THE VILLAGE
INTERNATIONAL SCHOOL
"We Nurture Dreams"

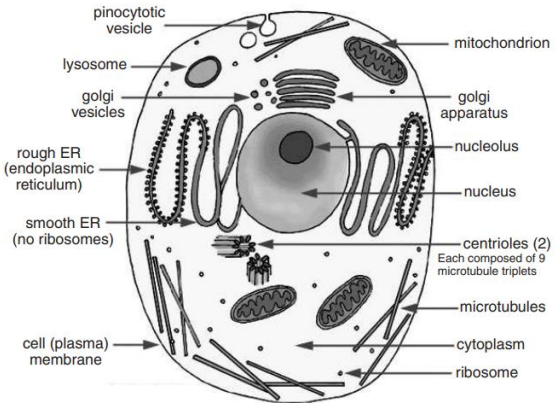
AIM HIGH, TOGETHER WE FLY

GRADE 9 BIOLOGY

CHAPTER 5: THE FUNDAMENTAL UNIT OF LIFE

Question Bank 2

1) Draw a neat diagram of an animal cell and label any four parts of it.



2) (a) Why is the cell called the structural and functional unit of life?
(b) Why is the plasma membrane called a selectively permeable membrane?
(c) Name the factor which decides the movement of water across the plasma membrane.
Ans. (a) Because shape and size of cells are related to specific functions they perform. Cells constitute various components of plants and animals.
(b) Because it permits exit and entry of some selected materials in and out of the cells.
(c) Amount of substance dissolved in water or solute concentration

3) What happens when :
(a) methylene blue stain is added to human cheek cell.
(b) rheo leaves are boiled in water and a drop of sugar added to it.
(c) RBCs are kept in concentrated solution.
Ans. (a) Because of its affinity for DNA and RNA, methylene blue will produce a darker stain leading the DNA in the nucleus to stand out so that nucleus can be clearly seen.
(b) On boiling, all the cells of rheo leaves become dead. On adding sugar syrup nothing will happen as liquid cannot pass through dead cell membrane.
(c) On placing RBCs in concentrated solution, the water will come out and the cell will shrink as the concentration of solution outside is higher than inside the cell. As a result of osmosis, water comes out of the cell to maintain equilibrium.

4) (i) Where are chromosomes present in the cell? What is their chemical composition?
(ii) How many pairs of chromosomes are present in humans?
Ans. (i) Chromosomes are present in the nucleus of a cell. Their chemical composition is of DNA, RNA and proteins.
(ii) Humans have 23 pairs of chromosomes.

5) What is the energy currency of the cell? Write it in expanded from. Which cell organelle is related to the currency?
Ans.ATP is the energy currency of the cell. Its expanded form is Adenosine Triphosphate. Mitochondria.

6) Discuss the role of:

(i) Cellulose in cell wall
(ii) Presence of deeply folded membrane in mitochondria
(iii) Digestive enzymes in lysosomes.
Ans. (i) Cellulose provides rigidity to the plant cell and helps it to withstand in dilute medium.
(ii) Folds in mitochondria increase the surface area to help in ATP generating reactions.
(iii) Digestive enzymes in lysosomes help in removal of viruses, worn out organelles, damaged cell.

7) How are the following related to each other?
(i) Chromatin network and chromosomes
(ii) Chloroplast and chlorophyll
(iii) Genes and DNA.
Ans. (i) On cell division, chromatin network organise themselves into chromosomes.
(ii) Chloroplast is a plastid which contains a green pigment called chlorophyll which is responsible for photosynthesis.
(iii) The segments of DNA are called genes.

8) Define Osmosis. In what two ways it is different from diffusion?
Ans. Osmosis is the process in which there is a movement of solvent (usually water) from a region of high water concentration to a region of low water concentration.

9) Difference between osmosis and diffusion :
Ans. Movement of solvent (usually water) from a

10) region of high water concentration to a region of low water concentration; it takes place through semi-permeable membrane whereas the diffusion does not require any membrane, in osmosis movement of solvent is involved whereas in diffusion movement of solid, liquid and gases are involved.

11) Write one function each of – Ribosomes, Vacuole, Plasma membrane.
Ans. (1) Ribosomes : It helps in protein synthesis
(2) Vacuole : Vacuoles are full of cell sap and provide turgidity and rigidity to the cell in plants.
(3) Plasma membrane : It allows or permits the entry and exit of some materials in and out of the cell. It prevents movement of some other materials not required or harmful for cells.

12) Write two similarities and one dissimilarity between mitochondria and plastid.
Ans. (i) (a) Both are double membrane structures.
b) Both of them have their own genetic material.
(ii) Mitochondria is the site of production of energy whereas plastid is the site of production of food.

