

# Life Processes

## TOPIC COVERED

### Nutrition

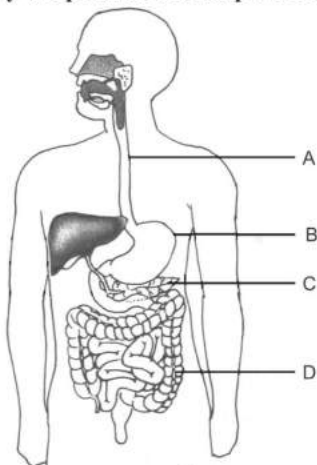


#### Multiple Choice Questions

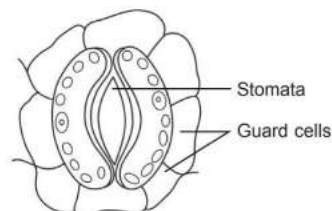
1 Mark



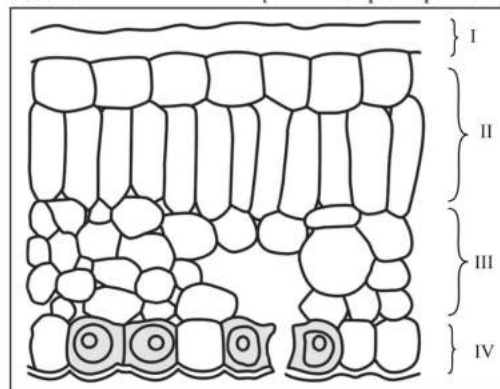
- Autotrophic organisms include
  - bacteria and virus
  - bacteria and fungi
  - green plants and some bacteria
  - green plants and all bacteria
- A gland not associated with the alimentary canal is
  - liver
  - salivary glands
  - pancreas
  - adrenal
- Which of the following are chiefly digested in the stomach?
  - Carbohydrates
  - Proteins
  - Lipids
  - Fats
- From the given picture of the digestive system, identify the part labelled as pancreas.



- A
  - B
  - C
  - D
- The process in which loss of water takes place in the form of water vapour through stomata is called
  - transportation
  - transpiration
  - guttation
  - translocation
- Which one of the following conditions is true for the state of stomata of a green leaf shown in the given diagram? [CBSE 2021]



- Large amount of water flows into the guard cells.
  - Gaseous exchange is occurring in large amount.
  - Large amount of water flows out from the guard cells.
  - Large amount of sugar collects in the guard cells.
7. In the given transverse section of the leaf identify the layer of cells where maximum photosynthesis occurs. [CBSE Sample Paper 2023]



- I, II
  - II, III
  - III, IV
  - I, IV
8. Many processes happen in the bodies of living organisms. Those processes which involve the building up of complex molecules from simpler ones are called anabolism. Those which involve the breakdown of complex molecules into simpler ones are called catabolism. Which of the following life processes can be considered as an example of anabolism?

[CFPQ, CBSE]

- Digestion
- Respiration
- Transpiration
- Photosynthesis

9. Read the following two statements and answer the question.

1. Gastroparesis is a disease in which the muscles of the stomach become paralysed and cannot contract or relax.
2. Foods high in fat can delay the process of digestion and the emptying of the stomach.

Which of the following food would be advised to a patient suffering from gastroparesis? [CFPQ, CBSE]

- (a) Soups and juices only
- (b) Soups and chicken salads only
- (c) Fried chicken and fried rice
- (d) Ice cream and milk only

10. Opening and closing of stomata is due to:

[CBSE 2023]

- (a) High pressure of gases inside the cells.
- (b) Movement of water in and out of the guard cells.
- (c) Stimulus of light in the guard cells.
- (d) Diffusion of  $\text{CO}_2$  in and out of the guard cells.

11. An incomplete equation for the digestion of starch using saliva is shown as:

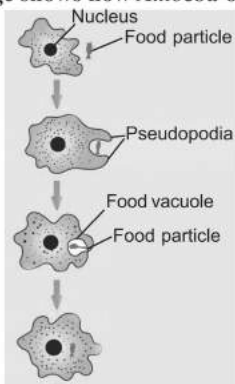
Saliva + Starch (in test tube)  $\longrightarrow$

What will be the likely outcome of this?

[CBSE T.E.R.M.\*]

- (a) Saliva will convert starch into complex fat molecules.
- (b) Saliva will convert starch into complex sugar molecules.
- (c) Saliva will breakdown starch into simple sugar molecules.
- (d) Saliva will breakdown starch into simple protein molecules.

12. The image shows how *Amoeba* obtains nutrition.



How this process is advantageous for *Amoeba*?

[CBSE T.E.R.M.\*]

- (a) Capturing of food takes less time.
- (b) Complex food can be digested easily.
- (c) More amount of food can be consumed.
- (d) Fast distribution of nutrition within the body.

## Answers

1. (c) Green plants and some bacteria can make their own food in presence of sunlight.
2. (d) There are two adrenal glands located in our body, one of top of each kidney.
3. (b) Digestion of proteins chiefly occurs in the stomach.
4. (c) 5. (b) 6. (c) 7. (b)
8. (d) Photosynthesis can be considered as an example of anabolism as carbohydrates are synthesised by green plants in this process using carbon dioxide and water.
9. (a)
10. (b)
11. (c) Saliva contains an enzyme called salivary amylase that breaks down starch which is a complex molecule to give simple sugar.
12. (d)



**Very Short Answer  
Type Questions 2 Marks**



13. Explain the process of nutrition in *Amoeba*.

Ans. The mode of nutrition in *Amoeba* is holozoic. It feeds on unicellular plant or animal. The various steps of nutrition are ingestion, digestion, assimilation and egestion. When *Amoeba* comes in contact with food particles, it sends out pseudopodia, which engulfs the prey by forming a food cup, which is known as ingestion. When the tips of the encircling pseudopodia touch each other, the food is encaptured into a bag called food vacuole. The food vacuole serves as a temporary stomach secreting digestive juice, this step is known as digestion. The digested food gets absorbed and diffuses into the cytoplasm and then assimilated. Egestion of undigested food takes place at any point on the surface of the body.

14. What is saliva? State its role in the digestion of food.

Ans. Saliva is a watery fluid secreted by the salivary glands in the mouth. In the mouth, food gets mixed up with saliva secreted by salivary glands. Saliva contains an enzyme salivary amylase which breaks polysaccharide starch into disaccharide maltose (sugar).

15. What is the role of HCl in protein digestion?

[HOTS]

Ans. HCl activates pepsinogen into active pepsin, which is a protease.

16. Why is the inner wall of alimentary canal not digested although the digestive enzyme can digest all the materials that make cells?

[HOTS]

Ans. The inner wall of alimentary canal is not digested because it has the following protective mechanisms:

- (i) The gastric mucin secreted by the gastric mucosa acts as buffer, which reduces high gastric acidity and prevents injury to the inner wall of the alimentary canal.
- (ii) The enzymes are secreted only when food is present in the alimentary canal and they are in an inactive form.

**17. Where are salivary glands situated in man? What are their functions?**

**Ans.** Salivary glands are situated in the mouth of man and contains starch-digestive enzymes. Salivary glands secrete saliva and the mucin in saliva helps to lubricate the food for swallowing.

**18. State two functions performed by bile juice.** [CBSE 2016]

**Ans.** Bile juice is secreted by the liver. (i) It contains bile pigments, bile salts that emulsifies fat to fatty acids. (ii) Bile juice also neutralizes the acidic food in the stomach and makes it alkaline so that it can react with the enzymes of pancreatic juice.

**19. Write any two functions of large intestine in man.**

**Ans.** Functions of large intestine in man are:  
 (i) It serves to store the unabsorbed food remnants temporarily.  
 (ii) It concentrates the contents by absorbing water.  
 (iii) The movements of colon help to void the faeces through anus. (any two)

**20. How would digestion of food be affected if the bile duct is completely blocked? Explain.** [HOTS]

**Ans.** If the bile duct is completely blocked, bile juice will not reach the small intestine and the digestion of fats will be affected.

**21. How would it affect the digestion of proteins and carbohydrates in the duodenum of man if there is a blockage in the pancreatic duct? Explain.** [HOTS]

**Ans.** If there is a blockage in the pancreatic duct, the pancreatic juice which contains enzymes for the digestion of carbohydrates and proteins will not reach the small intestine.

**22. What are enzymes? Name any one enzyme of our digestive system and write its function.**

**Ans.** Enzymes are biological catalysts. Catalysts are proteins that increase the rate of chemical reactions without being used up.  
 For example: Amylase catalyses the breakdown of starch into sugars in the mouth and small intestine.

