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Note: * - Internal Choice Questions of same chapter.
AR – Assertion, Reason based question
1. Identify ‘x’, ‘y’ and ‘z’ in the following balanced reaction
   \[ x\text{Pb(NO}_3\text{)}_2(s) \xrightarrow{\text{Heat}} y\text{PbO}(s) + z\text{NO}_2(g) + O_2(g) \]
   (a) 2, 4, 2  (b) 2, 2, 4  (c) 2, 4, 4  (d) 4, 2, 2

2. CaOCl\(_2\) will liberate Cl\(_2\) gas in presence of (i) CO\(_2\) (ii) HCl (iii) CO (iv) NO
   (a) (i) and (ii)  (b) (ii) and (iii)  (c) (i) and (iv)  (d) (ii) and (iv)

3. An element has atomic number 17. To which group, period does it belong? It is metal or nonmetal?
   (a) 7th group, 2nd period, Non-metal  
   (b) 17th group, 3rd period, Non-metal  
   (c) 7th group, 3rd period, Metal  
   (d) 17th group, 3rd period, Metal

   OR

   Which of the following is correct order of size?
   (a) I\(^+\) > I > I\(^-\)  (b) I\(^-\) > I > I\(^+\)  
   (c) I > I\(^+\) > I\(^-\)  (d) I > I\(^-\) > I\(^+\)

4. The resistance whose V – I graph is given below is

   \[ \text{(a) } \frac{5}{3}\Omega \quad \text{(b) } \frac{3}{5}\Omega \quad \text{(c) } \frac{5}{2}\Omega \quad \text{(d) } \frac{2}{5}\Omega \]
5. The defect of vision in which the person is able to see distant object distinctly but cannot see nearby objects clearly is called
   (a) Long sightedness  (b) Far-sightedness  
   (c) Hypermetropia      (d) All above
   **OR**
   The image formed on the retina of the human eye is
   (a) virtual and inverted  (b) real and inverted
   (c) real and erect        (d) virtual and erect

6. 20 coulomb charge is flowing in 0.5 second from a point in an electric circuit then value of electric current in amperes will be
   (a) 10  (b) 40  (c) 0.005  (d) 0.05

7. Dead organisms are transformed into petroleum and natural gas in
   (a) presence of air  (b) absence of air
   (c) presence of sunlight  (d) none of the above
   **OR**
   Surangams are the age old concept of water harvesting in
   (a) Karnataka  (b) Kerela  (c) Tamil Nadu  (d) Andhra Pradesh

8. Which of the following is not an use of forest?
   (a) Controls floods.  (b) Used to make paper.
   (c) Causes soil erosion.  (d) Resin, gum and drugs are obtained.

9. Write the electron dot structure of ethene molecule (C₂H₄).

10. Why the system of classification of elements into triads was not found suitable?

**Answer question numbers 11(i) - 11(iv) on the basis of your understanding of the following paragraph and the related studied concepts.**

11. (a) Aditi once visited her uncle's house. Somehow she came to know about her uncle's illness and also about the neglection of MRI (Magnetic resonance imaging) due to its high cost. She then not only collected money from some of her family friends but also convinced her uncle for the test. The reports came after the test helped the doctors to treat him well. After getting well, uncle arranged the money and returned to her saying thanks. Then her uncle did a brief research about the test and found that it was expensive because of its set-up, that needs a strong magnetic fields and pulses of radio wave energy.

11(i) How the magnetic field produced due to a circular coil depends on its radius?
11(ii) State one characteristic of magnetic field lines produce by current carrying circular coil.

(b) In a process called nuclear fission, the nucleus of a heavy atom (such as uranium, plutonium or thorium), when bombarded with low-energy neutrons, can be split apart into lighter nuclei. When this is done, a tremendous amount of energy is released if the mass of the original nucleus is just a little more than the sum of the masses of the individual products. The fission of an atom of uranium, for example, produces 10 million times the energy produced by the combustion of an atom of carbon from coal. In a nuclear reactor designed for electric power generation, such nuclear 'fuel' can be part of a self-sustaining fission chain reaction that releases energy at a controlled rate. The released energy can be used to produce steam and further generate electricity.

11(iii) Name one fuel used in nuclear reactor.
11(iv) Why is the large scale use of nuclear energy prohibitive?
Answer question numbers 12(i) - 12(iv) on the basis of your understanding of the following paragraph and the related studied concepts.

12. A delicate organ like the brain, which is so important for a variety of activities, needs to be carefully protected. For this, the body is designed so that the brain sits inside a bony box. Inside the box, the brain is contained in a fluid-filled balloon which provides further shock absorption. If you run your hand down the middle of your back, you will feel a hard, bumpy structure. This is the vertebral column or backbone which protects the spinal cord.

12(i) Name the two components of central nervous systems in humans.

12(ii) How is the spinal cord protected in the human body?

12(iii) The brain is responsible for
   (a) thinking (b) regulating the heart beat (c) balancing the body (d) all of the above.

