Class IX Session 2023-24
Subject - Science
Sample Question Paper - 3

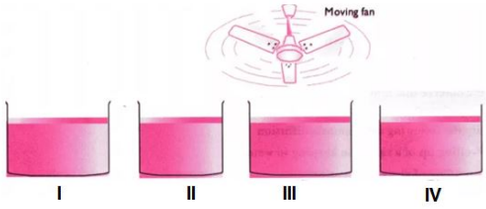
Time Allowed: 3 hours **Maximum Marks: 80**

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. Look at the following figure and suggest in which of glass container the rate of evaporation will be highest? **[1]**



a) II b) I

c) IV d) III

2. The statement 'cells arise only from pre-existing cells' was given by: **[1]**

a) Louis Pasteur b) Schwann

c) Schleiden d) Rudolf Virchow

3. A man walks on a straight road from his home to a market 5.5 km away with a speed of 5.5 km h^{-1}. Finding the market closed he instantly turns and walks back with a speed of 7.5 km h^{-1}. What is the average speed and average velocity of the man between t = 0 to t = 104 min? **[1]**

a) 6.36 km h^{-1}, 6.36 km h^{-1} b) 0, 6.36 km h^{-1}

c) 0, 0 d) 6.36 km h^{-1}, 0

4. Plants can be made diseases-resistant by **[1]**

a) both hybridisation and genetic modification
b) hybridisation
c) use of antibiotic
d) genetic modification

5. Chloroplasts may occur in **[1]**

a) chlorenchyma and sieve tubes
b) xylem parenchyma and sclerenchyma
c) collenchyma and sclerenchyma
d) parenchyma and collenchyma

6. The proteins and lipids, essential for building the cell membrane, are manufactured by **[1]**

a) Mitochondria
b) Golgi apparatus
c) Rough endoplasmic reticulum
d) Plasma membrane

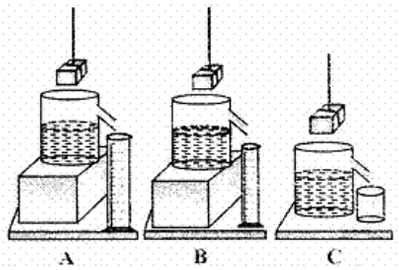
7. Symbol of Iron is:- **[1]**

a) Ir
b) Fe
c) None of these
d) I

8. Name the muscle which is found in visceral organs. **[1]**

a) Both Serum and Plasma
b) Smooth muscle
c) Blood
d) Plasma

9. Three students A, B and C determined the volume of a solid by immersing it in water in the overflow cans are set up as shown. The result obtained will be wrong for : **[1]**



a) Student A
b) All of these
c) Student B
d) Student C

10. In which of the following cases of motion, the distance moved and the magnitude of displacement are equal? **[1]**

a) The earth is revolving around the Sun
b) The pendulum is moving to and fro
c) A car is moving on a straight road
d) A car is moving in a circular path

11. The first model of an atom was given by **[1]**

a) Rutherford
b) N. Bohr
c) E. Goldstein
d) J.J. Thomson

12. Which of the following cells is found in the cartilaginous tissue of the body? **[1]**

a) Osteocytes
b) Mast cells
c) Basophils
d) Chondrocytes

13. Cell arises from the pre-existing cell was stated by **[1]**

a) Virchow
b) Purkinje

c) Robert Hook
d) Robert Brown

14. A student mixed the white of an egg with water and stirred it well. After sometimes he observe that: **[1]**

a) egg white settles down at the bottom
b) a transparent solution is formed
c) a translucent mixture is formed
d) egg white floats on the surface of the water

15. A change is said to be a physical change when **[1]**

a) No energy change occurs
b) All statements are correct
c) The change can be easily reversed
d) No new substances are formed

16. Which of the following type of irrigation system is used in areas closer to rivers? **[1]**

a) Dug wells
b) Tanks
c) River lift
d) Canals

17. **Assertion (A):** When the displacement of a body is directly proportional to the square of the time. Then the body is moving with uniform acceleration. **[1]**
Reason (R): The slope of velocity-time graph with time axis gives 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.