**23. Patients whose gall bladder are removed are recommended to eat less oily food. Why?**

**Ans.** Gall bladder stores bile which helps in emulsification of lipids. (1 Mark)  
 [CBSE Sample Paper 2023]

In the absence of stored bile, emulsification of fats will be negligible/ affected/ less (1 Mark) and thus fat digestion will be slow. Hence there are such diet restrictions. [CBSE Marking Scheme]

**24. There are various muscles present in the human digestive system known as sphincters. Two examples of those are given below:**

1. pyloric sphincter - at the junction of stomach and small intestine
  2. anal sphincter - at the anus
- Give ONE most likely consequence of malfunctioning of each of these sphincters.**

[CFPQ, CBSE]

**Ans.** **Pyloric sphincter:** Food getting into small intestine too fast causing poor absorption/poor digestion.

**Anal sphincter:** Involuntary release of feces from the body

**25. (a) What is peristaltic movement?**

**(b) 'Stomata remain closed in desert plants during daytime'. How do they do photosynthesis?**

[KVS]

**Ans. (a)** The relaxation of gut muscles to move the partially digested food downwards throughout the alimentary canal is called peristaltic movement.

**(b)** In desert plants, stomata open at night and take in carbon dioxide (CO<sub>2</sub>). Stomata remain closed during daytime to prevent the loss of water by transpiration. They take carbon dioxide during the night time and convert it into intermediate product of photosynthesis. During the day time in the presence of sunlight this intermediate compound is convert into the final product of photosynthesis.

**26. In each of the following situations what happens to the rate of photosynthesis?**

**(a) Cloudy days**

**(b) Stomata gets blocked due to dust** [KVS]

**Ans. (a)** In cloudy days photosynthesis is reduced due to low light intensity.

**(b)** When stomata gets blocked due to dust, photosynthesis decreases by reducing gaseous exchange.



### Short Answer Type Questions 3 Marks



**27. (a) Explain the process of nutrition in Amoeba.**  
**(b) If you chew chapatti for long after some time it taste sweet? Why is this so?** [DoE]

**Ans. (a)** The various steps of nutrition are ingestion, digestion, assimilation and egestion. When *Amoeba* comes in contact with food particles, it sends out pseudopodia, which engulfs the prey by forming a food cup, which is known

as ingestion. When the tips of the encircling pseudopodia touch each other, the food is encaptured into a bag called food vacuole. The food vacuole serves as a temporary stomach secreting digestive juice, this step is known as digestion. The digested food gets absorbed and diffuses into the cytoplasm and then assimilated. Egestion of undigested food takes place at any point on the surface of the body.

- (b) Chapatti contains starch which is converted to simple sugar by the action of enzyme salivary amylase. The salivary glands help in chemical digestion by secreting enzyme.

28. (a) **1 ml of dilute starch solution (1% starch solution) is taken in test tube and 1 ml of saliva is added to it. After keeping the mixture for an hour, few drops of iodine solution are added to the test tube. Is there any change in the colour of the test tube? What does this tell you about the action of saliva on starch?**

- (b) **How would digestion of food be affected if the bile duct is completely blocked? Explain.** [HOTS]

Ans. (a) There is no change in colour when iodine solution is added to the test tube. Saliva had broken down starch into simple sugar which does not react with iodine solution to produce any colour.

- (b) If the bile duct is completely blocked, bile juice will not reach the small intestine and the digestion of fats will be affected.

29. (a) **Where are salivary glands situated in man? What are their functions?**

- (b) **Name the first digestive organ that is associated with the breakdown of proteins in humans. What are its three releases?**

Ans. (a) Salivary glands are situated in the mouth of man and contains starch-digestive enzymes. Salivary glands secrete saliva which helps to lubricate the food for swallowing and helps in digestion of starch.

- (b) The first digestive organ in humans is the stomach. It releases are enzymes, HCl and mucus.

30. (a) **Write the functions of large intestine in man.**

- (b) **What is dental caries? What are its adverse effect?**

Ans. (a) The walls of large intestine absorbs water and electrolytes from the undigested food and forms and stores faeces.

- (b) It is the tooth decay which involves destruction of the enamel layer of the tooth by acids produced by the action of bacteria on sugar. If dental caries is not treated, it can spread to the dentine and

pulp of the tooth, causing inflammation and infection of the tooth.

31. (a) **What are enzymes? Name any one enzyme of our digestive system and write its function.**

- (b) **Explain the cause of cramps after excessive physical exercise.** [DoE]

Ans. (a) Enzymes are biological catalysts, which increase the rate of chemical reactions without being used up.

For example: Salivary amylase catalyses the breakdown of starch into sugars in the mouth and small intestine

- (b) During excessive physical exercise, most of our energy in our muscles is produced by aerobic respiration. Anaerobic respiration in muscles provide only some extra energy which is needed under excessive physical exercise. The anaerobic respiration breakdown glucose into lactic acid. This lactic acid accumulates in the muscle. This accumulation of lactic acid in this muscles cause muscle cramps.

32. **In human alimentary canal, name the site of complete digestion of various components of food. Explain the process of digestion.** [CBSE 2012]

Ans. In small intestine, complete digestion of various components of food take place.

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 pepsin.

33. **State the role of the following in human digestive system:**

- (a) **Digestive enzymes**

- (b) **Hydrochloric acid** [KVS]

- (c) **Villi** [CBSE 2015, KVS]

Ans. (a) Digestive enzymes digest the food we eat.

- (b) Hydrochloric acid creates an acidic medium to facilitate the action of enzyme pepsin.

- (c) Villi increases the surface area inside the small intestine to facilitate absorption of food.

34. (a) **How does *Paramecium* obtain its food?**

- (b) **List the role of each of the following in our digestive system:**

- (i) **Hydrochloric acid**

- (ii) **Trypsin**

- (iii) **Muscular walls of stomach**

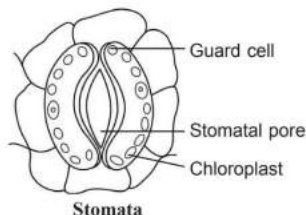
- (iv) **Salivary amylase** [CBSE 2023]

Ans. (a) In *Paramecium* the cell has a definite shape and food is taken in at a specific spot. Food is moved to this spot by the movement of cilia which cover the entire surface of the cell.

- (b) (i) The hydrochloric acid creates an acidic medium in stomach which facilitates the action of protein digesting enzyme pepsin.  
 (ii) Trypsin enzyme is secreted by pancreas for digesting proteins.  
 (iii) Muscular walls of stomach contract periodically and help in the churning and mixing of food with the digestive enzymes and HCl acid.  
 (iv) Salivary amylase enzyme is present in saliva and it breaks down starch which is a complex sugar to give simple sugar.

35. What are stomata? Draw a labelled diagram of stomata. Write any two functions of stomata. [KVS]

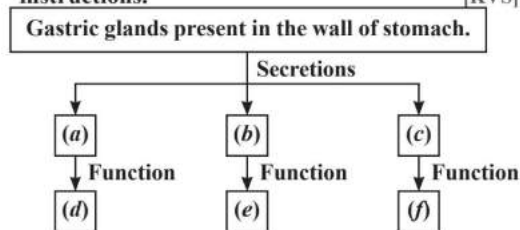
Ans. Stomata are pores regulated by two chloroplast containing guard cells that occur in the epidermis of leaves.



#### Functions of stomata

- Exchange of gases
- Transpiration.

36. Complete the following flow chart as per the given instructions. [KVS]



- Ans. (a) Pepsin  
 (b) HCl (Hydrochloric acid)  
 (c) Mucus  
 (d) The main function of pepsin is to digest proteins.  
 (e) The main function of HCl is to create an acidic environment, kill microbes and activate inactive pepsinogen into an active form.  
 (f) Mucus protects the wall of the stomach from the acidic effect of acid.

37. Leaves of a healthy potted plant were coated with vaseline. Will this plant remain healthy for long? Give reasons for your answer. [KVS]

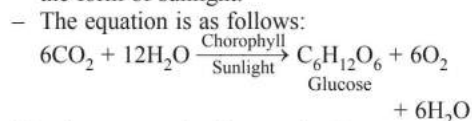
Ans. The leaves of a healthy plant coated with vaseline would not stay healthy because vaseline coating will block the stomata. In the plant, there will be no intake of carbon dioxide from the surrounding to carry out the process of photosynthesis because the pores of stomata are blocked by the vaseline.

### Long Answer Type Questions 5 Marks

38. (a) Name the process and explain the type of nutrition found in green plants. List the raw materials required for this process. Give chemical equation for the mentioned process.

