Sample Paper

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 be 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 be 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 labelled diagrams should be drawn.

Section A

1. Which postulate of Dalton's atomic theory is the result of the law of conservation of mass given by Lavoisier?

   OR

   Rutherford's 'alpha (α) particles scattering experiment' resulted in the discovery of _____.

2. Fill in the blank -

   CFCs are carbon compounds having both ..... and chlorine.

3. On the basis of the composition of matter, milk is considered to be:

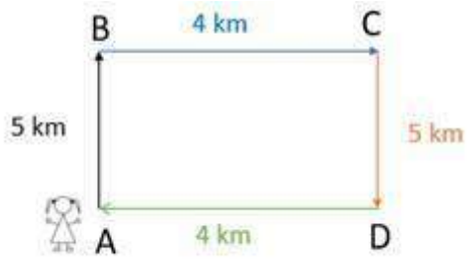
   A. a pure substance

   B. an impure substance

   C. An element

   D. a compound

4. A girl starts from point A of the rectangular park and reaches point D. What is the displacement of the girl at point D?



5. A body goes from A to B with a velocity of 20m/s and comes back from B to A with a velocity of 30m/s. What is the average velocity of the body during the journey?

6. The forces applied to two bodies are 10N & 60N respectively having masses 40kg and 20kg. What will be the ratio of their acceleration?

   OR

   What is the momentum of a 200kg train wagon moving at a constant velocity of 36 kmph?

7. The relative density of silver is 10.8. The density of water is 10^3 kg m^{-3}. What is the density of silver in the SI unit?

   A. 10.8×10^3 kg m^{-3}

   B. 12.4×10^3 kg m^{-3}

   C. 19.8×10^2 kg m^{-3}

   D. 13.4×10^3 kg m^{-3}

8. If a planet's orbital period is 10 earth years, what is its average distance from the sun?
9. A man is trying to stop a box from sliding by applying a force on it in the opposite direction. What can be said about the work done by him in doing so?

   OR

   An 8kg object travelling at 5m/s has how much kinetic energy?
10. Acid rain contains: -
    a) oxides of carbon
    b) oxides of nitrogen
    c) oxides of carbon & sulphur
    d) oxides of nitrogen & sulphur
11. Name the microbe that does not have its own biochemical mechanisms but depends upon that of the host cell.
12. Name the organelles that contain genetic material.
13. What are pathogens?
14. DIRECTION: In the following questions, a statement of assertion (A) is followed by a statement of the reason (R).

    Assertion: When a beam of light is passed through a colloidal solution placed in a dark place the path of the beam becomes visible.

    Reason: Light gets scattered by the colloidal particles.

    A. Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of the assertion
    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.
15. Assertion: Water hyacinth floats on the surface of the water

    Reason: Parenchyma present in the swollen petiole provides buoyancy

    Choose the correct alternative:

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

    b) Both A and R are true, R is not the correct explanation of A

    c) A is true but R is false.

    d) A is false but R is true
16. Assertion: The motion of a body moving in a circular path with constant speed is an example of variable acceleration.

Reason: Acceleration varies due to change in velocity

A. Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

B. Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion

C. Assertion is correct but Reason is incorrect

D. Assertion is incorrect but Reason is correct

17. Read the following paragraph and answer any four questions from 17(i) to 17(v):

Water also obeys the law of diffusion. The movement of water molecules through such a selectively permeable membrane is called osmosis. The movement of water across the plasma membrane is also affected by the amount of substance dissolved in water. Thus, osmosis is the passage of water from a region of high concentration through a selectively permeable membrane to a region of low water concentration.

(a) Why is the plasma membrane called selectively permeable?

(b) According to you, which one of the two – cell membrane or cell wall, is more rigid?

(c) What will happen when an animal cell is placed in a hypotonic solution as compared to a plant cell in a hypotonic solution?

(d) How do unicellular organisms breathe?

