विद्या सर्वार्थ साधिका

ANANDALAYA
PRE-BOARD EXAMINATION
Class: X

Subject: Science (086) MM: 80
Date : 19-01-2024 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 Answer type 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. Iron filings were added to a solution of copper sulphate. After 10 minutes, it was observed that the blue colour of the solution has changed and a layer has deposited on iron filings. Which one of the following set of colours correspond to the colour of the solution and the colour of the coating respectively? (1)
   (A) Yellow and green. (B) Brown and blue.
   (C) Red and greenish blue. (D) Light green and reddish brown

2. A solution of sodium carbonate is prepared by dissolving 1 gram of it in 10 ml of distilled water. To this solution is added a strip of blue litmus paper 'A' and strip of red litmus paper 'B'. The colour of strips 'A' and 'B' will be _____. (1)
   (A) blue in both cases (B) red in both cases
   (C) red in case of A and blue in case of B. (D) blue in case of A and red in case of B.

3. A student studying the chemical properties of metals finds incomplete chemical reactions in his book, as shown below. (1)

   $MgO + HNO_3 \rightarrow$

   Which option completes the reaction?
   (A) $MgO + HNO_3 \rightarrow Mg_3N_2 + 4H_2O$ (B) $MgO + HNO_3 \rightarrow Mg + NO_2 + O2$
   (C) $MgO + HNO_3 \rightarrow Mg(OH)_2 + 2NO_2$ (D) $MgO + HNO_3 \rightarrow Mg(NO_3)_2 + H_2O$

4. Which of the following oxide(s) of iron would be obtained on prolonged reaction of iron with steam? (1)
   (A) FeO (B) Fe_2O_3 (C) Fe_3O_4 (D) Fe_2O_3 and Fe_2O_4

5. The highly reactive metals like Sodium, Potassium, Magnesium, etc. are extracted by the _____. (1)
   (A) electrolysis of their molten chloride (B) electrolysis of their molten oxides
   (C) reduction by aluminium (D) reduction by carbon

6. Oils on treating with hydrogen in the presence of palladium or nickel catalyst form fats. This is an example of _____. (1)
   (A) Addition reaction (B) Substitution reaction
   (C) Displacement reaction (D) Oxidation reaction

7. Ethanol reacts with sodium and forms two products. These are: (1)
(A) sodium ethanoate and hydrogen (B) sodium ethanoate and oxygen
(C) sodium ethoxide and hydrogen (D) sodium ethoxide and oxygen

8. Select from the following the correct statement that describes the action of saliva on food: (1)
(A) Starch is broken down into simple sugars.
(B) Proteins are broken down into amino acids.
(C) Absorption of vitamins.
(D) Fats is broken down into fatty acids and glycerol.

9. The type of neuron that carries impulses from sensory receptors to the central nervous system is _____. (1)
(A) Sensory neuron (B) Motor neuron (C) Relay neuron (D) Mixed Neuron

10. Select a plant from the following which undergo vegetative propagation: (1)
(A) Banana (B) Sweet Potato (C) Mustard (D) Gram

11. A particular plant hormone promotes wilting of leaves. Which one of them is it? (1)
(A) Auxin (B) Abscisic acid (C) Cytokinin (D) Gibberellins

12. Lizards, snakes, birds and insects excrete mostly uric acid but crocodiles and alligators excrete only ammonia though they are reptiles. (1)
The scientific reason for the given statement would be that _____.
(A) there is no uniform pattern of removal of nitrogen wastes
(B) aquatic and land animals excrete urea
(C) animals that fly excrete uric acid
(D) nitrogen waste excretion is closely related to the availability of water in the environment

13. If a grasshopper is eaten by frog, then the energy transfer will be from _____. (1)
(A) producer to decomposer
(B) producer to primary consumer
(C) primary consumer to secondary consumer
(D) secondary consumer to primary consumer

14. Which of the following is an example of a biodegradable waste? (1)
(A) Plastic (B) Glass (C) Food waste (D) Styrofoam

15. A circular loop carrying current is lying on a table. If the current is flowing in clockwise direction, what will be the direction of the magnetic field due to this current loop? (1)
(A) North - South direction (B) East - west direction
(C) Upward direction (D) Downward direction

16. The image formed by a concave lens is _____. (1)
(A) always real and inverted (B) always real and erect
(C) always virtual and inverted (D) always virtual and erect

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 (A) : Nichrome is used for making standard resistors. (1)
Reason (R) : Alloys have higher resistivity.

