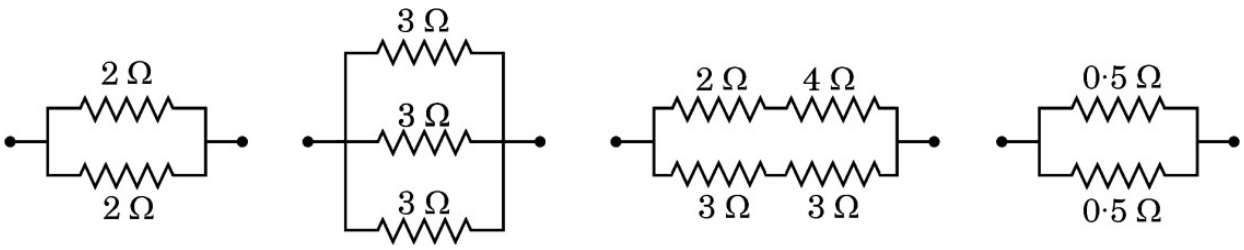
(A) Red

(B) Orange

(C) Blue

(D) Yellow

16. निम्नलिखित प्रतिरोधकों के संयोजनों पर विचार कीजिए :



I II III IV

इनमें तुल्यांक प्रतिरोध 1 Ω वाला/वाले संयोजन है/हैं :

(A) I और IV (B) केवल IV

(C) I और II (D) I, II और III

प्रश्न संख्या 17 से 20 के लिए, दो कथन दिए गए हैं — जिनमें एक को अभिकथन (A) तथा दूसरे को कारण (R) द्वारा अंकित किया गया है । इन प्रश्नों के सही उत्तर नीचे दिए गए कोडों (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, परन्तु कारण (R), अभिकथन (A) की सही व्याख्या ***नहीं*** करता है ।

(C) अभिकथन (A) सही है, परन्तु कारण (R) ग़लत है ।

(D) अभिकथन (A) ग़लत है, परन्तु कारण (R) सही है ।

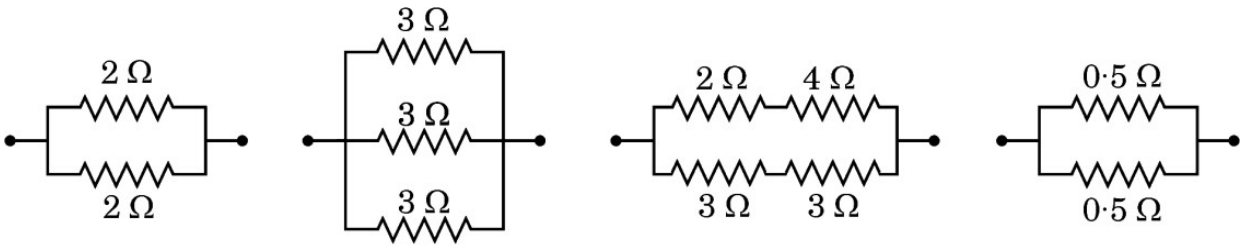
17. *अभिकथन (A) :* जीवन के सभी वायवीय रूपों के लिए ऑक्सीजन आवश्यक है ।

कारण (R) : ऑक्सीजन के स्वतंत्र परमाणु आणविक ऑक्सीजन से संयुक्त होकर ओज़ोन बनाते हैं ।

18. *अभिकथन (A) :* चुम्बकीय क्षेत्र रेखाएँ कभी भी एक-दूसरे का प्रतिच्छेदन नहीं करती हैं ।

कारण (R) : यदि वह प्रतिच्छेदन करें, तो प्रतिच्छेदन बिन्दु पर दिक्सूची की सुई दो दिशाओं की ओर संकेत करेगी जो संभव नहीं है ।

16. Consider the following combinations of resistors :



I II III IV

The combinations having equivalent resistance 1 Ω is/are :

(A) I and IV (B) Only IV

(C) I and II (D) I, II and III

For Questions number 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 Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of 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) :* Oxygen is essential for all aerobic forms of life.

Reason (R) : Free oxygen atoms combine with molecular oxygen to form ozone.

18. *Assertion (A) :* Magnetic field lines never intersect each other.

Reason (R) : If they intersect, then at the point of intersection, the compass needle would point towards two directions, which is not possible.

19. *अभिकथन (A) :* धातु के सल्फाइड अयस्कों से अयस्क को बिना भर्जन किए धातु निष्कर्षित नहीं किया जा सकता है ।

कारण (R) : भर्जन से सल्फाइड अयस्क सीधे ही धातु में परिवर्तित हो जाते हैं ।

20. *अभिकथन (A) :* मानव हृदय में अलिन्द की अपेक्षा निलय की पेशीय भित्ति मोटी होती है ।

कारण (R) : निलय को शरीर के विभिन्न अंगों में रुधिर को पंप करना होता है ।

खण्ड ख

*प्रश्न संख्या **21** से **26** अति लघु-उत्तरीय प्रश्न हैं ।*

21. (a) हमें पौधों की मृदा को नियमित रूप से पानी देने की आवश्यकता होती है । परन्तु यह पानी अंतिमत: पौधे की पत्तियों तक पहुँच जाता है । व्याख्या कीजिए कि ऐसा किस प्रकार होता है । *2*

अथवा

(b) अमीबा द्वारा दर्शाए जाने वाले पोषण के प्रकार का नाम लिखिए । व्याख्या कीजिए कि यह जीव अपना भोजन किस प्रकार ग्रहण करता है और उसे पचाता है । *2*

22. जब किसी साबुन को पानी में घोला जाता है, तो साबुन के अणु कुछ संरचनाएँ बनाते हैं । इन संरचनाओं को क्या कहते हैं ? इन संरचनाओं का नामांकित आरेख खींचिए । *2*

23. (a) किसी स्वच्छ व शुष्क परखनली में 1 ग्राम ठोस सोडियम क्लोराइड लेकर उसमें सांद्र सल्फ्यूरिक अम्ल मिलाया गया ।

(i) अभिक्रिया में उत्सर्जित होने वाली गैस का नाम लिखिए ।

(ii) क्या प्रेक्षण किया जाएगा जब इस गैस का परीक्षण (I) शुष्क, तथा (II) आर्द्र (गीले) नीले लिटमस पेपर से किया जाएगा ? इस गैस की प्रकृति (अम्लीय/क्षारकीय) के बारे में अपना निष्कर्ष लिखिए । *2*

अथवा

(b) कुछ धातुएँ अम्लों से अभिक्रिया करके लवण और हाइड्रोजन गैस बनाती हैं । कोई उदाहरण देकर इसे स्पष्ट कीजिए । इस गैस की उपस्थिति का परीक्षण आप किस प्रकार करेंगे ? *2*

19. *Assertion (A) :* The extraction of metals from their sulphide ores cannot take place without roasting of the ore.

Reason (R) : Roasting converts sulphide ores directly into metals.

20. *Assertion (A) :* In the human heart ventricles have thicker muscular walls than atria.

Reason (R) : Ventricles have to pump the blood into various organs.

SECTION B

Questions no. ***21*** *to* ***26*** *are very short answer type questions.*

21. (a) We need to water the soil in plants on a regular basis. But it ultimately reaches the leaves of the plant. Explain how this takes place. *2*

OR

(b) Name the type of nutrition exhibited by Amoeba. Explain how food is taken in and digested by this organism. *2*

22. When a soap is dissolved in water, the soap molecules form structures. What are these structures called ? Draw a labelled diagram of these structures. *2*

23. (a) 1 gram of solid sodium chloride was taken in a clean and dry test tube and concentrated sulphuric acid was added to it.

(i) Name the gas evolved in the reaction.

