SAMPLE PAPER - 4

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. Name a process by which an impure sample of naphthalene can be purified. **[1]**

   a) Steam distillation
   b) Fractional distillation
   c) Sublimation
   d) Chromatography

2. A cell will swell up if **[1]**

   a) The concentration of water molecules in the surrounding medium is higher than water molecules concentration in the cell.
   b) The concentration of water molecules is the same in the cell and in the surrounding medium.
   c) The concentration of water molecules does not matter.
   d) The concentration of water molecules in the cell is higher than the concentration of water molecules is the surrounding medium.

3. The displacement of the body can be- **[1]**

   a) Zero
   b) All of these
   c) Positive
   d) negative

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

(a) Symbiosis	(i) NPK
(b) Cropping pattern	(ii) Legum and Rhizobium association

(c) Primary nutrients	(iii) Rabi
(d) Crop season	(iv)Intercropping

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

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

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

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

5. While doing work and running, you move your organs like hands, legs, etc. Which among the following is correct? **[1]**

a) Skeletal muscles contract and pull the tendon to move the bones

b) Smooth muscles contract and pull the ligament to move the bones

c) Skeletal muscles contract and pull the ligament to move the bones

d) Smooth muscles contract and pull the tendons to move the bones

6. The structure of the nuclear membrane is suitable for: **[1]**

a) separation of chromosomes

b) the organisation of spindle for nuclear division

c) nucleocytoplasmic exchange of materials

d) synthesis of endoplasmic reticulum

7. Calculate the number of moles in 17 g of hydrogen peroxide (H_2O_2). **[1]**

a) 2 mole

b) 1 mole

c) $\frac{1}{2}$ mole

d) 3 mole

8. Which cell does not have perforated cell wall? **[1]**

a) Companion cells

b) Vessels

c) Trachieds

d) Sieve tubes

9. A ball is thrown up and attains a maximum height of 100 m. It is thrown upwards with a speed of **[1]**

a) $9.8\ ms^{-1}$

b) $19.69\ ms^{-1}$

c) $98\ ms^{-1}$

d) $44.2\ ms^{-1}$

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. Mass of one atom of oxygen is **[1]**

a) 8 u

b) $\frac{1}{6.023\times10^{23}}$ g

c) $\frac{32}{6.023\times10^{23}}$ g

d) $\frac{16}{6.023\times10^{23}}$ g

12. Cartilage is not found in **[1]**

a) nose

b) ear

c) larynx

d) kidney

13. Ribosomes are made up of _____. **[1]**

a) Both RNA and Proteins

b) RNA

c) Lipoprotein

d) Proteins

14. Identify the incorrect statement(s). **[1]**

a) Atoms of the same element may have different masses.

b) Atoms of different elements may have same masses.

c) None of these

d) Atoms have been found to be made up of sub-atomic particles.

15. The components of the compound can be separated by using: **[1]**

a) chemical method

b) physical method

c) None of these

d) cannot be separated by using any method.

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

a) both hybridisation and genetic modification

b) hybridisation

c) use of antibiotic

d) genetic modification

17. **Assertion (A): T**he speedometer of a car measures the instantaneous speed of the car. **[1]**

Reason (R): Average speed is equal to the total distance covered by an object divided by the total time taken.

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):** There is no change in the temperature of a substance when it undergoes a change of state through it is still being heated. **[1]**

Reason (R): The heat supplied is absorbed either as latent heat of fusion or as latent heat of vaporisation.

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):** Lateral meristems add thickness to plants. **[1]**

Reason (B): Lateral meristems divide only in one plane.

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):** The mass of the total number of protons and neutrons is a measure of the approximate mass of an atom. **[1]**

Reason (R): The mass of an electron is negligible.

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 man of mass 60 kg runs up a flight of 30 steps in 15 seconds. If each step is 20 cm high, calculate the power developed by the man. (Take g = 10 m/s). **[2]**

OR

Explain why it is difficult to push a tin can into water keeping its mouth upwards than when its mouth is kept downwards towards the water?

