Chapter – 6

Life Processes

NCERT Back Exercises:

Ques 1: The kidneys in human beings are a part of the system for

(i) Nutrition.

(ii) Respiration.

(iii) Excretion.

(iv) Transportation.

Ans 1: (iii) In human beings, the kidneys are a part of the system for excretion.

Ques 2: The xylem in plants are responsible for

(i) Transport of water.

(ii) Transport of food.

(iii) Transport of amino acids.

(iv) Transport of oxygen.

Ans 2: (i) In a plant, the xylem is responsible for transport of water.

Ques 3: The autotrophic mode of nutrition requires

(i) Carbon dioxide and water.

(ii) Chlorophyll.

(iii) Sunlight.

(iv) All of the above.

Ans 3: (iv) The autotrophic mode of nutrition requires carbon dioxide, water, chlorophyll and sunlight.

Ques 4: The breakdown of pyruvate to give carbon dioxide, water and energy takes place in

(i) Cytoplasm.

(ii) Mitochondria.

(iii) Chloroplast.

(iv) Nucleus.

Ans 4: (ii) The breakdown of pyruvate to give carbon dioxide, water and energy takes place in mitochondria.

Ques 5: How are fats digested in our bodies? Where does this process take place?

Ans 5: Fats are present in the form of large globules in the small intestine. The small intestine gets the secretions in the form of bile juice and pancreatic juice respectively from the liver and the pancreas. The bile salts (from the liver) break down the large fat globules into smaller globules so that the pancreatic enzymes can easily act on them. This is referred to as *emulsification* of fats. It takes place in the small intestine.

Ques 6: What is the role of saliva in the digestion of food?

Ans 6: Saliva is secreted by the salivary glands, located under the tongue. It makes the food soft for easy swallowing. It contains a digestive enzyme called salivary amylase, which breaks down starch into sugar.

Ques 7: What are the necessary conditions for autotrophic nutrition and what are its by- products?

Ans 7: Autotrophic nutrition takes place through the process of photosynthesis. Carbon dioxide, water, chlorophyll pigment, and sunlight are the necessary conditions required for autotrophic nutrition. Carbohydrates (food) and O_2 are the by- products of photosynthesis.

$$6CO_2 + 6H_2O \xrightarrow{Chlorophyll\ \&\ Sunlight} C_6H_{12}O_6 + 6O_2$$

Ques 8: What are the differences between aerobic and anaerobic respiration? Name some organisms that use the anaerobic mode of respiration.

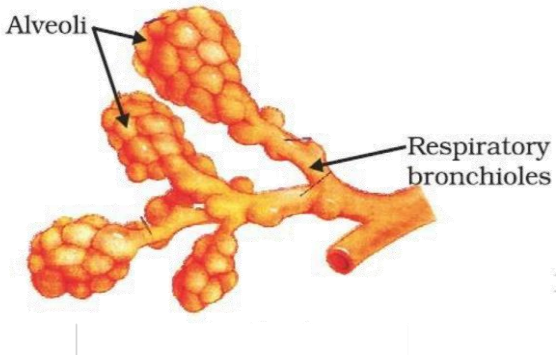
Ans 8: Difference between Aerobic respiration and Anaerobic respiration:

	Aerobic respiration		*Anaerobic respiration*
1.	It occurs in the presence of O_2.	1.	It occurs in the absence of O_2
2.	It involves the exchange of gases between the organism and the outside environment.	2.	Exchange of gases is absent.
3.	It occurs in cytoplasm and mitochondria.	3.	It occurs only in cytoplasm.
4.	It always releases CO_2 and H_2O.	4.	It produces alcohols and CO_2.
5.	It yields large amount of energy.	5.	Energy released is very low.

Anaerobic respiration occurs in the roots of some waterlogged plants, some parasitic worms, animal muscles and some micro-organisms such as yeasts.

Ques 9: How are the alveoli designed to maximise the exchange of gases?

Ans 9: The alveoli are the small balloon-like structures present in the lungs. The walls of the alveoli consist of extensive network of blood vessels. Each lung contains 300−350 million alveoli, making it a total of approximately 700 million in both the lungs. The alveolar surface when spread out covers about 80 m^2 area. This large surface area makes the gaseous exchange more efficient.



