

Class IX Session 2024-25
Subject - Science
Sample Question Paper - 9

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

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

Section A

1. The name of A, B, C and D in the following diagram are: [1]



- | | |
|---|--|
| a) A - Solidification, B - Vaporisation, C - Fusion, D - Condensation | b) A - Vapourisation, B - Fusion, C - Condensation, D - Solidification |
| c) A - Fusion, B - Vaporisation, C - Condensation, D - Solidification | d) A - Condensation, B - Vaporisation, C - Solidification, D - Fusion |
2. A eukaryotic nucleus has a: [1]
- | | |
|--------------------------------|--------------------------------|
| a) non-porous, single membrane | b) porous, single membrane |
| c) porous, double membrane | d) non-porous, double membrane |
3. Two racing cars of masses m_1 and m_2 are moving in circles of radii r_1 and r_2 respectively. Their speeds are such that each makes a complete circle in the same length of time T. The ratio of angular speed of the first car to that of the second car is [1]
- | | |
|------------------------|----------------|
| a) $r_1 : r_2$ | b) 1 : 1 |
| c) $m_1 r_2 : m_1 r_2$ | d) $m_1 : m_2$ |
4. What is the pulse rate of buffalo/minute? [1]

- a) 40–60/minute
 b) 16–18/minute
 c) 70–72/minute
 d) 40–45/minute

5. The smooth muscle consists of _____. Each fibre contains a single oval nucleus in its thick middle part. The cross-striations are absent so that the fibres look smooth, hence the name unstriated. [1]

- a) straight, wide unbranched spindle-shaped fibres
 b) long, narrow unbranched spindle-shaped fibres
 c) long, wide and spindle-shaped tissues
 d) short, wide unbranched spindle-shaped fibres

6. Which of the following is absent in plant cells? [1]

- a) Cell membrane
 b) Vacuole
 c) Mitochondria
 d) Centriole

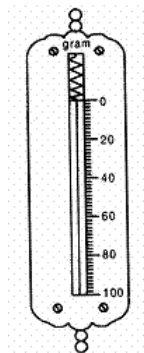
7. The number of molecules in $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ bonded by H-bond is [1]

- a) 5
 b) 3
 c) 2
 d) 1

8. Girth of stem increases due to [1]

- a) apical meristem
 b) vertical meristem
 c) intercalary meristem
 d) lateral meristem

9. The least count of the spring balance shown in the diagram is: [1]



- a) 1 g
 b) 2 g
 c) 0.5 g
 d) 5 g

10. A signal from a space ship reaches the ground in 5 minutes. What was the distance of the space ship from the ground station? The speed of the signal is 3×10^8 m/s. [1]

- a) 9×10^7 m
 b) 9×10^{10} m
 c) 9×10^6 m
 d) 3×10^6 m

11. **Statement 1:** Isobars have different chemical properties. [1]

Statement 2: The sum of protons and neutrons in isobars is always different.

- a) Statement 1 is true and statement 2 is false.
 b) Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.

c) Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.

d) Both statements 1 and 2 are false.

12. Which of the following is non – vascular? [1]

a) Epithelial tissue

b) Muscular tissue

c) Connective tissue

d) Nervous tissue

13. "Viruses are non-cellular organisms" - this statement is a: [1]

a) Partially false

b) True statement

c) False statement

d) Partially true

14. Fermentation of grapes is an example of [1]

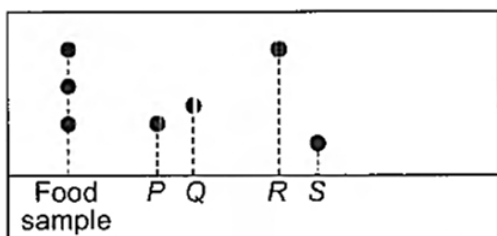
a) Redox reaction

b) Reversible change

c) Chemical change

d) Physical change

15. A food sample was tested for the presence of components P, G, R and S and the following chromatogram was obtained. [1]



The components not present in food sample are

a) Q and R

b) P and Q

c) P and R

d) Q and S

16. Which of the following is soil borne disease? [1]

a) Leaf spot of rice

b) Red rot of sugarcane

c) Smut of bajra

d) Rust of wheat

17. **Assertion (A):** A tiger can accelerate from rest at the rate of 4 m/s^2 . [1]

Reason (R): The velocity attained by it in 10s is 40 m/s.

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.

