

**DAV PUBLIC SCHOOLS, ODISHA
PRE-BOARD EXAMINATION, 2023-24**

- Please check that this question paper contains **8** printed pages.
- Set number given on the right-hand side of the question paper should be written on the title page of the answer book by the candidate.
- Check that this question paper contains **39** questions.
- Write down the Serial Number of the question in the left side of the margin before attempting it.
- 15 minutes time has been allotted to read this question paper. The question paper will be distributed 15 minutes prior to the commencement of the examination. The students will read the question paper only and will not write any answer on the answer script during this period.

**CLASS- X
SUB : SCIENCE(086)**

Time Allowed : 3 Hours

Maximum Marks : 80

General Instructions :

- i) This question paper consists of 39 questions in 5 sections.
- ii) All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
- iii) **Section A** consists of 20 objective type questions carrying 1 mark each.
- iv) **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.
- v) **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
- vi) **Section D** consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.
- vii) **Section E** consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

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 incorrect response.

1. The table given below shows the reaction of a few metals with acids and bases to evolve hydrogen gas.

Element	Acid	Base
A	No	No
B	Yes	Yes
C	Yes	No
D	Yes	Yes

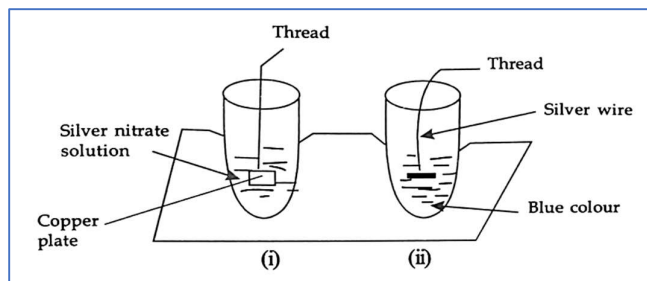
Which of these metals form amphoteric oxides?

- (a) B and D (b) A and D (c) C and D (d) A and C

1

2. In the following experimental set up, silver nitrate solution and copper sulphate solution are taken in two test tubes (i) and (ii) respectively.

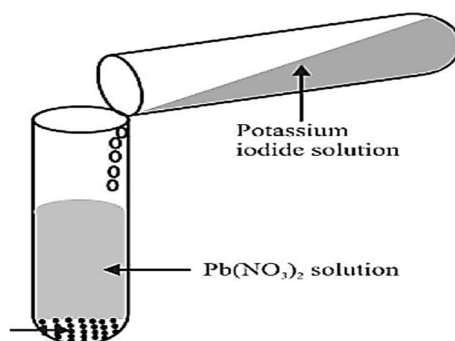
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The correct observation after the reaction for the above experiment is

- (a) The colour of the solution in test tube (i) remains colourless and that of test tube (ii) remains blue.
 (b) The colour of the solution in test tube (i) becomes blue and that of test tube (ii) remains blue.
 (c) The colour of the solution in test tube (i) becomes yellow and that of test tube (ii) remains blue.
 (d) The colour of the solution in test tube (i) remains colourless and that of test tube (ii) becomes yellow.
3. Study the reaction in the given diagram and identify the name and colour of the precipitate formed in the reaction.

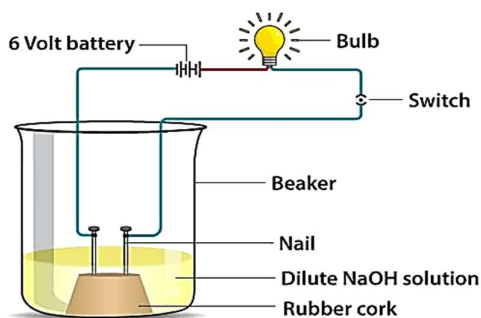
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- (a) Potassium nitrate, yellow
 (b) Lead iodide, yellow
 (c) Lead iodide, white
 (d) Potassium nitrate, white
4. To demonstrate the electrical conductivity through an electrolyte, a teacher took dilute sodium hydroxide solution, two iron nails connected to the two terminals of the battery. He connected a bulb and a switch in the circuit. The whole experimental set up is given below:

1

Which among the following statement(s) is (are) correct conclusion for the above experiment?