(ii) What will be observed when this gas is tested with (I) dry, and (II) wet blue litmus paper ? Write your conclusion about the nature (acidic/basic) of this gas. *2*

OR

(b) Some metals react with acids to produce salt and hydrogen gas. Illustrate it with an example. How will you test the presence of this gas ? *2*

24. व्याख्या कीजिए कि संतति में नर जनक और मादा जनक का समान आनुवंशिक योगदान किस प्रकार सुनिश्चित किया जाता है । *2*

25. यदि पृथ्वी पर कोई वायुमण्डल नहीं होता, तो आकाश किस रंग का होता ? अपने उत्तर की कारण सहित पुष्टि कीजिए । *2*

26. 1000 m लम्बे और 2 mm^2 अनुप्रस्थ-काट क्षेत्रफल के कॉपर के किसी तार का प्रतिरोध परिकलित कीजिए । कॉपर की प्रतिरोधकता $1{\cdot}6 \times 10^{-8}\ \Omega\ m$ है । *2*

खण्ड ग

*प्रश्न संख्या **27** से **33** लघु उत्तरीय प्रश्न हैं ।*

27. मानव नेत्र की समंजन क्षमता की परिभाषा दीजिए । जब हम किसी बिम्ब की नेत्र से दूरी में वृद्धि करते हैं, तो नेत्र में प्रतिबिम्ब दूरी का क्या होता है ? इस प्रकरण में मानव नेत्र के उस भाग का नाम और भूमिका की व्याख्या कीजिए जो इसके लिए उत्तरदायी है । *3*

28. प्रत्येक प्रकरण में अभिक्रिया के लिए शर्तों का उल्लेख करते हुए निम्नलिखित अभिक्रियाओं के लिए रासायनिक समीकरण लिखिए : *3*

(a) एथेनॉल की एथेनॉइक अम्ल से अभिक्रिया

(b) एस्टर की किसी क्षारक (NaOH) से अभिक्रिया

(c) एथेनॉल से एथीन का बनना

29. कोई छात्र ड्राइंग बोर्ड पर सफ़ेद कागज़ की शीट लगाता है । वह इस कागज़ के केन्द्र पर एक छड़ चुम्बक रखता है । वह इस छड़ चुम्बक के चारों ओर एकसमान रूप से कुछ लोह-चूर्ण छिड़कता है । इसके पश्चात वह ड्राइंग बोर्ड को धीरे से थपथपाता है और देखता है कि, लोह-चूर्ण स्वयं एक विशेष पैटर्न में व्यवस्थित हो जाता है ।

(a) लोह-चूर्ण एक विशेष पैटर्न में क्यों व्यवस्थित हो जाता है ?

(b) चुम्बक के सिरों पर लोह-चूर्ण की भीड़ (अधिक निकटता) क्या इंगित करती है ?

(c) वह रेखाएँ, जिनके अनुदिश लोह-चूर्ण संरेखित होता है, क्या निरूपित करती हैं ?

(d) यदि यह छात्र किसी धारावाही परिनालिका के भीतर किसी कार्डबोर्ड को क्षैतिजत: रखकर उपर्युक्त क्रियाकलाप को दोहराए, तो लोह-चूर्ण किस पैटर्न में व्यवस्थित होगा ? इन प्रेक्षित रेखाओं के पैटर्न के आधार पर चुम्बकीय क्षेत्र के बारे में निकाले गए निष्कर्ष का उल्लेख कीजिए । *3*

24. Explain how equal genetic contribution of male and female parents is ensured in the progeny. *2*

25. What would have been the colour of the sky, if the Earth had no atmosphere ? Give reason to justify your answer. *2*

26. Calculate the resistance of a copper wire of length 1000 m and area of cross-section 2 mm^2. Resistivity of copper is $1{\cdot}6 \times 10^{-8}\ \Omega$ m. *2*

SECTION C

Questions no. ***27*** *to* ***33*** *are short answer type questions.*

27. Define the term power of accommodation of human eye. What happens to the image distance in the eye when we increase the distance of an object from the eye ? Name and explain the role of the part of human eye responsible for it in this case. *3*

28. Write chemical equations for the following reactions, giving the conditions for the reaction in each case : *3*

(a) Reaction of ethanol with ethanoic acid

(b) Reaction of an ester with a base (NaOH)

(c) Formation of ethene from ethanol

29. A student fixes a sheet of white paper on a drawing board. He places a bar magnet in the centre of it. He sprinkles some iron filings uniformly around the bar magnet. Then he taps the drawing board gently and observes that the iron filings arrange themselves in a particular pattern.

(a) Why do iron filings arrange in a particular pattern ?

(b) What does the crowding of iron filings at the ends of the magnet indicate ?

(c) What do the lines, along which the iron filings align, represent ?

(d) If the student places a cardboard horizontally in a current carrying solenoid and repeats the above activity, in what pattern would the iron filings arrange ? State the conclusion drawn about the magnetic field based on the observed pattern of the lines. *3*

30. (a) ऊँचाई के अतिरिक्त विपर्यासी लक्षणों के किन्हीं दो जोड़ों के नाम लिखिए जिनका उपयोग मेंडल ने अपने प्रयोगों में किया था ।

(b) लम्बे और बौने मटर के पौधों के बीच संकरण कराने पर, मेंडल को F_1 संतति के मटर के पौधे प्राप्त हुए जो सभी लम्बे थे ।

(i) क्या ये पौधे अपने पैतृक लम्बे पौधों से पूर्ण रूप से समान थे ? इनके जीन संयोजन लिखिए ।

(ii) F_1 संतति के पौधों का स्व-परागण कराने पर प्राप्त F_2 संतति के पौधों में बौने पौधों की प्रतिशतता दीजिए ।

(iii) F_2 संतति के पौधों में TT और Tt का अनुपात क्या होगा ? *3*

31. यौगिक $CaSO_4 . \frac{1}{2} H_2O$ का सामान्य नाम और रासायनिक नाम लिखिए । इसको बनाने की विधि लिखिए । उस अभिक्रिया का रासायनिक समीकरण दीजिए जिसमें $CaSO_4 . \frac{1}{2} H_2O$ जल से अभिक्रिया करता है । *3*

32. (a) नामांकित आरेख की सहायता से, मुकुलन द्वारा हाइड्रा में जनन की प्रक्रिया की व्याख्या कीजिए । इस प्रक्रिया में जनन में भाग लेने वाली कोशिकाओं के नाम लिखिए । *3*

अथवा

(b) मानव जनन तंत्र में निम्नलिखित में से प्रत्येक की दो-दो भूमिकाओं की सूची बनाइए : *3*

(i) शुक्राशय और प्रोस्टेट ग्रंथि

(ii) अण्डवाहिनी

(iii) वृषण

33. जैव-निम्नीकरणीय और अजैव-निम्नीकरणीय अपशिष्टों के बीच विभेदन कीजिए । हम अपने दैनिक जीवन में अत्यधिक मात्रा में अजैव-निम्नीकरणीय अपशिष्ट उत्पन्न करते हैं । यदि इनका उचित निपटारा न किया जाए, तो इन अपशिष्टों के कोई दो हानिकर प्रभाव लिखिए । *3*

30. (a) Name any two pairs of contrasting characters other than height used by Mendel in his experiments.

(b) On crossing a tall and a short pea plant, Mendel obtained F_1 generation in which all pea plants were tall.

(i) Are these plants exactly the same as tall plants of the parent generation ? Write their gene combination.

(ii) Give the percentage of short plants obtained in F_2 generation when F_1 plants are self-pollinated.

(iii) In what ratio would you find TT and Tt in F_2 generation ? *3*

31. Write the common name and the chemical name of the compound $CaSO_4 \cdot \frac{1}{2} H_2O$. Write the method of its preparation. Give chemical equation for the reaction, when water reacts with $CaSO_4 \cdot \frac{1}{2} H_2O$. *3*

32. (a) Explain with the help of a labelled diagram, the process of reproduction in Hydra by budding. Name the cells used for reproduction in this process. *3*

OR

(b) List two roles of each of the following in human reproductive system : *3*

(i) Seminal vesicles and prostate gland

(ii) Oviduct

(iii) Testis

33. Differentiate between biodegradable and non-biodegradable wastes. We generate a lot of non-biodegradable wastes in our daily life. Write any two harmful effects caused by these wastes if not disposed off properly. *3*

खण्ड घ

*प्रश्न संख्या **34** से **36** दीर्घ उत्तरीय प्रश्न हैं ।*

34. (a) (i) प्रतिवर्ती चाप की परिभाषा लिखिए । जन्तुओं में प्रतिवर्ती चाप क्यों विकसित हुआ है ? जब आप अचानक किसी गर्म वस्तु को स्पर्श करते हैं, तो होने वाली घटनाओं को क्रमवार रेखांकित कीजिए ।

(ii) तंत्रिका तंत्र के उस भाग का नाम लिखिए जो केन्द्रीय तंत्रिका तंत्र तथा शरीर के अन्य भागों के बीच संचार में सहायता करता है । इस तंत्र के दो अवयव कौन-से हैं ? *5*

अथवा

(b) (i) किसी उद्दीपन की अनुक्रिया में 'छुई-मुई' पौधे की पत्तियाँ मुड़ने लगती हैं और मुरझा जाती हैं । उद्दीपन का नाम लिखिए और इतनी तीव्र गति का कारण दीजिए । क्या इस गति में कोई वृद्धि सम्मिलित होती है ?

