CBSE Class 09 Science

Sample Paper 05 (2020-21)

Maximum Marks: 80

Time Allowed: 3 hours

General Instructions:

i. The question paper comprises four sections A, B, C and D. There are 36 questions in the question paper. All questions are compulsory.
ii. Section–A - question no. 1 to 20 - all questions and parts thereof are of one mark each. These questions contain multiple-choice questions (MCQs), very short answer questions and assertion - reason type questions. Answers to these should be given in one word or one sentence.
iii. Section–B - question no. 21 to 26 are short answer type questions, carrying 2 marks each. Answers to these questions should in the range of 30 to 50 words.
iv. Section–C - question no. 27 to 33 are short answer type questions, carrying 3 marks each. Answers to these questions should in the range of 50 to 80 words.
v. Section–D - question no. 34 to 36 are long answer type questions carrying 5 marks each. Answers to these questions should be in the range of 80 to 120 words.
vi. There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
vii. Wherever necessary, neat and properly labeled diagrams should be drawn.

Section A

1. What is meant by a substance?

OR

What types of mixtures can be separated by technique known as crystallisation?

2. Explain the Saturated solution.
3. **Statement A:** The secreted proteins are packed inside the secretory vesicles which are pinched off from the Golgi apparatus.

Statement B: ER is absent in the red blood cells of mammals.

Which of the two statement(s) is/are true?

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

4. What is microscope?
5. State Newton's first law of motion.
6. Which organelle is associated with ribosome formation?

OR

Name two varieties of Indian fishes.

7. Name two animals, which transmit rabies to human beings.
8. How many times is radius of extra nuclear portion more than that of the nucleus of an atom?
9. Write the name of different plant parts in which chromoplast, chloroplast and leucoplast are present.

OR

What is hypertonic solution?

10. What is the range of the size of the particles of dispersed phase in a colloidal solution?
11. What does the odometer of an automobile measure?

OR

State SI unit of acceleration.

12. Name two diseases against which vaccines are available.
13. If the body is found to be accelerated, is the force acting on it balanced or unbalanced?
14. **Assertion:** The weight of an object on the moon is less than that on the earth.
Reason: The mass and radius of the moon are less than that of earth.

a. Both A and R are true and R is the correct explanation of assertion.
b. Both A and R are true but R is not the correct explanation of assertion.
c. A is true but R is false.
d. A is false but R is true.

15. **Assertion:** The symptoms of the disease depend on the target organ infected by the microbe.
Reason: Based on the signs and symptoms of a disease, we can get an idea of the target organ of the microbe.
a. Both A and R are true and R is the correct explanation of assertion.
b. Both A and R are true but R is not the correct explanation of assertion.
c. A is true but R is false.
d. A is false but R is true.

OR

Assertion: We need food to keep ourselves healthy.
Reason: Good economic conditions and jobs are needed for individual health.

a. Both A and R are true and R is the correct explanation of assertion.
b. Both A and R are true but R is not the correct explanation of assertion.
c. A is true but R is false.
d. A is false but R is true.

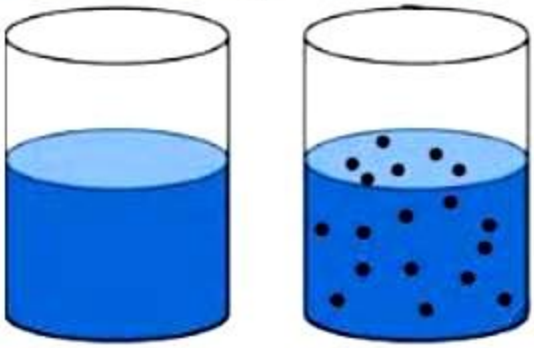
16. **Assertion:** The speedometer of an automobile measure the average speed of the automobile.

Reason: Average velocity is equal to total displacement per total time-taken.

a. Both assertion(A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
b. Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
c. Assertion (A) is true but reason (R) is false.
d. Assertion (A) is false but reason (R) is true.

