Class: IX
SESSION : 2022-2023
SUBJECT: Science (086)
SAMPLE QUESTION PAPER - 1
with SOLUTION

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 undefined nuclear region of prokaryotes are also known as **[1]**

   a) nucleiod
   b) nucleic acid
   c) nucleolus
   d) nucleus

2. The property to flow is unique to fluids. Which one of the following statements is correct? **[1]**

   a) Only liquids are fluids
   b) Gases and solids behave like fluids
   c) Only gases behave like fluids
   d) Gases and liquids behave like fluids

3. If the velocity of a body is reducing, it is said to have **[1]**

   a) Retardation
   b) Both Negative acceleration and Retardation
   c) Negative acceleration
   d) Positive acceleration

4. Which of the following tissues divide continuously and are found on growing regions of the plants? **[1]**

   a) Phloem
   b) Parenchyma
   c) Meristematic
   d) Xylem

5. Match the following with the correct response. **[1]**

(a) Freshwater fish	(i) Aseel
(b) The indigenous breed of fowl	(ii) Jersey
(c) Exotic breed of hen	(iii) White leghorn
(d) Breed of cattle	(iv) Hilsa

a) (a) - (iii), (b) - (ii), (c) - (iv), (d) - (i)

b) (a) - (iv), (b) - (i), (c) - (iii), (d) - (ii)

c) (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii)

d) (a) - (i), (b) - (iii), (c) - (ii), (d) - (iv)

6. The primary function of smooth endoplasmic reticulum in liver cells is: **[1]**

a) detoxification

b) protein synthesis

c) carbohydrate metabolism

d) catabolism of proteins

7. What information do we get from the molecular formula? **[1]**

a. It represents one molecule of the substance.

b. It does not tell the name of the substance.

c. It tells about the type of atoms.

d. It represents the formula mass unit of the substance.

a) (b) and (c) are correct

b) All of these

c) (a) and (b) are correct

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

8. Specimens of plants and animals are preserved in: **[1]**

a) acetone

b) methylated spirit

c) ethanol

d) formalin

9. For a uniformly accelerated body with initial and final velocities as u and v ms^{-1}, the average velocity is: **[1]**

a) $\frac{u-v}{2}$

b) $\frac{v}{2}$

c) $\frac{u+v}{2}$

d) $\frac{u}{2}$

10. Variation of acceleration due to gravity g with distance r from the centre of earth with ($r > R_e$) is best given as **[1]**

a) $g \propto r^2$

b) $g \propto r$

c) $g \propto \frac{1}{r}$

d) $g \propto \frac{1}{r^2}$

11. Which of the following two statement(s) is/are true? **[1]**

Statement A: Mole is quite often known as chemist's dozen.
Statement B: The mass of one-twelfth ($\frac{1}{12}$) of the mass of one atom of Carbon is taken as 1 u.

a) Statement A
b) Statement B
c) Neither Statement A nor Statement B.
d) Both the statements - A and B

12. 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

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

a) 111 u
b) 123 u
c) 124 u
d) 137 u

14. Living cells were discovered by **[1]**

a) A.V. Leeuwenhoek
b) Robert Brown
c) Robert Hooke
d) R. Virchow

15. Tyndall effect is observed in which one of the following? **[1]**

a) True solution
b) Starch + Water
c) Alum + Water
d) NaCl + Water

16. **Assertion (A):** An object may acquire acceleration even if it is moving at a constant speed. **[1]**
Reason (R): With change in the direction of motion, an object can acquire acceleration.

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.

17. To solve the food problem of the country, which among the following is necessary? **[1]**

a) Easy access of people to the food grain
b) All of these
c) Increased production and
d) People should have money to

storage of food grains

purchase the grains

18. **Assertion (A):** Camphor disappears without leaving any residue. **[1]**
Reason (R): Camphor undergoes sublimation.

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):** The atoms of different elements having same mass number but different atomic numbers are known as isobars. **[1]**
Reason (R): The sum of protons and neutrons, in the isobars is always different.

