CBSE EXAMINATION PAPER-2023

SCIENCE

(Solved)

Time allowed : 3 hours | Maximum Marks : 77

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **35 questions.** All questions are **compulsory.**

ii. This question paper is divided into **5 sections.**

iii. **Section A** – questions number **1 to 1** are case based questions

iv. **Section B** – questions number **2 to 13** are multiple choice questions

v. **Section C** – questions number **14 to 22** are very short answer

vi. **Section D** – questions number **23 to 31** are short answer

vii. **Section E** – questions number **32 to 35** are long answer

viii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

ix. Use of calculator is NOT allowed.

Section A

Question 1. The ability of a medium to refract light is expressed in terms of its optical density. Optical density is not the same as mass density. When comparing two media, the one with the larger refractive index is optically denser than the other. The other medium with a lower refractive index is optically rarer. The speed of light through a medium is inversely proportional to its optical density.

(1)

Determine the speed of light in diamond if the refractive index of diamond with respect to vacuum is 2.42. Speed of light in vacuum is 3×10^8 m/s

[1 Marks]

(2)

Refractive indices of glass, water and carbon disulphide are 1.5, 1.33 and 1.62 respectively. If a ray of light is incident in these media at the same angle (say θ), then write the increasing order of the angle of refraction in these media.

[1 Marks]

(3)

The speed of light in glass is 2×10^8 m/s and in water is 2.25×10^8 m/s.
(a) Which one of the two is optically denser and why?
(b) A ray of light is incident normally at the water-glass interface when it enters a thick glass container filled with water. What will happen to the path of the ray after entering the glass? Give reason.

[2 Marks]

(4)

The absolute refractive indices of water and glass are 4/3 and 3/2 respectively.
If the speed of light in glass is 2×10^8 m/s, find the speed of light in
(i) vacuum and
(ii) water.

[2 Marks]

Section B

Question 2. When Sodium bicarbonate reacts with dilute hydrochloric acid, the gas evolved is:

[1 Marks]

(A) Hydrogen; it gives pop sound with burning match stick.

(B) Hydrogen; it turns lime water milky.

(C) Carbon dioxide; it turns lime water milky.

(D) Carbon dioxide; it blows off a burning match stick with a pop sound.

Question 3.

When aqueous solutions of potassium iodide and lead nitrate are mixed, an insoluble substance separates out. The chemical equation for the reaction involved is:

[1 Marks]

(A) $KI + PbNO_3 \rightarrow PbI + KNO_3$

(B) $2KI + Pb(NO_3)_2 \rightarrow PbI_2 + 2KNO_3$

(C) $KI + Pb(NO_3)_2 \rightarrow Pb + KNO_3$

(D) $KI + PbNO_3 \rightarrow PbI_2 + KNO$

Question 4.

A metal ribbon 'X' burns in oxygen with a dazzling white flame forming a white ash 'Y'. The correct description of X, Y and the type of reaction is:

[1 Marks]

(A) X = Ca; Y = CaO; Type of reaction = Decomposition

(B) X = Zn; Y = ZnO; Type of reaction = Endothermic

(C) X = Al; Y = Al_2O_3; Type of reaction = Thermal decomposition

(D) X = Mg; Y = MgO; Type of reaction = Combination

Question 5. Acid present in tomato is:

[1 Marks]

(A) Acetic acid

(B) Methanoic acid

(C) Lactic acid

(D) Oxalic acid

Question 6. Sodium hydroxide is termed an alkali while Ferric hydroxide is not because:

[1 Marks]

(A) Sodium hydroxide is a strong base, while Ferric hydroxide is a weak base.

(B) Sodium hydroxide is a base which is soluble in water while Ferric hydroxide is also a base but it is not soluble in water.

(C) Sodium hydroxide and Ferric hydroxide both are strong base but the solubility of Sodium hydroxide in water is comparatively higher than that of Ferric hydroxide.

(D) Sodium hydroxide is a strong base while Ferric hydroxide is a strong acid.

Question 7.