(e) What is diffusion?

18. Read the following paragraph and answer any four questions from 18(i) to 18(v)

100 ml of water at room temperature of 25° C is taken in a beaker and a little solid S is dissolved in it by stirring to obtain a solution X. More and more solid S is added to the solution with constant stirring while keeping the temperature of the solution constant at 30° C. After some time it is observed that no more solid dissolves in water and at the same time some solid is also left undissolved at the bottom of the beaker. The contents of the beaker are filtered through a filter paper to obtain solution Y in the form of a filtrate.

(a) What name is given to solutions like X?

(b) What name is given to a solution like Y?

(c) What will you observe if the solution Y at 30°C is cooled down to 10° C by keeping the beaker in crushed ice? Why?

(d) What term is used to denote the amount of solid dissolved in 100 grams of water in a solution like Y?

(e) Define unsaturated and saturated solutions.

19. Read the following paragraph and answer any four questions from 19(i) to 19(v)

An Internal combustion engine converts the energy stored in fuel to mechanical energy to drive a car. The fuel is mixed with air and then burnt in the cylinders of the engine by using a spark plug. The engine then converts this energy stored in fuel to kinetic energy by rotating the drive shaft, which in turn rotates the wheels of the vehicle. This process is inefficient and leads to pollution. In electric cars, however, an electric motor is used to convert electrical energy to mechanical energy. This process is very efficient and produces the least pollution.

(i) The energy stored in the fuel of internal combustion is converted to?

A. Mechanical Energy

B. Electrical energy

C. Wind Energy

D. Solar energy

(ii) What type of energy is used to power electric cars?

A. Thermal energy

B. Wind energy

C. None of the above

D. Electrical energy

(iii). What is the formula for the kinetic energy of a body?

A. ½ mv^2

B. ½ mv

C. mv^2

D. mv

(iv) If the car travels a distance of 10 m while the engine exerts a force 180 N on it, then how much work is done in moving the car?

A. 900 J

B. 1400 J

C. 1800 J

D. 1000 J

(v) If the engine provides an energy of 50,000 J to the car which has a mass of 1000 Kg, then what will be the velocity of the car?

A. 10 m/s

B. 100 m/s

C. 50 m/s

D. 5 m/s

20. Read the following paragraph and answer any four questions from 20(i) to 20(v)

In astronomy, a satellite is an object that orbits (goes around) a planet. There are several hundred natural satellites, or moons, in our Solar System. Thousands of artificial (human-made) satellites have also been launched since 1957. These have many different uses, including taking pictures of the Sun, Earth, and other planets, and looking deep into space at black holes, and distant stars and galaxies. There are also communications satellites, weather satellites, and the International Space Station.

A satellite rotates around a planet due to the gravitational force between them. To rotate around on a planet in a specific orbit, a satellite has to move with a certain velocity called orbital velocity. This causes the satellite to move in a uniform circular motion around a planet.

(i) Which of these forces always exist between any two bodies in the universe?

A. Gravitational force

B. Electrostatic Force

C. Magnetic force

D. None of the above

(ii) The orbital velocity of a satellite in an orbit of radius r is given by the formula

A. $v = \sqrt{\frac{GM_{earth}}{r}}$

B. $v = \sqrt{\frac{Gm_{satellite}}{r}}$

C. $v = 2gr$

D. $v = \sqrt{2}$ gr

(iii) The gravitational force between two objects is given as

A. $F = \frac{Gm_1m_2}{r}$

B. $F = \frac{Gr}{m_1m_2}$

C. $F = \frac{Gm_1m_2}{r^2}$

D. $F = ma$

(iv) Which of the following is true for the orbital speed of a satellite?

A. It is dependent on the mass of the satellite

B. It is not related to the distance between satellite and planet

C. It depends on the mass of the planet

D. None of the above

(v) As the height of a satellite orbit gets lower, the speed of the satellite …….

