COMMON PRE-BOARD EXAMINATION 2022-23

Subject: SCIENCE (086)

Date:

Max.Marks: 80

Duration: 3 hours

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 Answer type questions carrying **02 marks** each. Answers to these questions should 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 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 one most appropriate option out of the four options given for each of the questions 1-20

1. Which of the following chemical equations represent the combination reaction between two elements? 1

   (a) $N_2 + 3H_2 \rightarrow 2NH_3$

   (b) $CaO + H_2O \rightarrow Ca(OH)_2$

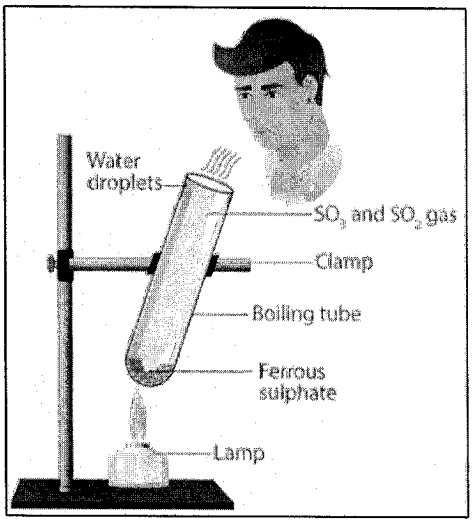
   (c) $2SO_2 + O_2 \rightarrow 2SO_3$

   (d) $NH_3 + HCl \rightarrow NH_4Cl$

2. Which one of the following can be used as an acid–base indicator by a visually impaired student? 1
   (a) Litmus
   (b) Turmeric
   (c) Vanilla essence
   (d) Methyl orange

3. When copper powder is heated, it gets coated with: 1
   (a) black copper oxide
   (b) yellow copper oxide
   (c) red copper oxide
   (d) none of these

4. 1



Which of the following statement(s) is (are) correct about the reaction shown in the above set up?

(a) It is a combination reaction
(b) It is a decomposition reaction by the release of heat
(c) It is a photochemical decomposition reaction
(d) It is a decomposition reaction and endothermic in nature

5. A solution reacts with metal carbonate or metal bicarbonate to produce a gas which turns lime water milky. The solution contains: 1

(a) Na_2SO_4
(b) $CaSO_4$
(c) H_2SO_4
(d) K_2SO_4

6. Hydrogenation of ethene leads to the formation of: 1

(a) Ethyne
(b) Methane
(c) Ethane
(d) Ethanol

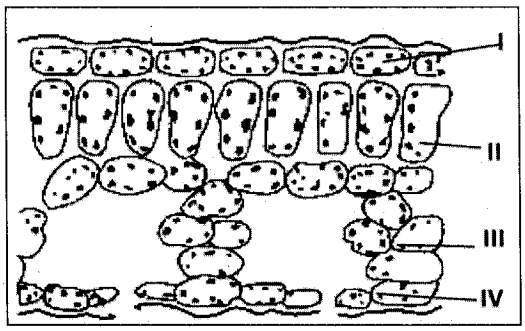
7. Which one of the following properties is not generally exhibited by ionic compounds? 1

(a) Solubility in water
(b) Electrical conductivity in the solid state
(c) High melting and boiling points
(d) Electrical conductivity in the molten state

8. If a pure tall pea plant is crossed with a pure dwarf pea plant then, what percentage of F1 and F2 generation respectively will be pure tall? 1

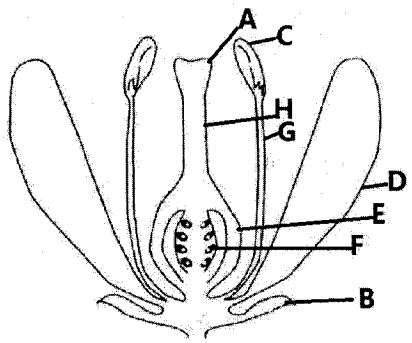
(a) 25%, 25%
(b) 50%, 50%
(c) 100%,75%
(d) 0%, 25%

9. In the given transverse section of the dicot leaf, identify the layer of cells where maximum stomata are present. 1



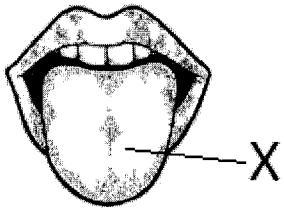
(a) I (b) II (c) III (d) IV

10. Which of the following parts shrivel away after the process of fertilization in a flower? 1



(a) A and E
(b) B and D
(c) G and E
(d) H and F

11. Identify the type of receptors present on the organ marked 'X' in the diagram? 1



(a) Thermoreceptor
(b) Olfactory receptor
(c) Gustatory receptor
(d) Photoreceptor

12. Name the cell components required for completion of aerobic respiration in a cell. 1

(a) Chloroplast and nucleus
(b) Ribosomes and ER
(c) Golgi body and lysosomes
(d) Cytoplasm and mitochondria

