**SET- 2**

| Roll No. | | | | | | |
|---|---|---|---|---|---|---|

**Candidate must write the Set No. on the title page of the answer book.**

# SAHODAYA PREBOARD EXAMINATION – 2023-24

- Please check that this question paper contains **12** printed pages.
- Set number given on the top right hand side of the question paper should be written on the title page of the answer book by the candidate.
- Check that this question paper contains **39** questions.
- Write down the Serial Number of the question in the left side of the margin before attempting it.
- 15 minutes time has been allotted to read this question paper. The question paper will be distributed 15 minutes prior to the commencement of the examination. The students will read the question paper only and will not write any answer on the answer script during

# CLASS-X
## SCIENCE (086)

***Time allowed – 3hours*** ***Maximum marks - 80***

**General Instructions:**

i. This question paper consists of 39 questions in 5 sections.

ii. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.

iii. Section A consists of 20 objective type questions carrying 1 mark each.

iv. Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should be in the range of 30 to 50 words.

v. Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should be in the range of 50 to 80 words.

vi. Section D consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.

vii. Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts

## SECTION – A

***Select and write the most appropriate option out of the four options given for each of the questions 1 - 20. There is no negative mark for incorrect response.***

**1.** The correct pair of metal and non-metal that is liquid at room temperature: **1**

(a) Gallium and chlorine (b) Sodium and nitrogen

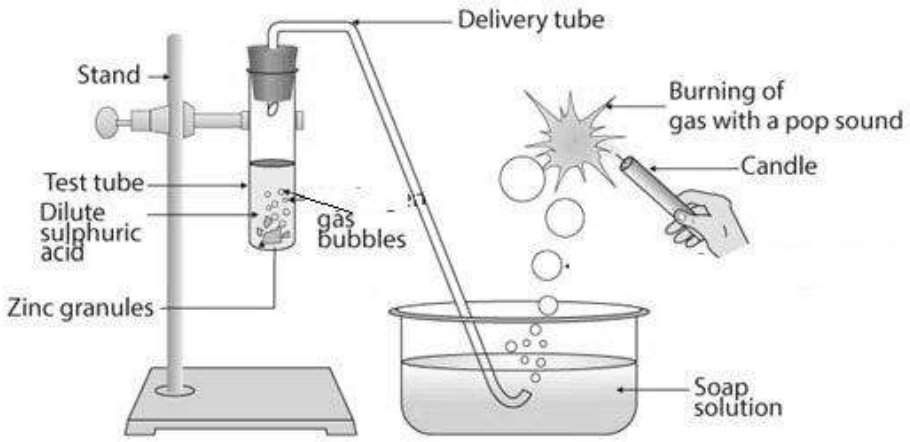
(c) Mercury and Bromine (d) Sodium and bromine

**2.** Identify the correct composition of solder: **1**

(a) Copper and zinc (b) Lead and tin

(c) Lead and mercury (d) Iron and carbon

**3.** **1**




What happens when dilute sulphuric acid is replaced with concentrated solution of sodium hydroxide and heated in the experiment shown in the above diagram?

(a) There is no reaction. (b) Carbon dioxide is released.

(c) Oxygen gas is released. (d) Hydrogen gas is released.

**4.** Name the gas released when Potassium carbonate reacts with Hydrochloric acid. **1**

(a) Hydrogen (b) Chlorine

(c) Carbon dioxide (d) Hydrogen sulphide

**5.** **p** Fe (s) + **q** $H_2O$ (g) → **r** $Fe_3O_4$(s)+ **s** $H_2$(g) **1**

When this equation is balanced, the coefficients **p, q, r** and **s** respectively are

