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Roll No.

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प्रश्न-पत्र कोड
Q.P. Code

31/4/3

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 27 हैं।	(I) Please check that this question paper contains 27 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** – 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 be 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

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

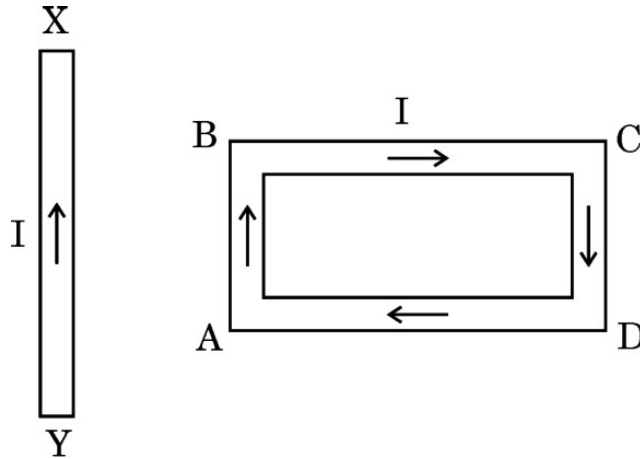
20×1=20

- 1. An electric iron of resistance $20\ \Omega$ draws a current of 5 A. The heat developed in the iron in 30 seconds is :
 - (A) 15000 J
 - (B) 6000 J
 - (C) 1500 J
 - (D) 3000 J
- 2. The acid produced in our stomach during digestion and the base used to neutralise the excess acid during indigestion respectively are :
 - (A) HCl, Mg(OH)_2
 - (B) HCl, Ca(OH)_2
 - (C) Amino acids, Ca(OH)_2
 - (D) Lactic acid, Mg(OH)_2

3. A zygote is formed by the fusion of a male gamete and a female gamete. The number of chromosomes in the zygote of a human is :
- (A) 23 (B) 44
(C) 46 (D) 92
4. The part of seed which is a source of food during germination of seed is :
- (A) Cotyledon (B) Radicle
(C) Plumule (D) Embryo
5. $\text{Zn} + 2\text{CH}_3\text{COOH} \longrightarrow (\text{CH}_3\text{COO})_2\text{Zn} + \text{H}_2$
- The above reaction is a :
- (A) Decomposition reaction (B) Displacement reaction
(C) Double displacement reaction (D) Combination reaction
6. Four solutions, namely glucose, alcohol, hydrochloric acid and sulphuric acid filled in four separate beakers are connected one by one in an electric circuit with a bulb. The solutions in which the bulb will glow when current is passed are :
- (A) Glucose and alcohol
(B) Alcohol and hydrochloric acid
(C) Glucose and sulphuric acid
(D) Hydrochloric acid and sulphuric acid
7. The metals which are found in both free state as well as combined state are :
- (A) Gold and platinum (B) Platinum and silver
(C) Copper and silver (D) Gold and silver
8. The part of the flower which attracts insects for pollination is/are :
- (A) Stigma and style
(B) Sepals and petals
(C) Petals only
(D) Sepals only

