Series D3CBA/1 **Set-2**

प्रश्न–पत्र कोड
Q.P. Code **31/1/2**

रोल नं.
Roll No. | 2 | 6 | 2 | 0 | 2 | 5 | 5 | 2 |

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.

विज्ञान
SCIENCE

निर्धारित समय : 3 घण्टे *अधिकतम अंक : 80*
Time allowed : 3 hours *Maximum Marks : 80*

नोट	Note
(I) कृपया जाँच कर लें कि इस प्रश्न–पत्र में मुद्रित पृष्ठ **23** हैं।	(I) Please check that this question paper contains **23** printed pages.
(II) कृपया जाँच कर लें कि इस प्रश्न–पत्र में **39** प्रश्न हैं।	(II) Please check that this question paper contains **39** questions.
(III) प्रश्न–पत्र में दाहिने हाथ की ओर दिए गए प्रश्न–पत्र कोड को परीक्षार्थी उत्तर–पुस्तिका के मुख–पृष्ठ पर लिखें।	(III) 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.
(IV) **कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर–पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें।**	(IV) **Please write down the Serial Number of the question in the answer-book before attempting it.**
(V) 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।	(V) 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.

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** – Question Nos. **1** to **20** are multiple choice questions. Each question carries **1** mark.*

*(iv) **Section B** – Question Nos. **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** – Question Nos. **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** – Question Nos. **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** – Question Nos. **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

Select and write the most appropriate option out of the four options given for each of the questions 1-20. There is no negative mark for the incorrect response.

1. Select from the following a decomposition reaction in which source of energy for decomposition is light : **1**

(a) $2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$

(b) $2H_2O \rightarrow 2H_2 + O_2$

(c) $2AgBr \rightarrow 2Ag + Br_2$

(d) $CaCO_3 \rightarrow CaO + CO_2$

2. Oxides of aluminium and zinc are : **1**

(a) acidic

(b) basic

(c) amphoteric

(d) neutral

3. Consider the following compounds :

$FeSO_4$; $CuSO_4$; $CaSO_4$; Na_2CO_3

The compound having maximum number of water of crystallisation in its crystalline form in one molecule is : 1

(a) $FeSO_4$
(b) $CuSO_4$
(c) $CaSO_4$
(d) Na_2CO_3

4. The name and formula of third member of homologous series of alkyne is : 1

(a) Propyne C_3H_6
(b) Propyne C_3H_4
(c) Butyne C_4H_8
(d) Butyne C_4H_6

5. A metal and a non-metal that exists in liquid state at the room temperature are respectively : 1

(a) Bromine and Mercury
(b) Mercury and Iodine
(c) Mercury and Bromine
(d) Iodine and Mercury

6. $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

The reaction given above is a redox reaction because in this case : 1

(a) MnO_2 is oxidised and HCl is reduced.
(b) HCl is oxidised.
(c) MnO_2 is reduced.
(d) MnO_2 is reduced and HCl is oxidised.

7. When 2 mL of sodium hydroxide solution is added to few pieces of granulated zinc in a test tube and then warmed, the reaction that occurs can be written in the form of a balanced chemical equation as : 1

(a) $NaOH + Zn \rightarrow NaZnO_2 + H_2O$
(b) $2NaOH + Zn \rightarrow Na_2ZnO_2 + H_2$
(c) $2NaOH + Zn \rightarrow NaZnO_2 + H_2$
(d) $2NaOH + Zn \rightarrow Na_2ZnO_2 + H_2O$

8. Which one of the following statements is **NOT** true ? 1

(a) DNA carries the information for inheritance of features from parents to the next generation.

(b) DNA is the information source for making proteins.

(c) Change in the information leads to different proteins.

(d) Features will remain the same even if the protein changes.

9. In a nerve cell, the site where the electrical impulse is converted into a chemical signal is known as : 1

(a) Axon

(b) Dendrites

(c) Neuromuscular junction

(d) Cell body

10. Chromosomes :

(i) carry hereditary information from parents to the next generation.

