

Chapter - 5

The Fundamental Unit of Life

Multiple Choice Questions

1. Which of the following can be made into crystal?

- (a) A Bacterium
- (b) An Amoeba
- (c) A Virus
- (d) A Sperm

Soln

Answer is (c) A Virus

Explanation:

Viruses are considered as the intermediates between living and non-living as they cannot metabolize or reproduce on their own. For all its processes, a virus requires a host. Viruses can be stored as crystal-like chemicals. Virus crystals are a collection of millions of virus cells.

2. A cell will swell up if

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

Soln:

Answer is (b) The concentration of water molecules in surrounding medium is higher than water molecules concentration in the cell.

Explanation:

When the concentration of water molecules in surrounding medium is higher than water molecules concentration in the cell, water from the surrounding enters the cell through osmosis and the cell swells up.

3. Chromosomes are made up of

- (a) DNA
- (b) protein
- (c) DNA and protein
- (d) RNA

Soln:

Answer is (c) DNA and protein

4. Which of these options are not a function of Ribosomes?

- (i) It helps in manufacture of protein molecules**
- (ii) It helps in manufacture of enzymes**
- (iii) It helps in manufacture of hormones**
- (iv) It helps in manufacture of starch molecules**
- (a) (i) and (ii)**
- (b) (ii) and (iii)**
- (c) (iii) and (iv)**
- (d) (iv) and (i)**

Soln:

Answer is (c) (iii) and (iv)

Explanation:

Proteins are produced in ribosomes hence they are called as protein factories. Enzymes are proteins. Hormones and starch are not produced in ribosome hence option (iii) and (iv) are wrong statements.

5. Which of these is not related to endoplasmic reticulum?

- (a) It behaves as transport channel for proteins between nucleus and cytoplasm**
- (b) It transports materials between various regions in cytoplasm**
- (c) It can be the site of energy generation**
- (d) It can be the site for some biochemical activities of the cell**

Soln:

Answer is (c) It can be the site of energy generation

Explanation:

Energy is produced in the Mitochondria hence option c is not related to Endoplasmic reticulum.

6. Following are a few definitions of osmosis Read carefully and select the correct definition

- (a) Movement of water molecules from a region of higher concentration to a region of lower concentration through a semipermeable membrane**
- (b) Movement of solvent molecules from its higher concentration to lower concentration**
- (c) Movement of solvent molecules from higher concentration to lower concentration of solution through a permeable membrane**
- (d) Movement of solute molecules from lower concentration to higher concentration of solution through a semipermeable membrane**

Soln:

Answer is (a) Movement of water molecules from a region of higher concentration to a region of lower concentration through a semipermeable membrane

Explanation:

Osmosis is a special type of diffusion in which water molecules move from a region of higher concentration to a region of lower concentration through a semipermeable membrane.

Option b) Movement of solvent molecules from its higher concentration to lower concentration is called as diffusion.

7. Plasmolysis in a plant cell is defined as

- (a) break down (lysis) of plasma membrane in hypotonic medium**
- (b) shrinkage of cytoplasm in hypertonic medium**
- (c) shrinkage of nucleoplasm**
- (d) none of them**

Soln:

Answer is (b) shrinkage of cytoplasm in hypertonic medium

Explanation:

Living plant cell loses water through osmosis resulting in shrinkage or contraction of the contents of the cell away from the cell wall. This phenomenon is known as plasmolysis.

When plant cell has more water content than in the surrounding plant cell tend to transfer water to its surroundings which results in shrinkage of the cell through plasmolysis.

8. Which of the following are covered by a single membrane?

- (a) Mitochondria**
- (b) Vacuole**
- (c) Lysosome**
- (d) Plastid**

Soln:

Answer is (c) Lysosome

Explanation:

Mitochondria, Vacuole and plastids are covered by double layered membranes hence Lysosome is the answer.

9. Find out the false sentences

- (a) Golgi apparatus is involved with the formation of lysosomes**
- (b) Nucleus, mitochondria and plastid have DNA; hence they are able to make their own structural proteins**
- (c) Mitochondria is said to be the power house of the cell as ATP is generated in them.**
- (d) Cytoplasm is called as protoplasm**

Soln:

Answer is (a) Golgi apparatus is involved with the formation of lysosomes

Explanation:

Golgi apparatus has role in storage and synthesis of certain biomolecules. They do not have any role in the synthesis of Lysosome hence option a) is the right answer.

