# 1. CELL AND CELL ORGANELLES SOLUTIONS

## REVIEW QUESTIONS (Page 10,11)

### (A) Very Short answer type questions:

1. What is cell?

a) A cell is the smallest unit of life capable of performing all living functions.

2. What is the structural and functional unit of life?

a) The cell is the structural and functional unit of life.

3. What are three basic criteria for defining the cell?

a) Three criteria for defining a cell: membrane-bound, contains genetic material, capable of metabolism.

4. Give any three examples of unicellular organisms.

a) Amoeba, Paramecium, Euglena.

5. Give any three examples of multicellular organisms

a) Humans, trees, jellyfish.

### (B) Short answer type Questions:

1. Differentiate a plant cell and an animal cell?

a) Plant Cell vs. Animal Cell:

Plant Cell: Has a cell wall, chloroplasts for photosynthesis, and large central vacuole; typically, rectangular.

Animal Cell: Lacks cell wall and chloroplasts, has smaller vacuoles, and contains centrioles; usually irregular in shape.

2. Differentiate prokaryotic cell and eukaryotic cell?

a) Prokaryotic Cell vs. Eukaryotic Cell:

Prokaryotic Cell: No nucleus, smaller, simpler, lacks membrane-bound organelles (e.g., bacteria).

Eukaryotic Cell: Has a nucleus, larger, complex, contains membrane-bound organelles (e.g., plant and animal cells).

3. Describe cell theory?

a) Cell theory states: All living organisms are composed of one or more cells. The cell is the basic structural and functional unit of life. All cells arise from pre-existing cells.

4. "Cell is the structural and functional unit of life" Justify it?

a) The cell is the smallest unit capable of performing all life processes (e.g., metabolism, reproduction, response to stimuli). It provides structure (via components like membranes and organelles) and function (through processes like energy production and protein synthesis), forming the basis of all living organisms.

5. Write a short note on size of cell?

a) Cells vary widely in size, typically ranging from 1 to 100 micrometres. Prokaryotic cells (e.g., bacteria) are smaller (1–10 μm), while eukaryotic cells (e.g., plant and animal cells) are larger (10–100 μm). Some cells, like ostrich egg cells, can be macroscopic (several centimetres). Cell size is limited by surface area-to-volume ratio, affecting nutrient exchange and metabolic efficiency.

**(C) Fill in the blanks:**

1) Prokaryotic cells are found in .....and .....

2) Membrane-less nuclear area found in prokaryotic cells is called .....

3) Cell organelles are well developed in .....cells.

4) Typical chromosomes are found in ..... cells.

5) The cell theory was given by .....and .....

**Solutions:**

1) Prokaryotic cells are found in **bacteria** and **archaea**.

2) Membrane-less nuclear area found in prokaryotic cells is called **nucleoid**.

3) Cell organelles are well developed in **eukaryotic** cells.

4) Typical chromosomes are found in **eukaryotic** cells.

5) The cell theory was given by **Matthias Schleiden** and **Theodor Schwann**.

**(D) Mark the following statements as True (T) or False (F):**

1) In eukaryotic cells, the genetic material is not surrounded by a nuclear membrane.

2) Well-defined organelles are found in prokaryotic cells.

3) Plant cells are bounded by a wall composed of cellulose.

4) Amoeba is a multicellular organism.

5) Plasma membrane is present in all the cells.

**Solutions:**

1) F - In eukaryotic cells, the genetic material is surrounded by a nuclear membrane.

2) F - Well-defined organelles are not found in prokaryotic cells; they lack membrane-bound organelles.

3) T - Plant cells are bounded by a cell wall composed of cellulose.

4) F - Amoeba is a unicellular organism.

5) T - Plasma membrane is present in all cells.

**REVIEW QUESTIONS (Page 17,18)**

**(A) Very short answer type questions:**

1) What is plasma membrane?

a) Plasma membrane is a semi-permeable layer surrounding the cell, controlling substance movement.

2) Give the names of three basic molecules of the plasma membrane?

a) Phospholipids, proteins, cholesterol.

3) Mention the constituent of cell wall in bacteria & Plants?

a) Bacteria: Peptidoglycan; Plants: Cellulose.

4) What is diffusion?

a) Diffusion is the movement of molecules from high to low concentration.

5) Define osmosis?

a) Osmosis is the diffusion of water across a semi-permeable membrane.

6) What is active transport?

a) Active transport is the movement of substances against a concentration gradient using energy.

