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.
(viii) Question numbers 19 to 24 in Section A are five-marks questions. These are to be answered in about 70 words each.

(ix) 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.

(x) 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 तीनों 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 स्पष्टीकरण 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?

   पौधे  ➔  भेड़ ➔  मानव

   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 प्रतिबिंब के चार अभिलक्षणों (प्रकृति, स्थिति, आदि) की सूची बनाएं।

   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 बनाईए 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. \( \text{H}_2\text{SO}_4 \) at 443 K? Write the chemical equation for the reaction stating the role of conc. \( \text{H}_2\text{SO}_4 \) 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 does 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. How did Mendel explain that it is possible that a trait is inherited but not expressed in an organism?

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

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

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

15. 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?

16. “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.
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- treated dough sampled at 5 m depth did not contain any carbon. The depth of incorporation varied for different samples. The diagram in the section shows the depth of incorporation. The conditions necessary for the reaction to occur are:

(i) The depth of incorporation is
(ii) The reaction proceeds as follows:...
(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 प्रश्न तालिका का विश्लेषण कीजिए, जिसमें उत्तर लेंस की स्थिति में बिम्ब-दूरी (u) के साथ प्रतिबिम्ब-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>बिम्ब-दूरी u (cm)</th>
<th>प्रतिबिम्ब-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) उत्तर लेंस की फोक्स दूरी क्या है? अपने उत्तर की पुष्टि के लिए कारण दीजिए।
(b) उस प्रक्षण 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 प्रक्षण 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 बिंब की किसी भी स्थिति के लिए सदैव ही छोटा, सीधा और आभासी प्रतिबिम्ब बनता है, तो इस दर्पण की प्रकृति लिखिए और अपने उत्तर की पुष्टि के लिए किरण आरेख भी खींचिए। इस प्रकार के दर्पणों का एक उपयोग लिखिए तथा इनका उपयोग कैसे किया जाता है, उसका उद्देश्य 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. 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

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
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. दिए गए किरण आरेखों का अध्ययन कीजिए और निम्नलिखित में से सही कथन चुनिए :

(A) युक्ति X अवतल दर्पण है और युक्ति Y उत्तल लेन्स है, जिनकी फोक्स दूरियाँ क्रमशः 20 cm और 25 cm हैं ।
(B) युक्ति X उत्तल लेन्स है और युक्ति Y अवतल दर्पण है, जिनकी फोक्स दूरियाँ क्रमशः 10 cm और 25 cm हैं ।
(C) युक्ति X अवतल दर्पण है और युक्ति Y उत्तल दर्पण है, जिनकी फोक्स दूरियाँ क्रमशः 20 cm और 25 cm हैं ।
(D) युक्ति X उत्तल लेन्स है और युक्ति Y अवतल दर्पण है, जिनकी फोक्स दूरियाँ क्रमशः 20 cm और 25 cm हैं ।
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.

35. 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. Amoeba में द्विखण्डन की प्रक्रिया को (चार चरणों द्वारा) क्रमवार आरेख खींचकर दर्शाइए।

Draw in sequence (showing the four stages), the process of binary fission in Amoeba.

35. कोई छात्र 10 cm फोक्स दूरी के उत्तर लेंस का उपयोग करके लेंस से लगभग 2 m दूरी पर रखी मोमबत्ती की ज्वाला को परदे पर फोकसित करता है। इसके पश्चात् वह ज्वाला को धीरे-धीरे लेंस की ओर खिसकाता है और हर बार उसके प्रतिबिम्ब को परदे पर फोकसित करता है।

(A) परदे पर ज्वाला को फोकसित करने के लिए उसे लेंस को किस दिशा में खिसकाना होता है?
(B) परदे पर बने ज्वाला के प्रतिबिम्ब के साइज में क्या अन्तर होता है?
(C) परदे पर बने ज्वाला के प्रतिबिम्ब की तीव्रता (चमक) में क्या अन्तर दिखाई देता है?
(D) जब ज्वाला लेंस के बहुत पास (लगभग 5 cm दूरी पर) होती है, तो परदे पर क्या दिखाई देता है?
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. योगशाला में साबुन बनाने के लिए आवश्यक सामग्री (रासायनिक पदार्थों) का उल्लेख 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.