17. **Read the passage and answer any four questions:**
A suspension is a heterogeneous mixture in which the solute particles do not dissolve

but remain suspended throughout the bulk of the medium. Particles of a suspension are visible to the naked eye. The particles of a suspension scatter a beam of light passing through it and make its path visible. Due to the relatively smaller size of particles, as compared to that of a suspension, the mixture appears to be homogeneous. The scattering of a beam of light is called the Tyndall effect. The components of a colloidal solution are the dispersed phase and the dispersion medium. The solute-like component or the dispersed particles in a colloid form the dispersed phase, and the component in which the dispersed phase is suspended is known as the dispersing medium.



i. Which of the following is not the property of colloid?
   a. A colloid is a heterogeneous mixture.
   b. Size of particles of a colloid is too small
   c. Colloids are big enough to scatter a beam of light passing through it.
   d. A colloid is very unstable

ii. Sol and gel are examples of:
   a. Solid-solid colloids
   b. Sol is a solid-liquid colloid and gel is a liquid-solid colloid
   c. Sol is solid-solid colloid and gel is a solid-liquid colloid
   d. Sol is a liquid-solid colloid and gel is a solid-liquid colloid

iii. A mixture of sulphur and carbon disulphide is
   a. Heterogeneous and shows Tyndall effect
   b. Homogeneous and shows Tyndall effect
   c. Heterogeneous and does not show Tyndall effect
   d. Homogeneous and does not show Tyndall effect

iv. Which of the following is an example of solid sol?
   a. Milk

b. Coloured gemstone
c. Fog
d. Shaving cream

v. Milk of magnesia is an example of:
a. emulsion
b. sol
c. solid sol
d. gel

18. **Read the passage and answer any four 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. The flexibility in plants is due to
a. collenchyma
b. parenchyma
c. chlorenchyma
d. aerenchyma

ii. Function of aerenchyma:
a. It performs photosynthesis
b. It helps the aquatic plant to float
c. It provides mechanical support
d. none of these

iii. Which of the following tissues has dead cells?
a. Parenchyma

b. Sclerenchyma
c. Collenchyma
d. Epithelial tissue

iv. Which of the following statement is incorrect

I. Parenchyma tissues have intercellular spaces.
II. Collenchymatous tissues are irregularly thickened at corners.
III. Apical and intercalary meristems are permanent tissues.
IV. Meristematic tissues, in its early stage, lack vacuoles, muscles

a. (I) and (II)
b. (II) and (III)
c. (III) and (I)
d. Only (III)

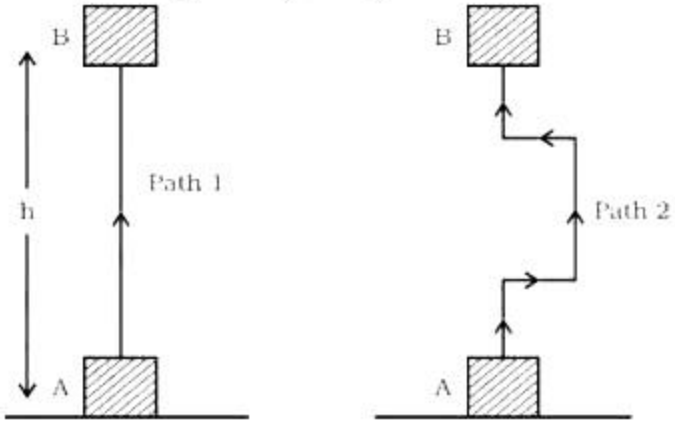
v. Which of the following is the function of the tissue which is shown in the below diagram?

a. Transpiration
b. Provides mechanical support
c. Provides strength to the plant parts
d. None of these

19. **Read the passage and answer any four questions:**

When an object throws upward the energy gets stored due to the work done on the object. The energy transferred to an object is stored as potential energy if it is not used to cause a change in the velocity or speed of the object. when you stretch a rubber band. The energy transferred to the band is its potential energy. An object increases its energy when raised through a height. This is because work is done on it against gravity while it is being raised. The energy present in such an object is the

gravitational potential energy. The gravitational potential energy of an object at a point above the ground is defined as the work done in raising it from the ground to that point against gravity.



i. The potential energy of a body depends on its:
   a. position
   b. configuration
   c. position and configuration
   d. mass and velocity

ii. Which of the following energy change involves frictional force?
   a. kinetic energy to heat energy
   b. potential energy to sound energy
   c. chemical energy to heat energy
   d. chemical energy to light energy

