

**Series Z1XYW/4****SET~2**प्रश्न-पत्र कोड
Q.P. Code**31/4/2**

रोल नं.

Roll No.

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परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।

Candidates must write the Q.P. Code on the title page of the answer-book.

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 23 हैं।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में 39 प्रश्न हैं।
- कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें।
- इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका में कोई उत्तर नहीं लिखेंगे।
- Please check that this question paper contains **23** printed pages.
- Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **39** questions.
- **Please write down the Serial Number of the question in the answer-book before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

विज्ञान (सैद्धान्तिक)

SCIENCE (Theory)

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

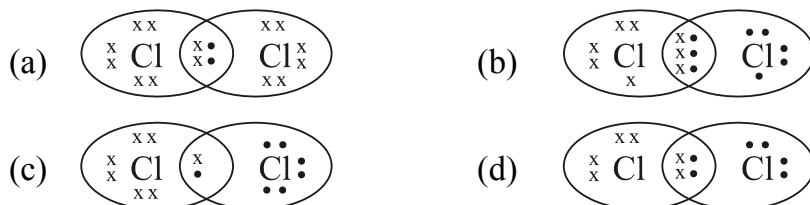
GENERAL INSTRUCTIONS :

Read the following instructions very carefully and follow them :

- (i) This question paper consists of **39** questions. **All** questions are compulsory.
- (ii) Question paper is divided into **FIVE** sections – **Section A, B, C, D and E**.
- (iii) In **section A** – question number 1 to 20 are multiple choice questions (MCQs) carrying **1** mark each.
- (iv) In **section B** – question number 21 to 26 are very short answer (VSA) type questions carrying **2** marks each. Answer to these questions should be in the range of 30 to 50 words.
- (v) In **section C** – question number 27 to 33 are short answer (SA) type questions carrying **3** marks each. Answer to these questions should be in the range of 50 to 80 words.
- (vi) In **section D** – question number 34 to 36 are long answer (LA) type questions carrying **5** marks each. Answer to these questions should be in the range of 80 to 120 words.
- (vii) In **section E** – question number 37 to 39 are of 3 **source based/case based units of assessment** carrying **4** marks each with sub-parts.
- (viii) There is no overall choice. However, an internal choice has been provided in some sections.

SECTION – A (Multiple Choice Questions)

1. The electron dot structure of chlorine molecule is : 1



2. The name of the salt used to remove permanent hardness of water is : 1

- (a) Sodium hydrogen carbonate (NaHCO_3)
- (b) Sodium chloride (NaCl)
- (c) Sodium carbonate decahydrate ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$)
- (d) Calcium sulphate hemihydrate ($\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$)

3. Sodium hydroxide is termed an alkali while Ferric hydroxide is not because : 1

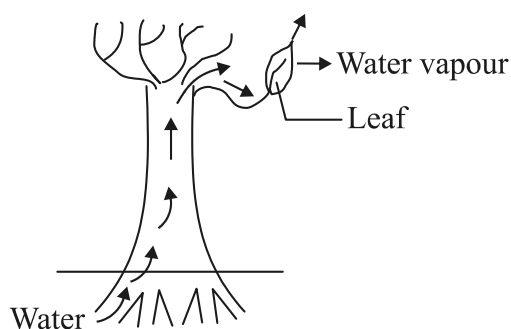
- (a) Sodium hydroxide is a strong base, while Ferric hydroxide is a weak base.
- (b) Sodium hydroxide is a base which is soluble in water while Ferric hydroxide is also a base but it is not soluble in water.
- (c) Sodium hydroxide is a strong base while Ferric hydroxide is a strong acid.
- (d) Sodium hydroxide and Ferric hydroxide both are strong base but the solubility of Sodium hydroxide in water is comparatively higher than that of Ferric hydroxide.



