विद्या सर्वार्थ साधिका

ANANDALAYA

PERIODIC TEST - 2

Class : X

Subject: Science (086) MM : 80

Date : 25-09-2023 Time: 3 hours

General Instructions:

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

SECTION A

1. A metal powder was added to dil. HCl and dil. NaOH solutions, taken in separate test tubes. On mixing, the contents react in both the test tubes. Hydrogen gas was formed in both the cases. The metal used will be: (1)
(A) Cu (B) Zn (C) Fe (D) Pb

2. Four solutions I, II III and IV were given to a student to test their acidic or basic nature by using pH papers. She observed that the colour of pH paper turned to red, blue, green and orange respectively when dipped in the four solutions. The correct conclusion made by the student would be: (1)
(A) I, II and III are acidic. (B) I and IV are acidic.
(C) II, III, and IV are acidic. (D) II and IV are acidic.

3. A dilute ferrous sulphate solution was gradually added to the beaker containing acidified permanganate solution. The light purple colour of the solution fades and finally disappears. Which of the following is the correct explanation for the observation? (1)
(A) $KMnO_4$ is an oxidising agent, it oxidises $FeSO_4$
(B) $FeSO_4$ acts as an oxidising agent and oxidized $KMnO_4$
(C) The colour disappears due to dilution; no reaction is involved
(D) $KMnO_4$ is an unstable compound and decomposes in presence of $FeSO_4$ to a colourless compound.

4. Solid calcium oxide reacts vigorously with water to form calcium hydroxide accompanied by liberation of heat. This process is called slaking of lime. Calcium hydroxide dissolves in water to form its solution called lime water. Which among the following is (are) true about slaking of lime and the solution formed? (1)
(i) It is an endothermic reaction
(ii) It is an exothermic reaction
(iii) The pH of the resulting solution will be more than seven
(iv) The pH of the resulting solution will be less than seven
(A) (i) and (ii) (B) (ii) and (iii) (C) (i) and (iv) (D) (iii) and (iv)

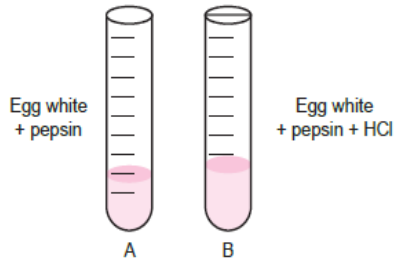
5. Which of the following chemical equations is an unbalanced one? (1)
(A) $2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$
(B) $2C_4H_{10} + 12O_2 \rightarrow 8CO_2 + 10\ H_2O$
(C) $2Al + 6H_2O \rightarrow 2Al(OH)_3 + 3H_2$
(D) $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

6. Three beakers labelled as A, B and C each containing 25 mL of water were taken. A small amount of NaOH, anhydrous $CuSO_4$ and NaCl were added to the beakers A, B and C respectively. It was observed that there was an increase in the temperature of the solutions contained in beakers A and B, whereas in case of beaker C, there was a decrease in temperature. Which one of the following statement(s) is(are) correct? (1)
(i) In beakers A and B, an exothermic process has occurred.
(ii) In beakers A and B, an endothermic process has occurred.
(iii) In beaker C exothermic process has occurred.
(iv) In beaker C endothermic process has occurred
(A) (i) only (B) (ii) only (C) (i) and (iv) (D) (ii) and (iii)

7. Which of the following is(are) true when HCl (g) is passed through water? (1)
(i) It does not ionise in the solution as it is a covalent compound.
(ii) It ionises in the solution
(iii) It gives both hydrogen and hydroxyl ion in the solution
(iv) It forms hydronium ion in the solution due to the combination of hydrogen ion with water molecule
(A) (i) only (B) (iii) only (C) (ii) and (iv) (D) (iii) and (iv)

8. Choose the correct path of urine in the excretory system of our body. (1)
(A) Kidney → ureter → urethra →urinary bladder
(B) Kidney → urinary bladder →urethra →ureter
(C) Kidney → ureter → urinary bladder →urethra
(D) Urinary bladder → kidney →ureter →urethra

9. A student sets up an experiment to study the role of enzymes in digestion of food. (1)



In which test tube, the digestion of protein will occur?
(A) Test tubes A as pepsin will breakdown protein into simple molecules.
(B) Test tube B as HCl will breakdown protein into simple molecules.
(C) Test tube A as pepsin will breakdown into simple molecules.
(D) Test tube B as HCl will activate pepsin for breakdown of protein into simple molecules.