A. Increases

B. Decreases

C. Remains the same

D. None of the above

Section B

21. Why are lysosomes called as suicidal bags?

OR

What are Infectious agents? Give examples.

22. Write the components that make up the following cell organelles:

(i) Plasma membrane

(ii) Cell wall

23. The mass of one steel screw is 4.11 g. Find the mass of one mole of these steel screws. Compare this value with the mass of the Earth (5.98×10^{24} kg). Which one of the two is heavier and by how many times?

OR

The number of protons, neutrons and electrons in particles A to E are given below:

Particle	Protons	Neutrons	Electrons
A	17	18	17
B	3	4	2
C	18	22	18
D	17	20	17
E	9	10	10

Give reasons, find a pair of isotopes from the above particles.

24. Write down the differences between physical and chemical changes.

25. A body of mass 1 Kg is thrown upwards with a velocity 20 m/s. It momentarily comes to rest after attaining a height of 18 m. How much energy is lost due to air friction?
26. A ball is shot vertically upward with a given initial velocity. It reaches a maximum height of 100 m. If on a second shot, the initial velocity is doubled then what will be the maximum height of the ball?

Section C

27. Enlist the key points of modified cells theory.

    OR

    Why does the growth of a plant occur in specific regions? Where are intercalary meristem as well as lateral meristem located in the plant body?
28. Explain how corks are formed and what is their role?
29. In the coastal area, the wind current moves from the sea towards the land during the day; but during the night it moves from land to the sea. Discuss the reason.
30. Find the ratio by mass of the combining elements in the following compounds.

    (a) $CaCO_3$ (b) $MgCl_2$

    (c) H_2SO_4
31. An element Y has a valency of 4. Write the formula for its:

    (i) chloride

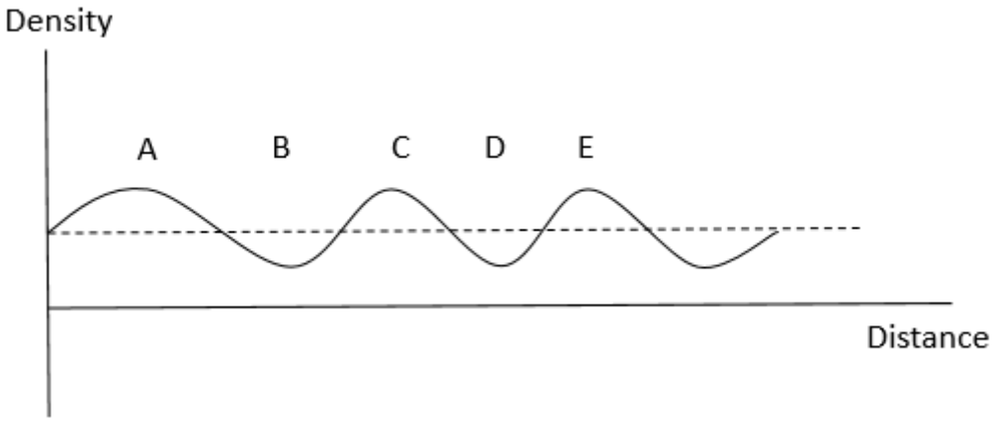
    (ii) oxide

    (iii) sulphate

    (iv) carbonate

    (v) nitrate

    (vi) iodide
32. a) List any four properties of a colloid and mention any two properties in which colloids differ from suspension.
33. The figure shows the density at an instant at various places (A, B, C) in the air as a sound wave travels through it. Now answer these questions



(a) At B, What would you find—a compression or a rarefaction pulse?

(b) Name three places where the pressure W below the atmospheric pressure.

(c) Explain wavelength with reference to the figure.

(d) Mark off two distances. In the figure to show wavelength, keeping in mind your explanation.

Section D

34. (a) List any two postulates of Bohr's model of an atom.

(b) Draw a sketch of Bohr's model of an atom with four shells.