- (i) Bulb will glow because the electrolyte is acidic.
 (ii) Bulb will glow because NaOH is a strong base and does not furnish ions for conduction.
 (iii) Bulb will glow because the circuit is incomplete.
 (iv) Bulb will glow because NaOH is a strong base, furnishes ions and the circuit is complete.
- (a) (i) and (iii) (b) (ii) only (c) (iv) only (d) (ii) and (iv)

5. A solid salt sample is heated as shown in the given figure. Choose the most appropriate properties of the sample from the given options which are correct if the salt sample is solid calcium chloride. **1**

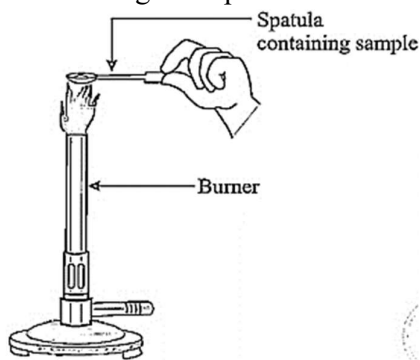
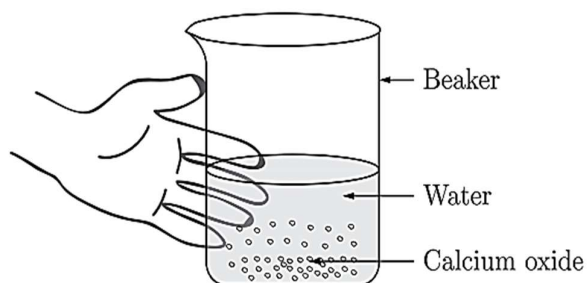


Figure 3.7
Heating a salt sample on a spatula

- (i) High melting and boiling point
 (ii) Soluble in water
 (iii) Soluble in solvent like kerosene.
 (iv) Do not conduct electricity in solid state.
 (a) (i) and (ii) only (b) (i), (ii) and (iv) only (c) (ii) and (iv) only (d) (i), (iii) only
6. Observe the following activity and identify the incorrect statement(s). **1**



- I. It is an endothermic reaction.
 II. Slaked lime is produced.
 III. It is an exothermic reaction.
 IV. It is a combination reaction.
 (a) I and II (b) only I (c) only III (d) II, III & IV
7. Identify the correct observations, when calcium metal is added to water. **1**
- (i) It does not react with water.
 (ii) It reacts violently with cold water.
 (iii) It reacts less violently with cold water.
 (iv) Bubbles of hydrogen gas formed stick to the surface of calcium.
 (a) (i) and (iv) (b) (ii) and (iii) (c) (i) and (ii) (d) (iii) and (iv)
8. Gastric juice of stomach contains hydrochloric acid, mucus and pepsin. Which of the following activities will be affected in the absence of hydrochloric acid? **1**
- (a) Digestion of protein (b) Digestion of starch
 (c) Digestion of lipid (d) Digestion of vitamin.
9. Raghav put some germinated seeds in a pot. He kept the pot in a cardboard box that was open from one side. He placed the box in such a way that the open side of the box faced sunlight near his window. After a week, he observed that the shoot bent towards the light. The type of movement shown by the shoot is **1**
- (a) geotropism (b) phototropism (c) chemotropism (d) hydrotropism

10. Study the activity performed by a boy in the given image. The part of the brain responsible for this is

1

- (a) medulla
- (b) hypothalamus
- (c) cerebrum
- (d) cerebellum



11. Two pea plants having round seeds are crossed. The genotypes of both parents are (RR) and (Rr). State the types of seeds obtained in F1.

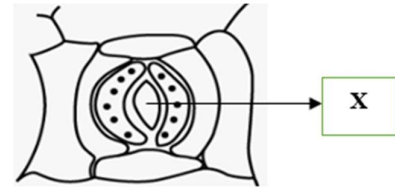
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- (a) Only round
- (b) Only wrinkled
- (c) 50% round and 50% wrinkled
- (d) 75% round and 25% wrinkled

12. If the structure marked X in the diagram given below is blocked, then identify the processes that will not occur.

1

- (a) Transpiration and translocation.
- (b) Transpiration, photosynthesis and respiration.
- (c) Respiration, transpiration and translocation.
- (d) Respiration and photosynthesis only.



