CLASS X
BIOLOGY
CHAPTER 13 - LIFE PROCESSES

SOLUTIONS

TEXTUAL QUESTIONS & ANSWERS

Let us answer (Page no. 255)

Q.1. How can we know that something is alive?

Ans: We can know that something is alive on the basis of the unique features such as growth, respiration, reproduction and presence of organized structures such as cells, tissues and organs etc. which are absent in non-living things.

Q.2. In which form the living organisms get energy from outside the body?

Ans: The living organisms get energy in the form of food from outside the body.

Q.3. What are life processes?

Ans: The processes necessary for the maintenance of the functions of the body such as nutrition, respiration, transportation and excretion are called life processes.

Q.4. No specific organ for gaseous exchange is needed in a unicellular organism. Why is it so?

Ans: In a unicellular organism the entire body surface is in contact with the environment, hence there is no specific organ or organ system for taking in food, exchange of gases or removal of wastes.

Let us answer (page no. 260)

Q.1. What are the differences between autotrophic and heterotrophic nutrition?

Ans:

DIFFERENCE	
Autotrophic Nutrition	**Heterotrophic Nutrition**
Autotrophs can manufacture their own food.	Heterotrophs cannot manufacture their own food.
Chlorophyll and light are necessary.	Chlorophyll and light are not necessary.
They use simple inorganic raw materials like CO_2 and H_2O and occur in green plants and some bacteria.	They use readymade organic and inorganic compound and occurs in animals, fungi and some protists.

Q.2. From where plants get raw materials required for photosynthesis?

Ans: Plants obtain raw materials such as carbon dioxide (**CO_2**) from atmosphere through stomata and water **(H_2O)** from soil by roots system. Moreover, chlorophyll present in the green leaves absorb light energy.

Q.3. What are the different types of heterotrophic nutrition?

Ans: The different types of heterotrophic nutrition are:

i) **Holozoic Nutrition**: Mode of nutrition in which organisms ingest complex food material and break down inside the body . e.g. ***Amoeba***, Man, etc.

ii) **Saprozoic Nutrition**: Mode of nutrition in which organisms feed on soluble organic matter in solution. e.g. Roundworms, Flatworms etc.

iii) **Saprophytic Nutrition**: Mode of nutrition in which organism breaks down food materials from decaying organic matter and then absorbs it . e.g. Some bacteria , fungi

iv) **Parasitic Nutrition**: Mode of nutrition in which organisms derive food from another living organism called host. e.g. ***Cuscuta*** (Plant), Ticks, Leeches, etc.

Q.4. Write the role of HCl in our stomach.

Ans: The role of HCl in our stomach:

- It creates an acidic medium which is necessary for activation of the enzyme pepsin.
- Also kills harmful bacteria entering the stomach along with the food.

Let us answer (page no. 264)

Q.1. What advantage does a terrestrial animal get with regard to obtain oxygen during respiration over an aquatic animal?

Ans: Terrestrial animal can get more amount of oxygen without any effort at a time than aquatic animals because the amount of oxygen dissolved in water is less than the amount of oxygen present in atmosphere. Therefore, aquatic animals have higher rate of breathing than terrestrial one in obtaining the same amount of oxygen from environment.

Q.2. How is oxygen and carbon dioxide transported in human beings?

Ans: Oxygen is transported from lungs to different parts of the body combined with haemoglobin inside RBC while carbon dioxide is transported in dissolved form in the plasma.

Q.3. "The human lungs are designed to have maximum surface area for exchange of gases". Explain.

Ans: Inside the lungs the bronchi divide repeatedly into smaller branches called bronchioles which end in tiny alveolar sac having several folds of surface, where the exchange of gases takes place between blood and alveoli. Hence, lungs provide a vast surface area for exchange of gases and the estimated total surface area of alveoli of human lungs is about 80 m^2.

Let us answer (page no. 269)

Q1. Name the components of the transport system in human being. Write the functions of the components.