13) Division of labour exists even at intra cellular level. Justify the statement.
Ans. Each cell has got certain specific components within it known as cell organelles. Each cell organelle performs a special function. A cell is able to live and perform all its functions perfectly because of these organelles. This is called division of labour. All cells are found to have the same organelles, no matter what their function is or in which organism they are found.

14) Differentiate between rough and smooth endoplasmic reticulum. How is endoplasmic reticulum, important for membrane biogenesis?
Ans. Rough endoplasmic reticulum looks rough under a microscope because it has particles called ribosomes attached to its surface and smooth endoplasmic reticulum do not have ribosomes attached to it.It helps in the manufacture of fat molecules or lipids important for cell function. Some of these proteins and lipids help in the building of cell membrane, the process called membrane biogenesis.

15) Describe the role played by the Lysosomes in a cell. Why these are termed as suicidal bags? How do they perform their function?
Ans. Lysosomes are a kind of waste disposal system of cell. They help to keep the cell clean by digesting any foreign material as well as worn out cell organelles. Foreign material entering the cell such as bacteria or food ends up in lysosomes. During the disturbance in cellular metabolism lysosomes may burst and the enzymes digest their own cell. Therefore, lysosomes are also known as suicidal bags. Lysosomes are able to do this because they contain powerful enzymes capable of breaking down all organic material.

16) Distinguish leucoplast from chromoplast based on one feature. Give an example of chromoplast present in plant cell. What is the function of chromoplast in the plant cell?
Ans. Leucoplasts are colourless plastids. They store starch, oil, proteins. Chromoplasts are coloured plastids. They contain pigments. .e.g. Chloroplasts contain green pigment present in the plant cell. Chromoplasts provide colour to various flowers and fruits.

17) Who gave the term Golgi apparatus? Name one cell organelle that is formed by Golgi apparatus. Write any two functions of Golgi apparatus.
Ans. Camillo Golgi. Lysosomes.
Functions :
(i) Packages and dispatches materials synthesised by ER.
(ii) Complex sugar made from simple sugars.
(iii)Involved in formation of Lysosomes. (any two)

18) Two beakers A and B contain plain water and concentrated sugar solution respectively. Equal number of dry raisins are kept in them for a few hours and then taken out.
(i) Explain the reason for the difference in the physical appearance of raisins which were taken out of the two beakers.
(ii) On the basis of above observation, categorise the two solutions as hypotonic and hypertonic.
Ans. (i) In beaker A, the raisins would swell because ater concentration is higher outside the cell membrane. So more water enters the membrane than leaves it.In beaker B, raisins will shrink because water concentration is less outside the cell membrane. So more water comes out of the membrane than enters.
(ii) A – hypotonic. B – hypertonic.

19) (a) Which cell organelle would you associate with ATP production? How is this organelle able to make its own proteins?
(b) A student performed an experiment by placing the de-shelled egg in a concentrated salt solution for five minutes. What changes did he observe in the egg? Give reason for the same.
Ans. (a) Mitochondria is associated with ATP production. It has own DNA and ribosomes to make proteins.
b) The egg shrinks because water passes out of the egg solution, into the salt solution due to osmosis.

20) State reason for the following :
(a) Mention the use of deep folding in the inner membrane of mitochondria.
(b) Plastids are able to make their own protein.
(c) Plant cells shrink when kept in hypertonic solution.
Ans. (a) These folds create a large surface area for ATP generating chemical reactions.
(b) Because plastids have their own ribosome hence they can form their own proteins.
(c) Plant cells shrink as it loses water by the process of osmosis.

21) Name three types of plastids found in plant cells and give one function of each.
Ans. Chloroplast : involved in the photosynthesis in plants.
Chromoplast : impart attractive colours to flowers and fruits.
Leucoplast : stores starch, oil and protein granules.

22) (a) What is membrane biogenesis?
(b) Explain what happens when a drop of concentrated sugar solution is placed on a rheo leaf peel mounted on a glass slide. Name this phenomenon. Would the same happen if the rheo leaf was boiled before mounting? Give reason for your answer.
Ans. (a) Some of the proteins and lipids manufactured by the RER and SER help in building the cell membrane. This process is known as membrane biogenesis.
(b) There is a shrinkage or contraction of the contents of the cell away from the cell wall. This phenomenon is known as Plasmolysis. No, because dead cells are not able to lose water by osmosis (plasmolysis in this case).

23) Describe the structure of the plant cell.

Ans. A plant cell consists of :

1. Cell wall : The outermost covering made mainly of non-living cellulose which gives distinct shape to the cell. 2. Plasma membrane : It is also called cell membrane. It is a thin, delicate and elastic covering lying inner to the cell wall. It controls the entry and exit of selected molecules and ions, and is selectively permeable.