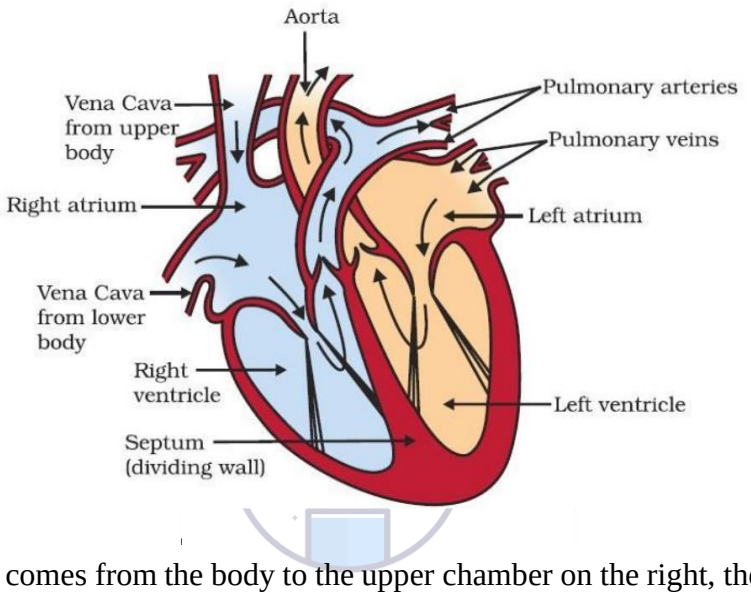
Ques 10: What would be the consequences of a deficiency of hemoglobin in our bodies?

Ans 10: Hemoglobin is the respiratory pigment that transports oxygen to the body cells for cellular respiration. Therefore, deficiency of haemoglobin in blood can affect the oxygen supplying capacity of blood. This can lead to deficiency of oxygen in the body cells. It can also lead to a disease called anaemia.

Ques 11: Describe double circulation in human beings. Why is it necessary?

Ans 11: Because both oxygen and carbon dioxide have to be transported by the blood, the heart has different chambers to prevent the oxygen-rich blood from mixing with the blood containing carbon dioxide. The human heart is divided into four chambers − the right atrium, the right ventricle, the left atrium and the left ventricle.

Oxygen-rich blood from the lungs comes to the thin-walled upper chamber of the heart on the left, the left atrium. The left atrium relaxes when it is collecting this blood. It then contracts, while the next chamber, the left ventricle, expands, so that the blood is transferred to it. When the muscular left ventricle contracts in its turn, the blood is pumped out to the body.



De-oxygenated blood comes from the body to the upper chamber on the right, the right atrium, as it expands. As the right atrium contracts, the corresponding lower chamber, the right ventricle, dilates. This transfers blood to the right ventricle, which in turn pumps it to the lungs for oxygenation.

During this process blood goes twice through the heart. That's why it is known as double circulation.

Double Circulation is necessary:

The separation of oxygenated and de-oxygenated blood allows a more efficient supply of oxygen to the body cells. This efficient system of oxygen supply is very useful in warm-blooded animals such as human beings. As we know, warm- blooded animals have to maintain a constant body temperature by cooling themselves when they are in a hotter environment and by warming their bodies when they are in a cooler environment. Hence, they require more O_2 for more respiration so that they can produce more energy to maintain their body temperature.

Thus, the circulatory system of humans is more efficient because of the double circulatory heart.

Ques 12: What are the differences between the transport of materials in xylem and phloem?

Ans 12: Difference between Xylem and Phloem:

	Xylem	Phloem
1.	Xylem tissue helps in the transport of water and minerals.	Phloem tissue helps in the transport of food.
2.	Water is transported upwards from roots to all other plant parts.	Food is transported in both upward and downward directions.
3.	Transport in xylem occurs with the help of simple physical forces such as transpiration pull.	Transport of food in phloem requires energy in the form of ATP.

Ques 13: Compare the functioning of alveoli in the lungs and nephrons in the kidneys with respect to their structure and functioning.

Ans 13:

	Alveoli	Nephron
1.	Alveoli are tiny balloon- like structures present inside the lungs.	Nephrons are tubular structures present inside the kidneys.
2.	The walls of the alveoli are one cell thick and it contains an extensive network of blood capillaries.	Nephrons are made of glomerulus, bowman's capsule, and a long renal tube. It also contains a cluster of thin walled capillaries.
3.	The exchange of O_2 and CO_2 takes place between the blood of the capillaries that surround the alveoli and the gases present inthe alveoli. Alveoli are the site of gaseous exchange.	The blood enters the kidneys through the renal artery which branches into many capillaries in the glomerulus. The water and solute are transferred to the nephron at Bowman's capsule. Then the filtrate moves through the proximal tubule, distal tubule and collecting duct. The collecting duct collects the urine from many nephrons and passes it to the ureter. During the flow of filtrate, some substances such as glucose, amino acids, and water are selectively reabsorbed. Nephrons are the basic filtration unit.

Chapter – 6

Life Processes

Intext Questions:

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Ques 1: Why is diffusion insufficient to meet the oxygen requirements of multicellular organisms like humans?

Ans 1: In multi-cellular organisms, all the cells may not be in direct contact with the surrounding environment. Thus, simple diffusion will not meet the requirements of all the cells.

Ques 2: What criteria do we use to decide whether something is alive?

