Class IX Session 2024-25
Subject - Science
Sample Question Paper - 14

Time: 3 Hours. **Total Marks: 80**

General Instructions:

i. *All questions would be compulsory. However, an internal choice of approximately 33% would be provided. 50% marks are to be allotted to competency-based questions.*

ii. *Section A would have 16 simple/complex MCQs and 04 Assertion-Reasoning type questions carrying 1 mark each.*

iii. *Section B would have 6 Short Answer (SA) type questions carrying 02 marks each.*

iv. *Section C would have 7 Short Answer (SA) type questions carrying 03 marks each.*

v. *Section D would have 3 Long Answer (LA) type questions carrying 05 marks each.*

vi. *Section E would have 3 source based/case based/passage based/integrated units of assessment (04 marks each) with sub-parts of the values of 1/2/3 marks.*

SECTION - A

Select and write the most appropriate option out of the four options given for each of the questions 1-20. There is no negative mark for incorrect response.

1. Before giving little Anvi her injection, the doctor applies spirit to the site, and she feels a cool sensation because the alcohol evaporates quickly, taking heat away from her skin. [1]

a) The spirit is at a low temperature.
b) The spirit loses its heat when removed from the bottle.
c) The spirit evaporates using the heat from our body.
d) The spirit kills the bacteria present on the skin.

2. When Rahim drops a sodium hydroxide pellet into water during his science experiment, what change does he observe? [1]

a) Physical change
b) Reversible chemical change
c) Chemical change
d) Reversible change

3. When Mitali dives into the swimming pool and easily cuts through the water, which property of matter is she demonstrating? [1]

a) Particles of matter have spaces between them.
b) Particles of matter are very small in size.
c) Particles of matter are continuously moving.
d) Particles of matter have property of diffusion.

4. The atoms usually exist in nature as: [1]

a) In the form of molecules
b) In the form of ions
c) In a free state
d) In the form of molecules and ions

5. According to Rutherford's atomic model, if a large playground represents an atomic size, which of the following objects best represent the size of a nucleus? [1]

a) A football
b) A Baseball
c) A tennis ball
d) A volleyball

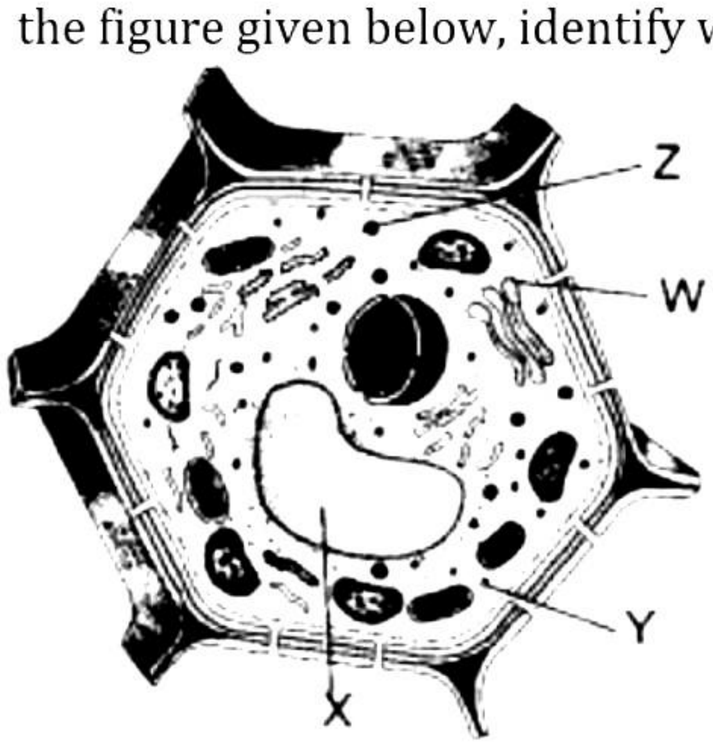
6. A wooden table is solid because: [1]

a) It is rigid
b) It has definite shape
c) It has definite volume
d) All the above

7. Which of the following pair of elements represents a mole ratio of 1:1? [1]

a) 7 g of nitrogen and 12 g of sodium
b) 20 g of sodium and 20 g of calcium
c) 14 g of nitrogen and 24 g of magnesium
d) 10 g of calcium and 6 g of carbon

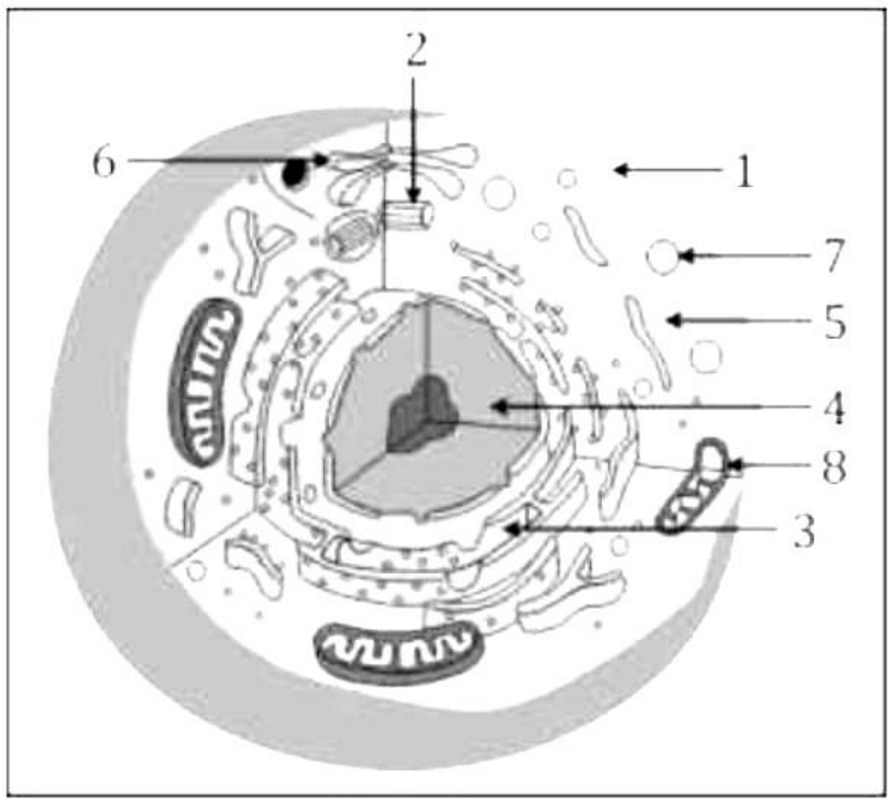
8. Given below are few statements which describe a particular cell organelle. Based on the figure given below, identify which organelle is being described. [1]