The name of the salt used to remove permanent hardness of water is:

[1 Marks]

(A) Sodium hydrogen carbonate ($NaHCO_3$)

(B) Sodium carbonate decahydrate ($Na_2CO_3 \cdot 10H_2O$)

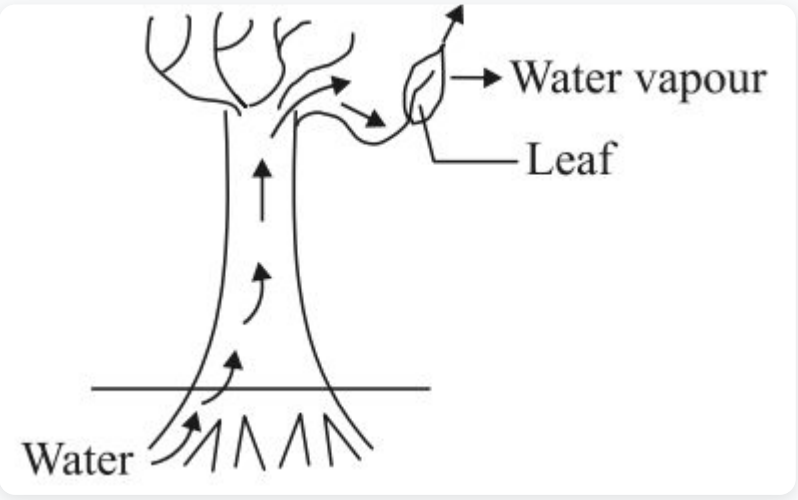
(C) Sodium chloride (NaCl)

(D) Calcium sulphate hemihydrate ($CaSO_4 \cdot \frac{1}{2}H_2O$)

Question 8.

Observe the following diagram and identify the process and its significance from the following options:

[1 Marks]



(A) Translocation : helps in transporting materials from one cell to another.

(B) Transpiration : creates a suction force which pulls water inside the plant.

(C) Evaporation : maintains water contents in leaf cells.

(D) Excretion : helps in excreting out waste water from the plant.

Question 9. In plants the role of cytokinin is:

[1 Marks]

(A) Promote cell division.

(B) Wilting of leaves.

(C) Promote the opening of stomatal pore.

(D) Help in the growth of stem.

Question 10. The number of chromosomes in parents and offsprings of a particular species undergoing sexual reproduction remain constant due to:

[1 Marks]

(A) doubling of chromosomes after zygote formation.

(B) halving of chromosomes after zygote formation.

(C) doubling of chromosomes before gamete formation.

(D) halving of chromosomes at the time of gamete formation.

Question 11. Two LED bulbs of 12W and 6W are connected in series. If the current through 12W bulb is 0.06A the current through 6W bulb will be:

[1 Marks]

(A) 0.04A

(B) 0.06A

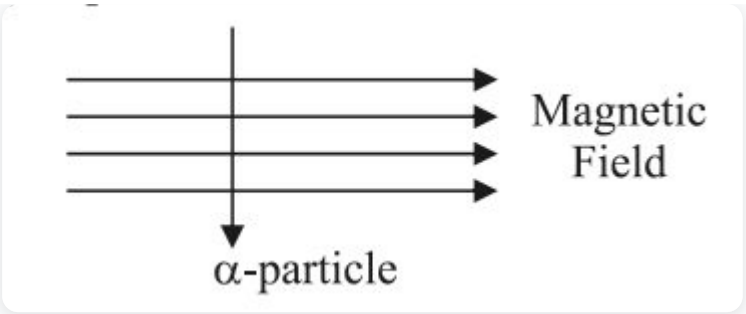
(C) 0.08A

(D) 0.12A

Question 12.

An alpha particle enters a uniform magnetic field as shown. The direction of force experienced by the alpha particle is:

[1 Marks]



(A) into the page

(B) out of the page

(C) towards right

(D) towards left

Question 13.

Assertion (A): Reaction of Quicklime with water is an exothermic reaction.

Reason (R): Quicklime reacts vigorously with water releasing a large amount of heat.