13. Unit of electric power may also be expressed as: 1

(a) kilowatt -hour
(b) Watt-second
(c) volt-ampere
(d) joule- second

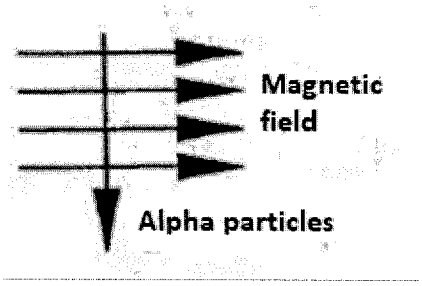
14. Which among the following statement is true for the wires used in the element of an electric heater and in a fuse? 1

(a) Element in heater has low melting point and fuse wire has high melting point
(b) Element in heater has high melting point and fuse wire has low melting point
(c) Element in heater as well as fuse wire will have very low resistance.
(d) None of these

15. A resistance wire has resistance R, is drawn to double its length. Then the its new resistance will be: 1

(a) R
(b) 2R
(c) R/4
(d) 4R

16. A stream of positively charged alpha particles enters a magnetic field at right angle to it as shown in the figure. 1



The direction of the force acting on the alpha particles will be :-

(a) To wards left
(b) Towards right
(c) Into the page
(d) Out of the page

Q.no 17 to 20 are Assertion - Reasoning based questions.

These consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true and R is not the correct explanation of A
(c) A is true but R is false
(d) A is False but R is true

17. **Assertion (A):** The aqueous solution of glucose and alcohol do not show acidic character. 1
Reason (R): Aqueous solution of glucose and alcohol do not give H^+ ions.

18. **Assertion (A):** The large intestine is the longest part of the alimentary canal. 1
Reason (R): Tiger has a shorter small intestine, than herbivores.

19. **Assertion (A):** Monohybrid cross deals with inheritance of one pair of contrasting characters. 1
Reason (R): Dihybrid cross deals with inheritance of two pairs of contrasting characters.

20. **Assertion (A):** The magnetic field inside a solenoid is uniform. 1
Reason (R): The magnetic field lines inside a solenoid are parallel.

SECTION B

Q.no 21 to 26 are very short answer questions

21. What is thermit reaction? Write the balanced chemical equation of this reaction. 2

OR

Write the balanced chemical equations involved in the extraction of Mercury from its ore Cinnabar.

22. How is venous blood vessel different from the arterial blood vessel circulating in our body? 2

23. Why are people living in mountain areas more prone to goitre? Which gland is affected in goitre and name the hormone secreted by the gland? 2

24. (a) If we tightly cover the leaves of a plant with a polythene bag and keep it under sunlight for an hour, we observe water droplets in the polythene bags. Why? 2

(b) Identify the tissue involved in the transport of food and name the process involved in transport of food in plants.

25. What is atmospheric refraction? List any two natural phenomena which can be explained on the basis of atmospheric refraction. 2

OR

List two essential conditions for observing a rainbow. Draw a well labelled diagram for the formation of rainbow.

26. It is important to create an awareness on avoiding the use of single use plastic bags and water bottles by people going for fishing into oceans. Justify. 2

SECTION C

Q.no 27 to 33 are short answer questions

27. (a) Aqueous solutions of lead nitrate and potassium iodide are mixed together in a test tube. What change in colour will you observe? Write balanced equation for the reaction and identify the type of reaction. 3

(b) Identify the reducing agent and oxidizing agent in the following reaction.

$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

28. (a) A white powdery substance having strong smell of chlorine is used for disinfecting water. Write the chemical equation for its preparation. 3

(b) While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid?

(c) A farmer has found that pH of the soil in his field is 4.2. Name any two chemical substances that he can mix with the soil to adjust the pH.

29. "A reflex is a response to a stimulus that is processed in the central nervous system without the need for conscious thought". Support this statement with an example. 3

OR

(a) What happen when a large part of the small intestine has been removed from our body?

(b) Describe the function of pancreas in human digestion.

30. A student focused the image of a candle flame on a white screen by placing the flame at various distances from the convex lens. He noted his observation in the following table. 3

SI NO:	Distance of the flame from the lens(cm)	Distance of the screen from the lens(cm)
i.	20	60
ii.	24	40
iii.	30	30
iv.	40	24
v.	70	12

Analyse the above table and give the answers for the following questions:

(a) What is the focal length convex lens?

(b) Which set of observation is incorrect and why?

(c) Draw ray diagram for observation (iv)

(d) Find the magnification for observation (iii).

31. Raju holding a mirror in his hand, directed the reflecting surface of that mirror towards the Sun. He then directed the reflected ray to a sheet of paper held close to the mirror. 3

(a) Which type of mirror does he have?

(b) What should he do to burn the paper?

(c) Will he be able to determine the approximate focal length of this mirror from this activity? Give reason and draw a diagram to justify your answer in this case.

32. (a) List out any two distinguishing features between a current carrying solenoid and a bar magnet. 3

(b) The following diagram shows a straight conductor carrying some current in the given direction. Copy the diagram and draw the magnetic field lines around it showing the direction.

