SAMPLE PAPER - 1

Class 09 - Science

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. Match the following with the correct response:-   **[1]**

(1) Element	(A) Sugar
(2) Compound	(B) Mercury
(3) Mixture	(C) Salt solution
(4) Liquid element	(D) Gold

    a) 1-B, 2-D, 3-A, 4-C   b) 1-D, 2-A, 3-C, 4-B

    c) 1-C, 2-B, 3-D, 4-A   d) 1-A, 2-C, 3-B, 4-D

2. The most abundant material on the plant cell wall is: **[1]**

    a) proteins   b) lipids

    c) wax   d) cellulose

3. Area under a v - t graph represents a physical quantity which has the unit   **[1]**

    a) ms^{-1} b) m^2

    c) m   d) m^3

4. Animal husbandry is the scientific management of   **[1]**

i. animal breeding

ii. culture of animals

iii. animal livestock

iv. rearing of animals

    a) (ii), (iii) and (iv)   b) (i), (ii) and (iv)

    c) (i), (iii) and (iv)   d) (i), (ii) and (iii)

5. Survival of plants in terrestrial environment has been made possible by the presence of **[1]**

    a) conducting tissue   b) apical meristem

    c) parenchymatos tissue   d) intercalary meristem

6. The structure which forms a barrier between the protoplasm of the cell and its external environment in an animal cell is: **[1]**

    a) plasma membrane   b) cell coat

    c) cell wall   d) mucilage

7. Calculate the formula unit mass of $ZnCl_2$? (nearest approximation) **[1]**

    a) 111 u   b) 123 u

   c) 124 u   d) 137 u

8. To prepare a mount of human cheek cell, the sample is collected from: **[1]**

    a) outer side of cheek with a blade   b) inner side of cheek with a toothpick

    c) inner side of cheek with a blade   d) outer side of cheek with a toothpick

9. An object weights 10 N in air. When immersed fully in water, it weighs only 8 N. The weight of the liquid displaced by the object will be **[1]**

    a) 12 N   b) 8 N

    c) 2 N   d) 10 N

10. Which of the following is the position-time graph for a body at rest? **[1]**
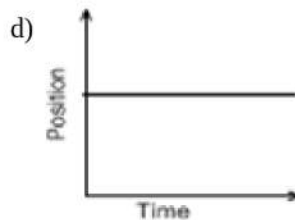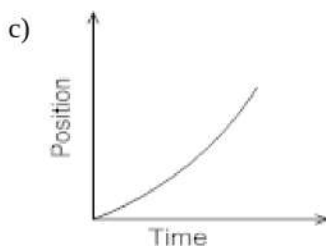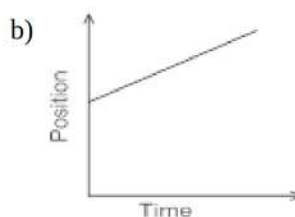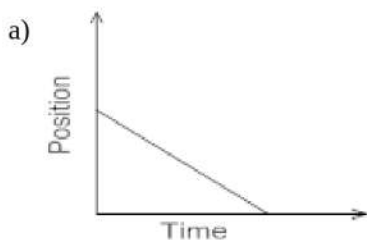
11. A sample of $CaCO_3$ contains 3.01×10^{23} ions of Ca^{+2} and CO_3^{-2}. The mass of the sample is: **[1]**

    a) 200 g   b) 50 g

	c) 100 g		d) 5 g	

12. The cells enclosing the stoma are called _____ cells. **[1]**

    a) cambial   b) guard

    c) subsidiary   d) epidermal

13. Viruses do not show any characteristic of living until they enter a living cell, because of the absence of: **[1]**

    a) membrane   b) mitochondria

    c) nucleic acid   d) proteins

14. Which of the following correctly represents 360 g of water? **[1]**

    a. 2 moles of H_2O

    b. 20 moles of water

    c. 6.022×10^{23} molecules of water

    d. 1.2044×10^{25} molecules of water

    a) (a)   b) (a) and (d)

    c) (b) and (c)   d) (b) and (d)

15. What happens on adding dilute HCl to a mixture of iron filling and sulphur powder? **[1]**

    a. H_2S is formed.

    b. A colourless and odourless gas is formed.

