SECTION – A

$(20 \times 1 = 20)$

In this section, Question Nos. 1 to 20 are Multiple Choice Questions. All questions are compulsory.

1. The main observations while performing the experiment of burning magnesium ribbon in air are :

(i) Magnesium ribbon burns with a dazzling white flame.

(ii) A white powder is formed.

(iii) Magnesium ribbon vapourises.

(iv) Aqueous solution of the white powder turns blue litmus to red.

(A) (i) and (iv)
(B) (ii) and (iii)
(C) (i) and (ii)
(D) (iii) and (iv)

2. A metal, M, displaces iron from aqueous solution of ferrous sulphate but fails to do so in case of aqueous solution of aluminium sulphate. The metal M is

(A) Magnesium
(B) Copper
(C) Lead
(D) Zinc

3. A common feature observed in the crystals of washing soda, copper sulphate, gypsum and ferrous sulphate is that all

(A) exhibit basic nature

(B) exhibit acidic nature

(C) have fixed number of molecules of water of crystallisation in one formula unit of these salts.

(D) are coloured

4. A metal, 'X', on treatment with sodium hydroxide liberates a gas 'G'. It also liberates the same gas, 'G' on treatment with dilute sulphuric acid.

Based on above information, 'X' and 'G' respectively are

(A) Copper and Sulphur dioxide (B) Zinc and Sulphur dioxide

(C) Zinc and Hydrogen (D) Copper and Hydrogen

5. The values of **a**, **b**, **c** and **d** in the following balanced chemical equation are respectively :

$$\mathbf{a}\ Pb(NO_3)_2 \xrightarrow{heat} \mathbf{b}\ PbO + \mathbf{c}\ NO_2 + \mathbf{d}\ O_2$$

(A) 1, 1, 2, 1 (B) 1, 1, 1, 2

(C) 2, 2, 1, 4 (D) 2, 2, 4, 1

6. During electrolytic refining of copper, the anode, the cathode and the electrolyte used respectively are

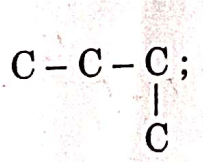
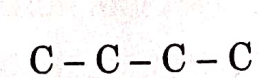
(A) Impure copper, pure copper, acidified copper sulphate solution

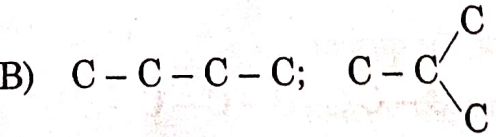
(B) Pure copper, impure copper, sulphuric acid

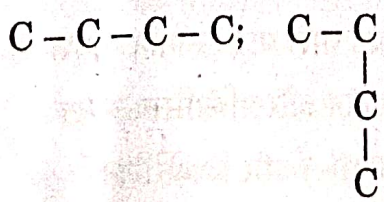
(C) Pure copper, impure copper, acidified copper sulphate solution

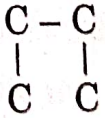
(D) Impure copper, pure copper, distilled water

7. If we make carbon skeleton with four carbon atoms, the two different possible skeletons will be

(A)  ; 

(B) 

(C) 

(D) 

8. Listed below are the steps of nutrition in Amoeba. Select the correct sequence of these steps :

(i) Diffusion of simple nutrients into cytoplasm

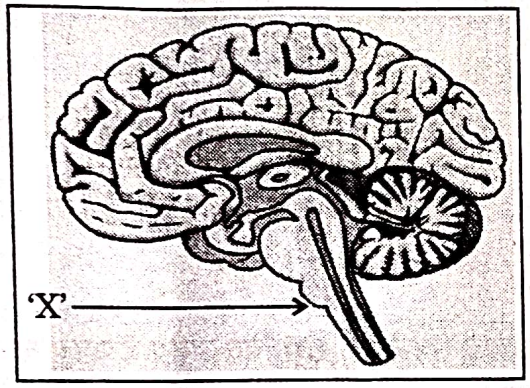
(ii) Food vacuole formation

(iii) Formation of finger like temporary extensions of cell surface

(iv) Complex substances broken to simpler ones

(v) Undigested material thrown out of the cell surface

(A) (iv), (i), (ii), (iii), (v)
(B) (iii), (ii), (iv), (i), (v)
(C) (ii), (i), (iv), (v), (iii)
(D) (iii), (iv), (i), (ii), (v)

9. 

Which among the following is not a neural action controlled by the part of human brain labelled 'X' in the figure above ?

