No. of Printed Pages : 13 Roll No. .....12.....

FAS(D)/Science(086)/X/Half Yearly Examination/2024-25

Time : 3 hrs.] **[M.M. : 80**

General Instructions

- *Read and answer all the questions carefully.*
- *All questions are compulsory.*
- *Question Paper comprises of three sections: Physics, Chemistry, Biology.*
- *Internal choices have been provided.*
- *Marks allotted are mentioned against each question/part.*

PHYSICS

Select and write the most appropriate option out of the four options given for each of the questions no. 1 and 2. (2×1 = 2 marks)

1. The image formed by a concave mirror of focal length 50 cm is real and of magnification - 1. In this case, the distance between the object from its own image is:

   (a) 50 cm (b) 100 cm

   (c) 200 cm (d) Zero (1)

2. The clear sky appears blue because

   (a) Violet and blue light get scattered more than the light of all the other colours by the atmosphere.

   (b) Blue light gets absorbed in the atmosphere.

   (c) Light of all other colours scattered more than the violet and blue colour lights by the atmosphere.

   (d) The ultraviolet radiations are absorbed in the atmosphere. (1)

For question number 3, two statements are given - one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true

3. Assertion (A): The mirrors used in search lights are concave.
Reason (R): In concave mirror, the image formed is always virtual. (1)

4. Explain, why do stars twinkle?

OR

Name the muscles present in the human eye which enables it to focus on objects at varied distances (i.e., distant as well as nearby objects). Explain how it happens. (2)

5. Identify the lens/mirror 'A','B','C','D' in following cases, when the image formed is virtual and erect in each case.

(i) Object is placed between 'A' and its focus, the image formed is enlarged and behind it.

(ii) Object is placed between the focus and 'B', the image formed is enlarged and on the same side as that of the object.

(iii) Object is placed between 'C' and its infinity, the image formed is diminished and between focus and optical centre on the same side as that of the object.

(iv) Object is placed between 'D' and infinity, the image formed is diminished and between pole and focus behind it. (2)

6. (a) What is meant by the power of a lens? Write its S.I unit.

(b) A student uses a lens of focal length 40 cm and another of -20 cm. Write the nature and the power of each lens. (3)

7. A person is unable to see objects distinctly placed within 50 cm from his eyes.

(a) Name the defect of vision the person is suffering from and also mention the type of the lens used by him for its correction.

(b) List two possible causes for this defect.

(c) Draw a ray diagram for the correction of the defect in the above case. (3)

8. (a) State Snell's law of refraction. If the speed of light in vacuum is 3×10^8 m/s, find the absolute refractive index of a medium in which light travels with a speed of 1.5×10^8 m/s.

(b) What will happen to a ray of light when it falls normally on a surface of glass? (3)

9. (i) A security mirror used in a big showroom has a radius of curvature 5 m. If a customer is standing 20 m from the cash counter, find the position and nature of the image formed in the security mirror.

(ii) Malti visited a dentist in his clinic. She observed that the dentist was holding an instrument fitted with a mirror. State the nature of this mirror and reason for its use in the instrument used by the dentist.

OR

9. (i) Define Principal focus of a convex lens.

(ii) An object 4 cm high is placed 30 cm in front of a convex lens of focal length 20 cm. Find nature, size and the position of the image formed. (5)

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

10. When a ray of light incident on a prism it will split in seven colours that is called dispersion of light. A prism is a transparent refracting body bounded by plane faces which are inclined to each other at a particular angle called angle of prism. When a ray of light passes through a prism, it suffers refraction twice and hence the ray deviates through a certain angle from its original path. The angle between the incident ray and emergent ray is called angle of deviation.

(a) What is the cause of dispersion of white light through a glass prism? (1)

(b) How will you use two identical prisms so that a narrow beam of white light incident on one prism emerges out of the second prism as white light? (1)

(c) Draw a ray diagram to show the formation of rainbow in the sky. Mark on the diagram three points A, B and C as given below: A – where dispersion of light occurs. B – where internal reflection of dispersed light occurs. C – where refraction of dispersed light occurs. (2)

OR

(c) Draw a labelled ray diagram to show the path of a narrow beam of white light through a glass prism. (2)

CHEMISTRY

Select and write the most appropriate option out of the four options given for each of the questions no. 1 to 7. (7×1 = 7 marks)