    c. A greenish solution appears.

    d. FeS is formed.

    a) (a), (b) and (c) are correct   b) (b) and (c) are correct

    c) All of these   d) (a) and (b) are correct

16. Milk does not provide _____ **[1]**

    a) Iron   b) Carbohydrates, protein and fats.

    c) Vitamin A and D   d) Minerals like phosphorus and calcium

17. **Assertion (A):** The bus travels 250 km from Delhi to Jaipur towards the West and then comes back to the starting point. Total displacement is zero. **[1]**

    Reason (R): The average velocity of the bus for the whole journey (both ways) is 0 kilometers per hour.

    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):** The term vapour is used to represent the gaseous state of a substance that is otherwise liquid at room temperature. **[1]**

    Reason (R): It is proper to regard the gaseous state of ammonia as vapours.

    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):** Epidermal cells on the aerial parts of the plant often secrete a waxy, water-resistant layer on their outer surface. [1]

    Reason (R): This aids in protection against loss of water, mechanical injury, and invasion by parasitic fungi.

    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):** Electrons moving in the same orbit will lose or gain energy. [1]

    Reason (R): On jumping from higher to lower energy level, the electron will gain energy.

    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. A ball is dropped from a height of 10 m. If the energy of the ball reduces by 40 per cent after striking the ground, how high can the ball bounce back? ($g = 10$ ms^{-2}) [2]

OR

Give reason : Ice bergs floating in the sea are dangerous for the ship.

22. How will you demonstrate that air contains water vapours? [2]

23. A wave is moving in the air with a velocity of 340 m/s. Calculate the wavelength if its frequency is 512 Hz. [2]

24. What are the characteristics of the particles of matter. [2]

25. An object of mass 1 kg travelling in a straight line with a velocity of 10 ms^{-1} collides with and sticks to a stationary wooden block of mass 5 kg. Then they both move off together in the same straight line. Calculate the total momentum just before the impact and just after the impact. Also, calculate the velocity of the combined object. [2]

OR

Which of the following has more inertia:

  a. a rubber ball and a stone of the same size?

  b. a bicycle and a train?

  c. a five-rupee coin and a one-rupee coin?

26. The relative atomic mass of copper is 63.5u. It exists as two isotopes which are $^{63}_{29}Cu$ and $^{65}_{29}Cu$. Calculate the percentage of each present in if. [2]

Section C

27. Two children are at opposite ends of an aluminium rod. One strikes the end of the rod with a stone. Find the ratio of times taken by the sound wave in air and in aluminium to reach the second child. [3]

28. In the following table, the mass numbers and the atomic numbers of certain elements are given. [3]

Element	A	B	C	D	E
Mass no.	1	7	14	40	40
At. no.	1	3	17	18	20

  i. Select a pair of isobars from the above table.

  ii. What would be the valency of element C listed in the above table?

iii. Which two sub-atomic particles are equal in number in a neutral atom?

29. State which of the following situations are possible and give an example for each of these. [3]

(a) An object moving with a constant acceleration but with zero velocity

(b) An object moving in a certain direction with an acceleration in the perpendicular direction.

OR

A stone is thrown in a vertically upward direction with a velocity of 5 ms^{-1}. If the acceleration of the stone during its motion is 10 ms^{-2} in the downward direction, what will be the height attained by the stone and how much time will it take to reach there?

30. An automobile engine propels a 1,000 kg car A along a levelled road at a speed of 36 km h^{-1}. Find the power if [3] the opposing frictional force is 100 N. Now, suppose after travelling a distance of 200 m, this car collides with another stationary car B of same mass and comes to rest. Let its engine also stop at the same time. Now, car B starts moving on the same level road without getting its engine started. Find the speed of the car B just after the collision.

31. The motion of a body of mass 5 kg is shown in the velocity-time graph. [3]
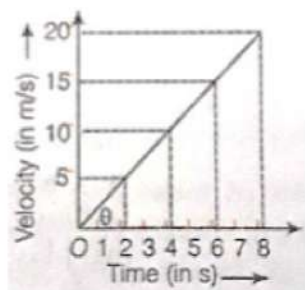
Find from the graph

i. The acceleration.

ii. The force acting on the body.

iii. The change in momentum of the body in 2 s after the start.