(b) Write three events that occur during this process. [CBSE 2018C]

- Ans. (a) – Photosynthesis is the process.  
 – Green plants show autotrophic nutrition.  
 – The raw materials required for photosynthesis are carbon dioxide and water and energy in the form of sunlight.



- (b) The three events in photosynthesis are  
 (i) Absorption of light energy by chlorophyll.  
 (ii) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen.  
 (iii) Reduction of carbon dioxide to carbohydrates.

39. Define heterotrophic nutrition. What are the various types of heterotrophic nutrition? Give examples of each.

Ans. **Heterotrophic Nutrition:** The type of nutrition in which organisms derive their food (nutrients) from other living organisms. In heterotrophic nutrition, the energy is derived from the intake and digestion of the organic substances, normally of plant or animal tissue. Heterotrophic mode of nutrition are of different types:

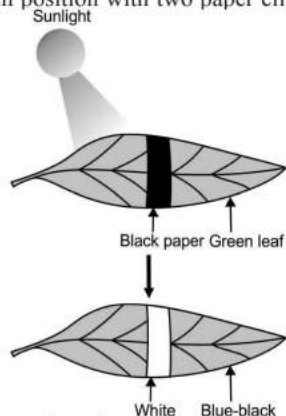
- (i) **Saprotrophic Nutrition:** It refers to the mode of nutrition in which organisms obtain nutrients from the dead and decaying organic matter, e.g., fungi, yeast and bacteria are called saprophytes.  
 (ii) **Parasitic Nutrition:** It refers to the mode of obtaining food synthesised by others. The organism which obtains food is called the 'parasite' and the organism from which food is absorbed is called the 'host'. This nutrition is observed in fungi, bacteria, a few plants like *Cuscuta* and some animals like *Plasmodium* and roundworm.



- (iii) **Holozoic Nutrition:** It refers to the mode of nutrition in which the complex organic matter in the form of solid food is ingested, digested and then absorbed into the cells and utilised, e.g., *Amoeba*, frog, human beings.

40. **Describe an experiment to show that “sunlight is essential for photosynthesis.”**

**Ans.** **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.



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).

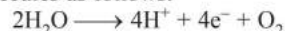
This is because plants store the food prepared by the process of photosynthesis as starch. Starch reacts with iodine solution to give blue-black colour. In this experiment, only those portions of the leaf that were exposed to light could photosynthesise. Hence, the uncovered portion of the leaf gives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

41. (a) **A gas is released during photosynthesis. Name the gas and also state the way by which the gas is evolved.**  
 (b) **What are stomata? What governs the opening and closing of stomata?** [CBSE 2020]

**Ans.** (a) Oxygen ( $O_2$ ) gas is released during the process of photosynthesis. The following events occur during the process of photosynthesis:

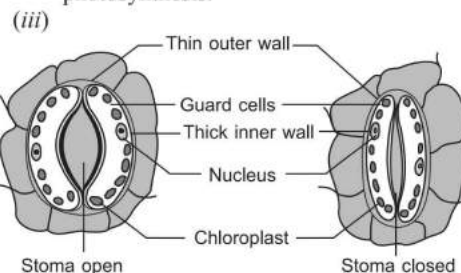
- (i) Light energy is absorbed by chlorophyll.  
 (ii) Light energy is converted to chemical energy and water molecules are split into hydrogen and oxygen.  
 (iii) Carbon dioxide is then reduced to carbohydrate.

Oxygen gas is produced due to the splitting up of water molecules as follows:



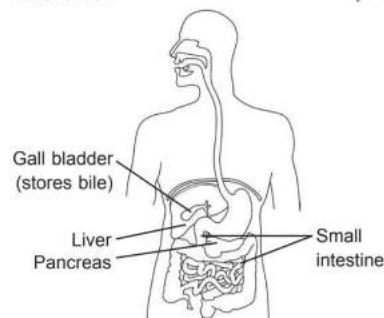
This is the first phase of photosynthesis which is called light reaction. In second phase which is called dark reaction, carbon dioxide is reduced to carbohydrate in a metabolic pathway known as the Calvin cycle

- (b) (i) **Stomata:** The tiny pores present on the epidermal surface of the leaves are called stomata.  
 (ii) 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.



42. (a) **Draw a diagram of human alimentary canal and label – gall bladder, pancreas, liver and small intestine on it.**  
 (b) **Give two reasons to explain why absorption of digested food occurs mainly in the small intestine.** [CBSE 2020]

**Ans.** (a)



- (b) The two reasons to explain why absorption of digested food occurs mainly in the small intestine are :

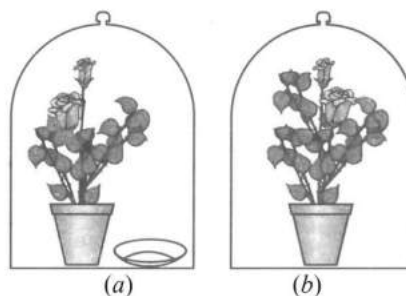
(i) Small intestine is the site of complete digestion of carbohydrates, proteins and fats. Small intestine produces intestinal juice from the glands present on its wall. The intestinal juice helps in further digestion of food. Small intestine also obtains digestive juices from liver and pancreas. The 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.

(ii) Villi are finger-like projections in the small intestine. They help to increase the surface area for absorption of the digested food. Villi are richly supplied with blood vessel which help to absorb digested food into the blood stream.

## PRACTICE QUESTIONS

- Amoeba* shows the following kind of nutrition—  
(a) Autotrophic  
(b) Holozoic  
(c) Saprotrophic  
(d) Parasitic [KVS]
- Which of the following organisms have parasitic mode of nutrition?  
(a) *Penicillium* (b) *Plasmodium*  
(c) *Paramecium* (d) *Rhizobium* [KVS]
- Why leaves become yellow in the absence of light?
- Bile juice does not contain any digestive enzymes, yet it is essential for digestion, why so? Explain.
- Name two proteases in pancreatic juice. What are their specific roles?
- (a) Which enzyme initiates the digestion of proteins? Name the other enzyme produced by the same gland.  
(b) How would the digestion of proteins and carbohydrates be affected if the pancreatic duct is completely blocked? [HOTS]
- Given below is the experimental set-up to establish that one of the atmospheric gases is essential for photosynthesis in plants.



- Name the atmospheric gas which is essential for photosynthesis.
  - What is kept in watch-glass in figure 'a' and why?
  - Write the balanced chemical equation for the process of photosynthesis.
  - When do the desert plants take up carbon dioxide and perform photosynthesis? [CBSE 2015]
8. Name the main organs of the human digestive system in the order they participate in the process of digestion. Describe how digestion of carbohydrates and proteins take place in our body. [HOTS]

## TOPIC COVERED

### Respiration



#### Multiple Choice Questions

1 Mark

- In living organisms during respiration which of the following products are not formed if oxygen is not available?  
(a) Carbon dioxide + Water  
(b) Carbon dioxide + Alcohol

- Lactic acid + Alcohol  
(d) Carbon dioxide + Lactic acid [CBSE 2021]

- The fermentation of glucose by yeast normally yields  
(a) alcohol,  $\text{CO}_2$  and 36 ATP  
(b)  $\text{CO}_2$ ,  $\text{H}_2\text{O}$  and 36 ATP  
(c) alcohol,  $\text{CO}_2$  and 2ATP  
(d) lactic acid,  $\text{CO}_2$  and 2 ATP

3. A large quantity of one of the following is removed from our body by lungs:

(a)  $\text{CO}_2$  and  $\text{H}_2\text{O}$  (b)  $\text{CO}_2$  only  
(c)  $\text{H}_2\text{O}$  only (d) ammonia

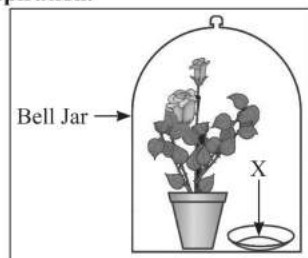
4. In respiration, air passes through

(a) Pharynx  $\rightarrow$  nasal cavity  $\rightarrow$  larynx  $\rightarrow$  trachea  $\rightarrow$  bronchi  $\rightarrow$  bronchioles  
(b) Nasal cavity  $\rightarrow$  pharynx  $\rightarrow$  larynx  $\rightarrow$  trachea  $\rightarrow$  bronchi  $\rightarrow$  bronchioles  
(c) Larynx  $\rightarrow$  nasal cavity  $\rightarrow$  pharynx  $\rightarrow$  trachea  
(d) Larynx  $\rightarrow$  pharynx  $\rightarrow$  trachea  $\rightarrow$  lungs

5. A biochemical compound that readily combines with oxygen and distributes it throughout the human body is

(a) water (b) urea  
(c) haemoglobin (d) acetylcholine

6. Observe the experimental setup shown below. Name the chemical indicated as 'X' that can absorb the gas which is evolved as a byproduct of respiration.