10. Find out the correct sentence

- (a) Enzymes packed in Lysosomes are made through RER (rough endoplasmic reticulum)**
- (b) Rough endoplasmic reticulum and smooth endoplasmic reticulum produce lipid and protein respectively**
- (c) Endoplasmic reticulum is related with the destruction of plasma membrane**
- (d) Nucleoid is present inside the nucleoplasm of eukaryotic nucleus**

Soln:

Answer is (a) Enzymes packed in Lysosomes are made through RER (rough endoplasmic reticulum).

Explanation:

RER has ribosomes present on its surface which are responsible for the synthesis of proteins and enzymes are the proteins. Hence option a) is correct.

Rough endoplasmic reticulum has no role in the production of lipid. Similarly Endoplasmic reticulum has no role in the destruction of plasma membrane.

Nucleoid is undefined nuclear region in prokaryotes.

11. Which cell organelle plays a crucial role in detoxifying many poisons and drugs in a cell?

- (a) Golgi apparatus
- (b) Lysosomes
- (c) Smooth endoplasmic reticulum
- (d) Vacuoles

Soln:

Answer is (c) Smooth endoplasmic reticulum

Explanation:

SER plays an important role in detoxifying many poisons and drugs in the liver cells of vertebrates.

12. The proteins and lipids, essential for building the cell membrane, are manufactured by

- (a) rough endoplasmic reticulum
- (b) golgi apparatus
- (c) plasma membrane
- (d) mitochondria

Soln:

Answer is (a) rough endoplasmic reticulum

Explanation:

Endoplasmic reticulum plays important role in the production of both lipids and proteins. SER produces Lipids. and RER produces Proteins.

13. The undefined nuclear region of prokaryotes are also known as

- (a) nucleus
- (b) nucleolus
- (c) nucleic acid
- (d) nucleoid

Soln:

Answer is (d) nucleoid

14. The cell organelle involved in forming complex sugars from simple sugars are

- (a) endoplasmic reticulum
- (b) ribosomes
- (c) plastids
- (d) golgi apparatus

Soln:

Answer is (d) golgi apparatus

Explanation:

Golgi apparatus is involved in the packaging and transport of many biomolecules such as proteins, lipids and carbohydrates.

15. Which out of the following is not a function of vacuole?

- (a) Storage
- (b) Providing turgidity and rigidity to the cell
- (c) Waste excretion
- (d) Locomotion

Soln:

Answer is (d) Locomotion

Explanation:

Vacuoles are responsible for storage, turgidity and rigidity of the cell and waste excretion. Locomotion is carried out by specialised organelles present outside cytoplasm. Vacuoles are present inside the cytoplasm hence option d) is a wrong statement.

16. Amoeba acquires its food through a process, termed

- (a) exocytosis
- (b) endocytosis
- (c) plasmolysis
- (d) exocytosis and endocytosis both

Soln:

Answer is (b) endocytosis

Explanation:

Endocytosis is taking in of matter by a living cell by invagination of its membrane to form a vacuole. In endocytosis, substances that are external to a cell are brought into the cell.

Membrane-bound vesicles containing cellular molecules are transported to the cell membrane in exocytosis. Process of contraction of the protoplast of a plant cell as a resulting in the loss of water from the cell is called as plasmolysis.

17. Cell wall of which one of these is not made up of cellulose?

- (a) Bacteria
- (b) Hydrilla
- (c) Mango tree
- (d) Cactus

Soln:

Answer is (a) Bacteria

Explanation:

Hydrilla, Mango tree and cactus are plants hence their cell wall is made up of cellulose. Cell wall of Bacteria is made of polysaccharide called as Peptidoglycan.

18. Silver nitrate solution is used to study

- (a) endoplasmic reticulum
- (b) golgi apparatus
- (c) nucleus
- (d) mitochondria

Soln:

Answer is (b) golgi apparatus

19. Organelle other than nucleus, containing DNA is

- (a) endoplasmic reticulum
- (b) golgi apparatus
- (c) mitochondria
- (d) lysosome

Soln:

Answer is (c) mitochondria

Explanation:

Mitochondria and Chloroplast are the organelles that have separate nuclear called as mitochondrial DNA and chloroplast DNA.