(ii) are thread like structures located inside the nucleus of an animal cell.

(iii) always exist in pairs in human reproductive cells.

(iv) are involved in the process of cell division.

The correct statements are : 1

(a) (i) and (ii)

(b) (iii) and (iv)

(c) (i), (ii) and (iv)

(d) (i) and (iv)

11. A stomata closes when :

(i) it needs carbon dioxide for photosynthesis.

(ii) it does not need carbon dioxide for photosynthesis.

(iii) water flows out of the guard cells.

(iv) water flows into the guard cells.

The correct reason(s) in this process is/are : 1

(a) (i) only

(b) (i) and (iii)

(c) (ii) and (iii)

(d) (ii) and (iv)

12. In which of the following organisms, multiple fission is a means of asexual reproduction ? 1

(a) Yeast
(b) Leishmania
(c) Paramoecium
(d) Plasmodium

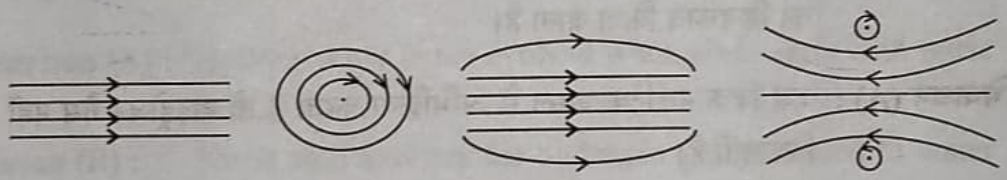
13. At what distance from a convex lens should an object be placed to get an image of the same size as that of the object on a screen ? 1

(a) Beyond twice the focal length of the lens.
(b) At the principal focus of the lens.
(c) At twice the focal length of the lens.
(d) Between the optical centre of the lens and its principal focus.

14. The lens system of human eye forms an image on a light sensitive screen, which is called as : 1

(a) Cornea
(b) Ciliary muscles
(c) Optic nerves
(d) Retina

15. The pattern of the magnetic field produced inside a current carrying solenoid is : 1



(a) (b) (c) (d)

16. Identify the food chain in which the organisms of the second trophic level are missing : 1

(a) Grass, goat, lion
(b) Zooplankton, Phytoplankton, small fish, large fish
(c) Tiger, grass, snake, frog
(d) Grasshopper, grass, snake, frog, eagle

For Q. Nos. **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) :** The rate of breathing in aquatic organisms is much faster than in terrestrial organisms.

Reason (R) : The amount of oxygen dissolved in water is very high as compared to the amount of oxygen in air. **1**

18. **Assertion (A) :** The rainbow is a natural spectrum of sunlight in the sky.

Reason (R) : Rainbow is formed in the sky when the sun is overhead and water droplets are also present in air. **1**

19. **Assertion (A) :** Accumulation of harmful chemicals is maximum in the organisms at the highest trophic level of a food chain.

Reason (R) : Harmful chemicals are sprayed on the crops to protect them from diseases and pests. **1**

20. **Assertion (A) :** Hydrogen gas is not evolved when zinc reacts with nitric acid.

Reason (R) : Nitric acid oxidises the hydrogen gas produced to water and itself gets reduced. **1**

SECTION – B

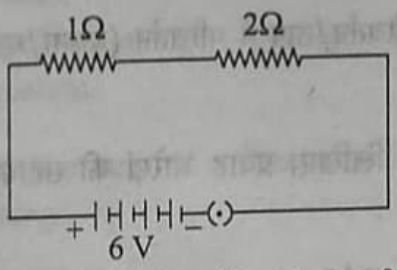
21. (i) Two magnetic field lines do not intersect each other. Why ? **2**

(ii) How is a uniform magnetic field in a given region represented ? Draw a diagram in support of your answer.