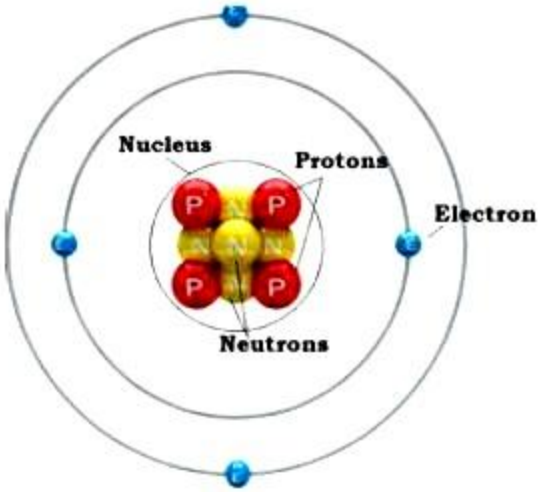
iii. When a coil spring is compressed, the work is done in the spring. The elastic potential energy
   a. increases
   b. decreases
   c. disappears
   d. remains unchanged

iv. Water stored in a dam possesses
   a. no energy
   b. electrical energy
   c. kinetic energy
   d. potential energy

v. A body is falling from a height h. After it has fallen a height $\frac{1}{2}$ h, it will possess
   a. only potential energy

b. only kinetic energy
c. half potential and half kinetic energy
d. more kinetic and less potential energy

20. **Read the passage and answer any four question**



Protons and neutrons are present in the nucleus of an atom, the electron is present in the outer shell. It is the number of protons of an atom, which determines its atomic number. It is denoted by 'Z'. For hydrogen, Z = 1, because in a hydrogen atom, only one proton is present in the nucleus. The mass of an atom is practically due to protons and neutrons which are present in the nucleus of an atom. For example, the mass of carbon is 12 u because it has 6 protons and 6 neutrons, 6 u + 6 u = 12 u.

i. All atoms of an element have _____ atomic number.
   a. same
   b. different
   c. both same and different
   d. none of these

ii. The ion of an element has 3 positive charges. The mass number of the atom is 27 and the number of neutrons is 14. What is the number of electrons in the ion?
   a. 13
   b. 10
   c. 14
   d. 16

iii. The number of electrons in an element Z is 6 and the number of neutrons is 12. Which of the following is the correct representation of the element?
   a. ${}_{15}Z^{18}$

b. ${}_{16}Z^{18}$

c. ${}_{15}Z^{16}$

d. ${}_{16}Z^{15}$

iv. Who discovered a sub-atomic particle which had no charge?

a. J.Chadwick

b. E. Goldstein

c. Rutherford

d. J.J. Thomson

v. _____ has a mass nearly equal to that of a proton

a. electron

b. neutron

c. both electron and neutron

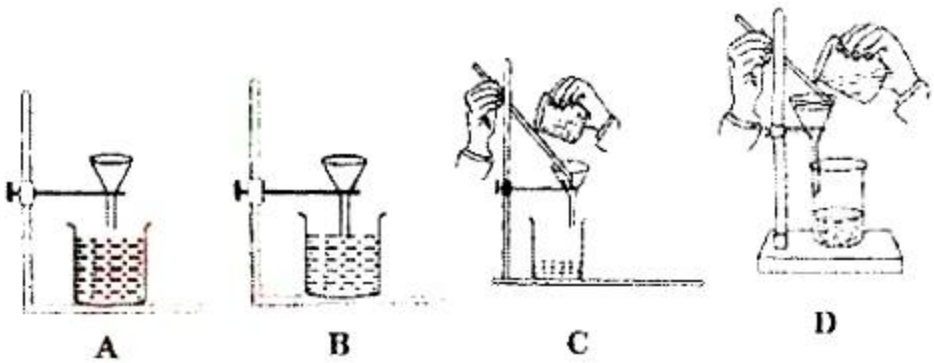
d. none of these

Section B

21. Can we separate alcohol dissolved in water by using a separating funnel? If yes, then describe the procedure. If not, explain.

OR

Which of the following is correct procedure for filtration?



22. Stat the properties of cathode rays?
23. Who discovered cells, and how?

OR

If you are provided with some vegetables to cook, you generally add salt into the

vegetables. After adding salt, vegetables release water. Why?