32. Differentiate between RER and SER [3]

OR

Differentiate between diffusion and osmosis. What is its importance?

33. i. Identify the tissue given in the following figure. [3]

ii. Mention the characteristic features of the cells.

iii. Specify the function of this tissue.

iv. Name any one part of the plant, where these cells are present.

Section D

34. A stone is allowed to fall from the top of a tower 100 m high and at the same time another stone is projected [5] vertically upwards from the ground with a velocity of 25 ms^{-1}. Calculate when and where the two stones will meet.

OR

Define acceleration due to gravity. Derive an expression for acceleration due to gravity in terms of mass of the earth (M) and universal gravitational constant (G).

35. What are cell organelles? Write the names of different cell organelles. **[5]**

OR

i. Describe the role played by the lysosomes. Why are they termed as suicidal bags? How do they perform their function?

ii. What happens to the dry raisins, when placed in plain water for some time? State the reason for whatever is observed. What would happen if these raisins are then placed in concentrated salt solution?

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 text carefully and answer the questions:** **[4]**

Permanent tissues are of two types that is Simple permanent tissues and Complex permanent tissues.

Simple permanent tissues subdivided as follows:

i. **Parenchyma:** Tissues provide support to plants. They are loosely packed and has large intracellular space. Parenchyma with chlorophyll which performs photosynthesis is called chlorenchyma.

ii. **Collenchyma:** Tissue are thickened at the corners, have very little intercellular space. It allows easy bending of various parts of a plant without breaking.

iii. **Sclerenchyma:** Cells of this tissue are dead and commonly seen in the husk of a coconut.
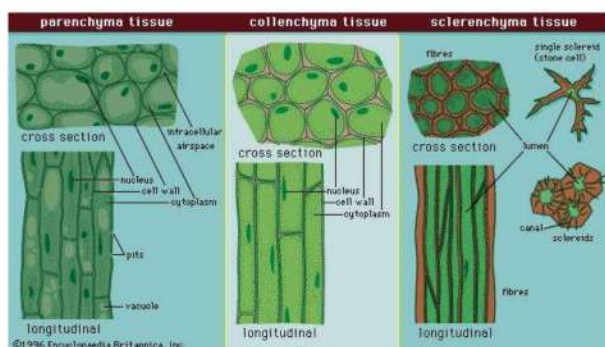
(i) In which of the simple plant tissue, deposition of lignin is found? Also describe lignin.

(ii) Why is cork impervious to gases and water?

OR

Which type of tissue is present in the cortex of the root and veins of the leaves?

38. **Read the text carefully and answer the questions:** **[4]**

The practice of keeping or rearing, caring, and management of honey bee on a large scale for obtaining honey and wax is called apiculture. The place where bees are raised is called an apiary. Bee-keeping requires low investment and generates additional income, hence it is done by farmers along with agriculture.

Following are the Honey bee varieties that are used for bee-keeping as follows:

Indigenous varieties	Exotic varieties
Apis cerana indica (Indian bee)	Apis mellifera (Italian bee)
Apis dorsata (Rock bee), Apis florae (Little bee)	Apis adamsoni (South African bee)

(i) Why bee keeping should be done in good pasturage?

(ii) Does honey bee help in pollination? Which type of flowers attracts the honey bee?

(iii) Mention the products obtained from the honey bee.

OR

What is the best season to start beehive?

39. **Read the text carefully and answer the questions:**   **[4]**

When a solution of silver nitrate is added to a solution of sodium chloride, the silver ions combine with the chloride ions to form a precipitate of silver chloride. Thus, Sodium chloride (NaCl) reacts with silver nitrate ($AgNO_3$) to produce silver chloride (AgCl) and sodium nitrate ($NaNO_3$).

(a) $Ag^+ + Cl^- \rightarrow AgCl(s)$

(i) What mass of silver nitrate will react with 5.85 g of sodium chloride to produce 14.35 g of silver chloride and 8.5 g of sodium nitrate?

(ii) Calculate the number of oxygen atoms present in 1 gram of calcium carbonate.

(iii) Calculate the mass of 0.5 mole of nitrogen gas.