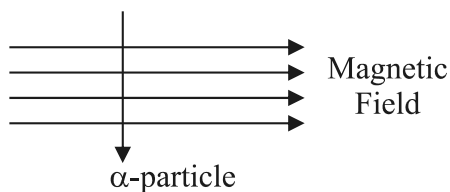
4. Acid present in tomato is : 1
 (a) Methanoic acid (b) Acetic acid
 (c) Lactic acid (d) Oxalic acid
5. A metal ribbon 'X' burns in oxygen with a dazzling white flame forming a white ash 'Y'. The correct description of X, Y and the type of reaction is : 1
 (a) $X = \text{Ca}$; $Y = \text{CaO}$; Type of reaction = Decomposition
 (b) $X = \text{Mg}$; $Y = \text{MgO}$; Type of reaction = Combination
 (c) $X = \text{Al}$; $Y = \text{Al}_2\text{O}_3$; Type of reaction = Thermal decomposition
 (d) $X = \text{Zn}$; $Y = \text{ZnO}$; Type of reaction = Endothermic
6. 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
 (a) $\text{KI} + \text{PbNO}_3 \longrightarrow \text{PbI} + \text{KNO}_3$
 (b) $2\text{KI} + \text{Pb}(\text{NO}_3)_2 \longrightarrow \text{PbI}_2 + 2\text{KNO}_3$
 (c) $\text{KI} + \text{Pb}(\text{NO}_3)_2 \longrightarrow \text{PbI} + \text{KNO}_3$
 (d) $\text{KI} + \text{PbNO}_3 \longrightarrow \text{PbI}_2 + \text{KNO}_3$
7. When Sodium bicarbonate reacts with dilute hydrochloric acid, the gas evolved is : 1
 (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.
8. The number of chromosomes in parents and offsprings of a particular species undergoing sexual reproduction remain constant due to : 1
 (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.
9. During adolescence, reproductive phase starts and : 1
 (a) general growth rate begins to slow down
 (b) height becomes less
 (c) the body weight is reduced
 (d) hair growth decreases



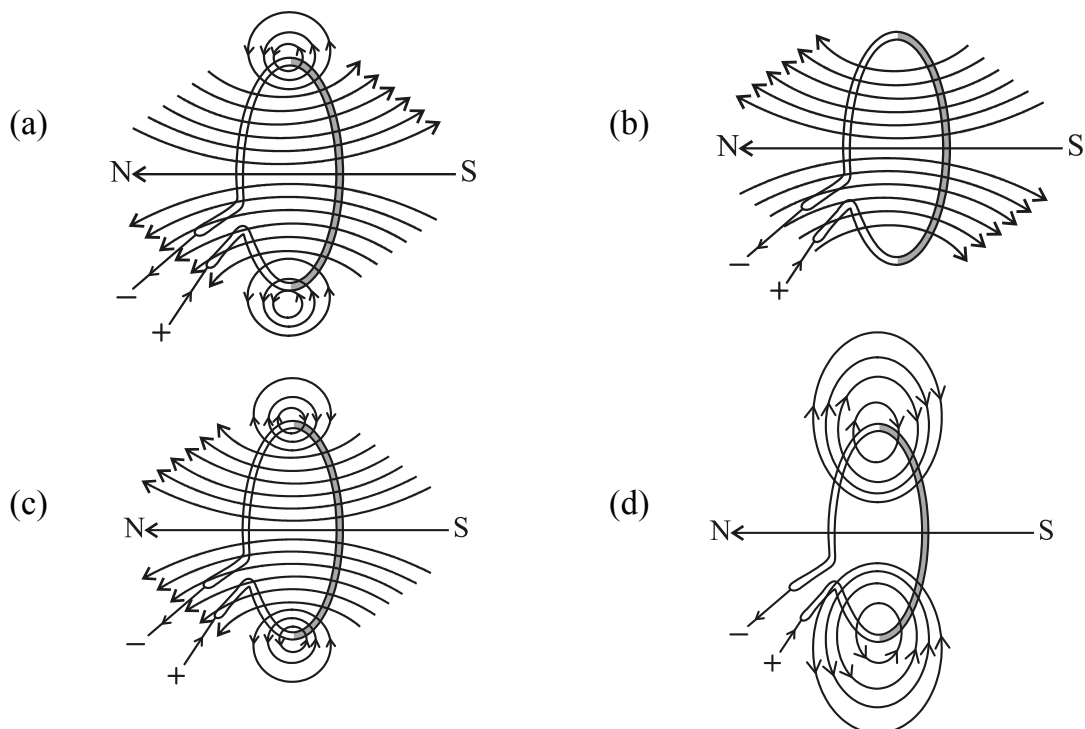
10. Which pair of sex chromosome will determine a male ? 1
- (a) XO
(b) XX
(c) XY
(d) YY
11. One of the events that does not occur during photosynthesis is : 1
- (a) Chlorophyll absorbs solar energy.
(b) Carbon dioxide is released during the process.
(c) Oxygen is released during the process.
(d) Carbon dioxide is absorbed during the process.
12. Observe the following diagram and identify the process and its significance from the following options : 1