18. **Assertion (A):** Solids have fixed shape but rubber band being solid can change its shape. **[1]**
Reason (R): When force is applied, then the rubber band changes its shape and regain its shape.

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):** Dendrite is a single, long cylindrical process which forms fine branches terminally. **[1]**
Reason (R): It consists of short processes arising from the cyton.

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):** Atomic mass number is the number of protons present in the nucleus of an atom. **[1]**
Reason (R): All atoms of an element have the same atomic number.

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 battery lights a bulb. Describe the energy changes involved in the process? **[2]**

OR

Define average power.

22. A sample of water under study was found to boil at 102° C at normal pressure. Is water pure? Will this water freeze at 0° C? Comment. **[2]**

23. A sound wave has a frequency 2 kHz and wavelength 40 cm. How long will it take to travel 1.6 km? **[2]**

24. Give an experiment to show that ammonium chloride undergoes sublimation. **[2]**

25. A stone of 1 kg is thrown with a velocity of 20 ms^{-1} across the frozen surface of a lake and comes to rest after travelling a distance of 50 m. What is the force of friction between the stone and the ice? **[2]**

OR

Why can a small mass such as a bullet kill a person when fired from a gun?

26. Write the electronic configuration of a positively charged sodium ion (Na^+). Atomic number of sodium is 11. **[2]**

Section C

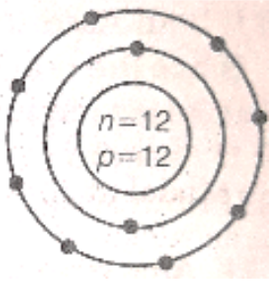
27. i. What is echo ranging? State any one application of this technique. **[3]**

ii. The wavelength of waves produced on the surface of the water is 20 cm. If the wave velocity is 36 m/s. Calculate

a. The number of waves produced in one second.

b. The time required to produce one wave?

28. **[3]**



i. Identify the ion from the given figure.

ii. Write the electronic configuration of the ion and atom mentioned in the figure.

iii. How do we get the number of protons as 12?

29. A 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? **[3]**

OR

An electron moving with a velocity of 5×10^4 ms^{-1} enters into a uniform electric field and acquires a uniform acceleration of 10^4 ms^{-2} in the direction of its initial motion.

i. Calculate the time in which the electron would acquire a velocity double of its initial velocity.

ii. How much distance the electron would cover in this time?

30. Shyam and his friends were playing with a catapult (gulel) in his garden. Several mangoes were dislodged and fell with the help of catapult. One of his friend was aiming the catapult on a bird. Shyam prevented him from doing so. **[3]**

a. Name the energy possessed by the stretched string of the catapult.

b. What will happen if the stone is thrown without stretching the string of a catapult?

c. Why did Shyam prevent his friend from aiming at the bird? Which quality is highlighted in Shyam's behaviour?

31. i. Explain, why is it difficult to walk on sand? **[3]**

ii. Why is the recoil of a heavy gun, on firing, not so strong as that of a light gun using the same cartridge?

32. Differentiate between chromatin and chromosome. **[3]**

OR

What happens when cell is placed in -

(a) Hypertonic solution

(b) Hypotonic solution

(c) Isotonic solution

33. Write a note on the protective tissue in plants. (Give appropriate diagram also). **[3]**

Section D

34. i. At some moment, two giant planets Jupiter and Saturn of the solar system are in the same line as seen from the earth. Find the total gravitational force due to them on a person of mass 50 kg on the earth. Could the force due to the planets be important? **[5]**

Mass of the Jupiter = 2×10^{27} kg

Mass of the Saturn = 6×10^{26} kg

The distance of Jupiter from the earth = 6.3×10^{11} m

The distance of Saturn from the earth = 1.28×10^{12} m

ii. A bag of sugar weighs 'w' at a certain place on the equator. If this bag is taken to Antarctica, then will it weigh the same or more or less. Give a reason for your answer.