12(iv) Which part of the human brain controls body temperature?
   (a) Pituitary (b) Diencephalon (c) Hypothalamus (d) None of these

For question numbers 13 and 14, two statements are given- one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below

i) Both A and R are true and R is correct explanation of the assertion.
ii) Both A and R are true but R is not the correct explanation of the assertion.
iii) A is true but R is false.
iv) A is false but R is true.

13. Assertion (A): Ethanol is present in alcoholic drinks.
    Reason (R): Ethanol has formula CH₂OH.

14. Assertion (A): When the direction of velocity of moving charge is perpendicular to the magnetic field, it experiences a maximum force.
    Reason (R): Force on the moving charge does not depend on the direction magnetic field in which it moves.

SECTION – B

15. Write the balanced equations for the following reactions and identify the type of reaction in each case:
   (a) Silver Nitrate (aq) + Potassium iodide (aq) → Silver iodide (s) + Potassium Nitrate (aq)
   (b) Potassium Chlorate (s) → Potassium chloride (s) + Oxygen (g)

16. How many groups and periods are there in the modern periodic table? How do the atomic size and metallic character of elements vary as we move : (a) down a group and (b) from left to right in a period

17. Name any three glands associated with digestion in humans. Write the names of enzymes secreted by them.

18. What is ‘phototropism’? How does it occur in plants? Describe an activity to demonstrate phototropism.

19. To construct a ray diagram we use two rays of light which are so chosen that it is easy to determine their directions after reflection from the mirror. Choose these two rays and state the path of these rays after reflection from a concave mirror. Use these two rays to find the nature
and position of the image of an object placed at a distance of 15 cm from a concave mirror of focal length 10 cm.

20. Define the term dispersion of white light. Name the colour of light which bends (i) the most, (ii) the least, while passing through a glass prism. Draw a ray diagram to justify your answer. 

OR

Explain giving reason why the sky appears blue to an observer from the surface of the earth. What should the appearance of the sky be during the day for an astronaut staying in the international space station orbiting the Earth? State reason to justify your answer.

21. Differentiate between biodegradable and non-biodegradable substances with the help of one example for each. List two changes in habit that people must adopt to dispose non-biodegradable waste, for saving the environment. 

OR

What is meant by food chain? “The number of trophic levels in a food chain is limited.” Give reason to justify this statement.

22. Which three chemical substances are obtained when electricity is passed through an aqueous solution of brine? Write one industrial use of each. 

OR

(a) Name the compound which is obtained from baking soda and is used to remove permanent hardness of water.
(b) Write its chemical formula.
(c) What happens when it is recrystallised from its aqueous solution?

23. (a) Explain, why fuse wire is made of a tin-lead alloy and not copper?
(b) A domestic circuit has 5A fuse. How many bulbs of rating 100W, 220V can be safely used in this circuit? Justify your answer.

24. (i) Planaria, insects, octopus and vertebrates all have eyes. Can we group eyes of these animals together to establish a common evolutionary origin? Justify your answer.
(ii) "Birds have evolved from reptiles" State evidence to prove the statement.

SECTION – C

25. (a) Define corrosion.
(b) What is corrosion of iron called?
(c) How will you recognise the corrosion of silver?
(d) Why corrosion of iron is a serious problem?
(e) How can we prevent corrosion of iron?

OR

How is the method of extraction of metals high up in the reactivity series different from that for metals in the middle? Why the same process cannot be applied for them? Explain giving equations, the extraction of sodium.

26. Draw a diagram of a human female reproductive system and label the part
(i) that produces egg
(ii) where fusion of egg and sperm take place
(iii) where zygote is implanted
What happens to human egg when it is not fertilised?

OR

Draw a longitudinal section of a flower and label the following parts:
(i) Part that produces pollen grain.
(ii) Part that transfers male gametes to the female gametes.
(iii) Part that is sticky to trap the pollen grain.
(iv) Part that develops into a fruit.

27. (a) Draw a sectional view of the human heart and label on it – Aorta, Right ventricle and Pulmonary veins.
(b) State the functions of the following components of transport system: (i) Blood (ii) Lymph

28. (a) State the laws of refraction of light. Explain the term absolute refractive index of a medium and write an expression to relate it with the speed of light in vacuum.
(b) The absolute refractive indices of two media 'A' and 'B' are 2.0 and 1.5 respectively. If the speed of light in medium 'B' is $2 \times 10^8$ m/s, calculate the speed of light in (i) vacuum (ii) medium 'A'

OR
(a) If the image formed by a lens is diminished in size and erect, for all positions of the object, what type of lens is it?
(b) Name the point on the lens through which a ray of light passes undeviated.
(c) An object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 30 cm. Find (i) the position (ii) the magnification and (iii) the nature of the image formed.

29. Derive the expression for the heat produced due to a current $T$ flowing for a time interval ‘$t$’ through a resistor ‘$R$’ having a potential difference ‘$V$’ across its ends. With which name is the relation known? How much heat will an instrument of 12 W produce in one minute if it is connected to a battery of 12 V?

30. (a) What are hydrocarbons? Give examples.
(b) Give the structural differences between saturated hydrocarbons and unsaturated hydrocarbons with two examples each.
(c) What is a functional group? Give examples of two different functional groups.