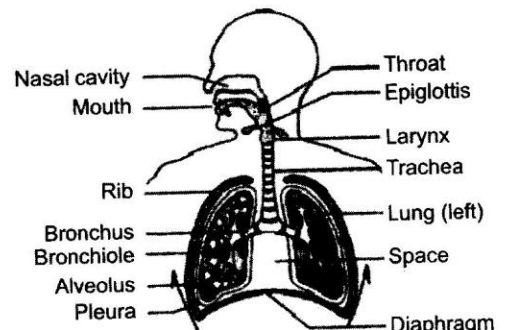


12. If mucus is not secreted by the gastric glands, it will lead to erosion of inner lining of stomach, causing excessive acidity, ulcers and extreme discomfort as mucus protects the inner lining of stomach from the action of hydrochloric acid and enzyme pepsin.
13. The significance of emulsification of fats is the conversion of large fat pieces into very fine fat globules which can be efficiently acted upon by lipase.
14. The rhythmic contraction and relaxation of the muscles present on wall of the alimentary canal pushes the food forward, which is called peristalsis movement and occurs along the gut.
15. Absorption of digested food occur mainly in the small intestine because :
  - (i) Digestion of food is completed in small intestine.
  - (ii) Inner lining of small intestine bears a number of finger-like projections called villi, which increases the surface area for absorption.
  - (iii) Wall of intestine has blood vessels for carrying the absorbed food to different parts of the body.
16. (a) – (iv), (b) – (iii), (c) – (i) and (d) – (ii)
17. The rate of breathing in aquatic organisms is much faster than in terrestrial organisms because the amount of dissolved oxygen is low compared to the amount of oxygen in the air. Therefore, they have to obtain the required oxygen from water.
18. The advantage of having four chambered heart is that it prevents oxygenated and deoxygenated blood from mixing, as the left half of the four chambered heart is completely separated from right half by septa. This mechanism is useful to animals with high energy needs such as birds and mammals. In this way, highly efficient supply of oxygenated blood is passed to all parts of the body.
19. (a) In cloudy days, photosynthesis is reduced due to low light intensity.
  - (b) In case of no rainfall in the area, rate of photosynthesis decreases.
  - (c) With good manuring in the area, rate of photosynthesis increases, it increases soil fertility.
  - (d) When stomata gets blocked due to dust, photosynthesis decreases by reducing gaseous exchange.
20. Adenosine triphosphate (ATP) is the energy currency of the living organisms. It is produced during respiration in living organisms and also during photosynthesis in plants.
21. All are parasites and they derive their nutrition from their hosts directly without killing them.
22. Functions of the gastric glands present in the wall of the stomach are as follows :
  - (i) Secretion of mucus for protection of inner lining of stomach.
  - (ii) Secretion of HCl which makes the food soft and acidified for pepsin to act upon food.
  - (iii) Secretion of pepsin enzyme that digests proteins.
23. (a) – (i), (b) – (iv), (c) – (ii), (d) – (iii)
24. (a) Trypsin — Proteins
  - (b) Amylase — Starch
  - (c) Pepsin — Proteins
  - (d) Lipase — Fats
25. Veins have thin walls as compared to arteries because the veins collect the blood from different organs and bring it back to the heart and the blood is no longer under pressure. The veins possess semilunar valves to ensure that blood flows only in one direction. But arteries carry blood from the heart to various organs of the body under high pressure so they have thick and elastic walls.
26. If platelets were absent in the blood, blood clotting will be absent resulting in loss of blood.
27. Plants have low energy needs as compared to animals because plants do not move and most of their body is made up of dead cells like sclerenchyma. But animals move about in search of food, mate and shelter.
28. Cells of root are in close contact with soil and so actively take up ions. Ions pass inward increasing osmotic concentration of xylem. Because of it water from the soil continuously pass into the root xylem.
29. In leaves, the waste materials are stored in the vacuoles of mesophyll and epidermal cells. When old leaves fall, the waste materials are excreted along with the leaves.

### LONG ANSWER TYPE QUESTIONS

30. Importance of soil for plant growth :
  - (i) It anchors the plant.
  - (ii) It is the source of water and minerals.
  - (iii) Symbiotic association with microbes.
  - (iv) It helps for respiration of root cells due to availability of oxygen of food material.
31. The function of epiglottis in man is that at the time of swallowing food, the epiglottis closes the tracheal opening thereby preventing the food from entering the windpipe.



Human Respiratory System

25.

**Blood**

- (i) It is red in colour.
- (ii) It contains haemoglobin.
- (iii) It contains RBCs, WBCs and blood platelets.
- (iv) It flows from heart to organs and vice versa.
- (v) It contains respiratory pigment, oxygen, CO<sub>2</sub> and excretory products.
- (vi) It carries all types of blood proteins.

**Lymph**

- (i) It is colourless or light yellow fluid.
- (ii) It does not contain haemoglobin.
- (iii) It does not contain corpuscles.
- (iv) It flows in one direction only, *i.e.*, from tissues to heart.
- (v) It bathes in body cells.
- (vi) It lacks fibrinogen.

**NCERT Question**

26. The comparison between alveoli in the lungs and nephrons in the kidneys with respect to their structure and functioning is as follows :

**Alveoli in Lungs**

- (i) Alveoli have thin walled balloon like structure with fine surface.
- (ii) Alveoli are supplied with extensive network of thin-walled blood vessels, *i.e.*, capillaries for gaseous exchange.
- (iii) Alveoli increase surface area for diffusion of CO<sub>2</sub> from blood to air and O<sub>2</sub> from air to blood.
- (iv) Alveoli provide surface for gaseous exchange in the lungs.
- (v) Alveoli are very small and are large in number present in such lung.

**Nephrons in Kidneys**

- (i) Nephrons have thin walled, cup-shaped structure with thin walled tubule.
- (ii) Bowman's capsule is supplied with a cluster of capillaries called glomerulus for filtration. A network of blood vessels are present around the tubular part of nephron for reabsorption of useful substance and water.
- (iii) Nephrons also increase surface area for filtration of blood and reabsorption of useful substances and water from filtrate leaving behind urine.
- (iv) Tubular part of nephron carries the urine to collecting duct.
- (v) A large number of nephrons are present in each kidney.