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):** 1-day Vinita went to see his brother's competition and he saw his brother in pain and not able to run comfortably. **[1]**
Reason (R): Two bones can be connected to each other by another type of connective tissue called the ligament. This tissue is very elastic. It has considerable strength.

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. How can a saturated solution be made unsaturated? **[2]**

22. The work done in lifting a box on to a platform does not depend upon how fast it is lifted up. Explain your answer giving proper reason. **[2]**

OR

Why is the bottom part of the foundation of a building made wider?

23. Define latent heat of vaporization and latent heat of fusion. **[2]**

24. A girl is sitting in the middle of a park of dimension 12 m $\times$ 12 m. On the left side of it there is a building adjoining the park and on the right side of the park, there is a road adjoining the park. A sound is produced on the road by a cracker. Is it possible for the girl to hear the echo of this sound? Explain your answer. **[2]**

25. What are the limitations of Rutherford's model of the atom? **[2]**

26. A motorcar of mass 1200 kg is moving along a straight line with a uniform **[2]**

velocity of 90 km/h. Its velocity is slowed down to 18 km h^{-1} in 4 s by an unbalanced external force. Calculate the acceleration and change in momentum. Also, calculate the magnitude of the force required.

OR

Two blocks made of different metals identicals in shape and sizes are acted upon by equal forces which cause them to slide on a horizontal surface. The acceleration of the second block is found to be 5 times that of the first. What is the ratio of the mass of the second to the first?

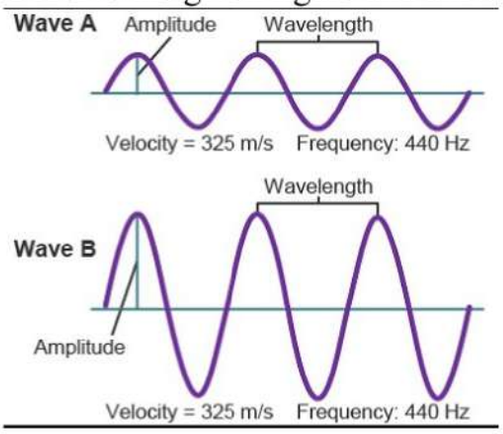
Section C

27. Composition of the nuclei of two atomic species X and Y are given as under: **[3]**

	X	Y
Protons	= 6	6
Neutrons	= 6	8

Give the mass numbers of X and Y. What is the relation between the two species?

28. Observe the given figure and answer the following questions: **[3]**



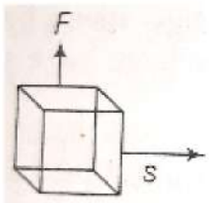
i. Identify the characteristics of the two graphs as shown above in the given figure.

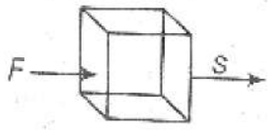
ii. What is the relationship between the velocity of sound, its wavelength, and frequency?

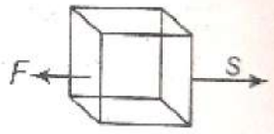
iii. What is the term for the magnitude of the maximum disturbance in the medium on either side of the mean value?

iv. Give the unit of frequency?

29. In each of the following, a force F is acting on an object of mass m. The direction of displacement is from West to east shown by the longer arrow. Observe the figure carefully and state whether the work done by the force is negative, positive or zero. **[3]**

i. 

ii. 

iii. 

30. Deduce the following equations of motion: **[3]**

i. $S = ut + (\frac{1}{2})at^2$

ii. $v^2 = u^2 + 2aS$

OR

A particle moves in a circle with O as centre and AO = OB = 5 cm, radius, as shown in the figure. It starts from A. Calculate.

a. the distance covered, and

b. the displacement, when it reaches B.

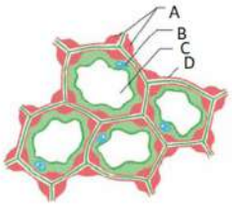
31. The following is the distance-time table of an object in motion: **[3]**

Time (in second)	**Distance (in metre)**
0	0
1	1
2	8
3	27
4	64
5	125
6	216
7	343

i. What conclusion can you draw about the acceleration? Is it constant, increasing, decreasing or zero?

ii. What do you infer about the force acting on the object?