22. How much water should be mixed with 12 mL of alcohol so as to obtain a 12 % alcohol solution? **[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. Why water is a liquid at room temperature? **[2]**

25. A 8000 kg engine pulls a train of 5 wagons, each of 2000 kg, along a horizontal track. If the engine exerts a force of 40000 N and the track offers a friction force of 5000 N, then calculate: **[2]**

a. the net accelerating force and

b. the acceleration of the train.

OR

According to the third law of motion, when we push on an object, the object pushes back on us with an equal and opposite force. If the object is a massive truck parked along the roadside, it will probably not move. A student justifies this by answering that the two opposite and equal forces cancel each other. Comment on this logic and explain why the truck does not move.

26. What are α, β and λ - rays composed of. **[2]**

Section C

27. Reena's grandmother took her mother to a doctor as she was four months pregnant for ultrasonography. But she showed her interest in determining whether the child is a boy or a girl. The doctor was annoyed and refused to disclose the gender of the child. **[3]**

a. What is ultrasonography?

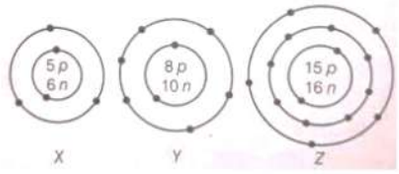
b. On what principle does it work?

c. Why do you think the doctor refused to determine the gender of the child?

d. What values are promoted by the doctor?

28. What information do you get from the figure about the atomic number, mass number and valency of atoms X, Y and Z? **[3]**

Give your answer in a tabular form.



29. 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. **[3]**

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?

OR

An iron ball of density 7800 k gm^{-3} and volume 200 cm^{-3} is totally immersed in water.

i. Calculate the weight of the iron ball in the air.

ii. Calculate the upthrust.

iii. Its apparent weight in water.

iv. Its apparent density in water.

[3]

30. i. The potential energy of a freely falling object decreases progressively. What happens to its

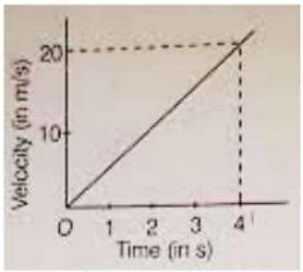
a. Kinetic energy,

b. total mechanical energy?

State the law on which your answer is based.

ii. A household consumes 1 kWh of energy per day. How much energy is this in joules?

31. The velocity-time graph of a ball moving on the surface of the floor is as shown in the figure. Calculate the force acting on the ball, if mass of the ball is 100 g. **[3]**

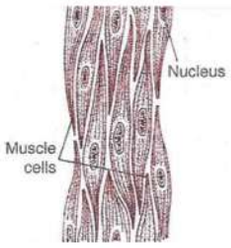


32. Differentiate between plant cell and animal cell. **[3]**

OR

In brief, state what happens when dry apricots are left for some time in pure water and later transferred to sugar solution?

33. Observe the following diagram and answer the following questions: **[3]**



i. Identify the type of tissue mentioned in the given figure.

ii. Write any two characteristics of the type of tissue mentioned in the given figure.

iii. Where is the given tissue found in our body? What is the nature of the given tissue mentioned in the diagram?

Section D

34. What is the magnitude of the gravitational force between the earth and a 1 kg object on its surface? (Mass of the earth is 6×10^{24} kg and radius of the earth is6.4×10^{6} m). **[5]**

OR

What are the differences between the mass of the object and its weight?

35. Why are mitochondria called powerhouse of the cell? Give three similarities and one difference between mitochondria and plastid. **[5]**

OR

Explain main functional regions of a cell with the help of a diagram.

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

a. Stability

b. Filterability

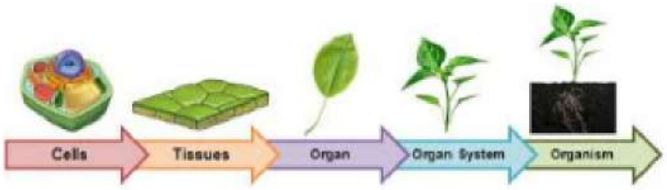
c. Type of mixture

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]**

A few layers of cells beneath the epidermis are generally simple permanent tissue. Parenchyma is the most common simple permanent tissue. It consists of relatively unspecialized cells with thin cell walls. They are living cells. Collenchyma allows bending of various parts of the plant-like tendrils and stems of climbers without breaking. Sclerenchyma tissue makes the plant hard and stiff. We have seen the husk of a coconut. It is made of sclerenchymatous tissue. They are long and narrow as the walls are thickened due to lignin. The tissue is present in stems, around vascular bundles, in the veins of leaves and in the hard covering of seeds and nuts.