24. Preeti was down with an attack of bronchitis. The atmosphere was full of smoke and noise as diwali was nearing when her parents explained to the ill effects of burning crackers to neighbourhood kids. They agreed not to burn crackers anymore.
    i. It is observed that when a cracker is burnt its light reaches us first and then we hear its sound. Why?
    ii. Write any three ill-effects that Preeti' parents might have explained to kids.
    iii. Do you support kid's decision of not burning crackers? Which qualities do you identify in those kids?
25. Abdul while driving to school computes the average speed for his trip to be 20 kmh^{-1}. On his return trip along the same route, there is less traffic and the average speed is 40 kmh^{-1}. What is the average speed for Abdul's trip?
26. A machine raises a load of 750 N through a height of 16 m in 5 seconds. Calculate the power at which the machine works.

Section C

27. i. Why does a bucket of water feel heavier when taken out of water?
    ii. Lead has greater density than iron and both are denser than water. Is the buoyant force on a lead object greater than, less than or equal to the buoyant force on an iron object of the same volume?

OR

    i. Explain, why a completely immersed bottle in water bounces back on the surface?
    ii. Why does a bucket of water weigh less inside the well water?
28. Differentiate between Potential and kinetic energy?
29. i. State the law of constant proportion.
    ii. In a compound carbon and oxygen react in a ratio 3 : 8 by mass to form carbon dioxide. What mass of oxygen is required to react completely with 9 g carbon?
30. What are the different means by which infectious diseases are spread ?
31. Describe Bohr's model of the atom.
32. What do you mean by plasmodesmata?
33. Draw a velocity versus time graph of a stone thrown vertically upward and then coming downwards after attaining the maximum height.

Section D

34. Define force? Explain five effects of force?

OR

Name and define three different types of inertia and give an example of each?

35. Draw well-labeled diagrams of various types of muscles found in the human body.
36. i. Which has more number of atoms?
    a. 10 g of nitrogen (N_2)
    b. 10 g of ammonia (NH_3)

    ii. Calculate the total number of moles in 0.585 g of sodium chloride.
    [Atomic mass of N = 14 u, H = 1 u, Cl = 35.5 u, Na = 23 u]

OR

a. Write the postulates of Dalton's atomic theory (Any three).
b. What is the difference between the molecules of an element and the molecule of a compound?

CBSE Class 09 Science

Sample Paper 05 (2020-21)

Solution

Section A

1. A substance can be defined as a kind of matter whose constituent particles cannot be separated from each other by any physical process since they are all similar in chemical properties.

   OR

   The solid mixtures in which one component or impurity is less soluble in a particular solvent as compared to the other. For example, impure samples of copper sulphate, potassium nitrate, potash alum etc. can be purified by this method.

2. A solution that has dissolved as much solute as it is capable of dissolving at a particular temperature is called a saturated solution. A saturated solution cannot dissolve more of solute particles at a particular temperature.
3. (c) Both the statements - A and B

   Explanation: Both statements are correct. Golgi apparatus consists of a system of membrane-bound vesicles. The proteins manufactured by the ribosomes are packed inside the vesicles. Endoplasmic Reticulum (ER) is absent in the red blood cells of mammals. Red Blood Cells in mammals anucleate when mature i.e. they do not contain a nucleus. This is so that the cell has maximum space for haemoglobin.
4. Microscope is an optical instrument consisting of a lens or combination of lenses which renders minute objects distinctly visible.
5. Newton's first law of motion states that, 'Every body continues to be in its state of rest or of uniform motion in a straight line unless it is compelled by some external applied force to change that state.'
6. Nucleolus

   OR

   Freshwater fish are those that spend some or all of their lives in fresh water, such as rivers and lake. Fresh water fishes– Catla and Rohu

Marine fishes are those which live in salt water. Marine fishes – Hilsa, Sardine

7. Rabid dog and cat.
8. The nucleus of an atom has diameter of 10^{-14} to 10^{-15} meters(m). The extranuclear space where its electrons are found is a much larger volume with a diameter of approximately 10^{-10}m.
   So, Radius of extra nuclear portion is nearly five times more as compared to the nucleus.
9. Flower and Fruit - Chromoplast,
   Leaves of the plant - Chloroplast,
   Root of the plant - Leucoplast

OR

A solution having solute concentration higher than that of the cell sap is called hypertonic solution.

