Progress Check

1. **Name the following:**
   (i) The kind of microscope that consists of a single biconvex lens
   (ii) The kind of mirror used for throwing light on the object in Hooke's microscope

Solution:

(i) Simple/Dissecting microscope
(ii) A concave mirror is used for throwing light

2. **What is the maximum magnification that can usually be achieved by**
   (i) A compound microscope,
   (ii) An electron microscope?

Solution:

The maximum magnification that can be achieved by the following are:

(i) Compound Microscope – It magnifies an object up to 2000 times.
(ii) Electron Microscope – It magnifies an object up to 200,000 times.

Progress Check

1. Name the following:

(i) Any two one-celled organisms.
(ii) The longest cells in the animals.
(iii) Amoeboid cells in humans.
(iv) Shape of white blood cells.
(v) A cell component which is visible only in cell division stages.

Solution:

(i) Chlamydomonas, amoeba.
(ii) The longest cell in animals is the nerve cell
(iii) White blood cells are amoeboid cells in humans that can squeeze out through the capillary walls.
(iv) The shape of white blood cells is amoeboid
(v) Chromosomes are a component of cell that appears in cell division stages only. They otherwise exist only as fine chromatin threads.

2. List three categories of substances which are ensured greater diffusion due to large surface/ volume ratio of the cells.

Solution:

The three groups of substances that exhibit greater diffusion because of larger volume/surface ratio of cells are listed below:

- Oxygen and carbon dioxide – the respiratory gases are diffused in and out of the alveoli
- The unwanted metabolic waste produced by the cells to its exterior.
- Absorption of nutrients from finger like projections – villi of the small intestine

Progress Check

Page: 18 & 19

1. Name the part of the cell in which:

(i) Many chemical reactions occur with the help of the enzymes.

(ii) A network of chromatin fibers occurs.

(iii) Cellulose forms the main component.

Solution:

The parts of the cell in which the following reactions occur are as follows:

i. In plant cells, Cytoplasm is the site in the cell wherein multiple chemical reactions take place in the presence of enzymes, whereas in animal cells the site in the cell in protoplasm.

ii. The site in the cell where a network of chromatin fibers occur is the nucleus.

iii. The cell wall in the plant cell.

2. Differentiate between

(i) an organ and an organelle

(ii) a plant cell and an animal cell pertaining to the presence of plastids.

Solution:

The differences are as follows:

(i)

Attributes	Organ	Organelle
Location	They are present throughout the body	Known as little organs, are found within the cell
Size	Visible to the naked eyes, larger in size	Microscopic
Function	Carry out functions of the entire body	Carry out functions within the cell
Example	Heart, Lungs, Liver	Ribosomes, Endoplasmic reticulum, Golgi complex

(ii)

Attributes	Plant cell	Animal cell
Presence of plastids	They possess plastids	Do not contain plastids
Type of plastids	4 forms – Chloroplasts, Chromoplasts, Leucoplasts, Gerontoplasts. Chloroplast contains chlorophyll, imparting the green color.	Do not contain any form of plastid.

3. Name the cell organelles concerned with

i. Secretion of enzymes

ii. Trapping of solar energy

iii. Synthesis of proteins

iv. Intracellular digestion

v. Production of ATP

Solution:

The cell organelles concerned with the following are:

i. Golgi apparatus is responsible for secretion of enzymes and hormones.

ii. Plastids, in particular, the Chloroplasts are responsible to trap solar energy for the process of photosynthesis as they contain the green pigment – chlorophyll.

iii. Ribosomes are concerned with the protein synthesis

iv. Lysosomes are responsible for the intracellular digestion.

v. Mitochondria often referred to as the 'power house of the cell' is responsible for the production of ATP.

4. Name the cell part which is

(i) composed of cellulose

(ii) formed of an irregular network of tubular double membranes

(iii) a clear space with water or other substances in solution

Solution:

(i) The cell wall is composed of cellulose.

(ii) The Endoplasmic reticulum is formed of an irregular network of double membrane tubules

(iii) Vacuoles are the clear spaces with water or other substances in solution.

