

**CBSE BOARD
SAMPLE PAPERS
(2023-24)
SCIENCE
Class-X**

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CBSE SAMPLE PAPERS

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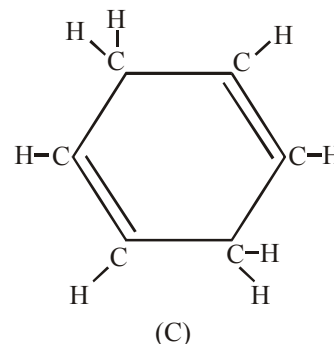
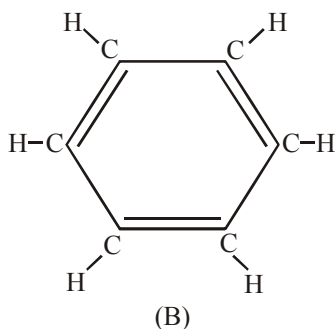
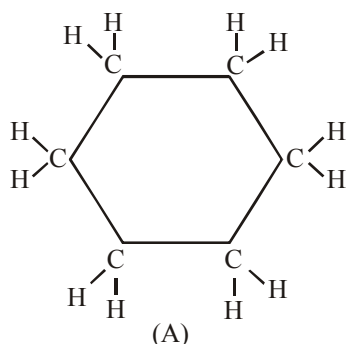
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CBSE 2022-23
TIME : 3 HRS.
MAX. MARKS : 80
GENERAL INSTRUCTIONS :

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

SECTION-A

- Consider the structures of the three cyclic carbon compounds A, B and C given below and select the correct option from the following :

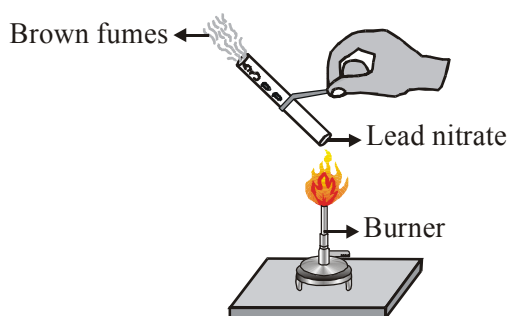


- A and C are isomer of hexane and B is benzene.
 - A is an isomer of hexane, B is benzene and C is an isomer of hexene.
 - A is a saturated cyclic hydrocarbon and B and C are unsaturated cyclic hydrocarbons.
 - A is cyclohexane and B and C are the isomers of benzene.
- Select washing soda from the following :
 - NaHCO_3
 - $\text{Na}_2\text{CO}_3 \cdot 5\text{H}_2\text{O}$
 - $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
 - NaOH
- Copper is used for making cooking utensils. Which of the following physical properties of copper is NOT responsible for the same?
 - Malleability
 - High melting point
 - Thermal conductivity
 - High reactivity

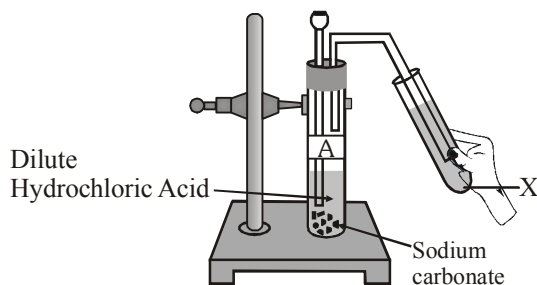
4. The table below has information regarding pH and the nature (acidic/basic) of four different solutions. Which one of the options in the table is correct?

Option	Solution	Colour of pH paper	Approximate pH Value	Nature of solution
(1)	Lemon juice	Orange	3	Basic
(2)	Milk of magnesia	Blue	10	Basic
(3)	Gastric juice	Red	6	Acidic
(4)	Pure water	Yellow	7	Neutral

5. $\text{MnO}_2 + x\text{HCl} \longrightarrow \text{MnCl}_2 + y\text{H}_2\text{O} + z\text{Cl}_2$
 In order to balance the above chemical equation, the values of x, y and z respectively are :
 (1) 6, 2, 2 (2) 4, 1, 2 (3) 4, 2, 1 (4) 2, 2, 1
6. The emission of brown fumes in the given experimental set-up is due to

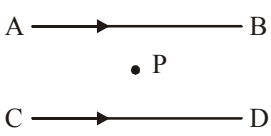


- (1) thermal decomposition of lead nitrate which produces brown fumes of nitrogen dioxide.
 (2) thermal decomposition of lead nitrate which produces brown fumes of lead oxide.
 (3) oxidation of lead nitrate forming lead oxide and nitrogen dioxide.
 (4) oxidation of lead nitrate forming lead oxide and oxygen.
7. In the experimental setup given below, it is observed that on passing the gas produced in the reaction in the solution 'X' the solution X first turns milky and then colourless.



The option that justifies the above stated observation is that 'X' is aqueous calcium hydroxide and -

- (1) It turns milky due to carbon dioxide gas liberated in the reaction and after sometime it becomes colourless due to formation of calcium carbonate.
 (2) It turns milky due to formation of calcium carbonate and on passing excess of carbon dioxide it becomes colourless due to formation of calcium hydrogen carbonate which is soluble in water.
 (3) It turns milky due to passing of carbon dioxide through it. It turns colourless as on further passing carbon dioxide, sodium hydrogen carbonate is formed which is soluble in water.
 (4) The carbon dioxide liberated during the reaction turns lime water milky due to formation of calcium hydrogen carbonate and after some time it turns colourless due to formation of calcium carbonate which is soluble in water.

8. Select endothermic reaction from the following:
- (1) Decomposition of vegetable matter into compost.
 - (2) Decomposition of calcium carbonate to form quick lime and carbon dioxide.
 - (3) Burning of a candle.
 - (4) Process of respiration.
9. Select from the following the correct statement about tropic movement in plants:
- (1) It is due to the stimulus of touch and temperature only.
 - (2) It does not depend upon the direction of stimulus received.
 - (3) It is observed only in roots and not in stems.
 - (4) It is growth related.
10. The statement that correctly describes the characteristic(s) of a gene is:
- (1) In individuals of a given species, a specific gene is located on a particular chromosome.
 - (2) A gene is not the information source for making proteins in the cell.
 - (3) Each chromosome has only one gene located all along its length.
 - (4) All the inherited traits in human beings are not controlled by genes.
11. Consider the following statements about small intestine and select the one which is NOT correct:
- (1) The length of the small intestine in animals differs as it depends on the type of food they eat.
 - (2) The small intestine is the site of complete digestion of food.
 - (3) The small intestine receives secretions from liver and pancreas.
 - (4) The villi of the small intestine absorb water from the unabsorbed food before it gets removed from the body via the anus.
12. An organism which breaks down the food material outside the body and then absorbs it is
- (1) a plant parasite, Cuscuta.
 - (2) an animal parasite, Tapeworm.
 - (3) a bacteria, Rhizobium.
 - (4) a fungi, Rhizopus.
13. The resultant magnetic field at point 'P' situated midway between two parallel wires (placed horizontally) each carrying a steady current I is
- 
- (1) In the same direction as the current in the wires
 - (2) In the vertically upward direction
 - (3) Zero
 - (4) In the downward direction
14. An electric iron of 1500 W, 200 V and a flash light of 500 W, 200 V are used in homes. The rating of fuse to be used should be
- (1) 5A
 - (2) 10A
 - (3) 15 A
 - (4) 20 A
15. In domestic electric circuits the wiring with 15 A current rating is for the electric devices which have
- (1) higher power rating such as geysers.
 - (2) lower power rating such as fan.
 - (3) metallic bodies and low power rating.
 - (4) non metallic bodies and low power rating.
16. If four identical resistors of resistance 8 ohm, are first connected in series. So as to give an effective resistance R_s , and then connected in parallel so as to give an effective resistance R_p then the ratio $\frac{R_s}{R_p}$ is
- (1) 32
 - (2) 2
 - (3) 0.5
 - (4) 16

Direction : Q.17 to 20 are Assertion - Reason based questions.

These consist of two statements - Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- (1) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (2) Both (A) and (R) are true, but (R) is not the correct explanation of (A).
- (3) (A) is true, but (R) is false.
- (4) (A) is false, but (R) is true.

17. Assertion (A) : The strength of the magnetic field produced at the centre of a current carrying circular coil increases on increasing the number of turns in it.

Reason (R) : The current in each circular turn has the same direction and the magnetic field due to each turn then just adds up.

18. Assertion (A) : The anaerobic respiration which takes place in yeast, has one of the end products as an acid.

Reason (R) : During anaerobic respiration, there is incomplete breakdown of glucose.

19. Assertion (A) : Genes inherited from the parents decide the sex of a child.

Reason (R) : X chromosome in a male child is inherited from his father.

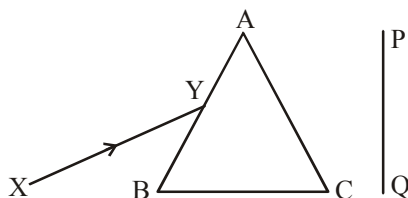
20. Assertion (A) : The colour of aqueous solution of copper sulphate turns colourless when a piece of lead is added to it.

Reason (R) : Lead is more reactive than copper, and hence displaces copper from its salt solution.

SECTION-B

21. List two reasons to show that the existence of decomposers is essential in an ecosystem.

22. (a) A narrow beam XY of white light passing through a glass prism ABC as shown in the diagram:



Trace it on your answer sheet and show the path of the emergent beam as observed on the screen PQ. Name the phenomenon observed and state its cause.

OR

(b) It is observed that the power of an eye to see nearby objects as well as far off objects diminishes with age.

(i) Give reason for the above statement

(ii) Name the defect that is likely to arise in the eyes in such a condition.

(iii) Draw a labelled ray diagram to show the type of corrective lens used for restoring the vision of such an eye.

23. Name the part of the human excretory system where nephrons are found. Write the structure and function of nephrons.

24. A knife which is used to cut a fruit was immediately dipped into water containing drops of blue litmus solution. If the colour of the solution is changed to red, what inference can be drawn about the nature of the fruit and why?
25. Write the sequence of events that involve the response of a person when a dust particle is inhaled through the nose by him.
26. (i) A compound 'X' which is prepared from gypsum has the property of hardening when mixed with proper quantity of water. Identify 'X' and write its chemical formula.
(ii) State the difference in chemical composition between baking soda and baking powder.

OR

Write balanced chemical equation for the reaction that occurs when -

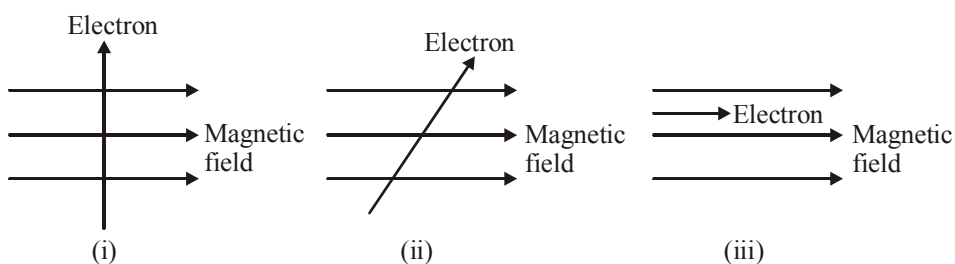
- (i) Blue coloured copper sulphate crystals are heated and
(ii) Sodium hydrogen carbonate is heated during cooking.

SECTION-C

27. (i) Why does a kitchen garden called an artificial ecosystem while a forest is considered to be a natural ecosystem?
(ii) While designing an artificial ecosystem at home, write any two things to be kept in mind to convert it into a self-sustaining ecosystem. Give reason to justify your answer.