- (a) Evaporation : maintains water contents in leaf cells.
(b) Transpiration : creates a suction force which pulls water inside the plant.
(c) Excretion : helps in excreting out waste water from the plant.
(d) Translocation : helps in transporting materials from one cell to another.
13. An alpha particle enters a uniform magnetic field as shown. The direction of force experienced by the alpha particle is : 1
- (a) towards right
(b) towards left
(c) into the page
(d) out of the page



14. The resistance of a resistor is reduced to half of its initial value. If other parameters of the electrical circuit remain unaltered, the amount of heat produced in the resistor will become : 1
- (a) four times (b) two times
(c) half (d) one fourth
15. The correct pattern of magnetic field lines of the field produced by a current carrying circular loop is : 1



16. Two LED bulbs of 10W and 5W are connected in series. If the current flowing through 5W bulb is 0.005A, the current flowing through 10W bulb is : 1
- (a) 0.02A
(b) 0.01A
(c) 0.005A
(d) 0.0025A

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.

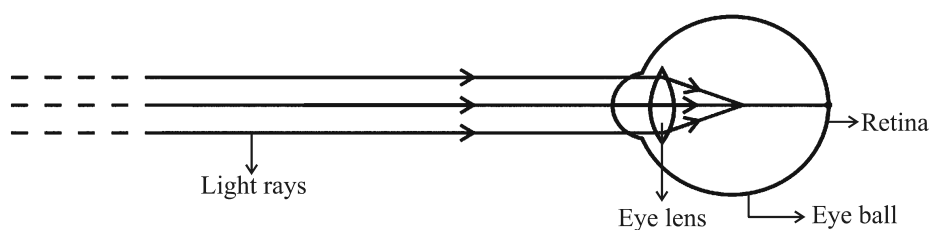
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(c) (A) is true but (R) is false.
(d) (A) is false but (R) is true.



17. **Assertion (A) :** A current carrying straight conductor experiences a force when placed perpendicular to the direction of magnetic field.
Reason (R) : The net charge on a current carrying conductor is always zero. 1
18. **Assertion (A) :** The inner walls of the small intestine have finger like projections called villi which are rich in blood.
Reason (R) : These villi have a large surface area to help the small intestine in completing the digestion of food. 1
19. **Assertion (A) :** In humans, if gene (B) is responsible for black eyes and gene (b) is responsible for brown eyes, then the colour of eyes of the progeny having gene combination Bb, bb or BB will be black only.
Reason (R) : The black colour of the eyes is a dominant trait. 1
20. **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

SECTION – B
(Very Short Answer Questions)

21. (i) State the essential function performed by ozone at the higher levels of the atmosphere. 2
(ii) Why was there a sharp drop in the amount of ozone in the atmosphere in 1980's.
22. (A) Observe the following diagram and answer the questions following it : 2



- (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.

OR



- (B) The colour of clear sky from the earth appears blue but from the space it appears black. Why ? 2
23. 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
24. Give two reasons, why bile juice is considered to be an important secretion of liver in the process of digestion ? 2
25. Name the hormone secreted in scary situations by animals. Write any three responses which enable the animal body to deal with it. 2
26. (A) 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. 2
- (i) Write the name of the compound formed and its colour.
- (ii) Write a balanced chemical equation for the reaction involved.

OR

- (B) 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

SECTION – C
(Short Answer Questions)

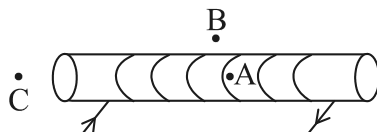
27. Write one difference between biodegradable and non-biodegradable wastes. List two impacts of each type of the accumulated waste on environment if not disposed off properly. 3
28. (A) (i) Why is an alternating current (A.C.) considered to be advantageous over direct current (D.C.) for the long distance transmission of electric power ? 3
- (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.

OR



- (B) 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



29. List two differences in the characteristic properties of the virtual images formed by the two types of spherical lenses (concave and convex). How are these characteristics of the two lenses used in the correction of the two common defects of vision namely myopia and hypermetropia ?

3

30. (A) An object is kept at a distance of 1m from a lens of power +2D :

3

- Identify the type of lens.
- Calculate its focal length and distance of the image formed.

OR

- (B) Define the following terms in the context of a diverging lens :

3

- Principal focus,
- Focal length.

Draw a labelled ray diagram to illustrate your answer.

31. (A) (i) How does Paramecium obtain its food ?

3

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

- Hydrochloric acid
- Trypsin
- Muscular walls of stomach
- Salivary amylase

OR

- (B) (i) What is double circulation ?

3

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

32. (i) Why is acidified water considered to be a good conductor of electricity ?

