



## SAMPLE PAPER 3 2024-25

### Class 10 - Science

Time Allowed: 3 hours

Maximum Marks: 80

#### General Instructions:

1. This question paper consists of 39 questions in 5 sections.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
3. Section A consists of 20 objective-type questions carrying 1 mark each.
4. Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should be in the range of 30 to 50 words.
5. Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should be in the range of 50 to 80 words.
6. Section D consists of 3 Long Answer type questions carrying 05 marks each. Answers to these questions should be in the range of 80 to 120 words.
7. Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

#### Section A

1. Consider the following Chemical equation: [1]  
$$a \text{ Al}_2\text{O}_3 + b \text{ HCl} \rightarrow c \text{ AlCl}_3 + d \text{ H}_2\text{O}$$

In order to balance this chemical equation, the values of a, b, c and d must be

a) 2, 6, 2 and 3	b) 1, 6, 3 and 2
c) 1, 6, 2 and 3	d) 2, 6, 3 and 2
2. In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution: [1]  
A. exchange of atoms takes place  
B. exchange of ions takes place  
C. a precipitate is produced  
D. an insoluble salt is produced  
The correct option is:  

a) A and C	b) B and D
c) only B	d) B, C and D
3. Tooth decay begins at the pH of: [1]  

a) 8.0	b) 5.1
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c) 5.8

d) 6.5

4. Consider the following statements about homologous series of carbon compounds: [1]
- All succeeding members differ by  $-\text{CH}_2$  unit.
  - Melting point and boiling point increases with increasing molecular mass.
  - The difference in molecular masses between two successive members is 16 u.
  - $\text{C}_2\text{H}_2$  and  $\text{C}_3\text{H}_4$  are **NOT** the successive members of alkyne series.

The correct statements are -

a) (b) and (c)

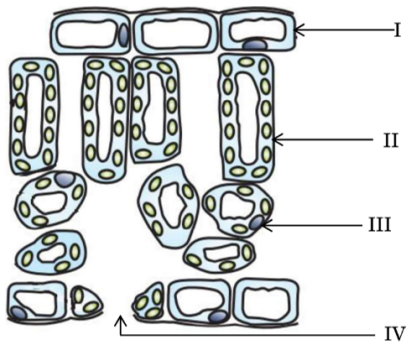
b) (a) and (c)

c) (c) and (d)

d) (a) and (b)

5. Which of the following is an alloy of copper and tin? [1]
- Constantan
  - Brass
  - Nichrome
  - Bronze
6. A metal and a non-metal that exists in liquid state at the room temperature are respectively: [1]
- Mercury and Bromine
  - Bromine and Mercury
  - Mercury and Iodine
  - Iodine and Mercury
7. The name and formula of third member of homologous series of alkyne is: [1]
- Butyne  $\text{C}_4\text{H}_8$
  - Butyne  $\text{C}_4\text{H}_6$
  - Propyne  $\text{C}_3\text{H}_6$
  - Propyne  $\text{C}_3\text{H}_4$

8. In the following diagram, identify the cells through which massive amounts of gaseous exchange takes place for photosynthesis: [1]



a) I

b) III

c) IV

d) II

9. 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 [1]
- 46
  - 23
  - 92
  - 44
10. The bacterial and the viral infections that may be caused due to unsafe sex respectively are: [1]
- Gonorrhoea and Syphilis
  - Warts and HIV-AIDS
  - HIV-AIDS and Warts
  - Syphilis and Warts
11. In a cross between pure tall pea plants (TT) and pure dwarf pea plants (tt) the offsprings of  $F_1$  generation were [1]