Ans: The components of transport system in human being are : **heart**, **blood** and **blood vessels** (arteries and veins).

i) **Heart** : supply of oxygenated blood to different parts of the body and removal of waste by maintaining a continuous flow of blood.

ii) **Blood** : transport digested food materials, CO_2, waste, hormones etc. in the body moreover fight infections and also help in clotting of blood.

iii) **Arteries** : carry blood from the heart to different parts of body.

iv) **Veins** : collect blood from different parts of body and bring back to the heart while capillaries help in exchange of material between blood and surrounding cells.

Q.2. What are the advantages of separation of oxygenated and deoxygenated blood in birds and mammals ?

Ans: Birds and mammals constantly use energy to maintain their body temperature where the separation of oxygenated and deoxygenated blood gives efficient supply of oxygen to the cells to generate larger amount of energy to meet their cellular demand.

Q.3. What are the components of the transport system in highly organized plants?

Ans: Transport system of highly organized plants consists of **Xylem** and **Phloem** :

- **Xylem** is used in the transport of water and minerals from soil to the aerial parts of the plant body.
- **Phloem** is used in translocation of food from the leaves to different parts of the plant body or *vice-versa* .

Q.4. How are water and minerals transported in plants?

Ans: Water and minerals are transported from soil to the leaves through xylem. The water conducting components of xylem like tracheids and vessels of the roots, stems and leaves are interconnected to form a continuous system reaching all parts of plants ; water from soil enter the cells of root and from where to the xylem of roots then stem and leaves.

So, there is a steady movement of water into xylem generating root pressure. During day time, the continuous loss of water in the form of vapour from leaves through transpiration create a suction which pull water to the aerial parts while minerals are also transported along with in dissolved form.

Q.5. How is food transported in plants?

Ans: Phloem transports food materials from the leaves to different parts of the plant by utilizing energy from ATP through sieve tubes with the help of companion cells of phloem. The soluble products of photosynthesis like sucrose get transferred into the phloem tissue and increases osmotic pressure causing water to move into it. Thus food is transported from the region of higher pressure to the region of lower pressure along a pressure gradient.

Let us answer (page no. 271)

Q.1. What are the methods used by plants to get rid of excretory products?

Ans. The various methods used by plants to get rid of excretory products are :

i) Plants give out O_2 from photosynthesis and CO_2 from respiration while excess water are released as vapour in day time and as liquid in night.

ii) Excess minerals get stored in the leaves that fall off.

iii) Wastes like resins, tannins, gums are stored in old xylem.

iv) Roots also exude waste materials in the soil.

Q.2. Which organs are responsible for excretion in *Platyhelminthes* and insects?

Ans: Flame cells in *Platyhelminthes* and Malpighian tubules for Insects respectively.

TEXTUAL EXERCISES

Q.1. What is the function of xylem?

Ans: The upward movement of water and dissolved minerals from roots to aerials parts against the gravitational force occurs through xylem besides providing mechanical support.

Q.2. Which part of the alimentary canal absorbs the digested food?

Ans: The villi of small intestine absorbs the digested food.

Q.3. In which part of the cell, the 3-carbon compound pyruvate is broken down to give CO_2, H_2O and energy?

Ans: Inside the mitochondria of the cell.

Q.4. What is the function of kidney?

Ans: The function of kidney is urine formation and removal of metabolic waste.

Q.5. Describe the structure and function of nephrons.

Ans: Nephrons are the structural and functional units of kidneys **(**consisting of two parts : malpighian body and renal tubule).

Structure of Nephron:

Nephrons are the functional units of kidney, each nephron is a highly coiled, closely packed tubule closed at one side and at the other end it has a cup-shaped structure called Bowman's capsule associated with clusters of capillaries called glomerulus. Bowman's capsule leads to tubular part of nephron that finally join collecting duct.

Function of Nephron:

The function of nephron is filtration of blood and elimination of waste from the body. The glomerular pressure causes filtration of blood into its lumen while some useful substances like glucose, amino acids, salts and large amount of water are selectively re-absorbed into the blood as the filtrate passes all along the renal tubule. Finally, the urine produced in each kidney enters urinary bladder by ureter and are released outside through the urethra.