OR

- (i) Construct a food chain of four trophic levels comprising the following : Hawk, snake, plants, rat.
(ii) 20000 J of energy was transferred by the producers to the organism of second trophic level. Calculate the amount of energy that will be transferred by organisms of the third trophic level to the organisms of the fourth trophic level.
28. (i) State the rule used to find the force acting on a current carrying conductor placed in a magnetic field.
(ii) Given below are three diagrams showing the entry of an electron in a magnetic field. Identify the case in which the force will be (a) maximum and (b) minimum respectively. Give reasons for your answer.



OR

- (i) Draw the pattern of magnetic field lines of (a) A current carrying solenoid (b) A bar magnet
(ii) List two distinguishing features between the two fields.
29. A person is suffering from an eye defect in which the far point of the eye is nearer than infinity. Identify the defect and list two main causes of this defect. Draw a ray diagram to show how this defect is corrected by using a suitable lens.
30. (a) The image of an object formed by lens is of the same size but inverted. If the Object distance is 30 cm, calculate
(i) The distance between the object and its image
(ii) Focal length of the lens
(b) Draw a ray diagram to show the image formed in the above case.

31. (i) State the role of ATP in cellular respiration.
 (ii) What ensures sufficient exchange of gases in plants?
 (iii) State the conditions on which the direction of diffusion of gases in plants depend upon.

OR

- (i) What is the internal energy reserve in plants and animals?
 (ii) How desert plants perform photosynthesis if their stomata remain closed during the day?
32. Write the chemical composition of tooth enamel. Under what conditions of pH it starts corroding? Explain the reason for tooth decay and suggest one method to prevent it.
33. (a) Identify the reducing agent in the following reactions
 (i) $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$
 (ii) $\text{H}_2\text{O} + \text{F}_2 \rightarrow \text{HF} + \text{HOF}$
 (iii) $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$
 (iv) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
 (b) Define a redox reaction in terms of gain or loss of oxygen.

SECTION-D

34. (a) An electric iron consumes energy at a rate of 880 W when heating is at the maximum rate and 330 W when heating is at the minimum rate. If the source voltage is 220 V, calculate the current and resistance in each case.
 (b) What is the heating effect of electric current?
 (c) Find an expression for the amount of heat produced when a current passes through a resistor for some time.
35. (a) What happens when the egg is not fertilised?
 (b) How is sperm genetically different from a human egg/ova?
 (c) List any three contraceptive methods practised for family planning. Mention how these methods work.
36. A saturated organic compound 'A' belongs to the homologous series of alcohols. On heating 'A' with concentrated sulphuric acid at 443 K, it forms an unsaturated compound 'B' with molecular mass 28 u. The compound 'B' on the addition of one mole of hydrogen in the presence of Nickel, changes to a saturated hydrocarbon 'C'.
 (i) Identify A, B and C.
 (ii) Write the chemical equations showing the conversion of A into B.
 (iii) What happens when compound C undergoes Combustion?
 (iv) State one industrial application of hydrogenation reaction.
 (v) Name the products formed when compound A reacts with sodium.

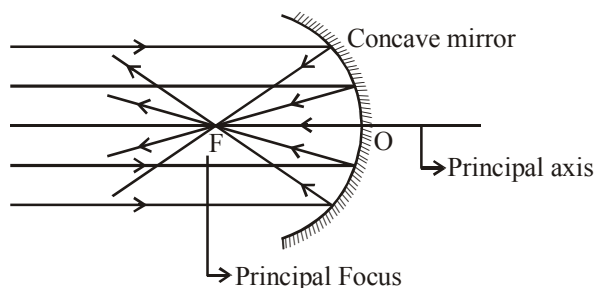
OR

- (i) With the help of a diagram, show the formation of micelles, when soap is applied on oily dirt.
- (ii) Take two test tubes X and Y with 10 mL of hard water in each. In test tube X add few drops of soap solution and in test tube 'Y' add a few drops of detergent solution. Shake both the test tubes for the same period.
 - (1) In which test tube the formation of foam will be more? Why?
 - (2) In which test tube is a curdy solid formed? Why?

SECTION-E

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

37. Hold a concave mirror in your hand and direct its reflecting surface towards the sun. Direct the light reflected by the mirror on to a white card-board held close to the mirror. Move the card-board back and forth gradually until you find a bright, sharp spot of light on the board. This spot of light is the image of sun on the sheet of paper; which is also termed as "Principal Focus" of the concave mirror.



- (a) List two applications of concave mirror.
- (b) If the distance between the mirror and the principal focus is 15 cm, find the radius of curvature of the mirror.
- (c) Draw a ray diagram to show the type of image formed when an object is placed between pole and focus of a concave mirror.

OR

- (c) An object 10 cm in size is placed at 100 cm in front of a concave mirror. If the image is formed at the same point where the object is located, find:
 - (i) focal length of the mirror, and
 - (ii) magnification of the image formed with sign as per cartesian sign convention.

38. In order to trace the inheritance of traits Mendel crossed pea plants having one contrasting character or a pair of contrasting characters. When he crossed pea plants having round and yellow seeds with pea plants having wrinkled and green seeds, he observed that no plants with wrinkled and green seeds were obtained in the F_1 generation. When the F_1 generation pea plants were cross-bred by self-pollination, the F_2 generation had seeds with different combinations of shape and colour also.
- (a) Write any two pairs of contrasting characteristics of the pea plant used by Mendel other than those mentioned above.
 - (b) Differentiate between dominant and recessive traits.
 - (c) State the ratio of the combinations observed in the seeds of F_2 generation (in the above case). What do you interpret from this result?

OR

- (c) Given below is a cross between a pure violet flowered pea plant (V) and a pure white flowered pea plant (v). Diagrammatically explain what type of progeny is obtained in F₁, generation and F₂, generation:

Pure violet flowered plant x Pure white flowered plant.

(VV) (vv)

39. Almost metals combine with oxygen to form metal oxides. Metal oxides are generally basic in nature. But some metal oxides show both basic as well as acidic behavior. Different metals show different reactivities towards oxygen. Some react vigorously while some do not react at all.

- (a) What happens when copper is heated in air? (Give the equation of the reaction involved).
 (b) Why are some metal oxides categorized as amphoteric? Give One example.
 (c) Complete the following equations :
- (i) $\text{Na}_2\text{O}(\text{s}) + \text{H}_2\text{O}(\ell) \rightarrow$
 (ii) $\text{Al}_2\text{O}_3 + 2\text{NaOH} \rightarrow$

OR

- (c) On burning Sulphur in oxygen a colourless gas is produced.
- (i) Write chemical equation for the reaction.
 (ii) Name the gas formed.
 (iii) State the nature of the gas.
 (iv) What will be the action of this on a dry litmus paper?
-

SAMPLE PAPER – 1

TIME : 3 HRS.

MAX. MARKS : 80

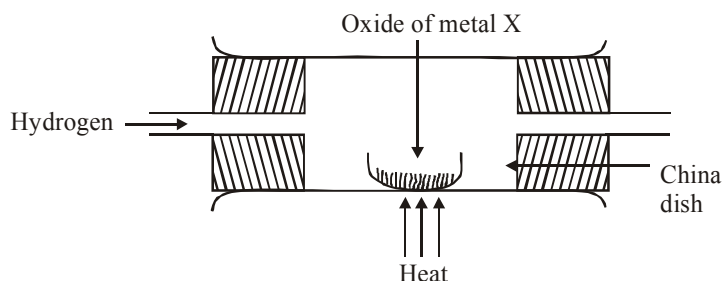
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SECTION-A

Select and write one most appropriate option out of the four options given for each of the questions from 1 to 20.

1. Dry hydrogen is passed over a heated oxide of metal X, using the apparatus shown below. A reddish brown residue is obtained.

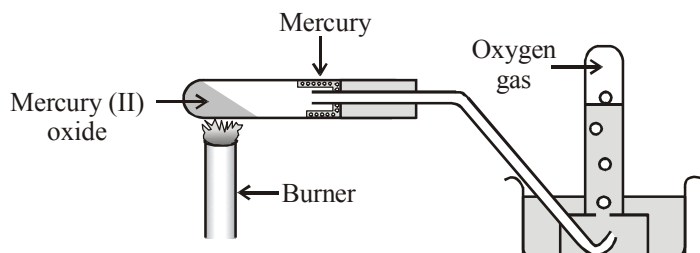


The reddish-brown residue could be

- (1) copper (2) lead (3) silver (4) zinc
- Identify the substance that is oxidised and the substance that is reduced in the following reaction :

$$\text{CuO}_{(s)} + \text{H}_{2(g)} \longrightarrow \text{Cu}_{(s)} + \text{H}_2\text{O}_{(l)}$$

(1) CuO, H₂ (2) H₂, CuO (3) H₂O, Cu (4) Cu, H₂O
- The given diagram represents a _____ reaction.



- (1) photodecomposition (2) electrolysis

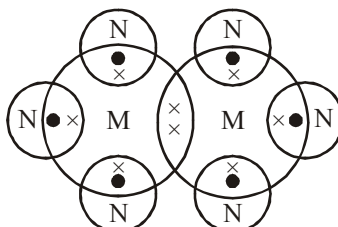
(3) displacement (4) thermal decomposition

4. In an experiment each of the metals Al, Zn, Cu and Fe are reacted with ZnSO_4 , CuSO_4 , $\text{Al}_2(\text{SO}_4)_3$ and FeSO_4 solutions. The results are tabulated as follows where '✓' means that the reaction occurs and '×' means no reaction occurs.

Metal	ZnSO_4	CuSO_4	$\text{Al}_2(\text{SO}_4)_3$	FeSO_4
Zn	×	✓	×	✓
Cu	×	×	×	×
Al	✓	✓	×	✓
Fe	×	✓	×	×

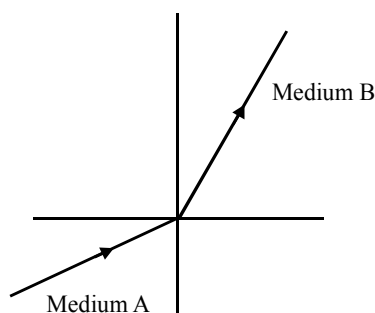
On the basis of the above results, the order of the reactivity of the metals may be concluded as

- (1) $\text{Zn} > \text{Fe} > \text{Al} > \text{Cu}$ (2) $\text{Al} > \text{Fe} > \text{Zn} > \text{Cu}$
 (3) $\text{Zn} > \text{Al} > \text{Fe} > \text{Cu}$ (4) $\text{Al} > \text{Zn} > \text{Fe} > \text{Cu}$
5. In an electrolytic cell
- Oxidation occurs at cathode
 - Oxidation occurs at anode
 - Reduction occurs at anode
 - Reduction occurs at cathode
- (1) (i) and (ii) (2) (iii) and (iv) (3) (i) and (iii) (4) (ii) and (iv)
6. An aqueous solution of a salt shows an orange red colour when a drop of universal indicator is added to it. This salt is made up of
- a strong acid and a strong base
 - a weak acid and a weak base
 - a strong acid and a weak base
 - a weak acid and a strong base
7. If M and N represent C and H respectively in the following figure, what would be the compound?