OR

A stone is dropped from a 100 m high tower. How long does it take to fall?

a. the first 50 m and

b. the second 50 m.

35. Write a note on Golgi apparatus and the functions it performs. **[5]**

OR

Draw a neat labelled diagram of an animal cell.

36. i. What factors affect the solubility of solvent and solute? **[5]**

ii. State the differences between compounds and mixtures

Section E

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

In older plants, the outer protective layer that is epidermis undergoes certain changes the epidermis of the stem is replaced. There is cork cambium which is simple tissue having one type of the cell. The cell of cork cambium are rectangular and their protoplast is vacuolated contain tannins. The cork cambium gives off new cell from its both side. The cell of the cork cambium is dead and compactly arranged without the intercellular space and there is suberin deposition.

(i) The epidermis of the cell is replaced by?

(ii) How does a cork acts as a protective tissue?

OR

There is suberin deposition what is the main disadvantage?

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

Fish is a cheap source of animal protein for our food. Fish liver oil is rich in vitamin A and D. Basically fisheries are of two types:

i. **Fin fishery:** It includes capturing, management and exploitation of cartilaginous and bony fishes.

ii. **Shell fishery:** It includes capturing, management and exploitation of crustaceans (prawns, crabs) and molluscs (oysters, mussels etc.).

Depending upon the mode of obtaining fish, fisheries are of two types: **Capture fishing and Culture fishing.**

(i) Mention the two types of fisheries depending upon the mode of obtaining fish.

(ii) Which fatty acid is exclusively found in fish?

(iii) Is Rohu a bony fish or not? In which type of fisheries it is used?

OR

What is the difference between capture fishery and culture fishery?

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

A solution of a solid in a liquid such as water can be prepared by adding it slowly to water with constant stirring at a certain temperature (room temperature). If the addition process is continued, a stage is ultimately reached in the dissolution process when no more of the solid dissolves. Rather it starts setlling at the bottom of the container such as a glass beaker. The solution at this stage is said to be saturated. The solubility of a solute is always expressed with respect to the saturated solution. It may be defined as the maximum amount of the solute that can be dissolved in 100 g of the solvent to form a saturated solution at a given temperature. Please remember that the role of temperature is very important. If temperature is increased, the solution becomes unsaturated. In case the temperature is decreased, the solution becomes supersaturated. As a result, crust of the solute gets deposited on the surface.

(i) What do mean by the term Solubility?

(ii) 20 g of a solute are dissolved in 500 g of the solvent. The solubility of the solute is:

(iii) When a saturated solution becomes unsaturated?

OR

What do you mean by concentration of solution?

Solution

Section A

1.

(d) III

Explanation: The rate of evaporation increases with an increase in surface area because evaporation is a surface phenomenon. Also, with the increase in air speed, the particles of water vapour will move away with air, which will increase the rate of evaporation.

2.

(d) Rudolf Virchow

Explanation: This statement was proposed by Rudolf Virchow in 1855. This theory is called Virchow's theory or Cell lineage theory. This the theory made as a result of objection to the Cell theory.

3.

(d) 6.36 km h^{-1}, 0

Explanation: Time taken by the man to go from his home to the market, $t_1 = \frac{5.5 \text{ km}}{5.5 \text{ km h}^{-1}} = 1.0 \text{ h}$

Time taken by the man to return back from the market to his home, $t_2 = \frac{5.5 \text{ km}}{7.5 \text{ km h}^{-1}} = 0.73 \text{ h}$

$\therefore$ Total time taken = $t_1 + t_2$ = 1.0 h + 0.73 h = 1.73 h = 140 min

In t = 0 to 104 min, total distance travelled = 5.5 km + 5.5 km = 11 km

Displacement = 0 (As the boy returns back home)

$\therefore$ Average speed

$= \frac{\text{Distance travelled}}{\text{Time taken}} = \frac{11 \text{ km}}{1.73 \text{ h}} = 6.36 \text{ km h}^{-1}$

Average velocity = $\frac{\text{Displacement}}{\text{Time taken}} = 0$

4. **(a)** both hybridisation and genetic modification

Explanation: The genetic modification provides an avenue for variety improvement. In other ornamentals, there are particularly good varieties with excellent post-harvest qualities, disease resistance, and productivity.
One advantage of hybridization is that it can combine disease resistance of one organism with the production capacity of another. Crop yields increase dramatically when hybridization is used to exceed one or more of the parents in size and reproductive potential.

