Candidates must write the Code on the title page of the answer-book.

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 16 हैं।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नंबर को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में 36 प्रश्न हैं।
- कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, प्रश्न का क्रमांक अवश्य लिखें।
- इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वांह 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।
- Please check that this question paper contains 16 printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains 36 questions.
- Please write down the Serial Number of the question before attempting it.
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.
General Instructions:

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

(ii) All questions are compulsory.

(iii) There is no choice in any of the questions.

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

(v) Question numbers 1 to 3 in Section A are one-mark questions. These are to be answered in one word or in one sentence.

(vi) Question numbers 4 to 6 in Section A are two-marks questions. These are to be answered in about 30 words each.

(vii) Question numbers 7 to 18 in Section A are three-marks questions. These are to be answered in about 50 words each.
Question numbers 19 to 24 in Section A are five-marks questions. These are to be answered in about 70 words each.

Question numbers 25 to 33 in Section B are multiple choice questions based on practical skills. Each question is a one-mark question. You are to select one most appropriate response out of the four provided to you.

Question numbers 34 to 36 in Section B are two-marks questions based on practical skills. These are to be answered in brief.

भाग अ

SECTION A

1. उस समजातीय श्रेणी के द्वितीय और तृतीय सदस्य का आण्विक सूत्र लिखिए जिसका प्रथम सदस्य एथाइन है।

Write the molecular formula of the 2nd and 3rd member of the homologous series where the first member is ethyne.

2. किसी स्पीषीज़ के लिए विभिन्नता क्यों महत्वपूर्ण होती है?

Why is variation important for a species?

3. निम्नलिखित खाद्य श्रृंखला में, पादपों को 20,000 J ऊर्जा उपलब्ध है। इस श्रृंखला में मानव को कितनी ऊर्जा उपलब्ध होगी?

In the following food chain, 20,000 J of energy was available to the plants. How much energy would be available to man in this chain?

Plants → Sheep → Man

4. कोई बिंब 30 cm फोकस दूरी के अवतल लेंस से 15 cm दूरी पर स्थित है। लेंस द्वारा बने प्रतिबिम्ब के चार अभिलक्षणों (प्रकृति, स्थिति, आदि) की सूची बनाइए।

An object is placed at a distance of 15 cm from a concave lens of focal length 30 cm. List four characteristics (nature, position, etc.) of the image formed by the lens.

5. आप एक पर्यावरणविद् हैं और प्राकृतिक संसाधनों के संरक्षण में सहयोग देना चाहते हैं। ऐसे चार क्रियाकलापों की सूची बनाइए जिन्हें आप स्वयं कर सकते हैं।

You being an environmentalist are interested in contributing towards the conservation of natural resources. List four activities that you can do on your own.
6. Why are coal and petroleum categorised as natural resources? Give a reason as to why they should be used judiciously.

7. Distinguish between esterification and saponification reactions with the help of the chemical equations for each. State one use of each (i) esters, and (ii) saponification process.

8. Write the structural formula of ethanol. What happens when it is heated with excess of conc. H\textsubscript{2}SO\textsubscript{4} at 443 K? Write the chemical equation for the reaction stating the role of conc. H\textsubscript{2}SO\textsubscript{4} in this reaction.

9. What is periodicity in properties of elements with reference to the Modern Periodic Table? Why do all the elements of the same group have similar properties? How do the tendency of elements to gain electrons change as we move from left to right in a period? State the reason of this change.

10. Write the electronic configuration of two elements X and Y whose atomic numbers are 20 and 17 respectively. Write the molecular formula of the compound formed when element X reacts with element Y. Draw electron-dot structure of the product and also state the nature of the bond formed between both the elements.
11. **Mendel Ne Yeh Kis Prakar Sapt Kiya Ki Yeh Sambhav Hai Ki Koii Lakshan Vanshanugat Ho Jaaye Parnu Kisi Jeev Men Vyakt N Ho Paaye?**

   How did Mendel explain that it is possible that a trait is inherited but not expressed in an organism?