- (1) Methane (2) Propane (3) Ethane (4) Butane
8. In an experiment with pea plant, one tall plant was crossed with one dwarf plant. The resultant progeny obtained were 50% tall and 50% dwarf. What could be the genotype of parental plants?
- (1) Tt, Tt (2) TT, tt (3) Tt, tt (4) tt, tt
9. A basic event in reproduction which is capable of producing similar multiple of blue prints is the
- Creation of DNA copy
 - Creation of gametes
 - Isolation of male and female nuclear DNA content
 - Creation of identical genes.
10. The ____ receives deoxygenated blood collected from different organs of the body via large vein called vena cava.
- (1) left atrium (2) right atrium
 (3) right ventricle (4) left ventricle
11. The lungs are enclosed by a double layered membrane which is called
- (1) pleura (2) bronchi
 (3) pericardium (4) none of these

12. The main function of the lacteals of intestine is the absorption of
 (1) amino acid (2) glucose and vitamins
 (3) fatty acids and glycerol (4) lactic acid
13. When a 4 V battery is connected across an unknown resistor, a current of 100 mA flows through it. The resistance of the resistor is:
 (1) 4 Ω (2) 40 Ω (3) 400 Ω (4) 0.4 Ω
14. Unit of electric power may also be expressed as:
 (1) volt-ampere (2) kilowatt-hour (3) watt-second (4) joule-second
15. A positively charged α -particle is projected towards West through a uniform magnetic field and it is deflected towards North by the magnetic field. The direction of magnetic field is
 (1) towards South (2) towards East (3) downwards (4) upwards
16. A light ray enters from medium A to medium B as shown in the figure. The refractive index of medium B with respect to A will be



- (1) Greater than unity (2) Less than unity
 (3) Equal to unity (4) Zero

Directions : Q.17 to 20 are Assertion - Reasoning based questions. These consist of two statements - Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- (1) Both A and R are true and R is the correct explanation of A
 (2) Both A and R are true and R is not the correct explanation of A
 (3) A is true but R is false
 (4) A is false but R is true

17. **Assertion :** When a mixture of hydrogen and chlorine is placed in sunlight, hydrogen chloride is formed.
Reason : It is an example of decomposition reaction.
18. **Assertion :** Breathing rate increases with increased physical activity.
Reason : Rapid breathing supplies more oxygen to body cells.
19. **Assertion :** The glomerular filtrate resembles the protein free plasma in composition and osmotic pressure.
Reason : The glomerular capillary wall and inner membranes of Bowman's capsule are impermeable to large molecules.
20. **Assertion :** Magnification of a lens is the ratio of the size of the image to that of the object.
Reason : Magnification of a concave lens is always negative.

SECTION-B

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

21. A solution of copper sulphate was kept in an iron pot. After a few days, the iron pot was found to have a large number of holes in it. Write the equation for the reaction that took place. Explain the reaction in terms of reactivity of the metals.

OR

Metallic oxides of zinc, magnesium and copper were heated with the following metals. In which cases will you find displacement reactions taking place?

	Metal		
	Zinc	Magnesium	Copper
Compound			
(a) Zinc oxide			
(b) Magnesium oxide			
(c) Copper oxide			

Also give chemical equation(s) of the reaction involved.

22. Why small intestine is the site of complete digestion of food?
23. Explain the significance of photosynthesis. Write the balanced chemical equation involved in this process.
24. Explain the process of budding in hydra.
25. Derive an expression for electric energy consumed in a device in terms of V, I and t, where V is the potential difference applied to it, I is the current drawn by it and t is time for which the current flows through it.

OR

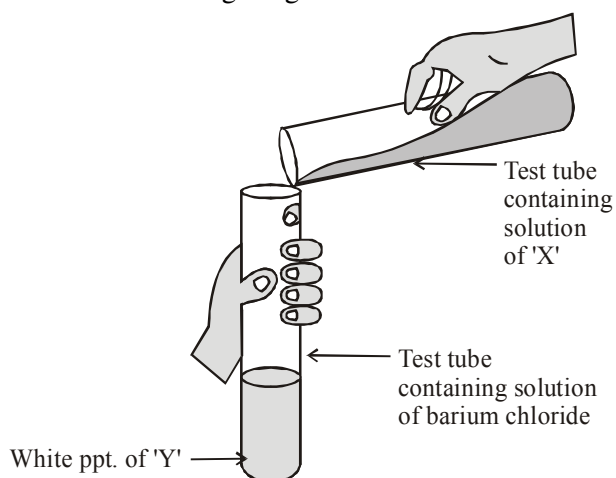
A metal wire has diameter of 0.25 mm and electrical resistivity of $0.8 \times 10^{-8} \Omega\text{m}$. What will be the length of this wire to make its resistance 5Ω ?

26. In human beings, the statistical probability of getting either male or female child is 50:50. Give a suitable explanation.

SECTION-C

Q.no. 27 to 33 are short answer questions.

27. Consider the following diagram :

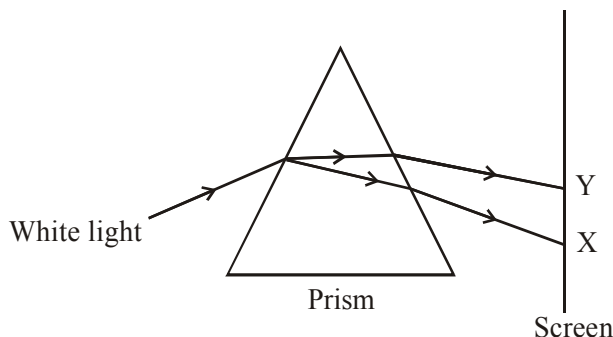


- (a) Identify 'X' and 'Y'.
- (b) What type of reaction is it?
- (c) Write a balanced chemical equation.

28. (a) What are covalent compounds?
 (b) How are they different from ionic compounds?
 (c) List any two properties of covalent compounds.
29. Draw the diagram of human female reproductive system and label the following parts:
 (i) which produces ovum?
 (ii) where fertilisation takes place?
 (iii) where implantation of embryo occurs?

OR

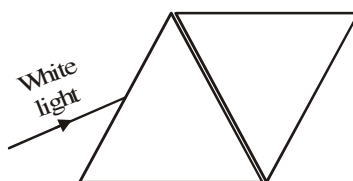
- (i) State the role of following in human respiratory system.
 (a) Nasal hairs (b) Diaphragm (c) Alveoli (d) Nasal cavity.
 (ii) Name the various organs that are involved in gaseous exchange in plants.
30. It is desired to obtain a virtual and erect image of an object, using a concave mirror of focal length 12 cm.
 (i) What should be the range of the object's distance from the mirror? Will the image be smaller or larger than the object? Draw a ray diagram to show the formation of image in this case.
 (ii) Find the position of image of an object, if the object is placed at 24 cm in front of the given concave mirror.
31. Suppose your parents have constructed a two room house and you want that in the living room there should be a provision of one electric bulb, one electric fan, a refrigerator and a plug point for other appliances. Draw an electric circuit diagram for the living room including electric fuse and earthing as safety measures.
32. In the figure given below, a narrow beam of white light is shown to pass through a triangular glass prism. After passing through the prism, it produces a spectrum XY on the screen.



- (i) Name the phenomenon.
 (ii) State the colours seen at X and Y.
 (iii) Why do different colours of white light bend at different angles through a prism?

OR

- (i) What is visible spectrum?
 (ii) Why the stopping light is chosen to be red in colour, at traffic signals?
 (iii) Two triangular glass prisms are kept together connected through their rectangular sides as shown in figure below. A white light beam is passed through one side of the combination. Will there be any dispersion seen, when the light ray emerges out of the second prism? Justify your answer.



33. (i) Write the mechanism of translocation of food in the phloem.
 (ii) Which mechanism plays an important role in transportation of water in plants at night?

SECTION-D

Q.no. 34 to 36 are Long answer questions.

34. (a) Write the chemical formula and name of the compound which is the active ingredient of all alcoholic drinks.
 (b) List its two uses.
 (c) Write chemical equation and name of the product formed when this compound reacts with
 (i) sodium metal
 (ii) hot concentrated sulphuric acid.

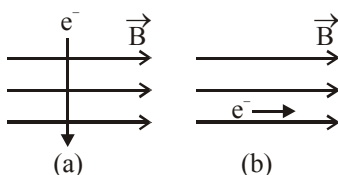
OR

An organic compound 'A' having molecular formula $C_2H_4O_2$ reacts with sodium metal and evolves a gas 'B' which readily catches fire. 'A' also reacts with ethanol in the presence of concentrated sulphuric acid to form sweet smelling substance 'C' used in making perfumes.

- (a) Identify A, B and C.
 (b) Write balanced chemical equations to represent the –
 (i) evolution of gas B from compound A
 (ii) conversion of compound A into compound C
35. (i) Why is the damage of ozone layer a cause of concern to us? State a cause of this damage.
 (ii) Write two differences between biodegradable and non-biodegradable wastes.
 (iii) What do you mean by abiotic components of an ecosystem? Give two examples.

OR

- (i) How is the movement of leaves of the sensitive plant different from the movement of a shoot towards light?
 (ii) How is brain protected in our body.
36. (a) What is an electromagnet?
 (b) State Fleming's left hand rule. An electron enters in a uniform magnetic field in two different ways, as shown below.



Identify the case in which the force on electron will be maximum and minimum. Give reasons for your answer. State the direction of maximum force acting on electron.

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.

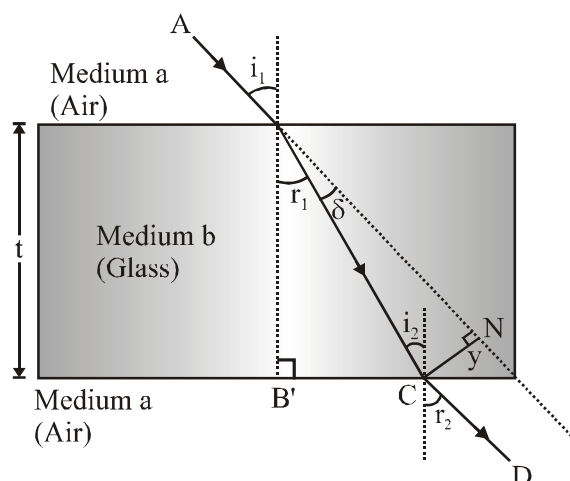
37. Corrosion is the phenomenon of deterioration of surface of metal in presence of air and moisture. It is a natural process and in the presence of a moist atmosphere, chemically active metals get corroded. This is an oxidation reaction. Rusting is the process where iron corrodes due to exposure to the atmosphere. The main circumstance of corrosion occurs with iron because it is a structural material in construction, bridges, buildings, rail transport, ships, etc. Aluminium is also an important structural metal, but even aluminium undergoes oxidation reactions. However, aluminium doesn't corrode or oxidize as rapidly as its reactivity suggests. Copper (Cu) corrodes and forms a basic green carbonate.
- (a) What is rusting? How can we prevent rusting?
- (b) What type of chemical reaction is involved in corrosion? Explain.

OR

- (b) Explain the corrosion of silver. Also write the chemical reaction involved.
38. Each year, more than half a million people go to emergency rooms for kidney stone problems. It is estimated that one in ten people will have a kidney stone at some time in their lives. The risk of kidney stones is about 11% in men and 9% in women. Other diseases such as high blood pressure, diabetes, and obesity may increase the risk for kidney stones.
- Drinking enough fluid will help keep your urine less concentrated with waste products. Darker urine is more concentrated, so your urine should appear very light yellow to clear if you are well hydrated. Most of the fluid you drink should be water. Most people should drink more than 12 glasses of water a day.
- (a) Which hormones are responsible for osmoregulation?
- (b) What are the various steps that are involved in urine formation?
- (c) What do you mean by artificial kidney? Write any two drawbacks of artificial kidney?

OR

- (c) Name the structural and functional unit of kidney. Name three parts of nephric tubule.
39. Consider a ray of light AB passing from air (medium a) through a parallel sided glass slab (medium b) into air (medium a). The ray of light will clearly suffer two refractions. Since the medium on both sides of glass is the same therefore the ray of light will get laterally shifted without any deviation. This is proved below.