(a)  $\text{NaOH}$  (b)  $\text{KOH}$   
(c)  $\text{Ca(OH)}_2$  (d)  $\text{K}_2\text{CO}_3$

7. Which row in the table below shows the correct products of anaerobic respiration in humans and in yeast? [CFPQ, CBSE]

	humans	humans	yeast	yeast
	lactic acid	carbon dioxide	lactic acid	carbon dioxide
(a)	X	✓	X	X
(b)	✓	X	X	✓
(c)	X	✓	✓	X
(d)	✓	✓	✓	X

8. Read the following statements.

**X:** Amount of carbon dioxide produced per molecule of glucose during aerobic respiration.

**Y:** Amount of carbon dioxide produced per molecule of glucose during fermentation by yeast.

Which of the following is TRUE about X and Y? [CFPQ, CBSE]

(a) X is more than Y. (b) X is less than Y.  
(c) X is equal to Y. (d) Cannot be determined.

## Answers

1. (a) In absence of oxygen, in our muscle cells lactic acid is formed.

2. (c)

3. (a)

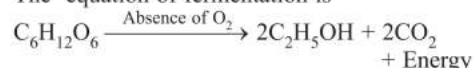
4. (b)

5. (c)

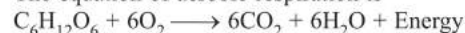
6. (b)

7. (b) Anaerobic respiration in human muscle cells produces lactic acid and energy. In yeast, anaerobic respiration produces ethanol, carbon dioxide and energy.

8. (a) The equation of fermentation is



The equation of aerobic respiration is



## Very Short Answer

### Type Questions 2 Marks

9. Name two animals having cutaneous respiration. What special features of the skin make cutaneous respiration effective?

**Ans.** Frog and earthworm have cutaneous respiration. This respiration is effective because of presence of features like thin, moist and highly vascular skin which is also highly permeable to gases.

10. How are inspiration and expiration brought about in human beings?

**Ans.** **Inspiration** is brought about by contraction of diaphragm muscles and some intercostal muscles. The diaphragm moves downward and the intercostal muscles move the lateral walls of thorax outward and upward. The volume of thorax increases and the air pressure is decreased. So, air is drawn into the lungs.

**Expiration** is brought about when the contracted muscles of diaphragm and intercostal muscles relax, the diaphragm moves upward and the lateral walls, move inward and downward. This decreases the volume of thorax and increases the air pressure. So, air is sent out of lungs.

11. If one holds his breath after expiration for about 30 sec., would there still be occurring any exchange of respiratory gases in the lungs during this period? Explain.

**Ans.** The exchange of gases will continue. Even after forceful expiration, some volume of air remains in the lungs, which is called residual volume. Exchange of gases continues because of this air.



12. Arthropods and molluscs have a copper-containing respiratory pigment called hemocyanin while human beings have iron-containing hemoglobin.

(a) How do respiratory pigments help in the process of respiration?

(b) Why do multicellular animals need a respiratory pigments? [CFPQ, CBSE]

Ans. (a) Respiratory pigments combine with oxygen and help in transport of oxygen throughout the body.

(b) When the body size of animals is large, diffusion pressure alone cannot take care of oxygen delivery to all parts of the body. Hence, respiratory pigments take up oxygen from the air in the lungs and carry it to tissues which are deficient in oxygen.

### SA Short Answer Type Questions 3 Marks

13. (a) What are stomata? What is their role in respiration?

(b) Draw a schematic diagram to show the opening and closing of stomata.

Ans. (a) Stomata are tiny openings found on the surface of the leaves. Stomata functions in gaseous exchange between the plant and the atmosphere. The oxygen from the air diffuses inside the leaf

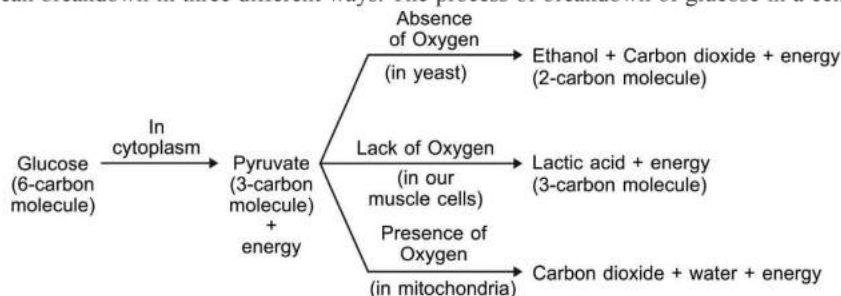
15. Explain the process of breakdown of glucose in a cell

(a) in the presence of oxygen,

(b) in the absence of oxygen.

[DoE, HOTS]

Ans. Glucose can breakdown in three different ways. The process of breakdown of glucose in a cell are as follows:



The first step in the breakdown of glucose both in presence of  $O_2$  and in absence of  $O_2$  is same.

In this step, glucose is broken down into pyruvate.

(a) **In presence of  $O_2$ :** In presence of  $O_2$ , pyruvate is converted into  $CO_2$  and water. Energy released during aerobic respiration is much greater than that released during an anaerobic respiration.

(b) **In absence of  $O_2$ :** In absence of  $O_2$  in yeast, pyruvate is converted into ethanol and  $CO_2$  and the process is called fermentation.

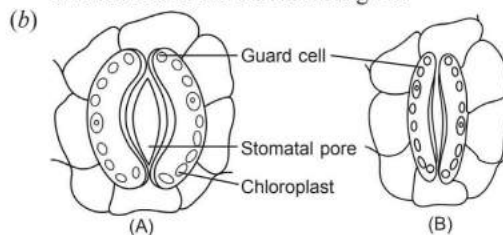
When there is a lack of  $O_2$ , anaerobic respiration takes place in our muscle cells, pyruvate is converted into lactic acid. The build up of lactic acid in muscle cells causes painful contractions of muscles which are called cramps.

### LA Long Answer Type Questions 5 Marks

16. (a) Write the reaction that occurs when glucose breaks down anaerobically in yeast.

(b) Write the mechanism by which fishes breath in water.

cells when stomata is open and carbon dioxide diffuses out of the leaves through it.



Showing Opening (A) and Closing (B) of Stoma

14. (a) Why do the walls of a trachea not collapse when there is less air in it? [CBSE 2012] [HOTS]

(b) How are lungs designed in human beings to maximise the area for exchange of gases?

Ans. (a) The walls of trachea does not collapse when there is less air in it as it is supported by rings of soft bones of cartilage.

(b) There are millions of alveoli in the lungs. There alveolus provides a very large surface area for the exchange of gases. The availability of large surface area maximises the exchange of gases. For example, if all the alveoli from the two human lungs are unfolded, they would give an area of about 80 square meters.

(c) Name the balloon likes structures present in lungs. List its two functions.

(d) Name the respiratory pigment and write its role in human beings. [CBSE 2018C]

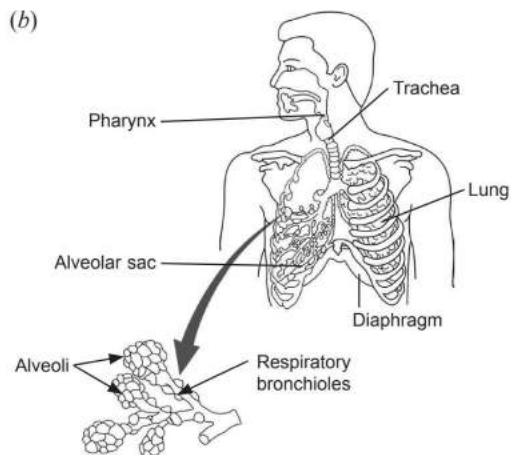
Ans. (a) Glucose  $\xrightarrow[\text{Cytoplasm}]{\text{In the}}$  Pyruvate  $\xrightarrow[\text{Cytoplasm}]{\text{In the}}$  Ethanol + carbon dioxide + Energy.

- (b) Fishes breathe with gills by diffusion.
- (c) Alveoli are the balloon-like structures.
  - They provide a surface for exchange of gases.
  - They contain a residual volume of air so that there is sufficient time for exchange of gases.
- (d) Haemoglobin is the respiratory pigment in humans. It transports a major part of oxygen and some amount of carbon dioxide through blood.

