पुना International School

Shree Swaminarayan Gurukul, Zundal

SCIENCE -IX

(BIOLOGY)

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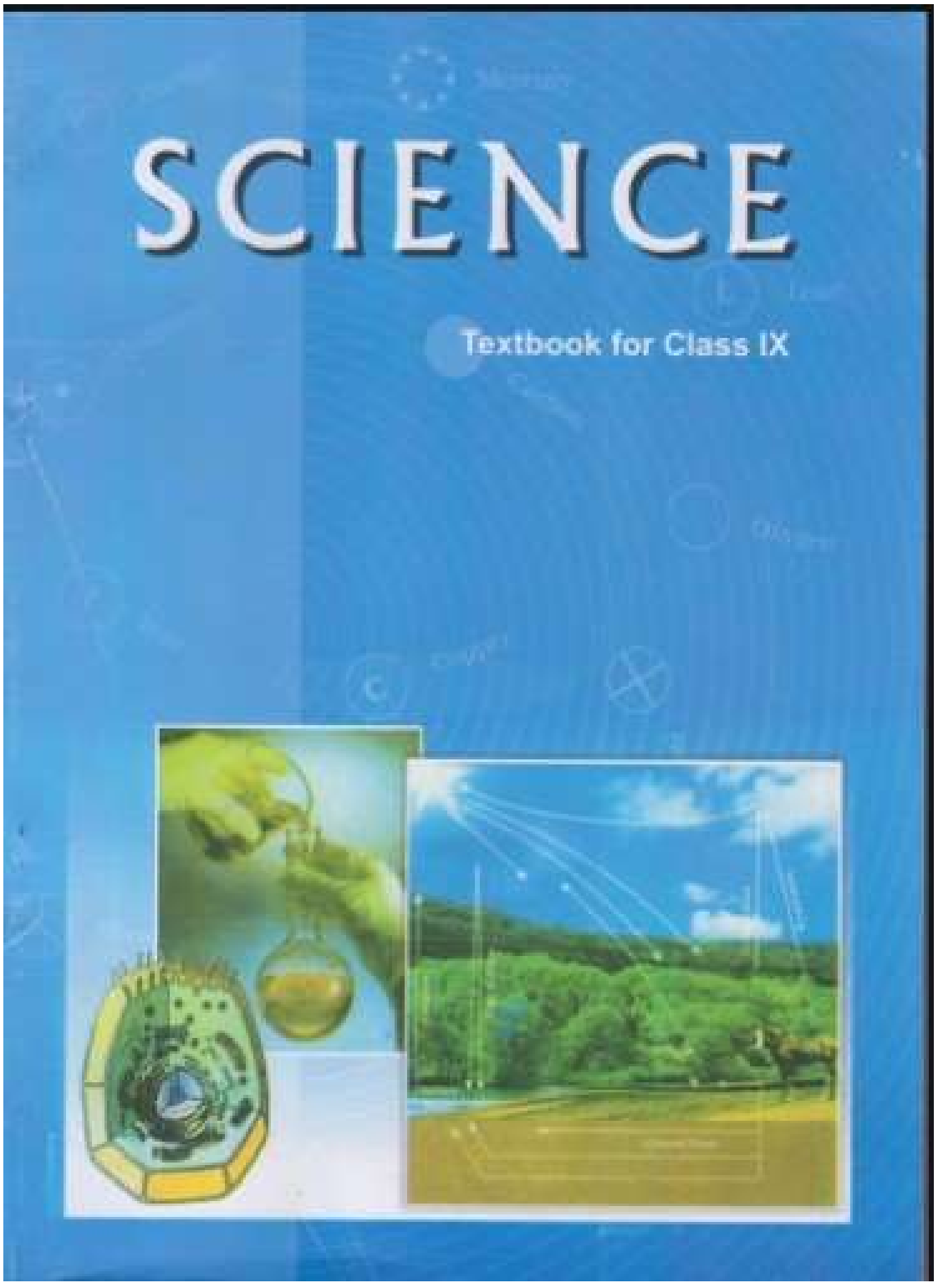
SCIENCE
Textbook for Class IX