3. Cytoplasm : It is a viscous, homogeneous colloidal liquid and consists of a number of living and non-living structures. The living structures are the cell organelles and include structures like mitochondria, endoplasmic reticulum, Golgi apparatus, lysosomes, vacuoles etc. Cytoplasm keeps the cell fully expanded and provides turgidity to the cell. Chloroplasts are present only in the cytoplasm of plant cell.

4. Nucleus : It is dense spherical body bounded by a membrane which is called nuclear membrane. A number of thread-like structures called chromosomes with genes on them are embedded within the nuclear sap. The nucleus controls the various metabolic activities of the cell and so is called the control centre of the cell.

24) In the given figure of an animal cell as observed under an electron microscope.

(i) Name the parts labelled as 1 to 10.

(ii) Which parts are concerned with the following functions :

(a) Release of energy,

(b) Protein synthesis

(c) Transmission of hereditary characters from parents to their offsprings.

(iii) Mention any two structures, found only in plant cell not in animal cell.

Ans. (i) 1. Mitochondria, 2. Cytoplasm, 3. Ribosome, 4. Smooth Endoplasmic reticulum, 5. Rough Endoplasmic reticulum, 6. Nucleolus, 7. Nucleoplasm, 8. Nuclear membrane, 9. Centrosome, 10. Golgi apparatus

(ii) (a) Mitochondria, (b) Ribosome, (c) Nucleus,

(iii) 1. Cell wall and 2. Plastids

25) (a) What are the consequences of the following conditions?

(i) A cell having higher water concentration than the surrounding medium.

(ii) A cell having lower water concentration than the surrounding medium.

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

(b) Name the materials of, which the cell membrane and cell wall are composed of.

Ans. (A) (i) When a cell possess higher water concentration than the surrounding medium then exosmosis occurs in the cell due to difference in concentration and cell shrinks.

(ii) When a cell has low water concentration than surrounding medium then endosmosis occurs that results in the swelling of the cell.

(iii)A cell having equal water concentration to its surrounding medium will not show any changes.

(b) Cell wall is composed of cellulose and cell membrane is composed of lipids and proteins.

26) (i) Explain the terms : (a) Endocytosis, (b) Plasmolysis.

(ii) What will happen if the organisation of a cell is damaged due to certain physical or chemical reasons?

(iii) How do substances like CO2 and water move in and out of the cell?

Ans. (i) (a) Endocytosis: The flexibility of the cell membrane enables the cell to engulf food and other materials from its external environment. Such process is known as endocytosis. (b) Plasmolysis: When a living plant cell loses water through osmosis, there is shrinkage or contraction of the contents of the cell away from the cell wall. This phenomenon is known as plasmolysis.

(ii) When the organisation of a cell gets damaged, lysosomes will burst and their enzymes will eat up their own cell organelles. Therefore, lysosomes are also known as the suicidal bags of the cell.

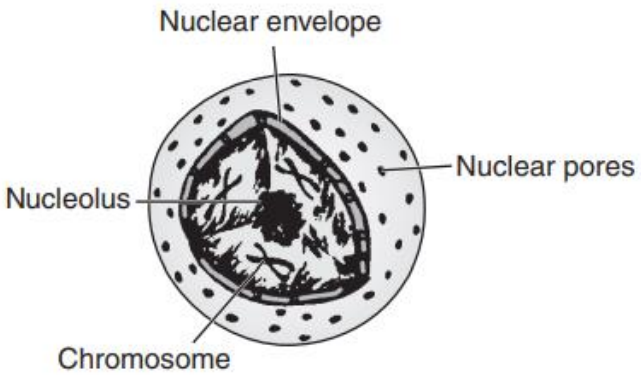
(iii) Gases like CO2 and O2 move in and out of the cell by diffusion from their higher concentration to lower concentration. Water enters the cell by endosmosis through semi-permeable plasma membrane from its higher concentration to lower concentration. Similarly, water moves out of the cell by exosmosis when a cell is placed in a hypertonic solution.

27) (a) What is the name given to the thread shaped structures in the nucleus? Why is it important?

(b) Draw a diagram of the nucleus to show the given parts :(i) nucleolus, (ii) nuclear pore, (iii) nuclear envelope.

Ans. (a) The thread shaped structures in the nucleus are known as chromosomes. These are important because they contain information for inheritance of features from parents to the next generation.

b)



28) (a)What would happen if the plasma membrane ruptures or breaks down?

(b) What would happen to the life of a cell if there were no Golgi apparatus?

Ans. (a) Plasma membrane is the selectively permeable membrane that surrounds the cell and allows the entry and exit of selected materials into and out of the cell. If it ruptures, the contents of the cell will come in direct contact with the surrounding medium and not only unwanted material will be able to enter freely into the cell, but useful material will also find its way out of the cell easily. This will seriously disrupt the various metabolic activities of the cell and will result in its eminent death.

