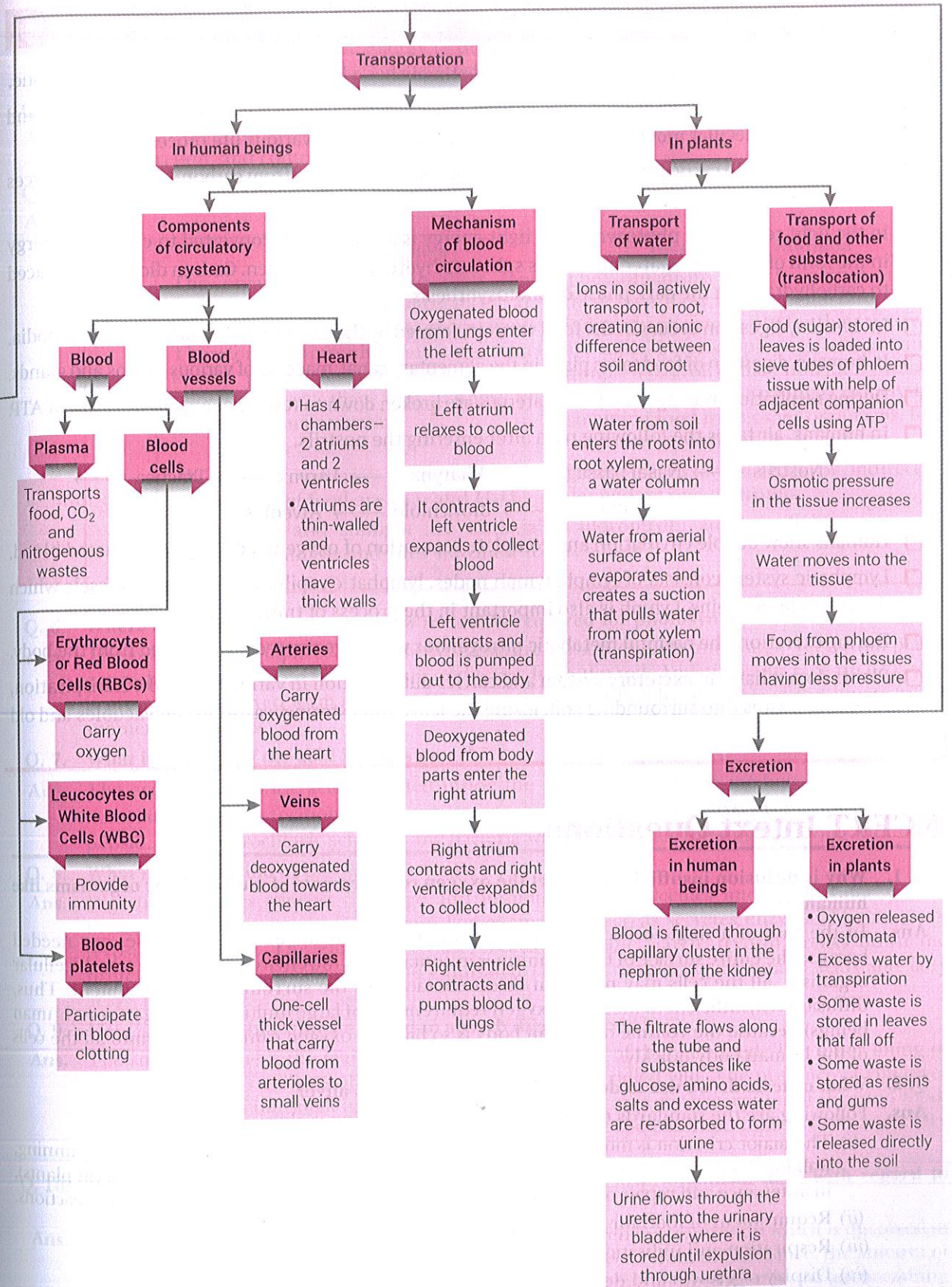
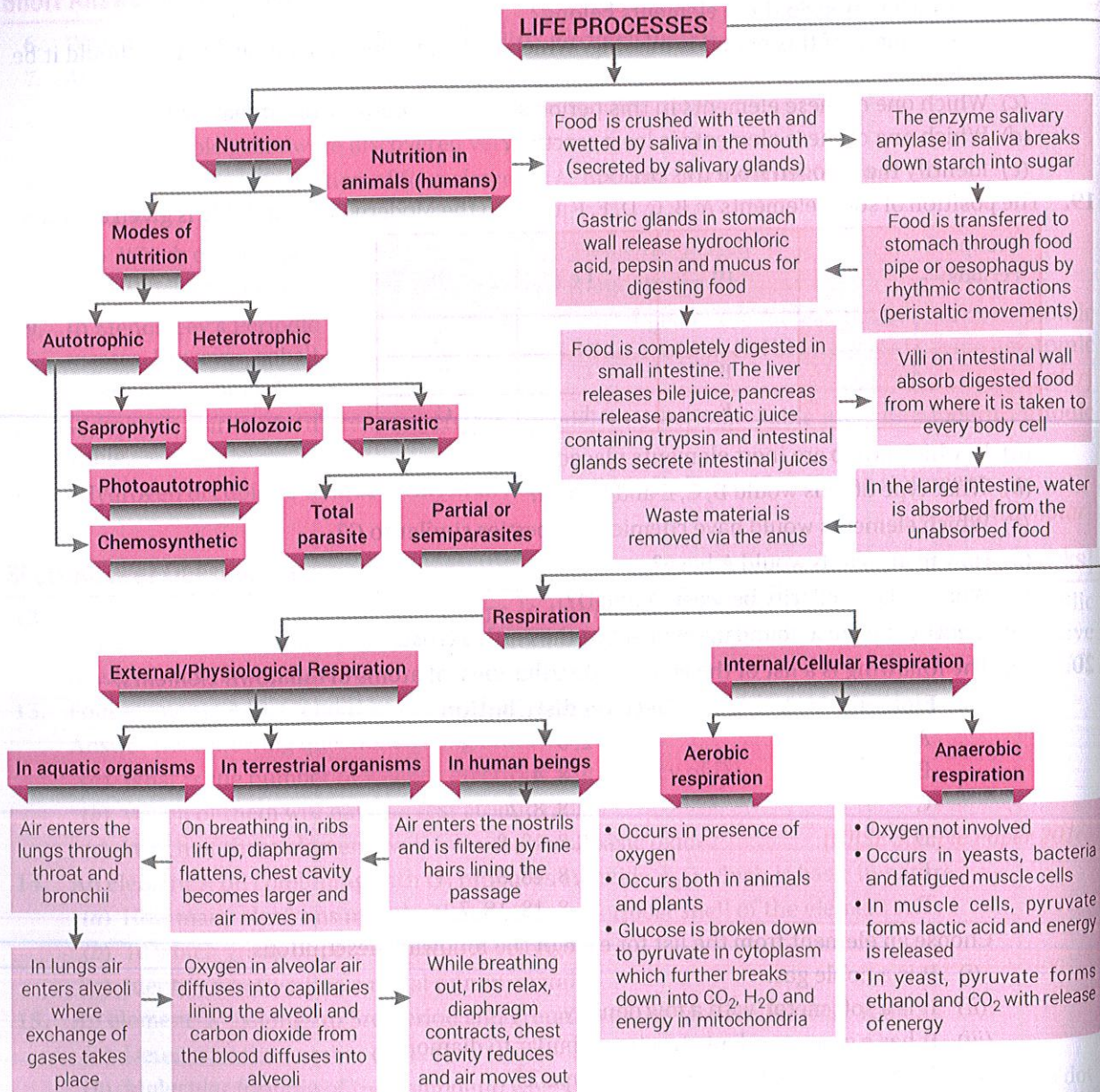


BASIC CONCEPTS – A FLOW CHART



MORE POINTS TO REMEMBER

- ❑ The ability to perform the basic life processes distinguishes a living organism from a non-living one.
- ❑ Life processes are the vital processes carried out by living organisms in order to maintain and sustain life. Molecular movements are essential to carry out the various life processes.
- ❑ Energy required to carry out the different life processes, is obtained from carbon-based food sources through nutrition.
- ❑ In the light reaction of photosynthesis, light energy is absorbed and converted to chemical energy in the form of ATP. Also water molecules split into hydrogen and oxygen. Carbon dioxide is reduced to carbohydrates in the dark phase of photosynthesis.
- ❑ In *Amoeba*, digestion occurs in the food vacuole, formed by the engulfing of food by its pseudopodia.
- ❑ In humans, digestion of food takes place in the alimentary canal, made up of various organs and glands.
- ❑ During respiration, the digested food materials are broken down to release energy in the form of ATP.
- ❑ In humans, air takes the following path after entering the nostrils.
 Nostrils → Nasal passage → Pharynx → Larynx → Trachea →
 Bronchus → Bronchiole → Alveolus
- ❑ Humans show double circulation and complete separation of oxygenated and deoxygenated blood.
- ❑ Lymphatic system consists of lymph, lymph nodes, lymphatic capillaries and lymph vessels which drain into larger veins. Lymph is also important in the process of transportation.
- ❑ During excretion, the harmful metabolic nitrogenous wastes generated are removed from the body.
- ❑ Plants do not have an excretory system and carries out excretion in various ways like transpiration, releasing wastes into surrounding soil, losing the leaves and storing wastes in cell vacuoles and old xylem.

NCERT Intext Questions

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

Ans. In the case of a single-celled organism, no specific organs for exchange of gases are needed because the entire surface of the organism is in contact with the environment. But in multicellular organism, all the cells may not be in direct contact with the surrounding environment. Thus, diffusion is insufficient to meet the oxygen requirements of large multicellular organisms (human beings) because the volume of human body is so big that oxygen cannot diffuse into all the cells of the human body quickly.