(A) Salivation
(B) Hunger
(C) Vomiting
(D) Blood Pressure

10. The modes of reproduction in *Spirogyra* and *Planaria* respectively are

(A) Regeneration and budding
(B) Regeneration and fragmentation
(C) Fragmentation and regeneration
(D) Budding and regeneration

11. The plant hormones promoting rapid cell division in seeds and wilting of leaves respectively are

(A) Auxins and Abscisic acid
(B) Cytokinins and Abscisic acid
(C) Gibberellins and Auxins
(D) Abscisic acid and Gibberellins

12. In aerobic respiration, the steps are : breakdown of glucose to pyruvate and its further conversion to carbon dioxide. Both processes respectively occur in –

(A) Vacuole and Cytoplasm
(B) Chloroplast and Mitochondria
(C) Mitochondria and Cytoplasm
(D) Cytoplasm and Mitochondria

13. In order to obtain large images of the teeth of patients, the dentist holds the concave mirror in such a manner that the teeth are positioned

(A) at the focus of mirror.
(B) between pole and focus of the mirror.
(C) between focus and centre of curvature of the mirror.
(D) at the centre of curvature of the mirror.

14. The possible way to restore clear vision of those people whose eyeball has elongated is the use of suitable

(A) bifocal lens
(B) concave lens
(C) converging lens
(D) convex lens

15. The examples of natural and manmade (artificial) ecosystems are respectively

(A) Forests and ponds
(B) Crop fields and lakes
(C) Lakes and gardens
(D) Crop fields and forests

16. Human activities that are affecting the environment are :

(A) minimising the use of chloroflurocarbons.
(B) excessive use of disposable cups and plates.
(C) maximising the use of reusable utensils for eating food and drinking fluids.
(D) segregating the wastes into biodegradable and non-biodegradable before disposal.

Question Nos. 17 to 20 consists of **two** statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option from (A), (B), (C) and (D) given below :

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

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

17. **Assertion (A)** : Silver chloride turns grey in sunlight.

Reason (R) : Decomposition of silver chloride into silver and chlorine takes place by sunlight.

18. **Assertion (A)** : The embryo gets nutrition from the mother's blood with the help of a special tissue called placenta.

Reason (R) : Placenta is a disc which is embedded in the uterine wall.

19. **Assertion (A)** : The pattern of the magnetic field of a solenoid carrying a current is similar to that of a bar magnet.

Reason (R) : The pattern of the magnetic field around a current carrying conductor is independent of the shape of the conductor.

20. **Assertion (A)** : All organisms can make organic compounds like sugar and starch from inorganic substances using radiant energy of the sun.

Reason (R) : The organisms which can produce food by photosynthesis are called producers.

SECTION – B

Question Nos. 21 to 26 are Very Short Answer type questions. Each question carries 2 marks.

21. A crystalline substance of green colour 'X' emits gases of characteristic odour when heated over a flame. It first loses water and changes colour. On further heating, it decomposes and produces a solid compound Y.

(a) Identify 'X' and 'Y'.

(b) State the change in colour observed when 'X' is heated.

22. Give reasons :

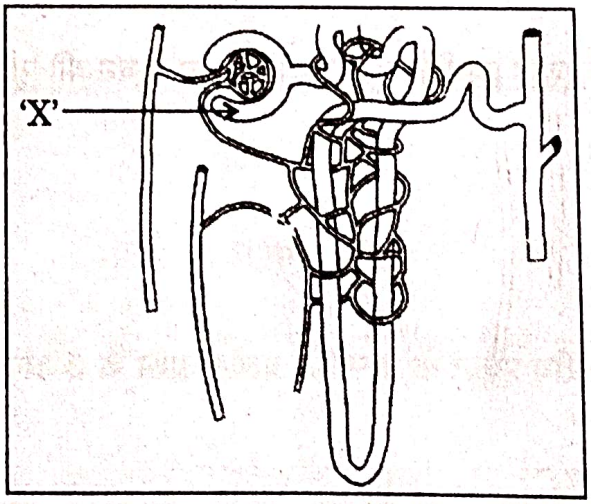
(a) The male reproductive organ responsible for formation of germ cells is located outside the abdominal cavity.

(b) The roles of the glands, present along the path of the vas-deferens, are very significant.

23. (A) How is lymph formed ? State its important function.

OR

(B) (a) Identify 'X' in the figure of human nephron shown below. What role does it play in the process of urine formation ?



(b) Why some substances are selectively reabsorbed from the initial filtrate of urine, as it flows along the tabular part of nephron ?

24. The values of absolute refractive indices of kerosene and water are 1.44 and 1.33 respectively. Compare the two media on the basis of their

(a) optical density

(b) mass density

(c) relative speed of propagation of light.

What do you infer on the basis of above comparisons ?

25. (A) State two applications of Joule's heating in domestic electric circuit.

(B) (a) Establish the relationship between the commercial unit of electric energy and the SI unit of electric energy.

OR

(b) Determine the total resistance of the parallel combination of three resistances of 2 Ω, 4 Ω and 6 Ω.