(ii) पौधों में गुरुत्वानुवर्तन की परिभाषा दीजिए । धनात्मक और ऋणात्मक गुरुत्वानुवर्तन से क्या तात्पर्य है ? प्रत्येक प्रकार का एक-एक उदाहरण दीजिए । *5*

35. (a) रासायनिक अभिक्रिया किसे कहते हैं ? यह दर्शाने के लिए कि रासायनिक अभिक्रिया हुई है जिसमें (i) रंग में परिवर्तन, तथा (ii) ताप में परिवर्तन हुआ है, प्रत्येक प्रकरण के लिए एक-एक क्रियाकलाप का वर्णन कीजिए । *5*

अथवा

SECTION D

Questions no. ***34*** *to* ***36*** *are long answer type questions.*

34. (a) (i) Define a reflex arc. Why have reflex arcs evolved in animals ? Trace the sequence of events which occur, when you suddenly touch a hot object.

(ii) Name the part of nervous system which helps in communication between the central nervous system and other parts of the body. What are the two components of this system ? *5*

OR

(b) (i) Leaves of 'chhui-mui' plant begin to fold up and droop in response to a stimulus. Name the stimulus and write the cause for such a rapid movement. Is there any growth involved in the movement ?

(ii) Define geotropism in plants. What is meant by positive and negative geotropism ? Give one example of each type. *5*

35. (a) What is a chemical reaction ? Describe one activity each to show that a chemical change has occurred in which (i) change of colour, and (ii) change in temperature has taken place. *5*

OR

(b) (i) वियोजन (अपघटन) अभिक्रिया की परिभाषा लिखिए । हम यह किस प्रकार कह सकते हैं कि (I) जल का विद्युत-अपघटन, तथा (II) सूर्य के प्रकाश में उद्‌भासित करने पर सिल्वर ब्रोमाइड का काला हो जाना वियोजन अभिक्रियाएँ हैं ? प्रत्येक प्रकरण में सम्मिलित ऊर्जा के प्रकार का उल्लेख कीजिए ।

(ii) "रासायनिक अभिक्रियाएँ जिनमें (I) कैल्शियम ऑक्साइड बनता है, और (II) जिसमें कैल्शियम हाइड्रॉक्साइड बनता है, एक-दूसरे की विपरीत अभिक्रियाएँ हैं ।" रासायनिक समीकरणों की सहायता से इस कथन की पुष्टि कीजिए । *5*

36. (a) (i) प्रकाश के परावर्तन के नियम लिखिए ।

(ii) 10 cm फोकस दूरी के किसी अवतल दर्पण के सामने 15 cm दूरी पर कोई 5·0 cm ऊँचा बिम्ब स्थित है । इस दर्पण से कितनी दूरी पर किसी परदे को रखा जाना चाहिए ताकि उस पर फोकसित प्रतिबिम्ब प्राप्त हो । प्रतिबिम्ब की ऊँचाई ज्ञात कीजिए । *5*

अथवा

(b) (i) प्रकाश के अपवर्तन के नियम लिखिए ।

(ii) किसी आयताकार काँच के गुटके (स्लैब) से किसी प्रकाश की किरण के अपवर्तन को दर्शाने के लिए किरण आरेख खींचिए । निर्गत किरण आपतित किरण से किस प्रकार संबंधित है ? आरेख में पार्श्विक विस्थापन को अंकित कीजिए । *5*

(b) (i) Define a decomposition reaction. How can we say that (I) electrolysis of water, and (II) blackening of silver bromide when exposed to sunlight, are decomposition reactions ? Mention the type of energy involved in each case.

(ii) "The type of reactions in which (I) calcium oxide is formed, and (II) calcium hydroxide is formed are opposite reactions to each other." Justify this statement with the help of chemical equations. *5*

36. (a) (i) State laws of reflection of light.

(ii) An object of height 5·0 cm is placed at 15 cm in front of a concave mirror of focal length 10 cm. At what distance from the mirror should a screen be placed, so that a focussed image is obtained on it ? Find the height of the image. *5*

OR

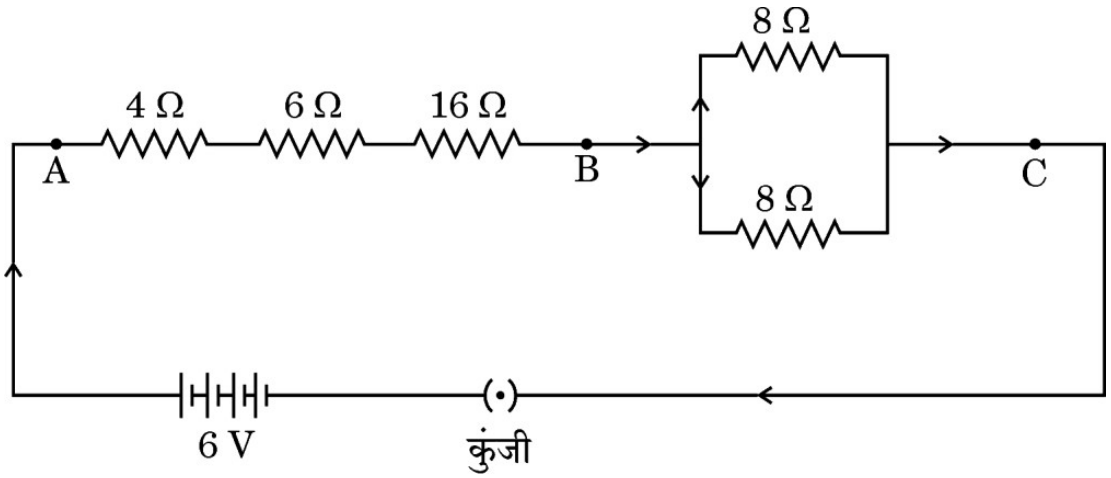
(b) (i) State laws of refraction of light.

(ii) Draw a ray diagram to show refraction of a ray of light through a rectangular glass slab. How is the emergent ray related to incident ray ? Mark lateral displacement in the diagram. *5*

खण्ड ङ

निम्नलिखित प्रश्न स्रोत-आधारित/केस-आधारित प्रश्न हैं । केस को सावधानीपूर्वक पढ़िए और दिए गए प्रश्नों के उत्तर दीजिए ।

37. निम्नलिखित परिपथ का अध्ययन कीजिए :



इस परिपथ के आधार पर, निम्नलिखित प्रश्नों के उत्तर दीजिए :

(a) बिन्दु A और B के बीच कुल प्रतिरोध का मान ज्ञात कीजिए । *1*

(b) बिन्दु B और C के बीच प्रतिरोध ज्ञात कीजिए । *1*

(c) (i) जब कुंजी बन्द है, तब बैटरी से ली जाने वाली धारा परिकलित कीजिए । *2*

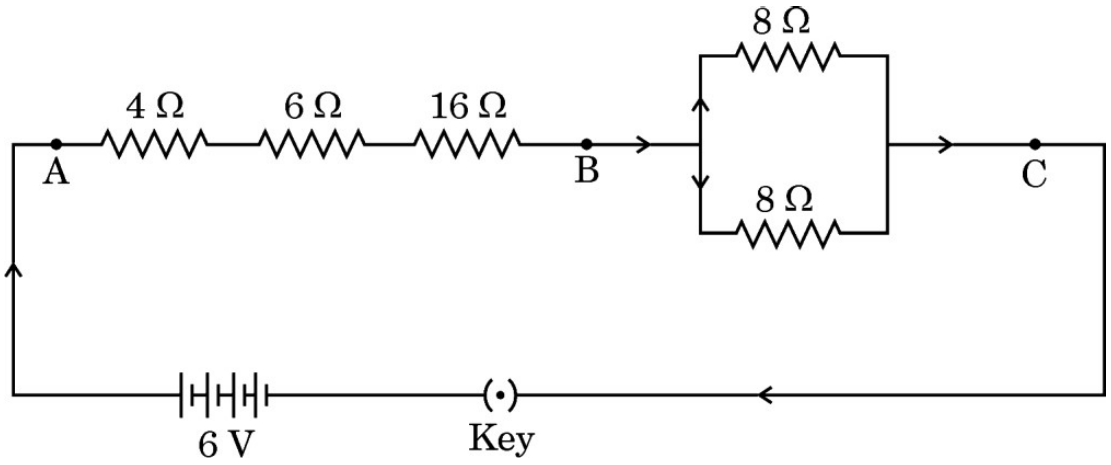
अथवा

(c) (ii) उपर्युक्त परिपथ में 16 Ω के प्रतिरोधक अथवा उस संयोजन जिसमें 8 Ω के दो प्रतिरोधक पार्श्व में संयोजित हैं, इन दोनों में से किसके सिरों पर विभवान्तर अधिक है ? अपने उत्तर की पुष्टि कीजिए । *2*

SECTION E

The following questions are source-based/case-based questions. Read the case carefully and answer the questions that follow.