7) Is the plant cell wall living or dead?

a) Plant cell wall is non-living.

8) What will happen if a few drops of ink are added to pure water?

a) Ink will diffuse, spreading evenly in water.

9) What will happen to plant cell when placed in concentrated sugar solution?

a) Plant cell will shrink due to water loss (plasmolysis).

10) What will happen to resins when placed in pure water?

Solutions

a) Raisins will swell due to water absorption (osmosis).

**(B) Short Answer type questions:**

1) Mention the functions of plasma membrane?

a) Functions of Plasma Membrane:

- Regulates entry and exit of substances (selective permeability).
- Maintains cell shape and integrity.
- Facilitates communication via receptors.
- Anchors cytoskeleton and supports cell structure.

2) Describe the type of solutions on the basis of concentration?

a) Types of Solutions Based on Concentration:

- Isotonic: Equal solute concentration inside and outside the cell; no net water movement.
- Hypertonic: Higher solute concentration outside; water moves out, causing cell shrinkage.
- Hypotonic: Lower solute concentration outside; water moves in, causing cell swelling.

3) Give difference between diffusion and osmosis?

a) Difference Between Diffusion and Osmosis:

- Diffusion: Movement of any molecules (e.g., gases, solutes) from high to low concentration across a membrane; no specific requirement for water.

- Osmosis: Movement of water molecules only, across a semi-permeable membrane, from high water concentration (low solute) to low water concentration (high solute).

4) Describe the structure of cell membrane?

a) Structure of Cell Membrane: The cell membrane is a fluid mosaic model, composed of a phospholipid bilayer with hydrophilic heads facing outward and hydrophobic tails inward. Embedded proteins (integral and peripheral) perform transport, signaling, and structural roles. Cholesterol stabilizes the membrane, and carbohydrates on the surface aid in cell recognition.

5) What is endocytosis? Mention its types?

a) Endocytosis and Its Types:
Endocytosis: The process by which cells engulf external substances by invaginating the plasma membrane to form vesicles.
Types:

- Phagocytosis: Engulfment of large particles (e.g., bacteria) by cells like macrophages.
- Pinocytosis: Uptake of fluids and small dissolved solutes in small vesicles.
- Receptor-mediated endocytosis: Specific uptake of molecules bound to receptors on the membrane.

**(C) Reasoning type questions:**

1) Why plasma membrane is called a selectively permeable membrane?

a) The plasma membrane is called selectively permeable because it allows only certain molecules to pass through while restricting others. Its phospholipid bilayer permits small, non-polar molecules (e.g., oxygen, carbon dioxide) to diffuse freely, while larger, polar, or charged molecules (e.g., glucose, ions) require specific transport proteins or channels, enabling the cell to control substance movement based on its needs.

2) Give the reason of liquid nature of plasma membrane?

a) The plasma membrane's liquid nature arises from its fluid mosaic structure, where phospholipids and proteins are not rigidly fixed but can move laterally within the bilayer. The phospholipids' hydrophobic tails form a flexible, fluid-like matrix, and cholesterol molecules modulate fluidity, preventing the membrane from becoming too rigid or too fluid, allowing dynamic functions like transport and signaling.

3) Why integral proteins cannot be separated easily from plasma membrane?

a) Integral proteins are embedded within the hydrophobic core of the phospholipid bilayer, with their hydrophobic regions interacting strongly with the lipid tails. This tight integration anchors them firmly, making separation difficult without disrupting the membrane structure. Specialized techniques, like detergents, are needed to extract them, as simple mechanical or chemical methods are insufficient.

4) How cell identifies each other?

a) Cells identify each other through specific molecules on their plasma membranes, primarily glycoproteins and glycolipids. These molecules act as markers or receptors, forming a unique "cell signature." For example, carbohydrates attached to proteins or lipids on the cell surface enable recognition during immune responses, tissue formation, or cell-to-cell communication, allowing cells to distinguish self from non-self or specific cell types.

5) Why cell wall allows entry of different sized molecules?

a) The cell wall, particularly in plants and bacteria, is porous, with a mesh-like structure (cellulose in plants, peptidoglycan in bacteria) that permits the passage of various molecules based on pore size. Unlike the selectively permeable plasma membrane, the cell wall is not a barrier to specific molecules but allows diffusion of ions, water, and small molecules while restricting larger ones, depending on the wall's pore size and composition, to provide structural support without hindering essential exchanges.

**(D) Fill in the blanks:**

1) Middle lamella is made up of .....