- This organelle is absent in bacteria, blue-green algae, mature sperms and red blood cells of mammals and other animals.
- It is usually called dictyosome in plants.
- It stores, modifies, packages, and condenses the proteins synthesised in the ribosomes.

a) X
b) Y
c) Z
d) W

9. Given below is a diagrammatic representation of the cell. Name the structure which is present in this cell but absent in a plant cell. [1]



a) 7
b) 4
c) 2
d) 3

10. Manures are obtained from the decomposition of dead plants and animals. They act as excellent fertilisers and help in the cultivation of crops. [1]
Find out the correct statement about manures.
(i) Manures contain large quantities of organic matter and small quantities of nutrients.
(ii) They increase the water holding capacity of the sandy soil.
(iii) They help in draining out excess water from the clayey soil.
(iv) Excessive use of manures pollutes the environment because they are made of animal excretory waste.

a) (i) and (iii)
b) (i) and (ii)
c) (ii) and (iii)
d) (iii) and (iv)

11. What is the nature of the velocity-time graph of a uniformly accelerated object? [1]

a) Straight line sloping upwards
b) Curved line
c) Straight line sloping downwards
d) Straight line parallel to the y-axis

12. The statement – 'To every action there is an equal and opposite reaction' is the [1]

a) Newton's first law
b) Newton's second law
c) Newton's third law
d) Law of Inertia

13. A stethoscope utilizes the principle of which of the following? [1]

a) Multiple refraction of sound
b) Reverberation
c) Conservation of energy
d) Multiple reflection of sound

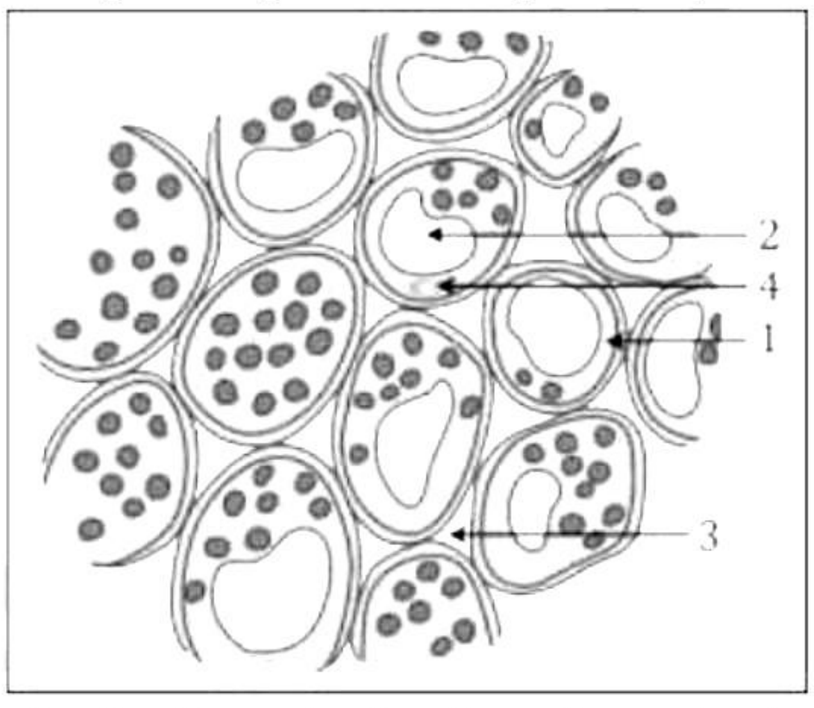
14. The sea water is denser than fresh water due to _____. [1]

a) Evaporation
b) Mixing of sand
c) Mixing of salts
d) Stagnation

15. Small intestine absorbs the digested food materials. Which type of epithelial cells present in the small intestine carry out this function? [1]

a) Stratified squamous epithelium
b) Columnar epithelium
c) Glandular epithelium
d) Cuboidal epithelium

16. The given figure shows parenchyma tissue. Identify parts 1-4. [1]



a) 1 – Vacuole, 2 – Cytoplasm, 3 – Intercellular spaces, 4 – Nucleus
b) 1 – Nucleus, 2 – Vacuole, 3 – Intercellular spaces, 4 – Cytoplasm
c) 1 – Cytoplasm, 2 – Nucleus, 3 – Intercellular spaces, 4 –Vacuole
d) 1 – Cytoplasm, 2 – Vacuole, 3 – Intercellular spaces, 4 – Nucleus

Question No. 17 to 20 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

(a) Both A and R are true, and R is the correct explanation of A

(b) Both A and R are true, and R is not the correct explanation of A

(c) A is true but R is false

(d) A is False but R is true

17. **Assertion (A)**: During evaporation of liquid, the temperature of liquid remains unaffected. [1]
Reason (R): Kinetic energy of the molecules is directly proportional to absolute temperature.

18. **Assertion (A):** Golgi bodies store, modify and pack products in vesicles. [1]
Reason (R): They are involved in the formation of lysosomes.