[1 Marks]

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

(B) Both (A) and (R) are true and (R) is the correct explanation of (A).

(C) (A) is false but (R) is true.

(D) (A) is true but (R) is false.

Section C

Question 14.

A student took a small amount of copper oxide in a conical flask and added dilute hydrochloric acid to it with constant stirring. He observed a change in colour of the solution.

(i) Write the name of the compound formed and its colour.

(ii) Write a balanced chemical equation for the reaction involved.

[2 Marks]

Question 15. The industrial process used for the manufacture of caustic soda involves electrolysis of an aqueous solution of compound ‘X’. In this process, two gases ‘Y’ and ‘Z’ are liberated. ‘Y’ is

liberated at cathode and ‘Z’, which is liberated at anode, on treatment with dry slaked lime forms a compound ‘B’. Name X, Y, Z and B.

[2 Marks]

Question 16.

Name the part of brain which is responsible for the following actions:

(i) Maintaining posture and balance

(ii) Beating of heart

(iii) Thinking

(iv) Blood pressure

[2 Marks]

Question 17.

Where are auxins synthesized in a plant? Which organ of the plant shows:

(i) Positive phototropism

(ii) Negative geotropism

(iii) Positive hydrotropism

[2 Marks]

Question 18.

Write one specific function each of the following organs in relation with excretion in human beings:

(i) Renal Artery

(ii) Urethra

(iii) Glomerulus

(iv) Tubular part of nephron

[2 Marks]

Question 19. Two green plants are kept separately in oxygen free containers, one in the dark and other in sunlight. It was observed that plant kept in dark could not survive longer. Give reason for this observation.

[2 Marks]

Question 20. Use of several pesticides which results in excessive accumulation of pesticides in rivers or ponds, is a matter of deep concern. Justify this statement.

[2 Marks]

Question 21.

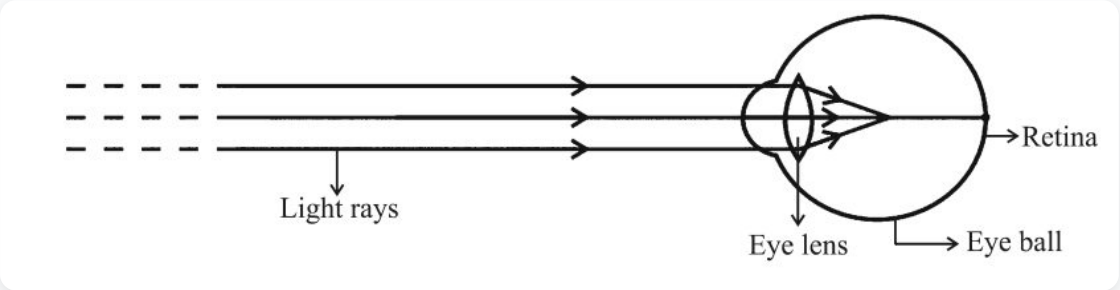
Observe the following diagram and answer the questions following it :

(i) Identify the defect of vision shown.

(ii) List its two causes.

(iii) Name the type of lens used for the correction of this defect.

[2 Marks]



Question 22.

The colour of clear sky from the earth appears blue but from the space it appears black. Why ?

[2 Marks]

Section D

Question 23.

(i) While electrolysing water before passing the current some drops of an acid are added. Why? Name the gases liberated at cathode and anode. Write the relationship between the volume of gas collected at anode and the volume of gas collected at cathode.

(ii) What is observed when silver chloride is exposed to sunlight? Give the type of reaction involved.

[3 Marks]

Question 24.

(i) Suggest a safe procedure of diluting a strong concentrated acid.

(ii) Name the salt formed when sulphuric acid is added to sodium hydroxide and write its pH.

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

[3 Marks]

Question 25.

(i) How does Paramecium obtain its food?

(ii) List the role of each of the following in our digestive system:

(a) Hydrochloric acid (b) Trypsin (c) Muscular walls of stomach (d) Salivary amylase

[3 Marks]

Question 26.

