COMMON PRE-BOARD EXAMINATION 2024-25

Subject: SCIENCE – (086)

Date: 12/12/2024

Max. Marks: 80 Time Allowed: 3 hours

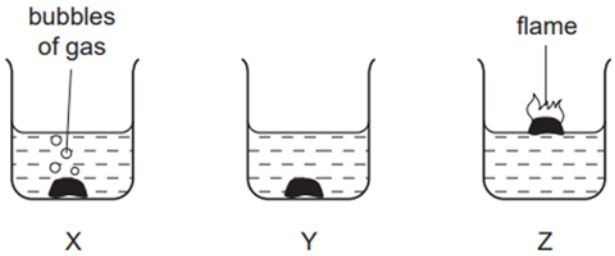
General Instructions:

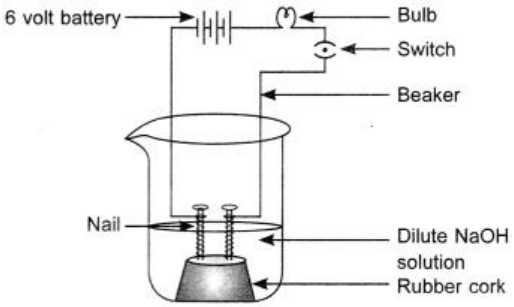
Read the following instructions very carefully and strictly follow them:

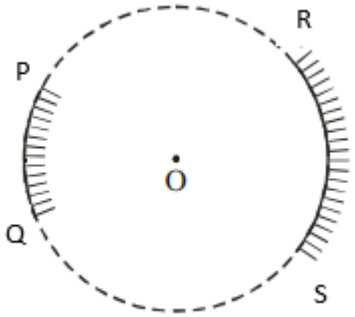
1. This question paper comprises 39 questions. All questions are compulsory.
2. Section A would have 16 simple/complex MCQs and 04 Assertion-Reasoning type questions carrying 1 mark each.
3. Section B would have 6 Short Answer (SA) type questions carrying 02 marks each.
4. Section C would have 7 Short Answer (SA) type questions carrying 03 marks each.
5. Section D would have 3 Long Answer (LA) type questions carrying 05 marks each.
6. Section E would have 3 source based/case based/passage based/integrated units of assessment (04 marks each) with sub-parts of the values of 1 & 2 marks.
7. Draw neat figures wherever required.

Section-A

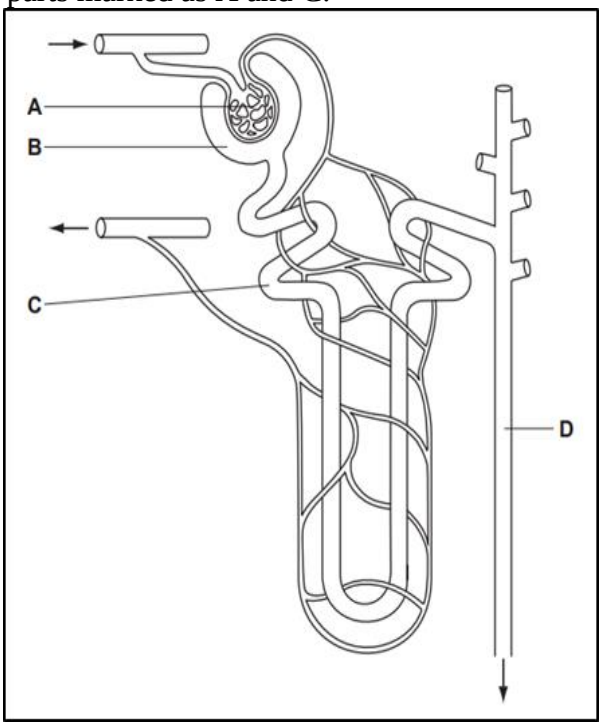
Question 1 to 16 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