When ray of light is refracted from air to glass, then the refractive index of glass (medium b) w.r.t. air (medium a) is given by

$$n_{ba} = \frac{\sin i_1}{\sin r_1} \quad \dots\dots(1)$$

When ray of light is refracted from glass to air, then the refractive index of air w.r.t. glass is given by

$$n_{ab} = \frac{\sin i_2}{\sin r_2} \quad \dots\dots(2)$$

Multiplying (1) and (2), we get

$$n_{ba} \times n_{ab} = \frac{\sin i_1}{\sin r_1} \times \frac{\sin i_2}{\sin r_2}$$

But we know that $n_{ba} = \frac{1}{n_{ab}}$

$$\therefore \frac{1}{n_{ab}} \times n_{ab} = \frac{\sin i_1}{\sin r_1} \times \frac{\sin i_2}{\sin r_2} \quad \Rightarrow \quad \frac{\sin i_1}{\sin r_1} = \frac{\sin r_2}{\sin i_2}$$

Since the glass slab is parallel sided, so $i_2 = r_1$

$$\therefore \sin i_1 = \sin r_2 \quad \text{or} \quad \boxed{i_1 = r_2}$$

- What can you conclude regarding incident and emergent ray from the phenomenon discussed above?
- Write the another name for the ‘law of refraction’ expressed by equation (1) in paragraph.
- If the emergent ray in the phenomenon incidents normally on a plane mirror, what will happen to it? If the absolute refractive index of glass is 1.5, then find the speed of light in glass.

OR

- Does the lateral shift between emergent and incident rays depend on the thickness of glass slab? If a light ray of 5700 \AA enters the glass slab from air, find the wavelength of light ray in glass slab. (Consider the refractive index of the glass to be $\frac{3}{2}$ with respect to air.)

SAMPLE PAPER – 2

TIME : 3 HRS.

MAX. MARKS : 80

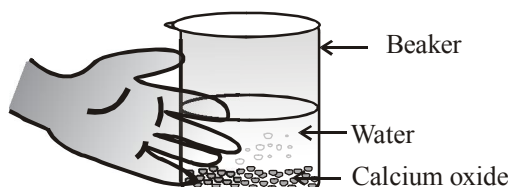
GENERAL INSTRUCTIONS :

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 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 in the range of 50 to 80 words.
6. 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.
7. Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

SECTION-A

Select and write one most appropriate option out of the four options given for each of the questions from 1 to 20.

1. Calcium oxide reacts vigorously with water.

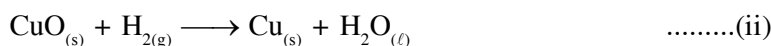
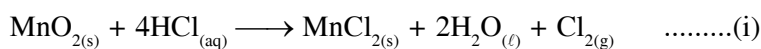


Identify the incorrect statements.

- (i) It is an endothermic reaction.
- (ii) Slaked lime is produced.
- (iii) Quick lime is produced.
- (iv) It is an exothermic reaction.
- (v) It is a combination reaction.

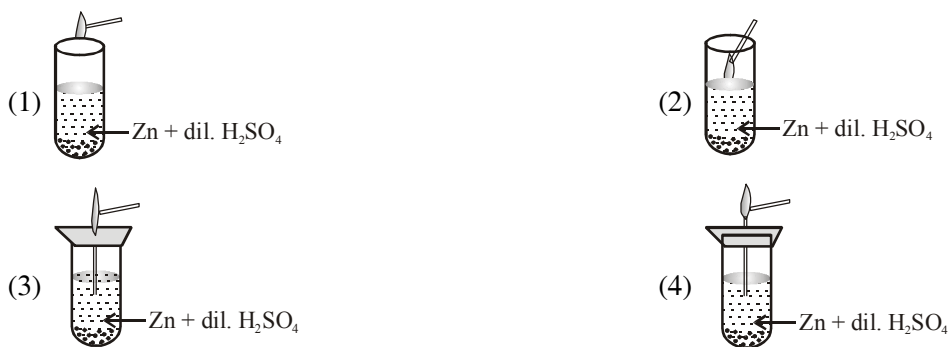
- (1) (i) and (ii) (2) (iii) and (iv) (3) (i) and (iii) (4) (ii), (iv) and (v)

2. Identify the reducing agent in the reaction (i) and (ii) respectively.

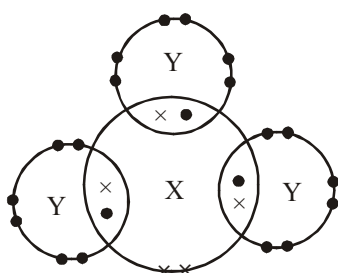


- (1) $\text{MnO}_{2(s)}$, $\text{H}_{2(g)}$ (2) $\text{HCl}_{(aq)}$, $\text{H}_{2(g)}$
 (3) $\text{Cl}_{2(g)}$, $\text{Cu}_{(s)}$ (4) $\text{MnCl}_{2(s)}$, $\text{H}_2\text{O}_{(l)}$

3. The safest method to detect hydrogen gas produced in a reaction would be the method shown in

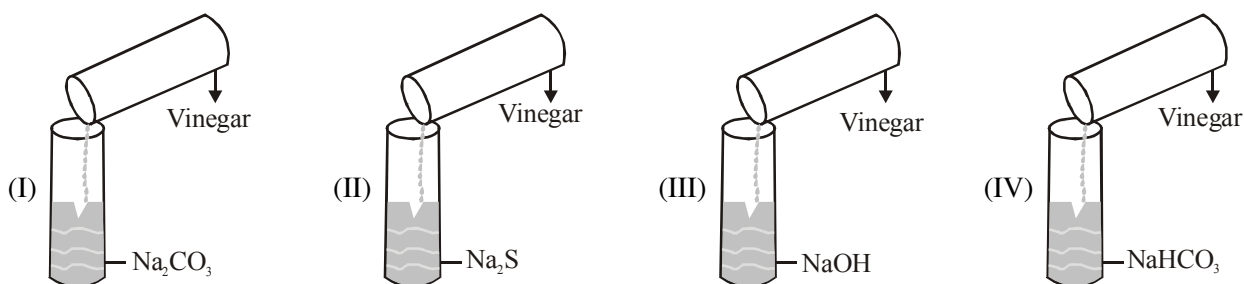


4. The diagram given below shows the electronic arrangement of the valence electrons in a molecule of compound XY_3 . Which of the following pairs of elements could be X and Y?



	X	Y
(1)	Argon	Neon
(2)	Nitrogen	Hydrogen
(3)	Phosphorus	Fluorine
(4)	Sulphur	Oxygen

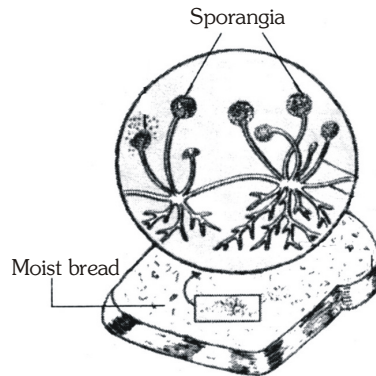
5. Which of the following metals will melt if you keep them on your palm?
- (i) Magnesium (ii) Mercury
 (iii) Caesium (iv) Gallium
- (1) (i) and (iii) (2) (ii) and (iv) (3) (iii) and (iv) (4) (ii) and (iii)
6. A student added vinegar to test tubes I, II, III, IV and then introduced a burning matchstick, near the mouth of the test tubes.



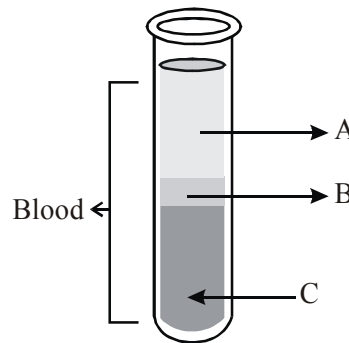
The matchstick will be extinguished in test tubes -

- (1) I and IV (2) II and III
 (3) III and IV (4) I and II

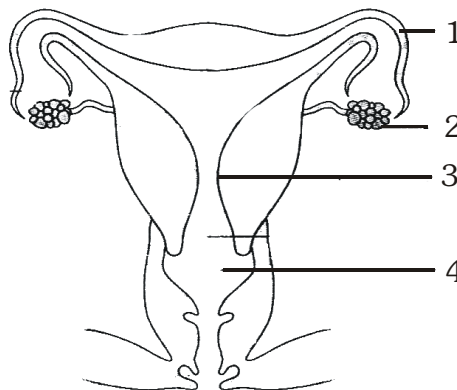
7. Which of the following compounds has a triple bond?
 (1) C_2H_4 (2) C_3H_4 (3) C_3H_8 (4) C_4H_{10}
8. The image shows the bread mould on a bread. How these fungi obtain nutrition?



- (1) By using nutrients from the bread to prepare their own food.
 (2) By allowing other organisms to grow on the bread and then consuming them.
 (3) By breaking down the nutrients of bread and then absorbing them.
 (4) By eating bread on which it is growing.
9. In the given diagram find out the 'C'



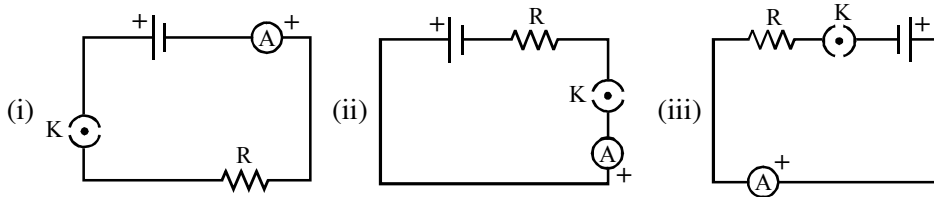
- (1) WBC (2) RBC (3) Platelets and WBC (4) Plasma
10. Identify the part '3' in the given diagram.



- (1) Fallopian tube (2) Vagina (3) Ovary (4) Endometrium

11. Which of the following trait chosen by Mendel was a recessive trait in garden pea ?
- (1) round seed (2) tall plant
(3) violet flower (4) green seed
12. In a food chain comprising of a snake, grass, frog and insect, the secondary consumer is _____.
- (1) Insect (2) Snake (3) Frog (4) Grass
13. Which of the following represents voltage?
- (1) $\frac{\text{Work done}}{\text{Current} \times \text{Time}}$ (2) Work done \times Charge
(3) $\frac{\text{Work done} \times \text{Time}}{\text{Current}}$ (4) $\frac{\text{Work done} \times \text{Charge}}{\text{Time}}$

14. A cell, a resistor, a key, and an ammeter are arranged as shown in the circuit diagrams. The current recorded in the ammeter will be



- (1) maximum in (i)
(2) maximum in (ii)
(3) maximum in (iii)
(4) the same in all the cases.
15. Which of the following can make a parallel beam of light when light from a point source is incident on it?
- (1) Concave mirror as well as convex lens.
(2) Convex mirror as well as concave lens.
(3) Two plane mirrors placed at 90° to each other.
(4) Concave mirror as well as concave lens.
16. An optical device has been given to a student and he determines its focal length by focusing the image of the sun on a screen placed at 24 cm from the device on the same side as the sun. Select the correct statement about the device.
- (1) Convex mirror of focal length 12 cm
(2) Convex lens of focal length 24 cm
(3) Concave mirror of focal length 24 cm
(4) Convex lens of focal length 12 cm

Directions : Q.17 to 20 are Assertion - Reasoning based questions. These consist of two statements - Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- (1) Both A and R are true and R is the correct explanation of A
 (2) Both A and R are true and R is not the correct explanation of A
 (3) A is true but R is false
 (4) A is false but R is true

17. **Assertion :** Reaction between barium chloride and sodium sulphate is a double displacement and precipitation reaction.

Reason : Reaction between barium chloride and sodium sulphate involves the exchange of ions between the reactants and a white precipitate of barium sulphate is formed.

18. **Assertion :** Respiration is a biochemical process opposite to photosynthesis.

Reason : Energy is released during respiration.

19. **Assertion :** Glomerular filtration requires expenditure of energy by kidney.

Reason : It occurs due to pressure difference in glomerular capillaries and Bowman's capsule.

20. **Assertion:** A fuse wire is always connected in parallel with the main line.

Reason: If a current larger than the specified value flows through the circuit, fuse wire melts.

SECTION-B

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

21. Give reason for the following :

- (a) Hydrogen gas is not evolved when most of the metals react with nitric acid.
 (b) Zinc oxide is considered as an amphoteric oxide.