19. **Assertion (A):** The cells of connective tissue except blood secrete fibres. [1]
Reason (R): Fibres provide strength, elasticity, and flexibility to the tissue.

20. **Assertion (A):** Watt hour is unit of energy. [1]
Reason (R): Kilo-watt hour is unit of electric power.

SECTION - B

Question No. 21 to 26 are very short answer questions.

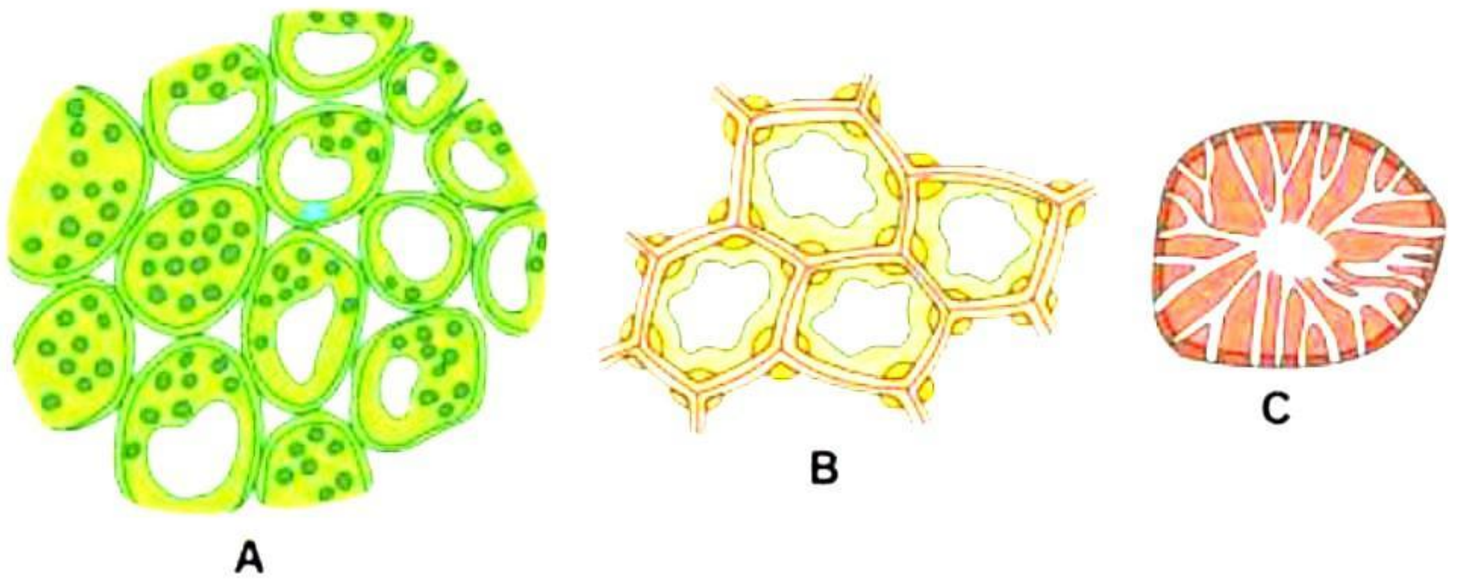
21. Nishant is a lab technician working in a pharmaceutical company, and he has to study different types of colloids used in drug formulations. He needs to take different samples based on the combinations as given below. Suggest an example for each. [2]

(a) Liquid and gas

(b) Liquid and solid

Give one example of each.

22. Figures A, B and C represent cross-section of three different types of plant tissues. [2]



(a) Which tissue - A, B or C, provides mechanical strength and flexibility to the plant body?

(b) Which tissue – A, B or C, can be modified to form air cavities in aquatic plants?

23. Why does the skin of your fingers shrink when you wash clothes for a long time? [2]

OR

Why does a person start vomiting after consuming a concentrated salt solution?

24. A moving train is brought to rest within 20 seconds by applying brakes. Find the initial velocity if retardation due to applying brakes is 2 m/s^2. [2]

25. Why do we always prefer to use seat belts in cars? Justify your answer with appropriate reasons. [2]

OR

Why do the fruits and leaves fall off the branches in strong wind?

26. Crossbreeding is a common practice in poultry farming to enhance the quality and productivity of eggs and chickens. Identify four specific desirable traits that poultry breeders often aim to achieve through crossbreeding. [2]

SECTION - C

Question No. 27 to 33 are short answer questions.

27. Kalpesh is a chemistry student working on a project to understand the concept of formula unit mass in ionic compounds. His teacher has assigned him the following task to demonstrate his understanding.

Calculate the formula unit masses of the following compounds:

- Zinc oxide (ZnO)
- Sodium oxide (Na_2O)

(Atomic mass of Zn = 65 u, Na = 23 u, O = 16 u) [3]

28. Write the names of compounds: [3]

(a) $Al_2(SO_4)_3$

(b) $CaCl_2$

(c) K_2SO_4

OR

Write the electronic configuration of the elements whose atomic numbers correspond to 7, 17 and 19.

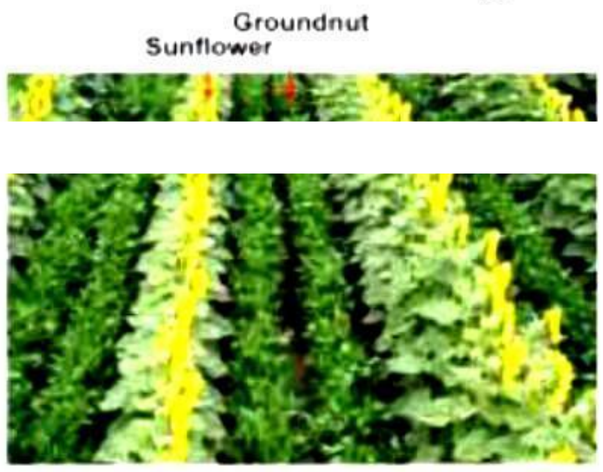
29. Give reasons: [3]

(a) It is difficult to pull out the husk of a coconut tree.