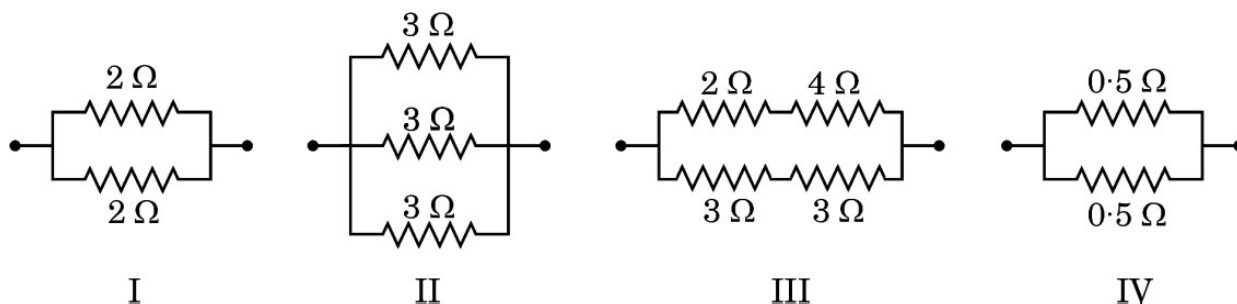
9. In human beings, when the process of digestion is completed, the (i) proteins, (ii) carbohydrates, and (iii) fats are respectively finally converted into :
- (A) (i) Amino acids, (ii) glucose and (iii) fatty acids
(B) (i) Amino acids, (ii) glucose, (iii) fatty acids and glycerol
(C) (i) Glucose, (ii) fatty acids and glycerol, (iii) amino acids
(D) (i) Sugars, (ii) amino acids, (iii) fatty acids and glycerol
10. The number of single and double bonds present in a molecule of benzene (C_6H_6) respectively, are :
- (A) 6 and 6 (B) 9 and 3
(C) 3 and 9 (D) 3 and 3
11. A plant growth inhibitor hormone which causes wilting of leaves is called :
- (A) Auxin (B) Cytokinin
(C) Absciscic acid (D) Gibberellin
12. Some wastes are given below :
- (i) Garden waste
(ii) Ball point pen refills
(iii) Empty medicine bottles made of glass
(iv) Peels of fruits and vegetables
(v) Old cotton shirt
- The non-biodegradable wastes among these are :
- (A) (i) and (ii)
(B) (ii) and (iii)
(C) (i), (iv) and (v)
(D) (i), (iii) and (iv)

13. A rectangular loop ABCD carrying a current I is situated near a straight conductor XY, such that the conductor is parallel to the side AB of the loop and is in the plane of the loop. If a steady current I is established in the conductor as shown, the conductor XY will



- (A) remain stationary.
 (B) move towards the side AB of the loop.
 (C) move away from the side AB of the loop.
 (D) rotate about its axis.
14. Absolute refractive index of glass and water is $\frac{3}{2}$ and $\frac{4}{3}$ respectively. If the speed of light in glass is 2×10^8 m/s, the speed of light in water is :
- (A) $\frac{9}{4} \times 10^8$ m/s (B) $\frac{5}{2} \times 10^8$ m/s
 (C) $\frac{7}{3} \times 10^8$ m/s (D) $\frac{16}{9} \times 10^8$ m/s
15. When a beam of white light passes through a region having very fine dust particles, the colour of light mainly scattered in that region is :
- (A) Red (B) Orange
 (C) Blue (D) Yellow

16. Consider the following combinations of resistors :



The combinations having equivalent resistance $1\ \Omega$ is/are :

- (A) I and IV (B) Only IV
(C) I and II (D) I, II and III

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 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.

17. *Assertion (A):* Oxygen is essential for all aerobic forms of life.

Reason (R): Free oxygen atoms combine with molecular oxygen to form ozone.

18. *Assertion (A):* Magnetic field lines never intersect each other.

Reason (R) : If they intersect, then at the point of intersection, the compass needle would point towards two directions, which is not possible.

19. *Assertion (A) :* The extraction of metals from their sulphide ores cannot take place without roasting of the ore.

Reason (R) : Roasting converts sulphide ores directly into metals.

20. *Assertion (A) :* In the human heart ventricles have thicker muscular walls than atria.

Reason (R) : Ventricles have to pump the blood into various organs.

SECTION B

Questions no. 21 to 26 are very short answer type questions.

21. (a) We need to water the soil in plants on a regular basis. But it ultimately reaches the leaves of the plant. Explain how this takes place. 2

OR

(b) Name the type of nutrition exhibited by Amoeba. Explain how food is taken in and digested by this organism. 2

22. When a soap is dissolved in water, the soap molecules form structures. What are these structures called ? Draw a labelled diagram of these structures. 2

23. (a) 1 gram of solid sodium chloride was taken in a clean and dry test tube and concentrated sulphuric acid was added to it.

(i) Name the gas evolved in the reaction.

