CLASS - X (CBSE SAMPLE PAPER) | SCIENCE

SAMPLE PAPER – 04

TIME : 3 HRS. **MAX. MARKS : 80**

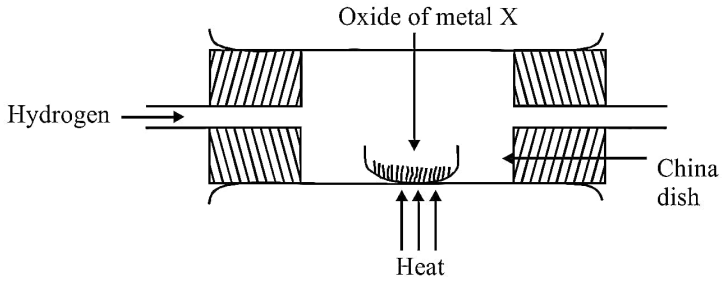
GENERAL INSTRUCTIONS :

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. 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

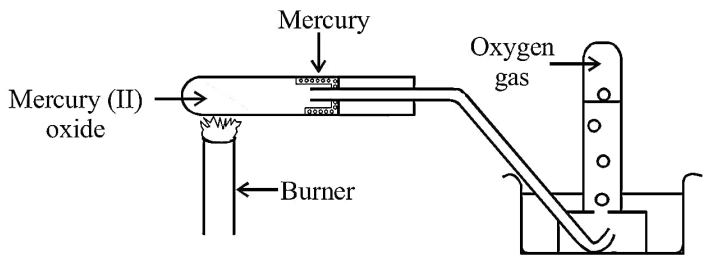
(1) copper (2) lead (3) silver (4) zinc

2. Identify the substance that is oxidised and the substance that is reduced in the following reaction :

$CuO_{(s)} + H_{2(g)} \longrightarrow Cu_{(s)} + H_2O_{(\ell)}$

(1) CuO, H_2 (2) H_2, CuO (3) H_2O, Cu (4) Cu, H_2O

3. 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 $ZnSO_4$, $CuSO_4$, $Al_2(SO_4)_3$ and $FeSO_4$ solutions. The results are tabulated as follows where '✓' means that the reaction occurs and '×' means no reaction occurs.

Metal	$ZnSO_4$	$CuSO_4$	$Al_2(SO_4)_3$	$FeSO_4$
Zn	×	✓	×	✓
Cu	×	×	×	×
Al	✓	✓	×	✓
Fe	×	✓	×	×

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

(1) Zn > Fe > Al > Cu (2) Al > Fe > Zn > Cu

(3) Zn > Al > Fe > Cu (4) Al > Zn > Fe > Cu

5. In an electrolytic cell

(i) Oxidation occurs at cathode

(ii) Oxidation occurs at anode

(iii) Reduction occurs at anode

(iv) Reduction occurs at cathode

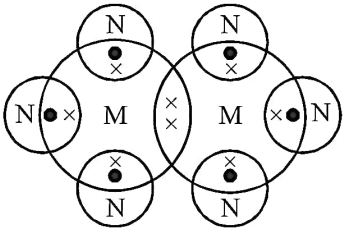
(1) (i) and (ii) (2) (iii) and (iv) (3) (i) and (iii) (4) (ii) and (iv)

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

(1) a strong acid and a strong base (2) a weak acid and a weak base

(3) a strong acid and a weak base (4) 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

(1) Creation of DNA copy

(2) Creation of gametes

(3) Isolation of male and female nuclear DNA content

(4) 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

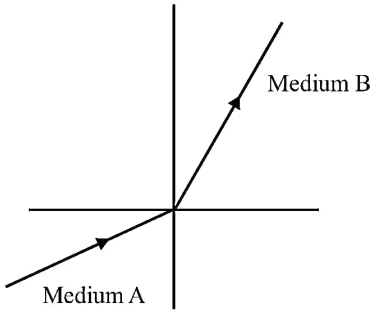
14. Unit of electric power may also be expressed as:

(1) volt-ampere (2) kilowatt-hour (3) watt-second (4) joule-second

15. A positively charged 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 filterate 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 / Compound	Zinc	Magnesium	Copper
(a)	Zinc oxide			
(b)	Magnesium oxide			
(c)	Copper oxide			