   What is an organic evolution? It cannot be equated with progress. Explain with the help of a suitable example.

13. **Jann Ke Do Prakaro Ki Sachhi Banaye. Inh Dono Mene Se Apni Santati Men Adhik Vikshpatataen Lane Ke Liye Kon Utaadhar Hai Oon Kish Prakar?**

   List the two types of reproduction. Which one of the two is responsible for bringing in more variations in its progeny and how?

14. **Kathik Prarjan Kya Hai? Is Vidhi Ke Do Laham Oo Do Hainiyo Lihiye.**

   What is vegetative propagation? State two advantages and two disadvantages of this method.


   List three techniques that have been developed to prevent pregnancy. Which one of these techniques is not meant for males? How does the use of these techniques have a direct impact on the health and prosperity of a family?


   “A lens can form a magnified erect image as well as magnified inverted image of an object placed in front of it.” State the nature of this lens and draw ray diagrams to justify the above statement. Mark the positions of O, F and 2F in the diagram.
17. What is “dispersion of white light”? Draw a labelled diagram to illustrate the recombination of the spectrum of white light. Why is it essential that the two prisms used for the purpose should be identical and placed in an inverted position with respect to each other?

18. (a) Water is an elixir of life, a very important natural resource. Your Science teacher wants you to prepare a plan for a formative assessment activity, “How to save water, the vital natural resource”. Write any two ways that you will suggest to bring awareness in your neighbourhood, on ‘how to save water’.

(b) Name and explain any one way by which the underground water table does not go down further.

19. With the help of one example for each, distinguish between the acquired traits and the inherited traits. Why are the traits/experiences acquired during the entire lifetime of an individual not inherited in the next generation? Explain the reason of this fact with an example.
20. (a) Write the functions of each of the following parts in a human female reproductive system:

(i) Ovary
(ii) Uterus
(iii) Fallopian tube

(b) Write the structure and functions of placenta in a human female.

21. Why are certain compounds called hydrocarbons? Write the general formula for homologous series of alkanes, alkenes and alkynes and also draw the structure of the first member of each series. Write the name of the reaction that converts alkenes into alkanes and also write a chemical equation to show the necessary conditions for the reaction to occur.

22. (a) Nitrate-ductile dose when poured into a 5 m length of pipe, certain bimts were not visible. This ductile dose is the upper limit of the visible bimbs. Kiran asked the students to explain why.

(i) This 5 m length of pipe was not visible due to certain bimbs.

(ii) The conclusion of the students is that a certain type of lens would be required to see these bimbs. Would a different type of lens be required to see these bimbs?

(b) If this type of lens is used, the visibility of the bimbs is reduced by 5 m, this type of visibility is required.
(a) A student suffering from myopia is not able to see distinctly the objects placed beyond 5 m. List two possible reasons due to which this defect of vision may have arisen. With the help of ray diagrams, explain

(i) why the student is unable to see distinctly the objects placed beyond 5 m from his eyes.

(ii) the type of the corrective lens used to restore proper vision and how this defect is corrected by the use of this lens.

(b) If, in this case, the numerical value of the focal length of the corrective lens is 5 m, find the power of the lens as per the new Cartesian sign convention.

23. निम्नलिखित प्रेक्षण तालिका का विश्लेषण कीजिए, जिसमें उत्तल लेंस की स्थिति में बिंब-दूरी (u) के साथ प्रतिबिंब-दूरी (v) का विचरण दर्शाया गया है, और बिना कोई परिकल्पन किए ही निम्नलिखित प्रश्नों के उत्तर दीजिए:

<table>
<thead>
<tr>
<th>क्रम संख्या</th>
<th>बिंब-दूरी u (cm)</th>
<th>प्रतिबिंब-दूरी v (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-100</td>
<td>+25</td>
</tr>
<tr>
<td>2</td>
<td>-60</td>
<td>+30</td>
</tr>
<tr>
<td>3</td>
<td>-40</td>
<td>+40</td>
</tr>
<tr>
<td>4</td>
<td>-30</td>
<td>+60</td>
</tr>
<tr>
<td>5</td>
<td>-25</td>
<td>+100</td>
</tr>
<tr>
<td>6</td>
<td>-15</td>
<td>+120</td>
</tr>
</tbody>
</table>