2) In Fungus Cell wall is made up of .....

3) The intaking of large sized solid bio-molecules by plasma membrane is called .....

4) Diffusion can occur in any medium, while osmosis occurs only in ..... medium.

5) Movement of solutes or ions from ..... to ..... is called diffusion.

**Solutions:**

1. Calcium and magnesium pectate.

2. Chitin

3. Phagocytosis

4. Liquid

5. Higher concentration, Lower concentration

**TEACHING TASK ( Page 32 – 36)**

**Single Correct Answer Type**

1.Cells are basic structural units of living organisms." It is called so because

Answer: A. All living organisms are made up of cells

Explanation: Cells are considered the basic structural units because all living organisms (unicellular or multicellular) are composed of cells, which are the fundamental building blocks of life.

2.Some cells of our body can be about a foot long. These are

Answer: A. Nerve cells

Explanation: Nerve cells (neurons) can be very long, with some axons extending up to a foot or more in humans, making them the longest cells in the body.

3. Energy currency of the cell is

Answer: C. ATP

Explanation: Adenosine Triphosphate (ATP) is known as the energy currency of the cell because it stores and transfers energy for cellular processes.

4. The extra protection in a plant cell which is made up of cellulose is

Answer: C. Cell wall

Explanation: The cell wall, made of cellulose, provides additional structural support and protection to plant cells, unlike the cell membrane or plasma membrane.

5. The component of the cell with hereditary material is

Answer: A. Nucleus

Explanation: The nucleus contains DNA, the hereditary material that carries genetic information.

6. DNA & RNA are found in the

Answer: A. Nucleus

Explanation: DNA is primarily located in the nucleus, and RNA is synthesized there, although RNA can also be found in the cytoplasm during protein synthesis.

7. The vacuoles in the cells are filled up with

Answer: B. Cell sap

Explanation: Vacuoles in plant cells are primarily filled with cell sap, a fluid containing water, nutrients, and waste products.

8. The study related to the structure and functioning of cells is known as

Answer: C. Cytology

Explanation: Cytology is the branch of biology that studies the structure, function, and behaviour of cells.

9. All organelles have a double membrane except

Answer: B. Lysosomes

Explanation: Lysosomes have a single membrane, while organelles like the nucleus, mitochondria, and chloroplasts have double membranes.

10. Which of the following is a storage organelle

Answer: B. Leucoplast

Explanation: Leucoplasts are plastids in plant cells that store materials like starch, oils, or proteins, making them storage organelles.

11. Which of the following shows the correct level of organisation

Answer: A. Cells → Tissues → Organs → Organ system → Organism

Explanation: The correct hierarchy of biological organization starts from cells, which group into tissues, then organs, organ systems, and finally the organism.

12. Mitochondria and chloroplasts are known as semi-autonomous organelles because

Answer: B. They have their own DNA and Ribosomes

Explanation: Mitochondria and chloroplasts contain their own DNA and ribosomes, allowing them to synthesize some of their own proteins, making them semi-autonomous.

13.Chromosomes are composed of

Answer: B. DNA and Proteins

Explanation: Chromosomes are made of DNA (genetic material) and proteins (like histones) that help package and organize the DNA.

14. The main function of plasma membrane is to

Answer: B. Control what goes into and out of the cell

Explanation: The plasma membrane regulates the movement of substances in and out of the cell, maintaining cellular homeostasis.

15. Cell is best defined as

Answer: D. The structural and functional unit of life

Explanation: The cell is the smallest unit that can perform all life processes, making it the structural and functional unit of life.

16. Double membrane is absent in

Answer: D. Lysosome

Explanation: Lysosomes have a single membrane, whereas mitochondria, chloroplasts, and the nucleus have double membranes.

17. Animal cell is limited by

Answer: A. Plasma membrane

Explanation: Animal cells lack a cell wall and are bounded by the plasma membrane, which separates the cell from its external environment.

18. The radiant energy of sunlight is converted to chemical energy and stored as

Answer: C. ATP

Explanation: In chloroplasts, sunlight is converted into chemical energy during photosynthesis, which is stored in ATP molecules.

19. Root hair absorbs water from soil through

Answer: A. Osmosis

Explanation: Root hairs absorb water via osmosis, a passive process where water moves from an area of higher concentration (soil) to lower concentration (inside the root hair).

20. The barrier between the protoplasm and outer environment in a plant cell is

Answer: C. Cell wall

Explanation: The cell wall is the rigid outer layer in plant cells that separates the protoplasm from the external environment.