13. Rohan wants to produce a diminished image of a candle flame on the wall of his room. Which of the following optical devices should he use for this purpose?

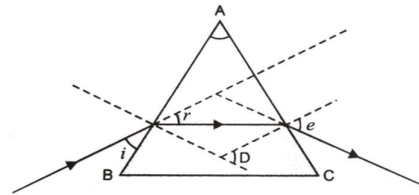
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- (a) Plane mirror
- (b) Concave mirror
- (c) Concave lens
- (d) Convex mirror

14. In the following diagram, the correctly marked angles are

1

- (a) $\angle A$ and $\angle e$
- (b) $\angle i$, $\angle A$ and $\angle D$
- (c) $\angle A$, $\angle i$ and $\angle e$
- (d) $\angle A$, $\angle r$ and $\angle D$



15. With reference to the given food chain, choose the consequence(s) that may occur, if the number of frogs decreases significantly.

1

Grass \rightarrow Grasshopper \rightarrow Frog \rightarrow Snake

- (a) The population of snakes will decrease.
- (b) The population of grasshoppers will increase.
- (c) It will not affect any organisms.
- (d) both (a) and (b) will happen.

16. The decomposers in an ecosystem

1

- (a) convert organic materials to simpler forms.
- (b) convert simple organic materials to complex organic forms.
- (c) convert inorganic materials into organic materials.
- (d) do not breakdown organic compounds.

Question number 17 to 20 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 the 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):** If a substance gains oxygen during a chemical reaction, it is said to be oxidized. **1**
Reason (R): Oxidising agent is itself oxidised.
18. **Assertion (A):** Human populations show a great deal of variations in traits. **1**
Reason (R): All variations in a species have equal chances of survival in the environment which they live.
19. **Assertion (A):** Magnetic field lines are closed and continuous curves. **1**
Reason (R): Magnetic field lines are directed from south pole to north pole outside a bar magnet but inside the magnet, they are directed from north pole to south pole.
20. **Assertion (A):** Gradual accumulation of harmful toxic substances at each trophic level of a food chain is called bio magnification. **1**
Reason (R): Maximum concentrations of harmful chemicals are found in human beings.

SECTION – B

Q. no. 21 to 26 are very short answer questions.

21. When a piece of lime stone reacts with dilute hydrochloric acid, a gas X is produced. When the gas X is passed through lime water, a white precipitate of Y is formed. On passing excess of gas X, the white precipitate dissolves forming a soluble compound Z. Write the balanced chemical equation when, **2**
 (a) lime stone reacts with dilute hydrochloric acid.
 (b) gas X is passed through lime water in limited quantity.
22. Give reason: **2**
 (a) Placenta is extremely essential for foetal development.
 (b) Taking oral pills can prevent pregnancy.
23. Justify the statements. **2**
 (a) Diffusion is not sufficient to meet oxygen requirement of all the cells in multicellular organism.
 (b) Trachea is surrounded by rings of cartilage.

OR

Two green plants are kept separately in oxygen free containers, one in the dark and the other in continuous light. Which one will live longer? Give reason.

24. Refractive index of water is 1.33 and that of alcohol is 1.36. **2**
 (a) Identify the medium in which the speed of light is more. Give reason to support your answer.
 (b) Find the relative refractive index of water with respect to alcohol.
25. Two wires 'X' and 'Y' are of equal length and have equal resistance. If resistivity of 'X' is greater than that of 'Y', identify the wire which is thicker. Justify your answer. **2**

OR

Draw a neat labeled schematic diagram of a common domestic circuit.

26. In the following food chain, only 200J of energy is available to the big fish. **2**

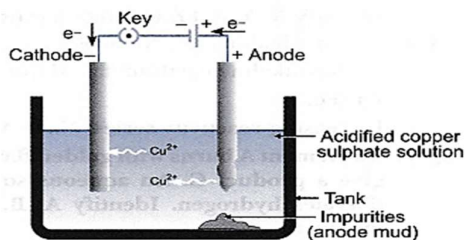
Phytoplankton → Zooplankton → Small fish → Big fish

Calculate the amount of energy available to the primary consumer.