Q. 2. What criteria do we use to decide whether something is alive?

Ans. Following are the standards that decide whether something is alive:

- (i) The major criterion is movement. Movement may be incurred through locomotion (running, walking, etc.), action of body parts (*e.g.*, chewing of cud by cow), breathing, growth (in plants), maintenance and repair of cellular structures and molecular movement in metabolic reactions.
- (ii) Requirement of food for performing life processes.
- (iii) Respiration and utilisation of the inhaled oxygen for oxidation of food.
- (iv) Display of growth and development.
- (v) Expulsion of metabolic wastes (Excretion).

Q. 3. What are outside raw materials used for by an organism?

Ans. Outside raw materials provide energy to organisms to maintain their body processes. They are needed to prevent damage and break-down in the body.

Q. 4. What processes would you consider essential for maintaining life?

Ans. The important processes essential for maintaining life are: nutrition, respiration, transportation and excretion, and control and coordination.

Q. 5. What are the differences between autotrophic nutrition and heterotrophic nutrition?

Ans.

| S.No. | Autotrophic Nutrition | Heterotrophic Nutrition |
|-------|--|---|
| 1. | The organisms that make their food from simple inorganic substances are called autotrophs, <i>e.g.</i> , most green plants. Therefore, autotrophic nutrition refers to the process of nourishing, namely photosynthesis, that they adopt for growth and maintenance. | The organisms which cannot make their own food and depend directly or indirectly on autotrophs for their survival are called heterotrophs, <i>e.g.</i> , animals and fungi. Heterotrophic nutrition refers to the process of nourishing, namely by obtaining food from other organisms, for their own growth and maintenance. |
| 2. | The raw materials required for preparation of food are CO ₂ and H ₂ O. | Heterotrophs are directly or indirectly dependent on autotrophs. |
| 3. | Chlorophyll and sunlight are essential for photosynthesis and thus nutrition to occur. | Chlorophyll and sunlight are not required. |

Q. 6. Where do plants get each of the raw materials required for photosynthesis?

Ans. The raw materials required for photosynthesis are carbon dioxide and water. Terrestrial plants get carbon dioxide from environment and water from the soil. Aquatic plants take up CO₂ that is present in dissolved form in water. Water is simply absorbed by the parts of the aquatic plant submerged in water.

Q. 7. What is the role of the acid in our stomach?

Ans. The acid (hydrochloric acid) secreted inside the stomach makes the medium acidic which is necessary for the activation of the enzyme pepsin. It converts inactive propepsin into active pepsin. Also, hydrochloric acid kills any bacteria which may enter the stomach along with food.

Q. 8. What is the function of digestive enzymes?

Ans. Digestive enzymes convert the large and insoluble food molecules into small water soluble molecules in the process of digestion. For example, pancreas secretes enzymes like amylase, trypsin and lipase. The enzyme amylase breaks down the starch, trypsin breaks down the proteins and lipase breaks down the emulsified fats into simple sugars, amino acids and fatty acids, respectively.

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

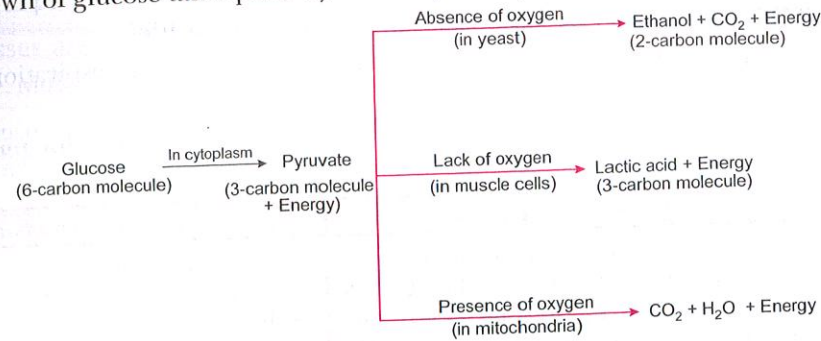
Ans. The small intestine is the main region for the absorption of digested food. The inner lining of small intestine has millions of tiny finger-like projections called villi. The presence of villi gives the inner walls of the small intestine a very large surface area for absorption of digested food. The villi are richly supplied with blood vessels which take the absorbed food to each and every cell of the body.

Q. 10. What advantage over an aquatic organism does a terrestrial organism have with regard to obtaining oxygen for respiration?

Ans. The organism that lives in water such as a fish obtains oxygen for respiration which is dissolved in water whereas the terrestrial organisms take in oxygen directly from the air. Since, the amount of oxygen dissolved in water is fairly low as compared to the amount of oxygen in the air, breathing rate in aquatic organisms is much faster than terrestrial organisms.

Q. 11. What are the different ways in which glucose is oxidised to provide energy in various organisms?

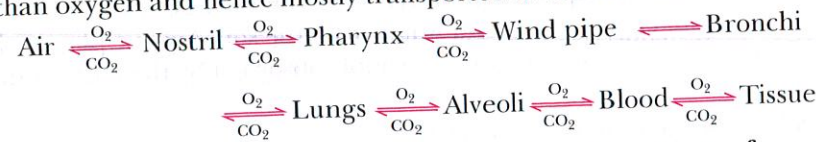
Ans. Breakdown of glucose takes place by various pathways as given below:



Q. 12. How is oxygen and carbon dioxide transported in human beings?

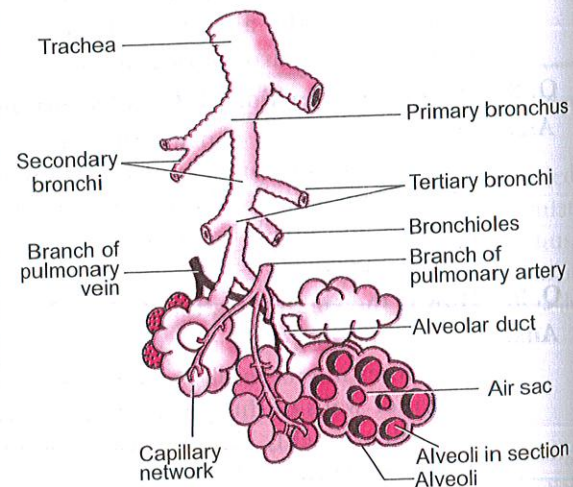
Ans. During inhalation, oxygen comes into alveoli of the lungs. The alveoli is surrounded by very thin blood vessels called capillaries. So, the oxygen diffuses out from the alveoli walls to the blood in capillaries. The oxygen is carried by blood to all the parts of body by binding it with haemoglobin present in blood.

The blood passes through the tissues of the body and the oxygen present in it diffuses into the cells (due to its higher concentration in the blood). This oxygen combines with the digested food present in the cells to release energy. Carbon dioxide is produced as a waste product during respiration in the cells of the body tissues. This CO_2 diffuses into the blood (due to its higher concentration in body tissues). Blood carries CO_2 back to the lungs where it diffuses into its alveoli, then into the trachea, nostrils and then out of the body into air. CO_2 is more soluble in water than oxygen and hence mostly transported in the dissolved form in our blood.



Q. 13. How are the lungs designed in human beings to maximise the area for exchange of gases?

Ans. Lungs are two soft spongy structures lodged in the thoracic cavity. Each lung is enclosed in a double-walled sac called pleura. In the lungs, the air passage (wind pipe) divides into smaller tubes, called bronchi which in turn form bronchioles. The bronchioles later terminate in balloon-like structures, called alveoli. The presence of alveoli in the lungs provides a very large area for the exchange of gases and this availability of large surface area maximises the exchange of gases. The alveoli have very thin walls and contain an extensive network of blood vessels to facilitate exchange of gases.



Alveoli and associated capillaries in the lung

Q. 14. What are the components of the transport system in human beings? What are the functions of these components?

Ans. Transport system in human beings consists of heart, blood and blood vessels.

- (i) **Heart:** The muscular organ which pumps and receives the blood.
- (ii) **Blood:** It is a fluid connective tissue. It consists of plasma, RBC, WBC and blood platelets.

Plasma transports food, CO_2 as nitrogenous wastes in dissolved form. RBCs transport respiratory gases and hormones. WBCs protect the body from infections and platelets prevent the loss of blood at the time of injury by forming blood clots.

(iii) **Vessels:** They are subdivided into:

- (a) **Arteries:** Carries blood from heart to different body parts.
- (b) **Veins:** Transport blood towards heart from various body parts.
- (c) **Capillaries:** Site of exchange of materials between blood and living cells through tissue fluid.

Q. 15. Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?

Ans. Mammals and birds are warm-blooded animals. They constantly use energy to maintain their body temperature. They have higher energy needs and so they require more oxygen to produce energy. Thus, it is important that their oxygenated blood does not get mixed up with deoxygenated blood.

Q. 16. What are the components of the transport system in highly organised plants?

Ans. The components of the transport system of highly organised plants consist of xylem and phloem. Xylem consists of tracheids, vessels, xylem parenchyma and xylem fibres. Phloem consists of sieve tubes, companion cells, phloem fibres and phloem parenchyma.

Q. 17. How are water and minerals transported in plants?

Ans. In xylem tissue, vessels and tracheids of the roots, stem and leaves are interconnected to form a continuous system of water-conducting channels reaching all parts of the plant. The root hairs are directly in contact with the film of water in between the soil particles. Water gets into the root hairs by the process of diffusion. At the roots, cells in contact with the soil actively take up ions. This creates a difference in concentration of these ions between the root and the soil. Water, therefore, moves into the root from the soil. Hence, there is steady movement of water into root xylem, creating a column of water that is steadily pushed upwards. Also, water is lost from the aerial parts of plant (transpiration). Evaporation of water molecules from the cells of the leaf creates a suction which pulls water from the xylem cell of roots (the transpiration pull).