37. Study the following circuit :



On the basis of this circuit, answer the following questions :

(a) Find the value of total resistance between the points A and B. *1*

(b) Find the resistance between the points B and C. *1*

(c) (i) Calculate the current drawn from the battery, when the key is closed. *2*

OR

(c) (ii) In the above circuit, the 16 Ω resistor or the parallel combination of two resistors of 8 Ω, which one of the two will have more potential difference across its two ends ? Justify your answer. *2*

38. तीन धातुओं मैग्नीशियम, ऐलुमिनियम और आयरन के नमूने लिए गए और इनके पृष्ठों को रेगमाल से रगड़ा गया । इसके पश्चात इन नमूनों को पृथक्-पृथक् परखनलियाँ, जिनमें तनु हाइड्रोक्लोरिक अम्ल था, में रखा गया था । प्रत्येक परखनली में थर्मामीटर भी इस प्रकार निलंबित किए गए कि उनके बल्ब अम्ल में डूबे हों । बुलबुले बनने की दरों का प्रेक्षण किया गया । उपर्युक्त क्रियाकलाप को तनु नाइट्रिक अम्ल के साथ दोहराया गया और प्रेक्षणों को रिकॉर्ड किया गया ।

निम्नलिखित प्रश्नों के उत्तर दीजिए :

(a) जब क्रियाकलाप को तनु हाइड्रोक्लोरिक अम्ल के साथ किया गया, तब किस परखनली में बुलबुले बनने की दर सबसे तीव्र थी तथा थर्मामीटर ने उच्चतम ताप दर्शाया था ? *1*

(b) किस धातु ने तनु हाइड्रोक्लोरिक अम्ल से अभिक्रिया नहीं की ? कारण दीजिए । *1*

(c) (i) जब कोई धातु तनु नाइट्रिक अम्ल से अभिक्रिया करती है, तो हाइड्रोजन गैस क्यों नहीं निकलती है ? इस अभिक्रिया में उत्पन्न अंतिम उत्पाद के नाम लिखिए । *2*

अथवा

(c) (ii) उस अभिक्रिया के प्रकार का नाम लिखिए जिसके आधार पर धातुओं की सक्रियता निश्चित की जाती है । आपके पास दो धातुएँ X और Y हैं । आप यह किस प्रकार सुनिश्चित करेंगे कि इनमें से कौन-सी अन्य से अधिक अभिक्रियाशील है ? *2*

38. Three metal samples of magnesium, aluminium and iron were taken and rubbed with sand paper. These samples were then put separately in test tubes containing dilute hydrochloric acid. Thermometers were also suspended in each test tube so that their bulbs dipped in the acid. The rate of formation of bubbles was observed. The above activity was repeated with dilute nitric acid and the observations were recorded.

Answer the following questions :

(a) When activity was done with dilute hydrochloric acid, then in which one of the test tubes was the rate of formation of bubbles the fastest and the thermometer showed the highest temperature ? *1*

(b) Which metal did not react with dilute hydrochloric acid ? Give reason. *1*

(c) (i) Why is hydrogen gas not evolved when a metal reacts with dilute nitric acid ? Name the ultimate products formed in the reaction. *2*

OR

(c) (ii) Name the type of reaction on the basis of which reactivity of metals is decided. You have two metals X and Y. How would you decide which is more reactive than the other ? *2*

39. वृक्क उत्तरजीविता के लिए महत्त्वपूर्ण जैव अंग हैं । संक्रमण, आघात अथवा वृक्क में सीमित रुधिर प्रवाह जैसे कई कारक हैं जो वृक्क की क्रियाशीलता को कम कर देते हैं । ये शरीर में विषैले अपशिष्टों को संचित कराते हैं जिनके कारण मृत्यु तक हो सकती है । वृक्क के अपक्रिय होने की अवस्था में, कृत्रिम वृक्क का उपयोग किया जा सकता है । कृत्रिम वृक्क अपशिष्ट उत्पादों को रुधिर से अपोहन (dialysis) द्वारा निकालने की एक युक्ति है ।

(a) (i) उस धमनी का नाम लिखिए जो ऑक्सीजनित रुधिर को वृक्क तक ले जाती है ।

(ii) बोमन संपुट में उपस्थित बहुत पतली भित्ति वाली रुधिर केशिकाओं के गुच्छ का नाम लिखिए । *1*

(b) मानव उत्सर्जन तंत्र के उस अंग का नाम लिखिए जहाँ मूत्र एकत्र (भंडारित) होता है । यह अंग तंत्रिका नियंत्रण में होता है अथवा हॉर्मोन नियंत्रण में ? *1*

(c) (i) मूत्र बनने में सम्मिलित दो प्रमुख चरणों की सूची बनाइए और इनके कार्यों का संक्षेप में उल्लेख कीजिए । *2*

अथवा

(c) (ii) वृक्काणु के किस भाग में चयनित पुनरवशोषण होता है ? उन कारकों की सूची बनाइए जिन पर जल की मात्रा का पुनरवशोषण निर्भर करता है । *2*

39. Kidneys are vital organs for survival. Several factors like infections, injury or restricted blood flow to kidneys reduce the activity of kidneys. This leads to accumulation of poisonous wastes in the body, which can even lead to death. In case of kidney failure, an artificial kidney can be used. An artificial kidney is a device to remove waste products from the blood through dialysis.

(a) (i) Name the artery that brings oxygenated blood to the kidney.

(ii) Name the cluster the thin-walled blood capillaries present in the Bowman's capsule. *1*

(b) In human excretory system name the organ which stores urine. Is this organ under hormonal control or nervous control ? *1*

(c) (i) List two major steps involved in the formation of urine and state in brief their functions. *2*

OR

(c) (ii) In which part of the nephron does selective reabsorption take place ? List the factors which the amount of water reabsorbed depends on. *2*

Marking Scheme
Strictly Confidential
Secondary School Examination, 2024
SUBJECT NAME SCIENCE (086) (Q.P. CODE 31/4/1)

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 deliberation and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
6	Evaluators will mark(√) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓)while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing.
7	If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
8	If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
9	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note "Extra Question".
10	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11	A full scale of marks 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

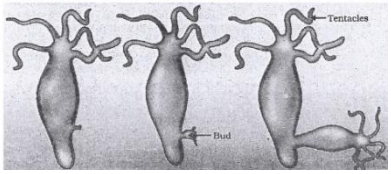
Secondary School Examination, 2024

SCIENCE (Subject Code–086)

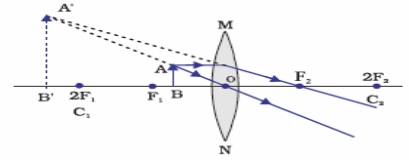
[Paper Code: 31/4/1]

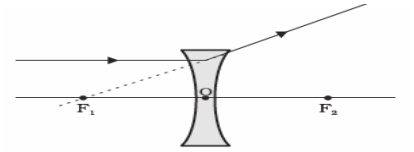
Maximum Marks: 80

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION A		
1	(B)/Displacement reaction	1	1
2	(D)/ HCl and NH_4OH	1	1
3	(D)/Hydrochloric acid and Sulphuric acid	1	1
4	(C)/Copper and Silver	1	1
5	(B)/9 and 3	1	1
6	(B)/ (i)Amino acid, (ii)glucose, (iii)fatty acid and glycerol	1	1
7	(C)/Abscisic acid	1	1
8	(A)/Sugarcane, roses, grapes	1	1
9	(A)/Cotyledon	1	1
10	(C)/46	1	1
11	(A)/9/4 x 10^8 m/s	1	1
12	(C)/Blue	1	1
13	(C)/I and II	1	1
14	(A)/15000 J	1	1
15	(B)/move towards the side AB of the loop	1	1
16	(B)/(ii) and (iii)	1	1
17	(B) /Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of Assertion (A).	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	(A)/ Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)	1	1
20	(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of Assertion (A)	1	1
	SECTION B		
21	(a) (i) • HCl gas was evolved (ii) (I) No change in colour (II) Wet blue litmus turns red • HCl gas is acidic in nature **OR** (b) • $Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2$ (g) **(Any other example)** • Hydrogen burns with a pop sound when a burning matchstick is brought near it.	½ ½ ½ ½ 1 1	2
22	saturated hydrocarbon: Burns with clean blue flame/ Complete combustion unsaturated hydrocarbon: Burns with yellow flame with lots of black smoke. or Sooty flame / Incomplete combustion • Carbon dioxide; Water	½ +½ ½; ½	2