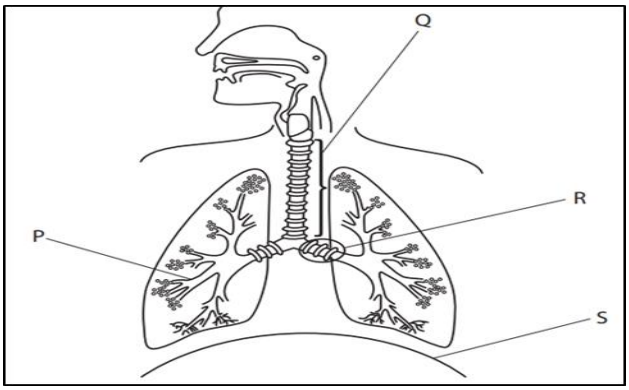
1	Which of the following is an example of a single displacement reaction? A. The electrolysis of water. B. The burning of methane. C. The reaction of a metal with an acid. D. The reaction of two salt solutions to form a precipitate.	1
2	The diagrams show what happens when three different metals are added to water. Identify X, Y and Z.  A. X: Calcium, Y: Copper, Z: Potassium B. X: Copper, Y: Calcium, Z: Potassium C. X: Potassium, Y: Calcium, Z: Copper D. X: Potassium, Y: Copper, Z: Calcium	1

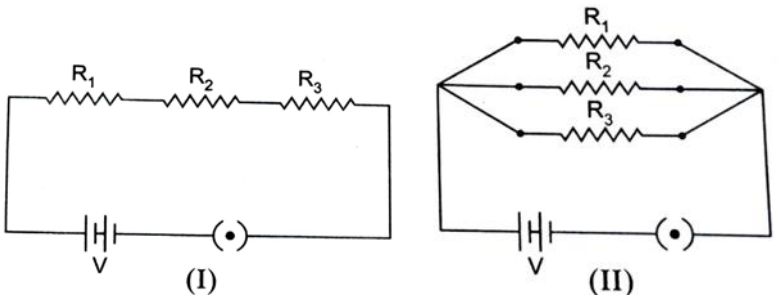
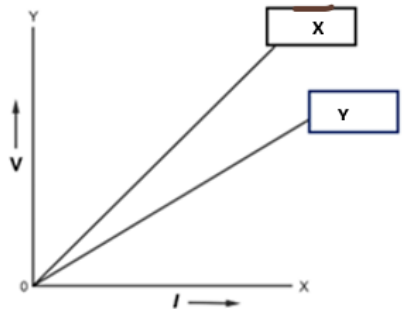
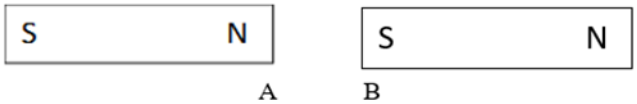
3	The oxide of element X forms a solution with pH 4. The oxide of element Y forms a solution that turns the universal indicator blue. The elements X and Y respectively are: A. X-Metal, Y-Metal B. X-Metal, Y- Non-metal C. X-Non-metal, Y-Metal D. X-Non-metal, Y-Non-metal	1
4	The apparatus given below was set up to demonstrate electrical conductivity.  Which of the following statement(s) is (are) correct? (i) Bulb will not glow because the electrolyte is not acidic. (ii) Bulb will glow because NaOH is a strong base and furnishes ions for conduction. (iii) Bulb will not glow because the circuit is incomplete. (iv) Bulb will not glow because it depends upon the type of electrolytic solution. A. (i) and (iii) B. (ii) only C. (ii) and (iv) D. (iv) only	1
5.	In an experiment, three beakers labelled A, B, and C, each containing 50 ml of water were taken. Concentrated H_2SO_4, solid CaO, and solid NH_4Cl were added to beakers A, B, and C respectively. It was noted that in beakers A and B there was an increase in temperature of the solution, while in beaker C, a decrease in temperature of the solution. Which of the following statements about the reactions occurring in these beakers is correct? (i) In beakers A and B, exothermic process has occurred. (ii) In beakers A and B, endothermic process has occurred. (iii) In beaker C exothermic process has occurred. (iv) In beaker C endothermic process has occurred. A. (i) only B. (ii) only C. (ii), (iii) and (iv) D. (i) and (iv)	1
6	The electronic configurations of four elements P, Q, R and S are given. Elements / Electronic configuration P — 2,8 Q — 2,8,2 R — 2,4 S — 2,6 Which of the following pairs will form ionic compounds? A. P and Q B. P and S C. Q and R D. Q and S	1