OR

With the help of a labelled diagram explain the distribution of magnetic field due to a current through a circular loop. How does the strength of magnetic field at the centre of the circular loop depend on :

(i) Radius of the loop

(ii) Number of turns of the loop

33. Explain how the pesticides enter a food chain and subsequently get into our body with an example. 3

SECTION D

Q.no.34 to 36 are long answer questions

34. (a) A sweet smelling compound 'X' is formed by the reaction of a carboxylic acid $C_2H_4O_2$ and an alcohol C_2H_6O in presence of few drops of con. H_2SO_4. 5
Identify the compound 'X' and name the reaction. Also write the chemical equation of this reaction.

(b) Draw the electron dot structure of Ethane [C_2H_6] molecule.

(c) Soaps does not form lather with hard water. Why?

(d) Write the next higher homologue of C_2H_2 and C_5H_{12}.

OR

(a) Write the IUPAC name of the following compounds.

(i) CH_3-CH_2-CH_2-CHO (ii) CH_3-CH_2-CH_2-Cl

(b) Can you distinguish between saturated and unsaturated hydrocarbons by burning them? Justify your answer.

(c) How will you convert Ethanol to Ethanoic acid? Write the chemical equation only.

(d) Complete the following reaction:

$$CH_3\text{-}CH_2\text{-}OH \xrightarrow[443\ K,\ Conc.\ H_2SO_4]{} $$

35. Mint propagated in the soil over time it occupies all available space. Later after a few weeks, rust, a fungal infection, appear as brown spots on stems, petioles, and mid-veins of leaves. 5

(a) State the type of reproduction exhibited by mint?

(b) What are the advantages of vegetative propagation?

(c) Name the asexual mode of reproduction exhibited by fungus?

(d) Mention any one condition needed for fungi to grow?

(e) What are sporangia?

OR

Draw a neatly labelled diagram of the excretory system in humans and describe how the urine is formed?

36. (a) Apply Ohm's law to obtain the relation for combined resistance when three resistors R_1, R_2 and R_3 are connected in series. 5

(b) Write any two advantages of connecting resistors in parallel combination.

(c) A set of 'n 'identical resistors each of resistance R are connected in series and the effective resistance is found to be 'X'. When these same resistors are connected in parallel, the effective resistance is found to be Y. Find the ratio of X to Y.

SECTION E

Q.no 37 to 39 are case based or data-based questions with 2 to 3 short sub- parts. Internal choice is provided in one of these sub parts.

37. A student, took four metals **P, Q, R** and **S** and carried out different experiments to study the chemical reactions of metals. Some of the observations were: 4

(i) Metal **'P'** combined with oxygen and formed an oxide $\mathbf{M_2O_3}$ which reacted with both acids and bases.

(ii) Metal **'P'** did not react either with cold or hot water, but reacted with steam.

(iii) Metal **'Q'** reacted with hot water and **'R'** reacted violently with cold water.

(iv) Metals **P, Q and R** reacted with sulphuric acid and formed the corresponding metal salt and hydrogen gas.

(v) Metal **'S'** did not react with water at all.

Based on the above observations, answer the following questions.

(a) Identify metal 'Q' and metal 'R'.

(b) Arrange the above metals in the increasing order of their reactivity.

(c) What is the nature of M_2O_3? Also mention one example of a metal oxide of this type and write the chemical equation of its reaction with hydrochloric acid.

OR

(c) Generally hydrogen gas is not evolved when a metal reacts with nitric acid. Why? Can you name any two metals that react with dilute nitric acid to evolve H_2 gas?

38. Sex determination is the method by which distinction between males and females is established in a species. The sex of an individual is determined by specific chromosomes. These chromosomes are called sex chromosomes or allosomes. X and Y chromosomes are called sex chromosomes. The normal chromosomes other than the sex chromosomes of an individual are known as autosomes. 4

(a) With the help of a diagram show the mode of sex determination in human beings.

(b) Why do you think mother is not responsible for the sex of the child?

(c) Define contraception? Mention a methods to avoid transmission of STD.

OR

(c) Name any two sexually transmitted bacterial infection.

39. In 1660s English physicist and mathematician Sir Isaac Newton began a series of experiments with sunlight and prisms. Newton saw that once the white light is passed through the prism and had been refracted, it not only changed the direction to shine onto the opposite wall, it also separated into a multi-coloured band of light showing a rainbow effect. Visible light waves consist of different wavelengths. These wavelengths range from 380 nanometres to 700 nanometres. He tried to split the spectrum of white light further by using another prism. He then placed the second identical prism in the inverted position with respect to the first prism. He found that the spectrum of light combines to form white light once it comes out of the second prism. This happens because two alternatively inverted prisms can be imagined to join together and form a rectangular glass slab in shape. Keeping a third alternatively inverted prism would again split the light emerging from the second prism. Hence it can be extended that even number of prisms will not produce a spectrum while an odd number will do. 4

(a) What is the range of wave length of the visible spectrum?

(b) Which colour is deviated more and which is deviated least while a beam of white light is passed through a prism?

(c) Why do different colours of white light bend through different angles with respect to the incident beam of light while passing through a prism? Will the refractive index of the glass be same for all the different colours?

OR

(c) Draw the path of white light when it passes through two identical prisms out which the second prism is in inverted position with respect to the first one.