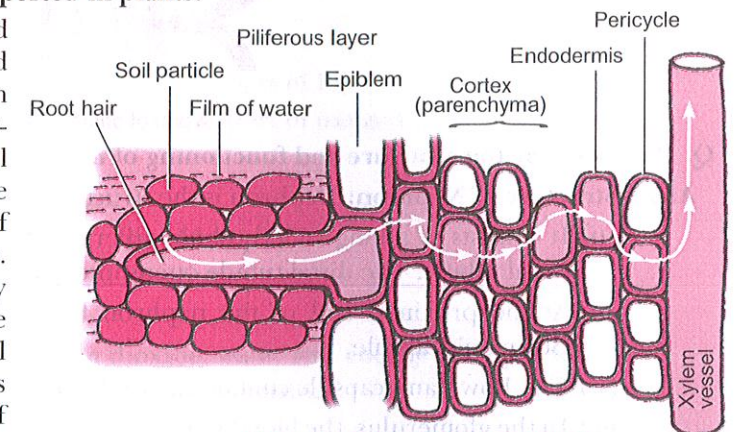
Thus, transpiration helps in the absorption and upward movement of water and minerals dissolved in it from roots to the leaves.

Q. 18. How is food transported in plants?

Ans. The food manufactured by the leaves of a plant is transported to its other parts through a kind of tube system called phloem. The transport of food from the leaves to other parts of the plant is called translocation. The movement of material through phloem depends on the action of living cells called sieve tubes.

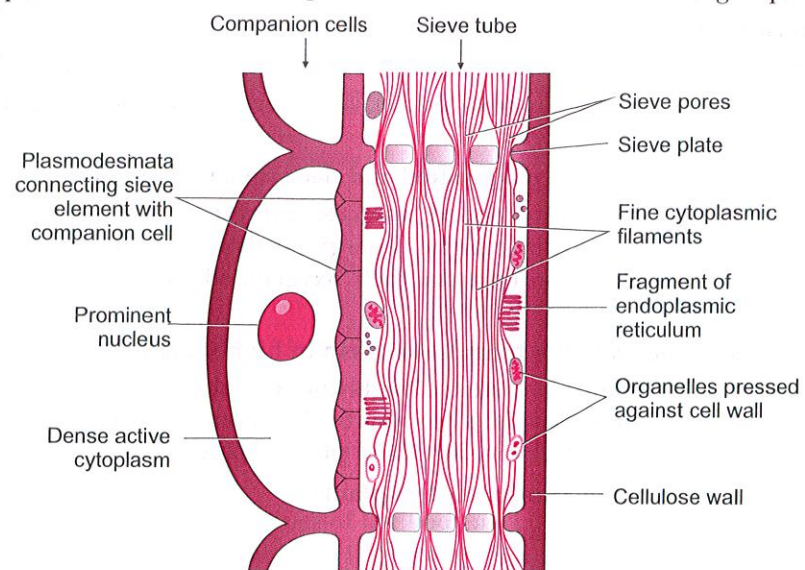
Food molecules enter the phloem elements or cells from mesophyll cells of the leaf. Once they enter phloem, they can be transported upwards or downwards to all parts of a plant, including roots.

This food is transported to different parts of plant in the form of solution through sieve tubes. The end walls of sieve tubes are connected with each other by perforated sieve plates, forming a continuous passage from root tips to stem tips through which dissolved food substances move freely.



Absorption of water through root hair

The translocation in phloem is achieved by utilising energy. Material like sucrose is transferred into phloem tissue using energy from ATP. This increases the osmotic pressure of the tissue causing water to move into it. This pressure moves the material in the phloem to tissues which have less pressure. This allows the phloem to move material according to plant's needs.



A part of phloem tissue

Q. 19. Describe the structure and functioning of nephrons.

Ans. Structure of Nephron: Nephron is the structural and functional unit of kidney.

- It consists of a long coiled tubule differentiated into proximal tubule, Loop of Henle and distal tubule. The distal tubule opens into the collecting tubule.
- At the proximal end of the nephron lies a double-walled cup-shaped structure called Bowman's capsule.
- The Bowman's capsule contains a bundle of blood capillaries which is called glomerulus.
- In the glomerulus, the blood that comes in through afferent arteriole is drained out through efferent arteriole.

Functions of Nephron:

- Filtration:** Filtration of blood takes place in Bowman's capsule from the capillaries of glomerulus. This takes place under high pressure. The filtrate passes into the tubular part of the nephron. This filtrate contains glucose, amino acids, urea, uric acid, salts and major amount of water.
- Reabsorption:** As the filtrate flows along the tubule useful substances such as glucose, amino acids, salts and water are selectively reabsorbed into the blood by capillaries surrounding the nephron tubule.
- Tubular secretion:** Certain substances which are harmful and not needed by the body like ammonia, potassium, creatinine and hydrogen ions are secreted from the capillary blood into the lumen of distal tubule. This is called tubular secretion.

The fluid entering the collecting tubule is called urine. It flows through the ureters into urinary bladder, where it is stored and discharged from time to time through urethra.

Q. 20. What are the methods used by plants to get rid of excretory products?

Ans. To get rid of excretory products, plants use the following ways:

- The plants get rid of gaseous waste products through stomata on leaves and lenticels in stems.

- The plants get rid of stored solid and liquid wastes by shedding of leaves, peeling of bark and felling of fruits.
- The plants also secrete wastes in the form of gums and resins.
- Some waste substances are excreted through roots into the soil around them.
- Excess of water is eliminated by the process of transpiration.
- In living cells, many cytoplasmic wastes are shifted to cellular vacuoles.

Q. 21. How is the amount of urine produced regulated?

Ans. The amount of urine produced depends on how much of excess water is there in the body, and on how much of dissolved waste is there to be excreted. More water and dissolved waste in the body will produce more urine and on the other hand, less water and less dissolved waste will therefore, produce less urine.

NCERT Exercises

Q. 1. The kidneys in human beings are a part of the system for

- nutrition
- respiration
- excretion
- transportation

Ans. (a)

Q. 2. The xylem in plants are responsible for

- transport of water
- transport of food
- transport of amino acids
- transport of oxygen

Ans. (a)

Q. 3. The autotrophic mode of nutrition requires

- carbon dioxide and water
- chlorophyll
- sunlight
- all of the above

Ans. (d)

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

- cytoplasm
- mitochondria
- chloroplast
- nucleus

Ans. (b)

Q. 5. How are fats digested in our bodies? Where does this process take place?

Ans. The small intestine is the site of the complete digestion of fats. The food coming from the stomach is acidic and has to be made alkaline for the pancreatic enzymes to act. It is made alkaline by bile juice secreted by the liver. The upper part of small intestine, also called duodenum, receives bile juice from the liver and the enzyme lipase from pancreas. Bile salts break them down into smaller globules thereby increasing the efficiency of enzyme action and lipase breaks down the emulsified fats. The wall of the small intestine contain glands which secrete intestinal juice. The enzymes present in it finally convert the fats into fatty acids and glycerol. These are absorbed by villi and passed to every cell for obtaining energy.

Q. 6. What is the role of saliva in the digestion of food?

Ans. Saliva contains an enzyme called salivary amylase which digests the starch (complex molecule) present in food into sugar (maltose).

Q. 7. What are the necessary conditions for autotrophic nutrition and what are its byproducts?

Ans. The conditions necessary for autotrophic nutrition are sunlight, chlorophyll, carbon dioxide and water.

The byproducts of autotrophic nutrition are water and oxygen.

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

OR

How does aerobic respiration differ from anaerobic respiration?

[NCERT Exemplar]

Ans.

| S.No. | Aerobic Respiration | Anaerobic Respiration |
|-------|---|--|
| 1. | Aerobic respiration takes place in the presence of oxygen. | Anaerobic respiration takes place in the absence of oxygen. |
| 2. | Complete break down of food occurs in it. | The end products may be ethyl alcohol and carbon dioxide or lactic acid. |
| 3. | The end products are carbon dioxide (CO ₂) and water (H ₂ O). | The end products may be ethyl alcohol and carbon dioxide or lactic acid. |
| 4. | It produces a considerable amount of energy, due to complete oxidation of food molecules. | Much less energy is produced, due to incomplete oxidation of food. |

Organisms that use the anaerobic mode of respiration are yeast, some bacteria and some parasitic worms.

Q. 9. How are the alveoli designed to maximise the exchange of gases?

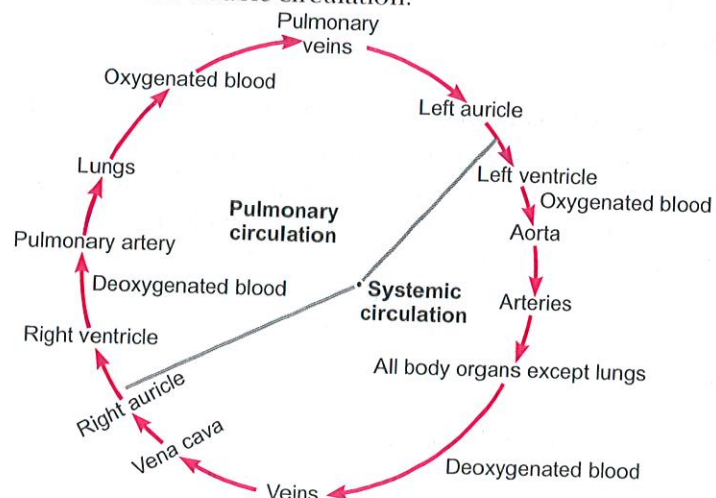
Ans. Alveoli are small pouches or sac-like structure. They are surrounded by blood capillaries. More than millions of alveoli are present in the lungs. The presence of millions of alveoli in the lungs provides a very large surface area for the exchange of gases. When we breathe in, the alveoli expand and maximise the exchange of gases.