32. Study the following figure and answer the following questions: **[3]**



i. Identify the type of tissue shown in the given figure. Write the labellings - A, B, C, D.

ii. Is the given type of tissue in the figure is flexible or not? Give a reason for your answer.

iii. What are the functions of the tissue shown in the given figure?

33. Fill in the gaps in the following table illustrating differences between prokaryotic and eukaryotic **[3]**

Prokaryotic Cell	Eukaryotic Cell
1. Size. Generally small (1 – 10 µm).	1. Size. Generally large (5 – 100 µm).
2. Nuclear Region ..... and known as	2. Nuclear Region. Well defined and surrounded by a nuclearmembrane.
3.Chromosomes. Single	3. Chromosomes. More than one Chromosome
4. Membrane Bound Cell Organelles. Absent.	4 .....

OR

Differentiate between diffusion and osmosis. What is its importance?

Section D

34. Draw a neat labelled diagram of an animal cell. **[5]**

OR

Write the main function of each of the following.
(a) Plasma membrane
(b) cell wall
(c) Ribosome
(d) Lysosome
(e) Nucleolus
(f) Endoplasmic reticulum

35. A stone is dropped from a 100 m high tower. How long does it take to fall? **[5]**

a. the first 50 m and

b. the second 50 m.

OR

i. A steel needle sinks in water but a steel ship floats. Explain, how?

ii. Why do you prefer a broad and thick handle of your suitcase?

36. i. Distinguish among the true solution, suspension and colloid in a tabular form under the following heads: **[5]**

a. Stability

b. Filterability

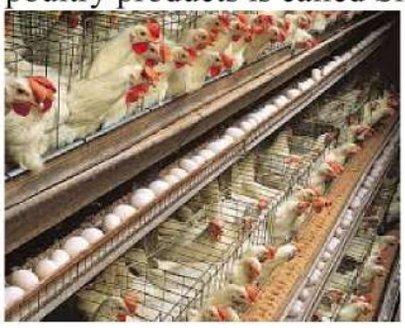
c. Type of mixture

ii. Give the expression for the concentration of a solution. How will you prepare a 10% solution of glucose by mass in the water?

Section E

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

Poultry is the rearing of domesticated fowl (chicken), ducks, geese, turkey and some varieties of pigeon for their meat and eggs. Poultry birds are of two types that is broilers and layers. One is specialized meat-producing poultry birds while other is egg-laying poultry birds. The tremendous rise in the availability of poultry products is called Silver Revolution.



(i) What is the meaning of layers regarding poultry?

(ii) There are different breeds of hens, so give some information about broiler.

(iii) We know that different types of revolution regarding animal husbandry. So, what is the silver revolution explain?

OR

There are different breeds of poultry birds, mention two examples of indigenous and exotic breeds of poultry birds.

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

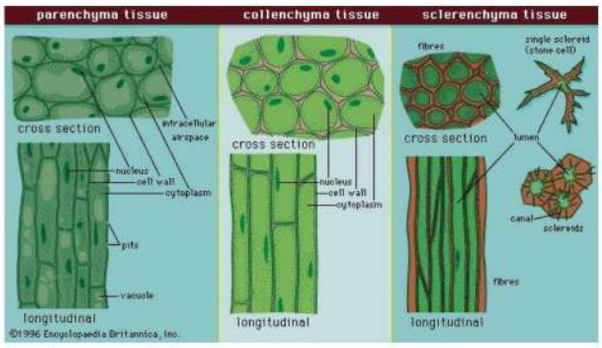
Permanent tissues are of two types that is Simple permanent tissues and Complex permanent tissues.

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.

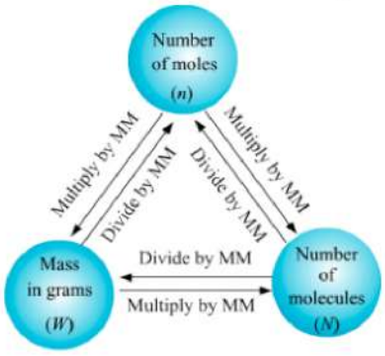
(ii) Why is cork impervious to gases and water?