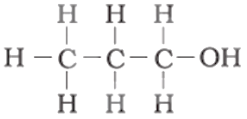
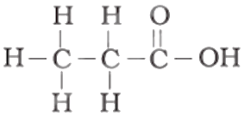
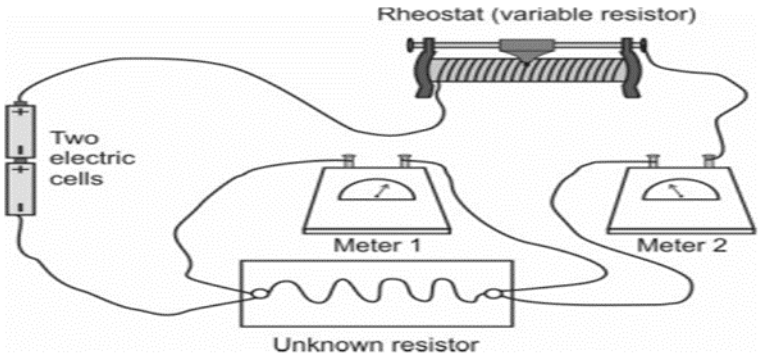
7	In a laboratory, four students attempted to perform a decomposition reaction. Each one followed different method as mentioned below. Student-1: Heated aqueous solution of Iron sulphate in a solution. Student-2: Added Zinc granules to Iron sulphate in a test tube and then heated the mixture. Student-3: Heated crystals of Iron sulphate in a test tube. Student-4: Heated crystals of Iron sulphate along with Copper sulphate crystals in a china dish. The student who adopted the correct method is: A. Student-1 B. Student-2 C. Student-3 D. Student-4	1
8	PQ and RS, two spherical mirrors, form part of a hollow spherical ball with its centre at O as shown in the diagram. If arc PQ = 1/2 arc RS, what is the ratio of their focal lengths?  A.2:1 B. 1:1 C. 1:2 D. 2:3	1
9	Rohit made a few statements regarding the parts and functions of the human eye. Which of these statements are true? (i) Ciliary muscles increase or decrease the curvature of the eye lens. (ii) Iris carry electrical signals generated by the image to the brain. (iii) Retina is a delicate membrane having the enormous number of light sensitive cells. (iv) Pupil regulates and controls the amount of light entering the eye. (v) Crystalline lens is diverging in nature. A. i, iii, v B. i, iii, iv C. ii, iii, iv D. i, iv, v	1
10	As compared to daytime, the amount of carbon dioxide released by the plants during night is more because: A. It is not produced during daytime. B. It is stored in the leaves of plants during daytime. C. Major amount of carbon dioxide produced is used up for photosynthesis during daytime. D. Plants do not respire during daytime.	1
11	Diffusion alone is insufficient for oxygen delivery in large animals. Choose the correct reason for the given statement. A. Large animals have a low metabolic rate that requires rapid oxygen transport. B. The distance for oxygen to diffuse increases with body size, leading to insufficient oxygen levels in deeper tissues. C. Large animals have more complex respiratory systems that only work efficiently with diffusion. D. Large animals require ATP transport mechanisms to move oxygen over long distances.	1