OR

Samples of four metals A, B, C and D were taken and added to the following solutions one by one.

The results obtained have been tabulated as follows :

Metal	Solutions to which metal is added			
	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 given above to answer the following questions :

- (a) Which is the most reactive metal?
 (b) Arrange the metals A, B, C and D in order of increasing reactivity.

22. State how concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from light?
23. "Transpiration is necessary evil" Justify the statement.
24. How is required pH maintained in the stomach and small intestine ?
25. State whether an alpha particle will experience any force in a magnetic field if :
- It is placed in the field at rest.
 - It moves in the magnetic field, parallel to field lines.
 - It moves in the magnetic field, perpendicular to field lines.

OR

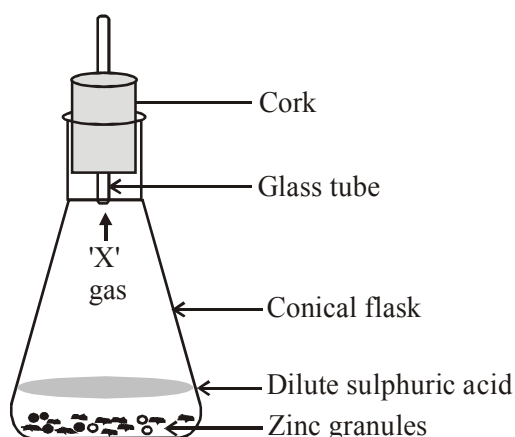
Write the three ways to produce magnetic field.

26. Kidney produces 180 litre of filtrate per day but the amount of urine released is 1.5-2 litre per day. Justify this statement.

SECTION-C

Q.no. 27 to 33 are short answer questions.

27. Observe the given figure and answer the questions that follow :



- How will you test for the gas which is liberated in the experiment?
 - Write the chemical reaction involved. Which type of chemical reaction is taking place?
 - Is it an exothermic reaction or an endothermic reaction?
28. A metal 'M' which is one of the good conductors of heat and electricity used in making electric wires is found in nature as sulphide ore M_2S ?
- Name the metal 'M'.
 - Which process will be suitable for concentration of its ore M_2S ?
 - With the help of a labelled diagram, explain the process of electrolytic refining of the metal.

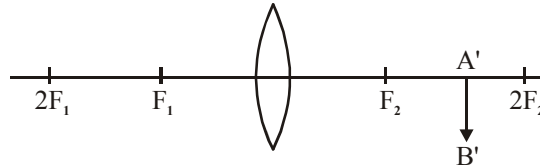
29. List the three events that occur during the process of photosynthesis ? Write two functions of stomata.

OR

(i) The breathing cycle is rhythmic whereas exchange of gases is a continuous process. Justify this statement.

(ii) How many molecules of ATP are produced by oxidation of glucose under anaerobic condition ?

30. (i) Observe the following incomplete ray diagram for an object, where the object's image A'B' is formed by a convex lens.



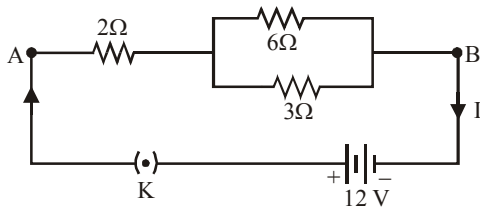
Based upon the above information, fill in the blanks:

(a) The position of object AB would have been.....

(b) Size of the object would have beenthan the size of image.

(ii) Refractive indices of water and glass are $\frac{4}{3}$ and $\frac{3}{2}$ respectively. A light ray travelling in water is incident on water-glass interface at 45° . What is the angle of refraction for light ray? (Take, $\sin 38.9^\circ = 0.6284$)

31. An electric network of resistors is shown below, which is supplied by a battery of 12 V.



Find :

(i) Effective resistance between the points A and B in the network.

(ii) Current flowing through resistor of 6Ω .

32. A 6 cm tall object is placed perpendicular to the principal axis of a concave mirror of focal length 30 cm. The distance of the object from the mirror is 45 cm. Use mirror formula to determine the position, nature and size of the image formed. Also, draw labelled ray diagram to show the image formation in this case.

OR

An object 6 cm in size is placed at 50 cm in front of a convex lens of focal length 30 cm. At what distance from the lens should a screen be placed in order to obtain a sharp image of the object? Find the nature and size of the image. Also draw labelled ray diagram to show the image formation in this case.

33. Draw a neat diagram of human brain and label following parts in it.

(i) Midbrain (ii) Pituitary

SECTION-D

Q.no. 34 to 36 are Long answer questions.

34. On dropping a small piece of sodium in a test tube containing carbon compound 'X' with molecular formula C_2H_6O , a brisk effervescence is observed and a gas 'Y' is produced. On bringing a burning splinter at the mouth of the test tube the gas evolved burns with a pop sound.
- (a) Identify 'X' and 'Y'.
- (b) Write the chemical equation for the reaction.
- (c) Write the name and structure of the product formed, when you heat 'X' with excess conc. sulphuric acid.

OR

- (a) Define the term isomer.
- (b) Two compounds have same molecular formula C_3H_6O . Write the name of these compounds and their structural formula.
- (c) How would you bring about the following conversions :
- (i) Ethanol to ethene (ii) Propanol to propanoic acid
35. (a) What is placenta ? Write 2 functions of it.
- (b) Explain any 3 methods of contraception.

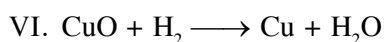
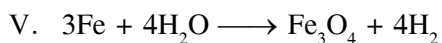
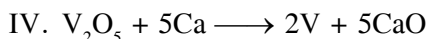
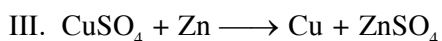
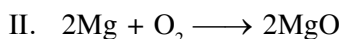
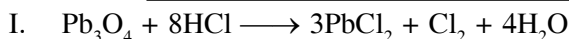
OR

- (a) Why did Mendel choose garden pea for his experiments? Write two reasons.
- (b) Explain three laws of inheritance.
36. (a) Explain why two magnetic lines do not intersect each other.
- (b) State the rule for determining the direction of the magnetic field produced around a current carrying straight conductor. Draw a sketch of the pattern of field lines due to the current flowing through a straight conductor.
- (c) Explain on what factors does the magnetic field produced by a straight current carrying conductor depend?

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. Oxidation is the process of gaining of oxygen, or losing of hydrogen. Reduction is the process of losing of oxygen or gaining of hydrogen. The substance which undergoes oxidation is the reducing agent while the substance which undergoes reduction is known as the oxidising agent. Oxidation and reduction always take place together and these type of reactions are known as redox reactions. Some of the examples of redox reactions are given below :



(a) Give two examples of oxidation reaction from your everyday life.

(b) Explain using reaction, the oxidising agent present in the reaction III and VI.

OR

(b) Out of oxidation and reduction, which reaction takes place at anode and cathode?

38. An ecosystem may be defined as a structural and functional unit of the biosphere comprising living organisms and their non-living environment which interact by means of food chains and biogeochemical cycles resulting in energy flow, biotic diversity, and material cycling to form a stable, self-supporting system.

(a) Give any two examples of artificial ecosystem?

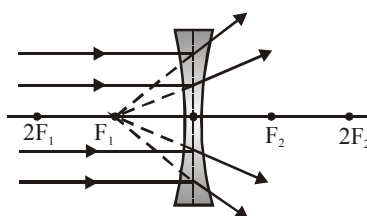
(b) Give some examples of biotic factors of an ecosystem?

(c) What are decomposers? State the role of decomposers in an ecosystem.

OR

(c) The number of trophic level in a food chain is limited. Why ?

39. A lens is a piece of transparent glass bound by spherical surfaces. A concave lens is a piece of transparent glass bound by two bent-in (or bulging-in) surfaces. This is thin in the middle but thicker at the edges. It is also called 'double concave' or 'biconcave lens'. A concave lens is a 'diverging lens' because the parallel beam of light rays after refraction through it, appears to diverge from a single point.



A concave lens

The image formed by a concave lens is always on the same side as the object and it is always virtual and erect. Also, the size of image is always diminished, that is, its size is always smaller than that of the object. The table given below briefly describes the properties of the image formed by a concave lens for an object placed at different positions in front of it.

Image formation by a concave lens

Position of the object	Position of the image	Size of the image	Nature of the image
Between infinity & optical centre O	Between O & F_1 i.e., on same side as the object	Diminished	Virtual and erect
At infinity	At the focus F_1	Highly diminished, Point-sized	Virtual and erect

- (a) Define focal length of a concave lens.
- (b) Draw a ray diagram to show the formation of image of an object when it is placed at a position between F_1 and $2F_1$ in front of a concave lens.
- (c) A divergent lens has a focal length of 30 cm. At what distance should an object of height 5 cm from the optical centre of the lens be placed so that its image is formed 15 cm away from the lens?

OR

- (c) The image of an object formed by a concave lens is of magnification $+\frac{1}{2}$. If the sum of the distances of the object and its image, respectively from the lens, is 60 cm; what is the focal length of the lens?

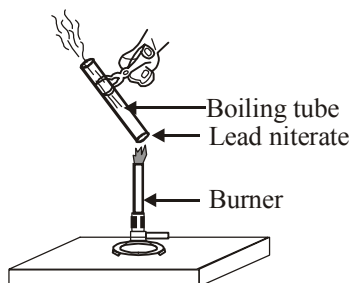
SAMPLE PAPER – 3
TIME : 3 HRS.
MAX. MARKS : 80
GENERAL INSTRUCTIONS :

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 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 in the range of 50 to 80 words.
6. 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.
7. Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

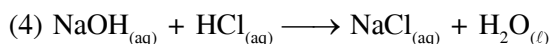
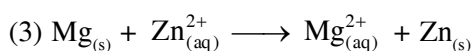
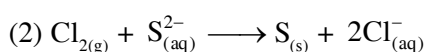
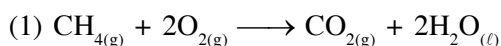
SECTION-A

Select and write one most appropriate option out of the four options given for each of the questions from 1 to 20.

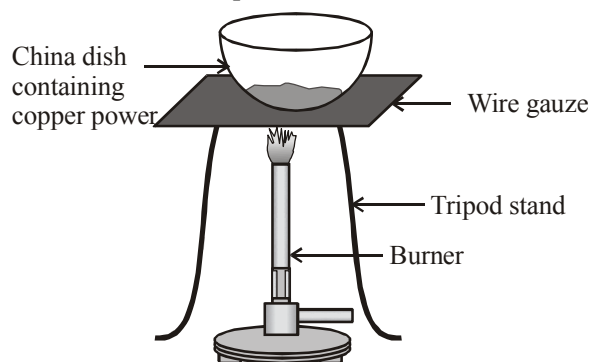
1. When lead nitrate crystals are heated



- (1) a colourless gas is evolved and a yellow residue is left behind
 - (2) a brown gas is evolved and a white residue is left behind
 - (3) a greenish yellow gas is evolved and a brown residue is left behind
 - (4) a brown gas is evolved and a yellow residue is left behind
2. Which of the following is not an oxidation or reduction reaction?



3. Observe the given figure and answer the question that follows :

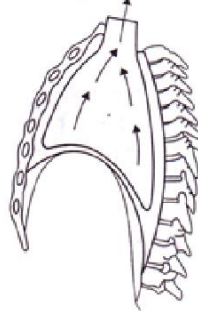


Identify the incorrect statement.