18. **Assertion (A):** Gaseous state of ammonia is not regarded as vapours. [1]

Reason (R): As the volume of a substance increases, its density increases.

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.

19. **Assertion (A):** Cells of cork or bark are dead, acts as a protective covering. [1]

Reason (R): In leguminous plants, the root nodules harbor nitrogen-fixing bacteria which convert atmospheric

nitrogen into nitrates.

- 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.

20. **Assertion (A):** An atom contains a positively charged center called the nucleus of the atom. [1]

Reason (R): The nucleus of an atom is 10,000 times bigger than the atom.

- 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.

Section B

21. Why an egg sinks in fresh water but floats in a strong solution of salt? [2]

OR

Why cutting instruments are sharpened?

22. Why are some substances found in the solid state, some in the liquid state and others in the gaseous state? [2]

23. Does sound follow the same laws of reflection as light does? Explain. [2]

24. Explain why should we wear cotton clothes in summer. [2]

25. In the oil tankers some space is left at the top while filling them. Explain. [2]

OR

Explain why some of the leaves may fall from a tree, if we vigorously shake its branch.

26. Nucleus of an atom has positive charge on it. Establish. [2]

Section C

27. i. How will you determine the depth of a sea using echo ranging in SONAR method? [3]

ii. A SONAR device on a submarine sends out a signal and receives an echo 5s later. Calculate the speed of sound in water if the distance of the object from the submarine is 2625 m.

28.  [3]

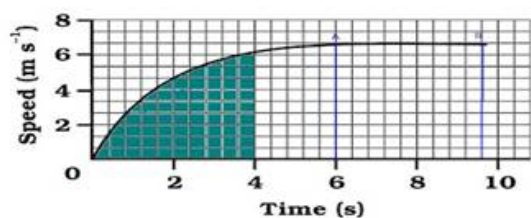
- i. Identify the ion from the given figure.
- ii. Write the electronic configuration of the ion and atom mentioned in the figure.
- iii. How do we get the number of protons as 12?

29. A body is dropped from a height of 320 m. The acceleration due to the gravity is 10 m/s^2 . [3]

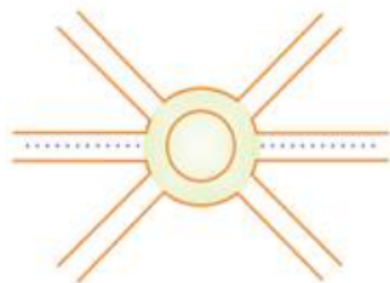
- (a) How long does it take to reach the ground?
- (b) What is the velocity with which it will strike the ground?

OR

The speed-time graph for a car is shown in Fig.



- a. Find how far does the car travel in the first 4 seconds? Shade the area on the graph that represents the distance travelled by the car during the period.
- b. Which part of the graph represents uniform motion of the car?
30. A boy is moving on a straight road against a frictional force of 5 N. After travelling a distance of 1.5 km he forgot the correct path at a round about (Fig.) of radius 100 m. However, he moves on the circular path for one and half cycle and then he moves forward to 2.0 km. Calculate the work done by him. [3]



31. The following is the distance-time table of an object in motion: [3]

Time (s)	Distance (m)
0	0
1	1
2	8
3	27
4	64
5	125
6	216
7	343

- a. What conclusion can you draw about the acceleration? Is it constant, increasing, decreasing, or zero?
- b. What do you infer about the forces acting on the object?
32. Differentiate between diffusion and osmosis. What is its importance? [3]
- OR
- How is a bacterial cell different from an onion peel cell?
33. Differentiate between sclerenchyma and parenchyma tissues. Draw a well-labeled diagram. [3]
- Section D**
34. i. A steel needle sinks in water but a steel ship floats. Explain, how? [5]
- ii. Why do you prefer a broad and thick handle of your suitcase?
- OR
- i. A cube of side 5 cm is immersed in water and then in saturated salt solution. In which case, will it experience a

greater buoyant force? If each side of the cube is reduced to 4 cm and then immersed in water, what will be the effect on the buoyant force experienced by the cube as compared to the first case for water. Give the reason for each case.

ii. A ball weight 4 kg of density 4000 kg m^{-3} is completely immersed in water of density 10^3 kg m^{-3} . Find the force of buoyancy on it. (Given $g = 10 \text{ ms}^{-2}$.)

