CBSE 2025 Science — Set 3

English Medium

Time Allowed: 3 Hours | Maximum Marks: 80

General Instructions:

1. This question paper contains 39 questions. All questions are compulsory.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 6 questions carrying 2 marks each.
4. Section C has 7 questions carrying 3 marks each.
5. Section D has 3 questions carrying 5 marks each.
6. Section E has 3 case-study based questions carrying 4 marks each.
7. Draw neat diagrams wherever required.

Section A

Multiple Choice Questions (1 mark each)

Q.1 [1 mark]

Consider the following chemical equation:

$pAl + qH_2O \rightarrow rAl_2O_3 + sH_2$

To balance this chemical equation, the values of p, q, r and s must be respectively:

(a) 3, 2, 2, 1

(b) 2, 3, 1, 1

(c) 2, 3, 1, 3

(d) 3, 1, 2, 3

Q.2 [1 mark]

Which of the given option represents a family of salts?

(a) $NaCl$, Na_2SO_4, $CaSO_4$

(b) $NaNO_3$, $CuSO_4$, $CaCO_3$

(c) K_2SO_4, Na_2SO_4, $CaSO_4$

(d) $MgCO_3$, $CaSO_4$, $MgCl_2$

Q.3 [1 mark]

The most common method of extraction of metals from their oxide ores is:

(a) Reduction with carbon

(b) Reduction with hydrogen

(c) Reduction with aluminium

(d) Electrolytic reduction

Q.4 [1 mark]

Given below are the structures of some hydrocarbons. Select the two structures which are related to each other from the given options:

(i) H-C(H_2)-C(H_2)-C=C-H (with H atoms, C_4H_8 - butene)

(ii) H-C(H_2)-C(H_2)-C(H_2)-C(H_2)-H (pentane, C_5H_{12})
(iii) H-C(H_2)-C(H)(CH_2)-C(H_2)-H (branched, isobutane/2-methylpropane)
(iv) Cl-C(H_2)-C(H_2)-C=C-H (chloro-substituted butene)

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

Q.5 [1 mark]

Choose the incorrect statement about the common reaction used in hydrogenation of vegetable oils.

(a) It is an addition reaction.
(b) It takes place in the presence of nickel or palladium catalyst.
(c) The product contains only single bonds between carbon atoms.
(d) It is an addition reaction which occurs in the presence of an acid catalyst.

Q.6 [1 mark]

Match Column-I with Column-II and select the correct option:
Column-I:
a. Site of fertilisation of egg with the sperm
b. Site of implantation of embryo
c. Site of entry of sperm into the female reproductive tract
d. Site through which the waste materials generated by the developing embryo are removed

Column-II:
(i) Vagina
(ii) Uterus
(iii) Oviduct
(iv) Placenta

(v) Cervix

(a) a-(ii), b-(i), c-(v), d-(iv)

(b) a-(iii), b-(i), c-(v), d-(iv)

(c) a-(iv), b-(ii), c-(iii), d-(i)

(d) a-(iii), b-(ii), c-(i), d-(iv)

Q.7 [1 mark]

The part of the brain that maintains the posture and balance of the body is:

(a) Pons

(b) Cerebrum

(c) Cerebellum

(d) Medulla

Q.8 [1 mark]

The plant hormone present in greater concentration in the areas of rapidly dividing cells is:

(a) Auxin

(b) Cytokinins

(c) Gibberelline

(d) Abscisic acid

Q.9 [1 mark]

Select a pair of bisexual flowers from the following:

(a) Papaya and mustard

(b) Hibiscus and mustard

(c) Hibiscus and papaya

(d) Hibiscus and watermelon

Q.10 [1 mark]

The gastric glands present in the wall of the stomach release:

(a) Mucus and Trypsin

(b) Pepsin and Trypsin
(c) Mucus and Pepsin
(d) Pepsin and Salivary amylase

Q.11 [1 mark]

Absolute refractive index of water and glass is 4/3 and 3/2 respectively. If the speed of light in glass is 2×10^8 m/s, the speed of light in water is:

(a) 8/3 m/s
(b) 3 m/s
(c) 10/3 m/s
(d) 9/4 m/s

Q.12 [1 mark]

When a beam of white light passes through a region of very fine dust particles, the colour of light that scatters the most in that region is:

(a) red
(b) orange
(c) blue
(d) yellow

Q.13 [1 mark]

A wire of length 'l' is gradually stretched so that its length increases to 3l. If its original resistance is R, then its new resistance will be:

(a) 3R
(b) 6R
(c) 9R
(d) 27R

Q.14 [1 mark]

Which one of the following statements is not true about a bar magnet?

(a) It sets itself in north-south direction when suspended freely.