22. (A) Show how you would connect three resistors each of resistance 6 Ω, so that the combination has a resistance of 9 Ω. Also justify your answer. 2

OR

(B) In the given circuit calculate the power consumed in watts in the resistor of 2 Ω : 2



23. A ray of light falls making an angle of incidence θ on the surface of a glass slab. Draw a labelled ray diagram to show its path. Also mark lateral displacement on it. 2

24. (A) In which region of the brain is (i) medulla and (ii) cerebrum located ? State one function of each. 2

OR

(B) Name a hormone that promotes the growth of tendrils and explain how they help a pea plant to climb up other plants. 2

25. Mention the pathway of urine in our body starting from the organ of its formation to its excretion. What will happen if the tubular part of the nephron does not work properly? 2

26. Translate the following statements into chemical equations and then balance them : 2

(i) Solution of barium chloride and aluminium sulphate in water react to give insoluble barium sulphate and the solution of aluminium chloride.

(ii) Aluminium metal reacts with steam to give aluminium oxide and hydrogen gas.

SECTION – C

27. (i) The pH of a sample of tomato juice is 4.6. How is this juice likely to be in taste ? Give reason to justify your answer. 1

(ii) How do we differentiate between a strong acid and a weak base in terms of ion-formation in aqueous solutions ? 1

(iii) The acid rain can make the survival of aquatic animals difficult. How ? 1

28. Write one chemical equation each for the chemical reaction in which the following have taken place : 3

(i) Change in colour

(ii) Change in temperature

(iii) Formation of precipitate

Mention colour change/temperature change (rise/fall)/compound precipitated along with equation.

29. Define reflex action. With the help of a flow chart show the path of a reflex action such as sneezing. 3

30. In the context of the statement "chlorophyll is necessary for photosynthesis" answer the following questions : 3

(i) What are variegated leaves? Give an example.

(ii) When leaf is boiled in alcohol, what happens to the colour of the leaf and the colour of the solution ?

(iii) In what form is the carbohydrate produced, stored in the plant? Why is chlorophyll necessary for photosynthesis ?

31. **(A)** Plants → Deer → Lion

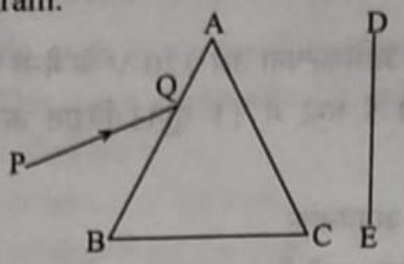
In the given food chain, what will be the impact of removing all the organisms of second trophic level on the first and third trophic level? Will the impact be the same for the organisms of the third trophic level in the above food chain if they were present in a food web? Justify. 3

OR

(B) A gas 'X' which is a deadly poison is found at the higher levels of atmosphere and performs an essential function.

Name the gas and write the function performed by this gas in the atmosphere. Which chemical is linked to the decrease in the level of this gas? What measures have been taken by an international organization to check the depletion of the layer containing this gas ? 3

32. A narrow beam, PQ of white light is passing through a glass prism ABC as shown in the diagram.



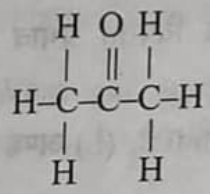
Draw a ray diagram to show the emergent beam as it falls on the screen DE. Also write the phenomenon involved and its cause. Using the second law of refraction state which colour of light must have the highest value of refractive index amongst seven visible colours of light. Justify your answer. 3

33. (i) Name two safety measures commonly used in electric circuits and appliances. 3

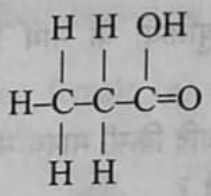
(ii) The power rating of an electric oven is 220 V; 2 kW. If it is used in a domestic electric circuit of current rating of 5A, what result do you expect ? Justify your answer with necessary calculations.

SECTION – D

34. **(A)** (i) Define the term functional group. Identify the functional groups present in the following carbon compounds : 5



(I)



(II)

(ii) What happens when ethanol reacts with acidified potassium dichromate solution ? Write chemical equation for the reaction. Why is this reaction considered an oxidation reaction ?