SECTION-C

Question No. 27 to 33 are short answer questions.

27. (a) Show the formation of magnesium chloride by transfer of electron using electron dot structure. **3**
 (b) Name two metals which react with very dilute nitric acid to evolve hydrogen gas.
28. (a) Observe the given experimental set up and answer the following questions: **3**



- (a) Identify the electrode where pure copper is taken and also name the process given in the diagram.

(b) Write any two points of difference between calcination and roasting.

OR

Metal A is used in Thermite reaction as a reducing agent. When A is heated with oxygen, gives an oxide B which is amphoteric in nature.

(a) Identify A and B.

(b) Illustrate the reaction of B with HCl and NaOH respectively with the help of chemical equations.

29. (a) When we touch a hot object, immediately we withdraw our hand. Trace the sequence of events, in the form of a flow chart/ arc which occur here. **3**

(b) Name the phenomenon involved.

30. (a) Name the sex chromosome found in human male gamete. **3**

(b) Sex of the new born in human being is determined by father. Justify.

31. Analyse the following observation table showing variation of image distance (v) with object distance (u) in case of a convex lens and answer the following questions. **3**

S. No.	Object distance (u) in cm	Image distance (v) in cm
1	-100	+25
2	-60	+30
3	-40	+40
4	-30	+60
5	-25	+100
6	-15	+120

(a) Find the focal length of the convex lens without doing any calculation. Give reason to justify your answer.

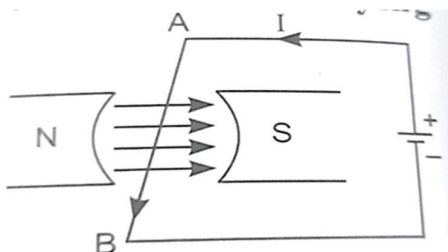
(b) Write the serial number of the observation which is not correct. Support your answer with a suitable reason.

(c) Calculate the power of the lens.

32. (a) Define electric power and write its SI unit. **3**

(b) Two bulbs rated 100 W at 220 V and 60 W at 220 V are connected in parallel to an electric mains of 220 V. Find the total current drawn by both the bulbs from the mains.

33. A current carrying conductor AB is placed perpendicular to the magnetic field as shown in the diagram. **3**



(a) Write the direction of force that acts on the current carrying conductor AB.

(b) State the rule you have applied here to get the direction of the force.

(c) Mention the condition for which the force experienced by the current carrying conductor AB placed in the uniform magnetic field is minimum.

SECTION: D

No 34 to 36 are long answer questions.

34. An organic compound 'A' is widely used as a preservative in pickles and has a molecular formula $C_2H_4O_2$. This compound reacts with ethanol in presence of conc. H_2SO_4 to form a sweet-smelling compound 'B' and water. **5**

(a) Identify the compound 'A'.

(b) Write the chemical equation for the reaction between 'A' and ethanol in presence of conc. H_2SO_4 .

(c) How can we get Ethanol back from 'B'? (Only mention the chemical reaction involved).

(d) Name the processes occur in (b) and (c).

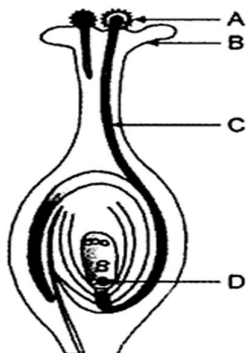
(e) Name the gas produced when compound 'A' reacts with baking soda. Write the chemical equation to support your answer.

OR

- (a) Give one chemical test to distinguish between Ethanol and Ethanoic acid.
- (b) An organic compound 'X', a constituent of tincture of iodine, on heating with conc. H_2SO_4 at $170^\circ C$ forms a compound Y and water. Y on addition of one mole of hydrogen in the presence of nickel forms a compound Z. One mole of compound Z on complete combustion forms two moles of CO_2 and three moles of H_2O .
- (i) Identify the compounds 'X', 'Y' and 'Z'.
- (ii) Write the chemical equations for all the chemical reactions involved.