**NCERT Exemplar Problems****SHORT ANSWER TYPE QUESTIONS**

1. (a) Photosynthesis  
(b) Autotrophs  
(c) Chloroplast  
(d) Guard cells  
(e) Heterotrophs  
(f) Pepsin
2. Yes, respiration takes place throughout day and night but photosynthesis occurs only during the day. During daytime, plants give out oxygen which is a product of photosynthesis. Thus, during night when there is no photosynthesis, plants liberate carbon dioxide.
3. The opening of stomatal pores occurs due to swelling of guard cells as a result of absorption of water while the closing of stomatal pores occurs due to shrinkage of guard cells. Thus, the opening and closing of stomata is due to turgor changes of guard cells. Stomatal pore is open when guard cells are turgid and stomatal pore closes when guard cells are in flaccid conditions.
4. The plant kept in continuous light will live longer because it will be able to manufacture food with the help of photosynthesis and produce oxygen required for its respiration.
5. A plant releases carbon dioxide and takes in oxygen only when photosynthesis is either absent or its rate is too low and does not compensate for respiration.
6. Fishes die when taken out of water because they cannot obtain gaseous oxygen.

They breath through gills, which are richly supplied with blood capillaries and can readily absorb oxygen dissolved in water.

7. Yes, 'nutrition' is a necessity for an organism. Because :
  - (i) It is required for the growth of new cells and repair of worn out cells.
  - (ii) It is required to develop resistance against various diseases.
  - (iii) It gives us energy for various metabolic activities of our body.
8. If green plants disappear from earth, then the herbivores will die of starvation followed by carnivores and then decomposers.
9. (a) – (ii), (b) – (i), (c) – (iv), (d) – (iii)
10. The adaptations of leaf for photosynthesis are as follows :
  - (i) Leaf has a large surface area to absorb maximum light.
  - (ii) Arrangement of leaves in order to absorb optimum amount of light.
  - (iii) The large number of veins provide mechanical strength and also take part in quick transport of substances to and from the mesophyll cells.
  - (iv) Leaf is the site of transpiration which cools the leaf surface for optimum photosynthesis.
  - (v) Leaf has numerous stomata for gaseous exchange.
  - (vi) Large number of chloroplasts are present on upper surface of leaves.
11. Herbivores eat grass and need a longer small intestine to allow complete digestion of cellulose. But carnivores cannot digest cellulose, and therefore they have a shorter intestine.

20. (a) The pulmonary vein brings oxygenated blood to the human heart.  
 (b) The left auricle of human heart receives oxygenated blood.  
 (c) (i) When oxygenated blood comes into the left atrium, it contracts and pours blood into left ventricle.  
 (ii) The left ventricle contracts and the oxygenated blood from here is distributed to all parts of the body through aorta.
21. (a) The pulmonary artery brings deoxygenated blood to the human heart.  
 (b) The right auricle of human heart receives deoxygenated blood.  
 (c) (i) Right auricle pours deoxygenated blood into right ventricle.  
 (ii) From right ventricle deoxygenated blood flows to the lungs through pulmonary artery for oxygenation.

22. **The main organs of Human Digestive System** in order involved in the process of digestion of food, *i.e.*, starting from mouth are as follows :

Mouth → Oesophagus → Stomach → Small intestine (consisting of duodenum, jejunum and ileum) → Large intestine (consisting of caecum ; colon and rectum).

There are three digestive glands associated with the alimentary canal. These are salivary glands, pancreas and liver.

**Carbohydrate digestion** begins in the buccal cavity as human saliva contains an enzyme ptyalin or salivary amylase which hydrolyses starch into the disaccharides, maltose and isomaltose and small dextrins called 'limit' dextrin.

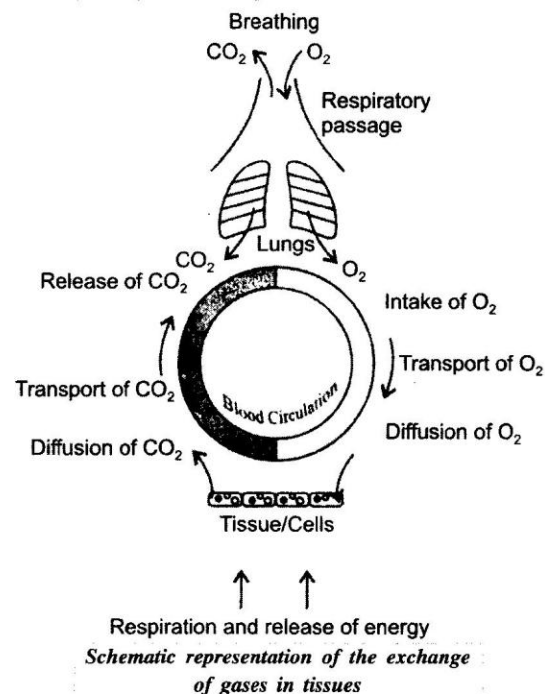
**Pancreatic amylase** digests starch into maltose, isomaltose and 'limit' dextrins in the intestine in alkaline medium. Enzyme maltose present in the intestinal juice hydrolyses maltose into glucose.

**Protein Digestion** : Enzymes hydrolysing proteins are called proteases in peptidases. Their actions are as follows :

- (a) **Proteolytic enzymes present in gastric juice**
- (i) **Pepsin** : It acts on proteins and form peptones. It hydrolyses soluble casein, a milk protein into paracasein.
- (ii) **Renin** : It is present in calf gastric juice and hydrolyses casein into paracasein leading to milk coagulation.
- (b) **Proteolytic enzymes present in the pancreatic juice.**
- (i) **Trypsin** : Hydrolyses basic protein into peptides. It also hydrolyses fibrinogen to fibrin in case of blood sucking animals.
- (ii) **Chymotrypsin** is milk coagulating enzyme and hydrolyses casein to paracasein which then coagulates into calcium paracaseinate.
- (c) Proteolytic enzymes present in the intestinal juice completes the digestion of proteins in the small intestine by forming amino acids.