Q. 10. What would be the consequence of a deficiency of haemoglobin in our body?

Ans. The deficiency of haemoglobin in our body is called anaemia. In anaemia, the blood is unable to carry the sufficient amount of oxygen required by the body. So, respiration would be less and less energy will be available to the body. The haemoglobin deficient person will feel weak, pale, lethargic and will be unable to perform heavy physical work.

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

Ans. The blood passes through the heart twice through separate pathways for completing one cycle. This type of circulation is called double circulation.



The double circulation of blood includes:

(i) Systemic circulation (ii) Pulmonary circulations.

(i) **Systemic circulation:** It supplies oxygenated blood from left auricle to left ventricle, which is pumped to aorta to distribute blood to various body parts. The deoxygenated blood is collected from the various body organs by the veins to pour into vena cava and finally into the right atrium (auricle). Right atrium transfers this blood into the right ventricle.

(ii) **Pulmonary circulation:** The deoxygenated blood is pushed by the right ventricle into the lungs for oxygenation through pulmonary artery. The oxygenated blood is brought back to left atrium of the human heart through pulmonary vein. From left atrium, the oxygenated blood is pushed into the left ventricle. The left ventricle pumps oxygenated blood into aorta for systemic circulation.

Necessity of double circulation: In humans, having four-chambered heart (which consists of two auricles and two ventricles) the left side and right side of heart are completely separated to prevent the oxygenated blood from mixing with deoxygenated blood. Such a separation allows a highly efficient supply of oxygen to the body cells which is necessary for producing a lot of energy. This energy is useful in case of human beings that have high energy need because they constantly require energy to maintain their body temperature.

Q. 12. What are the differences between the transport of materials in xylem and phloem?

Ans.

| S.No. | Transport in Xylem | Transport in Phloem |
|-------|--|---|
| 1. | It transports water and minerals. | It transports organic nutrients. |
| 2. | The movement is generally unidirectional. | The movement is multidirectional. |
| 3. | It is not influenced by metabolic inhibitors. | Phloem transport is inhibited by metabolic inhibitors. |
| 4. | It is carried out by xylem vessels and tracheids. | Takes place in sieve tubes with the help of adjacent companion cells. |
| 5. | Major operating forces are diffusion and transpiration pull. | Energy (ATP) is required for translocation. |

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

Ans.

| S.No. | Alveoli | Nephron |
|-------|--|---|
| 1. | Its structure is that of a pouch-like air sac. | They are elongated tubules. |
| 2. | The walls of alveoli are very thin. | Each nephron has two components—Bowman's capsule and tubules. |
| 3. | Alveoli's are surrounded by the thin blood capillaries. | Blood capillaries form two patches—glomerulus and peritubular capillaries. |
| 4. | The presence of millions of alveoli in the lungs provides a very large surface area for the exchange of gases between blood and inhaled air. | The function of tubular part of nephron is to allow the selective reabsorption of the useful substances into the blood capillaries. |

VERY SHORT ANSWER QUESTIONS

[1 mark]

Q. 1. Why is energy required by an organism even during sleep?

Ans. This is because even when an organism is asleep, various biological processes keep on occurring in its body which requires energy.

Q. 2. Give the energy transformation that takes place in the process of photosynthesis.

Ans. Solar energy is converted into chemical energy during photosynthesis.

Q. 3. What is chlorophyll?

Ans. Chlorophyll is a green coloured pigment found in the green leaves or green parts of the plant which traps solar energy for photosynthesis. Chlorophyll is present in cell organelles called chloroplasts.

Q. 4. Name the various factors which affect the rate of photosynthesis.

Ans. The factors which affect the rate of photosynthesis are light, water, temperature and carbon dioxide.

Q. 5. Define photolysis.

Ans. The phenomenon of breaking down of water molecule using solar energy absorbed by chlorophyll molecules is known as photolysis.

Q. 6. Define light reaction.

Ans. A chemical reaction, which take place only in the presence of light, is called light reaction or light dependent reaction. It takes place in grana of chloroplast.

Q. 7. Define dark reaction.

Ans. A chemical reaction, which can take place even in the absence of light, is called a dark reaction or light independent reaction. It takes place in stroma of chloroplast.

Q. 8. What are peristaltic movements?

Ans. The contraction and expansion movements of the walls of food pipe are called peristaltic movements. This movement pushes the food in forward direction in the alimentary canal.

Q. 9. Which is the largest gland in the human body?

Ans. Liver

Q. 10. Give an example of an organism whose digestion is intracellular.

Ans. *Amoeba*

Q. 11. Name the various cells through which water moves upward to reach the leaves.

Ans. Water absorbed by root hairs moves through epidermis → root cortex → endodermis → root xylem (*i.e.*, tracheids and vessels) → stem xylem → xylem in the leaf.

Q. 12. What will happen to a plant if its xylem is removed?

[CBSE Delhi 2009]

Ans. The xylem tissue transports water and minerals from the soil to the leaves of a plant for photosynthesis. If xylem is removed, upward movement of water will stop leading to wilting of leaves and ultimately causes death of a plant.

Q. 13. In which chamber of heart is oxygenated and deoxygenated blood found?

Ans. Oxygenated blood: It is found in left auricle and left ventricle.

Deoxygenated blood: It is found in right auricle and right ventricle.

Q. 14. What makes red blood corpuscles red?

Ans. Haemoglobin

Q. 15. What will happen if platelets were absent in the blood?

[NCERT Exemplar]

Ans. In the absence of platelets, the process of clotting will be affected.

Q. 16. What is the main function of kidneys in humans?

Ans. Kidneys excrete water and dissolve metabolic wastes, *e.g.*, urea and other dissolved solids like uric acid, creatinine and inorganic salts.

Q. 17. In which part of nephron is water reabsorbed?

Ans. Proximal and distal convoluted tubules.

Q. 18. In which region of kidney Malpighian corpuscles are found?

Ans. In the outer part *i.e.*, cortex of kidney.

Q. 19. What process in plants is known as transpiration?

Ans. The release of water vapours in the atmosphere through the pores present on plant leaves, *i.e.*, stomata, is called transpiration.

Q. 20. What is urethra?

Ans. It is a muscular tube through which the collected urine passes into the urinary bladder.

Q. 21. Which is the major nitrogenous waste product in human beings? How is it removed from the body?

Ans. The major nitrogenous waste product in human beings is urea. Urea is removed/ eliminated from the body through urine.

Q. 22. Name the membrane covering the lungs.

Ans. Pleura

Q. 23. What is osmoregulation?

Ans. Osmoregulation is the maintenance of optimum concentration of water and salts in the body fluids.

Q. 24. In which form

(i) oxygen is carried to the tissues?

(ii) CO₂ moves out of the blood?

Ans. (i) Oxyhaemoglobin

(ii) Carboxyhaemoglobin and as carbonic acid (CO₂ dissolved in blood plasma).

Q. 25. Why do the walls of trachea not collapse when there is less air in it?

Ans. Tracheal walls do not collapse when there is less air in it because it is supported by rings of cartilage.

Q. 26. Which part of root is involved in the exchange of respiratory gases in plants?

Ans. Root hairs are involved in the exchange of respiratory gases in plants.

Q. 27. Name two organisms in which food material is broken down outside the body and absorbed.

Ans. Yeast, mushroom.

Q. 28. What prevents backflow of blood inside the heart during contraction?

Ans. Valves in heart prevent backflow of blood inside the heart during contraction.

Q. 29. Which is the first enzyme to mix with food in the digestive system?

Ans. Salivary amylase

Q. 30. Why does lack of oxygen in muscles often lead to cramps among cricketers?

Ans. This is due to the conversion of pyruvate to lactic acid in the absence of oxygen.

Q. 31. Where is pyruvic acid converted into lactic acid during deficiency of oxygen in tissues of human beings?

Ans. Golgi body

Q. 32. Where does the oxygen come from when it is liberated during photosynthesis?

Ans. Oxygen liberated during photosynthesis comes from water.

Q. 33. What is the internal (cellular) energy reserve in autotrophs?

Ans. Starch

Q. 34. In which forms do most plants absorb nitrogen?

Ans. Nitrates and nitrites

Q. 35. What is common for Cuscuta, ticks and leeches?

Ans. All are parasites. They derive their nutrition from plants or animals without killing them.

Q. 36. If salivary amylase is lacking in the saliva, which event in the mouth cavity will be affected?

Ans. Starch breaking down into sugars.

Q. 37. What protects the inner lining of stomach from hydrochloric acid?

Ans. The inner lining of stomach is protected from hydrochloric acid by mucus.

Q. 38. What is chyme?

Ans. The slightly digested food, enters into the stomach through the alimentary canal. In the stomach, this food is churned along with gastric juices converting this food into a semi-solid paste called chyme.

Q. 39. Name the enzyme which is present in infants but may be absent in adults.

Ans. Renin

SHORT ANSWER QUESTIONS-I

[2 marks]

Q. 1. What is compensation point?

Ans. When the rate of photosynthesis is equal to rate of respiration, it is called as compensation point. The rate of liberation of O_2 during photosynthesis is equal to the rate of liberation of CO_2 during respiration. Thus, there is no net uptake of gases from the environment. Compensation point is usually reached at dusk and dawn and on a cloudy day.