10. It ranges from 1 nm (10^{-9} m) to 100 nm (10^{-7}m).
11. The odometer measures the instantaneous speed of the automobile at some particular time.

OR

S.I. unit of acceleration is metre / second^2 (ms^{-2}).

12. Polio and tuberculosis are two diseases against which vaccines are available.
13. Unbalanced force. Any body moving at constant speed gets accelerated or de-accelerated due to the action of unbalanced forces.
14. (a) Both A and R are true and R is the correct explanation of assertion.
    Explanation: The weight of an object on the moon is less than that on the earth because the mass and radius of the moon are less than that of earth.
15. (a) Both A and R are true and R is the correct explanation of assertion.
    Explanation: The symptoms of the disease depend on the target organ infected by the microbe like cough and breathing problems are seen when lungs are infected. So based on the signs and symptoms of a disease, we can get an idea of the target organ

of the microbe.

OR

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

Explanation: We need food to keep ourselves healthy, and this food will have to be earned by doing work. Good economic conditions and jobs are therefore needed for individual health.

16. (d) Assertion (A) is false but reason (R) is true.

    Explanation: Speedometer measures instantaneous speed of automobile.

17. i. (d) Colloid is very unstable
    ii. (b) Sol is a solid-liquid colloid and gel is a liquid-solid colloid
    iii. (d) Homogeneous and does not show the Tyndall effect
    iv. (b) Coloured gemstone
    v. (b) Sol

18. i. (a) Collenchyma
    ii. (b) help aquatic plant to float
    iii. (b) Sclerenchyma
    iv. (d) Only (III)
    v. (c) provide strength to plant parts

19. i. (c) position and configuration
    ii. (a) kinetic energy to heat energy
    iii. (a) increase
    iv. (d) potential energy
    v. (c) half potential and half kinetic energy

20. i. (a) same
    ii. (b) 10
    iii. (a) $_{15}Z^{18}$
    iv. (a) J.Chakwick
    v. (b) Neutron

Section B

21. Alcohol as well as water is a good solvent. They are highly soluble in each other. Hence, alcohol and water cannot be separated by using a separating funnel. However, they can be separated by fractional distillation.

OR

D is the correct option which demonstrates ideal filtration process. The suspension to be filtered should be added into funnel fitted with filter paper with the help of glass rod and the stem of funnel should touch the sides of the beaker so as to make filtration faster.

22. **Properties of cathode rays are:-**
    1) They travel in straight line
    2) They have momentum and energy
    3) They are deflected by electric and magnetic fields.
23. In 1665, an English scientist named Robert Hooke discovered cells. He saw honey comb like structure while observing thin slice of cork under his self-designed microscope.

OR

When salt is added, a hypotonic medium is created, i.e., the concentration of salt molecules is more outside the vegetables than inside. Hence, due to osmosis water from the vegetables come out.

24. i. When cracker is burnt its light reaches us first and then we hear its sound as light travel faster than sound.
    ii. 111 effects of burning crackers:
        a. Causes pollution in the atmosphere.
        b. It causes respiratory disorder.
        c. It creates noise pollution.
    iii. Yes, we support the kid's decision as they positively showed their concern towards "Say No to Crackers" and environment.
25. Let one way distance for his trip be S.

    Let t_1 be the time for his trip from home to school and t_2 be the time for his return trip.

    Then $t_1 = \frac{S}{V_1} = \frac{S}{20}h$ and $t_2 = \frac{S}{V_2} = \frac{S}{40}h$

    Therefore total time of trip is $T = t_1 + t_2 = \frac{S}{20} + \frac{S}{40} = \frac{3S}{40}h$

    Total distance covered = 2S

Therefore average speed of Abdul $V_{av} = \frac{\text{total distance}}{\text{total time}} = \frac{25 \times 40}{35} = 26.7\ kmh^{-1}$

26. Given force, F = 750 N, displacement = height,

h = 16 m and time, t = 5

Work done by machine,

W = Force x Displacement = F x h

= 750 N x 16 joule

Power of machine, P $\frac{W}{t}$

$\frac{750\,N \times 15J}{5s}$

= 2400 watt.

Section C

27. i. A bucket of water feels heavier when taken out of water because when immersed in water, an upward force, i.e. buoyant force acts on it which is equal to the weight of water displaced by the bucket.

ii. The buoyant force on a lead object is lesser than the buoyant force on the iron object because lead has greater density, so it displaces a lesser amount of water consequently lesser amount of buoyant force acts on it.