23. Exchange of respiratory gases, *i.e.*, oxygen and carbon dioxide occurs between the blood and tissues.

In tissues, oxygen is used up for their activities and carbon dioxide is released. The blood from lungs has high concentration of oxygen and low concentration of carbon dioxide. Due to this difference in concentration of oxygen and carbon dioxide, the exchange of gases takes place between tissue and blood.



24. **Lymphatic System** : It is a system of tiny tubes called lymph vessels or lymphatics and lymph nodes or lymph glands in the human body which transports the liquid, lymph from the body tissues to the blood circulatory system.

Lymphatic system runs parallel to veins and consists of the following parts :

- **Lymph** or tissue fluid is colourless containing lymphocyte cells which fight against infection. Lymph flows only in one direction, *i.e.*, from tissues to heart. Lymph is also called extracellular fluid as it lies outside the cells. Lymph drains into lymphatic capillaries.
- **Lymphatic capillaries** are thin-walled capillaries forming a network in every organ except nervous system.
- **Lymphatic vessels** form a second pathway for fluid returning from the tissues to the heart. The lymphatic capillaries unite to form lymphatic vessels which are very small veins in structure.
- **Lymph nodes or Lymph glands** are situated in the course of the lymph vessels and generally occur in groups and are oval or kidney shaped. They are rich with phagocytes and lymphocytes, thus act as filters for the microorganisms.

#### Functions of Lymph

- (i) Lymph carries digested and absorbed fat from intestine and drains excess fluid from extra cellular space back into the blood.
- (ii) It protects the body by killing the germs drained out of the body tissues with the help of lymphocytes contained in the lymph nodes.

molecules which play a key role in the photosynthetic process. The different types of chlorophyll molecules are chlorophyll a, b, c, d, e and bacteriochlorophyll; of which chlorophyll a and b are the most common.

- (iv) **Light.** Light affects photosynthesis by its intensity, quality and duration. In green light, the rate of photosynthesis is minimum, while in red and blue lights the rate of photosynthesis is maximum. Rate of photosynthesis is higher in plants getting average light of 10-12 hrs a day.

(b) **Differences**

**Autotrophic nutrition**

- (i) In this, the organisms make their food from carbon dioxide and water in the presence of sunlight and chlorophyll.
- (ii) All green plants are autotrophic and use light as a source of energy for synthesis.

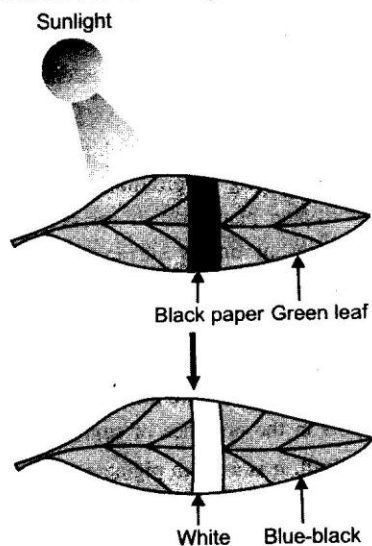
12. (a) The three events that occur during the process of photosynthesis are :

- (i) Absorption of light energy by the green pigment chlorophyll.
- (ii) Conversion of light energy into chemical energy and the splitting of water molecule into hydrogen and oxygen.
- (iii) Reduction of carbon dioxide into carbohydrate.

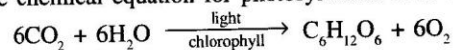
**Role of Stomata**

Stomata are tiny pores present on the surface of leaves. They are also present on the surface of young stems and roots, stomata are mainly engaged in the exchange of gases (entry of CO<sub>2</sub> and release of O<sub>2</sub>) associated with photosynthesis. Plant closes the stomata when it does not need CO<sub>2</sub> for photosynthesis.

- (b) **Sunlight is essential for Photosynthesis :** A healthy green potted plant is placed in a dark room for 1-2 days. This is done to ensure that the plant consumes all its reserve food and the leaves do not contain any starch. Both sides of a green leaf is covered with two uniform pieces of black paper and then fix the cover in position with two paper clips.



The chemical equation for photosynthesis is as follows :



11. (a) No, this plant will not remain healthy for long.

The plant will begin to die because

- (i) Gaseous exchange will not take place.
- (ii) No absorption of CO<sub>2</sub>, hence no photosynthesis.
- (iii) Transpiration will not occur; hence no transport of water.

**Heterotrophic nutrition**

- (i) In this, the organisms derive their food or nutrients from other living organisms.
- (ii) The energy is derived from the intake and digestion of the organic substances.

Now, the plant is exposed to bright light. After few hours, the leaf is removed and it is decolourised with alcohol. Now, the presence of food (starch) is tested by putting iodine solution on the leaf. It can be observed that the covered portion of the leaf does not show any presence of starch (food).

This is because plants store the food prepared by the process of photosynthesis as starch. Starch reacts with iodine solution to give blue-black colour. In this experiment, only those portions of the leaf that were exposed to light could photosynthesise. Hence, the uncovered portion of the leaf gives blue-black colour when tested with iodine. So, it does not change its colour when treated with iodine solution.

Thus, it can be concluded that the sunlight is essential for photosynthesis.

13. The process of digestion of food in mouth, stomach and small intestine in human body are as follows :

**Mouth :** Digestion of food begins in the mouth. Saliva present in mouth contains a digestive enzyme, called salivary amylase, which breaks down starch into sugar.

**Stomach :** Stomach stores and mixes the food received from the oesophagus with gastric juices. The main components of gastric juice are hydrochloric acid, mucus and pepsinogen. Hydrochloric acid dissolves bits of food and creates an acidic medium. In this medium, pepsinogen is converted to pepsin which is a protein digesting enzyme. Mucus protects the inner lining of the stomach from the action of HCl.