(a) 3, 4,1, 4 (b) 1, 4, 3, 4

(c) 1, 3, 3, 4 (d) 3, 1, 3, 4

**6.** The reaction $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$ is an example of a: **1**

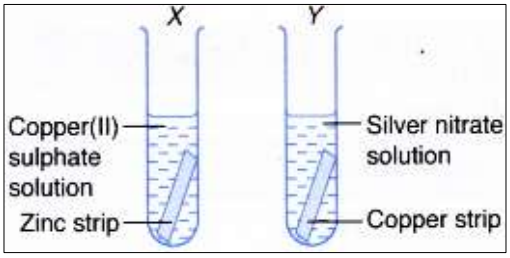
(i)displacement reaction (ii)combination reaction

(iii)redox reaction (iv)neutralisation reaction

(a) (i) and (iv) (b) (ii) and (iii)

(c) (i) and (iii) (d) (iii) and (iv)

**7.** Observe the diagram and identify the correct statement(s). **1**




(i) The colour of the solution becomes blue in test tube Y.

(ii) The colour of the solution remains blue in test tube X.

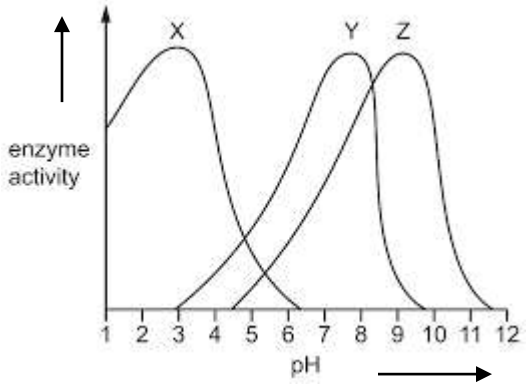
(iii) Copper metal will be deposited in test tube X.

(iv) Silver metal will be deposited in test tube Y.

(a) (i), (ii) and (iii) (b) (i), (iii) and (iv)

(c) (ii), (iii) and (iv) (d) (i), (ii) and (iv)

**8.** **1**




Study the above given graph and select the correct option which indicates appropriate names of the digestive enzymes with their respective locations in human body.

(a) X-Mouth , Y- Stomach, Z- Small intestine

(b) X- Stomach, Y- Mouth, Z- Small intestine

(c) X- Small intestine, Y- Mouth Z- Stomach

(d) X- Stomach, Y- Small intestine Z- Mouth

**9.** Consider the following two statements: **1**

(i) The trait that expresses itself in $F_1$ generation.

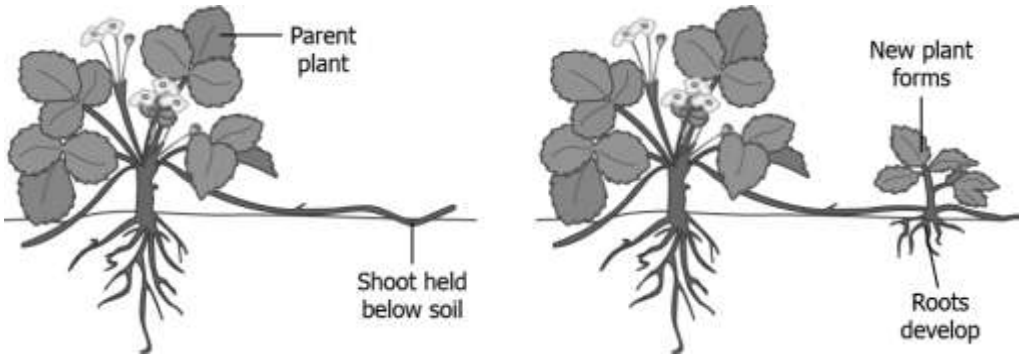
(ii) The trait that keeps on passing from one generation to another.

The appropriate terms for the statements (i) and (ii) respectively are:

(a) Recessive trait, dominant trait (b) Dominant trait , recessive trait

(c) Dominant trait , inherited (d) Recessive trait , inherited trait

**10.** The image shows the process of vegetative propagation in a plant. **1**




The shoot of the parent plant is pushed below the soil that results in growth of a new plant. What is the advantage of this process?

(a) This results in plant of different flowers.

(b) This helps to grow plants without adding extra manure.

(c) This eliminates the need of producing plant using seeds.