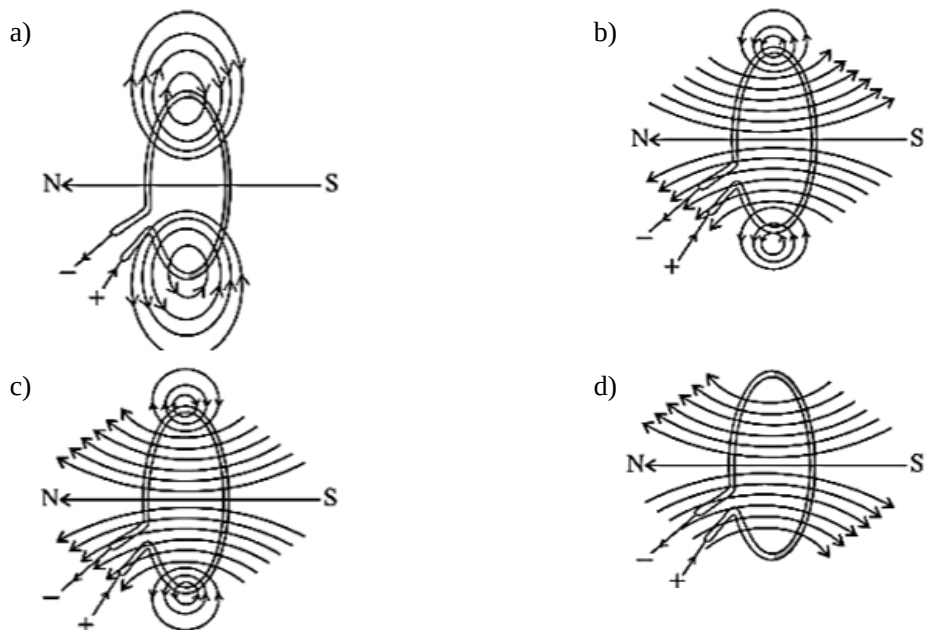
all tall. When  $F_1$  generation was self-crossed, the gene combinations of the offsprings of  $F_2$  generation will be:

- a) TT : tt  
 b) TT : Tt  
 c) TT : Tt : tt  
 d) Tt : tt

12. Which one of the following statements is correct about the human circulatory system? [1]

- a) Blood transports only oxygen and not carbon dioxide.  
 b) Human heart has five chambers.  
 c) Both oxygen-rich and oxygen-deficient blood gets mixed in the heart.  
 d) Valves ensure that the blood does not flow backwards.

13. The correct pattern of magnetic field lines of the field produced by a current carrying circular loop is: [1]



14. A cylindrical conductor of length  $l$  and uniform area of cross section  $A$  has resistance  $R$ . The area of cross section of another conductor of same material and same resistance but of length  $2l$  is [1]

- a)  $\frac{A}{2}$   
 b)  $2A$   
 c)  $3A$   
 d)  $\frac{3A}{2}$

15. For the management of wastes, we should follow: [1]

- a) 3Ps  
 b) 3Rs  
 c) 3Qs  
 d) 3As

16. In the given food chain, suppose the amount of energy at fourth trophic level is 5 kJ, what will be the energy available at the producer level? Grass  $\rightarrow$  Grasshopper  $\rightarrow$  Frog  $\rightarrow$  Snake  $\rightarrow$  Hawk [1]

- a) 5 kJ  
 b) 50 kJ  
 c) 500 kJ  
 d) 5000 kJ

17. **Assertion (A):** Chips manufacturers usually flush bags of chips with gas such as nitrogen to prevent the chips from getting oxidised. [1]

**Reason (R):** This increase the taste of the chips and helps in their digestion.

- 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.
18. **Assertion (A):** DNA copying is necessary during reproduction. [1]  
**Reason (R):** DNA copying leads to the transmission of characters from parents to offspring.
- 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.
19. **Assertion (A):** Copper is used to make electric wires. [1]  
**Reason (R):** Copper has very low electrical resistance.
- 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.
20. **Assertion (A):** Decomposers act as cleaning agents of the environment. [1]  
**Reason (R):** The decomposers recycle waste material in the hydrosphere.
- 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.

### Section B

21. Which compounds are called (i) alkanes, (ii) alkenes and (iii) alkynes?  $C_4H_{10}$  belongs to which of these? Draw two structural isomers of this compound. [2]
22. Draw a labelled diagram in proper sequence to show budding in hydra. [2]
23. i. In the human respiratory system, name the following: [2]  
I. Part where air is filtered by fine hairs and mucus lining  
II. Part which separates chest cavity from abdominal cavity  
III. Balloon like structures where exchange of gases takes place  
IV. The two large air passages that lead from trachea to the lungs  
ii. List any two characteristics of lungs which make it an efficient respiratory surface.