(b) We get a crunchy and granular feeling when we chew pear fruit.

(c) Branches of a tree move and bend freely in high wind velocity.

30. A field with sunflower and groundnut is shown below. [3]



(a) What pattern of cropping does the field show?
(b) Mention any two advantages of this type of cropping pattern.

31. A 10 kg ball is thrown upward with a velocity of 5 m/s. [3]
(a) Find the kinetic energy of ball at its initial position.
(b) Find its potential energy when it reaches the highest point.
(c) Calculate the maximum height the ball reaches. ($g = 10 m/s^2$).

32. [3]
In a science class, Mrs. Sharma explains the concept of the universal law of gravity, mass, and weight to her students. She uses an apple falling from a tree as an example to explain the concept of gravity, just as Sir Isaac Newton did centuries ago.
Answer the following question in one or two sentences.
(a) In a hypothetical scenario, Rohit, a student of Mrs. Sharma, travels to the moon. Would his weight differ from that on Earth? Please explain why.
(b) According to Mrs. Sharma, lifting a book on Earth is easier than lifting the same book on Jupiter. Based on this information, can we assume that the book's mass is different on Jupiter? Please provide a detailed justification for your answer.

33. [3]
(a) How will you differentiate a high pitch sound from a low pitch sound with the help of a graph?
(b) Give reasons for the following:
i. The reverberation time of a hall used for speeches should be very short.
ii. Sounds of same loudness and pitch but produced by different musical instruments like a violin and flute are distinguishable.

SECTION - D

Question No. 34 to 36 are long answer questions.

34. [5]

(a) Differentiate between three states of matter based on the following properties:

(i) Intermolecular forces

(ii) Arrangement of molecules

(b) During a laboratory experiment, Nayana discovered that when ice cubes were placed in water, they floated despite the general understanding that liquids typically have lower densities than solids. What must be the reason behind it?

OR

Answer the following questions: [3]

(a) Define physical and chemical changes. Classify the following as physical or chemical changes:

Cutting of vegetables, Rusting of an almirah, Melting of ice

(b) Julie was not able to understand the atomic model taught in class. When she came back home, her mother served her pudding cake filled with dry fruits and as soon as she saw the cake, she understood one of the atomic models of atom. [2]

(i)Which model is understood by Julie?

(ii)What are the features of this model?

35. [5]

(a) Animals of colder region and fishes of cold water have thicker layer of subcutaneous fat. Give reason.

(b) What will happen if all the blood platelets are removed from the blood?

OR

State one point of difference between:

(a) Blood and lymph

(b) Bone and cartilage

(c) Tendon and ligament

(d) Areolar and adipose tissues

(e) Xylem and phloem

36. [5]

(a)

(i) Why does the rider fall in the forward direction when a running horse stops suddenly?

(ii) Why is it easier to stop tennis ball in comparison to a cricket ball moving with the same speed?

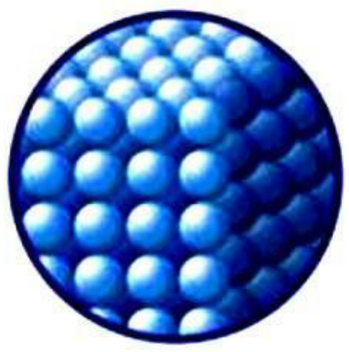
(iii) An athlete always runs some distance before taking a jump. Why?

(b) Which is having a higher value of momentum - A bullet of mass 10 g moving with a velocity of 400 m/s or a cricket ball of mass 400g thrown with the speed of 90 km/h?

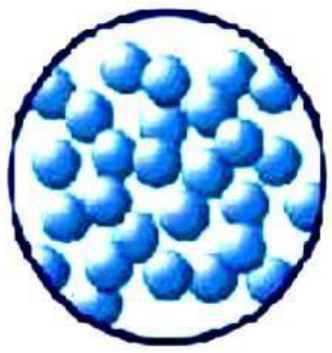
SECTION - E

Question No. 37 to 39 are case-based/data -based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts.

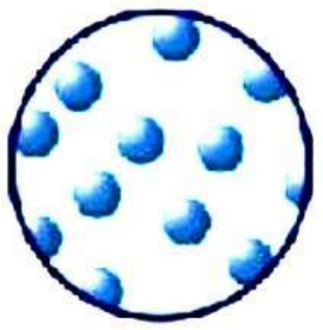
37. We know that the gases are highly compressible as compared to solids and liquids. The liquefied petroleum gas (LPG) cylinder that we get in our home for cooking, or the oxygen supplied to hospitals in cylinders is compressed gas. Now-a-days compressed natural gas (CNG) is used as fuel in vehicles. The liquid takes up the shape of the container in which they are kept. Liquids flow and change shape, so they are not rigid but can be called fluids. Solids and liquids can diffuse into liquids. The aquatic animals can breathe underwater. The rate of diffusion of liquids is greater than solid.



Solid



Liquid



Gas

(a) [2]

(i) How aquatic plants and animals can breathe underwater?