23	(a) When water is lost through stomata in the leaves by transpiration, it creates a suction force/transpiration pull. Due to which water is pulled up through xylem of the roots to the leaves. **OR** (b) • Heterotrophic /Holozoic Nutrition • Amoeba takes in food using temporary finger-like projections/pseudopodia of the cell which fuse over the food particle forming a food vacuole. Inside the food vacuole complex substances are broken down into simpler substances. / (**award marks if explained diagrammatically**)	2 1 1	2
24	Example − A population of bacteria living in temperate waters that can withstand heat due to the rise in temperature due to global warming will survive better in a heat wave than the non-variant bacteria having no capacity to tolerate heat wave. Thus, suitable variations promote survival. (**Any other example)**	2	2
25	• For distant vision: lens of power – 4·0 dioptre • f $(meter) = \frac{1}{P} = \frac{1}{-4{\cdot}0D}$ = −0.25 m or -25 cm	1 1	2
26	• Wire A will offer more resistance Justification: • R $\propto \frac{l}{A}$ /thinner the wire, more resistance to the flow of current.	1 1	2
	SECTION C		
27	• Plaster of Paris; Calcium sulphate hemihydrate •Prepared from gypsum ($CaSO_4 \cdot 2H_2O$) by heating it at 373K $CaSO_4 \cdot \frac{1}{2} H_2O + 1\frac{1}{2} H_2O \longrightarrow CaSO_4 \cdot 2H_2O$	½ + ½ 1 1	3
28	• Oxygen is added to ethanol to produce ethanoic acid. • Alkaline potassium permanganate or Acidified potassium dichromate • $CH_3 - CH_2OH \xrightarrow[\text{Or acidified } K_2Cr_2O_7 + \text{Heat}]{\text{Alkaline } KMnO_4 + \text{Heat}} CH_3COOH$ • It is oxidation reaction while other is combustion reaction/ burning of ethanol is exothermic while other is endothermic.	½ ½ 1 1	3
29	(a) In hydra, a bud develops as an outgrowth due to repeated cell division at one specific site. These buds develop into tiny individuals and when fully mature, detach from the parent body and become new independent individuals.  • Regenerative cells. **OR** (b) (i)Seminal vesicles and prostate glands: • Secrete a fluid for nourishment of sperms. • Secrete a fluid which makes the transport of the sperms easier (ii) Oviduct: • Egg is carried from ovary to the womb or uterus. • Site of Fertilization	1 1 ½ ½ ½ + ½ ½ + ½	

	(iii) Testis: • Produces sperms • Secretion of hormone – testosterone	½ + ½	3
30	<table><tr><th>Dominant Traits</th><th>Recessive Traits</th></tr><tr><td>(i) When both dominant and recessive traits are inherited, the dominant trait gets expressed.</td><td>(i) When both dominant and recessive traits are inherited, the recessive trait does not get expressed.</td></tr><tr><td>(ii) A single copy of dominant trait is enough to get it expressed.</td><td>(ii) Both the copies of a trait should be recessive to get it expressed.</td></tr></table> • 75% yellow seeds	1 x 2 1	3
31	•Ability of the eye lens to adjust its focal length. • Image distance remains unchanged •Ciliary muscles – • While focusing on distant objects ciliary muscles relax, eye lens becomes thin and its focal length increases.	1 1 ½ ½	3
32	(a) Because a magnetic field exists around the bar magnet (b) Strength of the magnetic field is maximum near the poles of the magnet (c) The lines represent the magnetic field lines (d) Equidistant parallel lines, magnetic field inside the solenoid is uniform	½ 1 ½ ½+½	3
33	(i) •Terrestrial /Grassland / cropland •Aquatic /Pond (ii)First trophic level are always producers or autotrophs as they can capture the solar energy and convert it into chemical energy. • 1% energy is captured. (iii)Because energy flows in one direction only. Justification: when energy passes from one trophic level to other it cannot revert back.	½ ½ ½ ½ ½ ½	3
	SECTION D		
34	(a) A chemical reaction involves the breaking and making of bonds between atoms to produce new substances. / when reactant changes to products. (i) Add lead nitrate solution to potassium iodide solution taken in a test tube. The colour changes from colourless solution to yellow ppt. / $Pb(No_3)_2 + 2KI \longrightarrow PbI_2\downarrow + 2KNO_3$ (Yellow) (D***educt ½ marks if colour is not mentioned in the reaction)*** (**or any example**) (ii) Calcium oxide reacts vigorously with water to produce slaked lime (calcium hydroxide) releasing a large amount of heat. / $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq) + Heat$ (Quick lime) (Slaked lime) (**or any example**) **OR** (b) (i) •A reactant breaks down to give two or more products. /A reaction which requires energy to split a compound or reactant in two or more simple substances.	1 1+1 1+1 1	

	(I) Water splits into hydrogen gas and oxygen gas. • Electrical energy (II) Silver bromide decomposes into silver and bromine • Light energy (ii) (I) Formation of calcium oxide: $CaCO_3(s) \xrightarrow{Heat} CaO(s) + CO_2(g)$ • It is an endothermic reaction/decomposition reaction. (II) Formation of calcium hydroxide: $CaO + H_2O \longrightarrow Ca(OH)_2$ +Heat • It is exothermic/combination reaction	½ ½ ½ ½ ½ ½ ½ ½	5
35	(a) (i) • The pathway in which impulses travel during the reflex action is called a reflex arc. • Because the thinking part of the brain is not fast enough/for quick response to avoid injury. • Reflex arc :  (ii) Peripheral Nervous System Components : Cranial Nerves; Spinal Nerves **OR** (b) (i) •Touch • **T**he shape of the leaves changes by changing the amount of water in them. • No (ii) Growth of a part of plant in response to the pull of earth or gravity is called geotropism. • Positive geotropism − Movement of plant part towards the earth gravity. Example − Roots grow downwards • Negative geotropism − Movement of plant part away from the force of gravity. Example − Shoots grow upwards.	1 ½ 1+½ 1 ½; ½ ½ 1 ½ 1 ½+½ ½+½	5
36	(a) (i) S. No. 3, 2f is 50 cm. ∴ 2f = 50 cm, or f = 25 cm. Justification: Object distance(u) and image distance (v) are same so it implies that object is placed at 2F. (ii) S. No. 6, is not correct. Reason: For u = −15 cm, sign of v **must** be – ve (as the image is formed on the same side of the lens as the object)  	1 1 ½ ½ 1	

	(deduct ½ mark if the direction of the rays are not shown)		
	(iii) Magnification : $m = \frac{v}{u}$ $= \frac{+150\ cm}{-30\ cm} = -5\ cm$	1	
	OR		
	(b) (i) Principal axis : It is an imaginary line passing through the two centres of curvatures of a lens.	1	
	 	1	
	(ii) f = − 20 cm; h = 5 cm; v = −15 cm	½	
	$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$ *or* $\frac{1}{u} = \frac{1}{v} - \frac{1}{f} = \frac{1}{(-15)} - \frac{1}{(-20)}$ $= \frac{-1}{60\ cm}$	½ 1	
	or u = − 60 cm object is at a distance of 60 cm from the lens • Size of the image(magnification): m = $\frac{h'}{h} = \frac{v}{u}$ $h' = \frac{v}{u} \times h = \frac{(-15)}{(-60)} \times 5$ = 1·25 cm	1	5
	SECTION E		
37	(a) In the test tube containing magnesium. (b) All three metals react with HCl because they are more reactive than hydrogen**.** **(Award marks if student write any less reactive metal with reason)**	1 1	
	(c) (i)Because HNO_3 is a strong oxidizing agent and oxidizes the H_2 produced to water. • Ultimate products are water, oxides of nitrogen.	1 1	
	OR		
	(c) (ii) • Displacement Reaction • If metal X displaces metal Y from its salt solution it is more reactive than Y or vice versa.	1 1	4
38	(a) (i) Renal Artery (ii) Glomerulus	½ ½	
	(b) • Urinary bladder • Nervous control	½ ½	
	(c) (i) Filtration: Nitrogenous wastes such as urea or uric acid are removed	½+½	
	Reabsorption: Glucose, amino acids, salts/some useful materials and major amounts of water reabsorbed	½+½	
	OR		

