General Instructions:

(i) The question paper comprises of two sections, A and B. You are to attempt both the sections.

(ii) All questions are compulsory.

(iii) There is no overall choice. However, internal choice has been provided in all the three questions of five marks category. Only one option in such questions is to be attempted.

(iv) All questions of Section A and all questions of Section B are to be attempted separately.

(v) Questions number 1 to 6 in Section A and 17 to 19 in Section B are short answer type questions. These questions carry one mark each.

(vi) Questions number 7 to 10 in Section A and 20 to 24 in Section B are short answer type questions and carry two marks each.

(vii) Questions number 11 to 14 in Section A and 25 and 26 in Section B are also short answer type questions and carry three marks each.

(viii) Questions number 15 and 16 in Section A and question number 27 in Section B are long answer type questions and carry five marks each.
1. Balance the following chemical equation:

\[ \text{Fe (s) + H}_2\text{O (g) } \rightarrow \text{Fe}_3\text{O}_4 (s) + \text{H}_2 (g) \]

निम्नलिखित रासायनिक समीकरण को संतुलित कीजिए:

\[ \text{Fe (s) + H}_2\text{O (g) } \rightarrow \text{Fe}_3\text{O}_4 (s) + \text{H}_2 (g) \]

2. Why is respiration considered an exothermic process?

श्वास की ऊष्माक्रिया प्रक्रिया क्यों माना जाता है?

3. How does the flow of acid rain water into a river make the survival of aquatic life in the river difficult?

अम्लीय वर्षा का जल जब बह कर नदी में प्रवाहित हो जाता है तो नदी के जलीय जीवों की उत्तरजीविता कठिन क्यों हो जाती है?
4. Draw the following diagram in your answer-book and show the formation of image of the object $AB$ with the help of suitable rays.

![Diagram]

नीचे दिए गए आरेख को अपनी उत्तर-पुस्तिका में खींचकर उपयुक्त किरणों की सहायता से विच्छेद $AB$ का प्रतिबिंब बनाना दिखाइए।

5. Why is a series arrangement not used for connecting domestic electrical appliances in a circuit?

घरेलू विद्युत साधनों का प्रयोग करते समय उन्हें परिपथ में श्रेणीृत्रम में क्यों नहीं जोड़ा जाता?

6. Out of 60 W and 40 W lamps, which one has a higher electrical resistance when in use?

प्रयोग के समय 60 W और 40 W के लैंपों में से किसका विद्युत प्रतिरोध अधिक होता है?

7. Write the chemical formula for washing soda. How may it be obtained from baking soda? Name an industrial use of washing soda other than washing clothes.

धावन सोडा का रासायनिक सूत्र लिखिए। इसे बेकिंग सोडा से किस प्रकार प्राप्त कर सकते हैं? कपड़े धोने के अतिरिक्त धावन सोडा का कोई एक अन्य औद्योगिक उपयोग लिखिए।

8. Give an example of a decomposition reaction. Describe an activity to illustrate such a reaction by heating.

विभेक (अपघटन) अभिक्रिया का एक उदाहरण लिखिए। गर्म करने पर ऐसी किसी अभिक्रिया के होने को दिखाने के लिए कोई एक क्रियाकलाप का वर्णन कीजिए।
9. Draw ray diagrams to represent the nature, position and relative size of the image formed by a convex lens for the object placed:

(a) at 2F₁.

(b) between F₁ and the optical centre O of lens.

10. What is meant by the term, ‘magnetic field’? Why does a compass needle show deflection when brought near a bar magnet?

11. (a) Why are covalent compounds generally poor conductors of electricity?

(b) Name the following compound:

```
H     H
|     |
H — C — C — C — H
|     |
H     H
```

(c) Name the gas evolved when ethanoic acid is added to sodium carbonate. How would you prove the presence of this gas?
12. (a) What are amphoteric oxides? Choose the amphoteric oxides from amongst the following oxides

\[ \text{Na}_2\text{O}, \text{ZnO}, \text{Al}_2\text{O}_3, \text{CO}_2, \text{H}_2\text{O} \]

(b) Why is it that non-metals do not displace hydrogen from dilute acids?