OR

i. Since it is known that a body can sink in water only when its weight is greater than the upthrust act on it by the water. But in this case, the upthrust act on the bottle is greater than its weight, that's why it bounces back on the water surface.

ii. A bucket of water weighs less inside the well water, it is because when the bucket immersed in the water fully, upthrust act on it by water which reduces its actual weight.

28.

.	Potential energy	Kinetic energy
1)	It is the energy possessed by the body on the virtue of its position.	It is the energy possessed by the body on the virtue of its motion.
2)	Potential energy = Mgh M= Mass g = Acceleration due to gravity h = Height	Kinetic energy = $\frac{1}{2}mv^2$ M = Mass V = velocity

3)	eg of potential energy water stored in a tank on the roof.	eg :- a moving car

29. i. Law of constant proportion states that "a pure chemical compound always consists of the same elements that are combined together in a fixed (or definite) proportion by mass".

    ii. Carbon: oxygen (by mass) = 3:8, i.e. 3g of carbon requires 8g of oxygen to form carbon dioxide.

    ∴ 9g of carbon require (3 × 8) 24g of oxygen to form carbon dioxide.

30.
- By air directly or as droplets, e.g., cold
- By contaminated food and water, e.g., cholera.
- By fomites or articles contaminated by the patient, e.g., chickenpox
- Contagious diseases simply spread by contact.
- By intimate contact in case of AIDS, syphilis and some other diseases.
- By vectors and carriers, e.g., malaria by female Anopheles.

31. Neils Bohr proposed a model of atom in 1912 to remove the drawbacks of Rutherford's atomic model and to explain the structure of an atom in detail. The features of Bohr's model of atom are given below:-

    i) An electron revolves in the orbit of atom with well-defined energy.

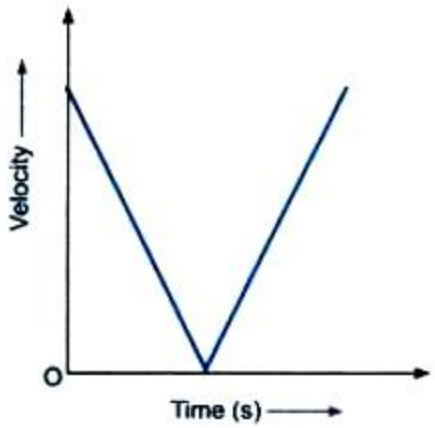
    ii) Energy of orbits increases from the inner shell to the outer shells i.e. energy of orbit nearest to the nucleus is the lowest.

    iii) If energy is supplied to an electron, it moves from a lower orbit to a higher orbit. When an electron moves from a higher orbit (energy level) to a lower orbit (energy level), energy is radiated as electromagnetic waves.

    iv) Each orbit or shell represents an energy level. Such orbits are represented as K,L,M,N,O (named starting from the centre of an atom).

    v) The shell or orbits are associated with a certain amount of energy and energy of orbits/shells increases from the nucleus towards the valence shell.

32. Due to the presence of cell wall the exchange of materials between the plant cells is not possible. Therefore, protoplasts of plant cells are connected by cytoplasmic channels through their walls which are called as plasmodesmata. These channels are used for the exchange of the material between two cells.

33. 

Section D

34. **Force:** Push or pull of an object is considered a force.
Example: to open a door, either we push or pull it. A drawer is pulled to open and pushed to close.

Effect of Force:

i. Force can make a stationary body in motion. For example, a football can be set to move by kicking it, i.e. by applying a force.
ii. Force can stop a moving body: For example, by applying brakes, a running cycle or a running vehicle can be stopped.
iii. Force can change the direction of a moving object. For example; By applying force, i.e. by moving handle the direction of a running bicycle can be changed. Similarly by moving steering the direction of a running vehicle is changed.
iv. Force can change the speed of a moving body: By accelerating, the speed of a running vehicle can be increased, or by applying brakes the speed of a running vehicle can be decreased.
v. Force can change the shape and size of an object. For example: By hammering, a block of metal can be turned into a thin sheet. By hammering a stone can be broken into pieces.