OR

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

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

Mass is the quantity of matter in a physical body. It is also a measure of the body's inertia, the resistance to acceleration when a net force is applied. An object's mass also determines the strength of its gravitational attraction to other bodies. The SI base unit of mass is the kilogram. The mass of **one mole of a substance is equal to that substance's molecular weight**. For example, the mean molecular weight of water is 18.015 atomic mass units (amu), so one mole of water weight 18.015 grams.



(i) Calculate the mass of 0.5 mole of N_2 gas (mass from mole of molecule).

(ii) Calculate the mass of 0.5 mole of N atoms (mass from mole of atom).

(iii) Calculate the mass of 3.011×10^{23} number of N atoms (mass from number).

OR

Calculate the mass of 6.022×10^{23} number of N_2 molecules (mass from number).

SOLUTION

Section A

1. **(a)** nucleiod
   Explanation: The undefined nuclear region of prokaryotes are also known as nucleoid which means similar to nucleus. It is present as there is no nuclear membrane covering in the nuclear region.
2. **(d)** Gases and liquids behave like fluids
   Explanation: The given option is correct because gases and liquid contain mobile molecules, therefore can flow. Moreover, both gases and liquids do not have a fixed shape.that is why behave like fluids.
3. **(b)** Both Negative acceleration and Retardation
   Explanation: If there is a decrease in acceleration, it is called Retardation. This means the rate of decrease in velocity is called **retardation or negative acceleration or deceleration**.
4. **(c)** Meristematic
   Explanation: Meristematic tissues divide continuously and are found in growing regions of the plants. Thus they are responsible for increasing the length and girth of the plant.
5. **(b)** (a) - (iv), (b) - (i), (c) - (iii), (d) - (ii)
   Explanation:
   i. Fresh water fish is hilsa. Hilsa is referred to as the softest freshwater fish known as Macher Raja. The Hilsa fish is a species of fish in the herring family which is very popular as food fish in the South. It is generally marketed fresh, frozen, smoked and salted.
   ii. Indian game bird Aseel is the indigenous breed of fowl. Aseel is a breed of chicken originating from South Punjab / Sindh area of Pakistan and the Indian states of Andhra Pradesh and Tamil Nadu. Fowl are found throughout Southeast Asia, such as Shamo and Thai Game. They are heavy-boned, heavy muscled, very hard feathered birds
   iii. The most popular egg-laying exotic breed of hen is white leghorn. A full-size breed and not prone to broodiness, Leghorns consistently lay large eggs nearly every day. Some “pet quality” breeds lay small eggs and as few as a hundred over the course of a year. The average hen lays about 250 eggs a year, but Leghorns are serious about laying and it is not unusual to see over 300 eggs a year from these production birds.
   iv. Highly desirable quality - exotic Breed of cattle is jersy. Exotic dairy breeds of cattle. It is the smallest of the dairy types of cattle developed on the island of Jersey, the U.K. In India this breed has acclimatized well and is widely used in crossbreeding with indigenous cows. The typical colour of Jersey cattle is reddish fawn.
6. **(a)** detoxification
   Explanation: Smooth Endoplasmic Reticulum (SER) is responsible for the synthesis and repair of membranes. It also has a detoxification function.
7. **(d)** (a), (c) and (d) are correct
   Explanation: The molecular formula of a substance (an element or a compound) is a symbolic representation of the actual number of atoms present in one molecule of

that substance. It represents the formula mass unit of the substance. It also conveys the name of the substance. Therefore, (a), (c) and (d) are correct.