(अ) उभयधार्मिक ऑक्साइड क्या होते हैं? निम्न ऑक्साइडों में से उभयधार्मिक ऑक्साइडों का चयन कीजिए

\[ \text{Na}_2\text{O}, \text{ZnO}, \text{Al}_2\text{O}_3, \text{CO}_2, \text{H}_2\text{O} \]

(ब) ऐसा क्यों होता है कि अभावी तनु अम्ल विलयनों से हाइड्रोजन का विस्थापन नहीं करती?

13. Two lamps, one rated 60 W at 220 V and the other 40 W at 220 V, are connected in parallel to the electric supply at 220 V.

(a) Draw a circuit diagram to show the connections.

(b) Calculate the current drawn from the electric supply.

(c) Calculate the total energy consumed by the two lamps together when they operate for one hour.

दो लैंपें जिनके अनुमानात् 220 V पर 60 W और 220 V पर 40 W हैं, को 220 V की विद्युत् आपूर्ति से पार्व त्रम में जोड़ा गया है।

(अ) इस संयोजन को दिखाने के लिए परिप्रेक्ष्य आरेख खींचिए।

(ब) विद्युत् आपूर्ति से आपत्ति विद्युत् धारा परिकलित कीजिए।

(स) इस संयोजन में दोनों लैंपें द्वारा एक घण्टे में उपभुक्त कुल ऊर्जा परिकलित कीजिए।

14. (a) Distinguish between the terms 'overloading' and 'short-circuiting' as used in domestic circuits.

(b) Why are the coils of electric toasters made of an alloy rather than a pure metal?

(अ) घरेलू परिप्रेक्ष्यों के संदर्भ में ‘अतिभारण’ तथा ‘लघुपथ’ पदों में भेद कीजिए।

(ब) विद्युत् टोस्टरों के तापन अवयवों (कॉइल्स) को शुद्ध धातु से न बनाकर किसी मिश्रधातु से क्यों बनाया जाता है?
15. On the basis of Mendeleev's Periodic Table given below, answer the questions that follow the table.

<table>
<thead>
<tr>
<th>Group</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
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<tbody>
<tr>
<td>Oxide</td>
<td>R$_2$O</td>
<td>RO</td>
<td>R$_2$O$_3$</td>
<td>RO$_2$</td>
<td>R$_2$O$_5$</td>
<td>RO$_3$</td>
<td>R$_2$O$_7$</td>
<td>RO$_4$</td>
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<tr>
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<td>RH$_3$</td>
<td>RH$_4$</td>
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<tr>
<th>Periods</th>
<th>A</th>
<th>B</th>
<th>A</th>
<th>B</th>
<th>A</th>
<th>B</th>
<th>A</th>
<th>B</th>
<th>Transition series</th>
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<tbody>
<tr>
<td>1</td>
<td>H</td>
<td>1·008</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Li</td>
<td>Be</td>
<td>B</td>
<td>10·81</td>
<td>C</td>
<td>N</td>
<td>14·007</td>
<td>O</td>
<td>15·999</td>
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<tr>
<td>3</td>
<td>Na</td>
<td>Mg</td>
<td>Al</td>
<td>29·98</td>
<td>Si</td>
<td>P</td>
<td>30·974</td>
<td>S</td>
<td>32·06</td>
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<td>4 First series:</td>
<td>K</td>
<td>39·102</td>
<td>Ca</td>
<td>40·08</td>
<td>Sc</td>
<td>44·96</td>
<td>Ti</td>
<td>47·90</td>
<td>V</td>
</tr>
<tr>
<td>Second series:</td>
<td>Cu</td>
<td>63·54</td>
<td>Zn</td>
<td>65·37</td>
<td>Ga</td>
<td>69·72</td>
<td>Ge</td>
<td>72·59</td>
<td>As</td>
</tr>
<tr>
<td>5 First series:</td>
<td>Rb</td>
<td>85·47</td>
<td>Sr</td>
<td>87·62</td>
<td>Y</td>
<td>88·91</td>
<td>Zr</td>
<td>91·22</td>
<td>Nb</td>
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<tr>
<td>Second series:</td>
<td>Ag</td>
<td>107·87</td>
<td>Cd</td>
<td>112·40</td>
<td>In</td>
<td>114·82</td>
<td>Sn</td>
<td>118·69</td>
<td>Sb</td>
</tr>
<tr>
<td>6 First series:</td>
<td>Cs</td>
<td>132·90</td>
<td>Ba</td>
<td>137·34</td>
<td>La</td>
<td>138·91</td>
<td>Hf</td>
<td>178·49</td>
<td>Ta</td>
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<tr>
<td>Second series:</td>
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<td>196·97</td>
<td>Hg</td>
<td>200·59</td>
<td>Tl</td>
<td>204·37</td>
<td>Pb</td>
<td>207·19</td>
<td>Bi</td>
</tr>
</tbody>
</table>