(i) The flexibility in plants is due to which tissue?

(ii) Is aerenchyma provides mechanical support?

OR

Is apical and intercalary meristems permanent tissue?

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

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

The Indian cropping season is classified into two main seasons- (i) Kharif and (ii) Rabi based on the monsoon. The characteristics of these two main crop seasons are:

(i) Mention the various cropping seasons in India.

(ii) Differentiate between Rabi and Kharif crops.

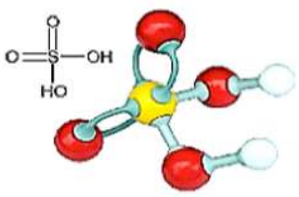
(iii) If there is low rainfall in a village throughout the year, what measures will you suggest to the farmers for better cropping ?

OR

What is zaid crop? Give example.

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

Sulfuric acid or sulphuric acid, known in antiquity as oil of vitriol, is a mineral acid composed of the elements sulfur, oxygen and hydrogen, with the molecular formula H_2SO_4. It is a colorless, odorless and viscous liquid that is miscible with water.



(i) Find the number of gram hydrogen atoms in 1 mole of $[H_2SO_4]$?

(ii) How many atoms of hydrogen does it have?

(iii) How many atoms (in grams) of hydrogen are present for every gram atom of oxygen in it?

OR

Calculate the number of atoms in H_2SO_4?

Solution

SAMPLE PAPER - 4

Class 09 - Science

Section A

1. **(c)** Sublimation
   Explanation: During sublimation, naphthalene being sublime changes into vapors leaving behind impurities. Vapour can be cooled by condensation. The impure sample of naphthalene can be purified by the sublimation process.
2. **(a)** The concentration of water molecules in the surrounding medium is higher than water molecules concentration in the cell.
   Explanation: A cell will swell up if it is placed in the hypotonic solution. This is so because the concentration of water molecules in the surrounding medium is higher than water molecules concentration in the cell So, the water molecules move from external solution into cell sap.
3. **(b)** All of these
   Explanation: Displacement is the shortest distance travelled so it can be positive or negative or zero.
4. **(c)** (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii)
   Explanation:
   - Symbiosis is a mutually beneficial association existing between two organisms and both organisms derive benefit from each other without causing any harm to each other. Examples: Leguminous plants show the symbiotic nutrition mode. Alga and fungus live together. The fungus provides water and shelter to the alga.
   - Cropping pattern means the proportion of area under various crops at a point of time. The crop statistics published by the governments are used to denote the cropping patterns. Cropping pattern is, however, a dynamic concept as it changes over space and time.
   - Primary nutrients are nutrients that are required by plants in larger quantities than other nutrients. The primary nutrients include nitrogen (N), phosphorous (P), and potassium (K). NPK fertilizer is a complex fertilizer comprised primarily of the three primary nutrients required for healthy plant growth.
   - Rabi crops or Rabi harvest are agricultural crops sown in winter and harvested in the spring in South Asia. The rabi crops are sown around mid-November after the monsoon rains are over, and harvesting begins in April/May. The crops are grown either with rainwater that has percolated into the ground or with irrigation.
5. **(a)** Skeletal muscles contract and pull the tendon to move the bones
   Explanation: Skeletal muscles are striped, voluntary muscles, due to the presence of alternate dark and light bands. They are called voluntary as they work according to our will. While doing work and running skeletal muscles contract and pull the tendon (which connects muscles to bones) to move the bone.
6. **(c)** nucleocytoplasmic exchange of materials
   Explanation: The nuclear membrane allows the nucleocytoplasmic exchange of materials as the membrane behaves as a semipermeable membrane.
7. **(c)** $\frac{1}{2}$ mole
   Explanation: The molecular mass of H_2O_2 is 34 u. So, 34 g of hydrogen peroxide will contain 1 mole. Therefore, 17 g of hydrogen peroxide will contain $\frac{17}{34}$ moles or $\frac{1}{2}$ mole.
8. **(a)** Companion cells
   Explanation: Tracheids and vessels are xylem elements and are concerned with the transport of water. They are long tube-like structures with partially or completely dissolved walls to form water pipes (in vessels) and pits in cell wall (in tracheids) for conducting water. Sieve tubes are slender tube-like structures with their end walls perforated by numerous pores and are called sieve plates. They are phloem elements and are main food conducting elements. Companion cells possess numerous mitochondria and ribosomes and are supporting units of sieve tubes.
9. **(d)** 44.2 ms^{-1}
   Explanation: $V^2 - u^2 = 2gs$
   $u = 0$ g , $g = 10ms^{-1}$, $s = 100$ m
   $V^2 = 2 \times 10 \times 100 = 2000$
   $V = 44.2$ m/s