18. Assertion (A): Zinc carbonate is heated strongly in presence of air to form zinc oxide and carbon dioxide. (1)
Reason (R) : Calcination is the process in which a carbonate ore is heated strongly in the absence of air to convert into metal oxide.

19. Assertion (A): Mutation is a sudden change in the genetic material. (1)
Reason (R) : Variation is useful for the survival of species over time.

20. Assertion (A): Ozone depletion leads to global warming. (1)
Reason (R) : CFC causes destruction of the ozone layer.

SECTION B

21. A battery of 9 V is connected in series with resistors of 0.2 Ω, 0.3 Ω, 0.5 Ω and 11 Ω, respectively. (2)
How much current would flow through the 11 Ω resistor?

22. A person cannot see objects beyond 1.2 m distinctly. What is the type of eye defect he has? What should be the type of the corrective lens used to restore proper vision? (2)

OR

Explain why the planets do not twinkle.

23. When a solution of potassium chloride 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. Mendelian monohybrid cross was performed between a pure tall pea plant and a short pea plant. Derive the phenotype and genotype ratio of F_2 generation. (2)

25. (a) A patient suffering from hepatitis was advised by the doctor to take less fats and proteins than carbohydrates. Why? (2)
(b) Write the function of pancreatic trypsin.

26. While designing an artificial ecosystem, write any two things to be kept in mind to convert it into a self-sustaining system. Give reason to justify your answer. (2)

SECTION C

27. The given reaction shows one of the processes to extract the metals like Iron and Manganese. (3)

$$MnO_2\,(s) + Al(s) \rightarrow Mn(l) + Al_2O_3(s) + Heat$$

(a) Give reason why the above reaction is known as a thermite reaction.
(b) Identify the substance oxidised and reduced in the above reaction.
(c) Give a reason why Aluminium is preferably used in thermite reactions.

28. Complete the following reactions and name the main product formed in each case. (3)

(i) $CH_3CH_2OH \xrightarrow{\text{alkalilne } KMnO_4}$

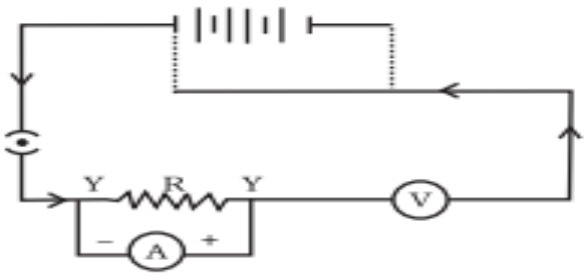
(ii) $CH_3COOC_2H_5 \xrightarrow{NaOH}$

(iii) $CH_4 + Cl_2 \quad CH_4{+}Cl_2 \xrightarrow{\text{Sunlight}}$

29. Draw ray diagrams showing the image formation by a convex mirror when an object is placed (a) at infinity and (b) at finite distance from the mirror. (3)

30. (a) State the law that explains the heating effect of current with respect to the measurable properties in an electrical circuit. (3)
(b) List the factors on which the resistance of a conductor depends

31. (a) A child has drawn the electric circuit to study Ohm's law as shown in Figure. His teacher said that the circuit diagram needs correction. Study the circuit diagram and redraw it after making all corrections. (3)



(b) How does use of a fuse wire protect electrical appliances?

32. "Nervous and hormonal systems together perform the function of control and coordination in human beings." Justify the statement. (3)

33. How is sex determined in human beings? Explain it with a schematic diagram. (3)

SECTION D

34. An organic compound A on heating with Conc. H_2SO_4 forms a compound B which on addition of one mole hydrogen in presence of Nickel forms a compound C. One mole of C on combustion forms 2 moles pf CO_2 and 3 moles of H_2O. Identify the compounds A, B and C and write the equations for the reactions involved. (5)

35. (a) State laws of reflection. What type of mirror is used as a rear-view mirror? (5)
(b) A rear-view on an automobile has a radius of curvature of 3.00 m. If a bus is located at 5.00 m from this mirror, find the position, nature and size of the image.

OR

A student focussed the image of a candle flame on a white screen using a convex lens. He noted down the position of the candle, screen and the lens as under:

Position of candle = 12.0 cm
Position of convex lens = 50.0 cm
Position of the screen = 88.0 cm

(i) What is the focal length of the convex lens?
(ii) Where will the image be formed if he shifts the candle towards the lens at a position of 31.0 cm?
(iii) What will be the nature of the image formed if he further shifts the candle towards the lens?
(iv) Draw a ray diagram to show the formation of the image in case (iii) as said above.