**Small Intestine :** Small intestine is the site of complete digestion of carbohydrates, proteins and fats. Small intestine produces intestinal juice from the glands present in its wall. The intestinal juice helps in further digestion of food. Small intestine also obtains digestive juices from liver and pancreas that helps in mixing of food.

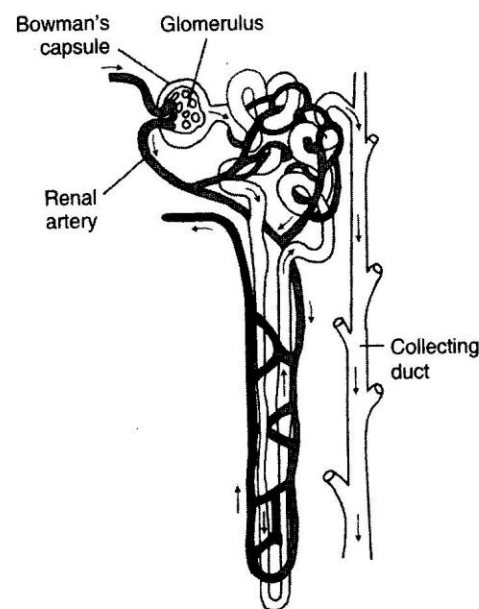
The liver produces bile juice that causes emulsification of fats and the pancreas produces pancreatic juice for digesting proteins and emulsified fats. This digested food is finally absorbed through the intestinal walls.

14. Xylem (vessels) of roots, stems and leaves are interconnected to form a continuous column. Roots also take up mineral salts actively, water moves in as a result creating pressure - the root

pressure pushes the water up. Stomatal transpiration creates suction force, pulling up the water from root xylem/ transpiration pull.

15. (a) (1) Pyruvate (3 carbon molecules)  
 (2) Energy (3) Presence of oxygen  
 (4) In Mitochondria (5) Carbon dioxide  
 (6) Water  
 (b) ATP  
 (c) Lactic acid accumulation, in the absence of oxygen (anaerobic respiration)
16. (a) The process of allowing oxygen from air to enter the lungs and expulsion of carbon dioxide out of the lungs is called breathing.  
 The rate of breathing during vigorous exercise increases by about 20 to 25 times per minute. It is because, during vigorous exercise the demand for oxygen increases. Breathing occurs involuntarily but its rate is controlled by the respiratory centre of the brain.
- (b) Translocation is the transport of food from the leaves to other parts of the plant and occurs in the part of the vascular tissue known as phloem.  
 It is essential for plants because every part of the plant needs food for obtaining energy for building its parts and maintaining its life.
- (i) Sugar is synthesised in the leaves of the plant.  
 (ii) Hormones are synthesised at the tips of roots and stems of a plant.

17. (a)

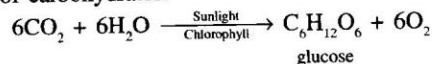


Structure of a Nephron

- (b) During excretion in human beings, glucose which enters the nephron along with filtrate gets reabsorbed by blood capillaries surrounding the nephron.

### Important Questions

18. 'Photosynthesis' is a process in which green plants use sunlight, chlorophyll, CO<sub>2</sub> and water to synthesise organic food in the form of carbohydrates.



It occurs in two stages :

- (i) **Light reaction** : During this reaction, ATP and NADPH are generated. This step is light dependent.  
 (ii) **Dark reaction** : It is not dependent on light. During this reaction, CO<sub>2</sub> is reduced to carbohydrate. Source of energy is ATP and NADPH.
19. Differences between :

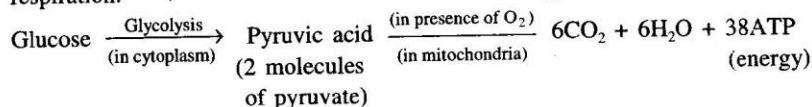
#### Breathing

- (i) It is a bio-physical process where oxygen is taken and carbon dioxide is given out.  
 (ii) It does not require enzymes.  
 (iii) No energy is released during this process.  
 (iv) It occurs at organ level.  
 (v) It is found in higher animals only.

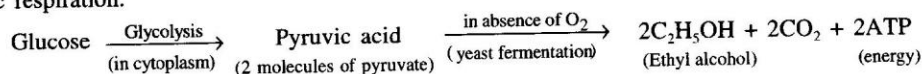
#### Respiration

- (i) It is a bio-chemical process where oxidation of food occurs and carbon dioxide is released.  
 (ii) It occurs in the presence of respiratory enzymes.  
 (iii) Energy is released in the form of ATP.  
 (iv) It occurs at cellular level.  
 (v) It is found in all animals and plants.

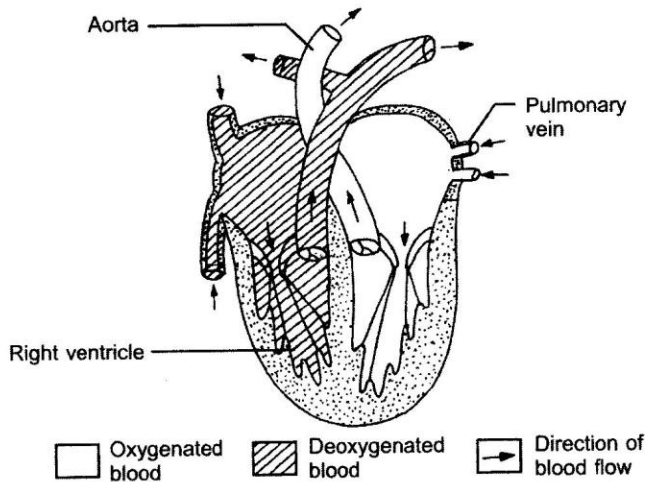
**Aerobic respiration.** When tissues carry out oxidation of food materials, utilising molecular oxygen ; the process is called aerobic respiration.



**Anaerobic respiration.** When cells or organisms carry out oxidation of nutrients without utilising molecular oxygen ; the process is called anaerobic respiration.