20. Kitchen of the cell is

- (a) mitochondria
- (b) endoplasmic reticulum
- (c) chloroplast
- (d) golgi apparatus

Soln:

Answer is (c) chloroplast

Explanation:

Food in plants is produced inside Chloroplast hence Chloroplast is known as kitchen of the cell.

21. Lipid molecules in the cell are synthesized by

- (a) smooth endoplasmic reticulum
- (b) rough endoplasmic reticulum
- (c) golgi apparatus (d) plastids

Soln:

Lipid molecules in the cell are synthesized by **smooth endoplasmic reticulum**

22. Cell arises from pre-existing cell was stated by

- (a) Haeckel
- (b) Virchow
- (c) Hooke
- (d) Schleiden

Soln:

Answer is (b) Virchow

23. Cell theory was given by

- (a) Schleiden and Schwann
- (b) Virchow
- (c) Hooke
- (d) Haeckel

Soln:

Answer is (a) Schleiden and Schwann

Explanation:

Schleiden and Schwann were the first to propose the cell theory which stated that all plants and animals are made up of cell and cell is the basic unit of life.

24. The only cell organelle seen in prokaryotic cell is

- (a) mitochondria
- (b) ribosomes
- (c) plastids
- (d) lysosomes

Soln:

Answer is (b) ribosomes

25 . Organelle without a cell membrane is

- (a) ribosome
- (b) golgi apparatus
- (c) chloroplast
- (d) nucleus

Soln:

Answer is (a) ribosome

Explanation:

Golgi bodies, Chloroplast and nucleus are membrane bound organelles and ribosomes are organelles without membrane.

26. 1 μm is

- (a) 10^{-6} m
- (b) 10^{-9} m
- (c) 10^{-10} m
- (d) 10^{-3} m

Soln:

Answer is (a) 10^{-6} m

Explanation:

10^{-3} m- millimetre
 10^{-6} m – Micrometer
 10^{-9} m – nanometer

27. Lysosome arises from

- (a) endoplasmic reticulum
- (b) golgi apparatus
- (c) nucleus
- (d) mitochondria

Soln:

Answer is (b) golgi apparatus

Explanation:

Main function of golgi apparatus is secretion, packaging and modification of proteins. It is also involved in synthesis of new membranes and lysosomes.

28. Living cells were discovered by

- (a) Robert Hooke
- (b) Purkinje
- (c) Leeuwenhoek
- (d) Robert Brown

Soln:

Answer is (c) Leeuwenhoek

Explanation:

Robert hook first observed cells but he observed dead cork cell and it was Leeuwenhoek who observed living cell from his microscope.

29. Select the odd one out

- (a) The movement of water across a semi permeable membrane is affected by the amount of substances dissolved in it.
- (b) Membranes are made of organic molecules like proteins and lipids
- (c) Molecules soluble in organic solvents can easily pass through the membrane.
- (d) Plasma membranes contain chitin sugar in plants

Soln:

Answer is (d) Plasma membranes contain chitin sugar in plants

Explanation:

Plasma membrane contain sugar is a wrong statement and rest other statements are true. Plant plasma membrane contain cellulose in it.

Short Answer Questions

30. Why are lysosomes known as ‘suicide-bags’ of a cell?

Soln:

Lysosomes are the organelles that has digestive enzymes in them. These enzymes helps in removal of damaged cells. Lysosomes encounter with damaged cell to burst out, releasing digesting enzyme resulting in destruction of damaged cell hence they are called suicide bag of cell.

31. Do you agree that “A cell is a building unit of an organism”. If yes, explain why?

Soln:

Yes, I agree that A cell is a building unit of an organism because all the living beings are made up of cells and cell is the smallest independent unit of living beings.

32. Why does the skin of your finger shrink when you wash clothes for a long time?

Soln:

Soap solution is hypertonic in nature which makes the water move out of the cells in your hand which results in finger shrink when you wash clothes for a long time.

33. Why is endocytosis found in animals only?

Soln:

Endocytosis is found only in animals because cellwall is absent in animals. Due to this, movement of substances inside the cell is easier in animals than in plants.