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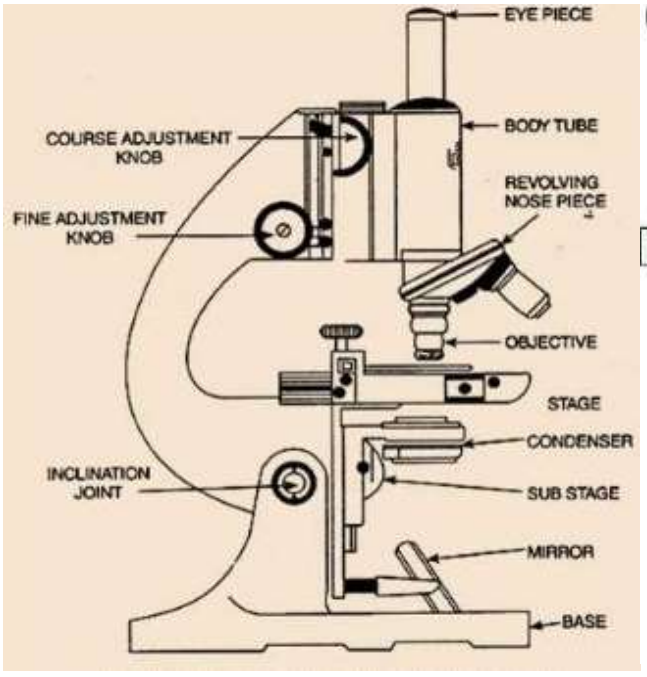

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1. Who discovered cells, and how?

Ans. In 1665, an English scientist named Robert Hooke discovered cells. He examined a thin slice of cork under a self-designed microscope and observed that the cork resembled the structure of a honey comb. Hooke named these tiny compartments as 'cells'.

2. Why is the cell called the structural and functional unit of life ?

Ans. All living organisms are made up of cells so cell is the basic building unit of a living organism and all the activities performed by a living organism are sum total of activities performed by its cells hence cell is called the structural and functional unit of life.

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1. How do substances like CO_2 and water move in and out of the cell? Discuss.

Ans. The exchange of gases (CO_2 and O_2) between cells takes place by diffusion process.

Diffusion is defined as movement of a substance from a region of higher concentration to lower concentration. CO_2 is formed inside cell due to respiration and it accumulates in the cell so its concentration is high in the cell as compared to the surroundings. On the other hand O_2 is utilized inside cell during respiration and therefore its concentration decreases inside the cell while remains comparatively high in the surroundings. s a result CO_2 diffuses out and O_2 diffuses into the cell.

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

Ans. Plasma membrane is a highly specific structure. It is made up of lipids and proteins

which selectively allows the entry of substances into cell and exit of some other substances from the cell i.e. selectively permeable.

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1. Fill in the gaps in the following table illustrating differences between prokaryotic and eukaryotic cells.

Prokaryotic Cell	Eukaryotic Cell
1. Size: generally small (1-10 µm) 1 µm = 10-6 m	1. Size : generally large (5-100 µm)
2. Nuclear region: _____ _____ and known as_____	2. Nuclear region: well defined and surrounded by a nuclear membrane
3. Chromosome: single	3. More than one chromosome
4. Membrane-bound cell organelles Absent.	4. _____, _____

Ans.

(Page No.65)

1. Can you name the two organelles we have studied that contain their own genetic material?

Ans. Chloroplasts and Mitochondria.

2. If the organisation of a cell is destroyed due to some physical or chemical influence, what will happen?

Ans. If the organisation of a cell is destroyed due to some physical or chemical influence then such cell would not survive any more as all components of that cell are digested up by its lysosomes.