1. When lead nitrate powder is heated in a boiling tube, three substances are produced. These three substances are: (1)

(a) PbO, NO and O_2 (b) PbO_2, NO and NO_2

(c) PbO, NO_2 and O_2 (d) PbO_2, NO_2 and O_2

2. A few drops of turmeric solution are added to a colourless liquid. If the liquid becomes red, the liquid may be: (1)

(a) Hydrochloric acid (b) Distilled water

(c) Ammonium hydroxide (d) Lemon juice

3. The ratio of water molecule in Plaster of Paris and gypsum is: (1)

(a) 3:1 (b) 1:4

(c) 1:3 (d) 4:3

4. When aqueous solutions of barium chloride and sodium sulphate react together, an insoluble substance along with aqueous solution of sodium chloride is formed. This reaction is an example of a: (1)

(a) Combination reaction (b) Decomposition reaction

(c) Displacement reaction (d) Double displacement reaction

5. Select the correct statement from the following about the reaction : (1)

$CuO + H_2 \rightarrow Cu + H_2O$

(a) CuO is getting oxidised and H_2 is getting reduced.

(b) H_2 is getting oxidised and CuO is getting reduced.

(c) CuO is a reducing agent.

(d) H_2 is an oxidising agent.

6. Reaction between X and Y forms compound Z. X loses electron and Y gains electron. Which of the following properties is not shown by Z ? (1)

(a) Has high melting point

(b) Has low melting point

(c) Conducts electricity in molten state

(d) Occurs as solid

7. The metals that float when treated with water are: (1)

(a) Manganese and magnesium (b) Sodium and calcium

(c) Magnesium and sodium (d) Magnesium and calcium

For question number 8, two statements are given - one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true

8. Assertion (A): In the electrolysis of water, the volume of hydrogen liberated is twice the volume of oxygen formed.

Reason (R): Water (H_2O) has hydrogen and oxygen in the ratio of 1:2 by volume. (1)

9. (a) When potassium iodide solution is added to a solution of lead (II) nitrate in a test tube, a precipitate is formed. List two types of reactions in which this reaction can be placed.

(b) Divyansha kept a sample of a white powder in a china dish under sunlight. After some time, she found that the white powder had turned grey. Identify the white and grey powders. (2)

10. A chemical compound which is obtained from baking soda is used in glass, soap and paper industries. Identify the compound. How is this compound obtained in its crystalline form? State whether this compound is acidic/ basic/ neutral in nature. Justify your answer. (3)

11. A magnesium ribbon is burnt in oxygen to give a white compound X accompanied by emission of light. If the burning ribbon is now placed in an atmosphere of nitrogen, it continues to burn and forms a compound Y.

(i) Write the chemical formulae of X and Y.

(ii) Write a balanced chemical equation, when X is dissolved in water.

OR

Complete the missing components/variables given as x and y in the following reactions:

(i) $Cu(s) + x\,AgNO_3\,(aq) \rightarrow Cu(NO_3)_2\,(aq) + y(s)$

(ii) $Zn(s) + H_2SO_4\,(aq) \rightarrow ZnSO_4\,(x) + H_2\,(y)$

(iii) $CaCO_3(s) \xrightarrow{X} CaO\,(y) + CO_2\,(g)$ (3)

12. (A) (a) What is observed when carbon dioxide gas is passed through lime water

(i) for a short duration?

(ii) for a long duration?

Write the chemical equations for the reactions involved.

(b) During electrolysis of brine, a gas 'G' is liberated at anode. When this gas 'G' is passed through slaked lime, a compound 'C' is formed, which is used for disinfecting drinking water.

(i) Write the formulas of 'G' and 'C'.

(ii) State the chemical equations involved.

(iii) What is the common name of compound 'C'? Give its chemical name. (5)

OR

12. (B) Answer the following questions:

(a) Define alkali and give an example.

(b) Why does 1 M HCl solution have a higher concentration of H^+ ions than 1 M CH_3COOH solution?

(c) Arrange the following in an increasing order of their pH values: NaOH solution, Blood, Lemon juice, Milk of magnesia and gastric juice.

(d) Name the acid present in – tomato and nettle sting.

(e) Why is tartaric acid a component of baking powder used in making cakes? (5)

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

13. The chemical reactivity of an element depends upon its electronic configuration. All elements having less than eight electrons in the outermost shell show chemical reactivity. During chemical reactions, atoms of all elements tend to achieve a completely filled valence shell and achieve the nearest noble gas configuration. The compounds formed by the transfer of electrons from one element to another are known as ionic or electrovalent compounds.

(a) The electronic configurations of three elements X, Y and Z are:

X : 2 Y: 2, 8, 7 Z : 2, 8, 2

Identify the metal from these elements. Give reason for your choice. (1)

(b) What will be the number of valence electrons in Cl^- ion? (1)

(c) In what state does sodium chloride conduct electricity and why?