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)** $\frac{16}{6.023\times10^{23}}g$
Explanation: Mass of one atom of oxygen
$= \frac{\text{Atomic mass}}{N_A}$
$= \frac{16}{6.022\times10^{23}}g$
$= 2.657 \times 10^{-26}$ Kg

12. **(d)** kidney
Explanation: The cartilage is a connective tissue with solid matrix composed of proteins and sugars. It is commonly seen in nose, ear, trachea, and larynx. Cartilage is not found in kidney.

13. **(a)** Both RNA and Proteins
Explanation: Ribosomes consist of two major components: the small ribosomal subunit, which reads the RNA, and the large subunit, which joins amino acids to form a polypeptide chain. Each subunit is composed of one or more ribosomal RNA (rRNA) molecules and a variety of ribosomal proteins (r-protein).

14. **(c)** None of these
Explanation:
- Atoms of different elements may have the same masses. E.g. Argon and Calcium.
- Atoms of the same element may have different masses as in the case of isotopes.
- Atoms are made up of sub-atomic particles - electron, proton, and neutron.

All the statements are correct.

15. **(a)** chemical method
Explanation: The components of the compound can be separated only by chemical methods because they have undergone chemical changes while formation which is physically irreversible in nature.

16. **(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.

17. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation: The speedometer of a car measures the instantaneous speed of the car.

18. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: The heat supplied during the state transformation does not increase the kinetic energy but is absorbed for conversation of complete solid to liquid or complete liquid to vapours.

19. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Lateral meristems are present along the side of the stem. Vascular cambium in the gymnosperms and the angiosperms is a good example of lateral meristems. Lateral meristem is always composed of a single layer of rectangular cells that divide only in one plane and produce new vascular tissues on either side.

20. **(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.

Section B

21. Height of each step = 20 cm = 0.20 cm
Height of 30 steps, H = 30 × 0.20 m = 6.0 m
Time, t = 15 seconds
Force exerted by man against gravity
F = Weight of man = mg
work done by man = Force × Height = mg × H

Power

$= \frac{mgH}{t}$

$= \frac{60 \times 10 \times 6.0}{15}$

= 240 joule.

OR

When the tin can is pushed into the water keeping its mouth upwards, it displaces more volume of water, and therefore it experiences more upthrust. But when it is pushed into the water with its mouth towards water, it displaces less volume of water (as water enters it). As a result the upthrust is also less. Thus it is comparatively easier to push a tin can into water with its mouth towards water than away from it.

22. Volume of alcohol (solute) =12 mL

Let the volume of water (Solvent) = x mL

∴ Volume of solution = (12 + x) mL

Concentration of solution $= \frac{\text{Volume of solute}}{\text{Volume of solution}} \times 100 = \frac{\text{Volume of alcohol}}{\text{Volume of solution}} \times 100$

$12 = \frac{12}{12+x} \times 100$

12 + x = 100

x = 100 - 12 = 88 mL

So, 88 mL of water should be mixed with 12 mL of alcohol to obtain 12% alcohol solution. .