5.

(d) parenchyma and collenchyma

Explanation: The main function of parenchyma is to provide support and to store food. In some plant parts, parenchyma has chlorophyll as well. In that case, parenchyma carries out photosynthesis and is then termed as chlorenchyma. Collenchyma tissue contains chloroplast and carry out photosynthesis.

6.

(c) Rough endoplasmic reticulum

Explanation: The proteins and lipids, essential for building the cell membrane, are synthesized by the rough endoplasmic reticulum (RER). The ribosomes attached to the RER help in this process.

7.

(b) Fe

Explanation: Symbol "Fe" for Iron has been derived from the Latin word Ferrum.

8.

(b) Smooth muscle

Explanation: Visceral muscle tissue, or smooth muscle, is tissue associated with the internal organs of the body, especially those in the abdominal cavity.

9.

(b) All of these

Explanation: The overflow can must always be filled upto its spout before using it to measure the volume displaced by the immersed solid.

10. **(c)** A car is moving on a straight road
Explanation: The distance moved and magnitude of displacement are equal only in the case of motion along a straight line. Because displacement is the shortest path between initial and find path. So, for car moving on straight road, distance moved and magnitude of displacement are equal.

11. **(d)** J.J. Thomson
Explanation: J.J Thomson was the first one to give atom's model. Which is also called plum pudding model/ watermelon model/ Raisin model as in his atom's structure he said that atom is a positively charged sphere with negative charge embedded in it like black seeds embedded in watermelon.

12. **(d)** Chondrocytes
Explanation: The matrix of cartilage has delicate network of collagen fibres and chondrocytes (living cells). These are present in fluid-filled spaces called lacunae. Chondrocytes multiply by mitosis and help in internal growth of cartilage.

13. **(a)** Virchow
Explanation: Rudolf Virchow presented the idea in 1855 that every cell arises from another (pre-existing) cell. This was an addition to the cell theory that was proposed earlier by **Matthias Jakob Schleiden** and **Theodor Schwann**.

14. **(c)** a translucent mixture is formed
Explanation: Egg white is translucent. Egg albumin forms colloidal solution which is translucent.

15. **(b)** All statements are correct
Explanation: Some of the characteristics of a physical change are:
    i. Temporary in nature.
    ii. No energy change occur.
    iii. Does not affect the internal structure of a substance, only the molecules are rearranged.
    iv. No new substance is formed.

    So all statements are correct.

16. **(c)** River lift
Explanation: When it is not possible to supply enough water through a normal canal system, then a river lift system is utilized to ensure a steady supply. This can happen in areas with uneven topography, or in areas which are far from a water reservoir.

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

18. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: The rubber band can not change its shape by itself. When force is applied it changes its shape (due to elasticity) and regain its shape when force is removed.

19. **(d)** A is false but R is true.
Explanation: Dendrite consists of short processes called dendrons that arises from the cyton and branches into dendrites. Axon is a single, long cylindrical process which forms fine branches terminally.

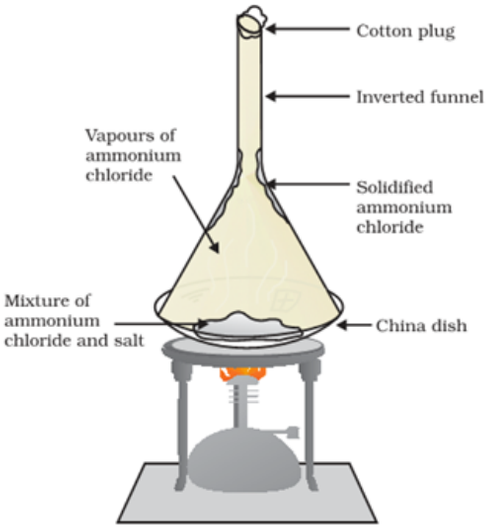
20. **(d)** A is false but R is true.
Explanation: Atomic number is the number of protons present in the nucleus of an atom is the atomic number of that atom. It is represented by the symbol Z. All atoms of an element have the same atomic number. The number of protons and electrons in an atom is equal. Thus, the atom of an element is electrically neutral.