(i) What is double circulation?

(ii) Why is the separation of the right side and the left side of the heart useful? How does it help birds and mammals?

[3 Marks]

Question 27. An object of height 10 cm is placed 25 cm away from the optical centre of a converging lens of focal length 15 cm. Calculate the image-distance and height of the image formed.

[3 Marks]

Question 28. The power of a lens is +4D. Find the focal length of this lens. An object is placed at a distance of 50 cm from the optical centre of this lens. State the nature and magnification of the image formed by the lens and also draw a ray diagram to justify your answer.

[3 Marks]

Question 29.

(i) Why is an alternating current (A.C.) considered to be advantageous over direct current (D.C.) for the long distance transmission of electric power?

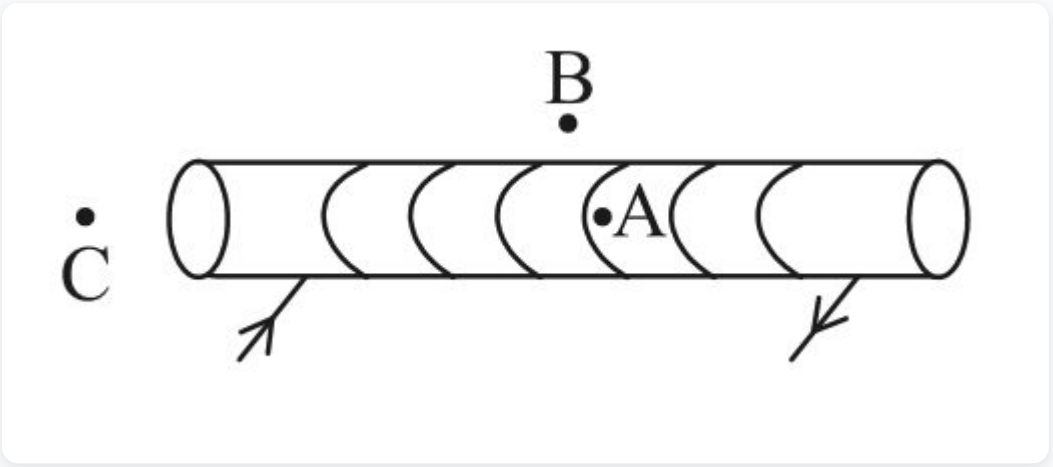
(ii) How is the type of current used in household supply different from the one given by a battery of dry cells?

(iii) How does an electric fuse prevent the electric circuit and the appliances from a possible damage due to short-circuiting or overloading?

[3 Marks]

Question 30. For the current carrying solenoid as shown, draw magnetic field lines and give reason to explain that out of the three points A, B and C, at which point the field strength is maximum and at which point it is minimum?

[3 Marks]



Question 31. Write one difference between biodegradable and non-biodegradable wastes. List two impacts of each type of the accumulated waste on environment if not disposed properly.

[3 Marks]