5. Mention if the following statements are true or false. If false, suggest the change in the information underlined.

(i) Prokaryotic cells have <u>larger</u> ribosomes.

(ii) Eukaryotic cells have <u>mitochondria</u>.

(iii) Amoeba is an example of <u>Prokaryotes</u>.

(iv) Bacteria have no <u>nuclear membrane</u> but possess <u>chloroplasts</u>.

Solution:

(i) The statement is false. Prokaryotic cells have a small ribosome.

(ii) The statement is true.

(iii) The statement is false. Amoeba is an example of eukaryotes.

(iv) The statement is false. Bacteria are prokaryotes, they do not have any other membrane bound organelles. They do not contain chloroplasts but possess bacterio chlorophyll.

Progress Check

1. **Column I lists a few activities of living organisms and column II the activity of cells related to them. Match the items in the two columns.**

Column I (Activity of organism)	Column II (Activity of cells)
(i) Repair	**(a) Contractility of cells**
(ii)Cooling of body	**(b) Cells devour germs**
(iii)Movement	**(c) Cell division**
(iv)Protection from diseases	**(d) Gland cells give out sweat for evaporation**

Solution:

Listed below are the matched items:

Column I (Activity of organism)	Column II (Activity of cells)
(i) Repair	(c) Cell division
(ii)Cooling of body	(d) Gland cells give out sweat for evaporation
(iii)Movement	(a) Contractility of cells
(iv)Protection from diseases	(b) Cells devour germs

2. **Which cell organelle is the key to the life of the cell?**

Solution:

The nucleus is the key to the life of the cell. It regulates the functions of the cell. It contains the genes, which control heredity characters and governs critical life processes such as reproduction and growth of the cell. It functions as a control centre.

3. **How do you say that a cell also has a life span and death like an organism? Give one example.**

Solution:

Cells are structural and functional living entities. It consists of organelles that undergo respiration and eliminate waste. They have a life span that is definite. As living entities are not immortal and die at a certain point in time, cells also die. Death of cells in human body takes place every second.

Because of the presence of cell organelles namely, lysosomes(suicidal bags) and mitochondria(respiration centre) we can deduce that cells have a life span and death as seen in a living entity. Lysosomes present in the cell age, deteriorate get damaged and die through a process known as apoptosis.

4. **All organisms excrete. Does an individual cell also do it? Give one example.**

Solution:

Excretion is a biological process and is essential to get rid of harmful substances. The process is exhibited by every living entity. The ingested food is digested and elimination of undigested wastes and toxic substances takes place from the body of the entity. Since a cell is living, it excretes wastes.

Example
Amoeba possess contractile vacuole that assembles wastes and water generated by the body, swells up and surfaces up to bursts liberating contents to the outwards.

5. Every organism needs food. Does a cell also need it? Explain very briefly.

Solution:

Yes, cell requires food. Energy is required by all living entities, be it single-celled or multicellular entities. They need energy to survive and grow which is obtained from the food ingested. This energy is utilized to perform various functions such as maintenance of cell organelles, their proper functioning and also promote functioning of other cells involved in digestion, movement etc.

Review Questions

A. Multiple Choice Type

1. **Which one of the following cell organelles is correctly matched with its function?**
   (a) Ribosomes – Synthesis of proteins
   (b) Mitochondria – Secretion of enzymes
   (c) Plasma Membrane – Freely permeable
   (d) Centrosome – Carries genes

Solution:

(a) Ribosomes – synthesis of proteins

Ribosomes are small granules scattered in the cytoplasm, responsible for protein synthesis.

2. **All life starts as**
   (a) An egg
   (b) A single cell
   (c) A gene
   (d) A chromosome

Solution:

(b) A single cell.

All living entities including humans start life as a single cell known as the zygote.

3. **Which one of the following is found both in cells of a mango plant and a monkey?**
   (a) chloroplasts
   (b) centrioles
   (c) cell wall
   (d) cell membrane

Solution:

(d) cell membrane

Cell membranes are found both in mango plant (plant cell) and monkey (animal cells).

