Series Z1XYW/C

SET~2

प्रश्न-पत्र कोड
Q.P. Code 31/C/2

रोल नं.
Roll No.

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 **27** हैं । *
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी 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 पर कोई उत्तर नहीं लिखेंगे ।
- Please check that this question paper contains **27** 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
SCIENCE

निर्धारित समय : 3 घण्टे **अधिकतम अंक : 80**

Time allowed : 3 hours **Maximum Marks : 80**

General Instructions :

Read the following instructions very carefully and strictly follow them :

(i) *This question paper comprises **39** questions. **All** questions are compulsory.*

(ii) *This question paper is divided into **five** sections – **A**, **B**, **C**, **D** and **E**.*

(iii) ***Section A** – Questions No. **1** to **20** are multiple choice questions. Each question carries **1** mark.*

(iv) ***Section B** – Questions No. **21** to **26** are very short answer type questions. Each question carries **2** marks. Answer to these questions should be in the range of 30 to 50 words.*

(v) ***Section C** – Questions No. **27** to **33** are short answer type questions. Each question carries **3** marks. Answer to these questions should in the range of 50 to 80 words.*

(vi) ***Section D** – Questions No. **34** to **36** are long answer type questions. Each question carries **5** marks. Answer to these questions should be in the range of 80 to 120 words.*

(vii) ***Section E** – Questions No. **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. Only one of the alternatives has to be attempted in such questions.*

SECTION A

*This section has **20** multiple choice questions (Q.No. 1 – 20). **All** questions are **compulsory**.* *20×1=20*

1. 2 g of yellow sulphur powder is burnt in a china dish and the fumes are collected in a test tube. Water is added in the test tube and the solution is tested separately with blue and red litmus paper. The correct option is :

(a) Blue litmus remains blue and red litmus turns blue.

(b) Blue litmus turns red and red litmus remains red.

(c) Blue litmus turns red and red litmus turns blue.

(d) Blue litmus remains blue and red litmus remains red.

2. You want to test for hardness of water but hard water is not available in the laboratory. Which of the following compounds may be dissolved in pure water to make it hard ?

(i) Hydrogen Carbonate of Sodium

(ii) Sulphate of Magnesium

(iii) Chloride of Calcium

(iv) Carbonate of Sodium

(a) (i) and (ii)

(b) (ii) and (iii)

(c) (iii) and (iv)

(d) (i) and (iv)

3. In the electrolysis of water, if the mass of the gas collected at the anode is m_a and the mass of the gas collected at the cathode is m_c, the value of (m_c/m_a) is :

(a) 8 (b) 16

(c) $\frac{1}{16}$ (d) $\frac{1}{8}$

4. Consider the following substances :

(i) Acidified $K_2Cr_2O_7$

(ii) Alkaline $KMnO_4$

(iii) Oxygen

(iv) Hydrogen

Out of these, the commonly used oxidising agents are :

(a) (i) and (ii) only

(b) (ii) and (iii) only

(c) (i), (ii) and (iii)

(d) (i), (ii) and (iv)

5. The metal which melts when kept on the palm is :

(a) Sodium (b) Potassium

(c) Lithium (d) Gallium

6. Select from the following compounds which is not a base :

(a) Sodium hydroxide

(b) Calcium hydroxide

(c) Sodium sulphate

(d) Zinc oxide

7. When an object is placed beyond 2F of a convex lens, the nature of the image formed is :

(a) Real, inverted and diminished

(b) Real, erect and magnified

(c) Virtual, erect and magnified

(d) Real, inverted and magnified

8. When a narrow beam of white light passes through a glass prism it splits into its component colours ? This phenomenon is called :

(a) Diffusion of light

(b) Total reflection of light

(c) Scattering of light

(d) Dispersion of light

9. A material used for making heating elements of electrical heating devices should have :

(a) High resistivity and high melting point.

(b) High resistivity and low melting point.

(c) Low resistivity and high melting point.

(d) Low resistivity and low melting point.