Ans 2: Any visible movement such as walking, breathing, or growing is generally used to decide whether something is alive or not. However, a living organism can also have movements, which are not visible to the naked eye. Therefore, the presence of molecular movement inside the organisms used to decide whether something is alive or not.

Ques 3: What are outside raw materials used for by an organism?

Ans 3: An organism uses outside raw materials mostly in the form of food (Since life on earth depends on carbon based molecules, most of these food sources are also carbon-based) and oxygen. The raw materials required by an organism can be quite varied depending on the complexity of the organism and its environment.

Ques 4: What processes would you consider essential for maintaining life?

Ans 4: Life processes such as nutrition, respiration, transportation, excretion, etc. are essential for maintaining life.

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Ques 1: What are the differences between autotrophic nutrition and heterotrophic nutrition?

Ans 1:

	Autotrophic nutrition	Heterotrophic nutrition
1.	Food is synthesized from simple inorganic raw materials such as CO_2 and water.	Food is obtained directly or indirectly from autotrophs. This food is broken down with the help of enzymes.
2.	Presence of green pigment (Chlorophyll) is necessary.	No pigment is required in this type of nutrition.
3.	Food is generally prepared during day time.	Food can be prepared at all times.
4.	All green plants and some bacteria have this type of nutrition.	All animals and fungi have this type of nutrition.

Ques 2: Where do plants get each of the raw materials required for photosynthesis?

Ans 2: The following raw materials are required for photosynthesis:

(i) The raw material CO_2 enters from the atmosphere through stomata.

(ii) Water is absorbed from the soil by the plant roots.

(iii) Sunlight, an important component to manufacture food, is absorbed by the chlorophyll and other green parts of the plants.

Ques 3: What is the role of the acid in our stomach?

Ans 3: Role of the acid (HCl) in our stomach:

(i) Kills germs present in the food.

(ii) Makes the food acidic, so that pepsin can digest protein.

Ques 4: What is the function of digestive enzymes?

Ans 4: Digestive enzymes such as amylase, lipase, pepsin, trypsin, etc. help in the breaking down of complex food particles into simple ones. These simple particles can be easily absorbed by the blood and thus transported to all the cells of the body.

Ques 5: How is the small intestine designed to absorb digested food?

Ans 5: The small intestine has millions of tiny finger-like projections called villi. These villi increase the surface area for food absorption. Within these villi, many blood vessels are present that absorb the digested food and carry it to the blood stream. From the blood stream, the absorbed food is delivered to each and every cell of the body.

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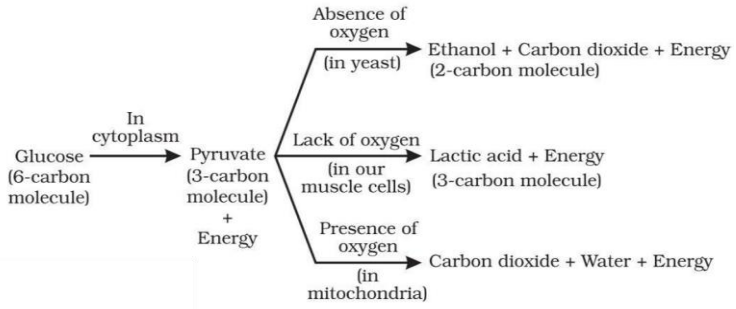
Ques 1: What advantage over an aquatic organism does a terrestrial organism have with regard to obtaining oxygen for respiration?

Ans 1: Since the amount of dissolved oxygen is fairly low compared to the amount of oxygen in the air, the rate of breathing in aquatic organisms is much faster than that seen in terrestrial organisms. Therefore, unlike aquatic animals, terrestrial animals do not have to show various adaptations for better gaseous exchange.

Ques 2: What are the different ways in which glucose is oxidised to provide energy in various organisms?

Ans 2: Glucose is first broken down in the cell cytoplasm into a three carbon molecule called pyruvate. Pyruvate is further broken down in the following ways to provide energy:



Ques 3: How is oxygen and carbon dioxide transported in human beings?

Ans 3: Haemoglobin transports oxygen molecule to all the body cells for cellular respiration. The haemoglobin pigment present in the blood gets attached to O_2 molecules that are obtained from breathing. It thus forms oxyhaemoglobin and the blood becomes oxygenated. This oxygenated blood is then distributed to all the body cells by the heart. After giving away O_2 to the body cells, blood takes CO_2 which is the end product of cellular respiration. Now the blood becomes de-oxygenated.
Since haemoglobin pigment has less affinity for CO_2, CO_2 is mainly transported in the dissolved form. This de-oxygenated blood gives CO_2 to lung alveoli and takes O_2 in return.

Ques 4: How are the lungs designed in human beings to maximise the area for exchange of gases?