(c) Name the three subatomic particles.

Or

Three different atoms of oxygen are represented as:

$^{16}_{8}O$, $^{17}_{8}O$ *and* $^{18}_{8}O$

(i) What do the subscripts (lower figures) and superscripts (upper figures) represent?

(ii) What factor is responsible for the change in the superscripts 16, 17 and 18, though the element is the same?

(iii) What is the usual name for such atoms of an element?

(iv) Give the nuclear composition of $^{18}_{8}O$

35. (a) Why overcrowded and poorly ventilated areas are major factors in the spread of airborne diseases?

(b) An active immune system sends many cells to the affected tissue to kill off the disease-causing microbes. Identify the process and mention its local and general effects?

(c) State one difference between infectious and non-infectious diseases. Give one example of each.

36. (a) A man standing in front of a vertical cliff fires a gun. He hears the echo after 3.5 seconds. On moving closer to the cliff by 84 m, he hears the echo after 3 seconds. Calculate the distance of the cliff from the initial position of the man.

(b) Two statement are made

Statement I: Loudness of sound depends on the amplitude

Statement II: Quality of the sound depends on the waveform

Which of the statement/s is/are correct?

(c) What is the minimum distance of the obstacle from the sound source for hearing a distinct echo?

Hints & Solutions

Section A

1. **Solution:** According to the law of conservation of mass, "Matter can neither be created nor destroyed in a chemical reaction". This law gives the result to the postulate of Dalton's atomic theory which states that "Atoms can neither be created and nor destroyed by physical and chemical changes."

   OR

   Rutherford designed an experiment in which the fast-moving alpha particles were made to strike a very thin gold foil. Alpha particles were deflected by subatomic particles in the gold atoms. Rutherford's 'alpha (α) particles scattering experiment' resulted in the discovery of the nucleus in the atom

2. **Solution:** Fluorine
3. **Solution:(B):** Milk is a mixture of fat, water, and other constituents.

4. **Solution:** As we know displacement is the minimum distance between two points. So, the displacement at point D will be the shortest path between A and D.
   So, displacement will be 4 km.

   Hence, option A is correct.

5. **Solution:** The average velocity is the total displacement covered per unit of time;

$$Average\ Velocity = \frac{Total\ displacement\ travelled}{total\ time\ elapsed}$$

   Here, the total displacement covered by the body is zero since the starting position and the endpoint is the same.
   Thus,

$$v = \frac{0}{t} = 0$$

   Hence, option A is the correct answer.
6. **Solution:** From the second law of motion we know that

$$F = ma$$

   Then, acceleration can be calculated as

$$a = \frac{F}{m}$$

for first body

$$a_1 = \frac{10}{40} = \frac{1}{4}\ m/s^2$$

for second body

$$a_2 = \frac{60}{20} = 3\ m/s^2$$

the ratio is, therefore,

$$\frac{a_1}{a_2} = \frac{\frac{1}{4}}{3} = \frac{1}{12}$$

OR

Given: Mass of train = m = 200 Kg

Velocity of the train= v = 36 kmph = 36 × 5/18 = 10 m/s

Now, the momentum of a body is given by

$$P = mv$$

On substituting the value of m & v we get,

$$P = 200 \times 10 = 2000\ kg$$

Therefore, the momentum of the train wagon is 2000 kg m/s

7. **Solution:** The relative density is the measure of the density of any substance with respect to the density of the water. It is mathematically described as the ratio of the density of the substance to the density of the water.

$$Relative\ density = \frac{Density\ of\ silver}{Density\ of\ water}$$

In the question, it is given that the,
Relative density of silver = n = 10.8
Density of water = ρ = 10^3
We have to determine the relative density of the silver (σ)
From the above equation the density of the silver can be written as;
The density of silver = Relative density of silver × density of water = 10.8 × 10^3 kg m^{-3}.