OR

Calculate the number of molecules in 50 g of NaCl.

[Atomic mass of Ca = 40 u, C = 12 u, O = 16 u, N = 14u, Na = 23u, Cl = 3 5.5u and Na = 6.022×10^{23} mol^{-1}]

SAMPLE PAPER - 1

Class 09 - Science

Section A

1. **(b)** 1-D, 2-A, 3-C, 4-B
   Explanation:
   i. Solid Element - Gold occurs in solid state.
   ii. Compounds - Sugar(Cane sugar - $C_{12}H_{22}O_{11}$)is made of two or more elements (C, H and O) which are chemically combined in a fixed proportion by mass.
   iii. Mixture - Salt solution consists of two or more compounds (Sodium chloride,and Water)which are not chemically combined.
   iv. Liquid element - Mercury is an element which is a liquid at room temperature.

2. **(d)** cellulose
   Explanation: Cellulose is an important structural component of the primary cell wall of green plants, many forms of algae, and the oomycetes. Some species of bacteria secrete it to form biofilms. Thus, cellulose is the most abundant organic polymer on Earth.

3. **(c)** m
   Explanation: The area under the velocity-time graph gives the distance (magnitude of displacement) which has the unit: metre (m)

4. **(c)** (i), (iii) and (iv)
   Explanation: Animal husbandry is scientific management of animal breeding, animals livestock, and rearing of animals.

5. **(a)** conducting tissue
   Explanation: The conducting tissues in plants conduct different saps and have different structures. The primary conducting tissues of plants are xylem and phloem. Xylem conducts water from roots to the other parts of the plant, whereas phloem transports food and other material from the leaves to other parts of plants.

6. **(a)** plasma membrane
   Explanation: The cell membrane (also known as the plasma membrane) is a biological membrane that separates the interior of all cells from the outside environment (the extracellular space). It consists of a lipid bilayer with embedded proteins.

7. **(d)** 137 u
   Explanation: Formula unit mass of $ZnCl_2$ is $(66 + 35.5 \times 2 = 137u)$

   The atomic mass of Zn is 66 and the atomic mass of Cl is 35.5

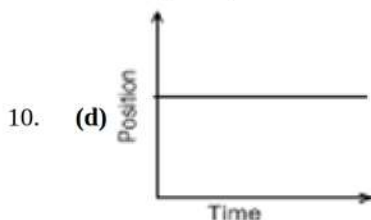8. **(b)** inner side of cheek with a toothpick
   Explanation: While preparing a mount of human cheek cell, the sample is collected from the inner side of the cheek using a toothpick, which will collect some cheek cells.

9. **(c)** 2 N
   Explanation: Weighs of air = 10 N
   When immersed fully in water = 8N
   The weight displaced = 10N – 8N = 2N

10. **(d)**

   Explanation: The above graph shows an object which is not moving i.e. it is at rest.
   The straight horizontal line parallel to the time axis shows that the distance covered by the body remains constant with the change in time.

11. **(b)** 50 g

Explanation: The mass of one mole of $CaCO_3$ is equal to 100 g. 6.022×10^{23} ions are equivalent to one mole. Therefore, mass of 3.01×10^{23} ions will be equivalent to $(\frac{100}{2})$ g or 50 g.

12. **(b)** guard

Explanation: Each stoma is bounded by a pair of specialized epidermal cells or two kidney-shaped cells called guard cells. The concave sides of these guard cells face each other and have a space forming the stomatal opening. A stoma is composed of two guard cells that regulate the opening and closing of the stoma.

13. **(a)** membrane

Explanation: Viruses are only crystalline genetic materials in the form of RNA and DNA. They lack any membrane. After getting incorporated in the host DNA they become functional otherwise remain inactive.

14. **(d)** (b) and (d)

Explanation: (b) and (d) correctly represent 360g of water.

We know that,

(b) 1 mole of water = molar mass of water = 18g

Thus, 20 moles of water = 18g $\times$ 20 = 360g

(d) 1 mole of water = 6.022×10^{23} molecules of water = 18g of water

Thus, 1.2044×10^{25} molecules of water = $\frac{18 \times 1.2044 \times 10^{25}}{6.022 \times 10^{22}}$ = 360 g

15. **(b)** (b) and (c) are correct

Explanation: $Fe(s) + 2HCl(aq) \rightarrow FeCl_2(aq) + H_2(g)$

Sulfur will not react with HCl and it will not conduct electricity.