26. (a) Why are the organisms of first trophic level important in any food chain ?

(b) Justify the following statement :

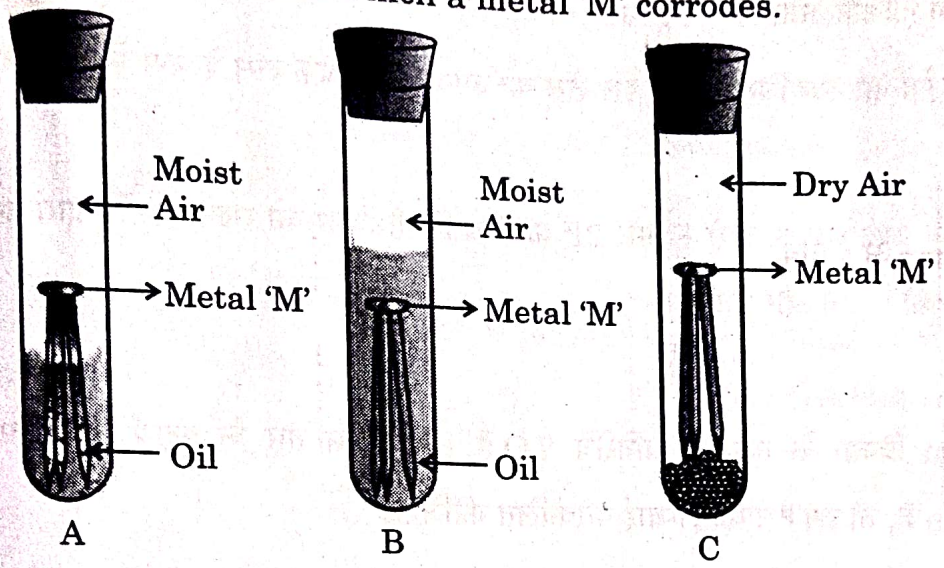
'The flow of energy in an ecosystem is unidirectional.'

SECTION – C

Question Nos. 27 to 33 are Short Answer type questions. Each question carries 3 marks.

27. Write chemical formula of washing soda. How is it obtained from baking soda ? List two uses of washing soda.

28. (A) Observe the following diagram showing an experiment to determine the conditions under which a metal 'M' corrodes.



List your observations in each of the three cases A, B and C with reason, if the metal 'M' is generally protected against corrosion by the method of galvanisation.

OR

(B) (a) Show the formation of Aluminium Nitride (AlN) by the transfer of electrons. [At. no. of Al = 13; At. no. of N = 7]

(b) "Ionic compounds are solids and are generally brittle and break into pieces when pressure is applied." Give reason to justify the statement.

29. (a) Write the name and one function of respiratory pigment found in human beings.

(b) Why do lungs always contain a residual volume of air ?

(c) Why is ATP known as energy currency of the living beings ?

30. (a) Define fertilisation.

(b) What happens to Zygote, Ovule, Ovary and Stamens after fertilisation in a flowering plant ?

31. The power of a lens is –0.25 D. Based on this information, find out

(a) The type of lens and its focal length.

(b) The eye defect for which it may be used as a corrective lens.

(c) The nature and size of the image formed by this lens when an object is placed between F and 2F from the optical centre of this lens.

32. The resistance of a wire of 0.01 cm radius is 7 ohms. If the resistivity of the material of the wire is 44×10^{-6} ohm meter, calculate the length of the wire.

33. (a) "The third wire of earth connection is very important in domestic electric appliances." Justify this statement.

(b) List two precautions to be taken to avoid the overloading of domestic electric circuits.

SECTION – D

Question Nos. 34 to 36 are Long Answer type questions. Each question carries 5 marks.

34. (A) (a) What is meant by the term homologous series of carbon compounds ? Write molecular formula of any two consecutive members of homologous series of ketones.

(b) Write chemical equation of the reactions of ethanoic acid with

(i) Sodium hydroxide and

(ii) Ethanol (in the presence of an acid); giving the name of the products in each case.

(c) Draw the structure of the molecule of benzene.

OR

(B) (a) Write the molecular formula of ethyne and draw its electron dot structure.

(b) Write chemical equation to show the reaction of ethanol with

(i) Sodium metal

(ii) Ethanoic acid (in the presence of an acid)

(iii) Acidified potassium dichromate

Write the name of the product formed in each case.

35. (A) (a) Analyse the given situations and interpret the possible reason for each :

(i) Iodine deficiency in diet increases the possibility of a disease of swollen neck in a person.

(ii) Some people in population may have very short heights (dwarfs).

(iii) Thick facial hairs develop in boys at the age of 10-12 years.