23. Given frequency, v =2 kHz = 2×10^3 Hz,

Wavelength, λ = 40 cm = 0.40 m

Speed of sound = Frequency × Wavelength

i. e., $v = v\lambda$

$= (2 \times 10^3 \text{ Hz}) \times (0.40 \text{ m})$

$= 0.80 \times 10 \text{ Hz} = 800 \text{ ms}^{-1}$

Time, $t = \frac{\text{Distance}}{\text{Speed}}$

$t = \frac{s}{v}$

Given distance, s = 1.6 km = 1.6×10^3 m

Time, $t = \frac{1.6 \times 10^3 m}{800\ ms^{-1}}$

$= \frac{1600}{800} s = 2s$

24. The boiling point (or boiling temperature) of water at one atmospheric pressure is 100°C. Therefore, water is a liquid at room temperature which is below its boiling point.

25. a. Net accelerating force is given by

= Force exerted by the engine - Frictional force

= 40000 - 5000 = 35000 N

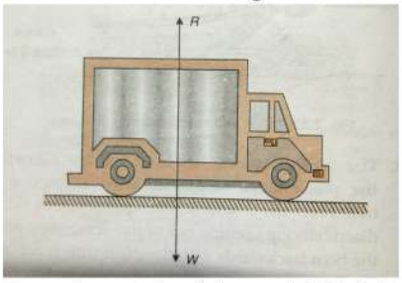
b. Acceleration is given by

$a = \frac{\text{Accelerating force}}{\text{Mass of train}}$

$= \frac{35000\text{N}}{10000+8000\text{kg}} = 1.94 \text{ ms}^{-2}$

OR

The various forces acting on the truck at rest are as follows:



Here, the weight of the truck W is balanced by the reaction R of the ground on the truck. But the frictional force due to the ground is much more than the force of push. Therefore, the truck does not move.

26. α- rays are made up of helium ions with +2 charge.

β- rays are negatively charged particles and are fast moving electrons.

λ- rays are neutral but are high-frequency electromagnetic radiation.

Section C

27. a. The technique of obtaining picture of internal organs of body by using echoes of ultrasound pulse is called ultrasonography.
    b. The ultrasonography is based on the principle that ultrasound waves are sent from transducer and propagate through different tissues and then return to the transducer as reflected echoes.
    c. To disclose the gender is against the law and also to discourage the curiousity of knowing the sex of the child before birth.
    d. Obeying laws, honesty.

28. The tabular form is as below:

Element	Atomic Number (= no. of p)	Mass Number {= no. of (p+n)}	Number of Electrons (= no. of p)	Electronic Configuration	Valency
X	5	5 + 6 = 11	5	2, 3	3
Y	8	8 + 10 = 18	8	2, 6	2
Z	15	15 + 16 = 31	15	2, 8, 5	3, 5

29. Given, initial velocity of electron, u = 5×10^4 ms^{-1} and acceleration, a = 10^4 ms^{-2}

    i. Final velocity of electron = v = 2 × u = $2 \times 5 \times 10^4$ ms^{-1}
    We know that, v= u +at or t = $\frac{v-u}{a} = \left(\frac{10\times10^4-5\times10^4}{10^4}\right) = \frac{5\times10^4}{10^4}$ = 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

    OR

    i. Volume in iron ball = 200 cm^3
    ∴ Mass of iron ball = $200 \times 10^{-6} \times 7800 = 1.56$ kg
    Weight of iron ball in air = m × g = 1.56 × 10
    Weight of iron ball in air = 15.6 N

    ii. Upthrust = Volume of water displaced (V) × density of water (d) × g
    = Vdg = $2 \times 10^{-4} \times 1000 \times 10$
    Upthrust = 2N

    iii. Apparent weight = True weight - Upthrust = (15.6 - 2)
    Apparent weight = 13.6 N

    iv. Apparent density = density of solid - density of liquid = 7800 - 1000
    Apparent density = 6800 kgm^{-3}