Q.6. **Describe double circulation in human being ?**

Ans : The flow of deoxygenated blood from right ventricle to the lungs and return of oxygenated blood into the left atrium is called pulmonary circulation. Similarly, oxygenated blood from left ventricle passes through the system and deoxygenated blood return into the right atrium. In this way, blood goes through the heart twice during one the one cycle of flow round the body. This is known as **double circulation**.

Q.7. How are the alveoli designed to maximize the exchange of gases?

Ans: Human lungs have a highly branched network of tubes in which trachea divides into two bronchi that enter the lungs and further divide repeatedly into smaller branches called bronchioles. The bronchioles end in tiny sacs called alveoli with several folds of membrane where exchange of gases takes place between blood and alveoli. The walls of alveoli possess a network of capillaries, providing a larger surface area which is estimated about 80 m^2.

Q.8. What is the role of saliva in the digestion of food?

Ans: Saliva breaks down starch (carbohydrates) into sugars with the help of salivary amylase. It also softens the food for easy swallowing .

Q.9. **How does the small intestine designed to absorb digested food?**

Ans: The small intestine has millions of tiny finger-like projections called villi. These villi increase the surface area for more efficient food absorption. The villi are richly supplied with blood vessels that absorb the digested food and carry it to the blood stream.

Q.10. What are the differences between the transport of materials in xylem and phloem?

Ans: The differences between the transport of materials in xylem and phloem are listed below:

DIFFERENCE	
Transport of material in xylem	**Transport of material in phloem**
Xylem is responsible for transport of water and dissolved minerals.	Phloem is responsible for translocation of soluble products of photosynthesis.
It is always from roots to the aerials parts of the plants i.e. unidirectional.	It occurs in upward and downward direction i.e. bidirectional.
ATP is not utilized, driving force is transpiration pull.	ATP is utilized, driving force is pressure gradient.

Q.11. What are the differences between aerobic and anaerobic respiration ? Name some organisms that use the anaerobic mode of respiration.

Ans: The differences between aerobic and anaerobic respiration are given in the table below :

DIFFERENCE	
Aerobic Respiration	**Anaerobic Respiration**
It takes place in the presence of oxygen.	It takes place in the absence of oxygen.
Complete breakdown of food into carbon dioxide and water.	Incomplete breakdown of food into ethanol or lactic acid and carbon dioxide.
It occurs inside the cytoplasm and mitochondria.	It occurs inside the cytoplasm.
Larger amount of energy is liberated.	Smaller amount of energy is liberated.
Examples – Many Plants and Animals (eukaryotes)	Examples – Yeast and some Bacteria (prokaryotes), in human muscle cells (eukaryotes)

Q.12. What are the necessary conditions for autotrophic nutrition?

Ans: The necessary conditions are:

i) Presence of sunlight as a source of energy and chlorophyll to trap the light energy.

iii) Carbon dioxide and water as the raw material for the process.

Q.13. What would be the consequences of a deficiency of haemoglobin in our bodies ?

Ans: The consequences will be reduced amount of oxygen reaching different cells of our body leading to **anaemia** associated with breathlessness, tiredness or weakness (which are common symptoms of anaemia).

Q.14. Compare the alveoli in the lungs and nephrons in the kidneys with respect to their structure and function.

Ans: Comparison between alveoli and nephrons are given in the tables below:

Alveoli	Nephrons
Structure : ▪ Structural and functional unit of lungs. ▪ Tiny Sac like structure present in lungs.	**Structure :** ▪ Structural and functional unit of Kidneys. ▪ Tubular and highly coiled structures.
Function : ▪ Alveoli are the site of exchange of gases. ▪ Facilitates supply of O_2 and removes CO_2 from the blood .	**Function :** ▪ Filtration of blood to form urine. ▪ Facilitates removal nitrogenous waste from the blood.

Q.15. Draw and label the sectional view of the human heart.