10. The opening and closing of the stomatal pore depends upon _____. (1)
(A) oxygen (B) temperature
(C) water in guard cells (D) concentration of CO_2 in stomata

11. Among the following choose the correct option which includes the organisms that have a holozoic mode of nutrition: (1)
(A) Plasmodium and Amoeba (B) Parakeet and Amoeba
(C) Paramecium and Plasmodium (D) Paramecium and Tapeworm

12. In a synapse chemical signal is transmitted from _____. (1)
(A) from dendrite of one neuron to axonal end of other neuron
(B) axon to cell body of same neuron
(C) cell body to axonal end of same neuron
(D) axonal end of one neuron to dendrite of another neuron

13. The growth of tendrils in pea plant is due to _____. (1)
(A) effect of gravity
(B) effect of chemicals
(C) rapid cell division in cells of tendril that are away from support
(D) rapid cell division in cells of tendril in contact with support

14. In humans life processes are regulated and controlled by _____. (1)
(A) reproductive and endocrine system (B) respiratory and nervous system
(C) digestive and respiratory system (D) endocrine and nervous system

15. For a real object, which of the following can produce a real image? (1)
(A) Plane mirror (B) Concave mirror (C) Concave lens (D) Convex mirror

16. A person cannot see distinctly objects kept beyond 2 m. This defect can be corrected by using a lens of power _____. (1)
(A) + 0.5 D (B) – 0.5 D (C) + 0.2 D (D) – 0.2 D

For question numbers 17 to 20, two statements are given-one labelled Assertion and the other labelled Reason. Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.
(A) Both Assertion and Reason are true and Reason is the correct explanation of Assertion
(B) Both Assertion and Reason are true but Reason is NOT the correct explanation of Assertion.
(C) Assertion is true but Reason is false
(D) Assertion is false and Reason is also false.

17. Assertion: Myopia is the defect of vision in which a person cannot see distant objects clearly. (1)
Reason: This is due to eye-ball being too small.

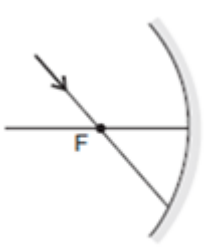
18. Assertion: A reaction in which a substance is decomposed into two or more substances is known as decomposition reaction.
Reason: The decomposition of a substance is impossible without supply of energy.

19. Assertion: The inner lining of the human small intestine contains numerous villi.
Reason: Villi increase the surface area for digestion.

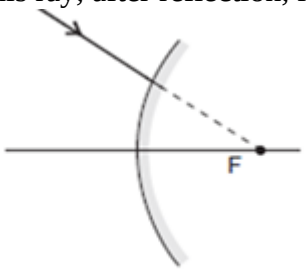
20. Assertion: The brain is also known as central nervous system.
Reason: Central nervous system controls and regulates the voluntary actions.

SECTION B

21. Draw the following diagram in which a ray of light is incident on a concave/convex mirror on your answer sheet. Show the path of this ray, after reflection, in each case. (2)



(a)

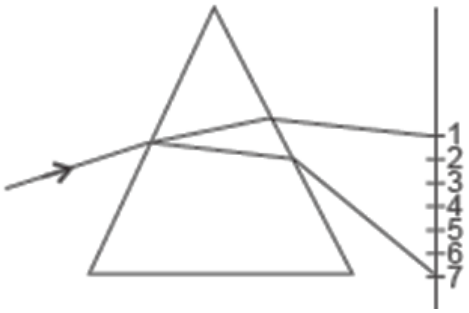


(b)

22. (a) Why do stars twinkle? (2)
(b) Why does the sky appear dark instead of blue to an astronaut?

OR

A beam of white light falling on a glass prism gets split up into seven colours marked 1 to 7 as shown in the diagram. A student makes the following statements about the spectrum observed on the screen.



(a) The colours at positions marked 3 and 5 are similar to the colour of the sky and the colour of gold metal respectively. Is the above statement made by the student correct or incorrect? Justify.
(b) Which position corresponds closely to the colour of 'Brinjal'?