OR

Following are the three types of inertia:

i. **The inertia of Rest:** When the resistance is offered by the body to continue in the state of rest unless an external force acts on it.
Example: A person sitting in a car falls backwards when the car suddenly starts. It

is because the lower portion in contact with the car comes in motion whereas the upper part tries to remain at rest due to inertia of rest.

ii. **The inertia of Direction**: When the resistance is offered by the body to continue the motion in the same direction unless an external force acts on it.

Example: When a moving car suddenly stops the person sitting in the car falls forward because the lower portion of the body in contact with the car comes to rest whereas the upper part tends to remain in motion due to inertia of motion.

iii. **The inertia of Motion:** When the resistance is offered by the body to continue to be in the uniform motion unless an external force acts on it.

Example: When a car moves around a curve, the person sitting inside is thrown outwards in order to maintain his direction of motion due to inertia of motion.

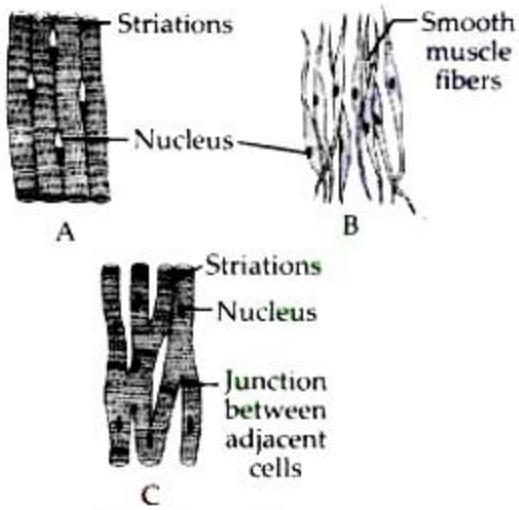
35. The three main types of muscular tissues found in the human body are:

i. Skeletal (striated) muscle tissue

ii. Smooth (Non-striated) muscle tissue

iii. Cardiac muscle tissue.

The well-labelled diagrams of these tissues are as follows:



A. Skeletal muscle tissue.

B. Smooth muscle tissue

C. Cardiac muscle tissue

36. i. a) Molecular mass of nitrogen = $2 \times 14 = 28$ u

Mass of 1 mole of nitrogen = 28 g

Number of molecules in 28 g of nitrogen = 6.022×10^{23}

Number of molecules in 1 g of nitrogen = $\frac{6.022 \times 10^{23}}{28}$

Number of molecules in 10g of nitrogen = $\frac{6.022 \times 10^{23}}{28} \times 10 = 2.15 \times 10^{23}$

Number of atoms in 10g of nitrogen (N_2) = $2 \times 2.15 \times 10^{23} = 4.30 \times 10^{23}$

b) Molecular mass of ammonia = $14 + 3 \times 1 = 17$ u

Mass of 1 mol of ammonia = 17 g

Number of molecules in 17 g of ammonia = 6.022×10^{23}

Number of molecules in 1 g of ammonia = $\frac{6.022 \times 10^{23}}{17}$

Number of molecules in 10 g of ammonia = $\frac{6.022 \times 10^{23}}{17} \times 10 = 3.54 \times 10^{23}$

Number of atoms in 10 g of ammonia (NH_3) = $4 \times 3.54 \times 10^{23} = 1.46 \times 10^{24}$

Thus, 10 g of NH_3 contains more number of atoms.

ii. Molecular mass of sodium chloride (NaCl) = 23 + 35.5 = 58.5 u

58.5 g of sodium chloride (NaCl) = 1 mol

1 g of sodium chloride (NaCl) = $\frac{1}{58.5}$ mol

0.585 g of sodium chloride (NaCl) = $\frac{1}{58.5} \times 0.585$ mol = 0.01 mol

OR

a. **The postulates of Dalton's Atomic Theory are as follows:**
   i. The matter is made up of indivisible particles known as atoms.
   ii. All the atoms of an element have identical mass while the atoms of different elements have different masses.
   iii. Atoms of different elements combine in fixed ratios to form compounds.

b. The molecule of the element is made up of only one kind of atoms but the molecules of a compound are made up of two or more kinds of atoms.
For example, **Water(H_2O) is a compound.** The one molecule of water contains two types of atoms two of the hydrogen and one of oxygen. While **Hydrogen is an element:** it is made up of only from the atom of hydrogen.