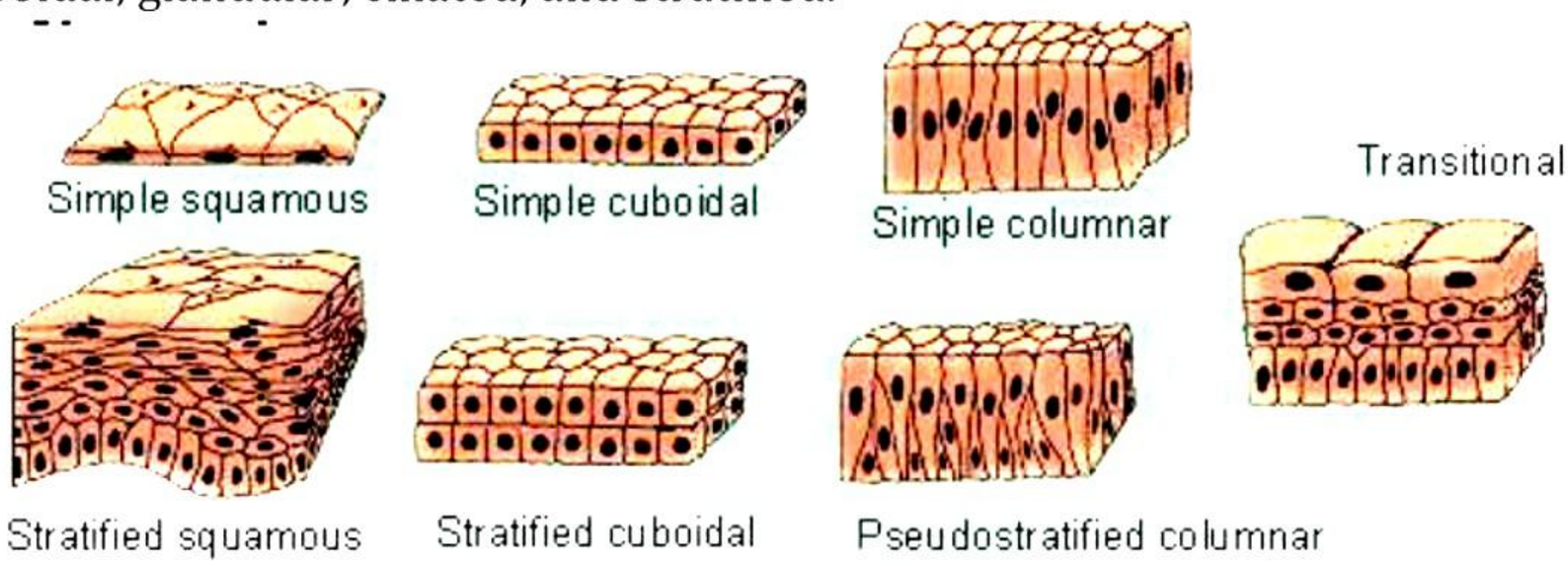
(ii) Among solids, liquids and gases which can be termed as fluids and why?

(b) Why compressed natural gas is used as fuel in vehicles these days? [2]

OR

(c) Why two different carats gold jewelry cannot be kept together? [2]

38. Epithelial tissues are widespread throughout the body. They form the covering of all body surfaces, line body cavities and hollow organs. Depending upon the shape and function of the constituent cells, epithelial tissues can be squamous, columnar, cuboidal, glandular, ciliated, and stratified. [4]



a) What is the role of ciliated epithelium?
b) Where is stratified epithelium located in the body?
c) Give two points of differences between cuboidal and columnar epithelium.

OR

c) Describe the structure, location and one function of squamous epithelium.

39. Ramesh conducts an experiment where he simultaneously drops a sheet of paper and a stone from the first floor of his school building. He observes that the paper reaches the ground later than the stone due to air resistance. Now, he imagines conducting this experiment on the moon, where there is no air.

(a) Predict what would happen if Ramesh repeated his experiment on the moon, where there is no air. Would the paper and stone reach the lunar surface at the same time? Why or why not?

(b) How does this experiment help in understanding the concept of gravity?

(c) What would gravity affect the paper and stone on Earth versus on the moon?

OR

(c) If Ramesh conducts the same experiment in the vacuum chamber. Will there be any difference in observation?

Solution

SECTION - A

1. Correct option – c: The spirit evaporates using the heat from our body.
This happens because when the spirit changes from the liquid state to the vapour state, it absorbs heat energy from the skin. The skin thus loses heat and feels cool.

2. Correct option – c: Chemical change
Sodium hydroxide pellet dissolves in water to form an aqueous solution of sodium hydroxide along with the release of heat. This is an exothermic reaction.

3. Correct option – a: Particles of matter have spaces between them
A diver can cut through water in a swimming pool because particles of matter have spaces between them.

4. Correct option – d: In the form of molecules and ions
Atoms usually exist in two ways:

- in the form of molecules
- in the form of ions.

For example, an iodine crystal is a collection of many iodine molecules. These molecules are so tiny that they are not visible to the naked eye. But what is visible is the entire iodine crystal. Similarly, in sodium chloride, the sodium ions and chloride ions being so tiny are not visible.
But we can see the compound sodium chloride as a white powder which is made up of several sodium and chloride ions.

5. Correct option – c: A tennis ball
According to Rutherford's model, the size of the nucleus is very small as compared to the size of the atom.

6. Correct option – d: All the above
A wooden table is solid as it is rigid, has definite shape, and has definite volume.

7. Correct option – c: 14 g of nitrogen and 24 g of magnesium.
14 g of nitrogen = gram atomic mass of nitrogen = 1 mole of nitrogen atoms 24 g of magnesium = gram atomic mass of magnesium = 1 mole of magnesium atoms. So, mole ratio = 1:1.

8. Correct option – d: W
W - Golgi apparatus, X - Vacuole, Y - Ribosome, Z – Lysosome
The organelle described is Golgi apparatus. It is absent in bacteria, blue-green algae, mature sperms and red blood cells of mammals and other animals. It is usually called dictyosome in plants. It stores, modifies, packages, and condenses the proteins synthesised in the ribosomes.

9. Correct option – c: 2
1 – Cell membrane, 2 - Centrosome, 3 - Endoplasmic reticulum, 4 - Nucleus,
5 - Cytoplasm, 6 - Golgi bodies, 7 - Vacuole, 8 – Mitochondrion
The cell shown in the diagram is an animal cell. Centrosome (2) is present in an animal cell but absent in a plant cell.