(a) उत्तल लेंस की फोक्स दूरी क्या है? अपने उत्तर की पुष्टि के लिए कारण दीजिए।

(b) उस प्रेक्षण की क्रम संख्या लिखिए जो सही नहीं है। यह निष्कर्ष आपने किस आधार पर निकाला है?

(c) किसी उचित पैमाने को चुनकर क्रम संख्या 2 के प्रेक्षण के लिए किरण आरेख खींचिए। आवर्धन का लगभग मान भी ज्ञात कीजिए।
Analyse the following observation table showing variation of image-distance (v) with object-distance (u) in case of a convex lens and answer the questions that follow without doing any calculations:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Object-Distance u (cm)</th>
<th>Image-Distance v (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-100</td>
<td>+25</td>
</tr>
<tr>
<td>2</td>
<td>-60</td>
<td>+30</td>
</tr>
<tr>
<td>3</td>
<td>-40</td>
<td>+40</td>
</tr>
<tr>
<td>4</td>
<td>-30</td>
<td>+60</td>
</tr>
<tr>
<td>5</td>
<td>-25</td>
<td>+100</td>
</tr>
<tr>
<td>6</td>
<td>-15</td>
<td>+120</td>
</tr>
</tbody>
</table>

(a) What is the focal length of the convex lens? Give reason to justify your answer.

(b) Write the serial number of the observation which is not correct. On what basis have you arrived at this conclusion?

(c) Select an appropriate scale and draw a ray diagram for the observation at S.No.2. Also find the approximate value of magnification.

24. (a) यदि किसी दर्पण द्वारा उसके सामने स्थित बिम्ब की किसी भी स्थिति के लिए सदैव ही छोटा, सीधा और आभासी प्रतिबिम्ब बनता है, तो इस दर्पण की प्रकृति लिखिए और अपने उन्नत की पुष्टि के लिए किरण आरेख भी खींचिए। इस प्रकार के दर्पणों का एक उपयोग लिखिए तथा इनका उपयोग किसी किसी कीजिए।

(b) गोलीय दर्पणों की वक्रता त्रिज्या की परिभाषा लिखिए। किसी गोलीय दर्पण की प्रकृति और फोक्स दूरी ज्ञात कीजिए, जिसकी वक्रता त्रिज्या +24 cm है।

(a) If the image formed by a mirror for all positions of the object placed in front of it is always diminished, erect and virtual, state the type of the mirror and also draw a ray diagram to justify your answer. Write one use such mirrors are put to and why.

(b) Define the radius of curvature of spherical mirrors. Find the nature and focal length of a spherical mirror whose radius of curvature is +24 cm.
25. Study the following ray diagram:

In this diagram, the angle of incidence, the angle of emergence and the angle of deviation respectively have been represented by

(A) y, p, z
(B) x, q, z
(C) p, y, z
(D) p, z, y

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26. A student very cautiously traces the path of a ray through a glass slab for different values of the angle of incidence ($\angle i$). He then measures the corresponding values of the angle of refraction ($\angle r$) and the angle of emergence ($\angle e$) for every value of the angle of incidence. On analysing these measurements of angles, his conclusion would be

(A) $\angle i > \angle r > \angle e$
(B) $\angle i = \angle e > \angle r$
(C) $\angle i < \angle r < \angle e$
(D) $\angle i = \angle e < \angle r$

27. The given figures represent two lenses. Identify the correct options for each figure:

(A) The lens X is converging and the lens Y is diverging, and the focal length of lens X is 20 cm and that of lens Y is 25 cm.
(B) The lens X is diverging and the lens Y is converging, and the focal length of lens X is 10 cm and that of lens Y is 25 cm.
(C) The lens X is converging and the lens Y is diverging, and the focal length of lens X is 20 cm and that of lens Y is 25 cm.
(D) The lens X is diverging and the lens Y is converging, and the focal length of lens X is 20 cm and that of lens Y is 25 cm.