7. (a)



**Internal Structure of Human Heart**

(b) The functions of the following components of the transport system are :

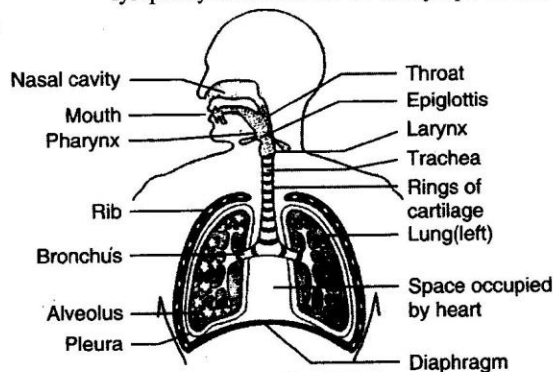
(i) **Blood :**

- Oxygen is transported to the tissues of the body for the purpose of respiration.
- Carbon dioxide is transported to the lungs by the blood plasma.
- The digested and absorbed nutrients are transported to the tissues.
- Nitrogenous wastes are transported to the kidneys.
- The blood regulates the body temperature.
- It maintains the pH of the body tissues.
- It transports various hormones from one region to another and bring about the coordination.
- It maintains water balance to constant level.
- The lymphocytes produce antibodies against the invading antigens and protects from diseases.
- Blood helps in rapid healing of wounds by forming a clot at the site of injury.

(ii) **Lymph :**

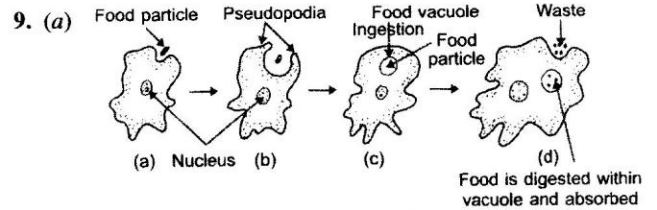
- It carries digested and absorbed fat from intestine and drains excess fluid from extracellular space back into the blood.
- It protects the body by killing the germs drained out of the body tissues with the help of lymphocytes contained in the lymph nodes.

8. (a)



**Human Respiratory System**

(b) The conditions required for efficient gas exchange in an organism are that the membrane should be extensive, thin, highly vascularised and easily permeable to oxygen and carbon dioxide.



**Nutrition in Amoeba**

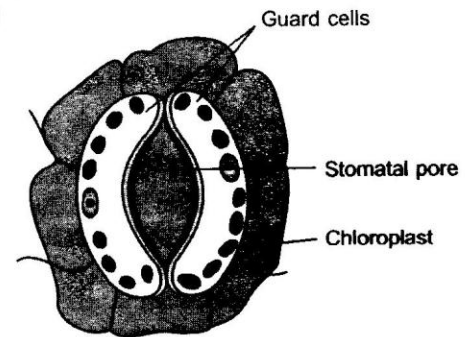
Pseudopodia serves the purpose of locomotion apart from nutrition.

(b) The salivary gland is associated with digestion of starch in human digestive tract.

It secretes saliva with the help of enzyme salivary amylase which converts starch into maltose (sugar).

(c) Gastric glands present on the walls of the stomach release HCl acid. HCl creates an acidic medium, which facilitates the action of enzyme pepsin. Bile juice from liver makes the food alkaline in small intestine for the pancreatic enzymes to act.

10. (a)



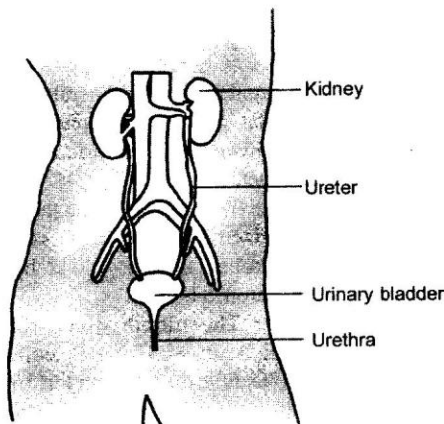
**Open Stomata**

**Functions of stomata**

- Gas exchanges between plant and the atmosphere.
  - Plant loses water through stomata which helps in movement of minerals from soil to leaves.
- (b) **Raw Materials for Photosynthesis.** Carbon dioxide, water, chlorophyll and sunlight are the essential raw materials for photosynthesis.
- Carbon dioxide** is a gas, which is released into the atmosphere during respiration. This gas is utilised by the autotrophic plants which enters the leaf through the stomata present on its surface during the process of photosynthesis.
  - Water** is another requirement for photosynthesis, which is transported upward through xylem tissues to the leaves, from where it reaches the photosynthetic cells. This water then splits in the presence of sunlight and chlorophyll.
  - Chlorophyll.** It is a green pigment in plants, which acts as a catalyst. It is responsible for absorption of the sun's energy by the plant. The chlorophyll pigments are photoreceptor

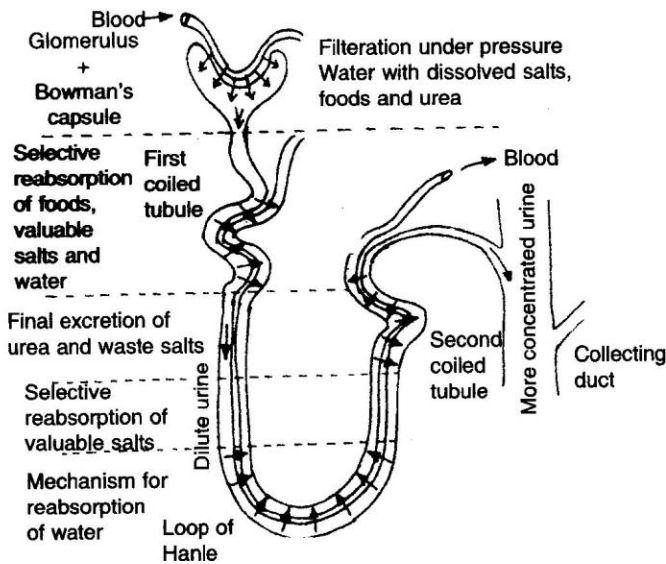
- (b) Quantity of dissolved oxygen is fairly low in water compared to the amount of oxygen in air. Aquatic organisms therefore have to breath faster than terrestrial organisms.