(ii) What will be observed when this gas is tested with (I) dry, and (II) wet blue litmus paper ? Write your conclusion about the nature (acidic/basic) of this gas. 2

OR

(b) Some metals react with acids to produce salt and hydrogen gas. Illustrate it with an example. How will you test the presence of this gas ? 2

24. Explain how equal genetic contribution of male and female parents is ensured in the progeny. 2
25. What would have been the colour of the sky, if the Earth had no atmosphere ? Give reason to justify your answer. 2
26. Calculate the resistance of a copper wire of length 1000 m and area of cross-section 2 mm^2 . Resistivity of copper is $1.6 \times 10^{-8} \Omega \text{ m}$. 2

SECTION C

Questions no. 27 to 33 are short answer type questions.

27. Define the term power of accommodation of human eye. What happens to the image distance in the eye when we increase the distance of an object from the eye ? Name and explain the role of the part of human eye responsible for it in this case. 3
28. Write chemical equations for the following reactions, giving the conditions for the reaction in each case : 3
- Reaction of ethanol with ethanoic acid
 - Reaction of an ester with a base (NaOH)
 - Formation of ethene from ethanol
29. A student fixes a sheet of white paper on a drawing board. He places a bar magnet in the centre of it. He sprinkles some iron filings uniformly around the bar magnet. Then he taps the drawing board gently and observes that the iron filings arrange themselves in a particular pattern.
- Why do iron filings arrange in a particular pattern ?
 - What does the crowding of iron filings at the ends of the magnet indicate ?
 - What do the lines, along which the iron filings align, represent ?
 - If the student places a cardboard horizontally in a current carrying solenoid and repeats the above activity, in what pattern would the iron filings arrange ? State the conclusion drawn about the magnetic field based on the observed pattern of the lines. 3

30. (a) Name any two pairs of contrasting characters other than height used by Mendel in his experiments.
- (b) On crossing a tall and a short pea plant, Mendel obtained F_1 generation in which all pea plants were tall.
- (i) Are these plants exactly the same as tall plants of the parent generation ? Write their gene combination.
- (ii) Give the percentage of short plants obtained in F_2 generation when F_1 plants are self-pollinated.
- (iii) In what ratio would you find TT and Tt in F_2 generation ? 3
31. Write the common name and the chemical name of the compound $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$. Write the method of its preparation. Give chemical equation for the reaction, when water reacts with $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$. 3
32. (a) Explain with the help of a labelled diagram, the process of reproduction in Hydra by budding. Name the cells used for reproduction in this process. 3
- OR**
- (b) List two roles of each of the following in human reproductive system : 3
- (i) Seminal vesicles and prostate gland
- (ii) Oviduct
- (iii) Testis
33. Differentiate between biodegradable and non-biodegradable wastes. We generate a lot of non-biodegradable wastes in our daily life. Write any two harmful effects caused by these wastes if not disposed off properly. 3

SECTION D

Questions no. 34 to 36 are long answer type questions.

34. (a) (i) Define a reflex arc. Why have reflex arcs evolved in animals ? Trace the sequence of events which occur, when you suddenly touch a hot object.

(ii) Name the part of nervous system which helps in communication between the central nervous system and other parts of the body. What are the two components of this system ?

5

OR

(b) (i) Leaves of 'chhui-mui' plant begin to fold up and droop in response to a stimulus. Name the stimulus and write the cause for such a rapid movement. Is there any growth involved in the movement ?

(ii) Define geotropism in plants. What is meant by positive and negative geotropism ? Give one example of each type.

5

35. (a) What is a chemical reaction ? Describe one activity each to show that a chemical change has occurred in which (i) change of colour, and (ii) change in temperature has taken place.

5

OR

- (b) (i) Define a decomposition reaction. How can we say that (I) electrolysis of water, and (II) blackening of silver bromide when exposed to sunlight, are decomposition reactions ? Mention the type of energy involved in each case.
- (ii) “The type of reactions in which (I) calcium oxide is formed, and (II) calcium hydroxide is formed are opposite reactions to each other.” Justify this statement with the help of chemical equations.

5

- 36.** (a) (i) State laws of reflection of light.
- (ii) An object of height 5.0 cm is placed at 15 cm in front of a concave mirror of focal length 10 cm. At what distance from the mirror should a screen be placed, so that a focussed image is obtained on it ? Find the height of the image.