Section B

21. A battery has stored chemical energy. The chemical energy is converted into electrical energy during lighting of bulb. So, a battery converts chemical energy into electrical energy. The filament in the bulb becomes white hot and gives out light. Electrical energy is converted into heat and light energy.
    Thus, the energy changes involved in this process can be written as follows:
    Chemical energy → Electrical energy → Heat energy + Light energy.

    OR

    When a machine or person does different amounts of work or uses energy in different interval of time, the ratio between the total work or energy consumed to the total time is average power.
    $Average\ Power\ =\ \frac{Time\ work\ done\ or\ energy\ consumed}{Total\ time}$
22. The boiling point of pure water is 100 °C at 1 atm. The freezing point of pure water is 0 °C. The sample of water under study boils at 102 °C at normal pressure. Hence, the sample is not pure water. The sample of water is not pure, it will not freeze at 0 °C. It will freeze at a temperature below 0 °C.
23. Given frequency, v =2 kHz = 2 $\times$ 10^3 Hz,
    Wavelength, λ = 40 cm = 0.40 m
    Speed of sound = Frequency $\times$ Wavelength
    i. e., $v = v\lambda$
    = (2 $\times 10^3$ Hz) $\times$(0.40 m)
    = 0.80$\times$ 10 Hz = 800 ms^{-1}
    Time, t = $\frac{\text{Distance}}{\text{Speed}}$
    t = $\frac{s}{v}$
    Given distance, s = 1.6 km = 1.6 $\times$ 10^3 m
    Time, t = $\frac{1.6\times10^3 m}{800\ ms^{-1}}$
    = $\frac{1600}{800}s$= 2s
24. Experiment to show that ammonium chloride (NH_4Cl) undergoes sublimation:-
    a. Take a china dish with crystals of ammonium chloride (NH_4Cl) and cover it with an inverted glass funnel with a cotton fitted at the top.
    b. Put the china dish on a burner and heat the crystals.
    c. As soon as the crystals are heated, we observe the vapours of ammonium chloride (NH_4Cl) rising in the funnel. These vapours get solidified along the walls at the upper end of the funnel which is a colder part.
    d. This shows that solid ammonium chloride does not undergo liquid state but directly changes to vapour state which then solidifies i.e. it undergoes sublimation (solid changes directly to gases without undergoing liquid state).



25. Here,
    Mass,m = 1 kg
    Initial velocity,u = 20 ms^{-1}
    Final velocity,v = 0 ms^{-1}

Distance travelled,S = 50 m

Force of friction, F =?

From the third equation of motion, we have, $v^2 = u^2 + 2as$

$\Rightarrow \quad a = \frac{v^2 - u^2}{2s} = \frac{0 - (20\ ms^{-1})^2}{2 \times 50\ m}$

$= \frac{-400 m^2 s^{-2}}{100\ m} = -4\ ms^{-2}$

From Newton's second law of motion, we have

F = ma = 1kg $\times\ (-4 ms^{-2}) = -4 kgms^{-2}$ = -4 N

Negative sign indicates the force is acting opposite to the direction of motion.

Thus,the force of friction between the stone and ice is -4 N

OR

When a small mass such as a bullet is fired from a gun, it moves out of the gun with a very high velocity. Thus, the momentum produced by a bullet is very high (p = mv). This high momentum of the bullet can kill a person.