8. **Solution:**

Let the orbital time period of the earth be T_e and for the planet be T_p. Then

$$T_p = 10 \ = 10\, T_e$$

From Kepler's third law

$$\frac{R_e^3}{T_e^2} = \frac{R_p^3}{T_p^2}$$

$$R_p^3 = R_e^3 \left(\frac{10T_e}{T_e}\right)^2$$

$$R_p = (100)^{\frac{1}{3}} \times (1\ A\ U)$$

9. **Solution:** The man applies a force on the box in the opposite direction to its motion. Therefore, the work done on the box will be negative.

OR

In this question, we are provided with the mass of an object as well as its velocity, and we are being asked to determine its kinetic energy. To do so, we'll need to use the following equation:

$$KE = \frac{1}{2}mv^2$$

Plugging in the values given, we obtain:

$$KE = \frac{1}{2} \times 8 \times 5^2 = 100\, J$$

10. **Solution:**- d) Oxides of nitrogen & sulphur
11. **Solution:-** Virus is the microbe that does not have its own biochemical mechanisms but depends upon that of the host cell.
12. **Solution:-** The nucleus contains most of the genetic material (DNA) of the cell. Additional DNA is in the mitochondria and (if present) chloroplasts. The nuclear DNA is complexed with proteins to form chromatin, which is organized as a number of linear chromosomes.
13. **Solution:-**

A pathogen is usually defined as a microorganism that causes, or can cause, disease. We have defined a pathogen as a microbe that can cause damage in a host.

14. **Solution:** A
Both assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of assertion (A).
Light is scattered by colloidal particles, making the path of the beam visible.
15. **Solution**:- A
Both A and R are true, and R is the correct explanation of A.
16. **Solution:** A
Solution: A body undergoing circular motion is in accelerated motion. The speed of the body remains the same but its direction changes continuously. If the velocity of a moving body changes when either of the two; directions or the magnitude of the body changes. Hence, both assertion and reason are true.

17. **Solution:-** (a) Plasma membrane is called selectively permeable as it allows only certain substances to move in or out.
(b) Cell wall is more rigid.
(c) Since plants have an outermost cell wall which is rigid so they become more turgid when placed in a hypotonic solution. On the other hand, an animal cell will take up excessive water and burst.
(d) Through Diffusion
(e) Diffusion is the process of movement of substances from a region of high concentration to the region of low concentration until the uniform concentration is finally achieved.

18. **Solution:** (a) Unsaturated solution
(b) Saturated solution
(c) What will you observe if the solution Y at 30°C is cooled down to 10°C by keeping the beaker in crushed ice? Why?
(c) Some of the dissolved solids will separate from the solution and settle down at the bottom of the beaker. The solubility of solid decreases in cooling.
(d) What term is used to denote the amount of solid dissolved in 100 grams of water in a solution like Y?
(d) Solubility
(e) Define unsaturated and saturated solutions.
Unsaturated solution: The solution is unsaturated when it can still dissolve more solute.
Saturated solution: The solution is saturated when it can not dissolve further more solute.

19. **(i) Solution:(A):** The energy stored in the fuel of an internal combustion engine is converted to mechanical energy

(ii) Solution:(D): Electrical energy is used in electric cars to power them

(iii) Solution:(A): The kinetic energy of a body is given by the formula

$$K.E. = \frac{1}{2}mv^2$$

where m is the mass of the body and v is the velocity.

(iv) Solution:(C): The work done on the car can be calculated as

$$W = Fd = 180 \times 10 = 1800\,J$$

Therefore, 1800 J of work is done on the car by the engine.

(v) Solution:(A): The energy is converted to the kinetic energy of the car, then the velocity of the car can be calculated as

$$K.E. = \frac{1}{2}mv^2$$

$$50{,}000 = \frac{1}{2} \times 1000 \times v^2$$

$$v = 10\,m/s$$

20. **(i) Solution:(A):** Gravitational force always exists between any two bodies in the universe.