10. The resistance of a wire does ***not*** depend on its :

(a) Length

(b) Area of cross-section

(c) Shape

(d) Material

11. The shape of magnetic field lines produced (i) inside a solenoid (ii) around a straight conductor, both carrying current of the same magnitude are, respectively :

(a) (i) straight, (ii) circular

(b) (i) circular, (ii) circular

(c) (i) straight, (ii) straight

(d) (i) circular, (ii) straight

12. Which one of the following properties of Carbon is ***not*** responsible for its formation of large number of compounds ?

(a) Tetravalency

(b) Isomerism

(c) Allotropy

(d) Catenation

13. Which one of the following molecules is produced initially when glucose breaks down in the cytoplasm of a cell in aerobic as well as anaerobic respiration ?

(a) Lactic acid (b) Ethanol

(c) Carbon dioxide (d) Pyruvate

14. 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.

15. The organism in which an outgrowth on the parent body develops into a new individual is :

(a) Amoeba (b) Paramecium

(c) Rhizopus (d) Yeast

16. In a cross between pure tall pea plants (TT) and pure dwarf pea plants (tt) the offsprings of F_1 generation were all tall. When F_1 generation was self-crossed, the gene combinations of the offsprings of F_2 generation will be :

(a) TT : Tt : tt (b) TT : tt

(c) Tt : tt (d) TT : Tt

For Questions number 17 to 20, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

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

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

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

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

17. *Assertion (A) :* $MnO_2 + 4HCl \longrightarrow MnCl_2 + 2H_2O + Cl_2$ is a redox reaction.

Reason (R) : In this reaction, HCl is oxidised to Cl_2 and MnO_2 is reduced to $MnCl_2$.

18. *Assertion (A) :* Cytokinins are present, in greater concentration in areas of rapid cell division such as fruits and seeds.

Reason (R) : Cytokinins promote cell division.

19. *Assertion (A) :* A rainbow is an artificial spectrum of white light appearing in the sky after a rain shower.

Reason (R) : The water droplets act like small prisms.

20. *Assertion (A) :* Each human trait is influenced by both paternal and maternal DNA.

Reason (R) : As compared to the father, the mother contributes more amount of genetic material to the child.

SECTION B

21. (a) Find the magnification of the image formed by a spherical mirror from the following data :
$u = -20$ cm, $f = -15$ cm. *2*

OR

(b) Draw a labelled ray diagram for the image formation by a concave mirror when an object is placed between its centre of curvature and focus. *2*

22. When leaves of 'Bryophyllum' fall on the soil they develop into new plants, but leaves of a lemon plant cannot do so. Why ? Name the method of reproduction by which these plants multiply. *2*

23. (a) State any one advantage of using cloth bags over plastic bags.

(b) List any two methods by which the solid wastes generated in urban areas can be safely disposed off. *2*

24. (a) A metal 'A' reacts violently with cold water and the gas evolved catches fire. Another metal 'B' when dipped in water starts floating. The metal 'C' does not react either with cold or hot water, but reacts with steam. The metal 'D' does not react with water at all. Identify the metals 'A', 'B', 'C' and 'D'. *2*

OR

(b) When two compounds namely sodium chloride and calcium chloride are heated directly, one by one on the flame of a burner, they impart different colours to the flame.

(i) Name the colour imparted by (1) sodium chloride and (2) calcium chloride.

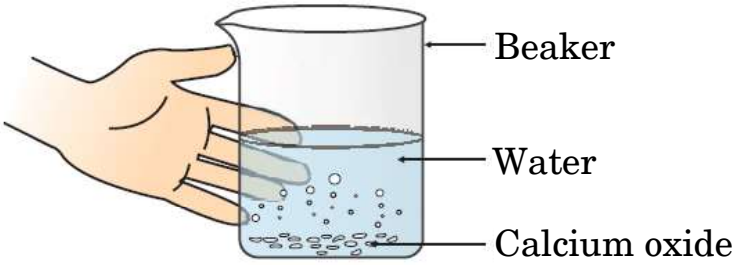
(ii) Are these compounds soluble in organic solvents such as kerosene or petrol ? Justify your answer. *2*

25. Differentiate between direct and alternating current. Name the type of current produced by the power plants in our country. Also state its frequency. *2*

26. "In human beings, the sex of a newborn child depends on the father and not the mother." Justify this statement with the help of a flow diagram. *2*

SECTION C

27. Observe the given diagram and answer the following questions : *3*



(a) Write a balanced chemical equation for the reaction taking place in the beaker.