30. i. a. As potential energy decreases with decreasing height, the speed of the object will increase and hence its kinetic energy will increase.
    b. Total mechanical energy will remain constant.
    It is based on the law of conservation of energy which states that energy can neither be created nor be destroyed/. It can only be transformed from one form to another.

    ii. 1 kWh = 3.6×10^6 J

31. The velocity-time graph shows that the velocity of the ball at t = 0 is zero. So, the initial velocity of the ball, u = 0.
    Velocity of the ball at t = 4 s is 20 m/s
    i.e. final velocity, v = 20 m/s; time, t = 4 s
    ∴ Acceleration of the ball,
    $a = \frac{v-u}{t} = \frac{20m/s-0}{4s} = 5m/s^2$
    Also, mass of the ball
    $a = 100g \Rightarrow \frac{100}{1000}kg = \frac{1}{10}kg$
    ∴ Force acting on the ball,
    F = ma
    F= $\frac{1}{10}kg \times 5m/s^2$
    = 0.5 kg-m/s^2 = 0.5 N [∵ 1 kg-m/s^2 = 1 N]

32.

Plant Cell	Animal Cell

Cells comparatively larger in size	Cells usually small in size
Cell wall present	Cell wall absent
Plastids present	Plastids absent
Vacuole are large and generally one	Vacuales are absent, if present small in size and large in number
Dictyosmoes (Golgi apparatus) are present	Prominent Golgi apparatus are present

OR

When dry apricots are left for some time in pure water, the apricots become swollen because they absorb water due to osmosis. After that, when the swollen apricots are kept in a sugar solution, they lose water because of exosmosis and shrink again.

33. i. The given diagram shows non-striated muscles or smooth muscles.
    ii. Following are the characteristics of non-striated muscles:
        a. The cells are spindle-shaped, uni-nucleated, elongated.
        b. They are elongated and have no striations.
    iii. The non-striated muscles or smooth muscles are found within the walls of the elementary canal, bladder, and blood vessels. The non-striated muscles or smooth muscles are involuntary in nature that is we can't control the movements of these muscles according to our will.

Section D

34. $F_{gravitation} = \frac{G \times M_e \times m_o}{r^2}$

$= \frac{6.67 \times 10^{-11} \times 6 \times 10^{24} \times 1}{(6.4 \times 10^6)^2}$
$= \frac{6.67 \times 6 \times 10^{-11+24}}{6.4 \times 6.4 \times 10^{12}}$
$= \frac{6.67 \times 6}{6.4 \times 6.4} \times 10^{-11+24-12}$
$= 0.9770 \times 10N = 9.770N$

OR

Mass	Weight
Mass is a property of matter. The mass of an object is the same everywhere,	Weight depends on the effect of gravity. Weight varies according to location.
Mass can never be zero.	Weight can be zero if no gravity acts upon an object, as in space.
Mass does not change according to location.	Weight increases or decreases with higher or lower gravity.
Mass is a scalar quantity. It has magnitude.	Weight is a vector quantity. It has magnitude and is directed toward the center of the Earth or other gravity well.
Mass may be measured using an ordinary balance.	Weight is measured using a spring balance.
Mass usually is measured in grams and kilograms.	Weight often is measured in newtons, a unit of force.

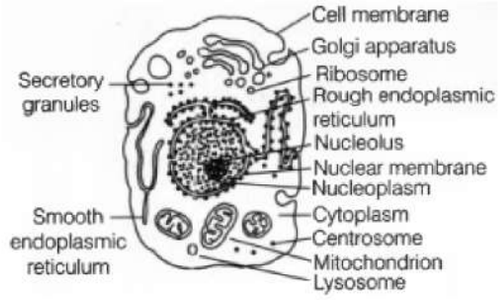
35. Mitochondria are often associated with cellular respiration and energy generation of the cell. The energy required for various chemical activities is released by the mitochondria in the form of ATP molecules. For this reason, mitochondria are known as the powerhouse of the cell.
Three similarities between mitochondria and plastids are as follows:
    i. Both have their own DNA and ribosomes.
    ii. External structures of mitochondria and plastids are similar.
    iii. Both have more than one membrane layer.