Q. 2. What happens to visible light of the sun when it falls on chlorophyll?

Ans. Visible light of the sun consists of seven colours—violet, indigo, blue, green, yellow, orange and red. Out of these lights of different wavelengths, chlorophyll absorbs mainly blue, violet, red and orange lights but does not absorb the green light. It is due to the reflection of green light by chlorophyll of the plants that the plants look green in colour.

Q. 3. "All plants give out oxygen during day and carbon dioxide during night". Do you agree with this statement? Give reason. [NCERT Exemplar]

Ans. During day time, as the rate of photosynthesis is more than the rate of respiration, the net result is evolution of oxygen. At night there is no photosynthesis, so they give out carbon dioxide due to respiration.

Q. 4. How does water affect the rate of photosynthesis in plants?

Ans. Water controls the opening and closing of stomata. The deficiency of water causes stomata to open very little or it may even remain closed. Therefore, it (required as a raw material for photosynthesis) cannot enter into the leaves and thus lack of water slows down the rate of photosynthesis.

Q. 5. What is peptic ulcer? How is peptic ulcer caused?

Ans. An ulcer on the inner membrane lining of the stomach is called peptic ulcer. Peptic ulcer is caused by the high acidity of gastric juice secretions.

Q. 6. How does respiration occur in the leaves?

Ans. Leaves have tiny openings on their lower surface called stomata. The exchange of gases takes place through the stomata by the process of diffusion.

Q. 7. What is ascent of sap?

Ans. Absorbed water from the soil also contains dissolved minerals (nitrates, phosphates, etc.) and hence it is called sap. This sap moves upwards due to the 'transpiration pull' developed in the xylem elements. Thus, transportation of sap from roots to the leaves at the top is called ascent of sap.

Q. 8. What is transpiration pull?

Ans. Water in the mesophyll cells of leaves (cells located below the stomata) is in contact with water or sap in xylem of leaf petiole, stem and root. This water evaporates by the process of transpiration. Thus, due to transpiration water is pulled upward which creates an upward suction force called 'transpiration pull'.

Q. 9. Plants have low energy needs as compared to animals. Explain. [NCERT Exemplar]

Ans. Plants do not move. In a large plant body there are many dead cells like sclerenchyma which provide strength to the plant but do not perform any cellular function. As a result they require less energy. Animals, on the other hand, need energy for different activities like movement or search of food. So, they require more energy.

Q. 10. What is root pressure?

Ans. It is a pressure developed in the xylem due to metabolic activity of the root cells. It is a hydrostatic pressure developed in the root system that pumps the water or sap in the root xylem.

Q. 11. How do leaves of plants help in excretion? [NCERT Exemplar]

Ans. Many plants store waste materials in the vacuoles of mesophyll cells and epidermal cells. When old leaves fall, the waste materials are excreted along with the leaves.

Q. 12. What is the role of intercostal muscles in respiration and where are these found?

Ans. Intercostal muscles are found in between the ribs. Their contraction and relaxation changes the volume of thoracic cavity so that air can enter and leave the lungs.

Q. 13. State the function of Bowman's capsule and glomerulus.

Ans. Bowman's capsule and glomerulus have semipermeable walls. The glomerulus, is a tuft of capillaries contained in Bowman's capsule. The water and dissolved substances (wastes and useful) are filtered into the Bowman's capsule and from here they are filtered into the tubule. Thus, both the structures act as filtering apparatus.

Q. 14. What causes movement of food inside the alimentary canal? [NCERT Exemplar]

Ans. The wall of alimentary canal contains muscle layers. Rhythmic contraction and relaxation of these muscles pushes the food forward. This is called peristalsis, which occurs all along the gut.

Q. 15. What happens to glucose which enters the nephron along with the filtrate?

Ans. Glucose along with filtrate runs down through the long renal tubule by the action of cilia. Glucose, amino acids, salts, etc., are reabsorbed by the tubular cells and then secreted into the capillary blood cells by diffusion.

Q. 16. Name the correct substrates for the following enzymes. [NCERT Exemplar]

- | | |
|--------------|--------------|
| (i) Trypsin | (ii) Amylase |
| (iii) Pepsin | (iv) Lipase |

Ans. (i) Protein (ii) Starch (iii) Protein (iv) Fats

Q. 17. Write down the functions of lymph nodes.

Ans. Functions of lymph nodes are:

- Lymph nodes produce and maintain the lymphocytes of blood. These are only found in the mammals.
- Lymph nodes filter the blood and remove poisonous and foreign substances, e.g., bacteria, debris, etc.

Q. 18. Why is cigarette smoking injurious to health?

Ans. During smoking, the cigarette fumes make the walls of alveoli very thin which causes rupturing of alveoli. This reduces the surface area for gaseous exchange in lungs. To make up for the reduced gaseous exchange, the heart has to pump more blood. This over-burdening of the heart may cause heart failure.

Q. 19. State the function of epiglottis.

Ans. At the top of the trachea (or wind pipe) there is a flap of cartilage called epiglottis. The function of epiglottis is to cover the mouth of trachea (or wind pipe) when we swallow food so that the food may not enter the trachea (or wind pipe).

Q. 20. Why are white blood corpuscles called soldiers of the body?

Ans. White blood corpuscles engulf (phagocytose) the foreign matter (bacteria, dust and other foreign material) entering the body, and are hence called soldiers. They produce antibodies against antigens, and antitoxins against toxins.

Q. 21. Name the parts of the body responsible for excretion in
(i) Amoeba (ii) Earthworm.

Ans. (i) Amoeba: Contractile vacuole
(ii) Earthworm: Nephridia

Q. 22. What happens to the rate of breathing during vigorous exercise and why?

Ans. During vigorous exercise, our body requires more energy and for this purpose more oxygen is needed, so the rate of breathing is increased. Oxygen intake rate increases by about 20 to 25 times.

Q. 23. How do the guard cells regulate opening and closing of stomatal pores? [NCERT Exemplar]

Ans. The swelling of guard cells due to absorption of water causes opening of stomatal pores while shrinking of guard cells closes the pores. Opening and closing of stomata occurs due to turgor changes in guard cells. When guard cells are turgid, stomatal pore is open while in flaccid conditions, the stomatal aperture closes.

Q. 24. Two green plants are kept separately in oxygen-free containers, one in the dark and the other in continuous light. Which one will live longer? Give reasons. [NCERT Exemplar]

Ans. Plant kept in continuous light will live longer. Because it will be able to produce oxygen required for its respiration by the process of photosynthesis.

Q. 25. In each of the following situations what happens to the rate of photosynthesis?

(i) Cloudy days (ii) No rainfall in the area
(iii) Good manuring in the area (iv) Stomata get blocked due to dust [NCERT Exemplar]

Ans. (i) Decreases (ii) Decreases
(iii) Increases (iv) Decreases

Q. 26. Name the energy currency in the living organisms. When and where is it produced?

Ans. Adenosine triphosphate (ATP) is the energy currency in the living organisms. It is produced in the mitochondria during respiration in living organisms and also during photosynthesis in plants.

Q. 27. Match the terms in Column (A) with those in Column (B): [NCERT Exemplar]

| Column A | Column B |
|--------------|--------------------|
| (i) Trypsin | (a) Pancreas |
| (ii) Amylase | (b) Liver |
| (iii) Bile | (c) Gastric glands |
| (iv) Pepsin | (d) Saliva |

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

Q. 28. Explain the role of mouth in digestion of food. [NCERT Exemplar]

Ans. (i) Food is crushed into small pieces by the teeth.
(ii) It mixes with saliva and the enzyme amylase (found in saliva) breaks down starch into sugars.
(iii) Tongue helps in thorough mixing of food with saliva.

Q. 29. Explain the statement, 'Bile does not contain any enzyme but it is essential for digestion.'

Ans. Bile does not contain any enzyme but it is essential for digestion because bile is alkaline and contain salts which helps to emulsify the fat present in the food. So, the bile perform two functions:

(i) The food coming from the stomach is acidic and has to be made alkaline for the pancreatic enzymes to act.
(ii) The bile salts breakdown the fat present in the food into smaller globules. This increases the efficiency of enzymes in the small intestine to digest the food effectively.

Q. 30. Why is blood circulation in human heart called double circulation? [NCERT Exemplar]

Ans. The blood circulation in human heart is called double circulation because the blood passes through the heart twice in one complete cycle of the body i.e., once through the right half in the form of deoxygenated blood and once through the left half in the form of oxygenated blood.

SHORT ANSWER QUESTIONS-II

[3 marks]

Q. 1. What are the adaptations of leaf for photosynthesis? [NCERT Exemplar]

Ans. (i) Leaves provide large surface area for maximum light absorption.
(ii) Leaves are arranged at right angles to the light source in a way that causes overlapping.
(iii) The extensive network of veins enables quick transport of substances to and from the mesophyll cells.
(iv) Presence of numerous stomata for gaseous exchange.
(v) The chloroplasts are more in number on the upper surface of leaves.

Q. 2. Mention the major events during photosynthesis. [NCERT Exemplar]

Ans. The major events during photosynthesis are:

(i) Absorption of light energy by chlorophyll
(ii) Conversion of light energy to chemical energy
(iii) Splitting of H₂O into H₂, O₂ and energy
(v) Reduction of CO₂ to carbohydrates

Q. 3. Study the given diagram:

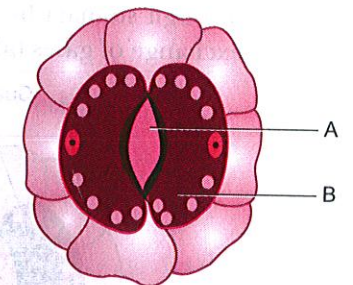
Name the parts 'A' and 'B' and state one function of each.