$FeCl_2$ is a Pale blue-green. And H_2 is a colourless and odourless gas.

So, Statement B and C are the correct statements.

16. **(a)** Iron

Explanation: Including milk in your daily diet enables you to increase your intake of calcium, which you need for your bones and teeth. While milk contains a trace amount of iron, it does not contain enough for it to be your only source of this nutrient in your diet.

17. **(b)** Both A and R are true but R is not the correct explanation of A.

Explanation: In this case, the bus travels 250 km from Delhi to Jaipur towards the West and then comes back to starting point Delhi in the reverse direction. So, the total displacement.

18. **(c)** A is true but R is false.

Explanation: It is not proper to regard ammonia in a gaseous state as vapour because ammonia is not liquid at room temperature.

19. **(a)** Both A and R are true and R is the correct explanation of A.

Explanation: Epidermal cells on the aerial parts of the plant often secrete a waxy, water-resistant layer on their outer surface. This aids in protection against loss of water, mechanical injury, and invasion by parasitic fungi. Since it has a protective role to play, cells of epidermal tissue form a continuous layer without intercellular spaces.

20. **(d)** A is false but R is true.

Explanation: Electrons moving in the same orbit will not lose or gain energy. On jumping from higher to lower energy level, the electron will lose energy.

Section B

21. Let, the mass of a ball ='m'

The energy possessed by a ball at height (h) = mgh = m $\times$ 10 $\times$ 10 = 100 mJ. (g= 10 ms^{-2})

If energy is reduced by 40%, then the remaining energy = 100mJ - 40mJ= 60 mJ.

Let h' be the height attained by a ball after bouncing back.

Now, Remaining energy = mgh'

Therefore, 60 m = m $\times$ 10 $\times$ h' or h' = 6 m.

OR

It is found that an iceberg floats in sea water with 90% of its volume below water and 10% of its volume above sea water. Ice bergs are extremely dangerous for shipping as under water ice can hit the ship and sink it.

22. Thoroughly dry a glass beaker and take some crushed ice in it. After sometime, droplets of water appear on the outer surface of glass. It is because of water vapours present in air, which get condensed when they come in contact with the glass surface where the temperature is very low.

23. Frequency = 512 Hz, speed of the sound = 340 m/s

Since $v = \lambda u$

$\lambda = v/u = 340/512 = 0.66m$

24. The important characteristics of the particles of matter are as :

1. Every matter is made up of particles.

2. The particles constituting a matter are very small in size.

3. The particles have empty or vacant spaces in them known as interparticular spaces.

4. Particles are not stationary and are in a state of motion.

5. Attractive forces are present in the particles of a substance. These are called interparticular forces.

6. The motion of particles increases with the rise in temperature due to increased kinetic energy.

25. For object: $m_1 = 1kg$

$u_1 = 10\ ms^{-1}$

For wooden block:

$m_2 = 5\ kg$

$u_2 = 0$

Momentum just before collision

$= m_1u_1 + m_2u_2$

$= 1 \times 10 + 5 \times 0$

$= 10\ kg\ ms^{-1}$

Mass after collision $= (m_1 + m_2)$

$= 1 + 5 = 6\ kg$

Let velocity after collision = v

$\therefore$ Momentum after collision $= 6 \times v$

Using the law of conservation of momentum

Momentum after collision = Momentum before collision

$6 \times v = 10$

$\Rightarrow v = \frac{10}{6} = 1.67\ ms^{-1}$

OR

As we know mass of body is the measure of its inertia, that is more the mass of a body, more is its inertia. So,

a. Stone has more inertia than a rubber ball of the same size.

b. Train has more inertia than a bicycle, and

c. A five-rupee, coin has more inertia than a one-rupee coin.