4. **A plant cell can be identified from an animal cell by the:**
   (a) Absence of centrosome
   (b) Presence of cell membrane
   (c) Presence of vacuoles
   (d) None of the above

Solution:

(a) Absence of centrosome

Centrosomes are regions girdling the centrioles, located near the nucleus. They are present in animal cells.

5. **Plant cell has a cell wall made of:**
   (a) Protein
   (b) Fructose
   (c) Cellulose
   (d) Fatty acids

Solution:
(c) Cellulose
The cell wall of plant cells is made up of cellulose.

6. **The cell organelle that helps in respiration of the cell is:**
   (a) Mitochondria
   (b) Lysosome
   (c) Ribosome
   (d) Centrosome
   Solution:
   (a) Mitochondria
   Mitochondria are involved in cellular respiration.

B. Very Short Answer Type

1. **Name the part of the cell concerned with the following?**
   (a) Liberation of energy
   (b) Synthesis of proteins
   (c) Transmission of heredity characters from parents to offspring
   (d) Initiation of cell division
   (e) Hydrolytic in function
   (f) Entry of only certain substances into and out of the cell.
   Solution:
   (a) Liberation of energy - Mitochondria
   (b) Synthesis of proteins - Ribosomes
   (c) Transmission of heredity characters from parents to offspring - Chromosomes
   (d) Initiation of cell division - Centrosome
   (e) Hydrolytic in function - Lysosomes
   (f) Entry of only certain substances into and out of the cell – Plasma membrane/cell membrane

2. **State whether the following statements are true(T) or false(F):**
   (a) All animal cells contain a cell wall. T/F
   (b) The cell wall is made of protein. T/F
   (c) Centrosome occurs in animal cells T/F
   (d) Plant cells contain large vacuoles. T/F
   (e) Protoplasm is the part of the cell which surrounds the nucleus T/F
   (f) Genes are located in chromosomes. T/F
   (g) Anthocyanins are the pigments of flowers, which are dissolved in cell-sap. T/F
   Solution:
   (a) The statement is false.
   (b) The statement is false. The cell wall in plant cells is made up of cellulose.
   (c) The statement is true.
   (d) The statement is true.
   (e) The statement is false. Cytoplasm is the protoplasm of the cell surrounding the nucleus.
   (f) The statement is true.
   (g) The statement is true.

3. **How many chromosome pairs are found in human cells?**
Solution:
Each cell in humans has 23 pairs of chromosomes, 46 in total. Out of this, 22 pairs of chromosomes are autosomes – same in both males and females. The last pair of chromosomes is the sex chromosome and differs in males (XY) and females (XX).

4. **What is the name of the chemical substance which constitutes the genes?**
Solution:
The chemical substance constituting the genes is DNA. It stands for de-oxy ribonucleic acid.

5. **Match the items in column 'A' with those in column 'B'**

Column A	Column B
(a) Vacuoles	**(i) Intracellular digestion**
(b) Nucleolus	**(ii) respiratory enzymes**
(c) Lysosomes	**(iii) Covered by tonoplast**
(d) Anthocyanin	**(iv) Dissolved in the cytoplasm**
(e) Cristae	**(v) Forms RNA**

Solution:

Column A	Column B
(a) Vacuoles	Covered by tonoplast
(b) Nucleolus	forms RNA
(c) Lysosomes	Intracellular digestion
(d) Anthocyanin	Dissolved in the cytoplasm
(e) Cristae	Respiratory enzymes

6. **Fill in the blanks:**
(a) _____ consists of membranous sacs and secretes 40 types of digestive enzymes.
(b) _____ is surrounded by microtubules, located near the nucleus
(c) Very thin flexible, living membranes which is differently permeable, is called _____
(d) More than 1000 chromosomes are found in the nucleus of certain _____
(e) _____ are heredity units.
(f) _____ is a plastid which stores starch.
Solution:
(a) Lysosomes
(b) Centriole
(c) Plasma membrane
(d) Insects
(e) Genes
(f) Leucoplast

C. Short Answer Type

1. It is said that the protoplasm cannot be analysed chemically. Why?

Solution:

Protoplasm is the living matter of the cell. Yes, they cannot be chemically analysed as the chemical composition of the protoplasm is complicated. The common elements in the protoplasm composition namely hydrogen, carbon, oxygen, nitrogen, iron, sulphur, phosphorous are same in all cells with slight variation in cells.