3. Why are lysosomes known as suicide bags?

Ans. Lysosomes are cell organelles filled with hydrolytic(digestive) enzymes. When a cell is damaged, its lysosomes may burst out and its enzymes digest up its own cell. Due to this, we can say that lysosomes are suicide bags.

4. Where are proteins synthesised inside the cell?

Ans. Ribosomes are the sites for protein synthesis inside the cell.

(Chapter – end)

1. Make a comparison and write down ways in which plant cells are different from animal cells.

Ans.

Plant cell	Animal cell
1. cell wall is present.	1. cell wall is absent.
2. Plastids are present.	2. Plastids are absent.
3. They have dictyosomes instead of golgi body.	3. They have golgi apparatus.
4. centrosomes and centrioles are absent.	4. centrosomes and centrioles are present.
5. Vacuoles are larger in size.	5. vacuoles are smaller in size.
6. Daughter cells separate from each other due to formation of cell plate.	6. Daughter cells separate from each other due to contrition or furrow formation.

2. How is a prokaryotic cell different from a eukaryotic cell?

Ans.

Prokaryotic cell	Eukaryotic cell
1. Nuclear region is not surrounded by a nuclear membrane.	1. A double layered nuclear envelope is present around the nuclear region.
2. Nucleolus is absent.	2. nucleolus is present.
3. Only one chromosome.	3. more than one chromosomes are present.
4. membrane bound cell organelles are absent.	4. membrane bound cell organelles are present.

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

Ans. The rupture or break down of cell's plasma membrane indicates that cell is damaged and in such condition the lysosomes of the damaged cells may burst and the digestive enzymes present inside those lysosomes would digest their own cell. This will result into death of the cell.

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

Ans. The functions of golgi apparatus includes storage, modification and packaging of products in the vesicles. If there was no golgi apparatus for a cell then all sort of storage, modification, packaging and dispatch of materials within and outside the cell would be impossible.

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

Ans. It is Mitochondria of the cell also known as the power house of the cell because it synthesizes energy in the form of ATP molecules during respiration which is vital for various life activities.

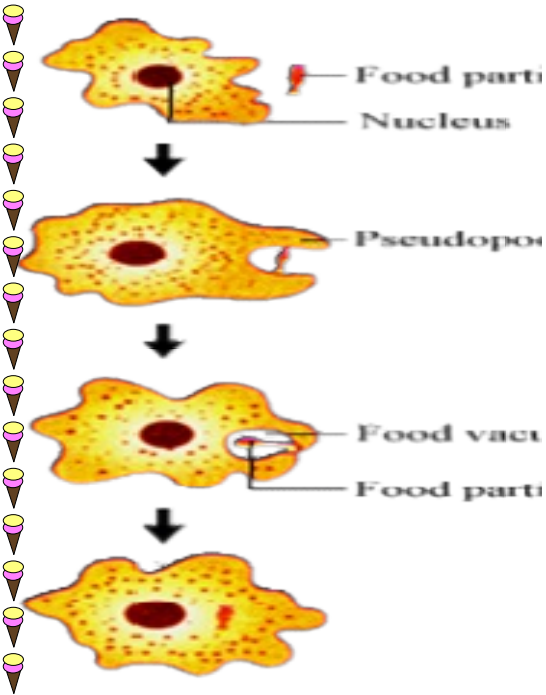
6. Where do the lipids and proteins constituting the cell membrane get synthesised? Ans. The endoplasmic reticulum is of two types:

i) Smooth endoplasmic reticulum (SER): It is responsible for the synthesis of lipids constituting cell membrane.

ii) Rough endoplasmic reticulum (RER) : It bears the ribosomes and is therefore responsible for the synthesis of proteins constituting cell membrane.

7. How does an *Amoeba* obtain its food?

Ans. Amoeba feeds on microorganisms (like planktons) which float on water. It develops false feet or pseudopodia to surround the food. It captures the food within a sac like structure called the food vacuole inside which digestion of food takes place.