4. (a)



*Excretory system in human beings*

- (b) **Mechanism of Urine Formation.** Urine is formed in the kidneys. There are numerous excretory units called nephrons and each nephron is very thin thread like structures with its one end bearing a cup-shaped structure known as Bowman's capsule. A thin network of blood vessels known as glomerulus is present in the Bowman's capsule, which consists of afferent and efferent arterioles.

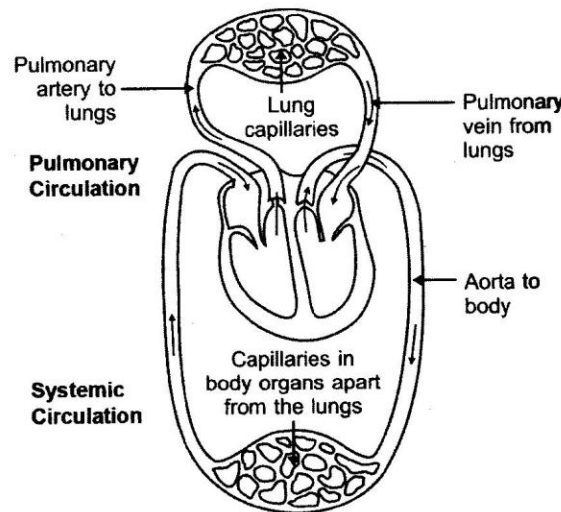


*Kidney and its functions*

Urine is formed in two stages called filtration and reabsorption (Fig.). In filtration, blood is filtered into kidney tubules to form a clear fluid containing the waste substance urea, and many useful substances like glucose and amino acids. The filtration occurs in the glomeruli. The useful substances are reabsorbed from the filtrate back into the blood leaving only urea and other substances in the kidney tubules.

- (c) The two excretory products other than  $O_2$  and  $CO_2$  in plants are resins and gums.

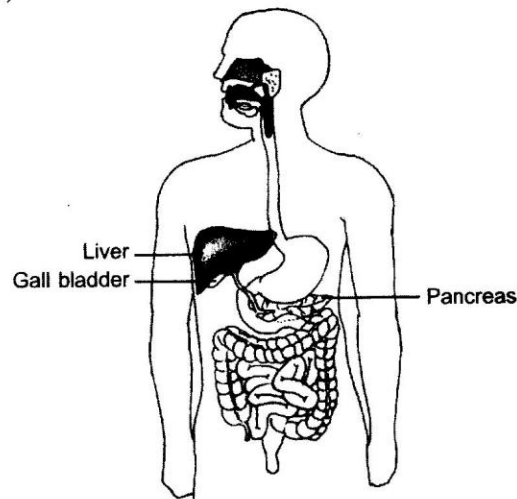
5. (a)



*A schematic representation of transport and exchange of oxygen and carbon dioxide during transportation of blood in human beings*

- (b) It is necessary to separate oxygenated and deoxygenated blood in mammals and birds, because they need high energy and large amount of oxygen. The separation of oxygenated and deoxygenated blood provides high oxygen supply to the organs.

6. (a)



*Alimentary canal of man*

- (b) **Liver** : It secretes bile juice which breaks down fats into fat globules.  
**Pancreas** : It secretes pancreatic juice which contains protein digesting and starch digesting enzymes.
- (c) The organ which performs the following functions in humans are as follows :
- Absorption of digested food – Ileum of small intestine.
  - Absorption of water – Large intestine.

## NCERT Questions

31. The different criteria that can be used to decide whether something is alive are the various features of living organisms, which are as follows :

- |                         |                    |
|-------------------------|--------------------|
| (i) Movement            | (ii) Growth        |
| (iii) Metabolism        | (iv) Cellular body |
| (v) Nutrition           | (vi) Respiration   |
| (vii) Transportation    | (viii) Excretion   |
| (ix) Respond to stimuli | (x) Reproduction.  |

32. The components of the transport system in human beings are as follows—

- (i) **Blood** : It is a fluid connective tissue that transports digested food, oxygen, carbon dioxide and nitrogenous wastes dissolved in it.
- (ii) **Blood vessels** : They are of two types **arteries** which carry blood from heart to different organs of the body and **veins** bring blood back to the heart.
- (iii) **Heart** : It is a muscular organ which pumps blood into arteries and thus, to different organs.

33. **Structure of a Nephron** : A nephron is made up of

- (i) A globular double walled **Bowman's capsule** around a cluster of capillaries or glomerulus. The blood enters into glomerulus through afferent arteriole of renal artery and leaves it through efferent arteriole.
- (ii) **Tubule** surrounded by blood capillaries. It consists of :
  - (a) Proximal convoluted portion.
  - (b) The loop of Henle with descending and ascending limbs, and
  - (c) A distal convoluted part.

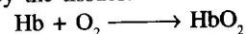
The nephron empties into a collecting duct. The tubule is connected with collecting duct at one end and a cup-shaped structure, *i.e.*, the Bowman's capsule at the other end.

### Functioning of Nephron :

Urine is formed by three processes—glomerular filtration, tubular reabsorption and tubular secretion.

- (i) **Filtration** : Filtration of blood takes place in Bowman's capsule from the capillaries of glomerulus. The filtrate passes into the tubular part of the nephron. This filtrate contains glucose, amino acids, urea, uric acid, salts and a major amount of water.
  - (ii) **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.
  - (iii) **Tubular Secretion** : The filtrate which remains after reabsorption is called urine. Urine is collected from nephrons by the collecting duct to carry it to the ureter. The secretion of H<sup>+</sup> helps to regulate the pH of the blood.
34. The necessary conditions for autotrophic nutrition are as follows :
- (i) CO<sub>2</sub> is necessary for photosynthesis.
  - (ii) Water is required.
  - (iii) Sunlight is necessary for photosynthesis.
  - (iv) Chlorophyll is essential for photosynthesis. Oxygen is liberated as a by-product.