8. **(d)** formalin
   Explanation: Specimen preservation means "longterm preservation of organisms either plant or animal in the best possible condition. So that it can be accessed in the future as a reference collection for scientific purposes". Formalin is the best preservative for plants and animals.
9. **(c)** $\frac{u+v}{2}$
   Explanation: Average velocity is the ratio of total displacement or total distance travelled by a body in a given interval of time.
10. **(d)** $g \propto \frac{1}{r^2}$
    Explanation: $g = \frac{GM}{r^2}$
    So, $g \propto M$ and $g \propto \frac{1}{r^2}$
11. **(d)** Both the statements - A and B
    Explanation: A mole is also known as a chemist's dozen. A mole, just like a dozen, is a common counting unit. A counting unit is a convenient number that makes it easier to count objects. The mass of one-twelfth of the mass of one atom of Carbon is taken as 1u. Both statements are correct.
12. **(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.
13. **(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
14. **(a)** A.V. Leeuwenhoek
    Explanation: A.V. Leeuwenhoek in 1674 with the improved microscope, discovered free-living cells of algae Spirogyra in pond water for the first time.
15. **(b)** Starch + Water
    Explanation: Starch forms a colloid in water (hot water).
16. **(a)** Both A and R are true and R is the correct explanation of A.
    Explanation: This is the equation of a parabola. A parabola results when one quantity is proportional to the square of the other. When an object is moving with a constant velocity (zero acceleration), the displacement versus time graph is a straight line and its slope is velocity.
    When an object is moving at a constant speed but its direction of motion changes, its velocity changes ant thus acceleration is produced. The motion of an object in a circular path is such an example. In a uniform circular motion, the direction of motion of the object changes continuously and hence the velocity changes continuously even though the speed is constant.
17. **(b)** All of these
    Explanation: To solve the food problem of the country, the following is necessary
    i. Increased production and storage of food grains.
    ii. Easy access of people to the food grain.
    iii. People should have money to purchase grains.
18. **(a)** Both A and R are true and R is the correct explanation of A.
    Explanation: Both A and R are true and R is the correct explanation of A.

19. **(c)** A is true but R is false.
Explanation: Sum of protons and neutrons is known as mass number which is same for isobars.
20. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation: Two bones can be connected to each other by connective tissue called the ligament. Vinita's brother might be suffering from a ligament tear due to which he has pain in the knee while running.

Section B

21. A saturated solution can be made an unsaturated solution in two ways :
a. By increasing the temperature or by heating.
b. By adding more of the solvent or by diluting the solution.
22. The work done (W) in lifting a box through a distance s against the gravitational force (F) is given by W = Fs. Hence it is obvious that it is independent of the rate at which the box is lifted.

OR

Foundation of a building is made wider so that it may not sink under the extremely high pressure of building. The broad foundation distributes the weight of the building to the ground.
23. Latent heat of vaporization is the amount of heat energy that is required to change 1 kg of a liquid into gas at atmospheric pressure at its boiling point, i.e. without changing its state.
Latent heat of fusion is the amount of heat energy that is required to change 1 kg of a solid into liquid at atmospheric pressure at its melting point, i.e. without changing its state.
24. If the time gap between the original sound and reflected sound received by the listener is around 0.1s, only then the echo can be heard.
Velocity of sound in air = 344 m/s.
Time interval = 0.1 s
Therefore, The minimum distance travelled by the reflected sound wave for the distinctly listening to the echo = Velocity of the sound × Time interval = 344 × 0.1 = 34.5 m
Since, the girl is sitting in middle of a park of dimension 12 m ×12 m, Therefore; The distance travelled by the sound reflected from the building and then reaching to the girl = (6 + 6) = 12 m, which is much smaller than the required distance. Therefore, Girl will not hear any echo of sound.
25. **Limitations of Rutherford's model of atom:**
(i) According to classical electromagnetic theory, a charged particle such as an electron moving under the influence of attractive electrostatic forces would lose energy continuously in the form of radiation. As a result of this, the electrons should lose energy and would move in even smaller orbits, ultimately falling into the nucleus. But the collapse of electrons into the nucleus does not occur. There is no explanation for this behaviour in the Rutherford's model of atom.
(ii) Rutherford did not specify the number of orbits in an atom and the number of electrons in each orbit.
26. i. Initial velocity of the car (u) = 90 kmh^{-1}
= 25 ms^{-1}
Final velocity of the car (v) = 18 kmh^{-1} = 5 ms^{-1}