17. (a) Why is there a difference in the rate of breathing between aquatic organisms and terrestrial organisms? Explain.

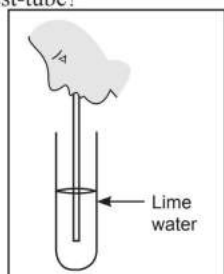
(b) Draw a diagram of human respiratory system and label – pharynx, trachea, lungs, diaphragm and alveolar sac on it. [CBSE 2020]

Ans. (a) Quantity of dissolved oxygen is fairly low in water as compared to the amount of oxygen in air. Aquatic organisms therefore have to breathe faster than terrestrial organisms to absorb the required amount of oxygen from the water.

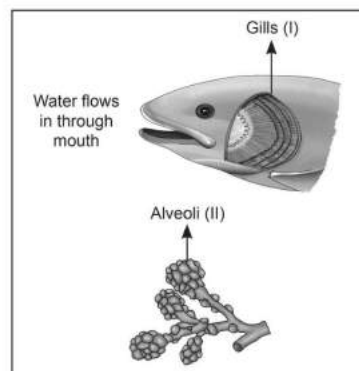


## PRACTICE QUESTIONS

- In humans, carbon dioxide that is excreted passes from the blood directly into the
  - trachea
  - kidneys
  - alveoli
  - liver
- Observe the diagram of an activity given below. What does it help to conclude, when the person exhales into the test-tube? [CBSE 2021]

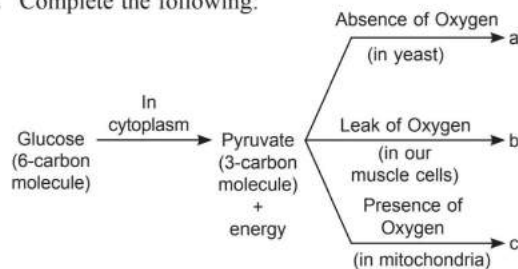


- Percentage of carbon dioxide is more in inhaled air.
  - Fermentation occurs in the presence of oxygen.
  - Percentage of carbon dioxide is more in the exhaled air.
  - Fermentation occurs in the presence of carbon dioxide.
3. Respiratory structures of two different animals—a fish and a human being—are as shown. Observe (I) and (II) and select one characteristic that holds true for both of them.



- Both are placed internally in the body of animal.
  - Both have thin and moist surface for gaseous exchange.
  - Both are poorly supplied with blood vessels to conserve energy.
  - In both the blood returns to the heart after being oxygenated. [CBSE 2021]
4. With a schematic diagram, explain the overall process of respiration. [HOTS]
5. Differentiate between left lung and right lung of humans.
6. (a) Describe the mechanism of breathing in human beings.
- (b) (i) Under normal conditions, what is the rate of breathing per minute?
- (ii) Why does the rate of breathing increase by 20 to 25 times during vigorous exercise? [HOTS]

7. Explain the process by which inhalation occurs during breathing in human beings. [HOTS]
8. Complete the following:



- (a) Ethanol and carbon dioxide  
(b) Lactic acid  
(c) Carbon dioxide and water [KVS]
9. Explain with a schematic representation the exchange of gases in tissues. [HOTS]

## TOPIC COVERED

## Transportation



### Multiple Choice Questions

1 Mark

1. Identify the two components of phloem tissue that help in transportation of food in plants.

[CBSE 2021]

(a) Phloem parenchyma and sieve tubes

3. Which row of the table given below correctly gives the movement of gases across blood and cells? [CFPQ, CBSE]

	Oxygen	Carbon dioxide				
	from	to	process	from	to	process
P	RBC	cells	diffusion	cells	RBC	osmosis
Q	RBC	cells	osmosis	cells	plasma	osmosis
R	RBC	cells	osmosis	cells	RBC	diffusion
S	RBC	cells	diffusion	cells	RBC	diffusion

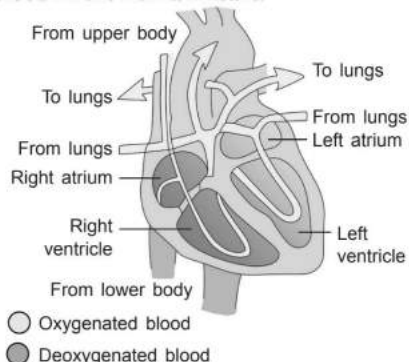
(a) P

(b) Q

(c) R

(d) S

4. The image shows oxygenated and deoxygenated blood in the human heart.



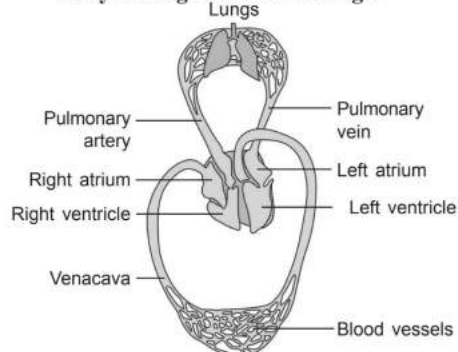
What is the direction of deoxygenated blood from right atrium of the heart? [CBSE T.E.R.M.\*]

- (b) Sieve tubes and companion cells  
(c) Phloem parenchyma and companion cells  
(d) Phloem fibres and sieve tubes

2. In a closed circulatory system, blood is completely enclosed within

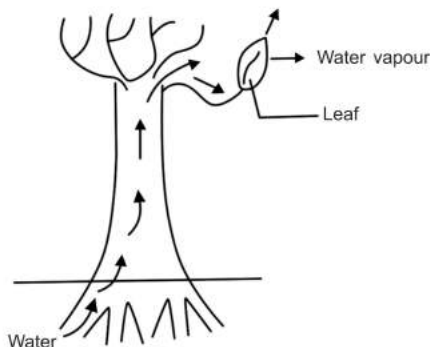
- (a) vessels (b) heart  
(c) skeleton (d) sinuses

- (a) Towards the lungs.  
(b) Towards the left atrium of heart.  
(c) Towards the upper body.  
(d) Towards the lower body.
5. The image shows the transport of gases in the body through heart and lungs.



Which option correctly shows the transport of oxygen to the cell? [CBSE T.E.R.M.\*]

- Lungs → pulmonary vein → left atrium → left ventricle → aorta → body cells
  - Lungs → pulmonary vein → right atrium → right ventricle → aorta → body cells
  - Lungs → pulmonary artery → left atrium → left ventricle → vena cava → body cells
  - Lungs → pulmonary artery → right atrium → right ventricle → vena cava → body cells
6. The process in which loss of water takes place in the form of water vapour through stomata is called
- transportation
  - transpiration
  - guttation
  - translocation
7. In a closed circulatory system, blood is completely enclosed within
- vessels
  - heart
  - skeleton
  - sinuses
8. Normal blood pressure (systolic/diastolic) is
- 120/80 mm of Hg
  - 160/80 mm of Hg
  - 120/60 mm of Hg
  - 180/80 mm of Hg
9. Blood pressure is measured by an instrument called
- barometer
  - sphygmomanometer
  - photometer
  - manometer
10. Observe the following diagram and identify the process and its significance from the following options: [CBSE 2023]



- Evaporation: maintains water contents in leaf cells.
- Transpiration: creates a suction force which pulls water inside the plant.
- Excretion: helps in excreting out waste water from the plant.
- Translocation: helps in transporting materials from one cell to another.

### Answers

- (b)
- (a)
- (d)
- (a)
- (a)
- (b) Transpiration is the loss of water in the form of vapours through the leaves of the plants.
- (b) Blood is completely enclosed within blood vessels in closed circulatory system.
- (a) Normal blood pressure is 120/80 mm of Hg
- (b) Sphygmomanometer is an instrument used to measure blood pressure.
- (b)



### Very Short Answer Type Questions 2 Marks

11. Name the water and mineral conducting element of non-flowering plants. Mention how conduction takes place in it.

Ans. Tracheids are the conducting cells of non-flowering plants. They are long, thin, spindle-shaped cells having pits in their thick cell walls. In them, water flows from one tracheid to other through these pits.

12. Write down any two differences between the transport of materials in xylem and phloem. [KVS]

Xylem	Phloem
– Xylem conducts water and dissolved minerals from roots to leaves and other parts.	– Phloem conducts prepared food material from leaves to other parts of plant in dissolved form.
– In xylem, the transport of material takes place through vessels and tracheids which are dead tissues.	– In phloem, transport of material takes place through sieve tubes with the help of companion cells, which are living cells.