Ans. A → Stomatal pore

Function: Massive amounts of gaseous exchange takes place in the leaves through these pores for the purpose of photosynthesis.

B → Guard cell

Function: The opening and closing of the stomatal pore is a function of the guard cell.



Q. 4. Why does absorption of digested food occur mainly in the small intestine? [NCERT Exemplar]

Ans. Maximum absorption occurs in small intestine because

(i) digestion is completed in small intestine.
(ii) inner lining of small intestine is provided with villi which increases the surface area for absorption.
(iii) wall of intestine is richly supplied with blood vessels which take the absorbed food to each and every cell of the body.

Q. 5. What substances are contained in the gastric juice? What are their functions?

Ans. Gastric juice contains three substances: hydrochloric acid, enzyme pepsin and mucus.

Their functions are:

(i) Hydrochloric acid in the stomach is used to make the medium acidic to facilitate the action of the enzyme pepsin and to kill germs if any.
(ii) Enzyme pepsin digests proteins to convert them into peptones.
(iii) The mucus helps to protect the stomach wall from its own secretions of hydrochloric acid.

Q. 6. What are the various processes that take place in the duodenum?

Ans. Processes that take place in the duodenum are:

(i) Bile emulsifies the fat molecules present in the food into small globules.

- (ii) The pancreatic enzyme trypsin starts digesting the proteins and the pancreatic amylase breaks down the starch.
- (iii) Bile juice secreted by the liver and bicarbonate ions secreted by the duodenal wall makes the medium alkaline.

Q. 7. How does respiration occur in the roots of the plant?

Ans. Air is present in between the particles of the soil. The roots take the oxygen by the process of diffusion. Oxygen first diffuses into the root hairs and reaches all other cells of the root for respiration. CO₂ produced in the cells moves out through the root hairs by the process of diffusion. For respiration, in older roots, where root hair is not present, the exchange of gases takes place through lenticels (tiny openings in the protective layer) by the process of diffusion.

Q. 8. (i) Explain why the rate of photosynthesis in plants is low both at lower and higher temperatures.

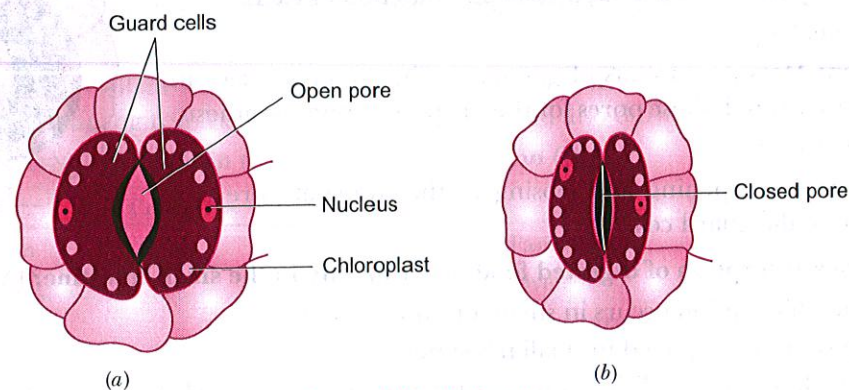
(ii) Is green light most or least useful in photosynthesis and why?

Ans. (i) Photosynthesis is an enzymatic process. The enzymes function within an optimum range of temperature which is neither very low nor very high. At low temperature the activity of enzymes is lowered due to which the rate of photosynthesis is also low. Again when the temperature is very high, the activity of enzymes decreases which leads to low rate of photosynthesis.

(ii) Green light is least useful in photosynthesis, because chlorophyll does not absorb green light.

Q. 9. How does respiration occur in the stem of the plant?

Ans. In the stem of herbaceous plants, stomatas are present. So, the exchange of gases takes place through stomata by the process of diffusion. In the woody and hard stems of big plants, the exchange of gases takes place through lenticels which are present on the bark of the stem.



Open and closed stomata

Q. 10. Give reasons:

- (i) Plants look green.
- (ii) The respiratory surface of earthworm is its skin.
- (iii) Nutrition is necessary for an organism.
- (iv) We boil the leaf in alcohol when we are testing it for starch.

Ans. (i) The leaves of plants contain green pigments called chlorophyll which is necessary for photosynthesis. Plants reflect green light of sunlight, so they look green.

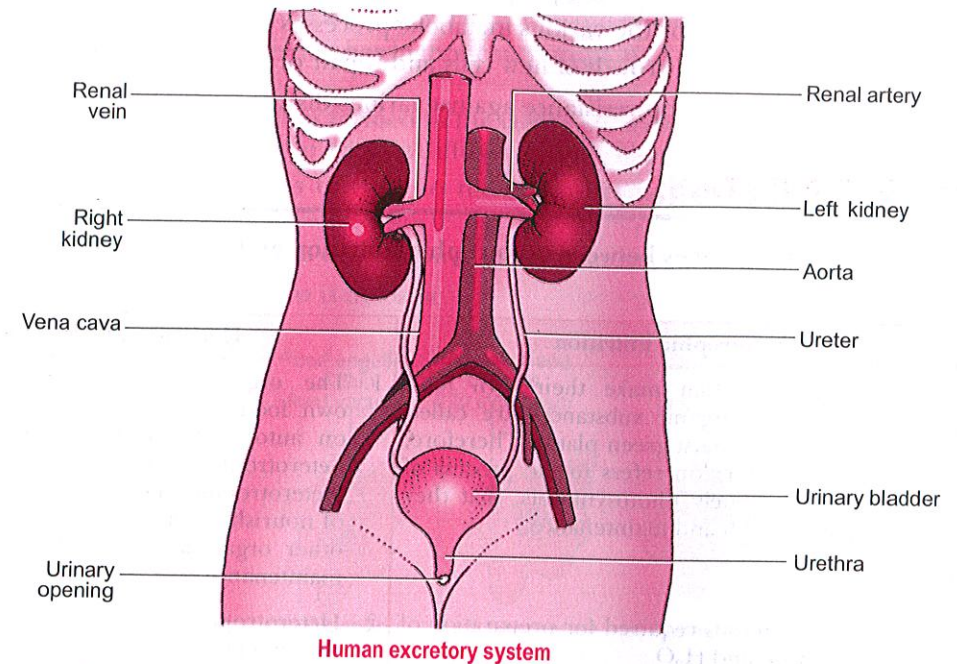
(ii) The skin of earthworm is quite thin and moist and has rich blood supply. So, it respire through its skin.

(iii) An organism requires nutrients like carbohydrates, fats, proteins, minerals and vitamins for the growth, reproduction and metabolic activities, so nutrition is necessary for an organism.

(iv) We boil the leaf in alcohol to remove chlorophyll from green leaf.

Q. 11. Draw and label the parts of the human excretory system.

Ans.



Human excretory system

Q. 12. State the functions of the following components of transport system:

(i) Blood

(ii) Lymph

Ans. (i) The following are the important functions of blood:

- (a) It transports the digestive component of food to all the body cells.
- (b) It also transports respiratory gases to body cells.
- (c) It carries waste product for excretion.
- (d) It acts as carrier of hormones.

(ii) Lymph contains lymphocyte cells which fight against infection and it also carries digested fat.

Q. 13. What is the advantage of having four chambered heart?

[NCERT Exemplar]

Ans. In four chambered heart, left half is completely separated from right half by septa. This prevents oxygenated and deoxygenated blood from mixing. This allows a highly efficient supply of oxygenated blood to all parts of the body. This is useful in animals that have high energy needs, such as birds and mammals.

Q. 14. State differences between artery, vein and capillary.

OR

Differentiate between an artery and a vein.

[NCERT Exemplar]

Ans.

| Artery | Vein | Capillary |
|---|--|---|
| 1. Thick-walled. | 1. Thin-walled. | 1. Thin-walled. |
| 2. Carries blood from the heart to other parts of the body. | 2. Carries blood from different organs to the heart. | 2. Capillaries are involved in the exchange of food material, respiratory gases, and body wastes. |
| 3. Situated deeper under the skin. | 3. Situated just under the skin. | 3. Occur at the terminals of artery and vein. |

Q. 15. Is 'nutrition' a necessity for an organism? Discuss.

[NCERT Exemplar]

Ans. Food is required for the following purposes:

- It provides energy for the various metabolic processes in the body.
- It is essential for the growth of new cells and repair or replacement of worn out cells.
- It is needed to develop resistance against various diseases.

LONG ANSWER QUESTIONS

[5 marks]

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

Ans.

| Autotrophic nutrition | Heterotrophic nutrition |
|---|--|
| 1. The organisms that make their own food from simple inorganic substances are called autotrophs, e.g., most green plants. Therefore, autotrophic nutrition refers to the process of nourishing, namely photosynthesis, that they adopt for growth and maintenance. | 1. The organisms which cannot make their own food and depend directly or indirectly on autotrophs for their survival are called heterotrophs, e.g., animals and fungi. Heterotrophic nutrition refers to the process of nourishing, namely by obtaining food from other organisms, for their own growth and maintenance. |
| 2. The raw materials required for preparation of food are CO ₂ and H ₂ O. | 2. Heterotrophs are directly or indirectly dependent on autotrophs. |
| 3. Chlorophyll and sunlight are essential for photosynthesis and thus for nutrition to occur. | 3. Chlorophyll and sunlight are not required. |

Q. 2. Describe the glands involved in the digestive system.

Ans.

| S. No. | Organ | Gland | Secretion | Enzymes | Substrate | End product |
|--------|-----------------|-------------------------|--------------------------------------|--|---|---|
| 1. | Mouth | Salivary | Saliva | Salivary amylase | Starch | Maltose |
| 2. | Stomach | Gastric | Gastric juice | 1. Pepsin 2. Lipase | Proteins Lipids | Peptones Glycerides |
| 3. | Duodenum | 1. Liver 2. Pancreas | Bile juice Pancreatic juice | No enzyme 1. Amylase 2. Trypsin 3. Lipase | Fat Starch Proteins Fats (emulsified) | Emulsification of fats (alkaline medium) Maltose Peptones, and peptides Fatty acids and glycerol |
| 4. | Small intestine | Intestinal glands | Intestinal juice or Succus entericus | 1. Erepsin 2. Enzyme for sugar digestion 3. Lipase | Peptones, and peptides Sugars Triglycerides | Amino acids Glucose Monoglycerides and fatty acids |

Q. 3. What are the common features between all the respiratory organs? Explain the mechanism of gaseous exchange between tissues and blood.

