

Time allowed: **3 hours**; Maximum Marks: **90**

General Instructions:

1. The question paper comprises of two Sections, A and B. You are to attempt both the sections.
2. All questions are compulsory.
3. There is no choice in any of the questions.
4. All questions of Section A and all questions of Section B are to be attempted separately.
5. Question numbers **1 to 3** in Section A are one-mark questions. These are to be answered in one word or in one sentence.
6. Question numbers **4 to 6** in Section A are two-marks questions. These are to be answered in about 30 words each.
7. Question numbers **7 to 18** in Section A are three-marks questions. These are to be answered in about 50 words each.
8. Question numbers **19 to 24** in Section A are five-marks questions. These are to be answered in about 70 words each.
9. 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.
10. Question numbers **34 to 36** in Section B are two-marks questions based on practical skills. These are to be answered in brief.

Section A

1. Write the number of covalent bonds in the molecule of ethane.
2. Name the life process of an organism that helps in the growth of its population.
3. What will be the amount of energy available to the organisms of the 2nd trophic level of a food chain if the energy available at the first trophic level is 10,000 joules?
4. The absolute refractive indices of glass and water are $\frac{4}{3}$ and $\frac{3}{2}$, respectively. If the speed of light in glass is 2×10^8 m/s, calculate the speed of light in
 - (a) Vacuum
 - (b) Water
5. List two main causes of the pollution of water of the river Ganga. State how pollution and contamination of river water prove harmful for the health of the people of neighboring areas.
6. What is biodiversity? What will happen if biodiversity of an area is not preserved? Mention one effect of it.
7. List two tests for experimentally distinguishing between an alcohol and a carboxylic acid and describe how these tests are performed.
8. Draw the electron-dot structure for ethyne. A mixture of ethyne and oxygen is burnt for welding. In your opinion, why cannot we use a mixture of ethyne and air for this purpose?
9. Two elements 'P' and 'Q' belong to the same period of the modern periodic table and are in Group 1 and Group 2, respectively. Compare their following characteristics in tabular form:
 - (a) The number of electrons in their atoms
 - (b) The sizes of their atoms
 - (c) Their metallic character
 - (d) Their tendencies to lose electrons
 - (e) The formula of their oxides
 - (f) The formula of their chlorides
10. Taking the example of an element of atomic number 16, explain how the electronic configuration of the atom of an element relates to its position in the modern periodic table and how valency of an element is calculated on the basis of its atomic number.
11. List six specific characteristics of sexual reproduction.

12. What are chromosomes? Explain how in sexually reproducing organisms the number of chromosomes in the progeny is maintained.
13. List four points of significance of reproductive health in a society. Name any two areas related to the reproductive health which have improved over the past 50 years in our country.
14. Explain with an example for each, how the following provides evidences in favour of evolution in organisms:
 - (a) Homologous organs
 - (b) Analogous organs
 - (c) Fossils
15. Explain the following:
 - (a) Speciation
 - (b) Natural Selection
16. If the image formed by a mirror for all positions of the object placed in front of it is always erect and diminished, what type of mirror is it? Draw a ray diagram to justify your answer. Where and why do we generally use this type of mirror?
17. What is meant by scattering of light? Use this phenomenon to explain why the clear sky appears blue or the Sun appears reddish at sunrise.
18. Differentiate between biodegradable and non-biodegradable substances with the help of one example each. List two changes in habit that people must adopt to dispose non-biodegradable waste, for saving the environment.
19. Both soap and detergent are some type of salts. What is the difference between them? Describe in brief the cleansing action of soap. Why do soaps not form lather in hard water? List two problems that arise due to the use of detergents instead of soaps.
20.
 - (a) Name the human male reproductive organ that produces sperms and also secretes a hormone. Write the functions of the secreted hormone.
 - (b) Name the parts of the human female reproductive system where
 - i. Fertilization takes place
 - ii. Implantation of the fertilized egg occurs

Explain how the embryo gets nourishment inside the mother's body.

21. How do Mendel's experiments show that the
 - (a) Traits may be dominant or recessive
 - (b) Traits are inherited independently
22. What is meant by power of a lens? Define its SI unit. [5] You have two lenses A and B of focal lengths +10 cm and -10 cm, respectively. State the nature and power of each lens. Which of the two lenses will form a virtual and magnified image of an object placed 8 cm from the lens? Draw a ray diagram to justify your answer
23. One half of a convex lens of focal length 10 cm is covered with a black paper. Can such a lens produce an image of a complete object placed at a distance of 30 cm from the lens? Draw a ray diagram to justify your answer.
A 4 cm tall object is placed perpendicular to its principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 15 cm. Find the nature, position and the size of the image.
24. Write the importance of ciliary muscles in the human eye. Name the defect of vision that arises due to gradual weakening of the ciliary muscles. What types of lenses are required by the person suffering from this defect to see the objects clearly?
Akshay, sitting in the last row in his class, could not see clearly the words write on the blackboard. When the teacher noticed it, he announced if any student sitting in the front row could volunteer to exchange his seat with Akshay. Salman immediately agreed to exchange his seat with Akshay. He could now see the words written on the blackboard clearly. The teacher thought it fit to send the message to Akshay's parents advising them to get his eyesight checked.

In the context of the above event, answer the following questions:

- (a) Which defect of vision is Akshay suffering from? Which type of lens is used to correct this defect?
- (b) State the values displayed by the teacher and Salman.
- (c) In your opinion, in what way can Akshay express his gratitude towards the teacher and Salman?