12	The loss of water from the leaves of the plant is transpiration. How is this process beneficial for the plant? A. It helps in the downward movement of the water. B. It helps the plant to maintain temperature on hot sunny days. C. It acts as a driving force for distribution of food in plant's body. D. It helps maintain a constant level of minerals in the soil around the plant.	1
13	Why have reflex arcs evolved in animals? A. Reflex arcs allow immediate response to stimuli without involving the brain, preventing injury. B. Reflex arcs are a way for the brain to think and act during emergencies. C. Reflex arcs are slower than normal brain processing but more accurate. D. Reflex arcs evolved because they bypass sensory organs.	1
14	How does an alteration in the gene for a specific enzyme affect plant height? A. The alteration increases the production of DNA, leading to a taller plant. B. The altered gene reduces the enzyme's efficiency, resulting in less hormone production and a shorter plant. C. The altered gene enhances the enzyme's function, producing more hormones and making the plant shorter. D. The gene directly controls plant height without involving enzymes or hormones.	1
15	Which of the following statements accurately describes the unidirectional flow of energy in an ecosystem? A. Energy is recycled and used repeatedly by all organisms at various trophic levels. B. Energy flows in a cyclic manner, moving from one trophic level to another and returning to the producers. C. Energy flows in one direction from producers to consumers, with some energy lost as heat at each trophic level. D. Energy flows only from consumers to producers in an ecosystem.	1
16	If the total energy at the trophic level of producers in an ecosystem is 'E', then which of the following corresponds to the energy available to the tertiary consumers? A. E/10 B. 10 x E C. E/1000 D. 1000 x E	1
	Assertion–Reason type questions Question No. 17 to 20 consist of two statements – **Assertion (A)** and **Reason (R)**. Answer these questions by 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)**: When lead nitrate is heated, it produces green coloured fumes. **Reason(R)**: Nitrogen dioxide gas is produced as a byproduct due to the decomposition of lead nitrate.	1

18	**Assertion (A)**: Bacteria that can withstand heat will survive better during a heat wave. **Reason (R)**: Selection of variants by environmental factors forms the basis for evolutionary processes.	1
19	**Assertion (A):** When the weather is foggy or smoggy, the beam of headlights becomes visible. **Reason(R):** Tyndall effect is responsible for making the path of light visible.	1
20	**Assertion (A):** Food webs are more stable than food chains. **Reason (R):** Food webs consist of multiple interconnected food chains that provide alternative pathways for energy flow.	1
	Section B Question No. 21 to 26 are very short answer questions	
21	In a laboratory experiment, students are given dilute hydrochloric acid along with marble chips and zinc granules. Write the chemical equations for the reactions that take place when marble chips and zinc granules are added separately to hydrochloric acid taken in test tubes.	2
22	Nidhi needs a lens of power −2.5D for the correction of the vision. A. What is the focal length and nature of the corrective lens? B. Draw a ray diagram showing the defective eye.	2
23	*Attempt either option A or B.* A. A wire of resistance 24 Ω is bent to form a closed square. What is the resistance across the diagonal of the square? **OR** B. An 18 Ω resistor is cut into three equal parts and connected in parallel. Find the equivalent resistance of the combination.	2
24	Elaborate the functions of parts marked as A and C. 	2

25	*Attempt either option A or B.* **A**. A variegated leaf with green and yellow patches is used for an experiment to prove that chlorophyll is required for photosynthesis. Before the experiment the green portions (A), and the pale-yellow portions (B), are observed. (i) What will be the colour of 'A' just before and after the starch test? (ii) Write a balanced equation for photosynthesis. **OR** **B.** The diagram shows part of the human thorax.  (i) What is Q? Explain the unique structural feature of the part. (ii) Explain the role of structure **S** when a person breathes out.	2
26	A study reveals that a pesticide used in agricultural practices is affecting the local wildlife. Create a terrestrial food chain with four trophic levels. How do these pesticides affect the members of food chain?	2
	Section-C **Question No. 27 to 33 are short answer questions.**	
27	A. A reddish brown coloured metal is obtained by heating its sulphide ore in the presence of air. Identify the metal and its ore and give the chemical reactions involved. B. During the reaction of some metals with water, the following observations were made. (i) Sodium metal catches fire on reaction. (ii) Some bubbles of gas are seen when calcium reacts with water. Explain these observations.	3
28	*Attempt either options A or B.* A. (i) State the chemical name of Plaster of Paris. Write the chemical equation to show the reaction between Plaster of Paris and water. (ii) Classify the following salts into acidic, basic and neutral: Potassium sulphate, Ammonium chloride, Sodium carbonate. **OR** B. (i) Two solutions M and N give red and blue colour respectively with a universal indicator. (a) In which solution will the hydrogen ion concentration be more? Justify your answer. (b) If both M and N solutions are mixed and the resultant mixture is tested with a universal indicator, it turns green. What is the nature of the salt formed? Justify your answer. (ii) Write the balanced chemical equation for the reaction between iron and steam.	3