Ans 4: The exchange of gases takes place between the blood capillaries that surround the alveoli and the gases present in the alveoli. Thus, alveoli are the site for exchange of gases. The lungs get filled up with air during the process of inhalation as ribs are lifted up and diaphragm is flattened. The air that is rushed inside the lungs fills the numerous alveoli present in the lungs. Each lung contains 300-350 million alveoli. These numerous alveoli increase the surface area for gaseous exchange making the process of respiration more efficient.

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Ques 1: What are the components of the transport system in human beings? What are the functions of these components?

Ans 1: The main components of the transport system in human beings are the heart, blood, and blood vessels.

(i) ***Heart*** pumps oxygenated blood throughout the body. It receives deoxygenated blood from the various body parts and sends this impure blood to the lungs for oxygenation.

(ii) ***Blood*** is a fluid connective tissue, it helps in the transport of oxygen, nutrients, CO_2, and nitrogenous wastes.

(iii)***Blood vessels*** (arteries, veins, and capillaries) carry blood either away from the heart to various organs or from various organs back to the heart.

Ques 2: Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?

Ans 2: Warm-blooded animals such as birds and mammals maintain a constant body temperature by cooling themselves when they are in a hotter environment and by warming their bodies when they are in a cooler environment. Hence, these animals require more oxygen (O_2) for more cellular respiration so that they can produce more energy to maintain their body temperature.
Thus, it is necessary for them to separate oxygenated and de-oxygenated blood, so that their circulatory system is more efficient and can maintain their constant body temperature.

Ques 3: What are the components of the transport system in highly organised plants?

Ans 3: In highly organised plants, there are two different types of conducting tissues − *xylem* and *phloem*.

(i) ***Xylem*** conducts water and minerals obtained from the soil (via roots) to the rest of the plant.

(ii) ***Phloem*** transports amino acids and food materials from the leaves to different parts of the plant body.

Ques 4: How are water and minerals transported in plants?

Ans 4: The components of xylem tissue (tracheids and vessels) of roots, stems and leaves are interconnected to form a continuous system of water – conducting channels that reaches all parts of the plant. Transpiration creates a suction pressure, as a result of which water is forced into the xylem cells of the roots. Then there is a steady movement of water from the root xylem to all the plant parts through the interconnected water – conducting channels.

Ques 5: How is food transported in plants?

Ans 5: Phloem transports food materials from the leaves to different parts of the plant body. The transportation of food in phloem is achieved by utilizing energy from ATP. As a result of this, the osmotic pressure in the tissue increases causing water to move into it. This pressure moves the material in the phloem to the tissues which have less pressure. This is helpful in moving materials according to the needs of the plant. For example, the food material, such as sucrose, is transported into the phloem tissue using ATP energy.

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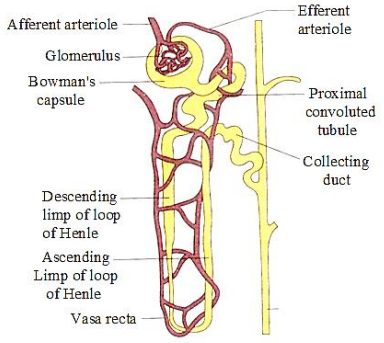
Ques 1: Describe the structure and functioning of nephrons.

Ans 1: Nephrons are the basic filtering units of kidneys. Each kidney possesses large number of nephrons, approximately 1-1.5 million. The main components of the nephron are glomerulus, Bowman's capsule, and a long renal tubule.



Functioning of a nephron:

(i) The blood enters the kidney through the renal artery, which branches into many capillaries associated with glomerulus.

(ii) The water and solute are transferred to the nephron at Bowman's capsule.

(iii) In the proximal tubule, some substances such as amino acids, glucose, and salts are selectively reabsorbed and unwanted molecules are added in the urine.

(iv) The filtrate then moves down into the loop of Henle, where more water is absorbed.

(v) From here, the filtrate moves upwards into the distal tubule and finally to the collecting duct. Collecting duct collects urine from many nephrons.

(vi) The urine formed in each kidney enters a long tube called ureter. From ureter, it gets transported to the urinary bladder and then into the urethra.

Ques 2: What are the methods used by plants to get rid of excretory products?

Ans 2: Plants use completely different strategies for excretion than those of animals. They can get rid of excess water by transpiration. For other wastes, plants use the fact that many of their tissues consist of dead cells, and that they can even lose some parts such as leaves. Many plant waste products are stored in cellular vacuoles. Waste products may be stored in leaves that fall off. Other waste products are stored as resins and gums, especially in old xylem. Plants also excrete some waste substances into the soil around them.

Ques 3: How is the amount of urine produced regulated?

Ans 3: The amount of urine produced depends on the amount of excess water and dissolved wastes present in the body. Some other factors such as habitat of an organism and hormone such as Antidiuretic hormone (ADH) also regulates the amount of urine produced.