35. Write the main functions of atleast ten cell components. [5]

OR

Differentiate between

- i. Cell wall and cell membrane.
- ii. Nuclear region of a bacterial cell and nuclear region of an animal cell.
- iii. Prokaryotic cell & eukaryotic cell.

36. Classify each of the following as a physical or a chemical change. Give reasons. [5]

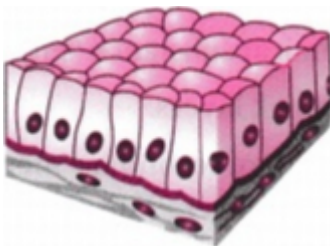
- i. Drying of a shirt in the sun.
- ii. Rising of hot air over a radiator.
- iii. Burning of kerosene in a lantern.
- iv. Change in the colour of black tea on adding lemon juice to it.
- v. Churning of milk cream to get butter.

Section E

37. Read the following text carefully and answer the questions that follow: [4]

The covering or protective tissues in the animal body are epithelial tissues. Epithelium covers most organs and cavities within the body. It also forms a barrier to keep different body systems separate. Epithelial tissue cells are tightly packed and form a continuous sheet. The skin, which protects the body, is also made of squamous epithelium. Skin epithelial cells are arranged in many layers to prevent wear and tear. This columnar epithelium facilitates movement across the epithelial barrier. In the respiratory tract, the columnar epithelial tissue also has cilia, which are hair-like projections on the outer surfaces of epithelial cells. Cuboidal epithelium forms the lining of kidney tubules.

i. Identify the type of epithelial tissue shown in the following figure. (1)



ii. Which cell is present in the inner lining of the intestine? (1)

iii. Is excretion is the main function of the cuboidal epithelium? (2)

OR

Sometimes a portion of the epithelial tissue folds inward, and a multicellular gland is formed which is called a? (2)

38. Read the following text carefully and answer the questions that follow: [4]

Crop Season: Different crops require different climatic conditions like temperature, moisture and photoperiods to grow well and complete their life cycle.

The Indian cropping season is classified into two main seasons- (i) Kharif and (ii) Rabi based on the monsoon.

The characteristics of these two main crop seasons are:



- i. Mention the various cropping seasons in India. (1)
- ii. Differentiate between Rabi and Kharif crops. (1)
- iii. If there is low rainfall in a village throughout the year, what measures will you suggest to the farmers for better cropping? (2)

OR

What is zaid crop? Give example. (2)

39. **Read the following text carefully and answer the questions that follow:**

[4]

Homogeneous mixtures are regarded as solutions or true solutions. Heterogeneous mixtures are of two types. These are suspensions and colloidal solutions. These differ in the size of the particles responsible for the difference in their properties. In a suspension, the particle size is more than 10^{-5} cm whereas in a colloidal solution, it ranges between 10^{-5} cm to 10^{-7} cm. The two phases which constitute colloidal solutions, are dispersed phase and dispersion medium. Based upon their nature, the colloidal solutions are classified into eight types. The mixture of the non-reacting gases is always homogeneous irrespective of their nature. Therefore, it is not a colloidal solution.

- i. Scattering of light occurs when a beam of light is passed through Blood. Why? (1)
- ii. What is Tyndall effect? (1)
- iii. What is called colloidal solution? (2)

OR

Give an example of colloidal solution and identified their dispersed phase and dispersion medium? (2)

Solution

Section A

1.
(c) A - Fusion, B - Vaporisation, C - Condensation, D - Solidification
Explanation:
 - i. A – Fusion: Change of solid state into liquid state is known as fusion.
 - ii. B – Vaporization: Change of liquid state into gases state is known as vaporization.
 - iii. C – Condensation: Change of gases state into liquid state is known as condensation.
 - iv. D – Solidification: Change of liquid state into solid state is known as solidification.

2.
(c) porous, double membrane
Explanation: The bounding structure of the eukaryotic nucleus. Composed of two phospholipid bilayers with the outer one connected to the endoplasmic reticulum. Double membrane structure riddled with pores that surround deoxyribonucleic acid in eukaryotes. The nuclear pores, like guards at an important government building, are very strict.

3.
(b) 1 : 1
Explanation: Both the cars make a complete circle in the same time T, which means that angular speeds of both the cars are same.
$$\therefore \omega = \frac{v}{r} = \frac{2\pi r}{Tr} = \frac{2\pi}{T}$$

4.
(a) 40–60/minute
Explanation: The pulse of cattle is taken at a point on the underside of the base of the tail, the normal rate is 40 - 80 per minute in the adult. In buffalo, the pulse rate is 40 - 60 per minute.