(b) Name the two types of reactions in which the above reaction can be placed, giving justification for each.

28. Write any two ways by which plants obtain carbon dioxide. What causes the opening and closing of the stomata ? *3*

29. Explain how oxygen is delivered to all parts of the body in human beings. In what form is carbon dioxide transported in our blood ? *3*

30. (a) (i) Differentiate between a solenoid and a circular coil.

(ii) Explain how a solenoid can be made in a school laboratory.

(iii) Write one use of the strong magnetic field produced inside a current carrying solenoid. *3*

OR

(b) With the help of a labelled circuit diagram, illustrate the pattern of the magnetic field lines of the magnetic field produced around a straight current carrying conductor. Explain how, with the help of right-hand thumb rule, we can determine and mark the direction of magnetic field lines due to a current. *3*

31. (a) White light is dispersed into seven visible coloured components by a glass prism. Name the colour which bends (i) the most and (ii) the least.

(b) How can the coloured components of white light be recombined after a prism has separated them ? Draw a labelled diagram to justify your answer. *3*

32. (a) An organic compound 'X' when reacts with sodium liberates hydrogen. The same compound 'X' when heated at 443 K in the presence of concentrated sulphuric acid gives an unsaturated hydrocarbon.

(i) Identify 'X'.

(ii) Write the chemical equations for the above mentioned reactions and state the role of concentrated sulphuric acid in the second reaction. *3*

OR

(b) (i) Why are carbon compounds exceptionally stable ?

(ii) Differentiate between saturated and unsaturated compounds. Give structures of both the types of compounds having three carbon atoms in their molecules. *3*

33. (a) Construct a food chain of four trophic levels operating in a grassland. If the energy available to the organisms of 4^{th} trophic level is 75 joules, how much energy was available with the organisms of the 2^{nd} trophic level for transfer to the next trophic level ? Justify your answer.

(b) Why is the flow of energy unidirectional in a food chain ? *3*

SECTION D

34. (a) (i) Name the parts in the human female reproductive system where the following functions take place :

(1) Maturation of eggs

(2) Fusion of the egg and the sperm

(3) Implantation of the zygote

(ii) What happens to the egg

(1) when it is fertilised ?

(2) when it is not fertilised ? *3+2=5*

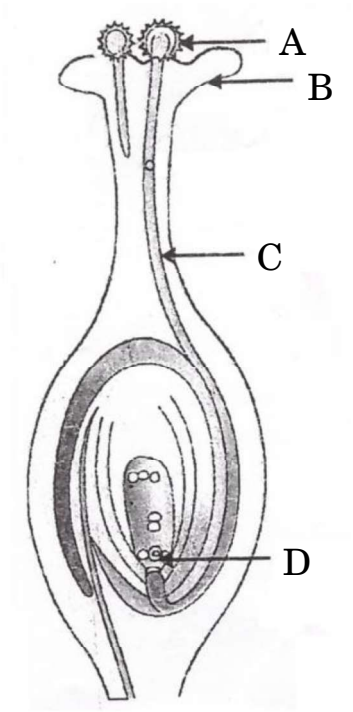
OR

(b) (i) Explain by giving one example each :

(1) Unisexual flowers

(2) Bisexual flowers

(ii) Name the labelled parts A, B, C and D in the diagram given below.



(iii) "Pollination may occur without fertilisation but fertilisation will not take place without pollination." Give reason to justify this statement. *5*

35. (a) (i) An aqueous solution turns blue litmus red. Which of the following solutions when added in excess would reverse the change ?