26. Let the percentage of $^{63}_{29}Cu$ isotope = x

$\therefore$ The percentage of $^{65}_{29}Cu$ isotope = $100 - x$

From the above data, the relative atomic mass of Cu = $\frac{63 \times x}{100} + \frac{65 \times (100 - x)}{100}$

But the given relative atomic mass of Cu = 63.5u

$\therefore \frac{63 \times x}{100} + \frac{65 \times (100 - x)}{100} = 63.5u$

$63x + 6500 - 65x = 6350$

$-2x = 6350 - 6500$

$= -150$

or $2x = 150$

$x = 75u$

$\therefore$ Percentage of $^{63}_{29}Cu$ isotope = 75%

Percentage of $^{65}_{29}Cu$ isotope = $100 - 75 = 25\%$

Section C

27. Since speed of sound in air = 344 m/s

and speed of sound in aluminium = 6420 m/s

we know that v = distance/time therefore time = d/v

time taken by sound wave in air/time taken by sound wave in aluminium

$= \frac{d}{344} : \frac{d}{6420} = \frac{6420}{344} = \frac{18.66}{1}$

the sound will take 18.66 times more time through air than in aluminium in reaching other boy.

28. i. D and E have the same mass number but different atomic numbers. Hence, they are a pair of isobars.

 ii. Electronic configuration of C is 2(K), 5(L). Hence, its valency is three because it gains three electrons to attain a stable electronic configuration.

 iii. For a neutral atom, Number of electrons = Number of protons

Thus, electrons and protons are equal in numbers in a neutral atom.

29. (a)An object with a constant acceleration can still have the zero velocity. For example an object which is at rest on the surface of earth will have zero velocity but still being acted upon by the gravitational force of earth with an acceleration of 9.81 ms^{-2} towards the center of earth. Hence when an object starts falling freely can have contant acceleration but with zero velocity.

(b)When an athlete moves with a velocity of constant magnitude along the circular path, the only change in his velocity is due to the change in the direction of motion. Here, the motion of the athlete moving along a circular path is, therefore, an example of an accelerated motion where acceleration is always perpendicular to direction of motion of an objectat a given instance. Hence, it is possible when an object moves in a circular path.

OR

u = 5 ms^{-1}, a = -10 ms^{-2}

v = 0 (since at maximum height its velocity will be zero)

v = u + at = 5 + (-10) × t

0 = 5 – 10t

10t = 5, or, t = 5/10 =0.5second.

s = ut + $\frac{1}{2}$at^2= 5 × 0.5 + $\frac{1}{2}$ × (-10) × 0.5^2

= 2.5 – 1.25 = 1.25m

30. $m_A = m_B$ = 1000 kg. v = 36 km/h= 10 m/s

Frictional force = 100 N

Since, the car A moves with a uniform speed, it means that the engine of car applies a force equal to the frictional force.

$\frac{Force \times distance}{time}$ Power =

= F.v

= 100 N × 10 m/s = 1000 W

after collision,

$m_A u_A + m_B u_E = m_A v_A + m_B$

1000 × 10 + 1000 × 0 = 1000 × 0 + 1000 × v_B

v_B = 10 ms^{-1}.

31. i. Acceleration = Slope of the line of the velocity-time graph,

$a = \frac{v_2 - v_1}{t - t_1} = \frac{5-0}{2-0} = \frac{5}{2} = \frac{10}{4} = \frac{15}{6}$ = 2.5 m/s^2

 ii. The force acting on the body is given by

F = ma = 5 × 2.5 = 12.5 N

 iii. ∴ Change in momentum = mv -mu [∵ u = 0 and v = 5 m/s]

= 5 × 5 - 5 × 0

= 25 kg-m/s

Sr.No.	SER	RER
1.	Ribosomes are absent.	Ribosomes occur over the surface of RER.
2.	Synthesis is specialised to synthesize lipids and steroids.	Synthesis is specialised to synthesize proteins.
3.	The products do not pass into lumen.	The products pass into lumen of E.R. for transport to other places.
4.	Less stable	More stable

32.

5.	Found in Epithelial cells, Intestinal cells, Sarcoplasmic Reticulum	Found in Pancreatic Exocrine cells

OR

| 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 lute 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.

33. i. The tissue given in the figure is collenchyma.

ii. The cells of collenchyma are living, elongated, thickened at the corners and have very little intercellular space.

iii. It provides mechanical support and flexibility to the plant.

iv. It is present in leaf stalks, below the epidermis.