(b) It has attractive power for iron filings.
(c) It produces magnetic field lines.
(d) The direction of magnetic field lines inside a bar magnet is from its north pole to its south pole.

Q.15 [1 mark]

The strength of magnetic field produced inside a long straight current carrying solenoid does not depend upon:

(a) number of turns in the solenoid
(b) direction of current flowing through the solenoid
(c) material of the core filled inside the solenoid
(d) radius of the coil of the solenoid

Q.16 [1 mark]

Other than the abiotic components, which of the given biotic components are not required to make an aquarium with small herbivorous fishes a self-sustaining system?

(i) Aquatic plants and aquatic animals
(ii) Terrestrial plants and terrestrial animals
(iii) Decomposers as bacteria and fungi
(iv) Consumers as clown fishes and sea urchins

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

Q.17 [1 mark]

For Questions 17 to 20, two statements are given - one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the codes (A), (B), (C) and (D).

Assertion (A): Hydrogen gas is not evolved when a metal reacts with nitric acid.

Reason (R): Nitric acid is a strong reducing agent and reduces the hydrogen produced in the reaction to water.

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

Q.18 [1 mark]

Assertion (A): In our actions of writing or talking, our nervous system communicates with the muscles.

Reason (R): Cranial nerves and spinal nerves form the peripheral nervous system.

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

Q.19 [1 mark]

Assertion (A): Magnetic field lines around a bar magnet never intersect each other.

Reason (R): Magnetic field produced by a bar magnet is a quantity that has both magnitude and direction.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the

correct explanation of Assertion (A).

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false, but Reason (R) is true.

Q.20 [1 mark]

Assertion (A): Use of jute bags for shopping reduces pollution.

Reason (R): Jute is biodegradable and its bag may be reused as and when required.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false, but Reason (R) is true.

Section B

Very Short Answer Questions (2 marks each)

Q.21 [2 marks]

(a) List the possible sources of energy required in decomposition reactions. Illustrate any one with a suitable example.

OR

(b) What is observed when hydrated ferrous sulphate crystals are heated in a dry boiling tube? Give balanced chemical equation(s) of the reaction(s) that occur(s).

OR

Q.21 [2 marks]

(OR for Q21) What is observed when hydrated ferrous sulphate crystals are

heated in a dry boiling tube? Give balanced chemical equation(s) of the reaction(s) that occur(s).

Q.22 [2 marks]

(a) Write the formula of the ions which (i) acids, and (ii) bases generate in water solutions.

(b) Dry HCl gas does not change the colour of dry litmus paper. Why?

Q.23 [2 marks]

State the main functions of veins in human circulatory system. Why do they not need thick walls?

Q.24 [2 marks]

(a) Explain how the proteins control the 'characteristics' in an organism with the help of an example of 'tallness' trait in pea plant.

(b) Name the section of DNA that controls the 'characteristics' in an organism.

Q.25 [2 marks]

(a) A student has difficulty in reading his textbooks but can read the blackboard clearly while sitting in the last row. Name the defect of vision the student is suffering from. List two reasons due to which this defect arises. Write the nature of the lenses required to correct this defect.

OR

(b) Draw a ray diagram to show the path of a ray of light falling obliquely on one of the refracting faces of a triangular glass prism and mark the angle of deviation on it.

OR

Q.25 [2 marks]

(OR for Q25) Draw a ray diagram to show the path of a ray of light falling obliquely on one of the refracting faces of a triangular glass prism and mark the angle of deviation on it.

Q.26 [2 marks]

An electric kettle is rated 230 V, 1000 W. Calculate the resistance of its heating element when in operation.

Section C

Short Answer Questions (3 marks each)

Q.27 [3 marks]

(a) What is a reactivity series of elements? How is it developed? Arrange the following elements as they are arranged in the reactivity series: Aluminium, Calcium, Copper, Lead.

(b) Write balanced chemical equation to show the reaction of iron (III) oxide (Fe_2O_3) with aluminium.

Q.28 [3 marks]

(a) Common salt is an important raw material for various chemicals of daily use. State in brief the method of preparation of (i) Sodium hydroxide, and (ii) Sodium hydrogen carbonate from common salt. Write balanced chemical equations of the reactions that occur.

OR

(b) Design an experimental set-up to demonstrate that 'Alcohol and glucose contain hydrogen but are not categorised as acids'. Also give the reason to justify this fact.

OR

Q.28 [3 marks]

(OR for Q28) Design an experimental set-up to demonstrate that 'Alcohol and glucose contain hydrogen but are not categorised as acids'. Also give the reason to justify this fact.