21. An animal cell differs from a plant cell in respect of

Answer: B. Cell wall

Explanation: Animal cells lack a cell wall, which is a key structural difference from plant cells that have a cellulose-based cell wall.

22. If the nucleus is a cell's "control centre" and chloroplasts its "solar collectors", which of the following might be called the cell's combination "food processor" and "garbage disposer"?

Answer: A. Lysosome

Explanation: Lysosomes break down nutrients (like a food processor) and degrade waste materials (like a garbage disposer) using hydrolytic enzymes.

23. The longest cell in the human body is

Answer: A. Neuron

Explanation: Neurons, particularly their axons, can extend up to a meter, making them the longest cells in the human body.

24. Identify human cells which lack nucleus

Answer: B. RBC

Explanation: Red blood cells (RBCs) in humans lack a nucleus to maximize space for haemoglobin, unlike WBCs, platelets, or nerve cells.

25. The energy currency of a cell is

Answer: C. ATP

Explanation: ATP (Adenosine Triphosphate) is the molecule that stores and provides energy for cellular activities.

26. Which organelle releases oxygen?

Answer: D. Chloroplast

Explanation: Chloroplasts release oxygen as a byproduct of photosynthesis in plant cells.

27. The term “protoplasm” to the living substance present inside the cell was given by

Answer: C. J.E. Purkinje

Explanation: J.E. Purkinje coined the term “protoplasm” in 1839 to describe the living substance within cells.

28. Ribosomes are the centre for

Answer: C. Protein synthesis

Explanation: Ribosomes are the cellular structures where protein synthesis occurs by translating mRNA into proteins.

29. Lysosomes are the reservoirs of

Answer: D. Hydrolytic enzymes

Explanation: Lysosomes contain hydrolytic enzymes that break down waste materials and cellular debris.

30.The membrane surrounding the vacuole of a plant cell is called

Answer: A. Tonoplast

Explanation: The tonoplast is the membrane that surrounds the vacuole in plant cells, regulating the movement of substances into and out of the vacuole.

**More Than One Answer Type**

31. Choose the correct statements about unicellular organism

Answer: B. ii, iii, iv

Explanation:

ii. One cell carries out all functions of an organism: True, as unicellular organisms perform all life processes within a single cell.

iii. Amoeba, Bacteria, Paramecium are examples of unicellular: True, these are well-known unicellular organisms.

iv. Death of one cell causes death of the organism: True, since the organism consists of only one cell.

i. Unicellular organisms are made up of many cells: False, unicellular organisms consist of a single cell.

32. Choose the correct statement about the size of cells

Answer: A. i, iii, iv

Explanation:

i. Egg of an ostrich is the largest cell: True, the ostrich egg is the largest single cell.

iii. RBC are the smallest cell in our body: True, red blood cells are among the smallest cells in the human body.

iv. Bacteria is the smallest cell in the world: True, bacterial cells are generally smaller than eukaryotic cells.

ii. Neurons are the shortest cell in our body: False, neurons are the longest cells in the human body.

33. Choose the odd one out from the sentences

Answer: A. i, ii, iii

Explanation:

i. Mitochondria is the single membrane organelle**: False, mitochondria have a double membrane.

ii. ER is the power house of the cell: False, mitochondria, not the endoplasmic reticulum (ER), are the powerhouse of the cell.

iii. Plastids are present in animal cell: False, plastids are found in plant cells, not animal cells.

iv. Nucleus is chief controlling center of the cell : True, the nucleus controls cellular activities.

**Assertion & Reason**

34. A: Mitochondria is the power house of the cell. R: ATP is produced in mitochondria.

Answer: A. A & R true & R explains A

Explanation: Mitochondria are called the powerhouse of the cell because they produce ATP, the cell's energy currency, through cellular respiration. The reason explains the assertion.

35. A: Cell wall is not found in animal cell. R: Animal cells are covered by cell membrane.

Answer: A. A & R true & R explains A

Explanation: Animal cells lack a cell wall and are bounded by a plasma membrane, which explains why they do not have a cell wall.