(iii) Write chemical equation for the reaction of ethanoic acid with sodium hydroxide.

OR

(B) (i) Describe method of preparation of soap giving chemical equation for the reaction involved. 5

(ii) Explain with diagram the mechanism of the cleansing action of soaps.

35. **(A)** (i) Define electric power. Express it in terms of potential difference (V) and resistance (R). 5

(ii) An electric oven is designed to work on the mains voltage of 220 V. This oven consumes 11 units of electrical energy in 5 hours. Calculate :

(a) power rating of the oven

(b) current drawn by the oven

(c) resistance of the oven when it is red hot

OR

(B) (i) Write the relation between resistance R and electrical resistivity ρ of the material of a conductor in the shape of cylinder of length l and area of cross-section A. Hence derive the SI unit of electrical resistivity. 5

(ii) The resistance of a metal wire of length 3 m is 60 Ω. If the area of cross-section of the wire is 4×10^{-7} m^2, calculate the electrical resistivity of the wire.

(iii) State how would electrical resistivity be affected if the wire (of part 'ii') is stretched so that its length is doubled. Justify your answer.

36. **(A)** (i) Name three techniques/devices used by human females to avoid pregnancy. Mention the side effects caused by each. 5

(ii) What will happen if in a human female (a) fertilisation takes place, (b) an egg is not fertilised ?

OR

(B) (i) Draw a diagram showing spore formation in Rhizopus and label the (a) reproductive and (b) non-reproductive parts. Why does Rhizopus not multiply on a dry slice of bread ? 5

(ii) Name and explain the process by which reproduction takes place in Hydra.

SECTION – E

Q. Nos. 37-39 are source-based/case-based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts :

37. Study the data given below showing the focal length of three concave mirrors A, B and C and the respective distances of objects placed in front of the mirrors :

Case	Mirror	Focal Length (cm)	Object Distance (cm)
1	A	20	45
2	B	15	30
3	C	30	20

(i) In which one of the above cases the mirror will form a diminished image of the object ? Justify your answer. **1**

(ii) List two properties of the image formed in case 2. **1**

(iii) (A) What is the nature and size of the image formed by mirror C ? Draw ray diagram to justify your answer. **2**

OR

(iii) (B) An object is placed at a distance of 18 cm from the pole of a concave mirror of focal length 12 cm. Find the position of the image formed in this case. **2**

38. Mendel worked out the rules of heredity by working on garden pea using a number of visible contrasting characters. He conducted several experiments by making a cross with one or two pairs of contrasting characters of pea plant. On the basis of his observations he gave some interpretations which helped to study the mechanism of inheritance.

(i) When Mendel crossed pea plants with pure tall and pure short characteristics to produce F_1 progeny, which two observations were made by him in F_1 plants ? **1**

(ii) Write one difference between dominant and recessive trait. **1**

(iii) (A) In a cross with two pairs of contrasting characters

RRYY × rryy

(Round Yellow) (Wrinkled Green)

Mendel observed 4 types of combinations in F_2 generation. By which method did he obtain F_2 generation ? Write the ratio of the parental combinations obtained and what conclusions were drawn from this experiment. **2**

OR

(iii) (B) Justify the statement :

"It is possible that a trait is inherited but may not be expressed." **2**

39. The metals produced by various reduction processes are not very pure. They contain impurities, which must be removed to obtain pure metals. The most widely used method for refining impure metals is electrolytic refining.

(i) What is the cathode and anode made of in the refining of copper by this process ? **1**

(ii) Name the solution used in the above process and write its formula. **1**

(iii) (A) How copper gets refined when electric current is passed in the electrolytic cell ? **2**

OR

(iii) (B) You have two beakers 'A' and 'B' containing copper sulphate solution. What would you observe after about 2 hours if you dip a strip of zinc in beaker 'A' and a strip of silver in beaker 'B'? Give reason for your observations in each case. **2**