OR

- List four functions of the human heart. Why is double circulation necessary in the human body?
24. State Snell's law of refraction of light. Write an expression for the absolute refractive index of a medium in terms of speed of light. [2]
25. Which chemical is used in fire extinguishers. It is harmful as it leads to depletion of ozone layer, thus allowing UV radiations from the Sun to enter into the atmosphere. [2]

OR

- How is ozone formed in the higher levels of the atmosphere? **Damage to the ozone layer is a cause of concern.** Justify this statement.
26. What is dispersion? What happens when light is passed through a glass prism? [2]

### Section C

27. The atomic number of an element is 20. Write its electronic configuration. State whether this element is a metal or a non-metal. What is its valency? Write the name and formula of the compound which this element forms with chlorine. [3]

28. Samples of four metals A, B, C and D were taken and added to the following solution one by one. The results obtained have been tabulated as follows: [3]

Metal	Iron(II) sulphate	Copper(II) sulphate	Zinc sulphate	Silver nitrate
A	No reaction	Displacement	—	—
B	Displacement	—	No reaction	—
C	No reaction	No reaction	No reaction	Displacement
D	No reaction	No reaction	No reaction	No reaction

Use the table above to answer the following questions about metals A, B, C and D.

- Which is the most reactive metal?
- What would you observe if B is added to a solution of copper(II) sulphate?
- Arrange the metals A, B, C and D in the order of decreasing reactivity.

OR

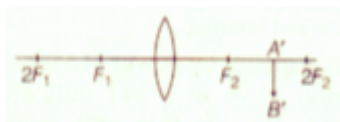
A group of a students looked at different metals and metal sulphate solutions given is a tabular form. From the data, answer the following:

Metal	Metal sulphate solution	Colour
Chromium	Chromium sulphate	Green
Cobalt	Cobalt sulphate	Pink
Copper	Copper sulphate	Blue
Magnesium	Magnesium sulphate	Colourless

- Which metal reacts with all other sulphate solutions?
  - Which metal did not react with any other metal sulphate solution?
  - Arrange the metals in decreasing order of reactivity.
29. Observe the following table carefully and match the components of part I with part II of the table. Write them in complete sentences. [3]

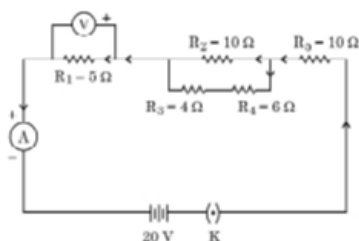
Part I	Part II
Unicellular organism	Transpiration
Human beings	Diffusion
Plants	Urination

30. Name the plant Mendel used for his experiment. What type of progeny was obtained by Mendel in  $F_1$  and  $F_2$  generations when he crossed the tall and short plants? Write the ratio he obtained in  $F_2$  generation plants. [3]
31. Observe the following incomplete ray diagram of an object where the image A'B' is formed after refraction from a convex lens. [3]



On the basis of above information fill in the blanks.

- i. The position of object AB would have been...
  - ii. Size of the object would have been ... than the size of image.
32. Define the term electric power. An electric device of resistance  $R$  when connected across an electric source of voltage  $V$  draws a current  $I$ . Derive an expression for the power in terms of resistance  $R$  and voltage  $V$ . What is the power of a device of resistance  $400\Omega$  operating at  $200\text{ V}$ ? [3]
33. Study the following circuit and find: [3]



- i. Effective resistance of the circuit
- ii. Current drawn from the battery
- iii. Potential difference across the  $5\Omega$  resistor

#### Section D

34. i. What is saponification? Differentiate between soaps and detergents on the basis of the following: [5]
1. Their chemical composition
  2. Their mechanism in hard water
- ii. Explain the formation of micelles between oily dirt and soap molecules. Also draw its diagram.

OR

- a. Distinguish between esterification and saponification reactions with the help of chemical equations for each.
- b. With a labelled diagram describe in brief an activity to show the formation of an ester.

35. i. Use of a condom is beneficial for both the sexes involved in a sexual act. Justify this statement giving two reasons. [5]
- ii. How do oral contraceptive help in avoiding pregnancies?
- iii. What is sex selective abortion? How does it affect a healthy society? (State any one consequence)

OR

- i. Distinguish between hormonal co-ordination in plants and animals.
- ii. Which part of the brain is responsible for -
  1. intelligence
  2. riding a bicycle
  3. vomiting
  4. controlling hunger
- iii. How is brain and spinal-cord protected against mechanical injuries?