(a) Name the element which is in
   (i) $1^{st}$ group and $3^{rd}$ period.
   (ii) $VII^\text{th}$ group and $2^{nd}$ period.

(b) Suggest the formula for the following:
   (i) oxide of nitrogen
   (ii) hydride of oxygen

(c) In group VIII of the Periodic Table, why does cobalt with atomic mass 58·93 appear before nickel having atomic mass 58·71?

(d) Besides gallium, which two other elements have since been discovered for which Mendeleev had left gaps in his Periodic Table?
(e) Using atomic masses of Li, Na and K, find the average atomic mass of Li and K and compare it with the atomic mass of Na. State the conclusion drawn from this activity.

OR

(a) Why do we classify elements?

(b) What were the two criteria used by Mendeleev in creating his Periodic Table?

(c) Why did Mendeleev leave some gaps in his Periodic Table?

(d) In Mendeleev's Periodic Table, why was there no mention of Noble gases like Helium, Neon and Argon?

(e) Would you place the two isotopes of chlorine, Cl-35 and Cl-37 in different slots because of their different atomic masses or in the same slot because their chemical properties are the same? Justify your answer.

नीचे दी गई मेंडेलीय प्रारंभ सारणी के आधार पर निम्नलिखित प्रश्नों के उत्तर लिखिए

<table>
<thead>
<tr>
<th>समूह</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
</tr>
</thead>
<tbody>
<tr>
<td>ऑक्साइड</td>
<td>R₂O</td>
<td>RO</td>
<td>R₂O₃</td>
<td>RO₂</td>
<td>R₂O₅</td>
<td>RO₃</td>
<td>R₂O₇</td>
<td>RO₄</td>
</tr>
<tr>
<td>ह्यड्रॉइड</td>
<td>RH</td>
<td>RH₂</td>
<td>RH₃</td>
<td>RH₄</td>
<td>RH₃</td>
<td>RH₂</td>
<td>RH</td>
<td></td>
</tr>
<tr>
<td>आवर्त</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
</tr>
</tbody>
</table>

1. H 1:008


3. Na 22.99 Mg 24.31 Al 29.98 Si 28.09 P 30.974 S 32.06 Cl 35.45

4. प्रथम श्रेणी: K 39.102 Ca 40.08 Sc 44.96 Ti 47.90 V 50.94 Cr 52.00 Mn 54.94 Fe 55.85 Co 58.93 Ni 58.71 पदार्था: Cu 63.54 Zn 65.37 Ga 69.72 Ge 72.59 As 74.92 Se 78.96 Br 79.90

5. प्रथम श्रेणी: Rb 85.47 Sr 87.62 Y 88.91 Zr 91.22 Nb 92.91 Mo 95.94 Tc 99 Ru 101.07 Rh 102.91 Pd 106.4 पदार्था: Ag 107.87 Cd 112.40 In 114.82 Sn 118.69 Sb 121.75 Te 127.60 I 126.90

6. प्रथम श्रेणी: Cs 132.90 Ba 137.34 La 138.91 Hf 178.49 Ta 180.95 W 183.85 Os 190.2 Ir 192.2 Pt 195.09 पदार्था: Au 196.97 Hg 200.59 Tl 204.37 Pb 208.98 Bi |
16. (a) What is meant by dispersion of white light? Describe the formation of rainbow in the sky with the help of a diagram.