10. Correct option – b: (i) and (ii)
Manures are natural fertilisers. They are bulky sources of organic matter which supply nutrients in small quantities, and organic matter in large quantities. Manures are prepared by the decomposition of animal excreta and plant waste. They are environment-friendly and do not cause pollution. They increase the water-retention capacity of the soil.

11. Correct option – a: Straight line sloping upwards.
The velocity-time graph of a uniformly accelerated object is a straight-line sloping in the upward direction.

12. Correct option –c: Newton's third law.
Newton's third law states that for every action, there is an equal and opposite reaction.

13. Correct option –d: Multiple reflections of sound
A stethoscope uses the principle of multiple reflection of sound.

14. Correct option – c: Mixing of salts.
The mixing of salts causes the density of sea water to rise.

15. Correct option – b: Columnar epithelium
Columnar epithelium forms the lining of the stomach, small intestine, and colon, forming the mucous membrane. Its main function is absorption (e.g., stomach, intestine) and secretion (e.g., mucous by goblet cells).
Stratified squamous epithelium is waterproof and resistant to mechanical injury. It is found around the skin, pharynx, and oesophagus.
Cuboidal epithelium is found in the kidney tubules, thyroid vesicles, and glands.
Glandular epithelium is found in the sweat glands and endocrine glands.

16. Correct option – d: 1 – Cytoplasm, 2 – Vacuole, 3 – Intercellular spaces, 4 – Nucleus
Parenchyma cells are isodiametric in shape. They have thin cell walls and very few intercellular spaces between them.

17. A is false but R is true.
During the process of evaporation of liquid, the temperature of the liquid decreases because the surface molecules while evaporating take some amount of energy from the other molecules of liquid. Thus, evaporation leads to cooling. So, the assertion is false.
Kinetic energy is proportional to absolute temperature. So, the reason is true.

18. Both A and R are true, but R is not the correct explanation of A
Golgi bodies are responsible for modifying, sorting, and packaging of proteins in vesicles for secretion. So, the assertion is true.
Golgi bodies are also involved in the transport of lipids around the cell, and the formation of lysosomes. So, the reason is also true
Although both assertion and reason are true, the reason statement however, does not explain the assertion statement.

19. Both A and R are true, but R is not the correct explanation of A.
All cells of connective tissue except blood secrete fibres. There are three types of fibres secreted by the connective tissue cells - collagen fibres, elastic fibres, and reticular fibres. So, the assertion is true.
The fibres of the connective tissue provide strength, elasticity, and flexibility to the connective tissue. So, the reason is also true.
Although both assertion and reason are true, the reason statement however, does not explain the assertion statement.

20. A is true, but R is false.
Kilowatt hour is also a unit of energy consumed.

SECTION - B

21.

(a) Aerosol, e.g., clouds

(b) Gel, e.g., jelly

22. A – Parenchyma, B – Collenchyma, C – Sclerenchyma

(a) Tissue B or collenchyma provides mechanical strength and flexibility to the plant body.

(b) Tissue A or parenchyma can be modified to aerenchyma with air cavities in aquatic plants.

23.

- Clothes are washed with soap or detergent solution. This solution is hypertonic because it contains lower water concentration as compared to the osmotic concentration of our skin cells.
- Therefore, when skin cells come in contact with the detergent solution, they begin to lose more water by exosmosis.
- As a result, the skin over the fingers shrinks while washing clothes for a long time.

OR

- Concentrated salt solution is a hypertonic solution.
- When a person consumes a hypertonic solution, it causes irritation and excessive dehydration in the walls of the alimentary canal due to exosmosis.
- There is uncomfortable stretching of the digestive muscles which causes reverse movements and results in vomiting.

24. Given:

Final velocity, $v = 0$

Time taken $t = 20$ s

Acceleration $a = -2$ m/s^2

From the equation $v = u + at$, we have

$u = v - at$

$u = 0 - (-2) \times 20$

$\therefore u = 40$ m/s

25. The cars are provided with seat belts for passengers to prevent injuries in case of an accident. In an accident, the fast-running car stops suddenly. Due to this the momentum of the car reduces to zero in a very short time. The stretchable seat belts worn by the passengers increase the time taken by the passengers to fall forward. Due to longer time, the rate of change of momentum is reduced, and hence less stopping force acts on them. So, the passengers are saved from fatal injuries.

OR

In the beginning the fruits and leaves on the branches are in state of rest. When a strong wind blows, the branches move rapidly. However, on account of inertia of rest, the fruits and leaves tend to continue in their state of rest and fall off the branches.

26. Desirable traits achieved in poultry through crossbreeding: *(Any four)*

- Quality and size of eggs
- Low maintenance breeds
- High resistance to diseases
- Tolerance to high temperature
- Quality and quantity of chicks
- Ability to utilise cheaper diets produced from agricultural wastes

SECTION - C

27. Formula unit mass of a substance is a sum of the atomic masses of all atoms in a formula unit of a compound.

Formula unit mass of ZnO = 65 u + 16 u = 81 u

Formula unit mass of Na_2O = (23 u × 2) + 16 u = 46 u + 16 u = 62 u

28.

(a) $Al_2(SO_4)_3$ - Aluminium sulphate

(b) $CaCl_2$ - Calcium chloride

(c) K_2SO_4 - Potassium sulphate

OR

Atomic numbers and electronic configuration:

Atomic numbers	**Electronic configuration**			
	K	L	M	N
7	2	5		
17	2	8	7	
19	2	8	8	1

29.

(a) The husk of a coconut tree is made up of sclerenchyma cells which have lignified cell walls. Lignin makes the cells compact and leaves no intercellular spaces. Hence, it is difficult to pull out the husk of a coconut tree.