36. a. What is a lens? List two main categories of lenses. In which category is a double concave lens placed? [5]
- b. A convex lens of focal length  $15\text{ cm}$  forms a real image at a distance of  $20\text{ cm}$  from its optical centre. Find the position of the object. Is the image formed by the lens magnified or diminished?

OR

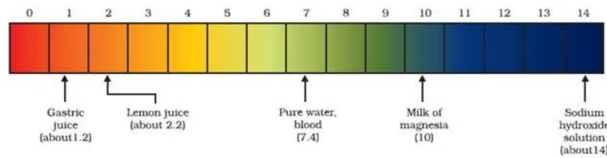
It is desired to obtain an erect image of an object, using concave mirror of focal length of 12 cm.

- What should be the range of distance of an object placed in front of the mirror?
- Will the image be smaller or larger than the object? Draw ray diagram to show the formation of image in this case.
- Where will the image of this object be, if it is placed 24 cm in front of the mirror? Draw ray diagram for this situation also to justify your answer. Show the positions of pole, principal focus and the centre of curvature in the above ray diagrams.

### Section E

37. **Read the following text carefully and answer the questions that follow:** [4]

The strength of acid and base depends on the number of  $H^+$  and the number of  $OH^-$  respectively. If we take hydrochloric acid and acetic acid of the same concentration, say one molar, then these produce different amounts of hydrogen ions. Acids that give rise to more  $H^+$  ions are said to be strong acids, and acids that give less  $H^+$  ions are said to be weak acids. Can you now say what weak and strong bases are?



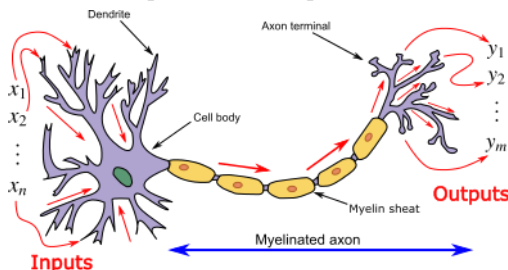
- Fresh milk has a pH of 6. How do you think the pH will change as it turns into curd? (1)
- Is Gastric juice a weak acid? (1)
- Milk of magnesia is an acid or base? For what purpose it can be used? (2)

**OR**

What is the pH value of saliva after the meal? (2)

38. **Read the following text carefully and answer the questions that follow:** [4]

In animals, control and coordination are provided by nervous and muscular tissues. Touching a hot object is an urgent and dangerous situation for us. We need to detect it and respond to it. How do we detect that we are touching a hot object? All information from our environment is detected by the specialised tips of some nerve cells. These receptors are usually located in our sense organs, such as the inner ear, the nose, the tongue, and so on. So gustatory receptors will detect taste while olfactory receptors will detect the smell. This information, acquired at the end of the dendritic tip of a nerve cell, see figure, sets off a chemical reaction that creates an electrical impulse. This impulse travels from the dendrite to the cell body, and then along the axon to its end.



- Name the largest cell present in the body. (1)
- What is an axon? (1)
- Name one gustatory receptor and one olfactory receptor present in a human beings. (2)

**OR**

Name the following parts of a neuron: (2)

- Where information is acquired.

b. Through which information travels as an electrical impulse.

39. **Read the following text carefully and answer the questions that follow:**

[4]

A student fixes a sheet of white paper on a drawing board using some adhesive materials. She places a bar magnet in the centre of it and sprinkles some iron filings uniformly around the bar magnet using a salt sprinkler. On tapping the board gently, she observes that the iron filings have arranged themselves in a particular pattern.

- i. What makes iron filings arrange in a definite pattern?
- ii. Draw a diagram to show this pattern of iron filings.
- iii. How is the direction of magnetic field at a point determined using the field lines? Why do two magnetic field lines not cross each other?

**OR**

How are the magnetic field lines of a bar magnet drawn using a small compass needle? Draw one magnetic field line each on both sides of the magnet.

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