23. A solution of potassium chloride when mixed with silver nitrate solution, an insoluble white substance is formed. Write the chemical reaction involved and also mention the type of the chemical reaction? (2)

24. A student performs an experiment using a Balsam plant with intact stem, leaves, roots and flowers. The plant was kept in a test tube containing saffranine stain. The student kept the plant undisturbed in the lab. After 2-3 hours, a transverse section of stem was obtained and studied under microscope. The studies reveal the presence of pink colour in some of the plant tissue. (2)
(a) Name the tissue that appeared pink in colour under the microscope.
(b) What does this observation explain?

25. How are the alveoli of human lungs designed to maximise the exchange of gases? (2)

26. Identify the part of hind brain that controls and co-ordinates the following activities: (2)
(a) riding a bicycle (b) body balance (c) salivation (d) blood pressure

SECTION C

27. Write the balanced chemical equations for the following reactions and identify the type of reaction in each case. (3)
(a) Thermite reaction, iron (III) oxide reacts with aluminium and gives molten iron and aluminium oxide.
(b) Magnesium ribbon is burnt in an atmosphere of nitrogen gas to form solid magnesium nitride.
(c) Chlorine gas is passed in an aqueous potassium iodide solution to form potassium chloride solution and solid iodine.

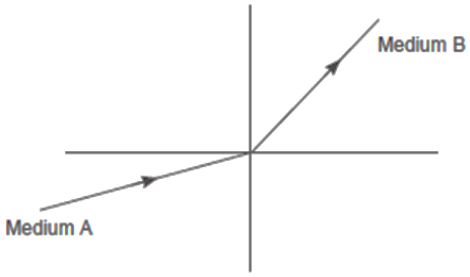
28. For making cake, baking powder is taken. If at home your mother uses baking soda instead of baking powder in cake, (3)
(a) how will it affect the taste of the cake and why?
(b) how can baking soda be converted into baking powder?
(c) what is the role of tartaric acid added to baking soda?

OR

A metal carbonate X on reacting with an acid gives a gas which when passed through a solution Y gives the carbonate back. On the other hand, a gas G that is obtained at anode during electrolysis of brine is passed on dry Y, it gives a compound Z, used for disinfecting drinking water. Identity X, Y, G and Z

29. (a) An object is held at the principal focus of a concave lens of focal length f. Where will the image be formed? (3)

(b) A light ray enters from medium A to medium B as shown in figure. The refractive index of medium B relative to A will be _____ (greater than / less than / equal to) unity.

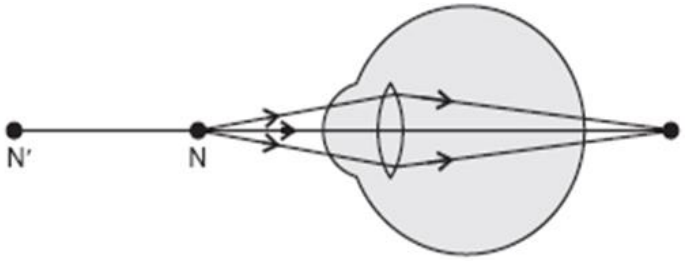


(c) A girl was playing with a thin beam of light from her laser torch by directing it from different directions on a convex lens held vertically. She was surprised to see that in a particular direction the beam of light continues to move along the same direction after passing through the lens. State the reason for this observation.

30. (a) Write one use each for concave mirror, convex mirror, convex lens and concave lens. (3)

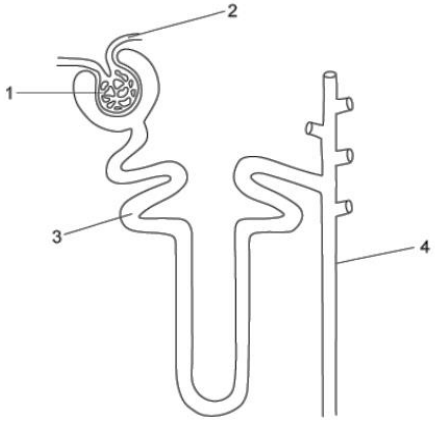
(b) Draw a ray diagram for any one of the above uses.

31. Study the diagram given below and answer the questions that follow it. (3)



(a) Identify the defect of vision. Give reason for your answer.
(b) State two possible causes of this defect.
(c) Draw a ray diagram to show how it is rectified.