29	Two electric circuits I and II are shown below.  A. While performing the experiments on circuits I and II with the three given resistors R_1, R_2 and R_3, a student plotted a V-I graph. Identify 'series' and 'parallel' on the plotted curve.  B. Through which circuit more current passes? C. In which circuit, the potential difference across each resistor is different? D. If $R_1 > R_2 > R_3$, in which circuit, more heat will be produced in R_1, as compared to other two resistors? Justify E. Name an instrument that measures potential difference between two points in a circuit.	3
30	A. Amaan placed a pencil perpendicular to principal axis in front of a converging mirror of focal length 20 cm. A virtual image formed is twice the size of the pencil. Calculate the distance of the object from the mirror. B. A ray of light falls normally on the surface of a transparent glass slab. Draw a ray diagram to show its path and also mark angle of incidence and angle of emergence.	3
31	A. Two magnets are lying side by side as shown below. Draw magnetic field lines between poles A and B.  B. The magnetic field in a given region is uniform. Draw a diagram to represent it. C. A current carrying conductor kept in a magnetic field experiences a force. List the factors on which the direction of this force depends.	3
32	A. How does the stomach protect itself from the acidic environment created by gastric juice? What might happen if this protective mechanism fails? B. How is excess glucose stored in the human body?	3

33	A dihybrid cross is conducted between a pea plant with tall stems and purple flowers (TTPP) and a plant with short stems and white flowers (ttpp). The F1 progeny were all plants with tall stems and purple flowers (TtPp). A. Which new combinations of traits apart from the parental trait can be expected in the F2 generation when the F1 plants are self-pollinated? B. If a total of 400 plants are produced in the F2 generation, how many plants are expected to show the new combinations of traits? Give a reason in support of your answer.	3
	Section-D **Question No. 34 to 36 are long answer questions.**	
34	*Attempt either option A or B.* A. (i) Draw the electron dot structure of the simplest saturated hydrocarbon. Name this hydrocarbon. (ii) The molecular formulae of two alkynes, A and B are C_xH_2 and C_3H_y. (a) Find the values of x and y. (b) Name the compounds A and B. (iii) Write the structures of two compounds having molecular formula C_3H_6O and give their names. **OR** B. (i) Identify and name the functional groups present in the following compounds. (a)  (b)  (ii) Write the name and general formula of a chain of hydrocarbons in which an addition reaction with hydrogen can take place. (iii) A compound X is formed by the reaction of carboxylic acid $C_2H_4O_2$ and an alcohol C_2H_6O in presence of few drops of conc.H_2SO_4. Identify X and write the chemical equation for its formation.	5
35	*Attempt either option A or B.* A. The diagram below shows how Sreeya had connected a circuit to verify Ohm's law.  (i) Identify which one of the devices in the circuit is a voltmeter. Justify your answer. (ii) State Ohm's law.	5

(iii) Draw a circuit diagram with appropriate symbols for the circuit shown in the diagram above.
(iv) Keeping the potential difference constant, the resistance of a circuit is tripled. By what factor does the current change in the circuit?

OR

B.

Electrical resistivities of some substances, in ohm-metres, at 20^0C are given as follows.

Silver	Copper	Tungsten	Mercury	Iron	Nichrome
1.60×10^{-8}	1.62×10^{-8}	5.2×10^{-8}	94×10^{-8}	10×10^{-8}	10×10^{-6}

(i) Out of the silver and tungsten, which one is a better conductor of electric current and why?
(ii) How will the resistivity of iron change when its length is tripled by stretching it?
(iii) Name the material that you would advise to use in the heating element of an electric heating device and why?
(iv) A given length of a copper wire is doubled on itself and this process is repeated once again. By what factor does the resistance of the copper wire change?