34. A person takes concentrated solution of salt, after sometime, he starts vomiting. What is the phenomenon responsible for such situation? Explain.

Soln:

Upon consuming salt solution Osmosis process takes place which results in dehydration. This is the reason for vomiting of the person who consumes salt solution.

35. Name any cell organelle which is non membranous

Soln:

Ribosome is the only non-membranous cell organelle.

36. We eat food composed of all the nutrients like carbohydrates, proteins, fats, vitamins, minerals and water. After digestion, these are absorbed in the form of glucose, aminoacids, fatty acids, glycerol etc. What mechanisms are involved in absorption of digested food and water?

Soln:

Absorption and digestion involves diffusion and osmosis respectively.

37. If you are provided with some vegetables to cook. You generally add salt into the vegetables during cooking process. After adding salt, vegetables release water. What mechanism is responsible for this?

Soln:

After adding salt vegetables release water due to process of **osmosis**.

Explanation:

When we add salt surrounding will be hypertonic and water is released from vegetables to maintain equilibrium.

38. If cells of onion peel and RBC are separately kept in hypotonic solution, what among the following will take place? Explain the reason for your answer.

- (a) Both the cells will swell.
- (b) RBC will burst easily while cells of onion peel will resist the bursting to some extent.
- (c) a and b both are correct.
- (d) RBC and onion peel cells will behave similarly.

Soln:

(c) a and b both are correct.

Explanation:

When surrounding medium is hypotonic water moves into the cell. This lead to swelling of cells. RBC do not have plasma membrane and they swell and burst easily. Plant cell have cell wall which will prevent them from bursting.

39. Bacteria do not have chloroplast but some bacteria are photoautotrophic in nature and perform photosynthesis. Which part of bacterial cell performs this?

Soln:

Small vesicles associated with plasma membrane are present in bacteria. These vesicles have pigment which can trap sunlight to carry photosynthesis.

40. Match the following A and B

- | | |
|----------------------------------|--------------------------------|
| (A) | (B) |
| (a) Smooth endoplasmic reticulum | (i) Amoeba |
| (b) Lysosome | (ii) Nucleus |
| (c) Nucleoid | (iii) Bacteria |
| (d) Food vacuoles | (iv) Detoxification |
| (e) Chromatin material | (v) Suicidal bag and nucleolus |

Soln:

- | | |
|----------------------------------|--------------------------------|
| (A) | (B) |
| (a) Smooth endoplasmic reticulum | (iv) Detoxification |
| (b) Lysosome | (v) Suicidal bag and nucleolus |
| (c) Nucleoid | (iii) Bacteria |
| (d) Food vacuoles | (i) Amoeba |
| (e) Chromatin material | (ii) Nucleus |

41. Write the name of different plant parts in which chromoplast, chloroplast and leucoplast are present.

Soln:

Chromoplast- Flower and fruit-
Chloroplast- leaves
Leucoplast-Root

42. Name the organelles which show the analogy written as under

- (a) Transporting channels of the cell——
- (b) Power house of the cell——
- (c) Packaging and dispatching unit of the cell——
- (d) Digestive bag of the cell——
- (e) Storage sacs of the cell——
- (f) Kitchen of the cell——
- (g) Control room of the cell——

Soln:

Answers

- a) Endoplasmic reticulum
- b) Mitochondria
- c) Golgi apparatus
- d) Lysosomes
- e) Vacuoles
- f) Chloroplast
- g) Nucleus

43. How is a bacterial cell different from an onion peel cell?

Soln:

Bacterial Cell	Onion Peel
Prokaryotic cell	Eukaryotic cell
Lack of organized nucleus, the genetic material present in the form of nucleoid.	Well organised Nucleus
Nuclear membrane absent	Nuclear membrane present
Only a single chromosome is present	More than one chromosome are present
Membrane-bound organelles absent.	Membrane-bound organelles present.
Nucleolus is absent	Nucleolus is present.
Cell division takes place by fission or budding.	Cell division takes place by mitosis or meiosis

44. How do substances like carbon dioxide (CO₂) and water (H₂O) move in and out of the cell?

Soln:

Substances like carbon dioxide (CO₂) and water (H₂O) move in and out of the cell through **Osmosis**.