2. What is the difference between an organ and an organelle?

Solution:

The following are the differences between organ and an organelle:

Attributes	Organ	Organelle
Size	Visible to the naked eyes, larger in size	Microscopic
Location	They are present throughout the body	Known as little organs, are found within the cell
Function	Carry out functions of the entire body	Carry out functions within the cell
Example	Heart, Lungs, Liver	Ribosomes, Endoplasmic reticulum, Golgi complex

3. Do you think the cells of an elephant would be larger than the cells of a rat? Explain briefly.

Solution:

The cell size is independent of the size of the entity. The cell size of a rat and that of an elephant are the same. Within the entity, the cell size is the same, it does not differ. However, what varies is the number of cells. Number of cells in a large entity such as elephant is much more compared to a smaller entity such as a rat.

4. Differentiate between the following pairs of terms:

(a) Protoplasm and cytoplasm
(b) Nucleolus and nucleus
(c) Centrosome and chromosome
(d) Cell wall and cell membrane
(e) Plant cell and animal cell
(f) Prokaryotes and eukaryotes

Solution:

Following are the differences:

(a) Protoplasm and cytoplasm

Protoplasm	Cytoplasm
Protoplasm is the living matter of the cell. The total substance of a living cell – nucleus and cytoplasm	Mixture of insoluble and soluble organic compounds and water wherein different cell organelles are implanted.

(b) Nucleolus and nucleus

Nucleolus	Nucleus
It is present in the nucleus and is round-shaped nucleoli.	It is present in the cell and is a dense spherical structure. It comprises a network of thread-like structures known as chromatin fibres.

(c) Centrosome and chromosome

Centrosome	Chromosome
Cytoplasm is close to the nucleus and it is a clear are. Here spindle fibres emerge during the process of cell division	They contain genes or hereditary data that transfer genetic traits from parents to offspring.
Found in animal cell only	They are found in the nucleus of both plant and animal cell

(d)

Cell wall	Cell membrane
Non-living rigid layer	Living, flexible membrane and thin
Composed of cellulose	Composed of lipoproteins
Permeable freely	Semi-permeable

(e)

Plant cell	Animal cell
Cell wall is definite and made of cellulose	No cell wall
Centrosome is absent	Centrosome is present
Plastids usually present	Plastids absent

(f)

Prokaryotes	Eukaryotes
Cells contain primitive and undefined nucleus	Have a well-defined nucleus along with a nuclear membrane
Other than ribosomes, they do not contain any other cell organelle	Possess other cell organelles
Possess smaller ribosomes	Larger ribosomes
Example – Blue-green algae	Example – Humans

5. Mention three features found only in plant cells and one found only in animal cells.

Solution:

Listed below are the features that are observed in plant cells only:

- Cell wall
- Plastids
- Large vacuoles

Following are the features that are observed in animal cells only:

- Centrosome is observed in animal cells only. Plants do not have centrosomes.

6. Why are the cells generally of a small size?

Solution:

Cells are smaller in size. It is because they facilitate various sections/parts of the cell to interlink with one another quickly in order for the cell to carry out its functionalities efficiently. Also, the size is smaller in order to have a larger surface area is to volume ratio. This ensures that more substances undergo diffusion in and out of the cell.

D. Long Answer Type

1. What is the cell theory? Who propounded it and when?

Solution:

The three major highlights of the cell theory are as follows:

- The cell is the smallest unit of structure of all living things
- The cell is the unit of function of all living things
- All cells arise from pre-existing cells.

The theory was propounded in 1839 by Schwann and Schleiden. Rudolf Virchow in 1858 added the last point mentioned above to the cell theory.