36 | *Attempt either option A or B.* | 5

A.
(i) A new Bryophyllum plant is genetically the same as the parent plant, but a child of human parents is genetically not the same as its parents. Why?
(ii) Depict the process of pollen germination with the help of a neat diagram and label the following parts.
(a) Ovary
(b) Male germ cell
(c) Female germ cell

OR

B.
(i) How is the sperm genetically different from the egg?
(ii) Draw the diagram of the female reproductive system and mark the part(s):
(a) where the block is created surgically to prevent fertilisation.
(b) where Copper-T is inserted.

Section – E

Question No. 37 to 39 are case-based/data-based questions.

37 | 4

Ionic compounds are formed by the transfer of electrons from a metal to a non-metal. Every element tends to attain a completely filled valence shell of its nearest noble gas or a stable octet. Ionic compounds have high melting points and boiling points. The melting point and boiling point of NaCl are 1074 K and 1686 K respectively.

A. Write the chemical reactions taking place at cathode and anode during electrolytic reduction of sodium chloride. We cannot use carbon to obtain sodium from sodium oxide. Why? (2)

Attempt either subpart B or C.

B. Name the product formed when ethanol reacts with sodium. The melting point and boiling point of ethanol are lower than that of sodium chloride. Why? (2)

OR

C.
(i) List two properties of ionic compounds other than high melting and boiling points.
(ii) Show the formation of $MgCl_2$ by the transfer of electrons. (2)

38	Refractive index of some medium is given below. |	
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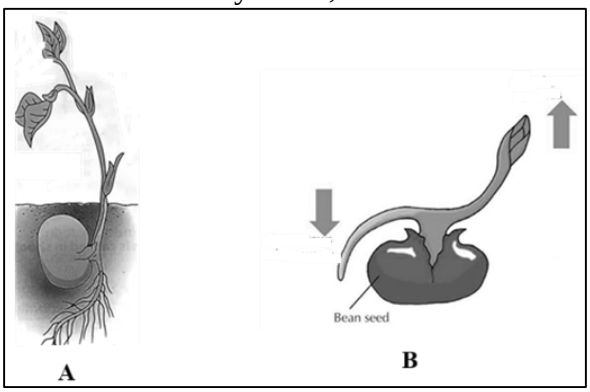
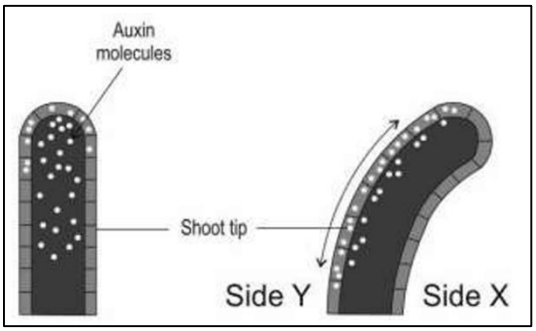
Crown glass	1.52
Sapphire	1.77
Water	1.33
Ruby	1.71 | A. In which medium, the speed of light is: (i) maximum (ii) minimum (1) B. Refractive index of Ruby is 1.71. What is meant by this statement? (1) *Attempt either subpart C or D* C. Calculate the speed of light in Sapphire. (Given the speed of light in air/vacuum is 3×10^8 ms^{-1}) (2) **OR** D. With respect to air, the refractive index of water is 1.33 and that of crown glass is 1.52. Calculate the refractive index of crown glass with respect to water. (2)	4
39	In a garden, a curious child planted two identical seeds in different directions. The first seed was sown as shown in figure A. He found that the seed grew with its roots sinking deep into the soil and its tiny shoot reaching up to the sky. The second seed was sown as shown in figure B, where the child tilted the seed sideways, wondering if the little plant would still grow the same way. To his surprise, even when the seed was sown sideways, the roots found their way down, and the shoots curved upwards.  *Attempt either subpart A or B.* A. Identify the stimulus required for the seed to develop roots downwards and shoots upwards? Name the type of tropism exhibited by roots and shoots in this example. (2) **OR** B. Describe the mechanism involved in the bending of a shoot tip due to stimulation by light. (2)	4

C. Where should the light be placed for the shoot tip to bend, Side X or side Y? (1)



D. What is the role of auxin in a plant? (1)