Q.29 [3 marks]

On the basis of the characteristics of the processes given in the brackets in each case, differentiate between the following:

(a) Production or breakdown of pyruvate in aerobic and anaerobic respiration in human beings (product(s) of the processes)

(b) Respiration and photosynthesis in plants (gas released)

(c) Respiration in terrestrial animals and fishes (organs involved)

Q.30 [3 marks]

A pure pea plant having round (R), yellow (Y) seeds is crossed with another pure pea plant having wrinkled (r), green (y) seeds. Subsequently F_1 progeny is self-pollinated to obtain F_2 progeny.

(a) What do the seeds of F_1 generation look like?

(b) Give the possible combinations of traits in seeds of F_2 generation. Also give their ratio.

(c) State the reason of obtaining seeds of new combination of traits in F_2 generation.

Q.31 [3 marks]

What is a rainbow? Draw a labelled diagram to show its formation.

Q.32 [3 marks]

Consider a rectangular cardboard having two holes P and Q through which a current carrying circular loop has been inserted as shown in the diagram.

(a) Make this diagram on your answer sheet and draw three magnetic field

lines, one each passing through the points 1 (near P), 2 (at the centre of the loop) and 3 (near Q).

(b) List two factors on which the intensity of the magnetic field produced at the centre of the loop depends.

(c) Name the rule you will apply to determine the direction of magnetic field produced due to a current carrying straight conductor.

Q.33 [3 marks]

(a) "In a food chain energy flow is unidirectional." Give two reasons for the given statement.

(b) If 10,000 J energy is available at the producer level, how much energy will be available to the secondary consumers? Give reason to justify your answer.

Section D

Long Answer Questions (5 marks each)

Q.34 [5 marks]

(a) (i) Consider the following metals: K, Ca, Al, Cu, Ag, Fe. Select from the above metals, a metal which:

I. does not react with oxygen even at high temperature.

II. reacts at ordinary temperature and forms a protective oxide layer which prevents the metal from further oxidation.

III. catches fire when kept in the open.

IV. does not burn in oxygen but the hot metal is coated with a black coloured oxide layer.

(ii) What are amphoteric oxides? With the help of balanced chemical equations show that aluminium oxide is an amphoteric oxide.

(iii) What are alkalis? Give one example.

OR

(b) (i) With the help of balanced chemical equations state the process of extracting (I) mercury from its ore called cinnabar, and (II) copper from its sulphide ore.
(ii) Silver and copper articles slowly lose their shiny surfaces when exposed to air. Name the compounds formed on (I) silver articles, and (II) copper articles in the form of coating.

OR

Q.34 [5 marks]

(OR for Q34) (b) (i) With the help of balanced chemical equations state the process of extracting (I) mercury from its ore called cinnabar, and (II) copper from its sulphide ore.
(ii) Silver and copper articles slowly lose their shiny surfaces when exposed to air. Name the compounds formed on (I) silver articles, and (II) copper articles in the form of coating.

Q.35 [5 marks]

(a) (i) Identify the parts 'X' and 'Y' in the figure of a flower given below (showing petals, sepals, and reproductive parts marked X and Y).
(ii) Name the yellowish coloured structures produced by the part labelled as 'Y'.
(iii) Write the name of the process by which these are transferred to the part labelled as 'X'.
(iv) Explain the process of seed formation in a flowering plant.

OR

(b) (i) Name the type of asexual mode of reproduction shown in the given figure (showing organisms like Hydra with buds).
(ii) Identify the unicellular organism in the diagram.

(iii) List any two advantages of asexual reproduction over sexual reproduction.
(iv) Name and explain any one mode of asexual reproduction observed in Hydra.

OR

Q.35 [5 marks]

(OR for Q35) (b) (i) Name the type of asexual mode of reproduction shown in the given figure.
(ii) Identify the unicellular organism in the diagram.
(iii) List any two advantages of asexual reproduction over sexual reproduction.
(iv) Name and explain any one mode of asexual reproduction observed in Hydra.

Q.36 [5 marks]

(a) (i) 'In refraction of light through a rectangular glass slab, the emergent ray is always parallel to the direction of the incident ray.' Why? Explain with the help of a ray diagram. What happens when a ray of light falls normally on one of the faces of a rectangular glass prism? Draw diagram.
(ii) An object is placed at a distance of 30 cm from the optical centre of a concave lens of focal length 20 cm. Use Lens formula to determine the position of the image formed in this case.

OR

(b) (i) A student wishes to study the image formation by a concave mirror using candle flame as object. State the type of image formed by the mirror and mention the change in the image formed, if any, that he observes when the candle flame is gradually moved away from the pole of the mirror. Draw a ray diagram to show the image formation when the object distance is

nearly equal to the radius of curvature of the mirror.