(d) This allows growth of plants with new genetic composition.

**11.** The function performed by sensory neuron is- **1**

(a) It transfers impulses from the receptor to the effector.

(b) It transfers impulses from the effector to the motor neuron.

(c) It transfers impulses from the receptor to the central nervous system.

(d) It transfers impulses from the central nervous system to the receptor.

**12.** The process in which loss of water in the form of vapour from the aerial parts of plants takes place is X which helps in Y. Here X and Y respectively are : **1**

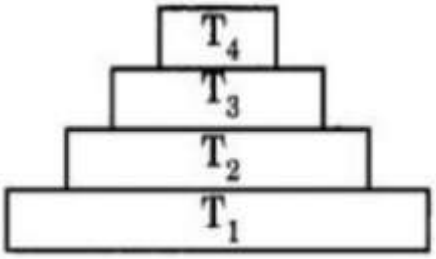
(a) Transpiration and photosynthesis

(b) Transpiration and temperature regulation

(c) Translocation and movement of soluble products of photosynthesis in phloem

(d) Translocation and absorption of water and minerals from soil by roots

**13.** In the given Figure, the various trophic levels are shown in a pyramid. At which trophic level, maximum energy is available? **1**




(a) T4 (b) T2

(c) T1 (d) T3

**14.** Find the statement which is not applicable for energy flow in an ecosystem. **1**

(a) The green plants in a terrestrial ecosystem capture about 10% of the energy of sunlight that falls on their leaves and convert it into food energy.

(b) When green plants are eaten by primary consumers, a great deal of energy is lost as heat to the environment.

(c) 10% can be taken as the average value for the amount of organic matter that is present at each step and reaches the next level of consumers.

(d) Food chains generally consist of only three or four steps.

**15.** A student writes the following statements: **1**

I. Stars appear raised due to atmosphere refraction.

II. Apparent length of the day increases due to atmospheric refraction.

III. Stars twinkle but planets do not. This happens on account of total internal reflection.

(a) All are correct. (b) I and II are correct, but III is incorrect.

(c) All are incorrect. (d) I and II are incorrect, only III is correct.

**16.** Same size of image is formed by a convex lens of focal length 20 cm . The distance between the object and image is **1**

(a) 0 cm (b) 20 cm

(c) 40 cm (d) 80 cm

***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 the Assertion(A)

(b) Both Assertion(A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the 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):** The amount of ozone in the atmosphere began to increase sharply in the 1980s. **1**

**Reason (R):** The United Nations Environment Programme (UNEP) succeeded in forging an agreement to freeze CFC production in 1987.

**18.** **Assertion(A) :** Fuse is a safety device always connected in series with neutral wire in a domestic circuit. **1**

**Reason (R) :** The fuse wire melts and breaks the circuit when current exceeds its safe limit in the circuit.

**19.** **Assertion(A):** A geneticist crossed a pea plant bearing violet flowers with another pea plant bearing white flowers and got 50% plants with violet flowers and 50% plants with white flowers in the $F_1$ progeny. **1**

**Reason** (R)**:** One parent plant was heterozygous violet flowered plant and the other was white flowered pea plant.

**20.** **Assertion (A):** $NH_4Cl$ is a neutral salt. **1**

**Reason (R):** Aqueous solution of ammonium chloride turns colour of blue litmus paper to red.

## SECTION-B

***Question No. 21 to 26 are very short answer questions***

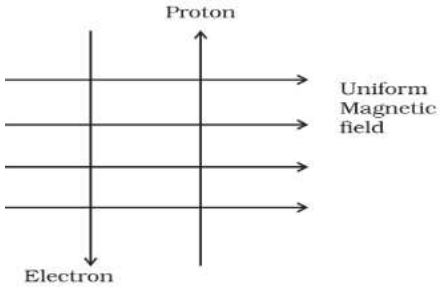
**21.** Phytoplankton ⟶ Zooplankton ⟶ Small fish ⟶ Large fish ⟶ Human being **2**

If 100 J of energy is available with zooplankton then calculate the amount of energy available with secondary consumer and tertiary consumer.