45. How does amoeba obtain its food?

Soln:

Amoeba obtain its food through **endocytosis**.

Explanation:

Amoeba surround food particle by its pseudopodia. It ingest the food and water particle to form a food vacuole. This process is known as endocytosis.

46. Name the two organelles in a plant cell that contain their own genetic material and ribosomes.

Soln:

Chloroplast and Mitochondria are the two organelles in a plant cell that contain their own genetic material and ribosomes.

47. Why are lysosomes also known as “scavengers of the cells”?

Soln:

Lysosomes also known as “scavengers of the cells” because lysosomes have lytic enzymes which are used to destroy pathogens and worn out cells. Lysosomes also destroys waste materials which are harmful for the cell.

48. Which cell organelle controls most of the activities of the cell?

Soln:

Nucleus controls most of the activities of the cell.

49. Which kind of plastid is more common in

- (a) roots of the plant
- (b) leaves of the plant
- (c) flowers and fruits

Soln:

Answers

- a) **Leucoplasts** are more common in roots of the plant
- b) **Chloroplasts** are more common in leaves of the plant
- c) **Chromoplasts** are more common in flowers and fruits

50. Why do plant cells possess large sized vacuole?

Soln:

Cells possess large sized vacuole because vacuoles not only stores important material but also contain sap that give turgidity to the cell.

51. How are chromatin, chromatid and chromosomes related to each other?

Soln:

Chromatin are the thread like structures which form the chromosomes.

A copy of duplicated chromosome which is generally joined to the other copy by a centromere is called **Chromatid**.

Chromosomes : When a cell starts to divide, the tangled mass of chromatin condense into long threads and finally, rod-like bodies called chromosomes.

52. What are the consequences of the following conditions?

- (a) A cell containing higher water concentration than the surrounding medium
- (b) A cell having low water concentration than the surrounding medium.
- (c) A cell having equal water concentration to its surrounding medium.

Soln:

- a) If a cell contains higher water concentration than the surrounding medium then cell loses water and it shrinks. This process is called exosmosis.
- b) If a cell has having low water concentration than the surrounding medium cell intakes water from the surrounds and cell bursts. This process is called endosmosis.
- c) If A cell having equal water concentration to its surrounding medium then there will be no change in the cell.

Long Answer Questions

53. Draw a plant cell and label the parts which

(a) determines the function and development of the cell

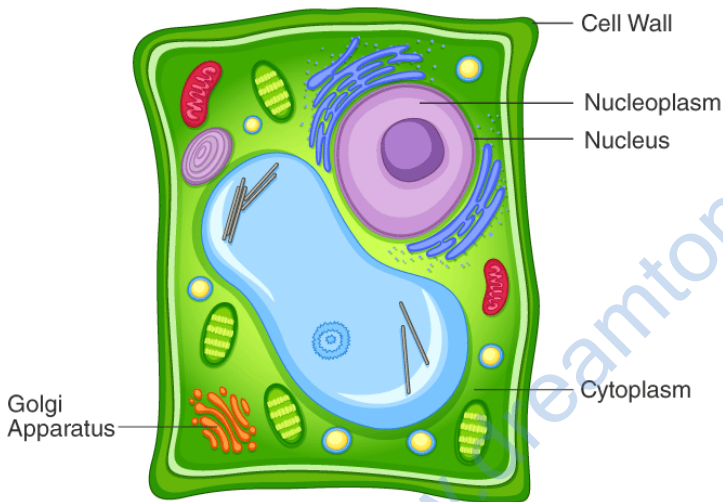
(b) packages materials coming from the endoplasmic reticulum

(c) provides resistance to microbes to withstand hypotonic external media without bursting

(d) is site for many biochemical reactions necessary to sustain life.