32. Observe the figure of the nephron and the parts labelled carefully to answer the questions given below: (3)



(a) Where does ultra-filtration occur in nephron?
(b) List the substances that are selectively re-absorbed from the initial filtrate by the part labelled as 3.
(c) Among the parts labelled 1 to 4 in the figure, which is not the part of a nephron? Why?

33. Write scientific reasons for the following statements: (3)
(a) It is important for us to have iodised salt in our diet.
(b) In human population, some people are found to be very short (dwarfs).
(c) Endocrine glands are called as ductless glands.

SECTION D

34. A remarkable property of acids is that they can “dissolve" metals. When metals are added to an acid, they disintegrate and disappear into the acid. (5)
(a) State one other common observation when metals “dissolve” in acids. Explain the reason for this observation.
(b) If the acid with the ‘dissolved' metal is evaporated, can we get the metal back? why or why not?
(c) In this question, the word ‘dissolve” is used within quotes. This is because it is not actually an example of dissolving. what is the main difference between a metal “dissolving’ in an acid and sugar dissolving in water

OR

Compounds such as alcohols and glucose also contain hydrogen but are not categorised as acids. Describe an activity with a neat labelled diagram to prove it.

35. A 6 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 15 cm. The distance of the object from the lens is 10 cm. (5)
(a) Draw a ray diagram to show the image formation.
(b) Find the position, size and nature of the image formed, using the lens formula.

OR

(a) What is meant by the power of a lens? Define its S.I. unit.
(b) You have two lenses A and B of focal lengths +10 cm and –10 cm respectively. State the nature and power of each lens.
(c) Which of the two lenses will form a virtual and magnified image of an object placed 8 cm from the lens? Draw a ray diagram to justify your answer.

36. (a) A cheetah, on seeing a prey moves towards him at a very high speed. What causes the movement of his muscles? How does the chemical events of cellular components of muscles change during this event? (5)
(b) Asma’s father is advised by his doctor to include less sugar food items in his diet.
i) Name the disease diagnosed by the doctor.
ii) Mention the hormone due to imbalance of which he is suffering from this disease.
iii) Which endocrine gland secretes this hormone? Write the location of this gland.

OR

(a) What is reflex action and reflex arc?
(b) Explain the sequence of events which occur in our body when a bright light is focussed on our eyes.

SECTION E

Questions 37 to 39 are Source-based/Case study based questions of 4 marks with sub-parts.

37. The interplay of light with objects around us gives rise to several spectacular phenomena in nature. The path of a beam of light passing through a true solution is not visible. However, its path becomes visible through a colloidal solution where the size of the particles is relatively larger. The earth’s atmosphere is a heterogeneous mixture of minute particles. These particles include smoke, tiny water droplets, suspended particles of dust and molecules of air. When a beam of light strikes such fine particles, the path of the beam becomes visible. The light reaches us, after being reflected diffusely by these particles.
Lord Rayleigh studied elastic scattering and established that intensity of scattered light varies

inversely as the fourth power of wavelength of incident light. The condition for Rayleigh scattering to be valid is that the size of scatterer must be less than the wavelength of light.

(i) The essential condition for Rayleigh scattering is that the size of the scatterer must be _____. (1)

(A) much larger than the wavelength (B) much smaller than the wavelength
(C) equal to wavelength (D) not related to the wavelength

(ii) In Rayleigh scattering intensity of scattered light is proportional to nth power of the wavelength, where n is _____. (1)

(A) 6 (B) 4 (C) -6 (D) -4

(iii) Scattering of light amounts to _____ (1)

(A) blue colour of the sky (B) white colour of clouds
(C) red hues of sunrise or sunset (D) all of the above

(iv) Danger signals are red. This is because _____ (1)

(A) red colour has shortest wavelength
(B) red colour scattered least
(C) red colour can bring strong emotions
(D) intensity of scattered red colour is less than that of scattered blue colour