**22.** Two metallic wires of the same material are connected in parallel. Wire A has length ‘l’ and radius ‘r’, wire B has a length ‘2l’ and radius ‘2r’. Calculate the ratio of their equivalent resistance in parallel combination to the resistance of wire B. **2**

**OR**

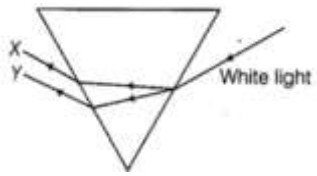
(a) A uniform magnetic field exists in the plane of paper pointing from left to right as shown in figure. In the field an electron and a proton move as shown. Predict the direction of force experienced by the electron and proton.




(b) State the rule used to determine the direction of force in the above case.

**23.** Name any two contraceptive methods adopted exclusively by human female to avoid unwanted pregnancy. State their side effects. **2**

**24.** A white light is incident on a prism as given in the figure. **X** and **Y** represent the extreme colours of the spectrum obtained due to the phenomenon Z of light. **2**




(a) Name **X,Y** and **Z**.

(b) Identify the colour that has more angle of refraction at the first surface of the prism.

**25.** With the help of an activity, explain the action of saliva on the food we eat. **2**

**OR**

In the process of digestion of food in human beings, two protein digesting enzymes are secreted. Name the enzymes along with the glands that secrete them.

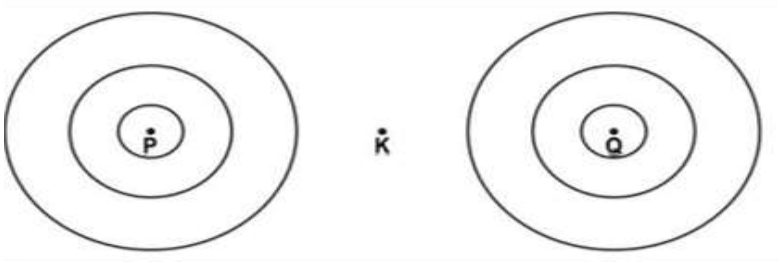
**26.** (a) Draw the electron dot structure of ethene. **2**

(b) Write the IUPAC name of: $\mathbf{CH_3CH(Cl)CH_2CH_3}$

## SECTION – C

***Question No. 27 to 33 are short answer questions***

**27.** **P** and **Q** represent two straight wires carrying equal current **(I)** in a direction perpendicular to the plane of the paper outwards. **K** is the midpoint of the line joining **P** and **Q**. The image shows the magnetic field lines around the wire. But the direction of the magnetic field is not marked. **3**




(a) Draw the above image and mark the direction of the magnetic field.

(b) If **B** is the magnetic field at point **K** due to the current in wire **P**, what will be the magnetic field due to **P** and **Q** at the midpoint **K**? Give a reason for your answer.

(c) If **B** is the magnetic field at point **K** due to the current in wire P and the current in wire **Q** is reversed, what will be the magnetic field at midpoint **K**? Give a reason for your answer.

**28.** (a) State the law that explains the heating effect of current with respect to the measurable properties in an electrical circuit. How does the heat developed in a conductor vary if current through it is doubled? **3**

(b) Why is tungsten used for filament of electric lamps? Give any two reasons.

**29.** Complete the following table **3**

| Sl No | Hormone | Endocrine Gland | Function |
|---|---|---|---|
| 1 | Growth Hormone | A | B |
| 2 | C | Pancreas | D |
| 3 | E | F | Heart beats faster resulting in supply of more oxygen to muscles to deal with emergency. |

**30.** (a) A real image 2/3rd of the size of an object is formed by a concave mirror when the object is at a distance of 12 cm from it. Find the focal length of the mirror. **3**

(b) State Snell's law of refraction of light.

**31.** Some fruit juice along with yeast powder was taken in a test tube and fitted with one- holed cork. The cork was fitted with bent glass tube. Then the free end of the glass tube was dipped into a test tube containing freshly prepared lime water. **3**

(a) State the changes observed in the lime water.