8. What is osmosis?

Ans. Osmosis is the movement of water(solvent) from a region of high water concentration through a semipermeable membrane to a region of low concentration of water. It can take place only in liquid medium and not in solid or gases. Example is absorption of water from soil by plant roots.

9. Carry out the following osmosis experiment:

Take four peeled potato halves and scoops each one out to make potato cups. One of

these potato cups should be made from a boiled potato. Put each potato cup in a trough containing water. Now,

(a) Keep cup A empty

(b) Put one teaspoon sugar in cup B

(c) Put one teaspoon salt in cup C

(d) Put one teaspoon sugar in the boiled potato cup D.

Keep these for two hours. Then observe the four potato cups and answer the following: (i) Explain why water gathers in the hollowed portion of B and C.

(ii) Why is potato A necessary for this experiment?

(iii) Explain why water does not gather in the hollowed out portions of A and D.

Ans. i) When we put one teaspoon sugar in cup B and one teaspoon salt in cup C, the hypertonic solution is formed inside so through osmosis, water from outside enters inside and collects in the hollowed portion of cups B & C.

ii) Potato A is necessary to observe osmosis.

iii) In hollowed out portion of A & D there is no solution (liquid medium) present therefore osmosis cannot take place and as a result water does not gather.

Extra Short Answer Questions

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

Ans. Lysosomes are known as 'suicide-bags' because when cell gets damaged during the disturbance in cellular metabolism, lysosomes may burst and the digestive enzymes thus released digest their own cell.

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

Ans. I agree with the statement that "A cell is a building block of an organism". This is true because all 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?

Ans. Soap solution is very concentrated - Hypertonic solution, so water moves out of your finger cells by osmosis.

33. Why is endocytosis found in animals only?

Ans. Cell wall is absent in animals. Due to this, movement of substances inside the cells is easier in animals than in plants. Due to this, endocytosis is found in animals only.

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

Ans. Swallowing a concentration solution of salt results in exosmosis from cells of the alimentary canal. Due to this, dehydration occurs in the person. As a result, the person vomiting.

35. Name any cell organelle which is non membranous.

Ans. Ribosome

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?

Ans. 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?

Ans. Exosmosis

38. If cells of onion peel and RBC are separately kept in hypotonic solution, what 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

. (c) a and b both are correct.

d) RBC and onion peel cells will behave similarly.

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

Ans. Small vesicles which are associated with plasma membrane are present in such bacteria. These vesicles contain pigments which can trap solar energy to produce food.

40. Match the following A and B

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

Ans. a—(iv); b—(v); c—(iii); d—(i); e—(ii).

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

Ans. Flower and Fruit—

Chromoplast Leaves of the

plant—Chloroplast Root of the

plant—Leucoplast

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

(a) Transporting channels of the cell _____

Ans. Endoplasmic reticulum

(b) Power house of the cell ____

Ans. Mitochondria

(c) Packaging and dispatching unit of the cell _____

Ans. Golgi body

d)Digestive bag of the cell _____

Ans. Lysosome

(e) Storage sacs of the cell _____

Ans. Vacuole

(f) Kitchen of the cell _____

Ans. Chloroplast

g)Control room of the cell _____

Ans. Nucleus

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

Ans.

Bacteria Cell	Onion peel cell
(i) Cell wall is made peptidoglycan.	(i) Cell wall is made of cellulose.
(ii) Nucleus is absent	(ii) Nucleus is present.
(iii) Vacuole is absent	(iii) Vacuole is present.
(iv) These are prokaryotes.	(iv) These are eukaryotes.

44. How do substances like carbon dioxide (CO_2) and water (H_2O) move in and out the cell?

Ans. Carbon dioxide moves through diffusion, while water moves through osmosis.