5.
(b) long, narrow unbranched spindle-shaped fibres
Explanation: The smooth muscle consists of **long, narrow unbranched spindle-shaped fibres**. Each fibre contains a single oval nucleus in its thick middle part. The cross-striations are absent so that the fibres look smooth, hence the name unstriated.

6.
(d) Centriole
Explanation: A centriole is an organelle that helps cells divide, or make copies of themselves. Centrioles are only found in animal cells. All centrioles are made of protein strands called microtubules.

7.
(d) 1
Explanation: One molecule of water is linked by H-bond because only one molecule of water is present outside the coordination sphere.

8.
(d) lateral meristem
Explanation: The lateral meristematic tissues are responsible for an increase in the diameter or girth of the plant.

9.
(b) 2 g
Explanation: $L.C. = \frac{20 - 0}{10} = \frac{20}{10} = 2 g$

10.
(b) 9×10^{10} m
Explanation: Time = 5 minutes = $5 \times 60 = 300$ sec.
Distance = speed \times time
 $= 3 \times 10^8 \text{ m/s} \times 300 = 9 \times 10^{10} \text{ m}$



11. (a) Statement 1 is true and statement 2 is false.
Explanation: Sum of protons and neutrons in isobars is same.
12. (a) Epithelial tissue
Explanation: Epithelial tissue is composed of cells laid together in sheets with the cells tightly connected to one another. Epithelial layers are non – vascular but innervated.
13. (b) True statement
Explanation: It is true that viruses are non-cellular organisms. Viruses do not contain cell membranes and other cellular organelles. Viruses are the link between the living and the non-living. They do not show any characteristics of life until they enter the body of a host. They then use the host cell machinery for reproduction.
14. (c) Chemical change
Explanation:
- The new substance is formed
 - It is not reversible
 - It is permanent
 - After fermentation, you are not able to obtain grapes again.
So, Fermentation of grapes is an example of chemical change.
15. (d) Q and S
Explanation: Chromatogram of food sample does not match with the chromatograms of components Q and S.
16. (c) Smut of bajra
Explanation: Soil-borne disease are caused by fungal pathogens which persist (survive) in the soil matrix and in residues on the soil surface are defined as soil-borne diseases. Smut of bajra is a soil-borne disease.
17. (a) Both A and R are true and R is the correct explanation of A.
Explanation: Initial velocity (u) = 0 , acceleration (a) = 4 m/s^2
 $v = u + at$
 $v = 0 + 4 \times 10$
 $v = 40 \text{ m/s}$
18. (b) Both A and R are true but R is not the correct explanation of A.
Explanation: A substance which is liquid at room temperature, then its gaseous state is regarded as vapour. Ammonia is gas at room temperature , hence its gaseous state is not regarded as vapour.
19. (b) Both A and R are true but R is not the correct explanation of A.
Explanation: Cells of cork or bark are dead, compactly arranged without intercellular spaces, and have a chemical called suberin in their walls that makes them impervious to gases and water. In this way, it acts as a protective tissue.
20. (c) A is true but R is false.
Explanation: An atom contains a positively charged center called the nucleus of the atom. Almost all the mass of the atom is concentrated in the nucleus. The size of the nucleus is many times smaller than the size of the atom. The nucleus of an atom is 10,000 times smaller than the atom.

Section B

21. When salt is mixed with water it increases the density of water and, hence, its density becomes greater than that of the density of egg which now floats in it.

OR

All cutting instruments such as blades, axes etc. are sharpened so that the area of cross section decreases and hence pressure exerted by them increases. Thus they can easily penetrate a given surface.