13. A major portion of the carbohydrates produced by plants is stored in different parts of the plant (storage organs). Explain the mechanism by which this stored food is made available when different organs need it for growth. [CFPQ, CBSE]

Ans. Sugar from storage organ is moved to phloem using energy. This increases osmotic pressure of phloem. As a result water enters into the phloem. Increased pressure inside the phloem cells moves sugar to cells with lower pressure to reach other organs.



### Short Answer Type Questions 3 Marks



14. Mention the three kinds of cells present in blood. Write one function of each.

[CBSE 2016]

Ans. Blood is made up of plasma and corpuscles. Three kind of cells are:

WBC, RBC and Blood platelets.

Red Blood cells (RBC) are small, biconcave cells that contain haemoglobin to transport  $O_2$  from the lungs to the body cells and  $CO_2$  from body cells to the lungs.

White blood cell's (WBC) main function is defence of the body against diseases and other infection.

Blood platelets are responsible for the clotting of blood during injuries.

15. List the three kinds of blood vessels of human circulatory system and write their functions in tabular form.

[CBSE 2013]

Or

Write three types of blood vessels. Give one important feature of each.

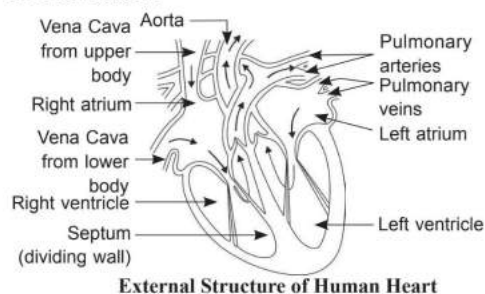
[Delhi 2019]

Ans. Three types of blood vessels in human circulatory system are -Arteries, Veins and Capillaries. Their functions are tabulated below:

Arteries	Veins	Capillaries
(i) Arteries carry oxygenated blood from heart to various organs of the body.	(i) Veins carry deoxygenated blood from various organs to heart.	(i) Exchange of materials between blood and surrounding cells take place in the capillaries.
(ii) They are thick walled.	(ii) They are thin walled.	(ii) They are thin walled and extremely narrow tubes or blood vessels which connect arteries to veins.

16. Draw a diagram of the front view of human heart and label any six parts including at least two, that are concerned with arterial blood supply to the heart muscles.

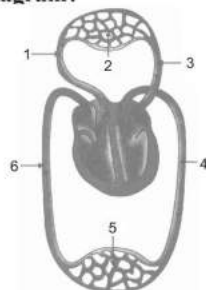
Ans.



17. (a) Label any 4 parts in the given diagram.

(b) What are the two functions represented in this diagram?

[HOTS]



Ans. (a) 1. Pulmonary artery to lungs

2. Lung capillaries

3. Pulmonary vein from lungs

4. Aorta to body

5. Capillaries in body organs

6. Vena cava from body. (any four)

(b) The two functions represented are :

(i) Transport of oxygen and carbon dioxide

(ii) Exchange of oxygen and carbon dioxide

18. Write one function of each of the following components of the transport system in human beings:

(a) Blood vessels

(b) Lymph

(c) Heart

[CBSE 2016]

Ans. Function of the following components of the transport system in human beings are as follows:

(a) **Blood vessels:** There are three types of blood vessels of different sizes involved in blood circulation viz. arteries, veins and capillaries, which are all connected to form a continuous closed system.

(b) **Lymph:** It carries digested and absorbed fat from intestine and drains excess fluid from extra cellular space back into the blood.

(c) **Heart:** It is a pumping organ that receives blood from the veins and pumps it into the arteries.



19. **What is blood pressure? How it is measured? Give one difference between systolic pressure and diastolic pressure.** [HOTS]

**Ans. Blood Pressure:** It is the force that blood exerts against the wall of a vessel. This pressure is much greater in arteries than in veins. It is measured by using an instrument called **sphygmomanometer**.

The pressure of blood inside artery during contraction or ventricular systole is called **systolic pressure** and pressure in artery during relaxation or ventricular diastole is called **diastolic pressure**. The normal systolic pressure is about 120 mm of Hg and diastolic pressure is 80 mm of Hg.

20. (a) **What is double circulation?**  
(b) **Why is the separation of the right side and the left side of the heart useful? How does it help birds and mammals?** [CBSE 2023]

**Ans. (a)** The circulatory system of man is called double circulation as the blood passes through the heart twice in one complete cycle of the body.

(b) The right side and the left side of the human heart are useful to prevent deoxygenated and oxygenated blood from mixing. This type of separation of oxygenated and deoxygenated blood ensures a highly efficient supply of oxygen to the body. This is useful in case of birds and mammals because it constantly gives energy to maintain their body temperature.

21. **How is lymph an important fluid involved in transportation? If lymphatic vessels get blocked, how would it affect the human body? Elaborate.** [CBSE Sample Paper 2023]

**Ans.** Lymph carries digested and absorbed fat from the intestine (1 Mark)  
and drains excess fluid from extracellular space back into the blood. (1 Mark)

Blockage of lymphatic system will lead to water retention and poor fat absorption in the body.

(1 Mark)

[CBSE Marking Scheme]

22. **Human beings exhibit 'double circulation' during which blood is passed through the lungs and heart.**

(a) **State the route of the first and the second circulation through the chambers of the heart and explain the usefulness of such circulation in humans.**

- (b) **Name the blood vessels that:**  
(i) **carry oxygenated blood from the lungs to the heart.**  
(ii) **carry deoxygenated blood from the heart to the lungs.** [CFPQ, CBSE]

**Ans. (a)** During first circulation oxygenated blood from lungs come to the left atrium to left ventricle

to pass to the body. During second circulation deoxygenated blood from body comes to right atrium and then right ventricle to pass for oxygenation to the lungs again.

Double circulation allows for separation of oxygenated and deoxygenated blood in the body.

- (b) (i) Pulmonary vein (ii) Pulmonary artery



### Long Answer

### Type Questions 5 Marks



23. (a) **Mention any two components of blood.**  
(b) **Trace the movement of oxygenated blood in the body.**  
(c) **Write the function of valves present in between atria and ventricles.**  
(d) **Write one structural difference between the composition of artery and veins.**

[CBSE 2018, KVS]

**Ans. (a)** Blood is composed of plasma and three types of cells—Red blood cells, white blood cells and platelets.

- (b) – Oxygenated blood from the lungs is brought to the left atrium by pulmonary veins.  
– When the atrium contracts, blood is transferred to left ventricle.  
– When the ventricle contracts, blood is pushed into the aorta and through arteries to all parts of the body.

(c) The valves prevent the backflow of blood from ventricles into atria.

Arteries	Veins
(i) They have thick elastic walls.	(i) They are thin walled.
(ii) They have no internal valves.	(ii) They have valves internally.

24. (a) **Name the blood vessel that brings oxygenated blood to the human heart.**  
(b) **Which chamber of human heart receives oxygenated blood?**  
(c) **Explain how oxygenated blood from this chamber is sent to all parts of the body.** [HOTS]

**Ans. (a)** The pulmonary vein brings oxygenated blood to the human heart.

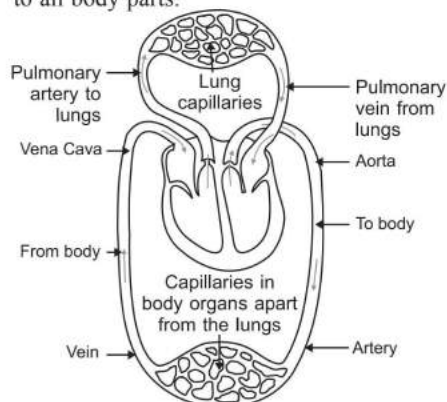
(b) The left auricle of human heart receives oxygenated blood.

(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.

25. **What is double circulation? What is its advantage?**  
**Show with labelled diagram.** [KVS]

**Ans. Double Circulation:** A circulatory system in which blood flows twice through heart during each cycle. This takes place in some vertebrates including human beings. In double circulation deoxygenated blood reaches heart, then it is sent to lungs for oxygenation and oxygenated blood is carried back again to the heart. From the heart, oxygenated blood is passed to all body parts.



**Schematic representation of transport and exchange of oxygen and carbon dioxide.**

**Advantage of double circulation:**

- It allows the separation of pure and impure blood in the body.
- It helps in maintaining a high blood pressure required for other life processes.

26. **Explain the various functions of blood.** [HOTS]

**Ans. Functions of Blood** — Blood performs the following functions :

- (i) **Transport of Oxygen:** Red blood corpuscles contain haemoglobin that combines with oxygen to form oxyhaemoglobin which is transported to the tissues of the body for the purpose of respiration.