Section B

25. What do we observe on pouring acetic acid on red and blue litmus papers?
 - (A) Red litmus remains red and blue litmus turns red.
 - (B) Red litmus turns blue and blue litmus remains blue.
 - (C) Red litmus turns blue and blue litmus turns red.
 - (D) Red litmus becomes colorless and blue litmus remains blue.

26. While preparing soap a small quantity of common salt is generally added to the reaction mixture of vegetable oil and sodium hydroxide. Which one of the following may be the purpose of adding common salt?
 - (A) To reduce the basic nature of the soap
 - (B) To make the soap neutral
 - (C) To enhance the cleansing power of the soap
 - (D) To favour the precipitation of the soap

27. A student takes about 4 ml of distilled water in four test tubes marked P, Q, R and S. He then dissolves in each test tube an equal amount of one salt in one test tube, namely sodium sulphate in P, potassium sulphate in Q, calcium sulphate in R and magnesium sulphate in S. After that he adds an equal amount of soap solution in each test tube. On shaking each of these test tubes well, he observes a good amount of lather (foam) in the test tube marked
 - (A) P and Q
 - (B) Q and R
 - (C) P, Q and S
 - (D) P, R and S

28. A student was asked to observe and identify the various parts of an embryo of a red kidney bean seed. He identified the parts and listed them as under:
 - I. Tegmen
 - II. Testa
 - III. Cotyledon
 - IV. Radicle
 - V. Plumule

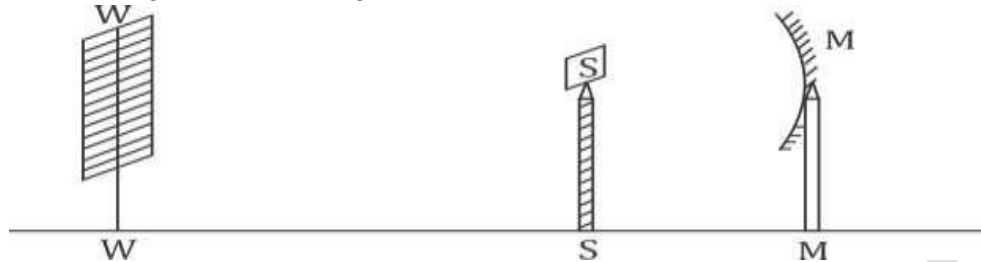
The correctly identified parts among these are

 - (A) I, II and III
 - (B) II, III and IV
 - (C) III, IV and V
 - (D) I, III, IV and V

29. Given below is the list of vegetables available in the market. Select from these the two vegetables having homologous structures:
 Potato, sweet potato, ginger, radish, tomato, carrot, okra (Lady's finger)
 - (A) Potato and sweet potato
 - (B) Radish and carrot

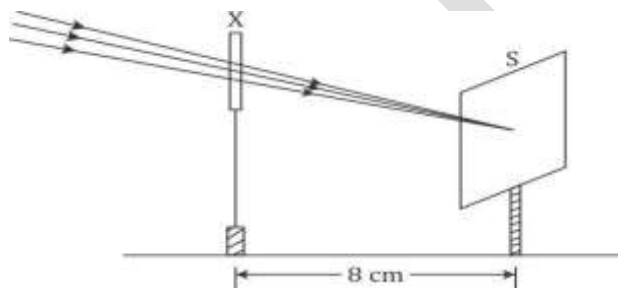
- (C) Okra and sweet potato
- (D) Potato and tomato

30. A student obtains a sharp image of the distant window (W) of the school laboratory on the screen (S) using the given concave mirror (M) to determine its focal length. Which of the following distances should he measure to get the focal length of the mirror?



- (A) MW
- (B) MS
- (C) SW
- (D) MW-MS

31. A student used a device (X) to obtain/focus the image of a well illuminated distant building on a screen (S) as shown below in the diagram. Select the correct statement about the device (X).



- (A) This device is a concave lens of focal length 8 cm.
- (B) This device is a convex mirror of focal length 8 cm.
- (C) This device is a convex lens of focal length 4 cm.
- (D) This device is a convex lens of focal length 8 cm.

32. A student traces the path of a ray of light through a rectangular glass slab for the different values of angle of incidence. He observes all possible precautions at each step of the experiment. At the end of the experiment, on analyzing the measurements, which of the following conclusions is he likely to draw?

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

33. A student traces the path of a ray of light through a triangular glass prism for different values of angle of incidence. On analyzing the ray diagrams, which one of the following conclusions is he likely to draw?
- (A) The emergent ray is parallel to the incident ray.
 - (B) The emergent ray bends at an angle to the direction of the incident ray.
 - (C) The emergent ray and the refracted ray are at right angles to each other.
 - (D) The emergent ray is perpendicular to the incident ray.
34. When you add sodium hydrogen carbonate to acetic acid in a test tube, a gas liberates immediately with brisk effervescence. Name this gas. Describe the method of testing this gas.
35. Students were asked to observe the permanent slides showing different stages of budding in yeast under high power of a microscope.
- (A) Which adjustment screw (coarse/fine) were you asked to move to focus the slides?
 - (B) Draw three diagrams in correct sequence showing budding in yeast.
36. A 4 cm tall object is placed on the principal axis of a convex lens. The distance of the object from the optical center of the lens is 12 cm and its sharp image is formed at a distance of 24 cm from it on a screen on the other side of the lens. If the object is now moved a little away from the lens, in which way (towards the lens or away from the lens) will he have to move the screen to get a sharp image of the object on it again? How will the magnification of the image be affected?