5

OR

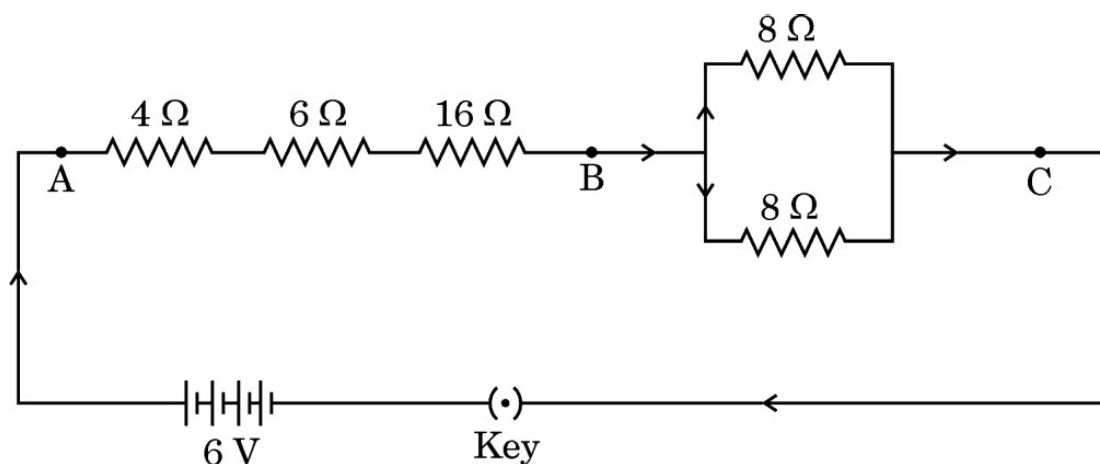
- (b) (i) State laws of refraction of light.
- (ii) Draw a ray diagram to show refraction of a ray of light through a rectangular glass slab. How is the emergent ray related to incident ray ? Mark lateral displacement in the diagram.

5

SECTION E

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

37. Study the following circuit :



On the basis of this circuit, answer the following questions :

- | | | |
|-----|---|---|
| (a) | Find the value of total resistance between the points A and B. | 1 |
| (b) | Find the resistance between the points B and C. | 1 |
| (c) | (i) Calculate the current drawn from the battery, when the key is closed. | 2 |

OR

- | | | |
|-----|--|---|
| (c) | (ii) In the above circuit, the $16\ \Omega$ resistor or the parallel combination of two resistors of $8\ \Omega$, which one of the two will have more potential difference across its two ends ? Justify your answer. | 2 |
|-----|--|---|

38. Three metal samples of magnesium, aluminium and iron were taken and rubbed with sand paper. These samples were then put separately in test tubes containing dilute hydrochloric acid. Thermometers were also suspended in each test tube so that their bulbs dipped in the acid. The rate of formation of bubbles was observed. The above activity was repeated with dilute nitric acid and the observations were recorded.

Answer the following questions :

- (a) When activity was done with dilute hydrochloric acid, then in which one of the test tubes was the rate of formation of bubbles the fastest and the thermometer showed the highest temperature ? 1
- (b) Which metal did not react with dilute hydrochloric acid ? Give reason. 1
- (c) (i) Why is hydrogen gas not evolved when a metal reacts with dilute nitric acid ? Name the ultimate products formed in the reaction. 2

OR

- (c) (ii) Name the type of reaction on the basis of which reactivity of metals is decided. You have two metals X and Y. How would you decide which is more reactive than the other ? 2

39. Kidneys are vital organs for survival. Several factors like infections, injury or restricted blood flow to kidneys reduce the activity of kidneys. This leads to accumulation of poisonous wastes in the body, which can even lead to death. In case of kidney failure, an artificial kidney can be used. An artificial kidney is a device to remove waste products from the blood through dialysis.

- (a) (i) Name the artery that brings oxygenated blood to the kidney.
(ii) Name the cluster the thin-walled blood capillaries present in the Bowman's capsule. 1
- (b) In human excretory system name the organ which stores urine. Is this organ under hormonal control or nervous control ? 1
- (c) (i) List two major steps involved in the formation of urine and state in brief their functions. 2

OR

- (c) (ii) In which part of the nephron does selective reabsorption take place ? List the factors which the amount of water reabsorbed depends on. 2