36. (a) Mention the role of the following organs of human male reproductive system: (5)
(i) Testis (ii) Scrotum (iii) Vas deferens (iv) Seminal vesicle
(b) What is placenta? State its function in a human female.

OR

(a) What happens when the egg is not fertilised?
(b) How is sperm genetically different from a human egg or ova?
(c) Explain the functions of ovary and uterus of human female reproductive system.

SECTION E

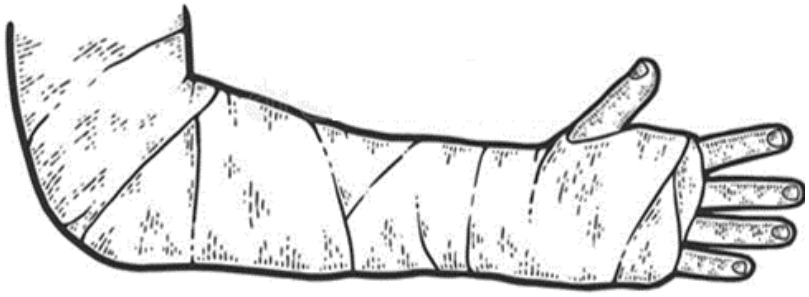
Questions 37 to 39 are Source-based/Case study-based questions of 4 marks with sub-parts.

37. For parallel refracting surfaces, as in a glass slab, the emergent ray is parallel to the incident ray. However, it is slightly displaced laterally. Consider a triangular glass prism. It has two triangular bases and three rectangular lateral surfaces. These surfaces are inclined to each other. The angle between its two lateral faces is called the angle of the prism. The peculiar shape of the prism makes the emergent ray bend at an angle to the direction of the incident ray. This angle is called the angle of deviation. When a white light is used instead of a monochromatic light, you can observe a colourful emerging ray similar to a rainbow.
(i) When a white light passes through a glass prism, which colour deviates the most? (1)
(ii) What is the angle of the prism? (1)
(iii) 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? Draw the diagram. (2)

OR

(iii) Draw a ray diagram to show the refraction through a glass prism. Mark in the diagram the angle of deviation.

38. A girl met with an accident and her hand got fractured. She went to an orthopaedical doctor for treatment. On examination, the doctor mixed a white power in water and applied it to her leg along with the cotton and gauze. After a while, it turned into white, solid, hard mass. The doctor said that it would support her fractured bone and help it to join in the right position.



(i) What is the 'white powder' and 'white hard solid mass' called? (1)

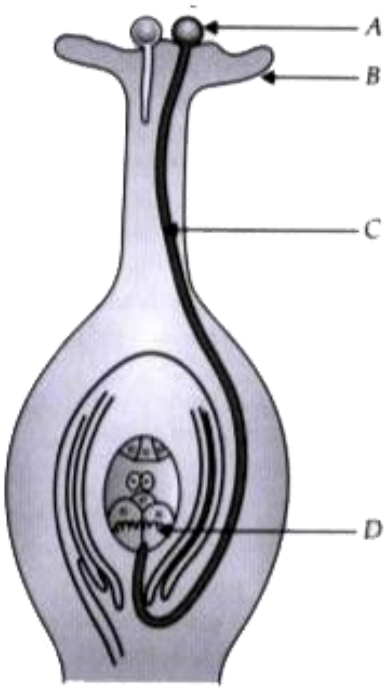
(ii) After treatment, the doctor repacked the white powder back into a moisture proof, airtight container. Why? (1)

(iii) Write a chemical equation to show the reaction between white powder and water. Find the difference in water molecules of white hard solid mass and white powder. (2)

OR

(iii) What is detergent chemically? Why are detergents effective as cleansing agent even in hard water?

39. In flowering plants, pollen grains are the male gametes and stigma is the female floral part. The process of germination of pollen on stigma occurs after pollination. The germination of pollen grain in stigma leads to fertilisation. Based on the information and diagram given below, answer the questions given below:



(i) Identify 'A' and explain how it reaches part 'D'. (1)

(ii) What happens to the part marked 'C' and 'B' after fertilisation? (1)

(iii) At times, pollen does not germinate even after the pollination. Explain why it is so, by stating any possible reasons. (2)

OR

(iii) Define the tropic movement exhibited by pollen tube in the given figure.