**Match the Following**

36. Column I: (i. Unicellular, ii. Multicellular, iii. Largest cell, iv. Living substance of the cell, v. Prokaryote)

Column II: (a. Egg of an ostrich, b. Protoplasm, c. Blue green algae, d. Plants and animals, e. Paramecium)

Answer: B. i-e, ii-d, iii-a, iv-b, v-c

Explanation:

i. Unicellular → e. Paramecium: Paramecium is a unicellular organism.

ii. Multicellular → d. Plants and animals: Plants and animals are multicellular organisms.

iii. Largest cell → a. Egg of an ostrich: The ostrich egg is the largest single cell.

iv. Living substance of the cell → b. Protoplasm**: Protoplasm is the living substance inside cells.

v. Prokaryote → c. Blue green algae: Blue-green algae (cyanobacteria) are prokaryotes.

37. Column I: (1. Mitochondria, 2. Golgi bodies, 3. Chloroplast, 4. Lysosomes)

Column II: (a. Suicidal bags, b. Power house of the cell, c. Packaging unit, d. Food Factory)

Answer: B. 1-b, 2-c, 3-d, 4-a

Explanation:

1. Mitochondria → b. Power house of the cell: Mitochondria produce ATP, the cell's energy.

2. Golgi bodies → c. Packaging unit: Golgi bodies package and modify proteins for secretion.

3. Chloroplast → d. Food Factory: Chloroplasts perform photosynthesis, producing food for the plant.

4. Lysosomes → a. Suicidal bags: Lysosomes contain enzymes that can break down cellular components, earning them the nickname "suicidal bags.

**Comprehensive**

38.Prokaryotes have ____ for movement

Answer: A. Flagellum

Explanation: Many prokaryotes, like bacteria, use flagella for locomotion.

39. Prokaryotes have

Answer: C. No membrane

Explanation: Prokaryotic cells lack a nuclear membrane and membrane-bound organelles, unlike eukaryotic cells.

40. Well-defined nucleus and cell organelles are present in

Answer: B. Eukaryotes

Explanation: Eukaryotic cells have a well-defined nucleus and membrane-bound organelles, unlike prokaryotes.

41. Example of prokaryotes

Answer: C. Bacteria & Blue green algae

Explanation: Bacteria and blue-green algae (cyanobacteria) are prokaryotes, while plants, animals, and fungi are eukaryotes.

**LEARNERS TASK (Page 37- 41)**

**Single Correct Answer Type**

1. The Kitchen of the cell" is called

Answer: D. Chloroplasts

Explanation: Chloroplasts are called the "kitchen of the cell" because they perform photosynthesis, producing food (glucose) for the plant cell using sunlight.

2.The functional unit of life is called

Answer: A. Cell

Explanation: The cell is the basic structural and functional unit of life, capable of performing all necessary life processes.

3.Which of the following cells does not have a nucleus

Answer: D. Matured man RBC

Explanation: Mature red blood cells (RBCs) in humans lack a nucleus to maximize space for haemoglobin, unlike brain cells, cardiac muscle cells, or Paramecium.

4.Who observed and coined the word cell for the first time

Answer: A. Robert Hooke

Explanation: Robert Hooke coined the term "cell" in 1665 after observing cork under a microscope, noting its box-like structures.

5. Which cell organelle is known as the powerhouse of the cell

Answer: D. Mitochondria

Explanation: Mitochondria produce ATP through cellular respiration, earning them the title "powerhouse of the cell."

6. The plasma membrane is

Answer: C. Differentially permeable

Explanation: The plasma membrane is selectively (or differentially) permeable, allowing specific substances to pass while restricting others.

7. The infoldings of the inner membrane of mitochondria are referred to as

Answer: D. Cristae

Explanation: The inner membrane of mitochondria has infoldings called cristae, which increase the surface area for ATP production.

8.The outermost boundary of an animal cell is

Answer: A. Plasma membrane

Explanation: Animal cells lack a cell wall, so the plasma membrane serves as the outermost boundary separating the cell from its environment.

9. The cells' "Garbage disposals" are

Answer: A. Lysosomes

Explanation: Lysosomes contain hydrolytic enzymes that break down waste materials and cellular debris, functioning as the cell's "garbage disposals."

10. The jelly-like interior of the cell is called

Answer: B. Cytoplasm

Explanation: The cytoplasm is the jelly-like substance within the cell, containing organelles and facilitating cellular processes.

11.Which is the largest cell

Answer: C. Ostrich

Explanation: The ostrich egg is considered the largest single cell, as it is a single cell before fertilization.

12. Cytoplasm contains _____ % of water

Answer: C. 80

Explanation: Cytoplasm is approximately 80% water, which provides a medium for cellular reactions.