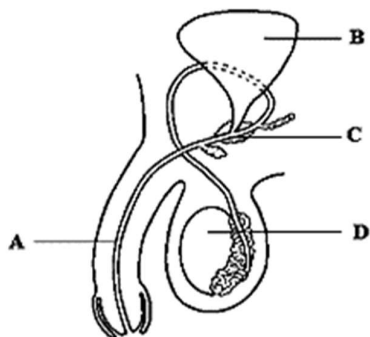
35. Study the diagram and answer the following:

5



- (a) Identify the parts A, B, C and D .
- (b) Mention one significance of the part C .
- (c) State the changes seen in a flower after fertilisation.

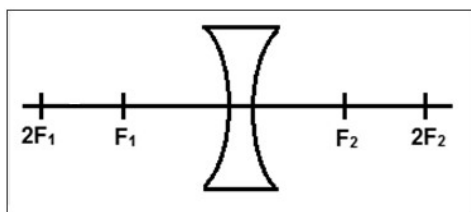
OR



- (a) Identify the parts A, B, C, D.
- (b) Mention the hormone secreted by D and state the role of that hormone.
- (c) Explain the functions of C in the process of reproduction.

36.

5



The above image shows a thin lens of focal length 24 cm.

- (a) Identify the kind of lens shown in the above figure.
- (b) Calculate the object distance from the lens if an image is to be formed by this lens at a distance of 16 cm from the optical centre.
- (c) Mention the nature of the image formed.
- (d) Draw a neat, labelled diagram of the image formation mentioned in (b).

OR

- (a) A spherical mirror produces three times enlarged, real image of an object placed at a distance 12 cm in front of it. Calculate the radius of curvature of the mirror.
- (b) Light enters from air to glass having refractive index 1.50. Calculate the time taken by the light to pass through the same glass of thickness of 12 cm. The speed of light in air is 3×10^8 m/s⁻¹.

SECTION-E

Q.No. 37 to 39 are case-based /data-based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts.

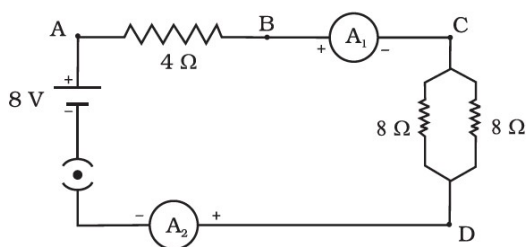
37. Amar was asked by his teacher to investigate the effect of alkaline potassium permanganate on ethanol. So, he took about 3 ml of ethanol in a test tube and warmed it gently in a water bath. Then he added 5% solution of alkaline KMnO_4 drop by drop to it followed by acidification. He observed that the colour of KMnO_4 slowly faded on heating and gradually it disappeared completely. **1+1+2**
- (a) Name the reaction involved in this experiment. Name any other reagent which can be used in place of alkaline KMnO_4 .
- (b) Write the chemical equation involved in the above experiment.
- (c) Write the IUPAC name and draw the structure of the compound formed in the given experiment. Also state the role of alkaline KMnO_4 .

OR

- (c) Draw the electron dot structure of the compound formed in the above experiment done by Amar and also find the number of covalent bonds in it.
38. Sahin performed an experiment to study the inheritance pattern of genes in pea plant. She crossed tall pea plants (TT) with short pea plants (tt) and obtained all tall plants in F_1 generation. **1+1+2**
- (a) State the genotype of F_1 generation.
- (b) Only tall plants are observed in F_1 progeny. Give reason.
- (c) When F_1 plants were self - pollinated, a total of 800 plants were produced. How many of these would be tall and short plants? Give the genotypic ratio of F_2 generation.

OR

- (d) When F_1 plants were cross - pollinated with plants having **tt** genes, a total of 800 plants were produced. How many of these would be tall and short plants? Give the genotype of F_2 generation.
39. A student was conducting an experiment in the laboratory with 3 resistors of different resistances. He had arranged them in a particular manner as shown in the following circuit diagram. Understand the circuit and answer the following questions related to the given circuit. **1+1+2**



- (a) Calculate the total resistance across 'C' and 'D'.
- (b) Find the reading of the ammeter 'A1'.
- (c) Calculate the heat dissipated by the circuit in 4s.

OR

- (d) Calculate the power dissipated in 4Ω resistor.