Time (t) = 4s
Acceleration = (a) = ?
We know: v = u = at
$5 = 25 + a \times 4$
$\therefore -a \times 4 = 20$
$\Rightarrow a = \frac{-20}{4} = -5 ms^{-2}$

ii. Change in momentum (p) = m (v - u)
= 1200 (5 - 25)
= 1200 × (-20)
= 2400 Ns

iii. Magnitude of force (F) = $\frac{m(v-u)}{t} = \frac{-24000}{4}$
= -6000 N

OR

Let, Mass of the first block = m_1
Acceleration of the first block = a_1
Mass of the second block = m_2
Acceleration of the second block = a_2
Also, $a_2 = 5\ a_1$
If the force acting on each block be F.
Then, $F = m_1a_1$ and $F = m_2a_2 = m_2 \times 5a_2$
or $m_1a_1 = m_2a_2 = m_2 \times 5a_1$
or $m_1 = 5m_2$
This gives, $\frac{m_2}{m_1} = \frac{1}{5}$ Thus, the mass of the second block is one-fifth that of the first block.

Section C

27. The mass number of X = Number of protons + Number of neutrons = 6 + 6 = 12
The mass number of Y = Number of protons + Number of neutrons = 6 + 8 = 14
Since the number of protons (6) in the two species is the same and the atomic mass of the two species is different (12 and 14), the given atomic species are isotopes of the same element (with atomic number Z = 6).

28. i. In the graphical figure, both the waves are of the same frequency but with different amplitude. In wave, A amplitude is less and in wave, B amplitude is higher.
ii. The relationship between the velocity of sound, its wavelength and frequency is given as-
Velocity of sound = frequency × wavelength
iii. Amplitude
iv. Frequency its unit is hertz.

29. In Fig. (i), the angle between F and S is 90°, so work done is zero.
In Fig. (ii), the angle between F and S is 0°, so work done is positive.
In Fig. (iii), the angle between F and S is 180°, so work done is negative.

30. i. Consider the linear motion of a body with initial velocity 'u'. Let the body accelerate uniformly and acquire a final velocity 'v' after time 't'.
Then, Average velocity of body = $\frac{\text{Initial velocity + Final velocity}}{2} = \frac{u+v}{2}$
$\therefore$ The distance covered by the body in time 't' = S = Average velocity × Time taken
$\Rightarrow S = \frac{u+v}{2} \times t$

We know that, v =u +at

$\Rightarrow S = \frac{u+(u+at)}{2} \times t$

or, S = $\frac{2ut+at^2}{2}$

$\Rightarrow$ S = $ut + \frac{1}{2}at^2$ Which is required equation.

ii. We know that, S = $ut + \frac{1}{2}at^2$ ..... (1)

Also, a = $\frac{v-u}{t}$

$\Rightarrow$ t = $\frac{v-u}{a}$

Putting the value of t in (1), we have

S = $u\left(\frac{v-u}{a}\right) + \frac{1}{2}a\left(\frac{v-u}{a}\right)^2$

or S = $\frac{uv-u^2}{a} + \frac{v^2+u^2-2uv}{2a}$

or 2aS = 2uv - $2u^2$ + v^2 + u^2 - 2uv

or v^2 - u^2 = 2aS. Which is required equation.

OR

a. Distance covered $= \pi \times OA = \pi \times 5 = 5\pi cm$

b. Displacement $= 2 \times OB$

$= 2 \times 5 = 10cm$ along AB

31. i. Here, initial velocity, u = 0

Using Newton's second law of motion, s = ut + $\frac{1}{2}at^2 = \frac{1}{2}at^2$ [$\because$ u = 0]

We get, $a = \frac{2s}{t^2}$

Time (in second)	**Distance (in metre)**	a = 2 s/t^2
0	0	0
1	1	2
2	8	4
3	27	6
4	64	8
5	125	10
6	216	12
7	343	14

Thus, acceleration is increasing.

ii. Since acceleration is increasing, so the net unbalanced force is acting on the object.

32. i. The tissue shown is collenchyma tissue.

The labelling of the collenchyma tissue is as follows:

A. - Wall thickenings

B. - Nucleus

C. - Vacuole

D. - Cell wall

ii. Yes, the collenchyma tissue is flexible. This is so because collenchyma cells don't have lignin in their cell wall.

iii. The function of collenchyma tissue are as follows:

a. Collenchyma tissue provides flexibility to the plant.

b. It also provides mechanical support to plants.