22. It all depends upon the amount of kinetic energy available with the constituent particles which determines their speed and the attractive forces existing between them.
- 1) If the constituent particles have sufficiently more kinetic energy, and they move so fast that they are not able to remain close to each other. Then the substance is in gaseous state.
 - 2) If they are moving slowly enough then the force between the constituent particles have a chance to pull them together and the substance then exists in the form of a liquid.
 - 3) If the constituent particles are moving so slowly that the forces of attraction hold them rigidly together, then substance exist in the form of a solid.
- The important fact to keep in mind is that, 'the higher the temperature, the faster the constituent particles move'. Due to this reason, solids melt as the temperature increases and vapourises at yet higher temperatures. The exact temperature at which a change takes place depends on the strength of the force between the molecules.
23. Yes. Sound follows the same laws of reflection as light does. We can say that because here the directions in which the sound is incident and is reflected make equal angles with the normal to the reflecting surface at the point of incidence, and the three are in the same plane.
24. During summer, we perspire more because of the mechanism of our body which keeps us cool. When evaporation takes place then sweat particles gain energy from body surface and change into vapour. The heat energy equal to the latent heat of vaporisation is absorbed from the body leaving the body cool. Cotton, being a good absorber of water helps in absorbing the sweat and exposing it to the atmosphere for easy evaporation. On the other hand, synthetic clothes (made of nylon, polyester, etc.) do not absorb much of sweat and therefore, they cannot keep our body cool in summer.
25. When the standing tanker suddenly picks up speed, the oil in it on account of inertia of rest tends to continue in its state of rest. Thus, in a way oil is left behind and, hence, exerts very large force on its rear wall. Conversely, when the moving tanker suddenly stops, the oil in it continues moving forward and, hence exerts a very large force on the front wall. These forces can crack the walls of the oil tanker. Therefore to avoid such a mis-hap, some space is left at the top of the tanker for the free movement of oil.

OR

When the branch is, suddenly set in motion, the leaves attached to it tend to continue in their state of rest, on account of inertia of motion. Thus a lot of strain acts on the junction of the leaves and the branches. Due to this strain the weakly held leaves are left behind and, hence fall off the branch.

26. This can be established on the basis of Rutherford experiment. Since some alpha particles were repelled by the nucleus of the atom, it is expected to have the same charge as on alpha particles. Therefore, nucleus of an atom has positive charge. The nucleus of an atom contains two things: Protons and neutrons. Because neutrons have no charge and protons have positive charge, the overall charge of the nucleus is positive.

Section C

27. i. The full name of SONAR is Sound Navigation and Ranging. Sonar is based on the principle of reflection of sound wave. Powerful pulses of ultrasound are sent out at regular intervals from a transmitter mounted on a ship. When these pulses are intercepted by submerged objects, they get reflected. The reflected sound or echo is detected by an underwater receiver, which is also mounted on the ship. If speed of ultrasound be v and t is the elapsed time between the transmission and the reception of the ultrasound signal, the depth of the submerged object underwater is $h = \frac{v \times t}{2}$
- ii. $t = 5$ s, $h = 2625$ m, $v = ?$
- $$h = \frac{v \times t}{2}$$
- $$2625 = \frac{v \times 5}{2}$$
- $$v = \frac{2625 \times 2}{5}$$
- $$v = 1050 \text{ m/s}$$
28. i. Mg^{2+} ion is mentioned in the given figure.
- ii. The electronic configuraton of Mg^{2+} ion = 2, 8 and that of ${}_{12}\text{Mg}$ atom = 2, 8, 2
- iii. Number of protons in Mg atom = $2 + 8 + 2 = 12$
29. Height = h
 Distance = $s = 320$ m
 Acceleration due to gravity = $g = 10 \text{ m/s}^2$
 Initial velocity = $u = 0$
- (i) from $s = ut + \frac{1}{2}at^2$
- $$h = ut \times \frac{1}{2}gt^2$$
- $$320 = 0 \times t + \frac{1}{2} \times 10 \times t^2$$



$$\frac{320 \times 2}{10} = t^2$$

$$64 = t^2 \quad t = \sqrt{64}$$

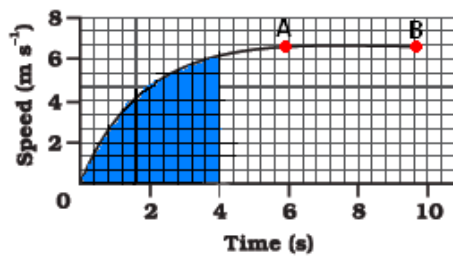
$$t = 8 \text{ sec}$$

(ii) from $v = u + at$

$$v = 0 + 10 \times 8$$

$$v = 80 \text{ m/s}$$

OR



a. Distance travelled by car in the 4 second

The area under the slope of the speed – time graph gives the distance travelled by an object.

In the given graph

56 full squares and 12 half squares come under the area slope for the time of 4 seconds.