13. Centriole is associated with

Answer: C. Spindle formation

Explanation: Centrioles play a key role in forming the spindle fibers during cell division (mitosis).

14. The cell organelle associated with cell secretion is

Answer: C. Golgi apparatus

Explanation: The Golgi apparatus modifies, packages, and secretes proteins and lipids for use inside or outside the cell.

15. Which of the following is an inclusion?

Answer: D. Starch grain

Explanation: Inclusions are non-living substances stored in the cell, such as starch grains, unlike organelles like mitochondria or lysosomes.

16. Which of the following would not be considered part of a cell's cytoplasm?

Answer: B. Nucleus

Explanation: The nucleus is a distinct organelle separated from the cytoplasm by the nuclear membrane, so it is not part of the cytoplasm.

17. Which of the following is called the brain of the cell?

Answer: A. Nucleus

Explanation: The nucleus controls cellular activities and contains genetic material, earning it the title "brain of the cell."

18. Which one is not a part of nucleus?

Answer: C. Centrosome

Explanation: The centrosome, containing centrioles, is located in the cytoplasm, not within the nucleus, unlike chromatin, nucleolus, and nucleoplasm.

19. The common feature amongst nucleus, chloroplast, and mitochondrion is

Answer: A. DNA

Explanation: The nucleus, chloroplasts, and mitochondria all contain DNA, which allows them to control certain functions independently.

20. Nucleus is separated from surrounding cytoplasm by a nuclear envelope which is

Answer: B. Double and porous

Explanation: The nuclear envelope consists of two membranes with nuclear pores, allowing exchange between the nucleus and cytoplasm.

21. Nucleoplasm is continuous with cytoplasm through

Answer: C. Nuclear pores

Explanation: Nuclear pores in the nuclear envelope allow the exchange of materials between the nucleoplasm and cytoplasm.

22. Nucleolus was discovered by

Answer: A. Fontana

Explanation: Felice Fontana is credited with discovering the nucleolus in 1781.

23. The function of the nucleolus in the cell is

Answer: C. Synthesis of RNA and ribosomes

Explanation: The nucleolus is responsible for producing ribosomal RNA (rRNA) and assembling ribosomes.

24. Which of the following phenomena is commonly referred to as ‘cell drinking’?

Answer: B. Pinocytosis

Explanation: Pinocytosis is the process by which cells engulf liquid particles, often called "cell drinking."

25. The cell organelle taking part in photorespiration is

Answer: C. Peroxisome

Explanation: Peroxisomes are involved in photorespiration in plant cells, particularly in metabolizing byproducts of photosynthesis.

26. Endoplasmic reticulum sometimes contains

Answer: A. Ribosomes

Explanation: The rough endoplasmic reticulum (RER) has ribosomes attached to its surface, which are involved in protein synthesis.

27. Ribosomes are composed of

Answer: C. 2 subunits

Explanation: Ribosomes consist of two subunits (large and small) that work together during protein synthesis.

**Descriptive Questions**

1. Why are mitochondria called the powerhouse of the cell?

Answer: Mitochondria are called the powerhouse of the cell because they produce ATP (adenosine triphosphate), the cell's energy currency, through cellular respiration. The process occurs in the inner membrane (cristae), where glucose is broken down in the presence of oxygen to generate energy.

2. What name is given to the Golgi apparatus occurring in plant cells? Why is it named differently in plant cells?

Answer: In plant cells, the Golgi apparatus is often called **dictyosomes**. It is named differently because, in plants, the Golgi apparatus typically exists as multiple, smaller, discrete units rather than a single large complex, as seen in animal cells.

3. Why are lysosomes called scavengers?

Answer: Lysosomes are called scavengers because they contain hydrolytic enzymes that break down and digest waste materials, damaged organelles, and foreign particles (like bacteria or viruses) within the cell, helping to clean up cellular debris.

4. What are suicide bags? Why are they called so?

Answer: Lysosomes are called suicide bags because they can release their hydrolytic enzymes to digest the cell's own contents under certain conditions, leading to programmed cell death (autolysis). This self-destructive capability gives them the name "suicide bags."

5. What does ATP stand for?

Answer: ATP stands for Adenosine Triphosphate, the molecule that serves as the energy currency of the cell.

6. What would happen if the plasma membrane ruptures or breaks down?

Answer: If the plasma membrane ruptures, the cell loses its integrity, allowing uncontrolled entry and exit of substances. This disrupts homeostasis, leading to the loss of essential cellular components, entry of harmful substances, and ultimately cell death.