33.

Prokaryotic Cell	Eukaryotic Cell
1. Size. Generally small (1 – 10 μm).	1. Size. Generally large (5 – 100 μm).
2. Nuclear Region Poorly defined due to absence of nuclear envelope and known as Nucleoid	2. Nuclear Region. Well defined and surrounded by a nuclear membrane.
3.Chromosomes. Single	3.Chromosomes. More than one Chromosome
4. Membrane Bound Cell Organelles. Absent.	4. Membrane bound cell organelles are present.

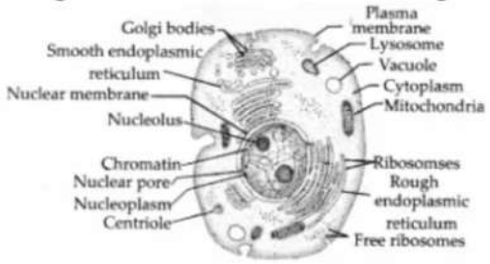
OR

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.

Section D

34. **Diagram of an animal cell is given below:**



OR

(a) Plasma membrane – The cell membrane separates the cell from its external environment, and is selectively permeable (controls what gets in and out). It protects the cell and provides stability. Proteins are found embedded within the plasma membrane, with some extending all the way through in order to transport materials.
(b) Cell wall – The cell wall is a rigid organelle composed of cellulose and lying just outside the cell membrane. The cell wall gives the plant cell it's box-like shape. it also protects the cell. The cell wall contains pores which allow materials to pass to and from the cell membrane
(c) Ribosome – Ribosomes are small particles which are found individually in the cytoplasm and also line the membranes of the rough endoplasmic reticulum. Ribosomes produce protein. They could be thought of as "protein factories" of the cell.
(d) Lysosome –Lysosomes are small sac-like structures surrounded by a single membrane and containing strong digestive enzymes which when released can break

down worn out organelles or food. The lysosome is also known as a suicide sac.
(e) Nucleolus – It synthesizes ribosome
(f) Endoplasmic Reticulum – Produces lipids and proteins and also in intracellular transport of substances.

35. Initial velocity ,u=0
Total height, h = 100 m
a. Let, for the first 50 m the time taken by the stone be 't' sec.
S=-50 m (- ve sign shows the stone falls in downward direction)
g = -10 m/s^2
$h = s = ut + \frac{1}{2}gt_1^2$
$\implies -50 = 0 + \frac{1}{2}(-10)t_1^2$
$\implies -50 = -5t_1^2$
$\implies \frac{50}{5} = t_1^2$
$\implies t_1^2 = 10$
$\implies t_1 = \sqrt{10}$
$\therefore t_1 = 3.16$ sec
b. For the entire journey,let the time taken be T
u = 0
S = -100 m
$a = -10m/s^2$
$S = ut + \frac{1}{2}aT^2$
$\Rightarrow -100 = 0 + \frac{1}{2} \times (-10)T^2$
$\Rightarrow T_2 = 20$
$\Rightarrow T = \sqrt{20}$
$\Rightarrow$ T = 4.47 sec
$\therefore$ Time taken to fall through the next 50 m = T - t_1 = 4.47 - 3.16 = 1.31 sec

OR

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.

36. i. Distinctions between true solution, suspension and colloid are:

Property	Solution	Suspension	Colloid
Stability	It is stable. Constituting particles do not settle down on keeping undisturbed.	It is unstable. Constituting particles settle down on keeping undisturbed.	It is quite stable. Constituting particles do not settle down on keeping undisturbed.