(ii) Solution:(A): The orbital velocity of a satellite in an orbit of radius r is given as

$$v = \sqrt{\frac{GM_{earth}}{r}}$$

(iii) Solution:(C): According to universal law of gravitation

$$F = \frac{Gm_1m_2}{r^2}$$

(iv) Solution:(C): The orbital velocity of a satellite in an orbit of radius r is given as

$$v = \sqrt{\frac{GM_{planet}}{r}}$$

Therefore, it depends on the mass of the planet

(v) Solution:(A): The orbital velocity of a satellite in an orbit of radius r is given as

$$v = \sqrt{\frac{GM_{planet}}{r}}$$

Therefore

$$v \propto \frac{1}{\sqrt{r}}$$

Therefore, speed increases as the orbit is lowered

Section B

21. **Solution:-** Lysosomes are known as suicide bags of the cell because they contain lytic enzymes capable of digesting cells and unwanted materials. lysosomes can be termed as a waste disposal system of the cell. For almost all types of organic materials they contain digestive enzymes. For example, when a cell gets damaged, Lysosomes may burst and the enzymes digest their own cell. Therefore lysosomes are known as the Suicidal bags of a cell or we can say that they possess different kinds of hydrolases on release of these enzymes that cause death of the cell.

OR

Solution:- Infectious agents are organisms that are capable of producing infection or infectious disease. They include bacteria, fungi, viruses, and parasites.

22. **Solution:**- (i) Plasma membrane is the outermost covering of the cell which is made up of phospholipids bilayer and proteins.
(ii) Cell wall is non-living, thick and freely permeable covering made up of cellulose(plant cell).

23. **Solution:**
Mass of one steel screw = 4.11 g
Mass of Earth = 5.98×10^{24} kg = 5.98×10^{27} g
We know, 1 mole = 6.022×10^{23}
One mole of screws weigh = $4.11 \times 6.022 \times 10^{23} = 2.48 \times 10^{24}$ g

Mass of the Earth/ Mass of 1 mole of screws = 5.98 $\times 10^{27}$ g / 2.48 $\times 10^{24}$ g = 2.4 x 10^3

Therefore, we can say that the mass of the earth is 2.4$\times 10^3$ times the mass of screws.

The earth is 2400 times heavier than one mole of the screw.

OR

Solution: A pair of isotopes from the above particles is A and D. This is so because both the isotopes have the same number of protons, but they have a different number of neutrons.

24. Write down the differences between physical and chemical changes.

Physical change	Chemical change
Here only the physical properties like state, shape or size of a substance change.	It brings about a change in the chemical properties of a substance.
There is no change in chemical composition of a substance.	There is always a change in chemical composition of a substance.
No new substance is formed.	A new substance is always formed.
It is temporary and hence reversible.	It is permanent and hence irreversible.
It is easily reversible.	It is usually irreversible.
Very little heat or light energy is usually absorbed or given out.	A lot of heat or light energy is usually absorbed or given out.
Melting of wax	Ripening of fruits.

25. **Solution:**

Given:

The mass of the body = 1 Kg

Initial velocity = 20 m/s

Maximum height attained by the body = 18 m

According to the conservation of kinetic energy,

Total loss in kinetic energy of the body = Gain in potential energy + losses due to air friction

$$\frac{1}{2}mv^2 = mgh + loss$$

$$\frac{1}{2} \times 1 \times 20^2 = 1 \times 10 \times 18 + loss$$

$$loss = 200 - 180 = 20\,J$$

Therefore, the loss due to air friction was 20 J

26. **Solution:** Let the initial velocity at the first shot be u, then from third equation of motion