7. Who discovered cells and how?

Answer: Robert Hooke discovered cells in 1665 by observing thin slices of cork under a microscope. He noticed box-like structures resembling a honeycomb, which he named "cells" because they reminded him of the cells in a monastery.

8. Why is the plasma membrane called a selectively permeable membrane?

Answer: The plasma membrane is called selectively permeable because it allows only specific substances (e.g., water, oxygen, and certain ions) to pass through while restricting others, based on size, charge, or solubility, to maintain cellular homeostasis.

9. Where are proteins synthesized inside the cell?

Answer: Proteins are synthesized in the ribosomes, particularly those attached to the rough endoplasmic reticulum (RER) or free in the cytoplasm, through the process of translation.

10. How does a cell act as the basic structural and functional unit of an organism?

Answer: A cell is the basic structural unit because all organisms are composed of one or more cells, which form tissues, organs, and systems. It is the functional unit because cells perform all essential life processes, such as metabolism, growth, reproduction, and response to stimuli, enabling the organism to survive.

11. How is rough ER different from smooth ER? What functions do they perform in a cell?

Answer:

Rough ER (RER): Has ribosomes on its surface, giving it a rough appearance. It synthesizes and modifies proteins destined for secretion or membrane use.

Smooth ER (SER): Lacks ribosomes, appearing smooth. It synthesizes lipids, detoxifies drugs, and regulates calcium ions in muscle cells.

Both are part of the endoplasmic reticulum, aiding in transport and synthesis within the cell.

12. What are the different types of plastids? What are their functions?

Answer: Plastids are of three types:

Chloroplasts: Contain chlorophyll, responsible for photosynthesis (food production).

Chromoplasts: Contain pigments (e.g., carotenoids), imparting colors to flowers and fruits.

Leucoplasts: Store nutrients like starch, oils, or proteins in roots and seeds.

13.Describe the functions of the Golgi complex.

Answer: The Golgi complex:

Modifies, sorts, and packages proteins and lipids from the ER.

Forms lysosomes by packaging hydrolytic enzymes.

Secretes substances like hormones or enzymes outside the cell.

Synthesizes polysaccharides for the plant cell wall.

14. What would happen to the life of a cell if there was no Golgi apparatus?

Answer: Without the Golgi apparatus, the cell would be unable to modify, package, or secrete proteins and lipids, leading to impaired secretion, no lysosome formation, and defective cell wall synthesis in plants. This would disrupt cellular functions and likely cause cell death.

15. Explain the structure of the nucleus. What is its function?

Answer:

Structure: The nucleus is a spherical organelle with a double nuclear envelope containing pores, enclosing nucleoplasm, chromatin (DNA and proteins), and a nucleolus (for ribosome synthesis).

Function: It controls cellular activities by regulating gene expression, stores hereditary material (DNA), and facilitates the synthesis of RNA and ribosomes in the nucleolus.

16. What is the main function of each of the following organelles:

Answer:

(i) Cell wall: Provides structural support and protection in plant cells.

(ii) Plasma membrane**: Regulates the entry and exit of substances, maintaining cell homeostasis.

(iii) Chromosomes: Carry genetic information for inheritance and control cellular functions.

(v) Mitochondria: Produce ATP through cellular respiration, serving as the cell's energy source.

(vi) Chloroplasts: Conduct photosynthesis to produce food (glucose) in plant cells.

(vii) Golgi apparatus: Modifies, packages, and secretes proteins and lipids.

(viii) Lysosomes: Digest waste materials and cellular debris.

(ix) Centrioles: Aid in spindle formation during cell division.

(x) Vacuoles: Store nutrients, waste, or water and maintain turgor pressure in plant cells.

17. Distinguish between cell wall and cell membrane.

Answer:

Cell Wall: Found in plant cells, made of cellulose, rigid, non-living, fully permeable, provides structural support and protection.

Cell Membrane: Found in all cells, made of lipids and proteins, flexible, living, selectively permeable, regulates substance movement.

18. Comment on the following:

Answer:

(i) Chloroplast is called "Kitchen of the cell": Chloroplasts perform photosynthesis, producing glucose (food) using sunlight, akin to a kitchen preparing food for the cell.

(ii) Chloroplast is semi-autonomous structure**: Chloroplasts have their own DNA and ribosomes, allowing them to synthesize some proteins independently, making them semi-autonomous.