Ans. Common features between all the respiratory organs are:

- All the respiratory organs have large surface areas to get enough oxygen.
- All the respiratory organs are thin-walled for easy diffusion of gases and substances.

(iii) All the respiratory organs (like skin, lungs, gills) have a rich supply of blood for transporting respiratory gases.

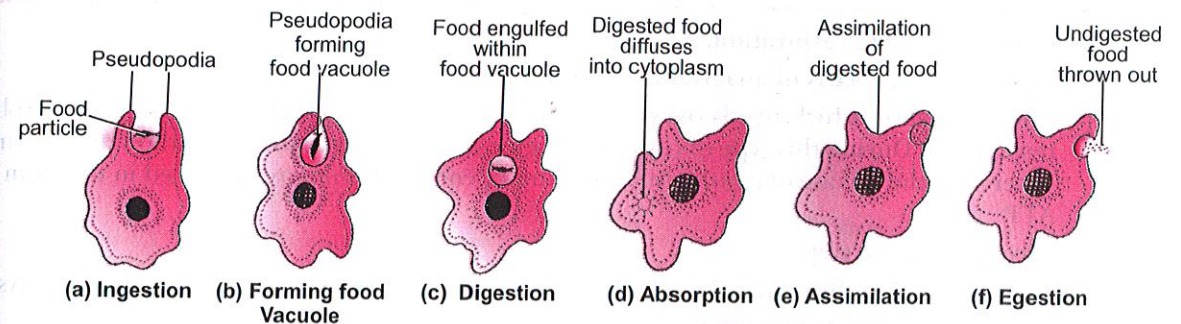
The mechanism of gaseous exchange between tissues and blood is as follows:

- The blood reaching the tissues has higher concentration of oxygen than in the cells so it gets diffused into the cells.
- The carbon dioxide, which is formed in the cells, gets accumulated in higher concentration as compared in the blood, so it easily diffuses into the blood.
- The blood with CO₂ takes this gas to the lungs, from where it is expelled out during exhalation.

Q. 4. Explain the nutrition process in an Amoeba.

[NCERT Exemplar]

Ans. The mode of nutrition in *Amoeba* is holozoic.



Different stages in the nutrition of *Amoeba*

The various steps involved in the process of nutrition are:

- Ingestion:** *Amoeba* ingests food with the help of its finger-like extensions, called pseudopodia. When a food particle approaches *Amoeba*, it forms pseudopodia around it and forms a food vacuole inside the *Amoeba*.
- Digestion:** Various enzymes from the cytoplasm enter into the food vacuole and break them down into simple soluble molecules.
- Absorption:** The simple soluble food is absorbed by cytoplasm of *Amoeba* from food vacuoles through the process of diffusion.
- Assimilation:** *Amoeba* cell obtains energy from the absorbed food through respiration. This energy is utilised by *Amoeba* for its growth and repair of the body.
- Egestion:** When a considerable amount of undigested food gets collected inside *Amoeba*, its cell membrane ruptures and throws out the undigested food.

Q. 5. Give the role of liver in the human beings.

Ans. Liver is the largest gland in human beings.

Its main functions are as follows:

- It secretes bile juice which makes the medium of the food alkaline and also emulsifies fat.
- It stores the excess of glucose in the form of glycogen.
- Old worn-out RBCs are broken down in liver cells. Their haemoglobin is changed into bile pigments.
- The ammonia is produced as a result of metabolism of amino acids. It is highly toxic. The ammonia combines with CO₂ and is converted into urea (less toxic).
- It stores vitamins, iron and copper.
- It produces fibrinogen and helps in blood-clotting.
- It produces heparin which does not allow the clotting of blood inside the blood vessels.
- It regulates the volume of blood to some extent.
- RBCs are produced at the foetal stage by the liver.

Q. 10. Describe the process of digestion of food in human beings.

OR

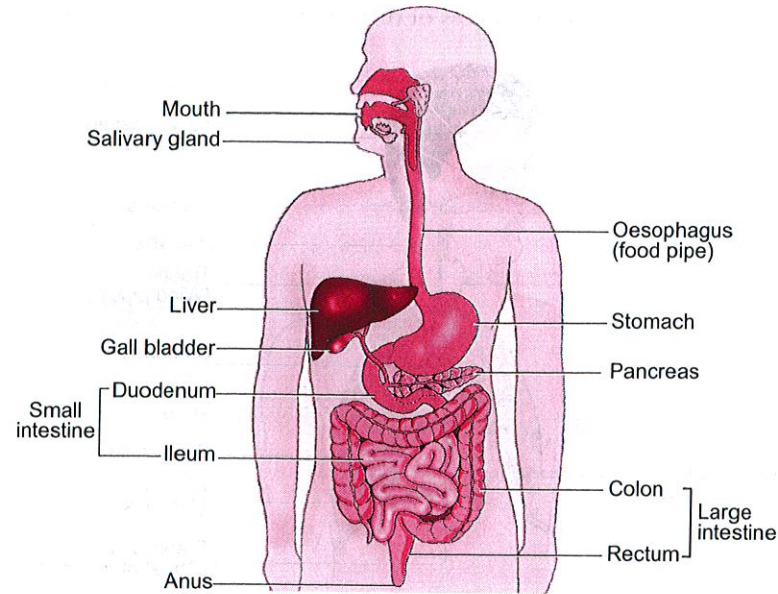
Draw the diagram of alimentary canal of man and label the following parts: [NCERT Exemplar]

Mouth, Oesophagus, Stomach, Intestine

OR

How do carbohydrates, proteins and fats get digested in human beings? [NCERT Exemplar]

Ans.



Human digestive system

The various processes involved in the digestion of human beings are:

- (i) **Ingestion:** Through the help of mouth human beings ingest food.
- (ii) **Digestion:** The teeth helps in physical digestion of food. In mouth there are salivary glands, which secretes saliva, in which salivary amylase enzyme is present which digest the starch present in food into maltose sugar, i.e., the digestion of carbohydrate starts from mouth itself. Mouth opens into a small funnel-shaped area called pharynx which leads to a long tube called **oesophagus**, whose wall is highly muscular. When the slightly digested food enters into oesophagus the contraction and expansion movement of its wall, takes place, which is known as **peristaltic movement**. This movement helps the food to move towards the stomach. Usually, in oesophagus there is no digestion of food. From the oesophagus the food enters into the stomach. In the stomach there is secretion of gastric juices which is a mixture of hydrochloric acid, pepsin (protein digesting enzyme) and mucus. Now, the partially digested food enters from stomach into the small intestine's wider part which is known as **duodenum** and the remaining part of the small intestine is termed as **ileum**. The duodenum, receives secretions of two glands, i.e., liver and pancreas. Liver secretes bile pigments and pancreas secretes pancreatic juice which digests the proteins, carbohydrates and emulsified fats. Here the digestive enzymes are **amylase**, **maltase** and **invertase** for digesting the carbohydrates, trypsin for proteins and lipase for fats. Thus, food is completely digested in ileum part of small intestine.
- (iii) **Absorption:** Now, the food enters from duodenum into ileum part of small intestine where millions of finger-like projections known as villi are present which absorb the food.

- (iv) **Assimilation:** The blood carries the digested and dissolved food to all parts of the body, where it is assimilated into the cells which is used for obtaining energy as well as for growth and repair of the body.
- (v) **Egestion:** The undigested food enters into the large intestine's wider part, where water is absorbed from the undigested food and the food becomes solid. Now, this solid undigested food enters the last part of large intestine known as **rectum** through which it moves out from the body.

Q. 11. Differentiate between blood and lymph.

Ans.

| Blood | Lymph |
|---|---|
| 1. Red in colour. | 1. Colourless. |
| 2. Red blood corpuscles are present. | 2. Red blood corpuscles are absent. |
| 3. Lymphocytes are present. | 3. Lymphocytes are present more in number than the blood. |
| 4. Nutritive substances are more. | 4. Nutritive substances are less in amount. |
| 5. Oxygen is more. | 5. Oxygen is relatively less. |
| 6. Metabolic wastes and CO ₂ are in normal amount. | 6. Both are more than in the blood. |
| 7. Soluble proteins are more than insoluble proteins. | 7. Insoluble proteins are more than soluble ones. |
| 8. Fibrinogen in large amount. | 8. Fibrinogen in less amount. |

Q. 12. Define the terms, 'nutrition' and 'nutrients'. List two differences between 'holozoic nutrition' and 'saprophytic nutrition'. Give two examples of each of these two types of nutrition.

Ans. **Nutrition:** The process by which the living organisms receive and utilise the food materials necessary for their survival, growth and repair of worn-out tissues is called nutrition.