Section D

34. Acceleration due to gravity (g) = 10 ms^{-2}
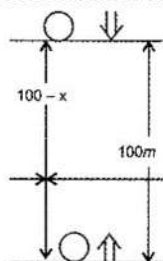
Initial velocity (u) = 0

Distance (S) = 100 - x

Time (t) = ?

$S = ut + \frac{1}{2} gt^2$

$\Rightarrow (100 - x) = 0 \times t + \frac{1}{2} 10 \times t^2$

$\Rightarrow 100 - x = 5t^2$ ...(1)

For the stone moving vertically upward:

Initial velocity (u) = 25 ms^{-1}

Time (t) = ?

Acceleration due to gravity (g) = - 10ms^{-2}

[In upward direction g is -ve]

Distance (S) = x

We know: $S = ut + \frac{1}{2} gt^2$ a

$\Rightarrow x = 25 \times t + \frac{1}{2}(- 10t^2)$

$\Rightarrow x = 25t - 5t^2$ ...(2)

Substituting the value of x from (2) in (1) we get,

$100 - (25t - 5t^2) = 5t^2$

$100 - 25t + 5t^2 = 5t^2$

$25t = 100$

t = 4 s

Put the value of t in (1)

$\Rightarrow 100 - x = 5(4)^2$

$\Rightarrow 100 - x = 80$

x = 20 m

∴ the stones will meet at a height of 20 m from ground, after 4s.

OR

Acceleration due to gravity: The acceleration produced in the motion of a body falling under the force of gravity is called acceleration due to gravity. It is denoted by 'g'. It is expressed in units, ms^{-2}.

Expression for acceleration due to gravity: The force (F) of gravitational attraction on a body of mass m due to earth of mass M and radius R is given by, $F = G\frac{mM}{R^2}$ .....(1)

Where, 'G' is universal gravitational constant.

According to Newton's second law of motion: Force is the product of mass and acceleration.

∴ F = ma

But the acceleration due to gravity is represented by the symbol g.

Therefore, we can write; F = mg .....(2)

From equation (1) and (2), we get

$mg = G\frac{mM}{R^2}$ or $g = \frac{GM}{R^2}$ ...(3)

When the body is at a distance 'R' from centre of the earth then $g = \frac{GM}{R^2}$.

It may be noted that, value of 'g' is independent of mass of object.

35. Cell organelles are the intracellular structures present in the cytoplasm. Various cell organelles are –

1. Mitochondrion – It produces energy

2. Endoplasmic reticular – synthesize lipids and proteins

3. Golgi apparatus - Storage, packaging and dispatch various substances.

4. Lysosomes – Digest intracellular substances

5. Ribosomes – Synthesize proteins

6. Vacuoles – Provide turgidity and store house of various organic substances

OR

i. • Lysosomes are membrane-bound sacs filled with digestive enzymes. These enzymes are made by the rough endoplasmic reticulum.
   • Lysosomes are a kind of waste disposal system of the cell. During the disturbance in cellular metabolism, e.g. when a cell gets damaged, lysosomes present in the cell may burst and the enzymes digest the damaged cell. Hence, lysosomes are called as 'suicidal bags' of a cell.
   • Lysosomes break up the foreign materials entering into the cell, such as bacteria or food into small pieces.

ii. The dry raisins, when placed in plain water for some time will swell up due to endosmosis. If these raisins are again placed in a concentrated salt solution, they will shrink, due to exosmosis.

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. **Read the text carefully and answer the questions:**

Permanent tissues are of two types that is Simple permanent tissues and Complex permanent tissues.

Simple permanent tissues subdivided as follows:

i. **Parenchyma:** Tissues provide support to plants. They are loosely packed and has large intracellular space. Parenchyma with chlorophyll which performs photosynthesis is called chlorenchyma.

ii. **Collenchyma:** Tissue are thickened at the corners, have very little intercellular space. It allows easy bending of various parts of a plant without breaking.