- (ii) **Transport of Carbon dioxide:** Carbon dioxide produced by the tissues as a result of respiration is transported by the blood plasma and also by the haemoglobin to the lungs from where it is removed.

- (iii) **Transport of Nutrients:** The digested and absorbed nutrients like glucose, amino acids, fatty acids, vitamins, etc. are first transported to the liver and then to the whole of tissues for their storage, oxidation and synthesis to new substances.

- (iv) **Transport of Excretory Products:** Nitrogenous wastes like ammonia, urea and uric acid of body are transported to the kidneys by the blood from where they are eliminated.

- (v) **Regulation of Body Temperature:** The blood flows in all parts of the body, so it equalises the body temperature. It carries heat produced from one place to another place of the body.

- (vi) **Maintenance of pH:** The plasma proteins act as buffer system and maintain required pH of the body tissues.

- (vii) **Transport of Hormones:** The plasma of blood transports various hormones from one region to another and brings about the co-ordination in the working of the body.

- (viii) **Water Balance:** The blood maintains water balance at constant level by distributing uniformly over the body.

- (ix) **Protection from Diseases:** The WBCs (eosinophils, neutrophils, monocytes) engulf the bacteria and other disease causing organisms by phagocytosis. The lymphocytes produce antibodies against the invading antigens.

- (x) **Clotting of Blood:** Blood forms a clot at the site of injury, thus preventing further loss of blood. Blood helps in rapid healing of wounds.

(any five)

## PRACTICE QUESTIONS

1. Which of the following has no muscular walls?
  - (a) Artery
  - (b) Vein
  - (c) Arteriole
  - (d) Capillary
2. Which of the following contributes most to the transport of water from the ground to the leaves of a tall tree?
  - (a) Root pressure
  - (b) Capillary rise of water in xylem
  - (c) Breakdown of ATP
  - (d) Cohesion of water and transpiration pull
3. Give a schematic diagram to show absorption of water through root hairs.
4. Differentiate between lymphatic capillaries and blood capillaries.
5. Draw a sieve tube and label the various parts. Name the dead elements of the phloem.
6. (a) Name the blood vessel that brings deoxygenated blood to the human heart.  
 (b) Which chamber of the human heart receives deoxygenated blood?  
 (c) Describe how deoxygenated blood from this chamber is sent to lungs for oxygenation. [HOTS]

7. (a) Draw a schematic representation of transport and exchange of oxygen and carbon dioxide during transportation of blood in human beings and label on it:

Lung capillaries, Pulmonary artery to lungs, Aorta to body, Pulmonary veins from lungs.

[CBSE 2014]

- (b) What is the advantage of separate chambers in mammals and birds for oxygenated and deoxygenated blood? [HOTS]

## TOPIC COVERED

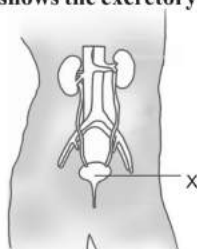
## Excretion



### Multiple Choice Questions

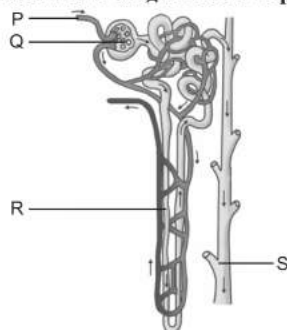
1 Mark

- Which of the following statement is not correct?
  - Deoxygenated blood is poured into right atrium of heart.
  - The excretory units of flatworms are flame cells.
  - Human kidney has about 1 million nephridia.
  - Tracheids and vessels are non-living conducting tissues.
- The image shows the excretory system in humans.



What is the importance of the labelled part in excretory system?

- It produces urine.
  - It filters waste from the blood.
  - It stores the urine till urination.
  - It carries urine from kidney to outside.
3. Given below is a diagram of a nephron.



Which row of the following table correctly shows where filtration and selective reabsorption occur?

[CFPQ, CBSE]

	Filtration	Selective reabsorption
(a)	P	Q
(b)	Q	S
(c)	Q	R
(d)	P	R

- Nitrogenous wastes are formed from the breakdown of
  - fat
  - water
  - amino acids
  - ammonia
- A plant gets rid of excess water through transpiration. Which is a method used by plants to get rid of solid waste products? [CBSE T.E.R.M.\*]
  - Shortening of stem
  - Dropping down of fruits
  - Shedding of yellow leaves
  - Expansion of roots into the soil

### Answers

1. (c)    2. (c)    3. (c)    4. (c)  
5. (c)



### Very Short Answer Type Questions 2 Marks

6. Write one specific function each of the following organs in relation with excretion in human beings:
- Renal Artery
  - Urethra
  - Glomerulus
  - Tubular part of nephron

[CBSE 2023]

- Ans.
- To carry blood from the heart to kidneys.
  - To expel urine out of the body.
  - To filter the blood passing through it and initiate urine formation.
  - Major function of tubules is reabsorption. Also, tubular secretion helps in urine formation without affecting the electrolyte balance of the body.

7. (a) Name two excretory products other than  $O_2$  and  $CO_2$  in plants.

(b) Why is urine yellow in colour?

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

(b) Urine contains pigment urochrome. Which imparts yellow colour.

8. Name the substances other than water, that are reabsorbed during urine formation. What are the two parameters that decide the amount of water that is reabsorbed in the kidney?

[CBSE Sample Paper 2023]

Ans. Glucose, amino acids, salts (any two)  
(1/2 Mark each)

and a major amount of water are selectively reabsorbed as the urine flows along the tube.

The amount of water reabsorbed depends on how much excess water there is in the body (1/2 Mark) and on how much of dissolved waste there is to be excreted. (1/2 Mark)

[CBSE Marking Scheme]

### Short Answer Type Questions 3 Marks

9. Describe in brief the functions of kidneys, ureters, urinary bladder and urethra.

Ans. **Functions of Kidneys**

It removes the nitrogenous wastes such as urea and excess water from the blood. It regulates the osmotic pressure/water balance/pH of the blood.

**Functions of Ureters**

Urine formed in each kidney is carried by the long tube called ureter to the urinary bladder. Some amount of glucose, amino acid, salt and a major amount of water are reabsorbed in ureter.

**Functions of Urinary bladder**

It acts as a reservoir that stores urine before being discharged to the outside.

**Functions of Urethra**

Urine is passed out from the body through the urethra.

10. How is urine produced? [KVS]

Ans. **Formation of Urine.** The purpose of urine is to filter out waste products from the blood.

### Long Answer Type Questions 5 Marks

12. (a) Define excretion.

(b) Name the basic filtration unit present in the kidney.

(c) Draw excretory system in human beings and label the following organs of the excretory system which perform following functions:

(i) form urine.

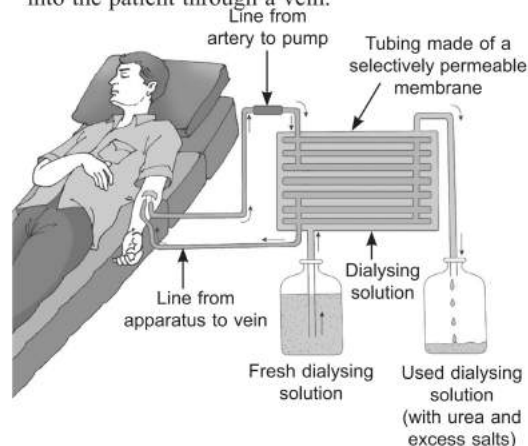
(ii) is a long tube which collects urine from kidney.

(iii) store urine until it is passed out.

- The nitrogenous waste such as urea or uric acid are removed from blood in the kidneys.
- Each capillary cluster in the kidney is associated with the cup-shaped end of a tube that collects the filtered urine.
- Each kidney has large numbers of these filtration units called nephrons.
- Some substances in the initial filtrate such as glucose, amino acids, salts and a major amount of water are selectively reabsorbed as the urine flows along the tube. This depends on how much excess water is there in the body and on how much of dissolved waste is there to be excreted.
- The urine forming in each kidney enters a long tube, the ureter, which connects the kidneys with the urinary bladder.
- Urine is stored in the urinary bladder until the pressure of the expanded bladder leads to pass out through the urethra.

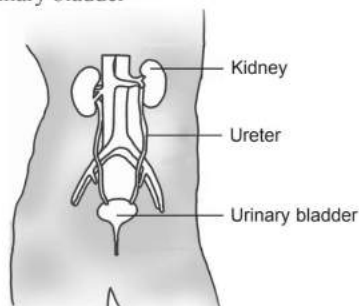
11. Explain the process of dialysis with the help of a diagram.