OR

(c) Write the electron-dot structures for sodium, oxygen and show the formation of Na_2O. (2)

BIOLOGY

Select and write the most appropriate option out of the four options given for each of the questions no. 1 to 7. (7×1 = 7 marks)

1. Which of the following statements about the transmission of nerve impulse is incorrect? (1)

(a) Nerve impulse travels from the dendritic end towards the axonal end.

(b) At the dendritic end, electrical impulses bring about the release of some chemicals, which generate an electrical impulse at the axonal end of another neuron.

(c) The chemicals released from the axonal end of one neuron cross the synapse and generate a similar electrical impulse in a dendrite of another neuron.

(d) A neuron transmits electrical impulses not only to another neuron but also to muscle and gland cells.

2. How do fungi obtain its nutrition ? (1)

(a) By eating the bread on which it is growing

(b) By using nutrients from the bread to prepare their own food

(c) By breaking down the nutrients of bread and then absorbing them

(d) By allowing other organisms to grow on the bread and then consuming them.

3. When the materials like sucrose are transferred to phloem tissue, the osmotic pressure of the tissue ..... leading to ..... of water into/from it. (1)

(a) Increases, entry (b) Decreases, entry

(c) Increases, exit (d) Decreases, exit

4. Choose the correct statement that describes arteries: (1)

(a) They have thick elastic walls, blood flows under high pressure; collect blood from different organs and bring it back to the heart

(b) They have thin walls with valves inside, blood flows under low pressure and carry blood away from the heart to various organs of the body

(c) They have thick elastic walls, blood flows under low pressure; carry blood from the heart to various organs of the body

(d) They have thick elastic walls without valves inside. The blood flows under high pressure and carry blood away from the heart to different parts of the body

5. Patient X was suffering from a pancreatic condition due to which the pancreas was not functioning adequately. (1)

Which of the following is a doctor likely to suggest to such an individual?

(a) including large amount of protein in the diet

(b) eating a diet with low fat content

(c) Eating only carbohydrates

(d) Including only liquid diets

6. Rajesh noticed that a potted plant kept in the window of his room shows bending towards sunlight. This could be due to: (1)

(a) More growth in the well-lit region due to diffusion of auxin hormone

(b) More growth in the region away from light due to diffusion of auxin hormone

(c) More growth in the well-lit region due to diffusion of Cytokinin hormone

(d) More growth in the region away from light due to diffusion of Cytokinin hormone

7. A plant gets rid of excess water through transpiration. What is the method used by plants to get rid of solid waste products? (1)

(a) Shortening of stem (b) by respiration

(c) Shedding of yellow leaves (d) Expansion of roots into the soil

For questions number 8 and 9, two statements are given - one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true

8. Assertion (A): The movement of water and dissolved salts in xylem is always upwards.

Reason (R): The upward movement of water is due to low pressure created by transpiration. (1)

9. Assertion (A): A receptor is a specialized group of cells in a sense organ that perceive a particular type of stimulus. (1)

Reason (R): Different sense organs have different receptors for detecting stimuli

10. How does lymph drain excess fluid from extracellular space back into the blood? (2)

11. You have touched a hot object. Represent diagrammatically the path that leads to a response, i.e., quickly pulling back the hand.

OR

11. Answer the following questions-

i) Name the endocrine gland associated with the brain.

ii) Which gland secretes the digestive enzymes as well as hormones?

iii) Name the endocrine glands associated with the kidney.

iv) Which endocrine gland is present in males but not in females? (2)

12. There is a potted plant in your drawing room, after a few days you notice that plant has bent to one side. What could be the reason? How has this movement been coordinated? (2)

13. (a) An old man is advised by his doctor to take less sugar in his diet. Name the disease from which the man is suffering. Mention the hormone due to imbalance of which he is suffering from this disease.

(b) A squirrel is in a scary situation. Its body has to prepare for either fighting or running away. State the immediate changes that take place in its body so that the squirrel is able to either fight or run. (3)

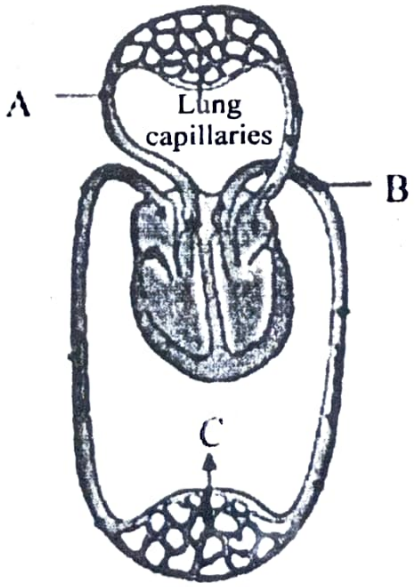
14. (a) Draw a neat diagram of a human excretory system and label the following –

(i) the part where urine is formed

(ii) the part where urine is stored

(b) How is the amount of urine produced regulated? (3)

15. (i) Study the diagram below showing schematic representation of transport and exchange of gases in human heart and name the parts labelled as A, B and C and mention the function of each part.