(b) If there were no Golgi apparatus, the material synthesized by Endoplasmic reticulum would not be carried to the various parts inside and outside the cell. Also, as the Golgi apparatus performs the function of storage and modification of the material synthesized in the cell, this material could not be stored and modified further. Moreover, there will be no production of lysosomes which will cause the accumulation

of waste material, viz. worn out and dead cell organelles within the cell which will ultimately lead to cell death.

29) Carry out the following osmosis experiment:

Take four peeled potato halves and scoop 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.

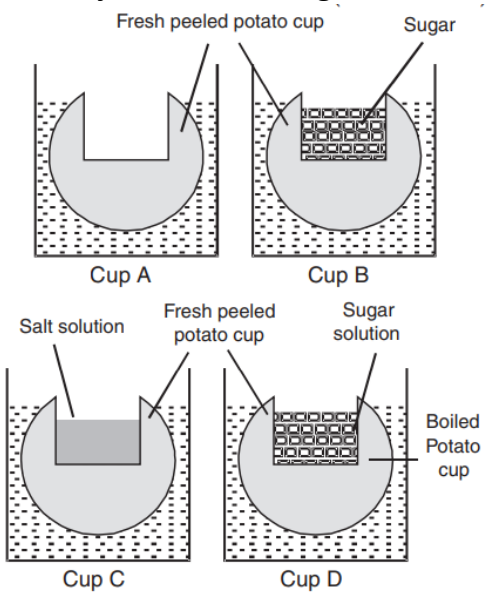
(d) Put one teaspoon sugar in the boiled potato cup D.

Keep this setup 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) Water gathers in the hollowed portion of B and C because of the process of endosmosis (moving in of the solvent). A potato is made up of several cells, and the cell membranes are selectively permeable. As the cups B and C are filled with sugar and salt respectively and their outer part is in contact with the water, the concentration of water outside the cups is higher than inside the cups, so water moves from its higher concentration towards the lower concentration, i.e., inside the cup.

(ii) Potato A acts as a control of the experiment. It is very necessary for comparing the results of the experiment and shows that if the conc. of water is same on both sides, there will be no movement of water.

(iii)Water does not gather in the hollowed-out portions of A as it does not contain hypertonic solution so there is no concentration difference. Water does not gather in the cup D as the cells of boiled potato are dead and hence no osmosis occurs.

30) Ravi's mother was preparing sweets at home. She put some raisins in the water. Ravi saw the raisins and asked his mother that why the raisins had swelled up in water. His mother replied him scientifically and told that this is due to endosmosis.

(i) What is Endosmosis?

(ii) Why is plasma membrane called selectively permeable membrane? (

iii)What values were shown by Ravi?

Ans. (i) Osmosis is the movement of water from the region of its higher concentration (pure water or dilute solution) to the region of its lower concentration, when the two are separated by a semipermeable membrane. When external water enters the cell, it is known as Endosmosis. (ii) Cell membrane is semi

permeable membrane for water, ions, sugar, amino acids etc. These substances pass through the plasma membrane by an active process so it is called selectively permeable. (iii)Ravi showed curiosity and skilfulness towards knowledge.

31) Sheela was washing clothes for a long time. She saw her hands and she found that the skin of her fingers was shrunk. She was amazed to see her hands and was worried.
(i) Why does the skin of Sheela's fingers shrink when she washes clothes for a long time?
(ii) What makes Sheela worried?
Ans. (i) Clothes are washed with soap or detergent solution. This solution is hypertonic as compared to osmotic concentration of our skin cells. The washing solution, therefore, causes exosmosis in the skin cells that come in contact with if for some time. Because of it, the skin over the fingers shrinks while washing clothes for a long time. (ii) Sheela was worried because her fingers had shrunk. But she didn't know that after sometime her fingers will come back to their original shape.

32) Osmosis is the movement of water molecules from solution with lower solute concentration (hypotonic solution) to the solution with higher solute concentration (hypertonic solution) through a selectively permeable membrane. The movement takes place due to the osmotic gradient created by difference in concentration of the solutions on both sides of the membrane and the end result is a state where osmotic equilibrium is reached wherein movement of the fluid ceases.
(a) What is the importance of osmosis in daily life? Give four examples.
(b) Is it useful for plants or not?
Ans. (a) (1) When your hands are immersed in dishwater for a long time, your skin looks bloated. This is an effect of osmosis.
(2) When you pour salt onto a slug, water diffuses and slug shrinks as a result of osmosis.
(3) When you cook food and put sauce in the liquid part of your dish, some part of the solute moves inside the solid part of the food you are cooking. The solid part could be an egg, piece of meat but the sauce is made of solute and not water, so it will move into the food.
(4) Osmosis also plays an important part in the body. It helps in the transfer of water and various nutrients between blood and fluid of cells.
(5) Reverse osmosis is a type of osmosis which is used to convert sewage water into clean drinking water.
(b) Yes, it is useful for plants.

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