(b) Pear has sclerenchymatous stone cells which are granular in texture. Hence, we get a crunchy and granular feeling while chewing a pear.

(c) The branches of a tree have collenchyma cells which provide tensile strength to the plant parts. So, it moves and bends freely when wind blows.

30.

(a) The field shows intercropping of sunflower and groundnut crops.

(b) Advantages of intercropping:

- It increases the productivity of crops per unit area.
- It helps maintain soil fertility and allows better use of natural resources.

31.

(a) Given that,

$m = 10\ kg, u = 5\ m/s$

$KE = \frac{1}{2} mu^2 = \frac{1}{2} \times 10 \times 5 \times 5 = 125\ J$

(b) At the highest point, all the kinetic energy gets converted to potential energy.

$\therefore PE = 125\ J$

(c) Now,

$$h = \frac{v^2 - u^2}{2g} = \frac{0^2 - 5^2}{2 \times -10} = \frac{25}{20}$$

$\therefore h = 1.25\ m$

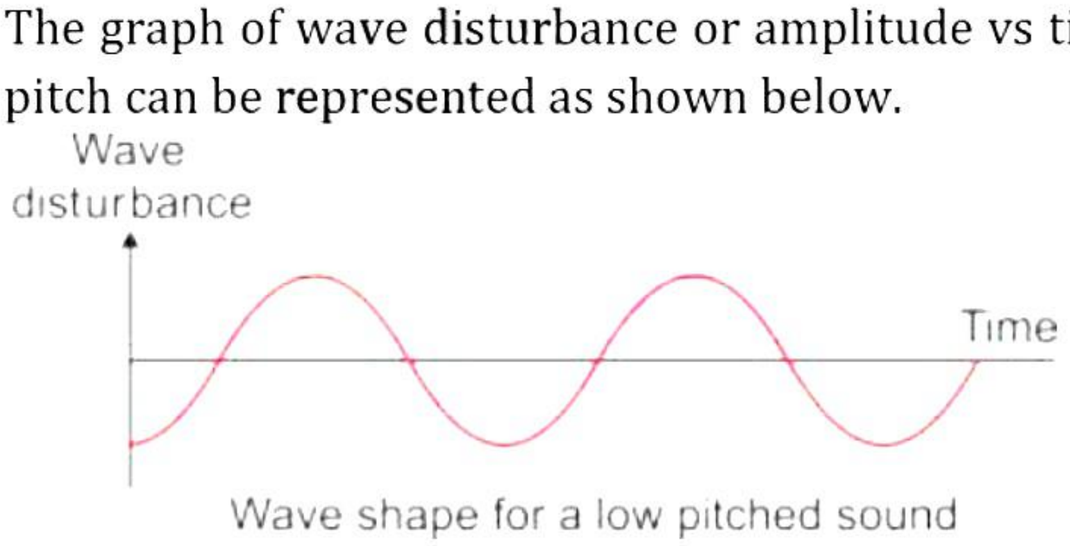
32.

(a) Yes, the weight of Rohit will change on the moon since weight is directly proportional to acceleration due to gravity.
i.e., Weight $\propto g$ ... ($\because$ mass is constant across the universe)

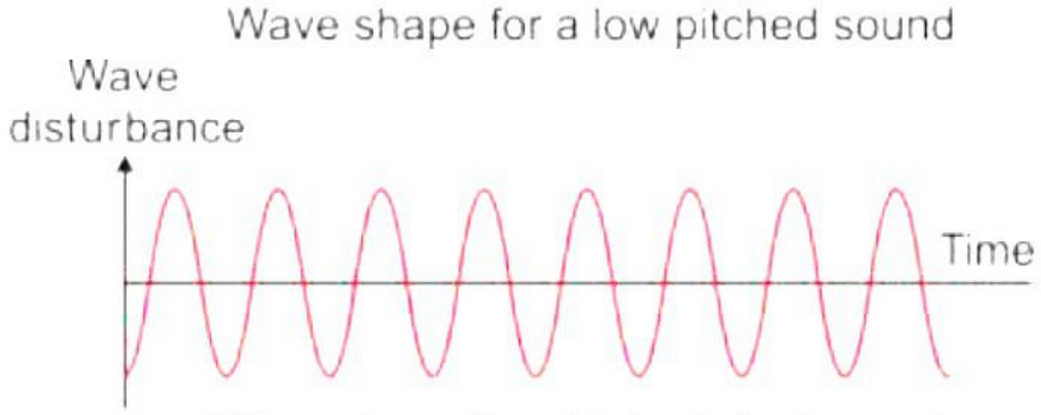
(b) No, the assumption is incorrect. Since mass is constant throughout the universe, it will remain the same on Earth and Jupiter. But we must note that the gravitational acceleration on the surface of Jupiter is much greater than that of Earth.
Hence lifting the book on Jupiter is much harder compared to Earth.

33.

(a) The graph of wave disturbance or amplitude vs time can for two waves of different pitch can be represented as shown below.



Wave shape for a low pitched sound



Wave shape for a high pitched sound

Thus, a low-pitched sound has a lower frequency, and a high-pitched sound has higher frequency.

(b)

i. If reverberation time of a hall is long, then the multiple echoes will interfere with original sound. Hence, nothing will be heard distinctly. For this reason, the reverberation time of the hall should be very short.

ii. Due to the characteristic of quality or timbre of sound waves, the two sounds are distinguishable.

SECTION - D

34.

(a)

Solids	Liquids	Gases
Have maximum intermolecular forces of attraction. Have closely packed molecules.	Have lesser intermolecular forces of attraction. Have less closely packed molecules.	Have least intermolecular forces of attraction. Have molecules which are far away from each other.

(b) When water freezes to form ice, its volume increases, and hence, its density decreases. As ice has a lower density than water, it floats on water.