Nutrients: Those substances which supply nourishment to living organisms from its surroundings and use it as an energy source or for biosynthesis of body constituents.

| Holozoic nutrition | Saprophytic nutrition |
|--|---|
| 1. In this type of nutrition solid and complex organic food is directly taken into the body. | 1. In saprophytic nutrition, the organism obtains nutrients from the dead and decaying organic matter. The food is digested outside the body of the organism and then absorbed. |
| 2. This type of nutrition takes place in 5 steps namely ingestion, digestion, absorption, assimilation and egestion. | 2. Saprophytic nutrition takes place by absorption of break-down products. |
| 3. Example: <i>Amoeba</i> , different vertebrates. | 3. Example: Bacteria, fungi, <i>Rhizopus</i> , yeast. |

Q. 13. Describe internal structure of a human heart.

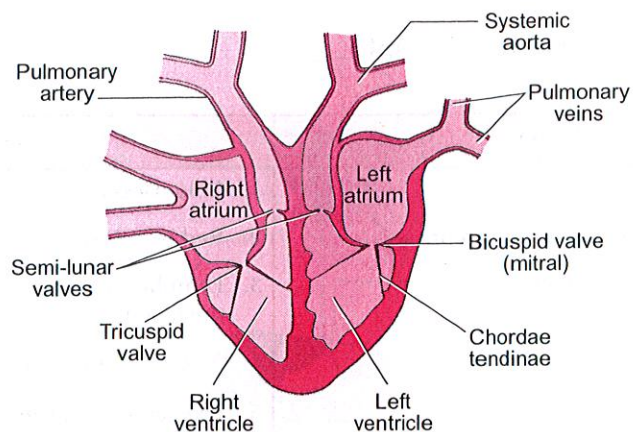
OR

Describe the flow of blood through the heart of human beings.

[NCERT Exemplar]

Ans. The two auricles or atria are thin-walled and are separated from each other by a thin inter-atrial septum. The right atrium receives venous (deoxygenated blood having very little O₂) from the entire body through a superior and inferior vena cava. The left smaller atrium receives oxygenated blood from the lungs through four pulmonary veins.

The two auricles (atria) are separated from the ventricles by two apertures guarded by membranous valves. The valve separating right atrium from right ventricle is called right atrio-ventricular valve or tricuspid valve made up of three flaps. The valve separating left atrium from left ventricle is called left atrio-ventricular valve or mitral valve, formed of two flaps. These valves are attached with fine cords with the papillary muscles of the ventricular wall. These valves only allow blood flow from auricles into ventricles and not in opposite direction.



Longitudinal section of human heart

Both the ventricles are separated from each other by a thick inter-ventricular septum. The wall of left ventricle is much thicker than that of right ventricle. The left ventricle pushes blood into aorta which supplies blood to entire body. The opening of aorta is also guarded by a valve formed of 3 semilunar flaps. The right ventricle pumps venous blood into lungs by a pulmonary artery. Its opening is also guarded by a valve, having 3 semilunar flaps. These valves allow the flow of blood from ventricles into the aorta and not back. Heart is formed of cardiac muscle fibres, which rhythmically contract the heart without feeling fatigue.

HOTS (Higher Order Thinking Skills)

Q. 1. If a plant is releasing carbon dioxide and taking in oxygen during the day, does it mean that there is no photosynthesis occurring? Justify your answer. [NCERT Exemplar]

Ans. Release of CO_2 and intake of O_2 gives evidence that either photosynthesis is not taking place or its rate is too low. Normally during day time, the rate of photosynthesis is much more than the rate of respiration. So, CO_2 produced during respiration is used up for photosynthesis hence CO_2 is not released.

Q. 2. The leaves of a plant first prepare food A by photosynthesis then food A gets converted into food B. What are A and B?

Ans. Food A \rightarrow glucose, Food B \rightarrow starch

Q. 3. Why do fishes die when taken out of water? [NCERT Exemplar]

Ans. Fishes respire with the help of gills. Gills are richly supplied with blood capillaries and can readily absorb oxygen dissolved in water. Since fishes cannot absorb gaseous oxygen they die soon after they are taken out of water.

Q. 4. What would happen if green plants disappear from the Earth? [NCERT Exemplar]

Ans. Green plants are the sources of energy for all organisms. If all green plants disappear from the Earth, all the herbivores will die due to starvation and so will the carnivores.

Q. 5. Why is small intestine in herbivores longer than in carnivores? [NCERT Exemplar]

Ans. Digestion of cellulose takes a longer time. Hence, herbivores eating grass need a longer small intestine to allow complete digestion of cellulose. Carnivorous animals cannot digest cellulose, hence they have a shorter intestine.

Q. 6. What will happen if mucus is not secreted by the gastric glands? [NCERT Exemplar]

Ans. Gastric glands in stomach release hydrochloric acid, enzyme pepsin and mucus. Mucus protects the inner lining of stomach from the action of hydrochloric acid and enzyme pepsin. If mucus is not released, it will lead to erosion of inner lining of stomach, leading to acidity and ulcers.

Q. 7. Why is the rate of breathing in aquatic organisms much faster than in terrestrial organisms? [NCERT Exemplar]

Ans. Aquatic organisms like fishes obtain oxygen from water present in dissolved state through their gills. 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.

Q. 8. Why do veins have thin walls as compared to arteries? [NCERT Exemplar]

Ans. Arteries carry blood from the heart to various organs of the body under high pressure so they have thick and elastic walls. Veins collect the blood from different organs and bring it back to the heart. The blood is no longer under pressure so the walls are thin with valves to ensure that blood flows only in one direction.

Q. 9. Why and how does water enter continuously into the root xylem? [NCERT Exemplar]

Ans. Cells of root are in close contact with soil and so actively take up ions. The ion concentration increases inside the root and hence osmotic pressure increases the movement of water from the soil into the root which occurs continuously.

Q. 10. Why is more concentrated yellowish urine excreted in summers?

Ans. In summers consumption of water is increased and in spite of that excretory amount of urine is less. Because most of the water is excreted in the form of sweat which is evaporated soon due to high environmental temperature. It keeps our body cool and hence concentrated yellowish urine is excreted.

Q. 11. Leaves of a healthy potted plant were coated with vaseline to block the stomata. Will this plant remain healthy for long? State three reasons for your answer. [NCERT Exemplar]

Ans. If waxy coating is made on the surface of leaf, loss of water in the form of water vapour does not take place. Even the gaseous exchange will not take place. So, photosynthesis will either be reduced or will not take place.

The plant will not remain healthy for long because:

- Exchange of gases will not take place.
- Photosynthesis will either be reduced or will not take place due to lack of CO_2 .
- Transpiration will not take place, so there will be no mechanism of cooling in hot weather.

Proficiency Exercise

Very Short Answer Questions

[1 mark]

- Which is the first enzyme to mix with food in the digestive tract?
- What prevents backflow of blood inside the heart during contraction?
- What causes movement of food inside alimentary canal?
- What process in plants is known as transpiration?
- What is the main toxic waste kidney filters from the blood?
- What is peristalsis?

Short Answer Questions-I

[2 marks]

- What is the significance of emulsification of fats? [NCERT Exemplar]
- Mention the components of the transport system in highly organised plants. State the functions of these components.
- What are the functions of gastric glands present in the wall of the stomach? [NCERT Exemplar]
- What is the function of the trachea? Why do its walls not collapse even when there is less air in it?
- What will happen if diaphragm of a person gets ruptured in an accident?
- Match Group (A) with Group (B)

| Group (A) | Group (B) |
|--------------------------------|------------------|
| (a) Autotrophic nutrition | (i) Leech |
| (b) Heterotrophic nutrition | (ii) Paramecium |
| (c) Parasitic nutrition | (iii) Deer |
| (d) Digestion in food vacuoles | (iv) Green Plant |

[NCERT Exemplar]

- Why is transpiration important for plants? [NCERT Exemplar]

Short Answer Questions-II

[3 marks]

- Name the following:
 - The process in plants that links light energy with chemical energy.
 - Organism that can prepare their own food.
 - The cell organelle where photosynthesis occurs.
 - Cells that surround a stomatal pore.
 - Organisms that cannot prepare their own food.
 - An enzyme secreted from gastric glands in stomach that acts on proteins. [NCERT Exemplar]
- How are the alveoli designed to maximise the exchange of gases?
- What are the methods used by plants to get rid of excretory products?
- Why is diffusion insufficient to meet the oxygen requirements of multicellular organisms like humans?

Long Answer Questions

[5 marks]

- Write down an account of composition of blood.
- Which is the major nitrogenous waste product in human beings? How is it removed from the body? [NCERT Exemplar]
- Describe the alimentary canal of man.

- Draw the diagram of sectional view of human heart and label the following parts:
 - The chamber of the heart that pumps out deoxygenated blood.
 - The blood vessel that carries away oxygenated blood from the heart.
 - The blood vessel that receives deoxygenated blood from the lower part of our body.
 - Part which prevents the backward flow of blood.

- How are nitrogenous wastes and water excreted in *Amoeba*?

- What is ultrafiltration? How does it occur?

- Describe the process of urine formation in kidneys. [NCERT Exemplar]

- Name two different ways in which glucose is oxidised to provide energy in various organisms.
 - Write any two differences on the two ways of oxidation of glucose in organisms.

- Differentiate between an autotroph and a heterotroph. [NCERT Exemplar]

- Match the words of Column A with that of Column B.

Column A

Column B

- | | |
|---------------|----------------------------|
| (a) Phloem | (i) Excretion |
| (b) Nephron | (ii) Translocation of food |
| (c) Veins | (iii) Clotting of blood |
| (d) Platelets | (iv) Deoxygenated blood |
- Explain the three pathways of breakdown in living organisms. [NCERT Exemplar]