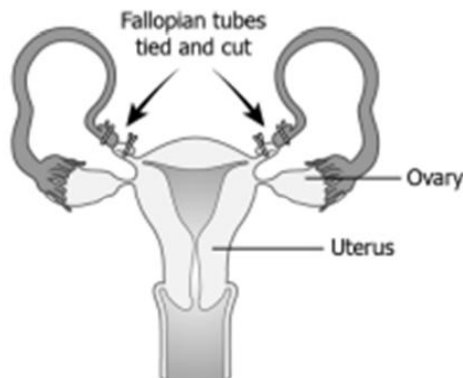
- The surface of copper powder gets coated with black copper(II) oxide.
 - This is because oxygen is added to copper and copper oxide is formed.
 - If hydrogen gas is passed over this heated material (CuO), the black coating on the surface turns brown as the reverse reaction takes place and copper is obtained.
 - During this reverse reaction, the copper(II) oxide is being reduced and the hydrogen is being oxidised.
- (1) (i), (iii) and (iv) (2) (ii) and (iv)
 (3) (i) and (iii) (4) All the statements are correct
4. Beakers A, B and C contain zinc sulphate, silver nitrate and iron(II) sulphate solutions respectively. Copper pieces are added to each beaker. Blue colour will appear in case of
- (1) beaker A (2) beaker B (3) beaker C (4) All the beakers
5. Metals such as _____ and _____ react so vigorously that they catch fire if kept in the open. Hence to protect them and to prevent accidental fires, they are kept immersed in _____.
- (1) phosphorus, magnesium, water (2) sodium, potassium, kerosene oil
 (3) sodium, potassium, water (4) tin, lead, alcohol
6. Bottle (A) contains oxalic acid and bottle (B) contains sodium carbonate solution. When pH paper is dipped in each of the solutions, the colour shown by (A) and (B) will respectively be
- (1) green, blue (2) blue, orange (3) blue, green (4) orange, blue
7. How many carbon atoms are there in one molecule of the following organic compounds respectively?
- (i) Butanol (ii) Propene (iii) Ethanoic acid
- (1) 3, 4, 2 (2) 4, 3, 2 (3) 4, 3, 3 (4) 3, 2, 3
8. Select the incorrect statements.
- Simple diffusion meets the requirements of all the cells in multicellular organisms.
 - Waste products are removed from the body by a process called excretion.
 - Most of the food sources on earth are carbon based.
 - The process of breakdown of food sources inside the body in the presence of oxygen for cellular needs is called transportation.
 - Life processes stop performing when an organism is not doing anything.
- (1) (i), (ii) and (iii) (2) (i), (iv) and (v)
 (3) (ii), (iv) and (v) (4) (ii), (iii) and (iv)

9. Which of these is correct regarding the given mechanism of breathing?

Air expelled from lungs



- | | |
|---------------------------------------|---|
| (1) Volume of thorax cavity decreases | (2) Ribs and sternum moves outward |
| (3) Diaphragm relaxes and become flat | (4) Pressure of thoracic cavity decreases |
10. A cross between two tall plants resulted in offsprings having few dwarf plants. What would be the genotype of both the parents?
- | | |
|---------------|---------------|
| (1) TT and Tt | (2) Tt and tt |
| (3) TT and TT | (4) Tt and Tt |
11. In a place, an earthquake tremors have struck. A person felt them and started to run out of a multi-storeyed building using stairs rapidly. This action is initiated by which hormone?
- | | |
|----------------|---------------|
| (1) Adrenaline | (2) Insulin |
| (3) Glucagon | (4) Thyroxine |
12. The image shows a surgical method in females to prevent pregnancy. Which event will be likely prevented from this method?



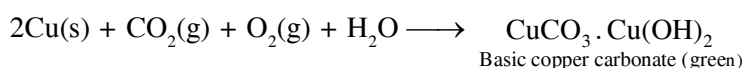
- | | |
|------------------------------|------------------------|
| (1) Maturation of eggs | (2) Production of eggs |
| (3) Fusion of egg with sperm | (4) Ovulation |

13. Which of the following correctly describes the magnetic field near a long straight current carrying straight wire?
- (1) The field consists of straight lines perpendicular to the wire.
 - (2) The field consists of straight lines parallel to the wire.
 - (3) The field consists of radial lines originating from the wire.
 - (4) The field consists of concentric circles centered on the wire.
14. An electron and a proton, moving with same velocity, enter a uniform magnetic field perpendicular to the field. Then, in the existing uniform magnetic field,
- (1) both electron and proton will execute circular motion.
 - (2) the velocity of both electron and proton will remain unchanged.
 - (3) the electron will accelerate but the proton will stop.
 - (4) the proton will accelerate but the electron will stop.
15. A cylindrical conductor of length ℓ and uniform area of cross-section A has resistance R. Another cylindrical conductor of length 2ℓ and resistance R of the same material has area of cross-section:
- (1) $A/2$
 - (2) $3A/2$
 - (3) $2A$
 - (4) $3A$
16. The human eye can focus objects at different distances by adjusting the focal length of the eye lens. This is called:
- (1) Power of scattering
 - (2) Power of accommodation
 - (3) Power of dispersion
 - (4) None of these

Directions : Q.17 to 20 are Assertion - Reasoning based questions. These consist of two statements - Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- (1) Both A and R are true and R is the correct explanation of A
- (2) Both A and R are true and R is not the correct explanation of A
- (3) A is true but R is false
- (4) A is false but R is true

17. **Assertion :** Following reaction describes the corrosion of copper and is a redox reaction.



Reason : The metallic copper is oxidised to Cu^{2+} .

18. **Assertion :** In a monohybrid cross, offsprings of F_1 generation express dominant character.

Reason : Dominance occurs only in heterozygous state.

19. **Assertion :** The principle of segregation given by Mendel is the principle of purity of gametes.
Reason : Gametes are pure for a character and do not mix up.
20. **Assertion :** Refractive index of glass with respect to vacuum is different for red colour light and violet colour light.
Reason : Refractive index of a pair of media depends on the wavelength of light used.

SECTION-B

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

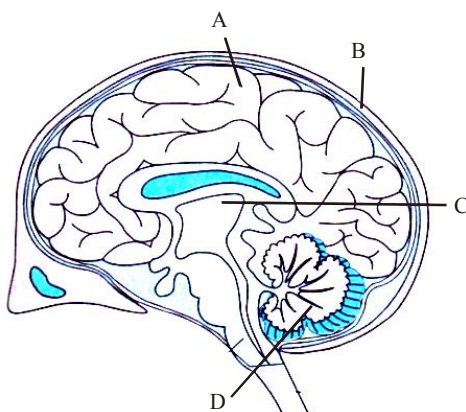
21. Royal water is prepared by mixing two acids A and B. It can dissolve gold and platinum. It is highly corrosive and fuming liquid.
- (a) Identify A and B.
 (b) What is the ratio in which A and B are mixed?

OR

Four metals, A, B, C and D are tested with water and with dilute hydrochloric acid. The table given below shows the results of the experiment.

Metal	Reaction with water	Reaction with steam	Reaction with HCl _(aq)
A	×	✓	✓
B	×	×	✓
C	✓	✓	✓
D	×	×	×

- (a) Place the metals A, B, C and D in order, stating the most reactive first.
 (b) Predict the method used for the extraction of metal C.
22. Identify the unlabelled parts of brain in the given figure and also write one function of each labelled part.



23. (i) Food does not pass through the digestive system by 'gravity'. This is clear from the fact that we can digest the food even if we are lying down. Explain the logic behind the passage of food through our digestive system.
 (ii) Why rate of breathing is faster in aquatic animals than terrestrial animals?

24. (i) Write the important function of the structural and functional unit of kidney.
(ii) What do you mean by ultrafiltration ?
25. A 5 cm high object is placed at 15 cm distance in front of a concave mirror of focal length 10 cm. The magnification produced by mirror is 1.5. Find the height and position of image, if it is real.

OR

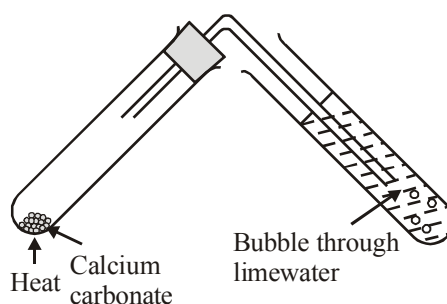
Where should a 10 cm high object be placed in front of a concave mirror of focal length 10 cm, to obtain a virtual image of magnification 1.5? Find the height of image also.

26. (i) Choose one consumer each that belongs to the second and third trophic levels from the organisms given below.
Eagle, frog, deer, rabbit, lion
- (ii) Pesticides added to a field is seen in increased amounts in the crop and in the birds that feed on them. What is this phenomenon called? Define it.

SECTION-C

Q.no. 27 to 33 are short answer questions.

27. You are given a white solid which is calcium carbonate, CaCO_3 .



- (a) What will you observe in the limewater during the heating process?
(b) Is calcium carbonate an element or a compound? Explain your answer.
(c) Write the reactions involved.
28. (a) A metal compound 'X' reacts with dil. H_2SO_4 to produce effervescence. The gas evolved extinguishes a burning candle. If one of the compounds formed is calcium sulphate, then what is 'X' and the gas evolved?
(b) Also, write a balanced chemical equation for the reaction which occurred.
(c) Name one antacid. How does it help to relieve indigestion in stomach?

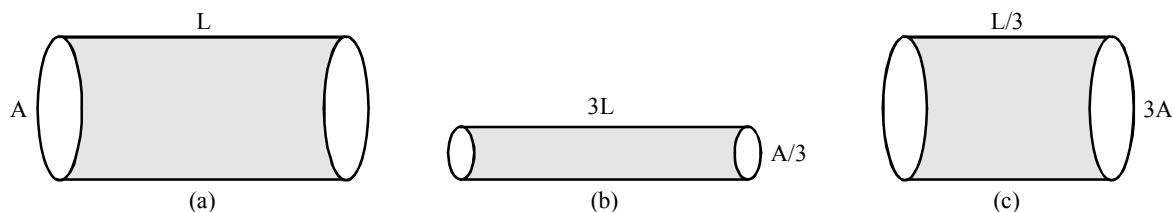
29. (i) Haemoglobin plays an essential role of being a respiratory pigment in human beings. Justify this statement.
 (ii) Write any three differences between aerobic and anaerobic respiration.

OR

Write the function of each of the following components of the transport system in human beings :

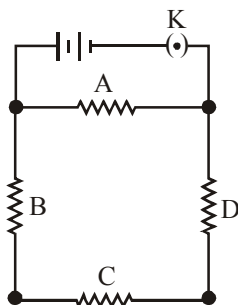
- (i) Blood vessels (ii) Lymph (iii) Heart

30. A straight current carrying conductor is held horizontally along east-west direction and the magnetic field lines associated with it are seen by an observer in anti-clockwise direction. What will be the direction of current flowing through the conductor? Explain it with the help of diagram. Name the rule used to determine the direction of magnetic field due to a straight current carrying conductor.
31. The figure below shows three cylindrical copper conductors along with their face areas and lengths. Compare the resistance and the resistivity of the three conductors. Justify your answer.



OR

The diagram shows a network of four equal resistors A, B, C and D of resistance $2\ \Omega$ each, which are connected to an electric source.



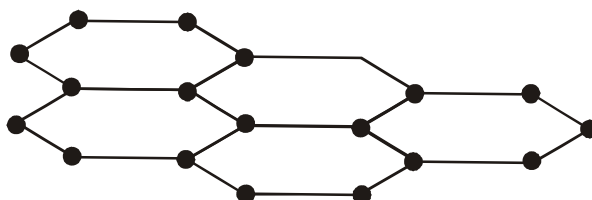
Identify the resistors which are connected in series in this network. What is the equivalent resistance of circuit? Also, find the current through resistor A (see in figure) if the voltage of electric supply source is 6 V.

32. (a) What is presbyopia? State its cause. How is it corrected?
 (b) The defective eye of a person has near point 0.5 m and far point 3 m. Calculate the focal lengths of corrective lenses required by the person for reading purpose and seeing far off.
33. (i) Explain in brief about the methods of waste disposal.
 (ii) What do you mean by abiotic components of an ecosystem? Give two examples.