Property	Solution	Suspension	Colloid
Filterability	Particles cannot be separated by filtration. Means passes through filter paper.	Particles are large, so they can be easily separated by ordinary filtration. Means do not pass through filter paper.	It cannot be separated by ordinary filter paper but can be separated by ultrafiltration. Means passes through filter paper.
Type of mixture	Homogeneous	Heterogeneous	Heterogeneous but appears to be homogeneous.

ii. Concentration is defined as the number of moles (amount of substance) per unit volume (often liters/ dm^3)

The methods by which the concentration of a solution can be expressed are:

a) Mass by mass% of solution = $\frac{Mass\ of\ solute}{Mass\ of\ solution} \times 100$

b) Mass by volume % of solution = $\frac{Mass\ of\ solute}{Mass\ of\ solution} \times 100$

Thus, a 10 percent solution of glucose can be prepared by dissolving 10 g of glucose in 90 g of water.

Section E

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

Poultry is the rearing of domesticated fowl (chicken), ducks, geese, turkey and some varieties of pigeon for their meat and eggs. Poultry birds are of two types that is broilers and layers. One is specialized meat-producing poultry birds while other is egg-laying poultry birds. The tremendous rise in the availability of poultry products is called Silver Revolution.

(i) Egg-laying poultry birds are called **layers.**

(ii) The specialized meat-producing poultry birds are called **broilers.** Broilers are quick growing birds which are raised for 6-8 weeks. Their food is rich in vitamin A and K.

(iii)The tremendous rise in the availability of poultry products is called Silver Revolution.

OR

Following are the example of poultry birds

Indigenous breed: Assel and Kadaknath.

Exotic breed: Rhode island red and Light Sussex.

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

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

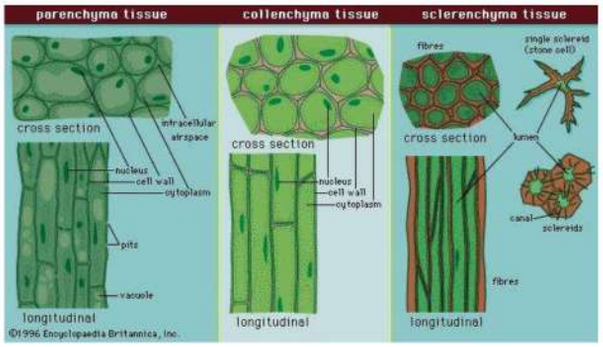
Simple permanent tissues subdivided as follows:

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.

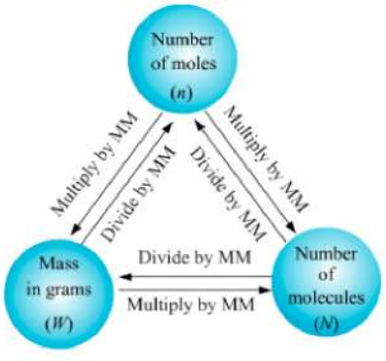
(ii) Due to presence of a chemical substance called suberin.

OR

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

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

Mass is the quantity of matter in a physical body. It is also a measure of the body's inertia, the resistance to acceleration when a net force is applied. An object's mass also determines the strength of its gravitational attraction to other bodies. The SI base unit of mass is the kilogram. The mass of **one mole of a substance is equal to that substance's molecular weight**. For example, the mean molecular weight of water is 18.015 atomic mass units (amu), so one mole of water weight 18.015 grams.



(i) Mass = molar mass × number of moles

$\Rightarrow m = M \times n = 28 \times 0.5 = 14$ g

$\therefore$ Mass from mole of molecule = 14 g

(ii) Mass = molar mass × number of moles

$\Rightarrow m = M \times n = 14 \times 0.5 = 7$ g

$\therefore$ mass = 7 g

(iii) The number of moles, $n = \frac{\text{given number of particles}}{\text{Avogadro number}} = \frac{N}{N_A} = \frac{3.011 \times 10^{23}}{6.022 \times 10^{23}}$

$\Rightarrow m = M \times n = 14 \times \frac{3.011 \times 10^{23}}{6.022 \times 10^{23}}$

$= 14 \times 0.5 = 7$ g

$\therefore$ mass from mole of atom = 7 g

OR

$n = \frac{N}{N_A}$

$\Rightarrow m = M \times \frac{N}{N_A} = 28 \times \frac{6.022 \times 10^{23}}{6.022 \times 10^{23}}$

$= 28 \times 1 = 28$ g

$\therefore$ mass = 28 g