26. The atomic number of Na, Z = 11

Number of electrons in Na atom = Atomic number = 11

Number of electrons in Na^+ ion =11 - 1 = 10

Electronic configuration in Na^+ ion = 2(K), 8(L), 0(M) i.e 2,8

Section C

27. i. Echo ranging is the process of detecting the underwater objects/obstacles by using the sound signals. For the formation of the echo, the minimum distance between the source and the reflecting body should be 17 metres.
Echo ranging technique is used to measure the depth of the sea with the help of the SONAR (Sound navigation and ranging) system.

ii. Given: Wavelength, l = 20 cm = 0.20 m and wave velocity (v) = 36 m/s

a. We know that v = nλ

$\Rightarrow$ n = $\frac{v}{\lambda}$ = $\frac{36}{0.20}$ = 180 waves per second.

b. Time period T = $\frac{1}{v}$ = $\frac{1}{180}$ = 5.55 $\times$ 10^{-3} seconds.

28. i. Mg^{2+} ion is mentioned in the given figure.

ii. The electronic configuraton of Mg^{2+} ion = 2, 8 and that of $_{12}$Mg atom = 2, 8, 2

iii. Number of protons in Mg atom = 2 + 8 + 2 = 12

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

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

v = u + at = 5 + (-10) $\times$ t

0 = 5 – 10t

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

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

= 2.5 – 1.25 = 1.25m

OR

Given, initial velocity of electron, u = 5 $\times$ 10^4 ms^{-1} and acceleration, a = 10^4 ms^{-2}

i. Final velocity of electron = v = 2 $\times$ u = 2 $\times$ 5 $\times$ 10^4 ms^{-1}

We know that, v= u +at or t = $\frac{v-u}{a}$ = $\left(\frac{10 \times 10^4 - 5 \times 10^4}{10^4}\right) = \frac{5 \times 10^4}{10^4}$ = 5s

ii. Using relation; S = ut + $\frac{1}{2}$at^2

Distance covered by electron in the given time,S = (5 $\times$ 10^4) $\times$ 5 + $\frac{1}{2}$(10^4) $\times$ $(5)^2$ = (25 $\times$ 10^4 + $\frac{25}{2}$ $\times$ 10^4) = 37.5 $\times$ 10^4 m

30. a. Potential energy.

b. If the stone is thrown without stretching the string of catapult the stone will fall down. As the stretched catapult possess potential energy due to stretch. It throws the stone with the high speed as string is released.

c. Shyam prevents his friend form aiming at the bird because stone could harm the bird and he does not want to harm or kill the bird, this shows his care and love for the living beings.

31. i. While walking on sand, the sand gets pressed down, impacting less reaction force on the person.

ii. The mass of the heavy gun is higher. So, its recoil velocity is less.

32.

Chromatin	Chromosome
1.It is the nucleoprotein of chromosomes which stains strongly with basis dyes and is present inside the nucleus.	1.Thread - like, stainable, condensed chromatin, visible at cell division and containing hereditary information in the form of genes.
2. Chromatin Fibers are Long and thin. They are uncoiled structures found inside the nucleus.	2. Chromosomes are compact, thick and ribbon-like. These are coiled structures seen prominently during cell division.
3. Chromatin is unpaired.	3. Chromosome is paired.
4. Found throughout the cell cycle.	4. Distinctly visible during cell division (metaphase, anaphase) as highly condensed structures upto several thousand nm.

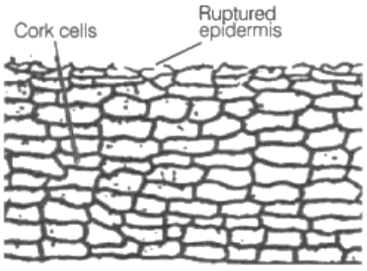
OR

(a) Cell will shrink due to exosmosis.

(b) Cell will swell up due to endosmosis

(c) There will be no net movement of solvent. Hence, there will be no change in the shape and size of the cell.

33. The protective tissue or the outermost covering of cells in plants is known as the epidermis, which performs protective function (protecting plants from adverse conditions). It is usually made up of a single layer of cells. In dry habitats, epidermis gets thicker to protect the plant from undue loss of water.



On aerial parts of the plant, epidermal cells often secrete a waxy, water-resistant layer on their outer surface. This waxy covering aids in protecting the plant against loss of water, mechanical injury and invasion by parasitic fungi. The cells of epidermal tissue are present in a continuous layer without intercellular spaces.