(e) is a fluid contained inside the nucleus

Soln:



(a) Nucleus: It determines the function and development of the cell

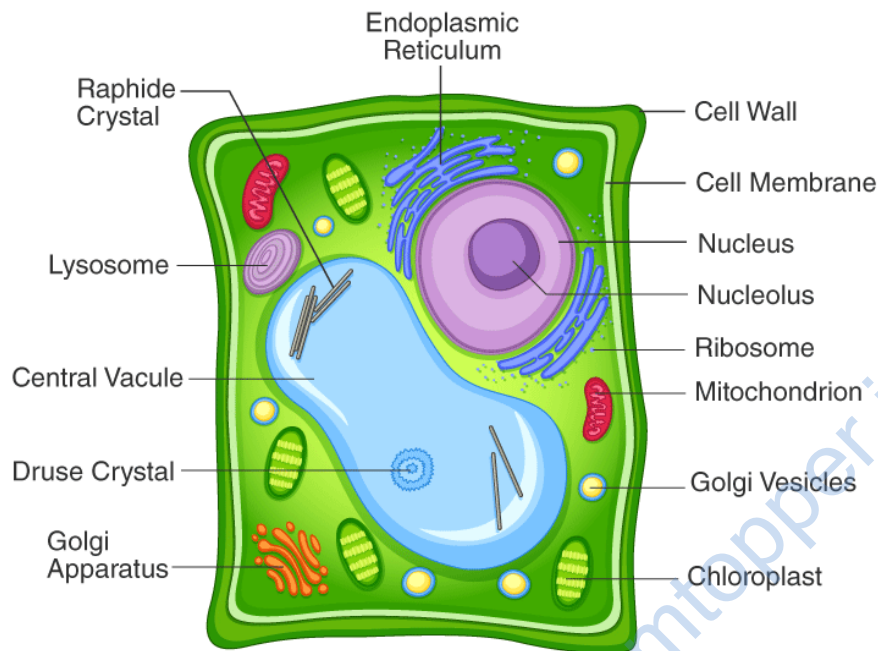
(b) Golgi apparatus: It packages materials coming from the endoplasmic reticulum

(c) Cell wall: It provides resistance to microbes to withstand hypotonic external media without bursting

(d) Cytoplasm: It is a site for many biochemical reactions necessary to sustain life.

(e) Nucleoplasm: It is a fluid contained inside the nucleus

**54. Illustrate only a plant cell as seen under electron microscope. How is it different from animal cell?
Soln:**

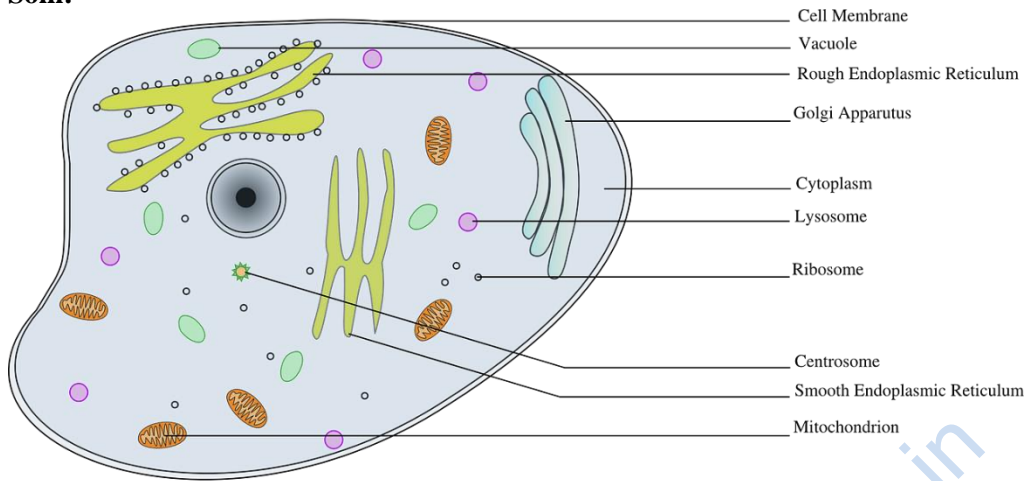


Major differences between a plant cell and animal cell are

- (i) Chloroplast in plant cell but absent in animal cells
- (ii) large central vacuole in plant cell which is absent in animal cells
- (iii) Cell wall is present in plant cell and absent in animal cells.