(ii) A convex mirror used for rear-view on an automobile has a focal length of 3.0 m. If a bus is located at 6.0 m from this mirror, use mirror formula to find the position of the image of the bus as seen in the mirror.

OR

Q.36 [5 marks]

(OR for Q36) (b) (i) A student wishes to study the image formation by a concave mirror using candle flame as object. State the type of image formed by the mirror and mention the change in the image formed, if any, that he observes when the candle flame is gradually moved away from the pole of the mirror. Draw a ray diagram to show the image formation when the object distance is nearly equal to the radius of curvature of the mirror.

(ii) A convex mirror used for rear-view on an automobile has a focal length of 3.0 m. If a bus is located at 6.0 m from this mirror, use mirror formula to find the position of the image of the bus as seen in the mirror.

Section E

Case Study Based Questions (4 marks each)

Q.37 [4 marks]

Case Study: 'A' and 'B' are two salts used for washing purposes. Salt 'A' is used for bathing also. Four test tubes I, II, III and IV as mentioned below are taken.

I. Rain water + solution of salt 'A'

II. Rain water + solution of salt 'B'

III. Tubewell water + solution of salt 'A'

IV. Tubewell water + solution of salt 'B'

All the test tubes are shaken well. A permanent lather/foam is formed in test tubes I and II, but not in III and IV. Based on these observations, answer the following questions.

Q.37(a) [4 marks]

Q37(a): From the case study about salts A and B used for washing, where lather forms in test tubes I and II (rain water) but not in III and IV (tubewell water): What type of water is rain water? Name any two salts dissolved in tubewell water that make it different from rain water.

Q.37(b) [4 marks]

Q37(b): Why does permanent lather form in test tubes I and II but not in III and IV?

Q.37(c) [4 marks]

Q37(c): Which salt out of 'A' and 'B' is a soap? What is the other salt called? Justify your answer.

OR

Q.37(c) [4 marks]

Q37(c) OR: What is the advantage of using a detergent over soap for washing clothes? Explain with the help of an ionic equation why a soap molecule fails to form lather (foam) in hard water.

Q.38 [4 marks]

Case Study: In the given circuit diagram, two resistors of resistances R_1 and R_2 are shown. A student performed four arrangements as follows:

Arrangement No. 1 - only resistor R_1 in gap XY

Arrangement No. 2 - only resistor R_2 in gap XY

Arrangement No. 3 - Resistors R_1 and R_2 in series in gap XY

Arrangement No. 4 - Resistors R_1 and R_2 in parallel in gap XY

Voltmeter and ammeter readings were recorded in the observation table for four arrangements. Based on the observations, four V-I graphs A, B, C and D were drawn. Study these graphs (Graph shows 4 straight lines from origin with different slopes - D steepest, then C, B, A).

Q.38(a) [4 marks]

Q38(a): From the V-I graphs (where D is steepest, then C, B, A), which one of the graphs represents the series combination of R_1 and R_2?

Q.38(b) [4 marks]

Q38(b): From the V-I graphs, which one of the graphs represents the parallel combination of R_1 and R_2?

Q.38(c) [4 marks]

Q38(c)(i): Show an arrangement of three resistors, each of resistance 10 Ω, so that the combination has a resistance of 15 Ω. Give justification for your answer.

OR

Q38(c)(ii): A battery of 6 V is connected with a series combination of five resistors of 0.1 Ω, 0.2 Ω, 0.3 Ω, 0.4 Ω and 0.5 Ω. How much current would flow through the 0.3 Ω resistor? Justify your answer.

OR

Q.38(c) [4 marks]

Q38(c)(ii) OR: A battery of 6 V is connected with a series combination of five resistors of 0.1 Ω, 0.2 Ω, 0.3 Ω, 0.4 Ω and 0.5 Ω. How much current would flow through the 0.3 Ω resistor? Justify your answer.

Q.39 [4 marks]

Case Study: A person while climbing up a rocky hill comes into a panic state and fear. His body starts reacting in a 'fight or flight' condition to adapt to the dangerous and stressful situation. Based on the above facts, answer the following questions.

Q.39(a) [4 marks]

Q39(a): Name the hormone secreted in the blood of the person in the fight-or-flight situation. Name the source gland of this hormone.

Q.39(b) [4 marks]

Q39(b): State any two responses in the body of the person as a result of the secretion of this hormone.

OR

Q39(b) OR: How does the action of the chemical signal in terms of hormones differ from the electrical impulses via nerve cells?

OR

Q.39(b) [4 marks]

Q39(b) OR: How does the action of the chemical signal in terms of hormones differ from the electrical impulses via nerve cells?