45. How does amoeba obtain its food?

Ans. Amoeba makes pseudopodia to surround a food particle. It then ingest the food particles; along with a drop of water and then forms food vacuole. This process of obtaining food by Amoeba is called endocytosis.

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

Ans. Mitochondria and plastids

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

Ans. Lysosomes contain enzymes which are used for destroying worn out parts of the cell. Lysosomes also destroys waste materials. Due to this, lysosomes are also known as 'scavengers of the cells'.

49. Which kind of plastid is more common in

(a) roots of the plant

Ans. Leucoplast

(b) leaves of the plant

Ans. Chloroplast

(c) flowers and fruits

Ans. Chromoplast

50. Why do plant cells possess large sized vacuole?

Ans. Vacuoles not only store many important substances, they also contain cell sap that give turgidity to cell.

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

Ans. Chromosomes are made up of chromatids and chromatids are made up of chromatin.

Q2. What are the consequences of the following conditions?

(a) A cell containing higher water concentration than the surrounding medium

Ans. Exosmosis

(b) A cell having low water concentration than the surrounding medium.

Ans. Endosmosis

(c) A cell having equal water concentration to its surrounding medium.

Ans. No effect

Lesson 5 The fundamental unit of life

Q 1 Who discovered cell, and how?

Ans: Robert Hooke discovered cells in 1665 while examining **a** thin slice of cork through **a** self-designed microscope. He saw that the cork resembled the structure of a honey comb consisting of many little compartments. Those small boxes are called cells.

Q 2 Why is the cell called the structural and functional unit of life?

Ans A cell is capable of carrying out all necessary activities of life independently. So, they are called functional or basic unit of life.

Q 3 How do substances like CO_2 and water move in and out of the cell?

Ans: CO2 moves by diffusion and H20 move by osmosis through cell membrane.

Q 4 Why is the plasma membrane called a selectively permeable membrane?

Ans : It is so called selectively permeable membrane because it allows only the entry and exit of some substances, not all.

Q 5 Can you name the two organelles we have studied that contain their own genetic material?

Ans: The two organelles which have their own genetic material are:

1. Mitochondria
2. Plastids

Q6 If the organization of a cell is destroyed due to some physical or chemical influence ,what will happen?

Ans : The cell will not be able to revive and lysosomes will digest it.

Q7 Why are lysosomes known as suicide bags?

Ans : When the cell gets damaged, lysosomes may burst, and the

enzymes digest their own cell. Therefore lysosomes are known as suicide bags.

Q8 Where are proteins synthesised inside the cell?
Ans : The proteins are synthesised in the ribosomes that are known as proteins factories

Q9 Write the difference between plants and animals cells.
Q10 Difference between prokaryotic and eukaryotic cell

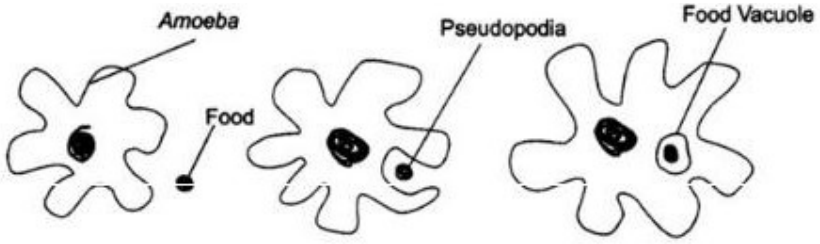
Q11 What would happen if plasma membrane ruptures or breaks ?
Ans: If plasma membrane ruptures or breaks down then molecules or some substances will move freely in and out

Q12 What would happen to the life of a cell if there were no Golgi apparatus?
Golgi apparatus has a function of storage , modification and packing of products in vesicles .If there were no Golgi bodies packaging and despatching of materials synthesised by the cell will be stocked.