Small pores are present on the epidermis of the leaf. These pores are called stomata. They are enclosed by two kidney-shaped cells called guard cells. They help in gaseous exchange and transpiration.

As the plant grows older, a strip of secondary meristem replaces the epidermis of the stem. This forms several layers thick cork or bark of the tree in which cells are dead and compactly arranged without intercellular spaces.

Section D

34. i. a. Gravitational force acting on the 50 kg,

$F = mg = 50 \times 9.8 = 490$ N

b. Gravitational force acting on the 50 kg mass due to jupiter,

$$F_{Jupiter} = \frac{G \times M_{jupiter} \times M_{person}}{(\text{distance of jupiter from the earth})^2}$$

$$F_{Jupiter} = \frac{6.67 \times 10^{-11} \times 2 \times 10^{27} \times 50}{6.3 \times 10^{11} \times 6.3 \times 10^{11}}$$

$F_{Jupiter} = 1.68 \times 10^{-5}$ N

c. Gravitational force acting on the 50 kg mass due to saturn

$$F_{saturn} = \frac{G \times M_{saturn} \times M_{person}}{(\text{distance of saturn from the earth})^2}$$

$$F_{saturn} = \frac{6.67 \times 10^{-11} \times 6 \times 10^{26} \times 50}{1.28 \times 10^{12} \times 1.28 \times 10^{12}}$$

$F_{saturn} = 1.12 \times 10^{-6}$ N

$\therefore$ Total gravitational force due to the Jupiter and the Saturn = $(1.68 \times 10^{-5} + 1.12 \times 10^{-6}) = 1.8 \times 10^{-5}$ N

Thus, the combined force due to the planets Jupiter and Saturn (1.8×10^{-5}) N is negligible as compared to the gravitational force i.e. 490 N due to the earth.

ii. We know that g at the equator is less than g at poles (Antarctica). Thus, weight at the equator is less than weight at the pole (Antarctica). A bag of sugar weighs 'w' at a certain place on the equator. If this bag is taken to Antarctica, then it will weigh more due to the greater value of g.

OR

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

$a = -10 m/s^2$

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

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

$\Rightarrow T_2 = 20$

$\Rightarrow T = \sqrt{20}$

$\Rightarrow$ T = 4.47 sec

$\therefore$ Time taken to fall through the next 50 m = T - t_1 = 4.47 - 3.16 = 1.31 sec

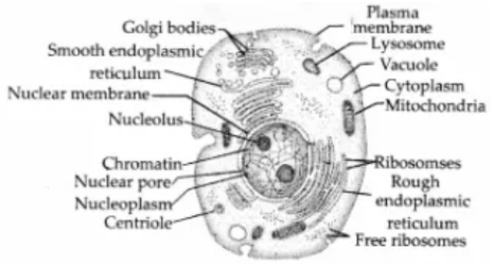
35. Golgi apparatus or Golgi bodies or Golgi complex is composed of membrane-bound fluid-filled vesicles, vacuoles and cisternae. In animal cells they are larger and only one or two in number, while in plants they are smaller and more in number. Also, in plant cells, they are distributed throughout the cytoplasm and are called dictyosomes.

Functions:

1. It is involved in the transport and modification of protein, lipids as well as carbohydrates.
2. It helps in the formation of cell plate during cell division.
3. It is also involved in the formation of lysosomes and peroxisomes.
4. The material synthesised near endoplasmic reticulum is packaged and dispatched to various targets and outside the cell through the Golgi apparatus.