iii. **Sclerenchyma:** Cells of this tissue are dead and commonly seen in the husk of a coconut.
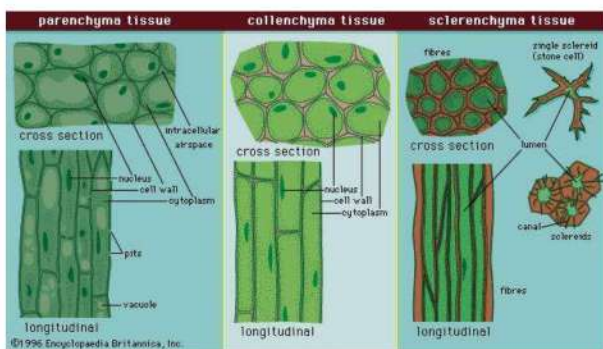
(i) Sclerenchyma, Lignin is a chemical substance present in the cell wall of plant that acts as cement and hardens it.

(ii) Due to presence of a chemical substance called suberin.

OR

The parenchyma tissue is present in the cortex of roots and sclerenchyma tissue is present in the veins of the leaves.

38. **Read the text carefully and answer the questions:**

The practice of keeping or rearing, caring, and management of honey bee on a large scale for obtaining honey and wax is called apiculture. The place where bees are raised is called an apiary. Bee-keeping requires low investment and generates additional income, hence it is done by farmers along with agriculture.

Following are the Honey bee varieties that are used for bee-keeping as follows:

| Indigenous varieties	Exotic varieties
Apis cerana indica (Indian bee)	Apis mellifera (Italian bee)
Apis dorsata (Rock bee), Apis florae (Little bee)	Apis adamsoni (South African bee)

(i) Bees need quality nectar to produce honey. A good pasturage consists of plenty of flowers that can be used by bees to get quality nectar. This increase the quality as well as the quantity of the bees. If bees are confined to only a single variety of flowers for nectar honey quality will have a similar taste and consistency. Most farmers make honey obtained from single nectar.

(ii) Yes, honey bee helps in pollination. The bright-coloured flowers attract the honey bee.

(iii)Besides honey, other products of bee-keeping are bee wax, bee venom, propolis, and royal jelly.

OR

Spring season is best to start a beehive.

39. **Read the text carefully and answer the questions:**

When a solution of silver nitrate is added to a solution of sodium chloride, the silver ions combine with the chloride ions to form a precipitate of silver chloride. Thus, Sodium chloride (NaCl) reacts with silver nitrate ($AgNO_3$) to produce silver chloride (AgCl) and sodium nitrate ($NaNO_3$).
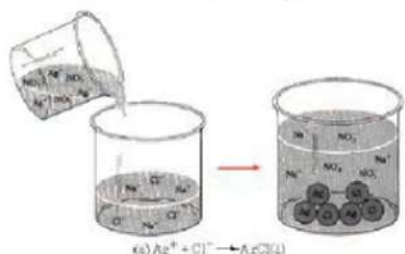
(i) Silver nitrate + $\underset{5.85g}{Sodium\ chloride} \rightarrow \underset{14.35g}{Silver\ chloride} + \underset{8.5g}{Sodium\ nitrate}$

Let mass of silver nitrate be x grams.

Total mass of reactants = Total mass of products

x + 5.85 = 14.35 + 8.5 $\Rightarrow$ x + 5.85 = 22.85

$\Rightarrow$ x = 22.85 - 5.85 $\Rightarrow$ x = 17 g

Therefore, silver nitrate is 17 g.

(ii) The molecular weight of calcium carbonate is 100 g per mole.

1 g of calcium carbonate corresponds to 0.01 mole.

1 mole of calcium carbonate contains three oxygen atoms.

Thus, 0.01 mole of calcium carbonate will contain 0.03 moles of oxygen atoms which is equal to $0.03 \times 6.02 \times 10^{23} = 1.8 \times 10^{22}$ oxygen atoms

(iii) Mass of 1 mole of N_2 gas = 2×14 = 28 g

$\therefore$ Mass of 0.5 mole of N_2 gas = 28×0.5 = 14 g

<div align="center">OR</div>

Molar mass of 1 mole of NaCl = 23 + 35.5 = 58.5 g

$\because$ 58.5 g of NaCl contains 6.022×10^{23} molecules

$\therefore$ 50 g of NaCl will contains $\frac{6.022 \times 10^{23}}{58.5} \times 50 = 5.147 \times 10^{23}$ molecules