(ii) Why don't veins need thick walls as compared to arteries?

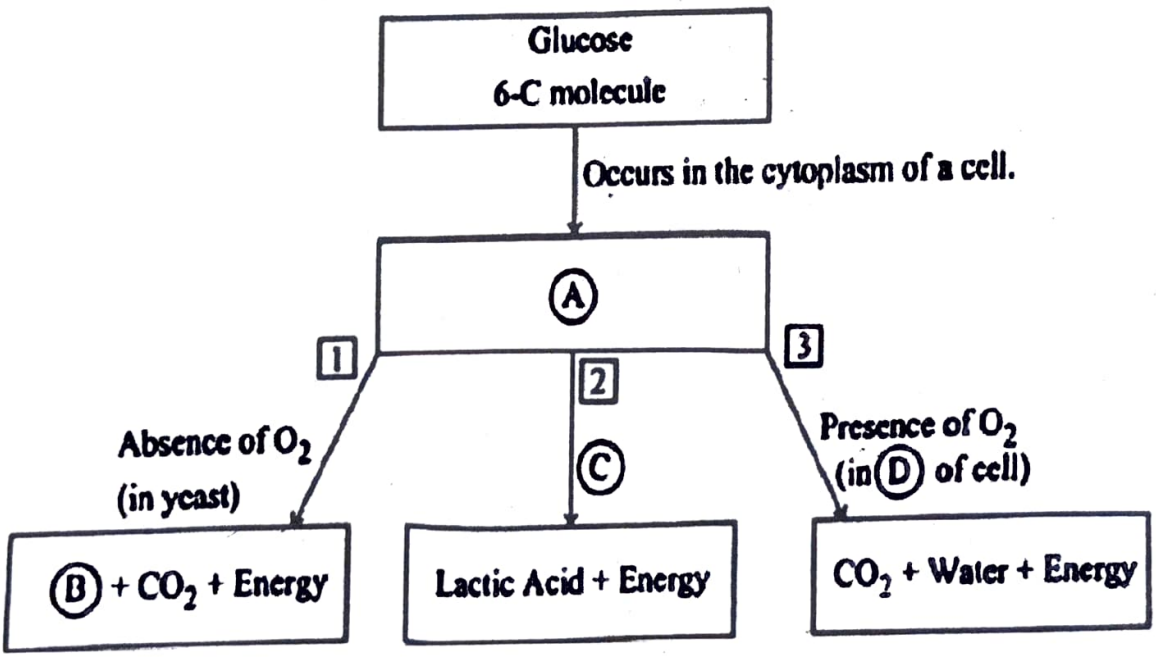
(iii) What is the advantage of separation of oxygenated and deoxygenated blood in the human heart? (5)

OR

15. Study the following flow chart showing the breakdown of glucose by various pathways.

In this flowchart, in four blocks some blanks are given as ————

Ⓐ, Ⓑ, Ⓒ and Ⓓ.



(i) Write the names of A, B. C & D

(ii) During the breathing cycle, when air is taken in and let out, the lungs always contain a residual volume. Why?

(iii) Why do athletes sometimes suffer from muscle cramps during running?

(iv) Give a reason why the rate of breathing is faster in aquatic organisms than in terrestrial organisms? (5)

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

16. In animals the control and coordination is provided by nervous and muscular tissues. Nervous tissue is made of an organized network of nerve cells or neurons. In human beings, thinking is a complex activity which involves more complex mechanisms and neural connections. These are concentrated in the brain which is the main coordinating centre of the human body. The brain and spinal cord constitute the Central Nervous System which receives information from all parts of the body and integrates it.

(a) How is the spinal cord protected from shocks and injuries? (1)

(b) How are involuntary actions and reflex actions different from each other? (1)

(c) Given below are some disorders noticed in some patients. It could be due to malfunctioning of which part of brain:

(i) Loss of sensation of feeling full

(ii) Lowered ability to salivate.

(iii) Not able to maintain posture of the body

(iv) Having faster breathing rate

OR

(c) How does the central nervous system communicate with other parts of the body to carry out various activities? Name two components of this system. (2)