OR

Diagram of an animal cell is given below:



36. i. a. **Temperature:** For the majority of solutions of solid-in-liquid and liquid-in-liquid types, solubility increases with temperature. However, for solutions of gases-in-water type, solubility decreases with increase in temperature.

b. **Pressure:** It is applicable to gas-in-liquid solutions. An increase in pressure increases the solubility of a gas. For example, aerated drinks contain carbon dioxide gas under pressure.

c. **Mechanical Stirring:** Mechanical stirring increases solubility. For example, sugar dissolves faster on stirring with a spoon.

d. **Size of Solute Particles:** Smaller the particle size of solute, greater is the solubility. For example, it is easier to dissolve powdered sugar than granules of sugar.

ii. **Compounds**

a. Compounds are pure substances.

b. They are made up of two or more elements combined chemically.

c. The constituents of a compound are present in a fixed ratio.

d. Compounds have fixed properties. For example, a particular compound will have fixed temperatures at which it melts and boils.

e. A compound can have properties different from its constituents, as a new substance is formed when the constituents are chemically combined.

f. The constituents of a compound can be separated only by chemical methods.

Mixtures

a. Mixtures are impure substances.

b. They are made up of two or more substances mixed physically.

c. The constituents of a mixture are present in varying ratios.

d. Mixtures do not have fixed properties. Their properties depend on the nature of their components and the ratios in which they are combined.

e. In mixtures, no new substance is formed. The properties of a mixture are the same as the properties of its constituents.

f. The constituents of a mixture can be separated easily by physical methods.

Section E

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

In older plants, the outer protective layer that is epidermis undergoes certain changes the epidermis of the stem is replaced. There is cork cambium which is simple tissue having one type of the cell. The cell of cork cambium are rectangular and their protoplast is vacuolated contain tannins. The cork cambium gives off new cell from its both side. The cell of the cork cambium is dead and compactly arranged without the intercellular space and there is suberin deposition.

(i) A strip of secondary meristem called phellogen replaced the epidermis of the stem.

(ii) Cork protects the plant against mechanical injury, extreme temperature, It also prevents the loss of water by evaporation.

OR

Suberin makes cell impermeable to water and gases.

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

Fish is a cheap source of animal protein for our food. Fish liver oil is rich in vitamin A and D. Basically fisheries are of two types:

i. **Fin fishery:** It includes capturing, management and exploitation of cartilaginous and bony fishes.

ii. **Shell fishery:** It includes capturing, management and exploitation of crustaceans (prawns, crabs) and molluscs (oysters, mussels etc.).

Depending upon the mode of obtaining fish, fisheries are of two types: **Capture fishing and Culture fishing.**

(i) The two types of fisheries depending upon the mode of obtaining fish are capture and culture fisheries.

(ii) Omega 3 fatty acid is exclusively found in the fishes.

(iii)Yes, Rohu is a bony fish. It can be used in fin fishery.

OR

Capture fishery is traditional fishing where a fisherman catches the fish from natural resources like the sea and rivers. A cultural fishery is one where the fish are obtained and reared for commercial purposes.

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

A solution of a solid in a liquid such as water can be prepared by adding it slowly to water with constant stirring at a certain temperature (room temperature). If the addition process is continued, a stage is ultimately reached in the dissolution process when no more of the solid dissolves. Rather it starts setlling at the bottom of the container such as a glass beaker. The solution at this

stage is said to be saturated. The solubility of a solute is always expressed with respect to the saturated solution. It may be defined as the maximum amount of the solute that can be dissolved in 100 g of the solvent to form a saturated solution at a given temperature. Please remember that the role of temperature is very important. If temperature is increased, the solution becomes unsaturated. In case the temperature is decreased, the solution becomes supersaturated. As a result, crust of the solute gets deposited on the surface.

(i) The maximum amount of solute that can dissolve in a given amount of solvent.

(ii) Given, Mass of solute = 20g

Mass of solvent = 500g

Mass-Volume percentage = $\frac{20}{500} \times 100$

= 4%

Solubility of 500 g of solute = $\frac{4}{100} \times 500$

= 20g

Hence, the solubility of 20g of solute in 500g of solvent is 20g.

(iii) A saturated solution becomes unsaturated by either heating it or by adding more of the solvent.

OR

Concentration of a solution is defined as the amount of solute that is present in a given amount of solution. It can be expressed in terms of: Mass by the mass percentage of a solution = $\frac{\text{mass of solute}}{\text{mass of solution}} \times 100$..