	(c) (ii)Tubular part of nephron. • The amount of water absorbed depends on: -how much water is there in the body. -how much dissolved waste is there to be excreted.	1 ½ ½	 4
39	(a) $R_S = 4\ \Omega + 6\ \Omega + 16\ \Omega = 26\ \Omega$ (b) $\frac{1}{R_P} = \frac{1}{8\ \Omega} + \frac{1}{8\ \Omega} = \frac{1}{4}\ \Omega$ $R_p = 4\ \Omega$ (c) (i) Total resistance = 26 Ω + 4 Ω = 30 Ω Potential difference = V = 6V Current I = $\frac{V}{R}$ $\frac{6}{30} = \frac{1}{5}\ A$ or 0·2 A. **OR** (c)(ii) 16 Ω Justification: According to Ohm's law when same current flows, the potential difference across a higher resistance is always higher./ Potential difference across 16 Ω =V=IR = 0.2x16=3.2V Potential difference across 8 Ω =V=$IR_{(total)}$ = 0.2x4 =0.8V	1 1 1 ½ ½ 1 1	 4

Marking Scheme
Strictly Confidential
Secondary School Examination, 2024
SUBJECT NAME SCIENCE (086) (Q.P. CODE 31/4/2)

General Instructions: -

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

11	A full scale of marks 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

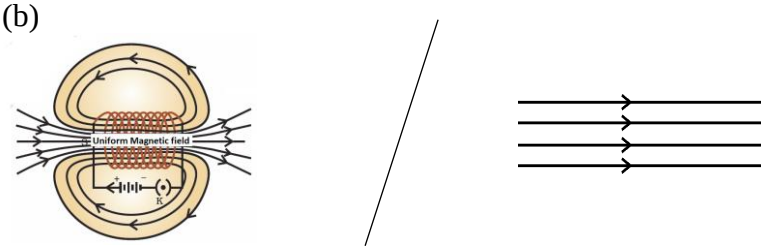
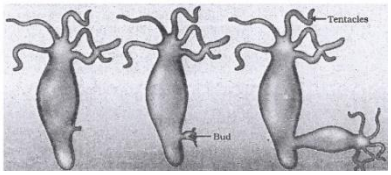
SCIENCE (Subject Code–086)

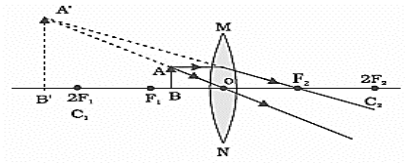
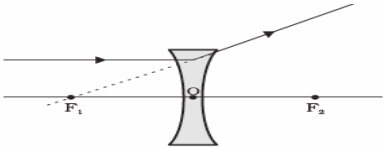
[Paper Code: 31/4/2]

Maximum Marks: 80

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION A		
1	(C)/ Double Displacement reaction	1	1
2	(C)/46	1	1
3	(A)/Cotyledon	1	1
4	(A)/Sugarcane, roses, grapes	1	1
5	(C)/Abscisic acid	1	1
6	(D)/ HCl and NH_4OH	1	1
7	(D)/Hydrochloric acid and Sulphuric acid	1	1
8	(C)/Copper and Silver	1	1
9	(B)/9 and 3	1	1
10	(B)/ (i)Amino acid, (ii)glucose, (iii)fatty acid and glycerol	1	1
11	(B)/(ii) and (iii)	1	1
12	(B)/move towards the side AB of the loop	1	1
13	(A)/9/4 x 10^{8} m/s	1	1
14	(C)/Blue	1	1
15	(C)/I and II	1	1
16	(A)/15000 J	1	1
17	(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of Assertion (A).	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	(A)/ Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)	1	1
	SECTION B		
21	(a) When water is lost through stomata in the leaves by transpiration, it creates a suction force/transpiration pull. Due to which water is pulled up through xylem of the roots to the leaves. **OR** (b) • Heterotrophic /Holozoic Nutrition • Amoeba takes in food using temporary finger-like projections/pseudopodia of the cell which fuse over the food particle forming a food vacuole. Inside the food vacuole complex substances are broken down into simpler substances. / (a**ward marks if explained diagrammatically**)	2 1 1	2
22	(a) $2\ CH_3COOH + Na_2CO_3 \longrightarrow 2\ CH_3COONa + H_2O + CO_2$ (b) Pass the gas/CO_2 in lime water. It turns lime water milky.	1 1	2
23	(a) (i) • HCl gas was evolved (ii) (I) No change in colour	 ½ ½	

	(II) Wet blue litmus turns red • HCl gas is acidic in nature **OR** (b) •$Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2$ (g) **(Any other example)** •Hydrogen burns with a pop sound when a burning matchstick is brought near it.	½ ½ 1 1	2
24	• Wrinkled and yellow, Round and green • Traits are independently inherited.	½ + ½ 1	2
25	• Scattering of light. • Example − When sunlight passes through a canopy of dense forest/ when a fine beam of sunlight enters a smoke filled room through a small hole. **(or any other)**	1 1	2
26	• Joule's Law − Heat produced in a resistor is directly proportional to: -Square of current for a given resistance -Resistance for a given conductor and -Time for which the current flows though the resister, • If any unduly high electric current flows through the circuit, the temperature of the fuse wire increases. This melts the fuse wire and breaks the circuit.	1 1	2
	SECTION C		
27	• Copper Chloride; Blue- green • $CuO + 2HCl \longrightarrow CuCl_2 + H_2O$ • CuO is basic.	½ ; ½ 1 1	3
28	•Ability of the eye lens to adjust its focal length. • Image distance remains unchanged • Ciliary muscles – While focusing on distant objects ciliary muscles relax, eye lens becomes thin and its focal length increases.	1 1 ½ ½	3
29	(i) •Terrestrial /Grassland / cropland •Aquatic /Pond (ii) First trophic level are always producers or autotrophs as they can capture the solar energy and convert it into chemical energy. • 1% energy is captured. (iii)Because energy flows in one direction only. Justification: when energy passes from one trophic level to other it cannot revert back.	½ ½ ½ ½ ½ ½	3
30	Three examples: • In some animals, the temperature at which the fertilized eggs are kept determines whether the animals developing in the eggs will be male or female. • In snails, individuals can change sex. • In human beings, the sex of the individual is genetically determined i.e. genes inherited from parents decide whether the child will be a boy or a girl.	 1 1 1	3
31	• Oxygen is added to ethanol to produce ethanoic acid. • Alkaline potassium permanganate or Acidified potassium dichromate. $CH_3 - CH_2OH \xrightarrow[\text{Or acidified } K_2Cr_2O_7 + \text{Heat}]{\text{Alkaline } KMnO_4 + \text{Heat}} CH_3COOH$ •	½ ½ 1	

	• It is oxidation reaction while other is combustion reaction/ burning of ethanol is exothermic while other is endothermic.	1	3
32	(a) A solenoid is made by winding insulated copper wire over a non-conducting cylindrical tube closely and tightly wound in the shape of a cylindrical spring. <table><tr><td>Solenoid</td><td>Circular coil</td></tr><tr><td>Length of solenoid is much greater as compared to its diameter.</td><td>Its diameter is much greater as compared to its length.</td></tr><tr><td>Strong magnetic field</td><td>Weak magnetic field</td></tr></table> (b)  • Field lines are in the form of parallel straight lines which indicates that the field is uniform.	1 1 ½ ½	3
33	(a) In hydra, a bud develops as an outgrowth due to repeated cell division at one specific site. These buds develop into tiny individuals and when fully mature, detach from the parent body and become new independent individuals.  • Regenerative cells. **OR** • (b) (i)Seminal vesicles and prostate glands: • Secrete a fluid for nourishment of sperms. • Secrete a fluid which makes the transport of the sperms easier (ii) Oviduct: • Egg is carried from ovary to the womb or uterus. • Site of Fertilization • (iii) Testis: • Produces sperms • Secretion of hormone – testosterone	1 1 ½ ½ ½ + ½ ½ + ½ ½ + ½	3
	SECTION D		