(b) Name the process involved in the test tube containing fruit juice.

(c) What are the end products of the above-mentioned process?

**32.** (a) An ore of metal '**X'** is found in nature as its carbonate. Metal '**X'** is used in galvanization of iron articles. Identify the metal '**X'** and name its ore. **3**

(b) We cannot use carbon to obtain sodium from sodium oxide. State the reason. Write the chemical reactions involved during the extraction of sodium metal from its ore.

**OR**

Metal **'M**' is a good conductor of heat and electricity and is used in making electric wires. Its ore is found in the form of sulphide.

(a) Name the metal **'M**' and its ore.

(b) Write chemical equations for the extraction of metal **'M**' from its sulphide ore.

**33.** (a) Define displacement reaction. **3**

(b) Write chemical equations for double displacement reaction which is also

(i) Neutralization reaction (ii) precipitation reaction. Justify your answer for each reaction.

## SECTION – D

***Question No. 34 to 36 are long answer questions.***

**34.** (a) How do Plasmodium and Leishmania reproduce? Write one difference in their mode of reproduction. **5**

(b) In a bisexual flower, after pollination the pollen grains land on the surface of Stigma. Represent this with a labelled diagram. (Any three labelings)

(c) Give two examples of unisexual flowers.

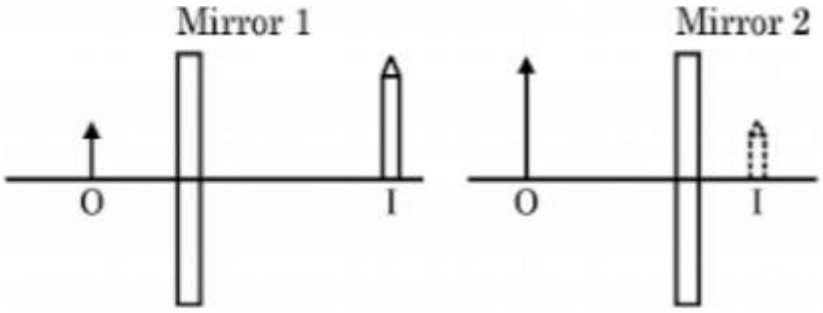
**OR**

(a) The communication between the central nervous system and the other parts of the body is facilitated by the peripheral nervous system. State the parts of the central nervous system and the peripheral nerves arising from them.

(b) While playing bare feet in a field, Rama accidentally stepped on a pointed object. He immediately moved back. Illustrate the situation diagrammatically in the form of a reflex arc.

(c) If you run your hand down the middle of your back, you will feel a hard, bumpy structure. Identify the structure and mention the part which it protects.

**35.** (a) Consider the figure given below and answer the following. **5**




**O= Object I =Image**

(i) Identify Mirror 1 and Mirror 2 and discuss one use of each.

(ii) Draw ray diagram to show image formation in the first case.

(b) On entering in a medium from air, the speed of light becomes half of its value in air. Find the refractive index of that medium with respect to air?

**OR**

(a) One-half of a convex lens of focal length 20 cm is covered with a black paper.

(i) Will the lens produce a complete image of the object? How will the intensity of the image formed by half covered lens vary compared with non-covered lens?

(ii) Show the formation of image of an object placed at $2F_1$ of such covered lens with the help of a ray diagram.

(iii) Find the magnification of the image formed in the above case.

(b) The absolute refractive indices of water and glass are 4/3 and 3/2 respectively. Find

(i) Refractive index of glass with respect to water.

(ii) Speed of light in water.

**36.** (a) How can ethanol and ethanoic acid be differentiated based on their chemical properties. Support your answer with a suitable chemical equation(s). **5**

(b) Draw the structures of possible isomers of pentane and write their names.

**OR**

(a) Write the balanced chemical equation for the following:

(i) Ethanol is heated at 443K in presence of excess concentrated sulphuric acid.