55. Draw a neat labelled diagram of an animal cell.

Soln:

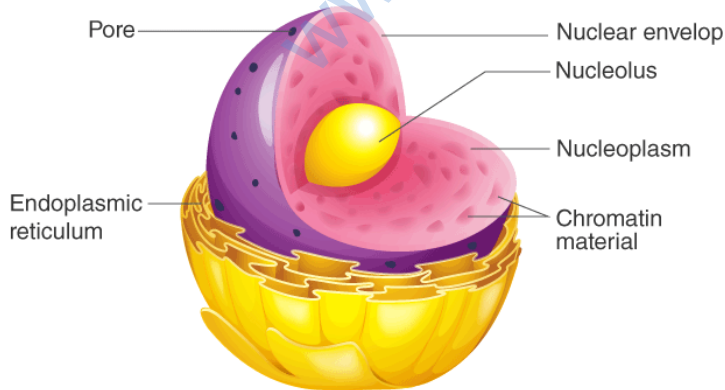


Cross Section of an Animal Cell

56. Draw a well labelled diagram of an eukaryotic nucleus. How is it different from nucleoid?

Soln:

Nucleus is an organelles present in the cell whereas Nucleoid is a small spot present in the cytoplasm of the cell. Nucleus is well organized and large whereas nucleoid is poorly organized and it is very small. Nucleus contains many chromosomes but Nucleoid contains single circular DNA molecule.



57. Differentiate between rough and smooth endoplasmic reticulum. How is endoplasmic reticulum important for membrane biogenesis?

Soln:

Rough Endoplasmic reticulum	Smooth Endoplasmic reticulum
RER Looks rough under Microscope	SER varies greatly in appearance in different cells
Ribosomes are present on all active cells	Ribosomes are not present on SER
They are the sites of protein manufacturing	helps in manufacture of fat molecules
Proteins are transported to various sites from here	Detoxification of drug takes place

58. In brief state what happens when

(a) dry apricots are left for sometime in pure water and later transferred to sugar solution?

(b) a Red Blood Cell is kept in concentrated saline solution?

(c) the Plasma-membrane of a cell breaks down?

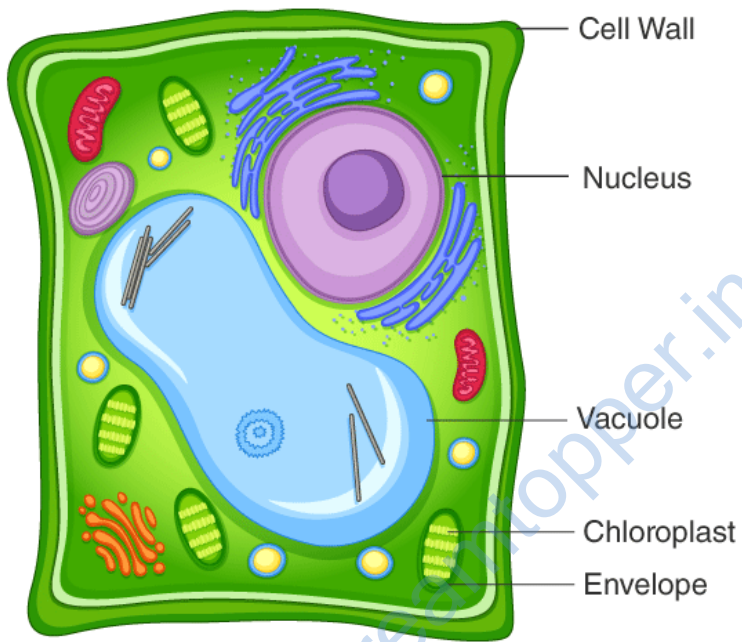
(d) rheo leaves are boiled in water first and then a drop of sugar syrup is put on it?

(e) golgi apparatus is removed from the cell?

Soln:

- When we put dried raisins or apricots in plain water and leave them for some time cell gains water and swells. If we put same seeds into a concentrated solution of sugar or salt. You will see it loses water, and consequently shrinks.
- When red blood cell is kept in concentrated saline solution. Cell loses water immediately and shrinks.
- When the plasma membrane of a cell breaks down cell dies.
- On boiling, cells of Rheo leaves are died and if we put sugar solution on it there will not be any intake of water due to lack of osmosis. Here cell undergo plasmolysis concluding only living cells undergo osmosis.
- This stop the formation of vesicles and transport of proteins and lipids is stopped by the removal of Golgi apparatus.

59. Draw a neat diagram of plant cell and label any three parts which differentiate it from animal cell.



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