34	(a) (i) • Decomposition reaction • A reaction in which a single reactant breaks down to simpler products. (ii) Nitrogen dioxide, NO_2 (iii) $2Pb(NO_3)_2(s) \xrightarrow{Heat} 2PbO(s) + 4NO_2(g) + O_2(g)$ (Lead nitrate; Lead oxide; Nitrogen dioxide; Oxygen) (iv) Residue left − Lead oxide. • Dissolve the residue in water and test the solution using litmus paper/Universal indicator. The colour of the litmus paper changes to blue indicating that lead oxide is basic in nature. **OR** (b) (i) $Pb(NO_3)(aq) + 2\ KI(aq) \longrightarrow PbI_{2(ppt)} + 2\ KNO_{3(aq)}$ • Yes, it is a double displacement reaction. • In this reaction, exchange of ions between the reactants (Lead nitrate and potassium iodide) is taking place. • Lead iodide; $[Pb^{2+}]\ [I^-]$ (ii) Calcium hydroxide is prepared on adding water to quicklime (calcium oxide) / $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq) + Heat$ (Quick lime; Slaked lime) • When CO_2 is passed through $Ca(OH)_2$ It turns milky white/ calcium carbonate is formed. • $Ca(OH)_2(aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l)$ (Calcium hydroxide; Calcium carbonate)	½ ½ ½ , ½ 1 1 1 1 ½ ½ ½ + ½ ½ ½ 1	5
35	(a) (i) S. No. 3, 2f is 50 cm. ∴ 2f = 50 cm, or f = 25 cm. Justification: Object distance(u) and image distance (v) are same so it implies that object is placed at 2F. (ii) S. No. 6, is not correct. Reason: For u = −15 cm, sign of v **must** be – ve (as the image is formed on the same side of the lens as the object)  ***(deduct ½ mark if the direction of the rays are not shown)*** (iii) Magnification : $m = \frac{v}{u}$ $= \frac{+150\ cm}{-30\ cm} = -5\ cm$ **OR** (b) (i) Principal axis : It is an imaginary line passing through the two centres of curvatures of a lens. 	1 1 ½ ½ 1 1 1 1	

	(ii) f = − 20 cm; h = 5 cm; v = −15 cm $\frac{1}{v}-\frac{1}{u}=\frac{1}{f}$ *or* $\frac{1}{u}=\frac{1}{v}-\frac{1}{f}=\frac{1}{(-15)}-\frac{1}{(-20)}$ $=\frac{-1}{60\ cm}$ or u = − 60 cm object is at a distance of 60 cm from the lens • Size of the image(magnification): m = $\frac{h'}{h}=\frac{v}{u}$ $h'=\frac{v}{u}\times h=\frac{(-15)}{(-60)}\times 5$ = 1·25 cm	½ ½ 1 1	5
36	(a) (i) • The pathway in which impulses travel during the reflex action is called a reflex arc. • Because the thinking part of the brain is not fast enough/for quick response to avoid injury. • Reflex arc :  (ii) Peripheral Nervous System Components : Cranial Nerves; Spinal Nerves **OR** (b) (i) •Touch • The shape of the leaves changes by changing the amount of water in them. • No (ii) Growth of a part of plant in response to the pull of earth or gravity is called geotropism. • Positive geotropism − Movement of plant part towards the earth gravity. Example − Roots grow downwards • Negative geotropism − Movement of plant part away from the force of gravity. Example − Shoots grow upwards.	1 ½ 1+½ 1 ½; ½ ½ 1 ½ 1 ½+½ ½+½	5
	SECTION E		
37	(a) R_S = 4 Ω + 6 Ω + 16 Ω = 26 Ω (b) $\frac{1}{R_P}=\frac{1}{8\ \Omega}+\frac{1}{8\ \Omega}=\frac{1}{4}\ \Omega$ R_p = 4 Ω (c) (i) Total resistance = 26 Ω + 4 Ω = 30 Ω Potential difference = V = 6V Current I = $\frac{V}{R}$ $\frac{6}{30}=\frac{1}{5}\ A$ or 0·2 A.	1 1 1 ½ ½	

	OR (c) (ii) 16 Ω Justification: According to Ohm's law when same current flows, the potential difference across a higher resistance is always higher./ Potential difference across 16 Ω =V=IR = 0.2x16=3.2V Potential difference across 8 Ω =V=$IR_{(total)}$ = 0.2x4 =0.8V	 1 1	 4
38	(a) In the test tube containing magnesium. (b) All three metals react with HCl because they are more reactive than hydrogen**.** **(Award marks if student write any less reactive metal with reason)** (c) (i)Because HNO_3 is a strong oxidizing agent and oxidizes the H_2 produced to water. • Ultimate products are water, oxides of nitrogen. **OR** (c) (ii) • Displacement Reaction • If metal X displaces metal Y from its salt solution it is more reactive than Y or vice versa.	1 1 1 1 1	 4
39	(a) (i) Renal Artery (ii) Glomerulus (b) • Urinary bladder • Nervous control (c) (i) Filtration: Nitrogenous wastes such as urea or uric acid are removed Reabsorption: Glucose, amino acids, salts/some useful materials and major amounts of water reabsorbed **OR** (c) (ii)Tubular part of nephron. • The amount of water absorbed depends on : - how much water is there in the body. - how much dissolved waste is there to be excreted.	½ ½ ½ ½ ½+½ ½+½ 1 ½ ½	 4

Marking Scheme
Strictly Confidential
Secondary School Examination, 2024
SUBJECT NAME SCIENCE (086) (Q.P. CODE 31/4/3)

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

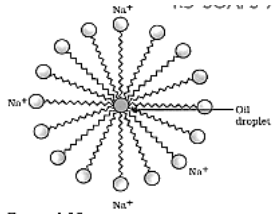
Secondary School Examination, 2024

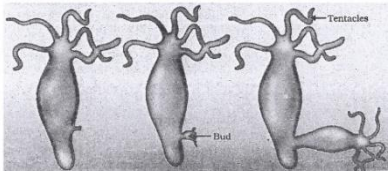
SCIENCE (Subject Code–086)

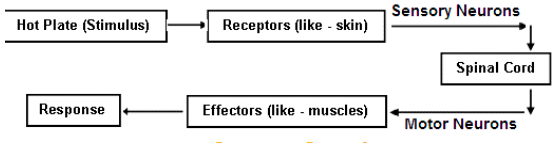
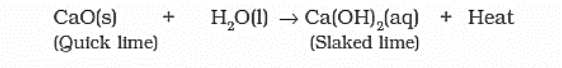
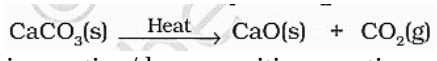
[Paper Code: 31/4/3]

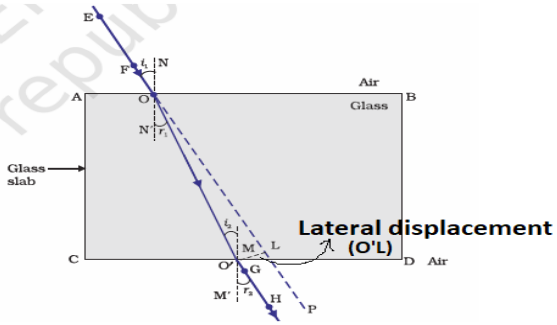
Maximum Marks: 80

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION A		
1	(A)/15000 J	1	1
2	(A)/ HCl, $Mg(OH)_2$	1	1
3	(C)/46	1	1
4	(A)/Cotyledon	1	1
5	(B)/Displacement reaction	1	1
6	(D)/Hydrochloric acid and Sulphuric acid	1	1
7	(C)/Copper and Silver	1	1
8	(C)/ Petals only	1	1
9	(B)/ (i)Amino acid, (ii)glucose, (iii)fatty acid and glycerol	1	1
10	(B)/9 and 3	1	1
11	(C)/Abscisic acid	1	1
12	(B)/(ii) and (iii)	1	1
13	(B)/move towards the side AB of the loop	1	1
14	(A)/9/4 x 10^8 m/s	1	1
15	(C)/Blue	1	1
16	(C)/I and II	1	1
17	(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of Assertion (A).	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	(A)/ Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)	1	1
	SECTION B		
21	(a) When water is lost through stomata in the leaves by transpiration, it creates a suction force/transpiration pull. Due to which water is pulled up through xylem of the roots to the leaves. **OR** (b) • Heterotrophic /Holozoic Nutrition. • Amoeba takes in food using temporary finger-like projections/pseudopodia of the cell which fuse over the food particle forming a food vacuole. Inside the food vacuole complex substances are broken down into simpler substances. / (**award marks if explained diagrammatically**)	2 1 1	2