35. **Transport of Oxygen** : It is transported from respiratory organs to body cells. Haemoglobin helps in the transport of oxygen. In the alveoli of the lungs, the haemoglobin (Hb) combines with oxygen to form oxyhaemoglobin. When the blood reaches the tissues, oxygen is released from the oxyhaemoglobin for the consumption by the tissues.



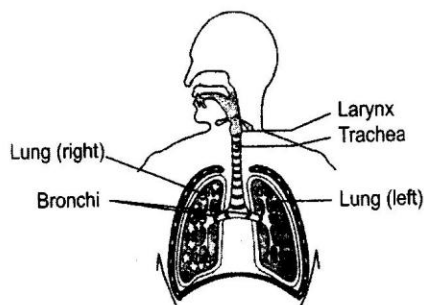
**Transport of Carbon dioxide** : CO<sub>2</sub> is more soluble in water. Hence, it is mostly transported from body tissues in the dissolved form in our blood plasma to lungs where it diffuses from blood to air in the lungs and then expelled out through nostrils.

## LONG ANSWER TYPE QUESTIONS

[5 MARKS]

### Previous Years' Questions

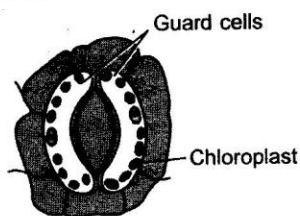
1. (a)



*Human Respiratory System*

(b) Rings of cartilages are present in trachea. These rings support the trachea and do not allow the trachea to collapse when there is less air in it.

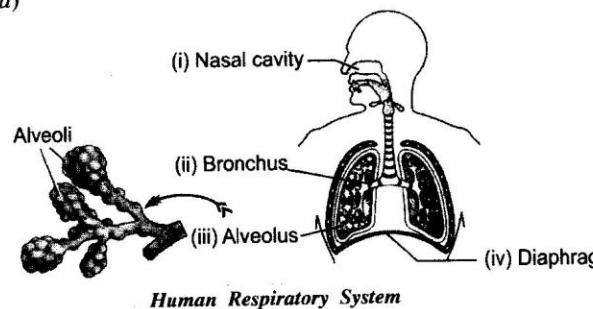
2. (a)



(b) Two functions of stomata are :

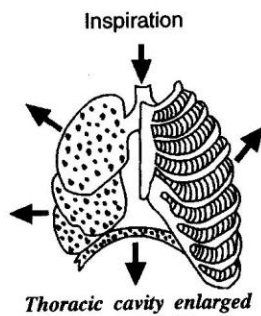
- (i) Exchange of gases between the plant and the atmosphere takes place through stomata.
  - (ii) Transpiration in plants take place through stomata.
- (c) **Opening and Closing of Stomatal Pore.** The opening and closing of the pore is a function of the guard cells. The guard cells swell when water flows into them causing the stomatal pore to open. Similarly, the pore closes if the guard cells shrink. As large amount of water is lost through these stomata, the plant closes these pores when it does not require carbon dioxide for photosynthesis.

3. (a)



*Human Respiratory System*





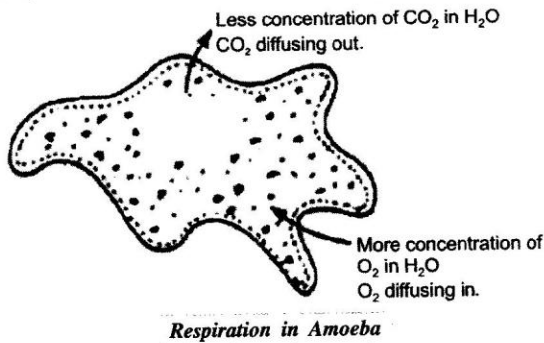
### Tracheoles

16.

- (i) They are fine breathing tubes in the tracheal system of insects.
- (ii) They are the ultimate branches of trachea.
- (iii) Tracheoles lie freely in the body cavity.
- (iv) The finer tracheoles contain a fluid.
- (v) They communicate directly with the tissue fluid.
- (vi) They exchange gases with the tissue fluid.

17. There are three pairs of salivary glands, viz. parotids, submaxillary and sublingual, which secrete saliva, a watery fluid in the mouth. Saliva contains a starch digesting enzyme - the mucin, which helps to lubricate the food for swallowing. In some animals, the starch digesting enzyme ptyalin acts on the starch and converts into maltose, isomaltose and limit dextrin in the alkaline medium.

18. **Gaseous exchange in Amoeba** : Amoeba has no special respiratory pigment. But there is a free exchange of gases that takes place by diffusion or osmosis through the general body surface, which is permeable to the respiratory gases dissolved in water. Oxygen constantly diffuses in the cytoplasm for its concentration in water is always higher than in the cytoplasm. The oxygen used is not obtained from the water molecule. It is free oxygen dissolved in water from atmosphere or produced as a by-product during the process of photosynthesis by the aquatic plants. Carbon dioxide diffuses out as it is always in a higher concentration within the body of Amoeba than in the surrounding water.



21. Differences between :

#### Intracellular Digestion

- (i) Digestion occurs within the cells in the food vacuoles.
- (ii) Enzymes are secreted into the food vacuole.
- (iii) The products of digestion diffuse into the cytoplasm, e.g., Amoeba.

#### Extracellular Digestion

- (i) Food is digested outside the cells in the cavity of alimentary canal.
- (ii) Enzymes are secreted into the digestive cavity.
- (iii) The products of digestion are absorbed by blood and carried to various parts of the body, e.g., Man.