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

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

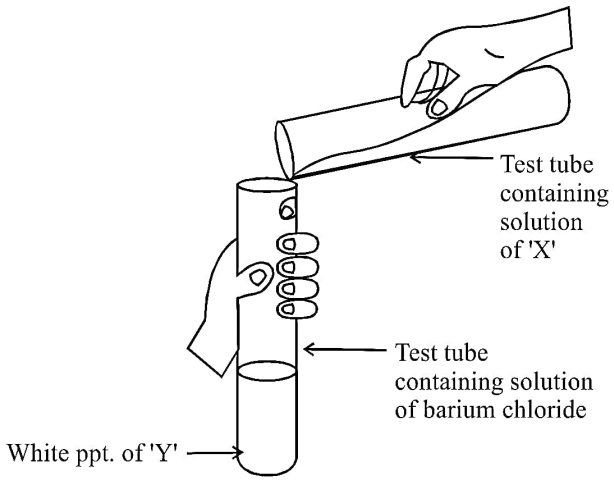
A metal wire has diameter of 0.25 mm and electrical resistivity of 0.8×10^{-8} Ωm. What will be the length of this wire to make its resistance 5 Ω?

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 labe 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.

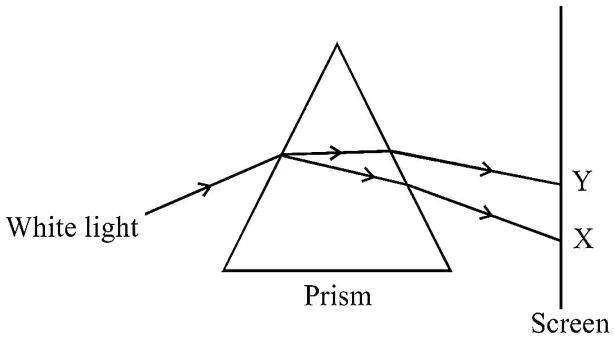
30. It is desired to obtain a virtual and erect image of an object, using a concave mirror of focal length 12 cm.

(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.

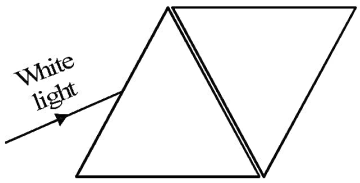
(iii)Why do different colours of white light bend at different angles through a prism?

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.

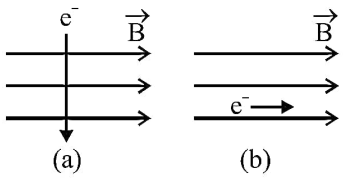
OR

(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?

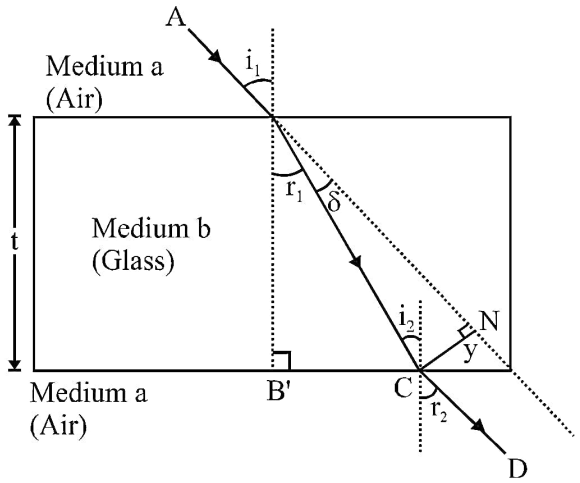
(b) What are the various steps that are involved in urine formation?

(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

$$n_{ba} = \frac{\sin i_1}{\sin r_1} \qquad \text{.....(1)}$$

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

$$n_{ab} = \frac{\sin i_2}{\sin r_2} \qquad \text{.....(2)}$$

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 $n_{ba} = \frac{1}{n_{ab}}$

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

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

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

(a) What can you conclude regarding incident and emergent ray from the phenomenon discussed above?

(b) Write the another name for the 'law of refraction' expressed by equation (1) in paragraph.

(c) 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

(c) Does the lateral shift between emergent and incident rays depend on the thickness of glass slab? If a light ray of 5700 Å 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.)