Total number of squares = $56 + \frac{12}{2} = 62$ squares

The total area of the squares will give the distance travelled by car in 4 seconds. on the time axis,

5 squares = 2 seconds, therefore 1 square = $\frac{2}{5}$ seconds

on speed axis there are 3 squares = 2 m/s

therefore, area of one square = $\frac{2}{5} \text{ s} \times \frac{2}{3} \text{ m/s} = \frac{4}{15} \text{ m}$

so area of 62 squares = $\frac{4}{15} \text{ m} \times 62 = \frac{248}{15} \text{ m} = 16.53 \text{ m}$

Hence the car travels 16.53 m in the first 4 seconds.

b. The straight line part of graph, from point A to point B represents a uniform motion of car.

30. Displacement = 1500 m + 200 m + 2000 m = 3700 m

Work done = Force \times displacement = 5 N \times 3700 m = 18500 J

(Note: We do not need to calculate the circumference because we need to take displacement and not distance because displacement is change of position not distance covered by the object)

Time t (s)	Distance s (m)	Velocity $u = \frac{s}{t} \text{ (ms}^{-1}\text{)}$	Acceleration $a = \frac{v-u}{t} \text{ (ms}^{-2}\text{)}$
0	0	0	-
1	1	1	$a_1 = \frac{1-0}{1-0} = 1$
2	8	4	$a_2 = \frac{4-1}{2-1} = 3$
3	27	9	$a_3 = \frac{9-4}{3-2} = 5$
4	64	16	$a_4 = \frac{16-9}{4-3} = 7$
5	125	25	$a_5 = \frac{25-16}{5-4} = 9$
6	216	36	$a_6 = \frac{36-25}{6-5} = 11$
7	343	49	$a_7 = \frac{49-36}{7-6} = 13$

i. There is an unequal change of distance in equal interval of time. Thus, the given object is having a non-uniform motion. From the above table, it is clear that the acceleration is not constant and increase with time.

ii. The object is in accelerated condition. According to Newton's second law of motion, the force acting on an object is directly proportional to the acceleration produced in the object. So, we can say that an unbalanced force is acting on the object.

32.	OSMOSIS	DIFFUSION

It involves the movement of solvent molecules	It involves the movement of solute molecules
Molecules move from a lower concentration of solute to a higher concentration of solute	Molecules move from higher concentration of solute to a lower concentration of solute
It occurs only across a semi-permeable membrane	It does not require semi-permeable membrane
Example: Shrinking of Potato slice when kept in concentrated sucrose solution	Example: Spreading of ink when a drop of it is put in a glass of water.

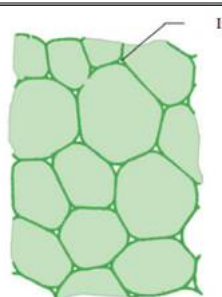
Importance – diffusion and osmosis are important for the transport of substances across the cell membrane.

OR

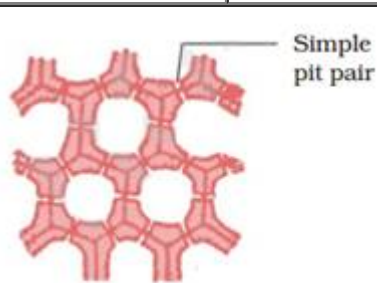
Bacterial cell	Onion peel cell
The cell wall is made of peptidoglycan.	The cell wall is made of cellulose.
The nucleus is absent.	The nucleus is present.
The vacuole is absent.	The vacuole is present.
These are prokaryotes.	These are eukaryotes.

33.

Parenchyma	Sclerenchyma
Cells are live.	Cells are dead.
Cells have thin cell walls.	The cell wall is thick due to the deposition of lignin.
Intercellular spaces are present between cells.	No intercellular spaces are found between the cells.
Cells are oval in shape.	Cells are long in shape.
Some cells contain chloroplast.	The chloroplast is absent.
Storage of food is a major function.	Structural rigidity is the main function.
Found in soft parts.	Found in hard parts.



T.S. Parenchyma



T.S. Sclerenchyma

Section D

34. i. Ship displaces more water than needle as the volume of the ship is more than that of the needle. Since upthrust depends on the volume of the object ($U = Vdg$), so more the volume of the object, more upthrust act on it and object floats.

ii. Since, pressure act on the body is inversely proportional to the surface area of contact, i.e.

$$P \propto \frac{1}{A}$$

It means that more the area of contact, less pressure will act on the body. As the broad and the thick handle of our suitcase has a large area, due to which less pressure acts on our hand and it is very easy to take from one place to another.