2. Mention the three differences between a living cell and a brick in a wall.

Solution:

Listed below are the differences between a living cell and a brick in a wall.

Living cell	Brick
The living structure is non-rigid	Living structure is rigid
Contains cellulose chiefly	Contains soil primarily
Is functional in nature, performs critical functions pertaining to life processes	Non-functional
Generously permeable	Impermeable

3. Name the plastid and pigment likely to be found in the cells of:

(a) Petals of sunflower

(b) Ripe tomato

(c) Skin of green tomato

(d) Cells of potato.

Solution:

The following are the pigments and plastids that are found in these cells:

(a) Pigment – Xanthophyll, Plastid – Chromoplasts
(b) Pigment – Carotene, Plastid – Chromoplasts
(c) Pigment – Chlorophyll, Plastid – Chloroplasts
(d) Pigment – No pigment, Plastid – Leucoplasts

4. State the major functions of the following:
(a) Plasma membrane
(b) Ribosome
(c) Lysosome
(d) Mitochondria
(e) Golgi apparatus
(f) Cytoplasm
(g) Asters of centrosome
(h) Chromosomes
(i) Glycogen granule
(j) Vacuoles

Solution:

The following are the major functions:

	Structure	Functions
a	Plasma membrane	• Responsible for separation of contents from its immediate surroundings • Maintenance of shape of the animal cell • Checks the entrance of ions and solutes
b	Ribosome	Synthesizes proteins
c	Lysosome	• They are referred to as ‘suicidal bags’ as they destroy cell organelles when they turn old or are damaged • Involved in intracellular digestion • Destruction of foreign substances
d	Mitochondria	• Controls the cell functions • Referred to as ‘power house of the cell’, as energy is stored in the form of ATP • Involved in cellular respiration to release energy • Bearers of genes
e	Golgi apparatus(in animal cells)	• Production and secretion of enzymes and hormones • Acrosomes of sperms are formed
f	Cytoplasm	• Contains organelles perform multitude of functions • Performs all metabolic activities
g	Asters of centrosome	• Cell division – regulation and initiation • Spindle fibre formation
h	Chromosomes	Passes genetic characteristics from parents to offspring
i	Glycogen granule	Food for cells
j	Vacuoles	• Stores food, water, pigments and waste products • Renders turgidity to the plant cell

		• Possess pigments such as Anthocyanins

5. List any six features found both in plant and animal cells.

Solution:

Listed below are the six features that are observed both in animal and plant cells.

- Cell membrane is present
- Golgi body is present
- Liquid matrix known as cytoplasm is observed in the cell
- Mitochondria generates energy, is found in the cells
- Ribosomes are found. They are responsible for protein synthesis
- A prominent nucleus is observed

E. Structured/Application/Skill Type

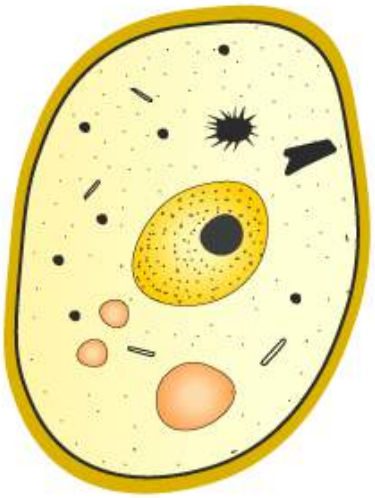
1. Given below are the sketches of two types of cells A and B

(a) Which one of these is a plant cell? Give reason in support of your answer.

(b) List the cell structures which are common to both the types

(c) Name the structures found only in plant cells and those found only in animal cells.

Solution:



A

B

(a) Figure B. displays a plant cell. Listed below are the reasons justifying the same:

- Presence of a cell wall
- Large vacuole
- The vacuole is seen pushing the nucleus to the periphery

(b) Both the cells in the figure have these structures in common:
Nucleus

Mitochondria
Ribosome
Cell membrane
Lysosome
Endoplasmic reticulum
Golgi body

(c) Plant cell – cell wall and plastid
Animal cell – Centrosome