(iii) Lysosomes are Garbage disposer: Lysosomes contain enzymes that break down waste materials and cellular debris, functioning as the cell's garbage disposal system.

**Advanced Questions**

**More Than One Answer Type**

1. Choose the correct statement regarding cell membrane.

Answer: C. i, ii, iv

Explanation:

i. Cell membrane is also called as plasma membrane: True, these terms are synonymous.

ii. It selectively controls the entry and exit of salts and water: True, it is selectively permeable.

iv. It is made with lipids and proteins: True, it consists of a phospholipid bilayer with embedded proteins.

iii. It does not protect the inner content of the cell: False, the cell membrane protects the cell by regulating what enters and exits.

2. Choose the incorrect statements about cell organelles.

Answer: A. Only iii

Explanation:

i. Plastids are divided into three types: True (chloroplasts, chromoplasts, leucoplasts).

ii. Vacuole is non-living fluid-filled sac-like structure: True, vacuoles contain cell sap and are considered non-living inclusions.

iii. Cell wall is present in animal cell: False, animal cells lack a cell wall.

iv. Ribosomes synthesize the proteins: True, ribosomes are the site of protein synthesis.

3. Choose the correct sentences from the following

Answer: B. iii, iv

Explanation:

i. Amoeba, single-celled organism unable to perform all its functions: False, Amoeba performs all life functions within one cell.

ii. A bigger organism has a big size cell: False, cell size is relatively constant; larger organisms have more cells.

iii. Cell wall is non-living structure: True, it is made of cellulose and is non-living.

iv. Leucoplast stores starch: True, leucoplasts store starch, oils, or proteins.

**Assertion & Reason**

4. A: Mitochondria and chloroplast are semi-autonomous cell organelles. R: Mitochondria and chloroplast have their own DNA and protein synthesizing machinery.

Answer: A. A & R true & R explains A

Explanation: Mitochondria and chloroplasts are semi-autonomous because they have their own DNA and ribosomes, allowing them to synthesize some proteins independently. The reason explains the assertion.

5. A: Plastids contain green pigments called chlorophyll. R: Chlorophyll-containing plastids are called chromoplasts.

Answer: C. A is true, R is false

Explanation:

A: True, some plastids (chloroplasts) contain chlorophyll.

R: False, chlorophyll-containing plastids are called chloroplasts, not chromoplasts (which contain other pigments like carotenoids).

**Match the Following**

6. Column I: (1. Cytoplasm, 2. Mitochondria, 3. RER, 4. Golgi apparatus)

Column II: (a. ATP, b. Proteins, c. Synthesizes and secretion of enzymes and hormones, d. Center for metabolic activities)

Answer: B. 1-d, 2-a, 3-b, 4-c

Explanation:

1. Cytoplasm → d. Center for metabolic activities**: Most cellular processes occur in the cytoplasm.

2. Mitochondria → a. ATP: Mitochondria produce ATP.

3. RER → b. Proteins: Rough ER synthesizes proteins due to attached ribosomes.

4. Golgi apparatus → c. Synthesizes and secretion of enzymes and hormones: The Golgi packages and secretes these molecules.

7. Column I: (1. Chromoplast, 2. Leucoplast, 3. Chloroplast, 4. Plastids)

Column II: (a. Stores starch, b. Photosynthesis, c. Double membrane, d. Imparts colours)

Answer: A. 1-d, 2-a, 3-b, 4-c

Explanation:

1. Chromoplast → d. Imparts colours: Chromoplasts contain pigments for colour in flowers and fruits.

2. Leucoplast → a. Stores starch: Leucoplasts store starch, oils, or proteins.

3. Chloroplast → b. Photosynthesis: Chloroplasts perform photosynthesis.

4. Plastids → c. Double membrane: All plastids have a double membrane structure.

**Comprehension**

8. The fluid present inside the nucleus

Answer: A. Nucleoplasm

Explanation: Nucleoplasm is the fluid inside the nucleus, containing chromatin and the nucleolus.

9. Chromatin looks like

Answer: B. Thread-like

Explanation: Chromatin appears as thread-like structures within the nucleus, consisting of DNA and proteins.

10. Full form of DNA

Answer: C. Deoxy Ribo Nucleic Acid

Explanation: DNA stands for Deoxyribonucleic Acid, the molecule carrying genetic information.

11. Nucleus is called

Answer: D. Both A & C

Explanation: The nucleus is called the "brain of the cell" and "boss of the cell" because it controls all cellular activities and regulates gene expression.