22	• Micelles • 	½ 1 ½	2
23	(a) (i) • HCl gas was evolved (ii) (I) No change in colour (II) Wet blue litmus turns red • HCl gas is acidic in nature **OR** (b) • $Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2$ (g) **(Any other example)** • Hydrogen burns with a pop sound when a burning matchstick is brought near it.	½ ½ ½ ½ 1 1	2
24	Each parent produces gametes that have half the number of chromosomes. During sexual reproduction, a female gamete fuses with a male gamete to form a zygote. Thus, zygote restores the original number of chromosomes in the progeny ensuring equal contribution of both the parents in the progeny.	2	2
25	• Black colour • As there would not be any particle to scatter light.	1 1	2
26	$R = \rho \frac{l}{A}$ $\rho = 1{\cdot}6 \times 10^{-8}\ \Omega$ m $A = 2 \times (10^{-3}\text{m})^2$ $l = 1000$ m $\therefore R = (1{\cdot}6 \times 10^{-8}\ \Omega\text{ m}) \times \frac{1000\text{ m}}{2 \times (10^{-3}\text{m})^2}$ $= 8{\cdot}0\ \Omega$	½ ½ 1	2
	SECTION C		
27	•Ability of the eye lens to adjust its focal length. • Image distance remains unchanged •Ciliary muscles – While focusing on distant objects ciliary muscles relax, eye lens becomes thin and its focal length increases.	1 1 ½ ½	3
28	(a) $CH_3 - COOH + CH_3 - CH_2OH \underset{}{\overset{Acid}{\rightleftharpoons}} CH_3 - \underset{\underset{O}{\|\|}}{C} - O - CH_2 - CH_3 + H_2O$ (b) $CH_3COOC_2H_5 \xrightarrow{NaOH} C_2H_5OH + CH_3COONa$ (c) $CH_3 - CH_2OH \xrightarrow[H_2SO_4]{Hot\ Conc.} CH_2 = CH_2 + H_2O$	1 1 1	3
29	(a) Because a magnetic field exists around the bar magnet (b) Strength of the magnetic field is maximum near the poles of the magnet (c) The lines represent the magnetic field lines (d) Equidistant parallel lines, magnetic field inside the solenoid is uniform	½ 1 ½ ½+½	3

30	(a) Two pairs of contrasting characters: • Round and wrinkled shape of seed • Violet and white flowers (Any other) (b) (i) No ; Tt (ii) 25% (iii) TT : Tt − 1:2	½ +½ ½ ; ½ ½ ½	3
31	• Plaster of Paris; Calcium sulphate hemihydrate •Prepared from gypsum ($CaSO_4 \cdot 2H_2O$) by heating it at 373K • $CaSO_4 \cdot \frac{1}{2} H_2O + 1\frac{1}{2} H_2O \longrightarrow CaSO_4 \cdot 2H_2O$	½ + ½ 1 1	3
32	(a) In hydra, a bud develops as an outgrowth due to repeated cell division at one specific site. These buds develop into tiny individuals and when fully mature, detach from the parent body and become new independent individuals.  • Regenerative cells. **OR** (b) (i)Seminal vesicles and prostate glands: • Secrete a fluid for nourishment of sperms. • Secrete a fluid which makes the transport of the sperms easier (ii) Oviduct: • Egg is carried from ovary to the womb or uterus. • Site of Fertilization (iii) Testis: • Produces sperms • Secretion of hormone – testosterone	1 1 ½ ½ ½ + ½ ½ + ½ ½ + ½	3
33	<table><tr><th>Biodegradable waste</th><th>Non-biodegradable waste</th></tr><tr><td>Wastes that are broken down by biological processes into simpler substances.</td><td>Wastes that are not broken down by biological processes into simpler substances.</td></tr></table> • Harmful effects: - Excessive use cause pollution. - Pesticides enter the food chain and cause biomagnification in humans and other animals. - Clogging of drains. - Death of cattle due to ingestion of plastics **(any two)**	2 ½ ½	3
	SECTION D		
34	(a) (i) • The pathway in which impulses travel during the reflex action is called a reflex arc. • Because the thinking part of the brain is not fast enough/for quick	1 ½	

	response to avoid injury. • Reflex arc :  (ii) Peripheral Nervous System Components : Cranial Nerves; Spinal Nerves **OR** (b) (i) •Touch • The shape of the leaves changes by changing the amount of water in them. • No (ii) Growth of a part of plant in response to the pull of earth or gravity is called geotropism. • Positive geotropism − Movement of plant part towards the earth gravity. Example − Roots grow downwards • Negative geotropism − Movement of plant part away from the force of gravity. Example − Shoots grow upwards.	1+½ 1 ½; ½ ½ 1 ½ 1 ½+½ ½+½	5
35	(a) A chemical reaction involves the breaking and making of bonds between atoms to produce new substances. / when reactant changes to products. (i) Add lead nitrate solution to potassium iodide solution taken in a test tube. The colour changes from colourless solution to yellow ppt. /  (**or any example**) (ii) Calcium oxide reacts vigorously with water to produce slaked lime (calcium hydroxide) releasing a large amount of heat. /  (**or any example**) ***(Deduct ½ marks if change in colour or heat is not mentioned in the reaction)*** **OR** (b) (i) •A reactant breaks down to give two or more products. /A reaction which requires energy to split a compound or reactant in two or more simple substances. (I) Water splits into hydrogen gas and oxygen gas. • Electrical energy (II) Silver bromide decomposes into silver and bromine • Light energy **(ii)** (I) Formation of calcium oxide:  • It is an endothermic reaction/decomposition reaction.	1 1+1 1+1 1 ½ ½ ½ ½ ½ ½	

	(II) Formation of calcium hydroxide: $CaO + H_2O \longrightarrow Ca(OH)_2$ +Heat • It is exothermic/combination reaction	½ ½	5
36	(a) (i) - The angle of incidence is equal to the angle of reflection. - The incident ray, the normal to the mirror at the point of incidence and the reflected ray, all lie in the same plane. (ii) u = – 15 cm, f = −10 cm (concave mirror) h = 5·0 cm Mirror formula $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$ $\frac{1}{v} = \frac{-1}{10\text{ cm}} + \frac{1}{15\text{ cm}} = \frac{-1}{30cm}$ or v = − 30 cm. The screen must be placed at a distance of 30 cm from the mirror in front of it $(m) = \frac{h'}{h} = -\frac{v}{u}$ $h = \frac{-v}{u} \times h = -\frac{-30\ cm}{-15\ cm} \times 5\ cm = -10$ cm **OR** (b)(i) -The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane. - The ratio of sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media. / $\frac{\sin i}{\sin r} = constant$ (ii)  • The emergent ray is parallel to the incident ray. • Labelling of lateral displacement **(If labelling is not done deduct ½ marks)**	1+1 ½ ½ 1 1 1 1 2 ½ ½	5
	SECTION E		
37	(a) R_S = 4 Ω + 6 Ω + 16 Ω = 26 Ω (b) $\frac{1}{R_P} = \frac{1}{8\ \Omega} + \frac{1}{8\ \Omega} = \frac{1}{4}\ \Omega$ R_p = 4 Ω (c) (i) Total resistance = 26 Ω + 4 Ω = 30 Ω Potential difference = V = 6V Current I = $\frac{V}{R}$ $\frac{6}{30} = \frac{1}{5}\ A$ or 0·2 A.	1 1 1 ½ ½	

	OR (c)(ii) 16 Ω Justification: According to Ohm's law when same current flows, the potential difference across a higher resistance is always higher./ Potential difference across 16 Ω =V=IR = 0.2x16=3.2V Potential difference across 8 Ω =V=$IR_{(total)}$ = 0.2x4 =0.8V	 1 1	4
38	(a) In the test tube containing magnesium. (b) All three metals react with HCl because they are more reactive than hydrogen**.** **(Award marks if student write any less reactive metal with reason)** (c) (i)Because HNO_3 is a strong oxidizing agent and oxidizes the H_2 produced to water. • Ultimate products are water, oxides of nitrogen. **OR** (c) (ii) • Displacement Reaction • If metal X displaces metal Y from its salt solution it is more reactive than Y or vice versa.	1 1 1 1 1	4
39	(a) (i) Renal Artery (ii) Glomerulus (b) • Urinary bladder • Nervous control (c) (i) Filtration: Nitrogenous wastes such as urea or uric acid are removed Reabsorption: Glucose, amino acids, salts/some useful materials and major amounts of water reabsorbed **OR** (c) (ii)Tubular part of nephron. • The amount of water absorbed depends on : -how much water is there in the body. -how much dissolved waste is there to be excreted.	½ ½ ½ ½ ½+½ ½+½ 1 ½ ½	4