3

- (ii) Write a chemical equation showing the ionic products formed on dissolving potassium hydroxide in water.

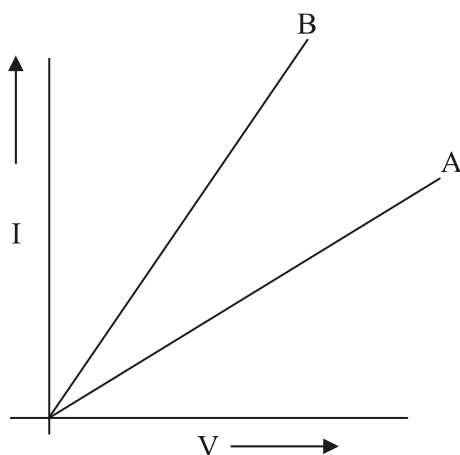
- (iii) Care must be taken while diluting concentrated nitric acid with water. Why ?



33. (i) While electrolysis of 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. 3
- (ii) What is observed when silver chloride is exposed to sunlight ? Give the type of reaction involved.

SECTION – D
(Long Answer Questions)

34. (i) How is electric current related to the potential difference across the terminals of a conductor ? 5
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.



35. (i) Name and explain the two modes of asexual reproduction observed in hydra. 5
- (ii) What is vegetative propagation ? List two advantages of using this technique.

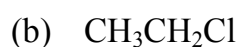
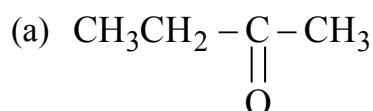


36 (A) (i) It is observed that covalent compounds are bad conductors of electricity. Give reason. 5

(ii) Carbon can neither form C^{4+} cation nor C^{4-} anion. Why ?

(iii) Draw electron dot structure of Ethanol.

(iv) Identify hetero atom(s) in the following compounds :



OR

(B) (i) What are soaps ? Explain the mechanism of cleansing action of soap with the help of a labelled diagram. 5

(ii) Detergents are better than soaps. Justify.

SECTION – E
(Source Based/Case Based Questions)

37. The ability of a medium to refract light is expressed in terms of its optical density. Optical density has a definite connotation. It is not the same as mass density. On comparing two media, the one with the large refractive index is optically denser medium than the other. The other medium with a lower refractive index is optically rarer. Also the speed of light through a given medium is inversely proportional to its optical density. 4

(i) 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

(ii) 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



- (iii) (A) The speed of light in glass is 2×10^8 m/s and in water is 2.25×10^8 m/s. 2

(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.

OR

- (iii) (B) The absolute refractive indices of water and glass are $\frac{4}{3}$ and $\frac{3}{2}$ 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

38. The most obvious outcome of the reproductive process is the generation of individuals of similar design, but in sexual reproduction they may not be exactly alike. The resemblances as well as differences are marked. The rules of heredity determine the process by which traits and characteristics are reliably inherited. Many experiments have been done to study the rules of inheritance. 4

(i) Why an offspring of human being is not a true copy of his parents in sexual reproduction ? 1

(ii) While performing experiments on inheritance in plants, what is the difference between F_1 and F_2 generation ? 1

(iii) (A) Why do we say that variations are useful for the survival of a species over time ? 2

OR

- (iii) (B) Study Mendel's cross between two plants with a pair of contrasting characters. 2

RRYY	×	rryy
Round Yellow		Wrinkled Green

He observed 4 types of combinations in F_2 generation. Which of these were new combinations ? Why do new features which are not present in the parents, appear in F_2 generation ?



39. The melting points and boiling points of some ionic compounds are given below :

4

Compound	Melting Point (K)	Boiling Point (K)
NaCl	1074	1686
LiCl	887	1600
CaCl ₂	1045	1900
CaO	2850	3120
MgCl ₂	981	1685

These compounds are termed ionic because they are formed by the transfer of electrons from a metal to a non-metal. The electron transfer in such compounds is controlled by the electronic configuration of the elements involved. Every element tends to attain a completely filled valence shell of its nearest noble gas or a stable octet.

- (i) Show the electron transfer in the formation of magnesium chloride. 1
- (ii) List two properties of ionic compounds other than their high melting and boiling points. 1
- (iii) (A) While forming an ionic compound say sodium chloride how does sodium atom attain its stable configuration ? 2

OR

- (iii) (B) **Give reasons :** 2
- (i) Why do ionic compounds in the solid state not conduct electricity ?
- (ii) What happens at the cathode when electricity is passed through an aqueous solution of sodium chloride ?