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

$$0 = u^2 - 2g(100)$$

$$u^2 = 2g(100)$$

Now for the second shot similarly

$$(2u)^2 = 2gH$$

$$4u^2 = 2gH$$

$$4\big(2g(100)\big) = 2gH$$

$$H = 400\,m$$

Hence, the maximum height will be 400 m

Section C

27. **Solution:-** Cell theory was proposed by Schleiden and Schwann in 1838-39. Following are the key points of this theory:
    - All the plants and animals are composed of cell products.
    - An organism is an outcome of all activities taking place inside the cell.
    - Cell is the structural and functional unit of life.
    - All cells arise from pre-existing cells (Rudolf Virchow in 1855)

OR

Solution:- Growth in a plant occurs throughout their life due to the presence of meristematic tissue in specific regions of the plant body. On the basis of position in the plant body, meristems are of three types - apical, intercalary and lateral.
Intercalary meristem occurs at the base of leaves and internodes or below the nodes whereas lateral meristem occurs on the sides both in stem and root. It gives rise to vascular tissues.

28. **Solution:**- Cork is a protective tissue that separates the living cells of the plant from the outside environment. The formation of cork in the periderm is the result of the activity of a secondary meristem, the cork cambium, or phellogen.

29. **Solution:-** In coastal areas, during daytime, there is a regular flow of cool air from the sea towards the land. At night, there is a reverse flow of air from land to sea. This happens because during the daytime, land gets heated faster than water and radiated heat from land, heats the air above it. The hot air rises and creates an area of low pressure. Sea water does not get heated so rapidly, so air above the sea is comparatively cool. A high-pressure area forms above sea water as compared to air over land. Therefore, cooler air over the sea flows towards the land (region of low pressure) area. The movement of air from one region to the other creates winds. Movement of wind from sea to land during day and from land to sea during night During the night, reverse flow of air occurs. Land cools down rapidly and the air above the land becomes cooler. Sea water cools down slowly, so the air above the sea is hotter and has a lower air pressure as compared to air pressure above the land. Therefore, cooler air present overland flows towards the sea.

30. **Solution:**(a) $CaCO_3$
Atomic mass of Ca = 40 u
Atomic mass of C = 12 u
Atomic mass of O = 16 u
Thus, $CaCO_3$ = 40: 12: 16 × 3
= 40 : 12 : 48
Ratio by mass = 10 : 3 : 12

(b) $MgCl_2$:
Atomic mass of Mg = 24 u
Atomic mass of Cl = 35.5 u
Thus, the ratio by mass = Mg : Cl x 2
= 24 : 35.5 x 2
= 24 : 71

(c) H_2SO_4:
Atomic mass of H = 1 u
Atomic mass of S = 32 u
Atomic mass of O = 16 u
Thus, the ratio by mass = 2XH : S : 4XO
= 2 : 32 : 64
= 1 : 16 : 32

31. **Solution:** (i) The valency of chloride ion is -1. Hence the formula becomes YCl_4

(ii) The valency of oxide ions is -2. Hence the formula becomes YO_2
(iii) The valency of sulphate ion is -2. Hence the formula becomes $Y(SO_4)_2$
(iv) The valency of carbonate ions is -2. Hence the formula becomes $Y(CO_3)_2$
(v) The valency of nitrate ion is -1. Hence the formula becomes $Y(NO_3)_4$
(vi) The valency of iodide ions is -1. Hence the formula becomes YI_4

32. **Solution:** (a) Properties of a colloid (any four)

(i) A colloid is a heterogeneous mixture.

(ii) The size of particles of a colloid is too small to be individually seen by naked eyes.

(iii) Colloids are big enough to scatter a beam of light passing through it and make its path visible.

(iv) They do not settle down when left undisturbed, that is, a colloid is quite stable.

(v) They cannot be separated from the mixture by the process of filtration. But, a special technique of separation known as centrifugation can be used to separate the colloidal particles.

Two properties in which colloids differ from suspension are (ii) and (iii) as the particles of a suspension are large enough to be observed with a naked eye and these particles settle down well when the mixture is left undisturbed.