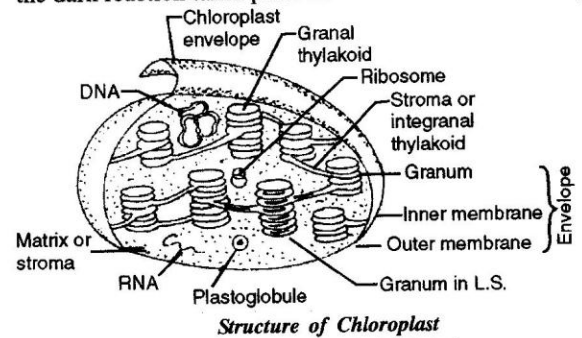
15. **Stomata** or **stoma** is a pore, large numbers of which are present in the epidermis of leaves and young shoots. Each stoma is bordered by two semicircular guard cells. Stomata functions in gaseous exchange between the plant and the atmosphere. **Lenticel** is any of the raised pores in the stems of woody plants. The pore is formed by the cork cambium, which at certain points produce a loose bulky form of cork that pushes through the outer tissues to create the lenticel. Lenticel function in gas exchange between the atmosphere and the internal tissues.

### Bronchioles

- (i) They are the breathing tubes in the lungs of higher vertebrates.
- (ii) They are the branches of smaller bronchi.
- (iii) Bronchioles occur inside lungs.
- (iv) Finer bronchioles and alveoli are devoid of any fluid.
- (v) Bronchioles ultimately open into alveolar sacs. There is no direct connection with the tissue fluid.
- (vi) They exchange gases with the blood capillaries present on the walls of alveoli.

19. Aquatic animals like fish use gills as their respiratory organ. Respiration through gills is known as **branchial respiration**. The blood flowing in the capillaries of gills absorb oxygen and gives carbon dioxide to the water passing over them by diffusion through thin epithelium.

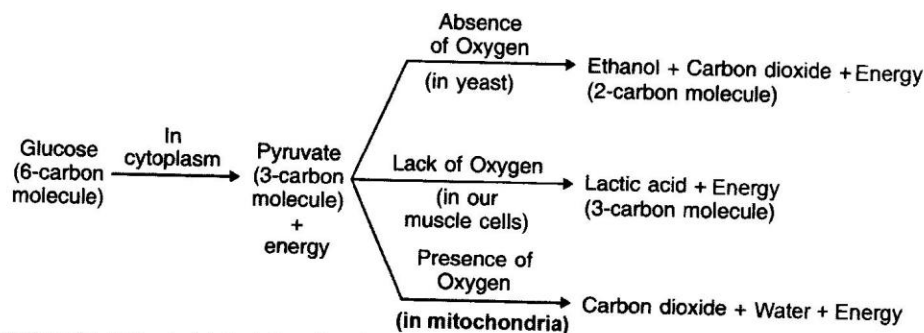
20. **Chloroplasts** are the plastids which are microscopic cell organelles containing the green pigment chlorophyll. They occur mainly in the mesophyll cells of leaves and are found in large number in those plant algal cells undergoing photosynthesis. Plant chloroplasts are typically lens shaped and minute bodies bounded by a double membrane. The interior contains closely packed membranous flattened sacs called **thylakoids** which are piled up into stacks called **granum** and surrounded by a gel-like matrix called **stroma**. The grana are interconnected by inter granal lamellae, the **stroma lamellae**. All the pigments are found in thylakoids of grana where the light reaction of photosynthesis occurs, while the dark reaction takes place in the stroma of the chloroplast.



32. In living organisms, food material taken is used by cells to provide energy.

Living organisms do these by three different pathways. But in all the three pathways, the first step is common which is the breakdown of glucose into pyruvate. These process takes place in cytoplasm. Pyruvate is then converted to provide energy in the following three pathways :

#### Breakdown of Glucose by Various Pathways



- (i) In yeast, pyruvate gets converted into ethanol and carbon dioxide and the process is called fermentation.
- (ii) In absence of oxygen, in muscle cells, pyruvate breaks down into lactic acid, this is an anaerobic process.
- (iii) In aerobic respiration, *i.e.* in presence of oxygen, pyruvate gets converted into carbon dioxide and water.

## VALUE BASED QUESTIONS

1. (a) Yes, he should construct the house by cutting minimum numbers of trees.  
 (b) We will plant equal numbers of trees in a different place to compensate for the loss.  
 (c) No. We have to water the trees regularly in the initial stage. The trees are also to be maintained by weeding and also by protecting them from animals in the initial stage.  
 (d) The value shown are love for nature and concern for protection of environment.
2. (a) The values showed by the driver were love for mankind and his driving knowledge.  
 (b) It is a procedure used on patients whose kidneys have got damaged. In the process, blood of the patient is allowed to pass through the long cellulose tubes dipped in a tank containing dialysing solution having same ionic concentration as plasma. The waste substances diffuse out of blood into the tank and the cleaned blood is returned back into the patient through a vein.  
 (c) We should always give pass to ambulances, fire brigades and police vehicles.
3. (a) People who donates organ show love for mankind.  
 (b) Organ donation agreement does not affect the donor as the organs are removed only after death of the person.  
 (c) The organ donation camp failed because people are still not well informed about organ donation. Government can launch a campaign to make people aware about organ donation.
4. (a) The main causes of a heart attack are – high level of cholesterol, hereditary factor, tobacco consumption, obesity, high blood pressure, stress, inflammatory diseases of arteries, trauma and disease of heart.  
 (b) The symptoms of a heart attack are— chest pain, pain on the shoulder, dizziness, shortness of breath, sweating, heartburn and nausea.  
 (c) I will call an ambulance immediately to take the person to a hospital. The following first aid will be provided to the person—  
 (i) The person will be made calm.  
 (ii) His tight clothes will be made little loose to facilitate easy breathing.  
 (iii) If no pulse is detected, he will be helped in respiration by pumping the chest and by blowing through his mouth. 15 pumps should be followed by 2 artificial respirations.
5. (a) The values showed by my mother were humanity and awareness about rules of the country.  
 (b) In human, transportation of oxygen, nutrients, hormones and other substances to the tissues, CO<sub>2</sub> to the lungs and waste products to the kidneys are carried out by blood. If a person bleeds profusely, these function may stop working after sometime and the person may die.  
 (c) There was a court order by which court had instructed all hospitals to provide immediate treatment to accident victims without waiting for police to arrive. Refusal to provide immediate treatment is a punishable offense. I will remind the hospital about the court order and shall request them to provide treatment to the victim without waiting for police.