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Study the given ray diagrams and select the correct statement from the following:

(A) Device X is a concave mirror and device Y is a convex lens, whose focal lengths are 20 cm and 25 cm respectively.

(B) Device X is a convex lens and device Y is a concave mirror, whose focal lengths are 10 cm and 25 cm respectively.

(C) Device X is a concave lens and device Y is a convex mirror, whose focal lengths are 20 cm and 25 cm respectively.

(D) Device X is a convex lens and device Y is a concave mirror, whose focal lengths are 20 cm and 25 cm respectively.

28. A student obtains a blurred image of a distant object on a screen using a convex lens. To obtain a distinct image on the screen he should move the lens

(A) away from the screen

(B) towards the screen

(C) to a position very far away from the screen

(D) either towards or away from the screen depending upon the position of the object.
29. While studying the saponification reaction, what do you observe when you mix an equal amount of colourless vegetable oil and 20% aqueous solution of NaOH in a beaker?

(A) The colour of the mixture has become dark brown
(B) A brisk effervescence is taking place in the beaker
(C) The outer surface of the beaker has become hot
(D) The outer surface of the beaker has become cold

30. When you add a few drops of acetic acid to a test-tube containing sodium bicarbonate powder, which one of the following is your observation?

(A) No reaction takes place
(B) A colourless gas with pungent smell is released with brisk effervescence
(C) A brown coloured gas is released with brisk effervescence
(D) Formation of bubbles of a colourless and odourless gas
A student requires hard water for an experiment in his laboratory which is not available in the neighbouring area. In the laboratory there are some salts, which when dissolved in distilled water can convert it into hard water. Select from the following groups of salts, a group, each salt of which when dissolved in distilled water will make it hard.

(A) Sodium chloride, Potassium chloride
(B) Sodium sulphate, Potassium sulphate
(C) Sodium sulphate, Calcium sulphate
(D) Calcium sulphate, Calcium chloride

To perform an experiment to identify the different parts of an embryo of a dicot seed, first of all you require a dicot seed. Select dicot seeds from the following group:

Wheat, Gram, Maize, Pea, Barley, Ground-nut

(A) Wheat, Gram and Pea
(B) Gram, Pea and Ground-nut
(C) Maize, Pea and Barley
(D) Gram, Maize and Ground-nut
33. The following vegetables are kept in a basket:

Potato, Tomato, Radish, Brinjal, Carrot, Bottle-gourd

Which two of these vegetables correctly represent the homologous structures?

(A) Carrot and Tomato
(B) Potato and Brinjal
(C) Radish and Carrot
(D) Radish and Bottle-gourd

34. Draw in sequence (showing the four stages), the process of binary fission in Amoeba.
A student focuses the image of a candle flame, placed at about 2 m from a convex lens of focal length 10 cm, on a screen. After that he moves gradually the flame towards the lens and each time focuses its image on the screen.

(A) In which direction does he move the lens to focus the flame on the screen?
(B) What happens to the size of the image of the flame formed on the screen?
(C) What difference is seen in the intensity (brightness) of the image of the flame on the screen?
(D) What is seen on the screen when the flame is very close (at about 5 cm) to the lens?

36. त्यों शास्त्रात राने बनाने के लिए आवश्यक सामग्री (रासायनिक पदार्थ) का उठ्धेख कीजिए। साबुनीकरण अभिक्रिया के अभिक्रिया मिश्रण की प्रकृति (अम्लीय/क्षारीय) को निर्धारित करने वाला परीक्षण आप किस प्रकार करेंगे? संक्षेप में वर्णन कीजिए।

Mention the essential material (chemicals) to prepare soap in the laboratory. Describe in brief the test of determining the nature (acidic/alkaline) of the reaction mixture of saponification reaction.