Q13 Which organelle is known as the power house of the cell? Why?
Ans: Mitochondria is known as the powerhouse of the cell because it releases energy required for different activities of life

Q14 Where do the lipids and proteins constituting the cell membrane get Synthesised ?
Ans:Lipids and proteins are synthesised in ER

Q15 How does an Amoeba obtain its food ?
Ans : Amoeba takes its food by the cell membrane which forms the food vacuole



Endocytosis in *Amoeba*

Q16 What is an osmosis ?
Ans : Osmosis is the processes of movements of water molecule from a region of higher concentration through a semi permeable membrane to the lower concentration

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

Ans.(c) A Virus

Explanation: Virus does not have a cell; like other options. Virus is composed of nuclear material enclosed in a protein coat. Due to this, it can be into crystal.

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

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

Explanation: If concentration of water molecules in surrounding medium is higher than water molecules concentration in the cell, it will result in movement of water into the cell. This will result in cell getting swelled up.

2. Chromosomes are made up of

(a) DNA

(b) protein

(c) DNA and protein

(d) RNA

Ans.(c) DNA and protein

3. 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)

Ans.(c)(iii) and (iv)

Explanation: Ribosomes are responsible for protein synthesis. Enzymes are composed of protein. Hence, options (iii) and (iv) are incorrect.

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

Ans.(c) It can be the site of energy generation

Explanation: Energy generation is the function of mitochondria.

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

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

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

Ans.(b)shrinkage of cytoplasm in hypertonic medium

Explanation: When a cell is kept in hypertonic solution, it results in exosmosis. Most of the fluid goes out of the cell; resulting in shrinkage of cytoplasm.

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

(a) Mitochondria

(b) Vacuole

(c) Lysosome

(d) Plastid

Ans. (b) and (c) Vacuole and lysosome

Explanation: Other organelles in the options are double – membrane structures.

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

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

Explanation: Golgi apparatus is involved in synthesis and storage of certain biomolecules and has no role to play in the formation of lysosomes.

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

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

Explanation: RES has ribosomes on the surface and ribosomes are responsible for protein synthesis and thus for enzymes synthesis as well. Hence, option 'a' is correct and option 'b' is incorrect. ER has no role to play in destruction of plasma membrane. The undefined nuclear region in prokaryotes is called nucleoid.

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

Ans.(c) Smooth endoplasmic reticulum

Explanation: In the liver cells of vertebrate, SER plays an important role in detoxifying many poisons and drugs.

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

Ans.(a)rough endoplasmic reticulum

Explanation: Endoplasmic reticulum synthesise both lipids and proteins. However, RER mainly synthesise proteins and SER mainly synthesise lipids.

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

(a) nucleus

(b) nucleolus

(c) nucleic acid

(d) nucleoid

Ans.(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

Ans.(d)golgi apparatus

Explanation: Golgi apparatus is involved in repackaging of many biomolecules.

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

Ans.(d) Locomotion

Explanation: Locomotion is carried out by specialized structures which are outside the cell but vacuoles are inside the cell.

16. Amoeba acquires its food through a process, termed

(a) exocytosis

(b) endocytosis

(c) plasmolysis

(d) exocytosis and endocytosis both

Ans.(b)endocytosis

Explanation: The Term endocytosis is composed of two term, i.e. 'endo' means towards inside and 'cytosis' means movement related to cell.

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

(a) Bacteria

(b) Hydrilla

(c) Mango tree

(d) Cactus

Ans.(a) Bacteria

Explanation: Other options show plants in which cell wall is made of cellulose. But cell wall of bacteria is made of peptidoglycan.

18. Silver nitrate solution is used to study

(a) endoplasmic reticulum

(b) golgi apparatus

(c) nucleus

(d) mitochondria

Ans.(b)golgi apparatus

Explanation: Camillo Golgi carried out 'black reaction' which involved use of silver nitrate. This helped him in staining individual nerve and cell structures.