OR

(a)

Physical change	Chemical change
(i) No new product is formed.	(i) New products are formed.
(ii) It is a temporary change.	(ii) It is a permanent change.
(iii) The mass of substance does not alter in this change.	(iii) The mass of substance does alter in this change.
(iv) Examples: Melting of wax, cutting of wood	(iv) Examples: Rusting of iron, burning of crackers

Physical Change	Chemical Change
Cutting of vegetables	Rusting of an almirah
Melting of ice	Spoiling of food

(b)

(i) Julie understood the Thomson's model of atom after looking at the pudding cake.

(ii) Features of the Thomson's model are:

1. An atom consists of a positively charged sphere and the electrons are embedded in it.
2. The negative and positive charges are equal in magnitude. So, the atom as a whole is electrically neutral.

35.

(a) In animals, subcutaneous fat functions as an insulating layer that prevents heat loss from the body in cold environment. So, animals of colder regions and fishes of cold water possess thick layer of subcutaneous fat. Fat also serves as reserve food during periods of food scarcity.

(b) Blood platelets are responsible for the release of thromboplastin necessary for blood clotting at the site of injury. In the absence of blood platelets, blood clotting will not occur after injury and bleeding will continue from the wound. This will finally cause the death of the injured person.

OR

(a)Difference between blood and lymph:

Blood	Lymph
• Blood consists of RBCs, WBCs, and platelets.	• Lymph consists of only WBCs but no RBCs and platelets.

(b)Difference between bone and cartilage:

Bone	Cartilage
Bone is a strong, non-flexible tissue and has a matrix made of calcium and phosphorus.	Cartilage is a strong, flexible tissue and has a matrix made of proteins and sugars.

(c) Difference between tendon and ligament:

Tendon	Ligament
Tendon is a strong but less elastic tissue that connects the muscles to the bones.	Ligament is a strong but highly elastic tissue that connects bone to bone.

(d)Difference between areolar tissue and adipose tissue:

Areolar tissue	Adipose tissue
Areolar tissue connects the skin to the lower muscles and fills the space in between the organs.	Adipose tissue contains fat globules, lies below the skin, absorbs external shocks and injuries, and acts as an insulator.

(e)Difference between xylem and phloem:

Xylem	Phloem
Xylem is made of dead cells which conduct water and minerals in plants.	Phloem has living cells which conduct food from leaves to other parts of the plant.

36.

a)

i. The rider falls in the forward direction when a running horse stops suddenly because of inertia of motion which is the tendency to be in state of motion and continue even when the horse stops suddenly. (b) (c)

ii. Mass is the measure of inertia. A cricket ball has larger mass than a tennis ball. Thus, it has larger inertia than the tennis ball. Therefore, the cricket ball needs a larger force to be stopped.

iii. If the athlete runs some distance before taking the jump, then inertia of motion helps the athlete to continue the state of motion which aids him to take a longer jump.

b) Given that,

Mass of Bullet = 10g = 0.01 kg

Velocity = 400m/s

Momentum of bullet = m x v = 0.01 x 400 = 4 kg m/s

Mass of Cricket ball = 400g = 0.4kg

Velocity = 90km/h = $\frac{5}{18} \times 90$ = 25 m/s

Momentum of ball = 0.4 x 25 = 10 kg m/s.

Thus, the cricket ball has higher momentum than the bullet.

SECTION - E

37.

(a)

(i) Aquatic plants and animals can breathe underwater because atmospheric oxygen gas dissolves in water due to diffusion.

(ii) Only liquids and gases can be termed fluids because they both have the unique property of being fluids, which is that they can flow.

(b) Compressed natural gas (CNG) is used as fuel in vehicles these days because,

(i) CNG has high compressibility,

(ii) Large volumes of a gas can be compressed into a small cylinder,

(iii) It can be transported easily.

OR

(c) Two different carats of gold jewellery cannot be kept together because the gold from higher-carat jewellery would get diffused into the jewellery made up of lower-carat gold. This results in the loss of gold from higher-carat jewellery. Hence, it is advisable to keep different-carat gold jewellery separately.

38.

(a) Ciliated epithelium helps in the movement of mucus, urine, eggs, sperms, and cerebrospinal fluid in a particular direction.

(b) Stratified epithelium is found in places where there is much wear and tear, such as the epidermis of skin and lining of the mouth cavity.

(c) Differences between cuboidal and columnar epithelium:

Cuboidal epithelium	Columnar epithelium
1. Cells are cube shaped.	1. Cells are tall and column-like.
2. Provides mechanical support.	2. Helps in absorption and secretion and facilitates movement across the epithelial barrier.
3. Forms the lining of kidney tubules and ducts of salivary glands.	3. Forms the inner lining of the intestine, stomach and colon and lining of gall bladder.

OR

c) **Squamous epithelium**

Structure:

- The cells in the squamous epithelium are extremely thin and flat and are arranged edge to edge forming a delicate lining or covering.

Location:

- Squamous epithelium forms the lining of cavities of ducts and blood vessels, lines the chambers of the heart, covers the skin, and lining of the mouth.
- It also lines pharynx, oesophagus, anal canal, vagina, and lower part of urethra.

Function:

- Squamous epithelium provides protection to the underlying parts against abrasion (mechanical injury) and entry of germs or chemicals.
- It also helps in excretion, gas exchange and secretion of coelomic fluid.

39.

(a) The paper and stone would reach the surface simultaneously on the moon due to a lack of air resistance.

(b) This experiment helps us understand that gravity acts on all objects equally, but air resistance can affect their fall.

(c) On Earth, gravity pulls both objects down, but air resistance affects them differently. On the moon, without air resistance, gravity affects them equally. As a result, irrespective of mass, both objects will hit the ground simultaneously.

OR

(c) In a vacuum chamber, both the paper and stone would fall at the same rate.