33. **Solution:**
(a) At B we can see that the density is low and hence we have a rarefaction pulse
(b) We can see that the dotted line is the mean density and therefore is the density of air in steady-state. Therefore, we can say that the pressure will be below atmospheric in locations B and D.
(c) The wavelength of the wave is the distance between points A and C or B and D

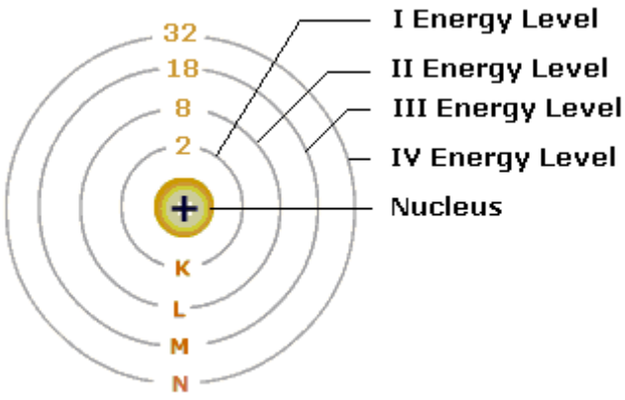
Section D

34. **Solution:** a. Two postulates of Bohr's model of an atom are-

1. Electrons revolve rapidly around the nucleus in fixed circular paths called energy levels or shells.

2. Each shell can hold electrons up to some limits and each shell is associated with a fixed amount of energy.

b.Bohr's model:



C. The three subatomic particles are electrons, protons, and neutrons. Electrons are negatively charged, protons are positively charged, neutrons are neutral.

Or

Solution:

(i) The subscripts (lower figures) represent the atomic number and the superscripts (upper figures) represent the mass number.

(ii) The factor is responsible for the change in the superscripts 16, 17 and 18, though the element is the same number of neutrons.

(iii) The usual name for such atoms of an element is isotopes.

(iv) The nuclear composition of ${}^{18}_{8}O$ is that it has 8 protons and 10 neutrons.

35. **Solution:-** a) In an over-crowded house, if one person is infected, other people living close to that person are prone to get the infection more easily and quickly. At the same time, in a poorly ventilated house, the germs do not escape and keep circulating within the house,

thus catching other people coming their way. So, over crowded and poorly ventilated housing is a major factor in the spread of airborne diseases

b) Process of inflammation:

An active immune system practices many cells to the affected tissues to kill off the disease producing microbes. This process is called inflammation and its local and general effects.

Inflammation:

Inflammation is a localized physical condition in which part of the body becomes inflamed, swollen, hot, and often painful, particularly as a reaction to injury or infection.

The general effect of inflammation is fever.

c) Infectious diseases are transmitted from person-to-person through the transfer of a pathogen such as bacteria, viruses, fungi or parasites. Non-infectious diseases do not spread to others and they restrain within a person who has contracted them. Examples of infectious disease are Cholera, chickenpox, malaria and non-infectious are Diabetes, cancer, asthma, etc.

36. **Solution:**

a. Let speed of sound = v
Difference of man from the class = d
Time taken to hear the who = 3.5s
Velocity of the sound wave to reach the person before he moved closer

$$v = \frac{2d}{3.5}$$

Distance of the man = d – 84
Time taken = T= 3 s

$$v = \frac{2(d-84)}{3}$$

$$\frac{2d}{3.5} = \frac{2(d-84)}{3}$$

$$d = 588\ m$$

b. The loudness or softness of a sound is determined basically by its amplitude. The amplitude of the sound wave depends upon the force with which an object is made to vibrate.

c. The total distance covered by the sound from the point of generation to the reflecting surface and back should be at least (344 m/s) × 0.1 s = 34.4 m. Thus, for hearing distinct echoes, the minimum distance of the obstacle from the source of sound must be half of this distance, that is, 17.2 m.