(1) Lemon juice

(2) Magnesium hydroxide

(3) Vinegar

(4) Calcium sulphate

(ii) Out of the following, which compound/compounds will turn the phenolphthalein solution pink ?

(1) CH_3COOH

(2) $Ca(OH)_2$

(3) HCl

(4) NaOH

(iii) Name a gas whose aqueous solution is basic. Write the formula/name of this solution.

(iv) A basic substance is used to treat a honey-bee sting. Why ?

(v) Name the acid which is present in (1) Tomato and (2) Tamarind. *5*

OR

(b) (i) Define water of crystallisation.

(ii) Write the chemical name and formula of a compound having water of crystallisation in its molecule and appears blue.

(iii) Write the chemical formula of bleaching powder. Write a balanced chemical equation of the reaction involved in its preparation. List its three uses. *5*

36. (a) Calculate the resistance of an aluminium wire of length 1 m and area of cross-section 2 mm^2. Resistivity of aluminium is $2{\cdot}63 \times 10^{-8}$ Ωm.

(b) From the values given below, plot a graph of I versus V. Show that the data is in conformity of the Ohm's law. *5*

Current – I (ampere)	0·1	0·2	0·3	0·4
Potential Difference – V (volt)	1·2	2·4	3·6	4·8

SECTION E

The following questions are source-based/case-based questions. Read the case carefully and answer the questions that follow.

37. The iron pillar in Qutab Minar complex in Delhi was built 1600 years ago. It is still standing intact and shows no signs of rusting even today. This shows that the ancient metallurgists of India in those times had fully developed metallurgical processes as well as the techniques of protection of different metals. The protection of metals, was done by several processes like coating of a thin film of another metal, alloying etc.

(a) Where is iron placed in the reactivity series of metals ? Write the form/forms in which its ores are found in nature. *1*

(b) Differentiate between roasting and calcination. *1*

(c) Explain any two methods that are employed to prevent rusting/corrosion of metals. *2*

OR

(c) Why is aluminium used to join railway tracks or the cracked machine parts of 'iron' ? Write a balanced chemical equation for the reaction which occurs. *2*

38. In animals the control and coordination is provided by nervous and muscular tissues. Nervous tissue is made of an organized network of nerve cells or neurons. In human beings, thinking is a complex activity which involves more complex mechanisms and neural connections. These are concentrated in the brain which is the main coordinating centre of the human body. The brain and spinal cord constitute the Central Nervous System which receives information from all parts of the body and integrates it.

(a) How is the brain protected from shocks and injuries ? *1*

(b) Write the main functions of (i) sensory neuron and (ii) motor neuron in a reflex arc. *1*

(c) Which part of the brain is involved in activities like (i) picking a pencil and (ii) vomiting ? State whether these actions are voluntary or involuntary. *2*

OR

(c) How does the central nervous system communicate with the other parts of the body to carry out various activities ? Name two components of this system. *2*

39. When a ray of light moving in a medium enters obliquely into another medium, it bends from its path. This phenomenon is called refraction of light. The ability of a medium to refract light is also expressed in terms of optical density. It is not the same as mass density. We use the terms 'rarer medium' and 'denser medium' which actually means 'optically rarer medium' and 'optically denser medium' respectively. When we say that a medium 'A' is optically denser than the other medium 'B', we mean that the refractive index of medium A is more than the refractive index of medium 'B'. The speed of light is higher in a rarer medium than a denser medium. Thus a ray of light travelling from a rarer medium to a denser medium slows down and bends towards the normal.

(a) Define the term absolute refractive index of a medium. *1*

(b) Absolute refractive indices of water and glass are $\frac{4}{3}$ and $\frac{3}{2}$ respectively.

(i) In which one of the two media is the speed of light more ?

(ii) If a ray of light enters obliquely from glass to water, will it bend towards the normal or away from the normal ? *1*

(c) 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) water and (ii) vacuum. *2*

OR

(c) "A ray of light incident on a rectangular glass slab immersed in any medium emerges parallel to itself." Draw a labelled ray diagram to justify this statement. *2*