38. The rusting of iron and the function of batteries both involve a particular type of chemical reaction called an oxidation – reduction reaction or redox reaction. In a redox reaction, electrons are transferred from one substance to another. When iron rusts, electrons transfer from iron atoms, which hold electrons loosely, to oxygen atoms, which hold them tightly. The oxidized iron atoms (iron atoms that lost electrons) bond with the reduced oxygen atoms (oxygen atoms that gained electrons) to form iron oxide or rust. As we will see, the overall chemical reaction that explains rusting also involves water. Consequently, rust is prevented if iron is kept dry. Rusting also requires the conduction of electrical charge. Consequently, rust is accelerated in the presence of salt water, a good electrical conductor. Substances such as elemental oxygen or chlorine, which tend to gain electrons easily, are called oxidising agents; they cause the oxidation of other substances while they are themselves reduced. Similarly, substances like elemental sodium or potassium, which tend to lose electrons easily, are called reducing agents; they cause the reduction of other substances while they are themselves oxidized. New cars have brilliant, shiny paint. Over time, however, new paint often fades and loses its shine. The dulling of paint is caused, at least in part, by the oxidation of molecules within the paint by atmospheric oxygen. The dulling of paint can be prevented by the periodic application of wax to the paint. Automobiles that are regularly waxed may keep their new car shine for many years.

(i) Which of the following is a redox reaction? (1)

(A) $CaCO_3 \rightarrow CaO + CO_2$ (B) $H_2 + Cl_2 \rightarrow 2HCl$
(C) $CaO + 2HCl \rightarrow CaCl_2 + H_2O$ (D) $NaOH + HCl \rightarrow NaCl + H_2O$

(ii) For the following redox reaction, identify the element being oxidized and that being reduced: $2NO + 5H_2 \rightarrow 2NH_3 + 2H_2O$ (1)

(iii) Identify the oxidizing and reducing agents in the following reaction: (2)

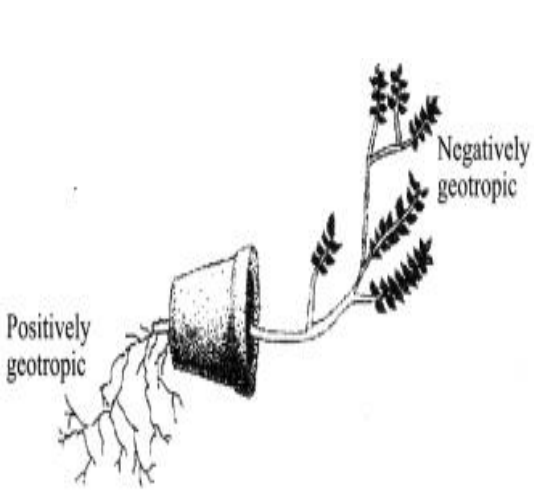
(a) $V_2O_5 + 2H_2 \rightarrow V_2O_3 + 2H_2O$
(b) $2K + Cl_2 \rightarrow 2KCl$

OR

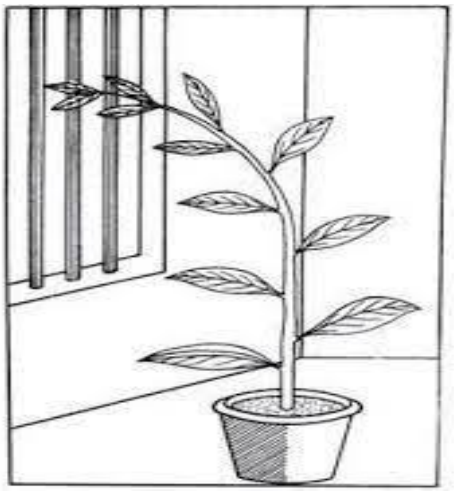
(**iii**) Why does wax prevent oxidation of paint? Can you give a molecular reason for this?

39. Movement is a characteristic of living beings. Animals show perceptible movement. They always move to fulfil their basic necessities like food, shelter and clothing. However, the movement in plants may or may not be perceptible. In higher animals, the plant organs like branches, leaves or flowers show movement. All parts of the plants are sensitive to stimuli. Specialized regions called receptive regions receive the stimulus and transmit it to the regions where responsive movements are effected. Sometimes, movements may take place spontaneously without the effect of external stimuli. Plants exhibit various types of movements. The figures A and B illustrate the some of the plant movements.

(i) Which figure A or B demonstrates the phenomenon of phototropism? (1)



A



B

(ii) Name the plant hormone which is responsible for phototropism. Where is this plant hormone secreted in plants? (1)

(**iii**) Explain how the movement of leaves of a sensitive plant is different from movement of shoots towards light? (2)

OR

(**iii**) Which is the plant hormone that inhibits growth? Write one example for Chemotropism.