(b) What is hypermetropia? Draw ray diagrams to show the image formation of an object by:

(i) Hypermetropic eye

(ii) Correction made with a suitable lens for hypermetropic eye.

OR

(a) Give reasons for the following:

(i) Colour of the clear sky is blue.

(ii) The sun can be seen about two minutes before actual sunrise.

(iii) We cannot see an object clearly if it is placed very close to the eyes.

(b) What is Presbyopia? Write two causes of this defect.
17. Which one of the following is a renewable resource?

- Natural gas
- Petroleum
- Ground water
- Coal

18. What is the effect of DNA copying which is not perfectly accurate on the reproduction process?

- DNA replication is not 100% accurate, leading to possible errors in genetic information.

19. How do autotrophs obtain CO₂ and N₂ to make their food?

- Autotrophs use photosynthesis to obtain CO₂ and use nitrogen fixation to obtain N₂.

20. List any four characteristics of biogas on account of which it is considered an ideal fuel.

- Biogas is a clean fuel that reduces carbon emissions.
- It is produced from waste materials, making it a sustainable resource.
- It can be used in a variety of energy applications, including heating and electricity generation.
- It is a renewable energy source, as it is derived from organic waste.

21. Discuss one limitation each for the extracting of energy from:

(a) winds
(b) tides.
22. Write one function each of the following components of the transport system in human beings:
   (a) Blood vessels
   (b) Blood platelets
   (c) Lymph
   (d) Heart

23. Name one sexually transmitted disease each caused due to bacterial infection and viral infection. How can these be prevented?

24. What are fossils? What do they tell about the process of evolution?

25. How is ozone formed in the upper atmosphere? Why is damage to ozone layer a cause of concern to us? What causes this damage?

26. How are oxygen and carbon dioxide transported in human beings? How are lungs designed to maximise the area for exchange of gases?

27. (a) Draw the structure of a neuron and label the following on it:
      Nucleus, Dendrite, Cell body and Axon

(b) Name the part of neuron:
    (i) where information is acquired.
    (ii) through which information travels as an electrical impulse.

OR
(a) What is (i) phototropism and (ii) geotropism? With labelled diagrams describe an activity to show that light and gravity change the direction that plant parts grow in.

(b) Mention the role of each of the following plant hormones:

(i) Auxin
(ii) Abscisic acid

(A) तंत्रिकौशिकाकीसंरचनाकाचित्रखींचकरउसपरनिम्नलिखितकोनामांकितकीजिएः
केंद्रक, बुधिका, कोशिकाकायतथा तंत्रिकाक्ष

(ब) तंत्रिकौशिकाकेउसभागकानामलिखिएः
(i) जहाँसूचनाएँउपाधिजितकोजातीहैं।
(ii) जिससे होकर सूचनाएँविपुलआवेगकोभाँतिगमनकरतीहैं।

अथवा

(अ) (i) प्रकाशावर्तनतथा(ii) गुरुत्वावर्तनक्रयहोतेहैं?नामांकितआरोग्योंकोसहायतासेकिसी
ऐसेस्रियाकलापकावर्णनकीजिएजोयहदर्शाता हो कि प्रकाशतथा गुरुत्वपादपके वृद्धि वाले
भागकोदिशाकोपरिवर्तितकरदेतेहैं।

(ब) निम्नलिखितपादपहाँमोंकोभूमिकालिखिएः
(i) ओविसन
(ii) ऐंबिसिसिकअम्ल