SECTION-D

Q.no. 34 to 36 are Long answer questions.

34. The diagram shows one layer of carbon atoms in the structure of graphite :



- Identify the type of bonding in graphite.
- Which property of graphite makes it suitable for use as a dry lubricant? Explain your answer.
- Graphite is burned in oxygen. What is the product formed?

OR

- What type of bond holds the two chlorine atoms together in a chlorine molecule?
- Briefly describe how this bond is formed.
- Draw a 'dot-and-cross' diagram to show the bonding in a chlorine molecule.

35. Differentiate between the following:

- Pollen tube and style
- Fission in Amoeba and Plasmodium
- Fragmentation and regeneration
- Bud of Hydra and Bryophyllum
- Cross pollination and self pollination

OR

Name the following

- The body part in which the testes are present in a human male.
- The part from where the sperms are released out of the body.
- The part of female reproductive system that produces a mature egg.
- The accessory fluid in human males, whose secretion activates the sperms.
- The period of adolescence when the reproductive tissue begin to mature.

36. (a) To construct a ray diagram we use two rays which are so chosen that it is easy to know their direction after reflection from the mirror. List two such rays and state the path of these rays after reflection in case of concave mirrors. Use these two rays and draw ray diagram to locate the image of an extended object placed between pole and focus of a concave mirror.
- (b) A concave mirror produces three times magnified real image on a screen. If the object is placed at 20 cm in front of the mirror; how far is the screen from the object?

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. When fats and oils are oxidized, they become rancid and their smell and taste change. Usually substances which prevent oxidation (antioxidants) are added to foods containing fats and oil. Keeping food in air tight containers also helps to slow down oxidation.

- (a) What do you mean by the word RANCIDITY?
(b) What is the meaning of antioxidants? Give an example.

OR

(b) Write any traditional method used by our ancestors to prevent rancidity.

38. Rohit performed an experiment to study the inheritance pattern of genes. He crossed white male rabbit (homozygous) with black female rabbit (homozygous).

[Black gene B colour dominant over white b]

- (a) What is the result in F_1 generation?
(b) What are the phenotypes of the offspring when offsprings of F_1 progeny self crossed.
(c) What percentage of white coloured rabbit were formed. What is the reason ?

OR

(c) What will be the appearance of F_2 progeny when a heterozygous tall plant cross with homozygous dwarf plant ? [Tallness gene T is dominant over dwarfness gene t]

Show with the help of cross.

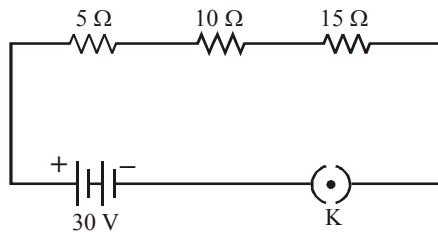
39. The combination of resistors in series or parallel are very useful in electrical circuits. When two or more resistors are joined in series and their combination is supplied by a voltage source, the current flowing through each resistor remains same but the potential difference across each resistor is directly proportional to the resistance of the resistor.

On the other hand, when a parallel combination of two or more resistors is supplied by a voltage source, the potential difference across each resistor remains same but the current flowing through each resistor is inversely proportional to the resistance of the resistor.

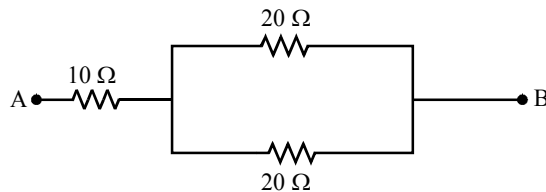
The equivalent resistance of resistors in series combination is equal to sum of the individual resistances in the combination.

In a parallel combination of resistors, the sum of the reciprocals of the separate resistances is equal to the reciprocal of equivalent resistance.

- (a) Find the current flowing in the circuit shown below and potential difference across the $15\ \Omega$ resistor.

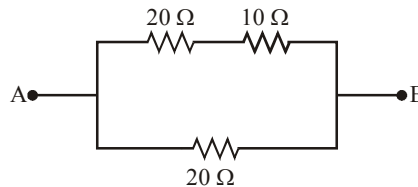


- (b) If all the three resistors used in series combination of sub-part (a) of the question, are now connected in parallel across the same voltage source; find the current flowing through the $5\ \Omega$ and $10\ \Omega$ resistors in this parallel combination.
- (c) Calculate the equivalent resistance of the following network :



OR

- (c) Calculate the equivalent resistance of the following network :



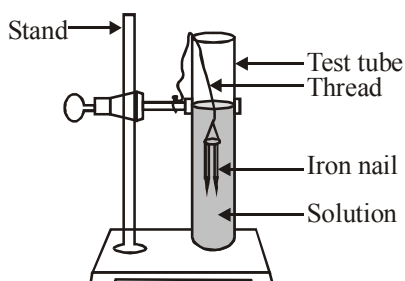
SAMPLE PAPER – 4
TIME : 3 HRS.
MAX. MARKS : 80
GENERAL INSTRUCTIONS :

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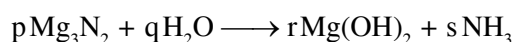
SECTION-A

Select and write one most appropriate option out of the four options given for each of the questions from 1 to 20.

1. Iron nails were dipped in a solution kept in a test tube. After half an hour, it was observed that the colour of the solution has changed. The solution present in the test tube was that of



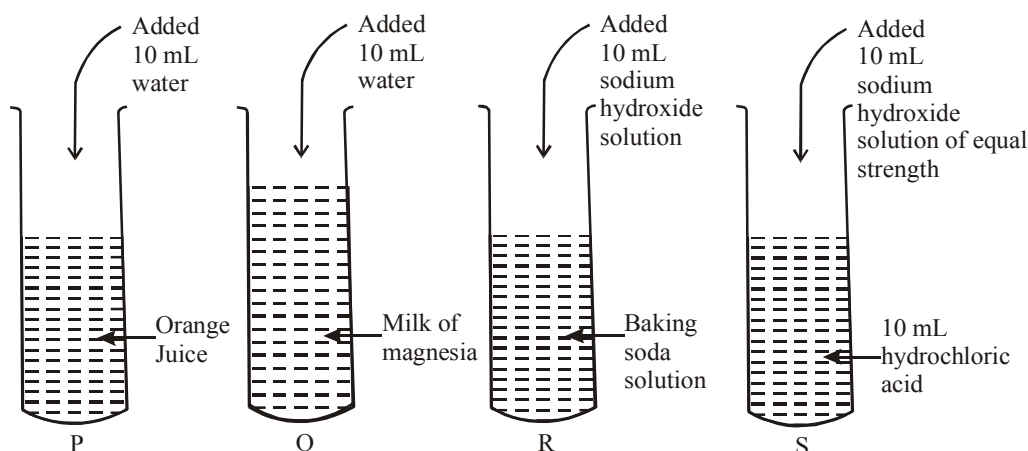
- (1) zinc sulphate
 - (2) copper sulphate
 - (3) iron sulphate
 - (4) aluminium sulphate
2. Consider the following reaction :



When the equation is balanced, the coefficients p, q, r, s respectively are

- (1) 1, 3, 3, 2
- (2) 1, 6, 3, 2
- (3) 1, 2, 3, 2
- (4) 2, 3, 6, 2

3. Ashish took four test tubes P, Q, R and S, each containing 10 mL of different solutions as shown in figure. Then few drops of methyl orange are added to each tube. The tube in which solution will turn methyl orange to red?



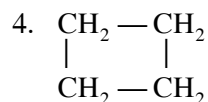
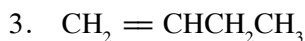
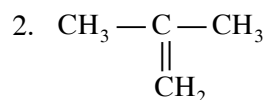
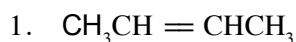
- (1) P (2) Q
(3) R (4) S
4. There are four metals K, L, M and N. Identify them by using the hints given below.
K forms basic oxide.
L forms amphoteric oxide.
Oxide of M dissolves in water to form alkali.
N does not react with water at all.
- (1) K → Zn, L → Al, M → Na, N → Fe (2) K → Fe, L → Na, M → K, N → Zn
(3) K → K, L → Cu, M → Pb, N → Na (4) K → Cu, L → Zn, M → K, N → Pb
5. Which of the following pairs will give displacement reactions?
- (1) NaCl solution and copper metal
(2) MgCl₂ solution and aluminium metal
(3) FeSO₄ solution and silver metal
(4) AgNO₃ solution and copper metal
6. In an experiment to test the pH of a given sample using pH paper, four students recorded the following observations :

Student	Sample taken	pH paper colour turned to
I	Water	Blue
II	Dilute HCl	Red
III	Dilute NaOH	Blue
IV	Dilute Ethanoic Acid	Orange

Which one of the given observations is incorrect?

- (1) I (2) II
(3) III (4) IV

7. The structural formulae of four hydrocarbons are shown below :



Which structural formulae represent alkenes?

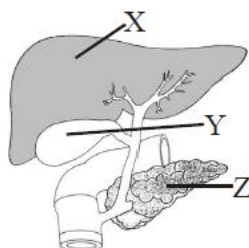
(1) 1 and 2

(2) 2 and 3

(3) 1, 2 and 3

(4) 1, 2, 3 and 4

8. Refer to the given figure showing the labelled parts X, Y and Z. Identify X, Y and Z and select the correct option regarding it.



(1) 'X' is the liver, which produces bile juice.

(2) 'Y' is gall bladder, which stores and secretes bile juice.

(3) 'Z' is pancreas, which secretes digestive juice.

(4) All of these

9. Terrestrial animals possess some adaptations in their respiratory structures to promote better exchange of gases. Choose the correct adaptations among the following options.

(1) Thin permeable membrane for easy diffusion of gases.

(2) Abundant blood supply for transporting respiratory gases.

(3) Large surface area for gaseous exchange.

(4) All of these

10. "When two pairs of traits are combined in a hybrid, segregation of one pair of characters is independent of the other pair of characters".

The statement explains which of the following laws/principles of Mendel?

(1) Principle of paired factors

(2) Principle of dominance

(3) Law of segregation

(4) Law of independent assortment

11. When growing plants detect light coming from one side then

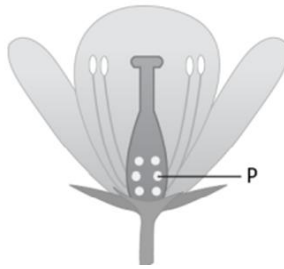
(1) Auxin diffuses in that part of the plant which is towards the sun.

(2) Auxin distributes uniformly in every part of the plant.

(3) Auxin collects on the shady side of the plant.

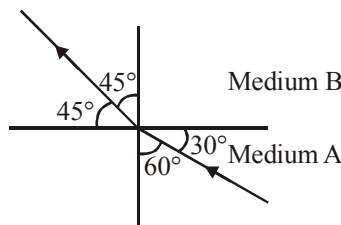
(4) None of these

12. The image shows the structure of a flower.



Which process will likely be disturbed or not occur, if labelled part is removed from the flower?

- (1) Formation of seed
 - (2) Transport of pollen
 - (3) Formation of pollen
 - (4) Development of pollen tube
13. The least distance of distinct vision for a young adult with normal vision is about
- (1) 25 m
 - (2) 2.5 cm
 - (3) 25 cm
 - (4) 2.5 m
14. In an electrical circuit three incandescent bulbs A, B and C of rating 40 W, 60 W and 100 W respectively, are connected in parallel to an electric source. Which of the following is likely to happen regarding their brightness?
- (1) Brightness of all the bulbs will be the same.
 - (2) Brightness of bulb A will be the maximum.
 - (3) Brightness of bulb B will be more than that of A
 - (4) Brightness of bulb C will be less than that of B.
15. Magnification produced by a rear-view mirror fitted in vehicles
- (1) is less than one.
 - (2) is more than one.
 - (3) is equal to one.
 - (4) can be more than or less than one depending upon the position of the object in front of it.
16. Figure shows a ray of light as it travels from medium A to medium B. Refractive index of the medium B relative to medium A is

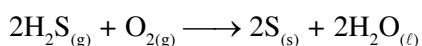


- (1) $\frac{\sqrt{3}}{\sqrt{2}}$
- (2) $\frac{\sqrt{2}}{\sqrt{3}}$
- (3) $\frac{1}{\sqrt{2}}$
- (4) $\sqrt{2}$

Directions : Q.17 to 20 are Assertion - Reasoning based questions. These consist of two statements - Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- (1) Both A and R are true and R is the correct explanation of A
- (2) Both A and R are true and R is not the correct explanation of A
- (3) A is true but R is false
- (4) A is false but R is true

17. **Assertion :** The reaction shown below is a redox reaction.