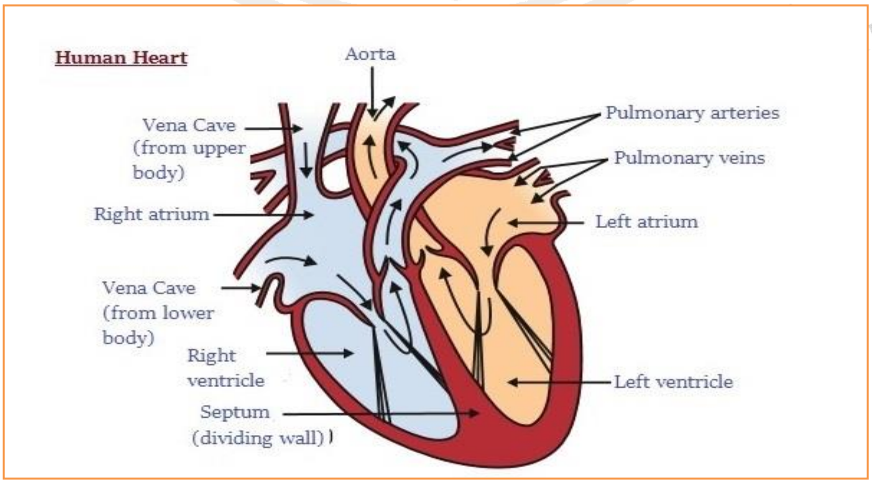

Fig: A Sectional View of Human Heart

QUESTIONS & ANSWERS

Q.1. Give two significances of transpiration.

Ans. It provides cooling effects to the leaves.

It creates transpiration pull for upward transport of water in plants.

Q. 2. What is excretion? Why is excretion considered as an essential process of life?

Ans: The process of elimination of metabolic waste is called excretion.

It is an essential life process because accumulation of metabolic waste beyond a limit is harmful to the organism and need to be removed.

Q. 3. Describe the process of opening and closing of stomata.

Ans: The opening and closing of stomata is brought about by the changes in the shape of the guard cells ; the stomata remain open when the guard cell swell due to the absorption of water and closed when the guard cell shrink.

Q.4. Why do the arteries have thicker walls than the veins?

Ans: Arteries have thicker walls than the veins in order to carry blood emerging under high pressure from the heart to various organs. While veins collect the blood from different organs and bring it back to the heart which is not under pressure.

Q.5. What is photolysis of water?

Ans. **Photolysis** is the process of splitting of water molecule into hydrogen and oxygen under the influence of sunlight.

Q.6. Write the three main events occurred during photosynthesis.

Ans. The three events are :

- Chlorophyll of the plant traps the light energy.
- Conversion of light energy into chemical energy and splitting of water molecules into hydrogen and evolution of oxygen.
- Reduction of carbon-dioxide to carbohydrates.

Q.7. How are fats digested in our bodies? Where does this process take place in?

Ans. **Bile** breakdown larger fat globules into smaller globules and this is known as emulsification. The pancreatic enzyme **lipase** can only digest emulsified fats into fatty acids and glycerol which are subsequently absorbed .The process occur in intestine.

Q.8. Illustrate the function of capillaries.

Ans. Capillaries are one-celled thickness and arranged in such a way that each and every cell is in contact with blood so that exchange of materials between the blood and surrounding cells takes place across them efficiently.

Q.9. Illustrate the major differences between arteries and veins by giving three points.

Ans.

DIFFERENCE	
Arteries	**Veins**
Carry blood from heart to different parts of the body.	Carry blood from different parts of the body towards the heart.
Arteries are thick walled.	Veins are thin walled.
They lack valves.	They possess valves.

Q.10. Give any two point of difference between Trypsin and Pepsin.

Ans. The two point of differences are given below :

Trypsin	**Pepsin**
Trypsin is a protein digesting enzyme present in pancreatic juice.	Pepsin is a protein digesting enzyme present in gastric juice.
It is secreted by pancreas and acts in alkaline medium.	It is secreted by gastric glands and acts in acidic medium.

Q.11. Discuss in brief the functioning of human heart.

Ans. Human heart is a muscular pumping organ as big as our fist. It has complete four separate chambers, two thin-walled atria and two thick-walled ventricles. There is filling of oxygenated blood from lungs into left atrium and deoxygenated blood from different parts of the body into right atrium. Both the atria contract and blood enter their corresponding ventricles ; Left ventricles pump blood to various organs while right ventricles pump blood to lungs for oxygenation. Thus blood passes through the heart twice during each cycle and this is known as **double circulation**.