19. Organelle other than nucleus, containing DNA is

(a) endoplasmic reticulum

(b) golgi apparatus

(c) mitochondria

(d) lysosome

Ans.(c)mitochondria

Explanation: Mitochondria and chloroplast contain DNA and hence have capability of replication.

20. Kitchen of the cell is

(a) mitochondria

(b) endoplasmic reticulum

(c) chloroplast

(d) golgi apparatus

Ans.(c)chloroplast

Explanation: Food is produced in plants inside chloroplasts. Hence, chloroplast is called the kitchen of the cell.

21. Lipid molecules in the cell are sythesized by

(a) smooth endoplasmic reticulum

(b) rough endoplasmic reticulum

(c) golgi apparatus

(d) plastids

Ans.(a)smooth endoplasmic reticulum

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

(a) Haeckel

(b) Virchow

(c) Hooke

(d) Schleiden

Ans. (b) Virchow

Explanation: This postulation of Virchow made an addition to the earlier cell theory.

23. Cell theory was given by

(a) Schleiden and Schwann

(b) Virchow

(c) Hooke

(d) Haeckel

Ans.(a) Schleiden and Schwann

Explanation: They 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

Ans.(b)ribosomes

Explanation: Other cell organelles are absent in prokaryotic cells.

25. Organelle without a cell membrane is

(b) golgi apparatus

(c) chloroplast

(d) nucleus

Ans.(a)ribosome

Explanation: Other cell organelles are membrane – bound.

26. 1 µm is

(a) 10^{-6} m

(b) 10^{-9} m

(c) 10^{-10} m

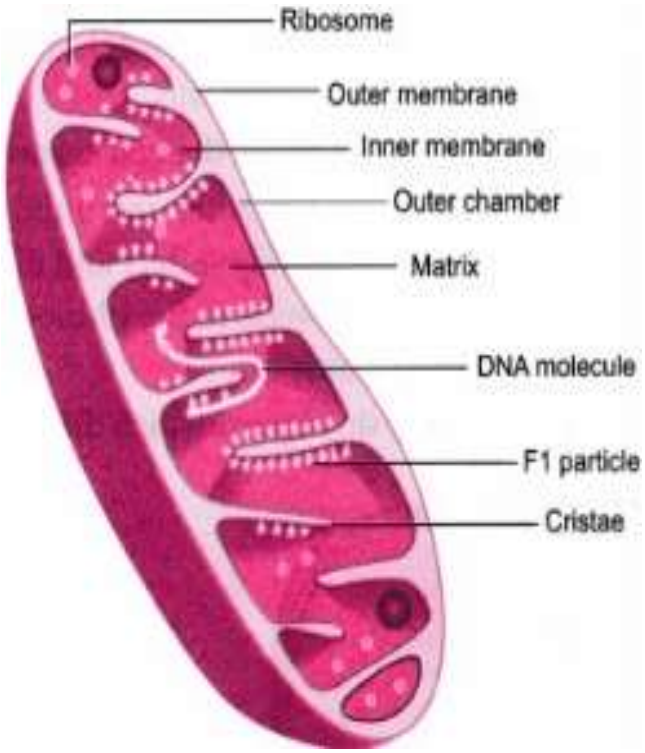
(d) 10^{-3} m

Ans.(a)10^{-6} m

27. Lysosome arises from (a) endoplasmic reticulum (b) golgi apparatus

(c) nucleus

(d) mitochondria



Ans.(b)golgi apparatus

28. Living cells were discovered by

(a) Robert Hooke

(b) Purkinje

d) Robert Brown

Ans.(c) Leeuwenhoek

Explanation: Robert Hooke was the first to observe cells but he observed dead cells of cork. It was Leeuwenhoek who was the first to observe living cells.

29. Select the odd one out

(a) The movement of water across a semipermeable 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

Ans.(d) Plasma membranes contain chitin sugar in plants

Explanation: This is a wrong statement, while others are correct.