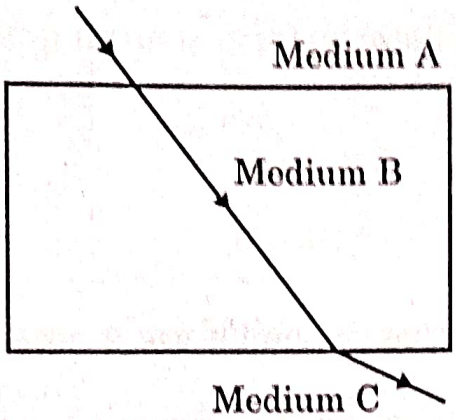
(b) Explain two reasons which necessitate the need of chemical communication in multicellular organisms.

OR

(B) (a) Differentiate between voluntary and involuntary action.

(b) Define reflex action. With the help of a flow diagram, show the correct sequence of path of Nerve impulse from place of its origin.

36. (A) (a) Observe the following diagram and compare (i) speed of light and (ii) optical densities of the three media A, B and C. Also give justification for your answer of any one of the two cases in terms of refractive indices of A, B and C.



(b) Redraw the path of a ray of light through the three media, if the ray of light starting from medium A falls on the medium B

(i) Obliquely and the optical density of medium B is made more than that of A and C.

(ii) The ray falls normally from medium A to medium B.

OR

(B) Analyse the following observation table showing variation of image distance (v) with object distance (u) in case of a convex lens and answer the questions that follow without doing any calculations :

Observation Number	Object distance (u) in cm	Image distance (v) in cm
1	–15	–60
2	–25	+100
3	–30	+60
4	–40	+40
5	–60	+30
6	–100	+25

(a) Determine the focal length of the lens. Give reason for your answer.

(b) Find magnification of the image formed in Observation No. 3.

(c) The numerical value of magnifications in cases of observation 1 and 2 is same. List two differences in the images formed in these two cases.

SECTION – E

Question Nos. 37 to 39 are Case/Data based questions with 2 or 3 sub parts. Internal choice is provided in one of these sub parts. Each question carries 4 marks.

37. The combining capacity of various elements depends on the number of valence electrons. Also the reactivity of elements is explained as their tendency to attain a completely filled outer shell, that is, to attain a noble gas configuration. This may be either through gain of electrons or loss of electrons or sharing of electrons.

(a) An element A has atomic number 16, how will it attain its nearest noble gas configuration ?

(b) Write the number of (i) single and (ii) double covalent bonds in a molecule of butene (C_4H_8).

(c) (A) Explain the formation of a molecule of ammonia (NH_3), using electron dot structure. (Atomic number of nitrogen is 7)

OR

(c) (B) Why does carbon share its valence electrons with other atoms of carbon or with atoms of other elements ?

38. In human beings, there are 23 pairs of chromosomes. Out of these 23 pairs of chromosomes (i.e. 46 chromosomes), 22 pairs of chromosomes are called autosomes and one pair of chromosomes. i.e. two chromosomes are called sex chromosomes. The sex chromosomes are of two types – 'X' chromosomes and 'Y' chromosomes. The sex of a child (i.e. progeny), is decided at the time of fertilisation. In other words, at the time of zygote formation the sex chromosomes inherited from the parents of a child decide whether the new born will be a boy or a girl.

(a) What are chromosomes ?

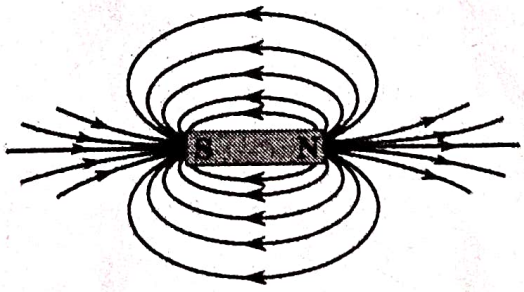
(b) Why is the pair of sex chromosomes in human males called mismatched pair ?

(c) (A) Show with the help of a flow chart that the statistical probability of getting a boy or a girl is 50 : 50.

OR

(c) (B) Mention two examples of animals where sex is not determined genetically like human beings. Describe in brief the method of sex determination in these animals.

39. In order to obtain magnetic field lines around a bar magnet, a student performed an experiment using a magnetic compass and a bar magnet. The magnet was placed on a sheet of white paper fixed on a drawing board. Using magnetic needle he obtained on the paper a pattern of magnetic field lines (as shown below) around the bar magnet.



(a) By convention, the field lines emerge from north pole and merge at south pole. Why ? Give reason.

(b) State the relationship between strength of the magnetic field and the degree of closeness of the field lines.

(c) (A) (i) No two field lines can ever intersect each other. Give reason.

(ii) The magnetic field in a given region is uniform. Draw a diagram to represent it.

OR

(c) (B) Draw the pattern of the magnetic field lines through and around a current carrying solenoid. What does the pattern of field lines inside the solenoid represent ?