(ii) Ethanol is treated with sodium.

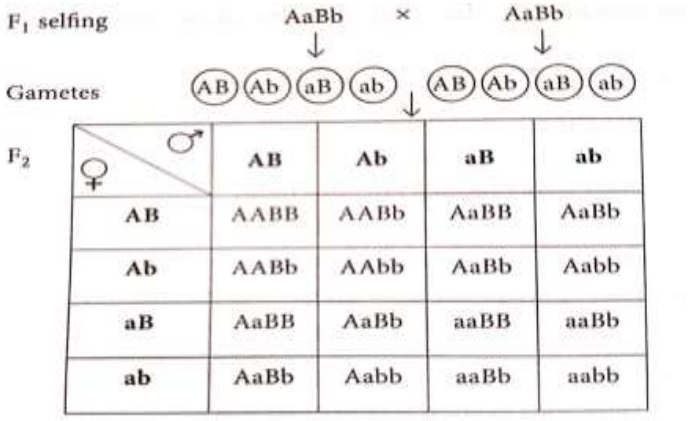
(b) Define saponification. Differentiate between soaps and detergents based on the following:

(i)Their chemical composition (ii)Their action in hard water

***SECTION-E***

*Question No. 37 to 39 are case-based/data -based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts.*

**37.** In a fruitfly, the (A) gene responsible for red eye colour is dominant over white eye colour (a) whereas (B) gene responsible for long wings is dominant over short wings(b). Consider the following dihybrid cross represented by Punnett square. **4**




| ♀ \ ♂ | AB | Ab | aB | ab |
|---|---|---|---|---|
| AB | AABB | AABb | AaBB | AaBb |
| Ab | AABb | AAbb | AaBb | Aabb |
| aB | AaBB | AaBb | aaBB | aaBb |
| ab | AaBb | Aabb | aaBb | aabb |

(a) How many progenies would have recombinant (new combination) phenotypes in $F_2$?

(b) Estimate the number of progenies that would have red eye colour and long wings.

(c) From the above Punnett square, write the four categories of phenotype obtained in $F_2$ generation.

**OR**

(c) State the phenotypic ratio of progeny in dihybrid cross and write the genotype of pure dominant progeny.

**38.** Suman went to attend her aunt's marriage with her family. She was amazed to see the decorations in the hall where fairy lights were used to decorate the hall. But she saw in one of the corners, an electrician was testing bulbs to find which one was fused. Suman wanted to **4**

know why the electrician spent a lot of time in locating the trouble and replacing the dead bulb. Her mother explained the reason that all the bulbs are joined in series. She also explained about heating effect of electric current where the heating element of a room heater converts electrical energy into heat energy.

(a) Based on the above text, why do you think Suman should connect the appliances used at home in parallel? Explain.

(b) How would you join three resistors, each of resistance 9 Ω so that the equivalent resistance of the combination is 3Ω?

(c) Out of Nichrome and Copper, which material should be preferred for making the heating element and why?

**OR**

(c) An electric heater of rating 1500W, 220V is switched on for half an hour daily. Find the current drawn and units of energy consumed by it daily.

**39.** Universal indicator is a mixture of several indicators. A scale for measuring hydrogen ion concentration in a solution called pH scale has been developed. The 'p' in pH stands for 'potenz' in German, meaning power. On the pH scale we can measure pH generally from 0 to 14. Acids and bases react to form salt and water. The nature of the salts formed depends on the strengths of acids and bases used. **4**

(a) Explain how antacids give relief from acidity.

(b) A basic salt '**X'** used for making soap is obtained by heating baking soda followed by crystallisation. Write the name and formula of the salt '**X'**.

(c) Two solutions **'M**' and **'N'** give red and blue colour respectively with a universal indicator. In which solution will the hydrogen ion concentration be more? Justify your answer.

**OR**

(c) If solutions of $CH_3COOH$ and NaOH are mixed and resultant mixture is tested with a universal indicator, it turns blue. What is the nature of the salt formed? Justify your answer.