One major difference between mitochondria and plastids is that mitochondria are present in both plant and animal cells, whereas plastids are present only in plant cells.

OR

The plasma membrane, cytoplasm, and nucleus are three main functional regions of a cell.
    i. Plasma membrane: It is a thin, selectively permeable membrane, covering the cell and is made up of lipids and proteins.
    ii. Cytoplasm: It is aqueous material containing a variety of cell organelles along with non-living inclusions.
    iii. Nucleus: It is the control centre of a cell. It contains the cells hereditary information (DNA).

The diagram of the eukaryotic cell is:-



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.
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 = $\frac{Mass\ of\ solute}{Mass\ of\ solution} \times 100$

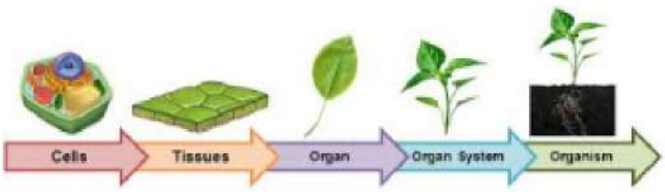
b) Mass by volume % of solution = $\frac{Mass\ of\ solute}{Mass\ of\ solution} \times 100$

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:**

A few layers of cells beneath the epidermis are generally simple permanent tissue. Parenchyma is the most common simple permanent tissue. It consists of relatively unspecialized cells with thin cell walls. They are living cells. Collenchyma allows bending of various parts of the plant-like tendrils and stems of climbers without breaking. Sclerenchyma tissue makes the plant hard and stiff. We have seen the husk of a coconut. It is made of sclerenchymatous tissue. They are long and narrow as the walls are thickened due to lignin. The tissue is present in stems, around vascular bundles, in the veins of leaves and in the hard covering of seeds and nuts.



(i) Collenchyma.

(ii) No, aerenchyma helps aquatic plants to float.

OR

No, apical and intercalary meristems are not permanent tissue.

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

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

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

of these two main crop seasons are:

(i) The various cropping seasons in India are Rabi crop, Kharif crop and Zaid crop.

(ii) Rabi crops are sown during the winter season which requires less water.

Kharif crop is sown during the summer/rainy season which requires abundant water.

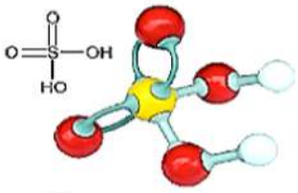
(iii) Farmers are suggested to grow drought-resistant crops that can mature early. Along with this farmers are advised to use manure for their fields as it increases the water-holding capacity of the soil.

OR

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

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

Sulfuric acid or sulphuric acid, known in antiquity as oil of vitriol, is a mineral acid composed of the elements sulfur, oxygen and hydrogen, with the molecular formula H_2SO_4. It is a colorless, odorless and viscous liquid that is miscible with water.



(i) 1 Mole of H_2SO_4 = gram molecular Mass of H_2SO_4 = 6.023×10^{23} molecules/atoms

In $H_2SO_4 \rightarrow$ 2 gram of hydrogen (H) atoms are present.

(ii) 1 Mole of H_2SO_4 = gram molecular Mass of H_2SO_4 = 6.023×10^{23} molecules/atoms

1 Mole of H_2SO_4 have 6.023×10^{23} atoms. So, 2 gram of hydrogen = $2 \times 6.023 \times 10^{23} = 12.046 \times 10^{23}$

(iii) 1 Mole of H_2SO_4 = gram molecular Mass of H_2SO_4 = 6.023×10^{23} molecules/atoms

In H_2SO_4; for every 2 hydrogen atoms there are average 4 oxygen atoms so for 1 hydrogen = $\frac{4}{2}$ oxygen are present = 2 oxygen are present

For 1 oxygen = $\frac{2}{4}$ hydrogen one present = 0.5 Hydrogen are present for every gram atom of oxygen in it.

OR

1 Mole of H_2SO_4 = gram molecular Mass of H_2SO_4 = 6.023×10^{23} molecules/atoms

1 Mole of H_2SO_4 = 6.023×10^{23} atoms