Section E

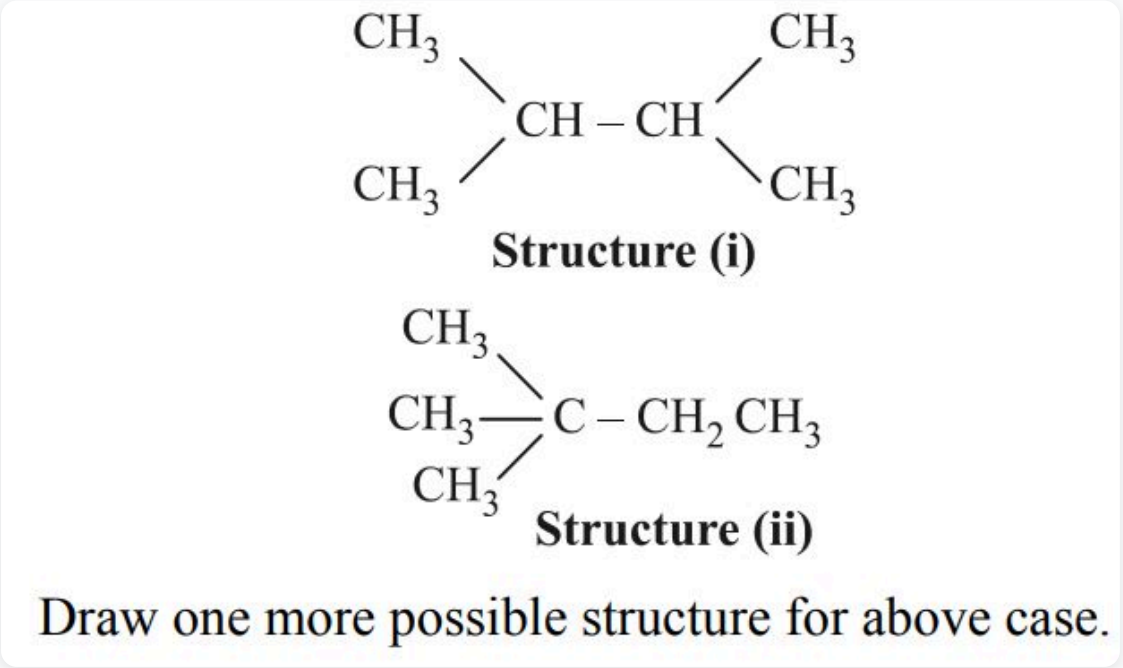
Question 32.

(i) Draw the structure of the following compounds : (a) Butanoic acid (b) Chloropentane

(ii) How are structure (i) and structure (ii) given below related to one another ? Give reason to justify your answer.

(iii) Differentiate between saturated and unsaturated carbon compounds on the basis of their general formula.

[5 Marks]



Question 33.

(i) What happens when a small piece of sodium is dropped in ethanol? Write the equation for this reaction.

(ii) Why is glacial acetic acid called so?

(iii) What happens when ethanol is heated at 443 K in the presence of conc. H_2SO_4? Write the role of conc. H_2SO_4 in this case.

(iv) Write an equation showing saponification.

[5 Marks]

Question 34.

(i) Name and explain the two modes of asexual reproduction observed in hydra.

(ii) What is vegetative propagation ? List two advantages of using this technique.

[5 Marks]

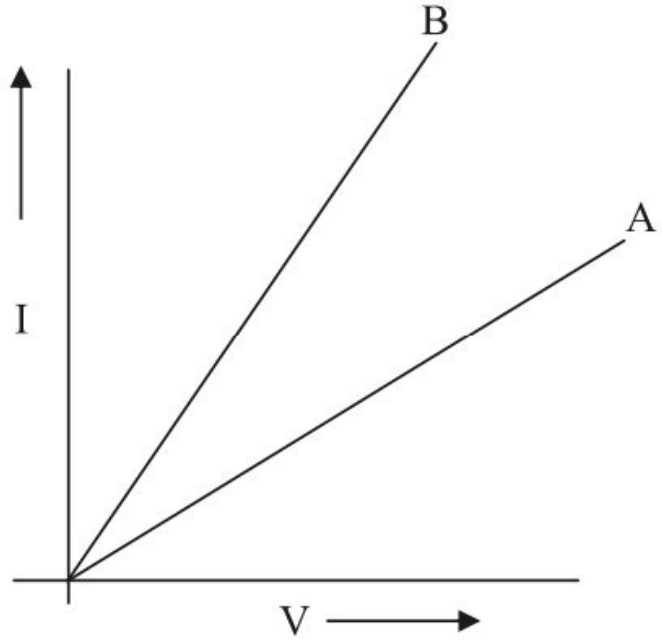
Question 35.

(i) How is electric current related to the potential difference across the terminals of a conductor ? Draw a labelled circuit diagram to verify this relationship.

(ii) Why should an ammeter have low resistance ?

(iii) Two V - I graphs A and B for series and parallel combinations of two resistors are as shown. Giving reason state which graph shows (a) series, (b) parallel combination of the resistors.

[5 Marks]


B
A
I
V