Reason : In redox reaction, oxidation and reduction take place simultaneously.

18. **Assertion :** Failure of testes to descend into the scrotum during development causes sterility in man.

Reason : Higher temperature in the abdomen than in the scrotum is not suitable for sperm development.

19. **Assertion :** Mendel picked common garden pea plants for the focus of his research.

Reason : Garden pea plants can be grown easily in large numbers and their reproduction cannot be manipulated.

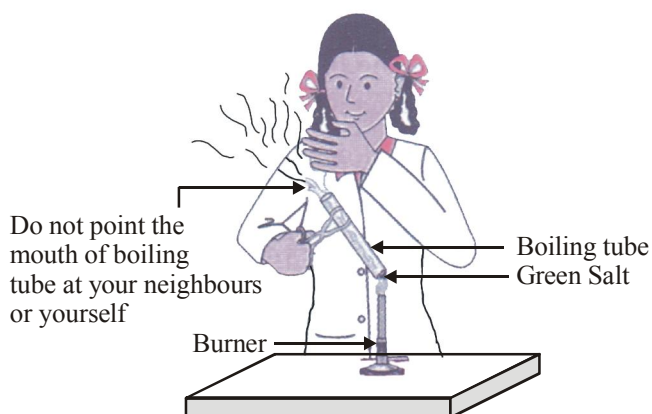
20. **Assertion :** If an electron moving vertically down in outer space, enters the earth's magnetic field, then it gets deflected towards West.

Reason : Electron has negative charge.

SECTION-B

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

21. A green salt on heating decomposes to produce a colourless suffocating gas and leaves behind a reddish brown residue. Name the salt and write the decomposition reaction.

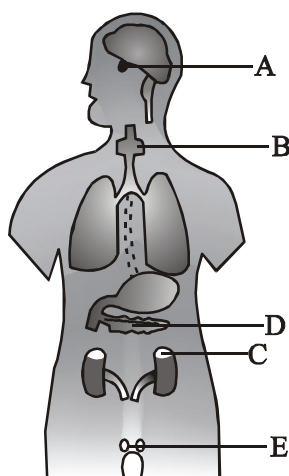


OR

Identify the type of reactions taking place in each of the following cases and write the balanced chemical equation for the reactions.

- (a) Phosphorus burns in presence of chlorine to form phosphorus pentachloride.
- (b) Potassium iodide reacts with lead nitrate to produce potassium nitrate and lead iodide.

22. Mention the three differences between all the type of blood vessels.
23. (i) Identify the endocrine glands A, B, C and D in the given diagram.
(ii) List the functions of part D and E.



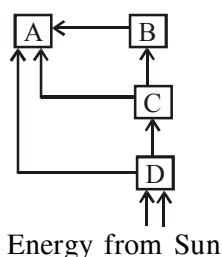
24. Write differences between reabsorption and tubular secretion in urine formation.
25. If the image formed by a lens for all positions of an object placed in front it is always erect and diminished, what is the nature of this lens? Draw ray diagrams for two different positions of object in front of concave lens, to justify your answer.

OR

Define power of a lens. If the numerical value of the power of a concave lens is 10 D, what is its focal length?

26. We already know that a food chain contains different organisms at different trophic levels in a tropical ecosystem.

In the diagram (of energy flow in an ecosystem) given below identify the secondary consumers and explain your choice.



SECTION-C

Q.no. 27 to 33 are short answer questions.

27. What is meant by
- Precipitation reaction,
 - Exothermic reaction,
 - Oxidation reaction?

Write balanced chemical equations for an example of each.

28. (a) What is a soap?
 (b) Why are soaps not suitable for washing clothes when the water is hard?
 (c) Explain the action of soap in removing an oily spot from a piece of cloth.
29. (i) Write differences between saprotrophic and parasitic mode of nutrition. Also give one example of each.
 (ii) When do the desert plants take up carbon dioxide and perform photosynthesis?

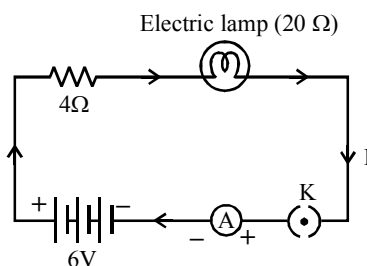
OR

Explain the process of breakdown of glucose in a cell,

- (i) In the presence of oxygen.
 (ii) In the absence of oxygen.
30. (a) A lens produces a magnification of -5 . Is this a converging or diverging lens? If the focal length of the lens is 6 cm, draw a ray diagram (not drawn to scale) showing the image formation in this case.
 (b) A girl was playing with a thin beam of light from a laser torch by directing it from different directions on a convex lens held vertically. She was surprised to see that in a particular direction, the beam of light continues to move along the same direction without any deviation after passing through the lens. State the reason for her observation. Draw a ray diagram to support your answer.
31. Consider a conductor of resistance 'R', length 'L', cross section area 'A' and resistivity ' ρ '. Now this conductor is cut into four equal parts of same lengths. What will be the new resistivity of each of these parts? Why? If these parts are connected in parallel with each other, what will be the equivalent resistance of this parallel combination?
32. (a) With the help of a suitable circuit diagram prove that the reciprocal of the equivalent resistance of a group of resistances joined in parallel is equal to the sum of the reciprocals of the individual resistances.
 (b) In an electric circuit two resistors, of $12\ \Omega$ each, are joined in parallel to a 6 V battery. Find the current drawn from the battery.

OR

An electric lamp of resistance $20\ \Omega$ and a resistor of resistance $4\ \Omega$ are connected to a 6V battery as shown in the circuit.



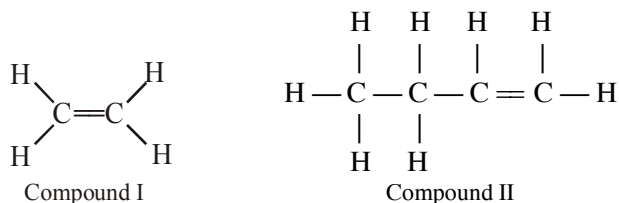
Calculate :

- (a) The total resistance of the circuit.
 (b) The current through the circuit.
 (c) The units of energy consumed by the electric lamp in 8 hours.
33. (i) Write two differences between food chain and food web.
 (ii) Name the two gases that has replaced the use of CFCs and also define incineration.

SECTION-D

Q.no. 34 to 36 are Long answer questions.

34. Consider the molecular models of the two organic compounds shown below :



- Name the homologous series that compounds I and II belong to and give its general formula.
- Write the molecular formulae of next homologue of both compounds I and II.
- Give one identification test for these compounds.

OR

The table given below shows some information about four organic compounds P, Q, R and S.

Organic compound	Molecular formula	Melting point (°C)	Boiling point (°C)
P	C ₃ H ₈	-188	-42
Q	C ₄ H ₁₀	-138	-1
R	C ₅ H ₁₂	-130	36
S	C ₆ H ₁₂	6	80

- Which homologous series does C₃H₈ belong to?
 - Why are P, Q, R and S classified as hydrocarbons?
 - Which of these organic compounds belong to the alkane series?
 - Based on the information given above, state one characteristic of the alkane series.
35. (i) Trace the F₁ generation formed by crossing two plants with separate traits for shape and seed colour—round green (RRyy) and wrinkled yellow (rrYY). Mention the characteristic exhibited by it.
- (ii) Describe monohybrid cross with the help of an example.

OR

- In a certain plant yellow fruit (Y) is dominant over white fruit (y). A heterozygous plant with yellow fruit is crossed with a plant with white fruit. Find the genotype and phenotype.
 - Black eyed colour is dominant over blue eyed colour. A blue eyed female married with black eyed man (whose mother was blue eyed).
 - Find out the colour of eyes in the children of this couple.
 - What will be the percentage of blue eyed coloured children.
36. (a) The magnetic field lines associated with a current carrying vertical straight conductor is in anti-clockwise direction, as seen by an observer. What is the direction of current through it? Explain it with the help of diagram.
- (b) When does an electric short circuit occur?
- (c) How will the magnetic field produced at the centre of a current carrying circular coil change if we
- increase the current flowing through the coil?
 - reverse the direction of current through the coil?

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. Ores mined from the earth are usually contaminated with large amounts of impurities such as soil, sand, etc., called gangue. The impurities must be removed from the ore prior to the extraction of the metal. Several steps are involved in the extraction of pure metal from ores. Methods used for removing the gangue from the ore are based on the differences between the physical or chemical properties of the gangue and the ore. Different separation techniques are accordingly employed.

- (a) Name the methods by which concentrated ore is converted into metallic oxide?
 (b) Name an ore of zinc. Which process can be applied to concentrate this ore? How can we change this ore into oxide ore?

OR

- (b) Give one example of extracting metals low in the activity series.

38. Menstrual cycle is the cycle of events taking place in female reproductive organs, under the control of sex hormones, in every 28 days, at an interval of 28 days, regular menstrual cycle stopped abruptly in a married women. She got herself tested and was happy to find that she is pregnant.

- (a) Why menstruation stops in a pregnant female?
 (b) What change take place in the uterus of a pregnant female?
 (c) Write two chemical methods of avoiding pregnancy.

OR

- (c) How development of embryo takes place inside the uterus ?

39. The phenomenon of change in path of light when it passes from one medium to another is called 'Refraction'. Speed of light is different in different media. The bending of light takes place when it passes from one medium to another because speed of light changes from one medium to another.

The frequency of light does not change during the refraction of light. The speed and wavelength of light change during refraction of light. Also, amplitude and intensity of light decrease slightly during refraction of light due to absorption of small amount of light at the surface.

We know that, speed of any wave, $v = \nu\lambda$ where ' ν ' is frequency and ' λ ' is wavelength of the wave. As ' ν ' is constant here, thus, $\lambda \propto v$.

When ray of light passes from rarer medium to denser medium, the refracted ray bends towards the normal at the point of incidence. When ray of light passes from denser medium to rarer medium, the refracted ray bends away from the normal at the point of incidence.

The ratio of sine of angle of incidence to the sine of angle of refraction is constant for two given media. This constant is denoted by n_{21} and it is called 'refractive index of medium 2 with respect medium 1'.

$$\frac{\sin i}{\sin r} = \text{constant} = n_{21} \quad (\text{This is called 'Snell's Law'.})$$

$$\text{Also, } n_{21} = \frac{v_1}{v_2}$$

- (a) Absolute refractive indices of water and diamond are 1.33 and 2.42 respectively. Find refractive index of diamond with respect to water.
- (b) When light ray enters the glass from water, will the wavelength of light change or not? Why?
- (c) On entering in a medium from air, the speed of light becomes $\frac{1}{\sqrt{3}}$ times to that in air. Find the refractive index of the medium with respect to air. If the angle of incidence for light is 60° , find the angle of refraction.

OR

- (c) A glass slab made of a material of refractive index n_1 is kept in a medium of refractive index n_2 . A light ray is incident on the slab. Draw the path of the rays of light emerging from the glass slab, if
- (i) $n_1 > n_2$ (ii) $n_1 = n_2$ (iii) $n_1 < n_2$
-