OR

i. The cube will experience a greater buoyant force in saturated salt solution than in water because density of saturated salt solution is more than the density of water. If each side of the cube is reduced to 4 cm, it will result in reduction in volume of the cube. Hence, the buoyant force experienced by it will reduce in water.

ii. Buoyant force = weight of displaced water

$$= \text{density of water} \times \text{volume of displaced water} \times g$$

$$= 1000 \times \frac{4}{4000} \times 10 \left[\because \text{volume} = \frac{\text{weight}}{\text{density}} \right]$$

$$= 10 \text{ N}$$

35. The ten cell components are:

- i. **Plasma membrane:** It acts as a semipermeable membrane and allows only selective substances to pass through it.
- ii. **Chromosomes:** To carry hereditary characters of an organism from one generation to another.
- iii. **Lysosomes:** Breakdown of unwanted macromolecules is the main function of these organelles.
- iv. **Ribosomes:** These help in protein synthesis.
- v. **Nucleus:** Control centre of the cell. It contains cellular DNA (genetic information) in the form of genes.
- vi. **Mitochondria:** The main function of mitochondria in aerobic cells is the production of energy by the synthesis of ATP.
- vii. **Nucleolus:** Biosynthesis of ribosomal RNA (rRNA) and acts as a platform for protein synthesis.
- viii. **Cell wall:** It provides protection and rigidity to the plant cell.
- ix. **Chloroplasts:** These are the sites of photosynthesis within plant cells.
- x. **Endoplasmic reticulum:** Serves as channels for transport of materials.

OR

i.	Cell wall	Cell membrane
	It is present in bacteria, fungi, and plant cells. It is absent in animal cells and protozoans.	It is present in all cells.
	There is no other name of the cell wall.	The cell membrane is also known as the plasma membrane or plasmalemma.
	The cell wall is completely permeable.	The cell membrane is semi-permeable.
	The cell wall is made up of cellulose.	The cell membrane is made up of lipids and proteins.
ii.	Nuclear region of bacterial cell	Nuclear region of an animal cell
	Smaller in size.	Larger in size.
	The nuclear membrane is absent, the nucleolus is absent. The nucleus is regarded as the nucleoid.	Nuclear membrane with nucleolus present.
iii.	Prokaryotic cell	Eukaryotic cell
	The size of a cell is generally small.	The size of a cell is generally large.
	The true nucleus is absent.	The true nucleus is present.
	It contains a single chromosome.	Contains more than one chromosome.
	Membrane-bound cell organelles absent.	Membrane-bound cell organelles present.

36. i. It is a physical change because moisture in the shirt is converted from its liquid state to gaseous state because of the heat of the Sun.
- ii. It is a physical change because water in the radiator is converted from a liquid state to gaseous state.
- iii. It is a chemical change because combustion of kerosene occurs and new products are formed.
- iv. It is a chemical change because there is a reaction between citric acid present in lemon and the compounds of the tea resulting in the formation of new products.
- v. It is a physical change because the cream suspended in milk is separated by churning (centrifugation).

Section E

37. i. Columnar.
- ii. columnar epithelial.
- iii. No, providing mechanical support is the main function of the cuboidal epithelium.

OR

Glandular epithelium.

38. i. The various cropping seasons in India are Rabi crop, Kharif crop and Zaid crop.
- ii. Rabi crops are sown during the winter season which requires less water.
Kharif crop is sown during the summer/rainy season which requires abundant water.
- iii. Farmers are suggested to grow drought-resistant crops that can mature early. Along with this farmers are advised to use manure for their fields as it increases the water-holding capacity of the soil.

OR

There is a short season between Kharif and Rabi season in the months of March to July. The crops that grow in this season are **Zaid crops**. These crops are grown on irrigated lands and do not have to wait for monsoons. Some examples of Zaid types of crops are pumpkin, cucumber, and bitter gourd.

39. i. Since blood is a colloid, so Tyndall effect is observed when a beam of light is passed through it since the dispersed particles of a colloid are large, deflect light.
- ii. The phenomenon by which the colloidal particles scatter light is called Tyndall effect. If light is passed through a colloid the light is scattered by the larger colloidal particles and the beam becomes visible.
- iii. Colloidal solutions are a mixture in which the substances are regularly suspended in a fluid. A colloid is a very tiny and small material that is spread out uniformly all through another substance.

OR

Fog: Liquid (water drops) acts as dispersed phase and gas (air) as the dispersion medium.