Ans. It is the procedure used in artificial kidney to replace a non-functional or damaged kidney. 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 cleansed blood is returned back into the patient through a vein.



[CBSE 2018]

- Ans. (a) Excretion is the biological process of removal of harmful metabolic wastes from the body.  
 (b) Nephrons.  
 (c) (i) Kidney  
 (ii) Ureter  
 (iii) Urinary bladder



Excretory system in human beings

## PRACTICE QUESTIONS

- The process by which blood is cleared of metabolic wastes in case of kidney failure is called  
 (a) Artificial kidney  
 (b) Dialysis  
 (c) Transplantation  
 (d) Filtration [KVS]
- Differentiate between ureter and urethra.
- (a) Name the organs that form the excretory system in human beings.  
 (b) Describe in brief how urine is produced in human body. [CBSE 2020]



## INTEGRATED (MIXED) QUESTIONS

- (a) What is a pulse? (3 Marks)  
 (b) How does *Paramoecium* obtain its food?
- (a) "The breathing cycle is rhythmic whereas exchange of gases is a continuous process". Justify this statement. (3 Marks)  
 (b) What happens if conducting tubes of circulatory system develops a leak? State in brief, how could this be avoided?  
 (c) What is hypertension? How is it caused? What damage can it do in our body?
- How does gaseous exchange take place in *Amoeba*? (3 Marks)
- In single celled organisms diffusion is sufficient to meet all their requirements of food, exchange of gases or removal of wastes but it is not in case of multicellular organisms. Explain the reason for this difference. [CBSE 2015] (3 Marks)
- Distinguish between photosynthesis and respiration. (3 Marks)
- The leaves of a plant were covered with aluminium foil, how would it affect the physiology of the plant? [CBSE Sample Paper 2023] (3 Marks)
- (a) What is ATP? What is its use?  
 (b) How does smoking affect the health of a person?  
 (c) Describe the circulatory system on a fish. (5 Marks)
- (a) Account for the following.  
 Amphibians or many reptiles have three chambered hearts and can tolerate mixing of oxygenated and deoxygenated blood.  
 (b) Why are the walls of ventricles thicker than the auricles? [HOTS]  
 (c) State two sources from which plants obtain nitrogen for the synthesis of proteins and other compounds. (5 Marks)
- (a) Write the difference between inhalation and exhalation. [DoE]  
 (b) State the roles of liver and pancreas.  
 (c) Name the organ which performs the following functions in humans:  
 (i) Absorption of digested food  
 (ii) Absorption of water [HOTS] (5 Marks)
- (a) What are the function of lungs?  
 (b) State the functions of the following components of transport system: (5 Marks)  
 (i) Blood (ii) Lymph [KVS]



11. (a) Explain the mechanism of gaseous exchange between tissues and blood. [HOTS]  
(b) Describe the mechanism of blood clotting. [HOTS]

- (c) How is carbon dioxide obtained by (i) aquatic plants and (ii) terrestrial plants? (5 Marks)



## ASSERTION AND REASON QUESTIONS

In the following Questions, the Assertion and Reason have been put forward. Read the statements carefully and choose the correct alternative from the following:

- (a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion.  
(b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.  
(c) Assertion is true but the Reason is false.  
(d) The statement of the Assertion is false but the Reason is true.
1. **Assertion:** When air is blown through lime water, lime water turns milky.  
**Reason:** Air contains 78% nitrogen and 21% oxygen.
2. **Assertion:** Veins have thin walls to collect blood from different organs.  
**Reason:** Blood in veins are not under pressure.
3. **Assertion:** Human being has a complex respiratory system.  
**Reason:** Human skin is impermeable to gases.
4. **Assertion:** All proteins in our food are digested in small intestine only.  
**Reason:** The protein digesting enzymes are released into small intestine and stomach.
5. **Assertion:** Nitrogen is an essential element for plant growth and is taken up by plants in the form of inorganic nitrates or nitrites.  
**Reason:** The soil is the nearest and richest source of raw materials like nitrogen, phosphorus and other minerals for the plants. [CBSE 2021]
6. **Assertion:** Aerobic respiration release less energy as compared to anaerobic respiration.  
**Reason:** Mitochondria is the power house of the cell. [KVS]
7. **Assertion:** Energy is required to carry out different life processes.  
**Reason:** Energy is obtained in the form of ATP in the mitochondria. [KVS]
8. **Assertion:** Molecular movements help in repair and maintenance of cell organelles, cells and tissues.  
**Reason:** Molecular movements are involved in removal of catabolic products like  $\text{CO}_2$  and  $\text{NH}_3$ .
9. **Assertion:** In parasitic nutrition, an organism lives on or inside another living organism and derives its food.

**Reason:** Parasites obtain predigested or partially digested food from their host.

10. **Assertion:** The stomata are present in the leaves and green stems of a plant.  
**Reason:** The gaseous exchange in plants takes place only through the stomata in leaves.
11. **Assertion:** Chloroplasts are the organelles in the cells of green plants which contain chlorophyll.  
**Reason:** The site of photosynthesis in cell of the leaf is chlorophyll.
12. **Assertion:** The process of obtaining food by *Amoeba* is phagocytosis.  
**Reason:** *Amoeba* ingests the food particles by forming finger like projections called pseudopodia around it
13. **Assertion:** Due to the presence of hydrochloric acid, the gastric juice is acidic in nature.  
**Reason:** In acidic medium, the enzyme pepsin begins the digestion of proteins present in food the form smaller molecules in small intestine.
14. **Assertion:** The digested food which is not used by our body immediately is stored in the liver in the form of a carbohydrate starch.  
**Reason:** The stored food can be used as a source of energy by the body as and when required.
15. **Assertion:** The act of expelling the undigested food from the large intestine is called excretion.  
**Reason:** The exit of undigested food is controlled by anal sphincter.
16. **Assertion:** Plants use oxygen of air for respiration and release carbon dioxide.  
**Reason:** Oxygen and carbon dioxide are called respiratory gases.
17. **Assertion:** The build up of lactic acid in our muscles during sudden activity causes cramps.  
**Reason:** The anaerobic respiration in animal muscle tissue produces lactic acid as the end produce.
18. **Assertion:** The inner walls of the small intestine have finger like projections called villi which are rich in blood.  
**Reason:** These villi have a large surface area to help the small intestine in completing the digestion of food. [CBSE 2023]



## CASE-BASED QUESTIONS

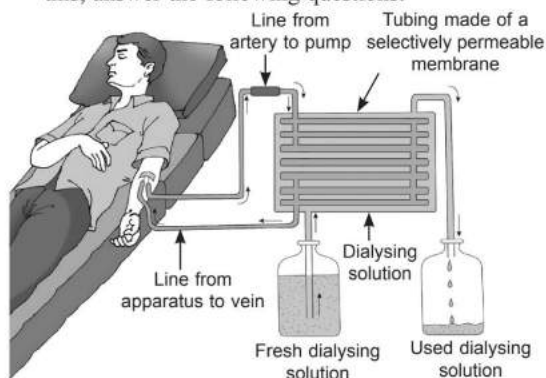
The following questions are case-based with 2-3 short sub-parts.

1. Three main regions of the small intestine are the duodenum, the jejunum, and the ileum. The small intestine is where digestion is completed and virtually all absorption occurs. These two activities are facilitated by structural adaptations that increase the mucosal surface area by 600-fold, including circular folds, villi, and microvilli. There are around 200 million microvilli per square millimeter of small intestine, which contain brush border enzymes that complete the digestion of carbohydrates and proteins. Combined with pancreatic juice, intestinal juice provides the liquid medium needed to further digest and absorb substances from chyme large intestine. The main regions of the large intestine are the cecum, the colon, and the rectum. The large intestine absorbs water and forms feces, and is responsible for defecation.

- (a) What is the function of large intestine?
- (b) What controls the exit of waste material from intestine?
- (c) How is the area of absorption increased in small intestine?

Or

- (c) What are the enzymes secreted by pancreatic juice?
2. The figure shown below represents a common type of dialysis called as Haemodialysis. It removes waste products from the blood. Such as excess salts, and urea which are insufficiently removed by the kidney in patients with kidney failure. During the procedure, the patients blood is cleaned by filtration through a series of semi-permeable membranes before being returned to the blood of the patient. On the basis of this, answer the following questions:



- (a) Give one functional difference between kidney and artificial kidney.
- (b) Name the duct by which urine is transferred from kidney to the urinary bladder.
- (c) What is an artificial kidney?

Or

- (c) Name the process by which waste products from blood pass into dialysing fluid.
3. Respiratory disease causes an immense worldwide health burden. It is estimated that 235 million people suffer from asthma, more than 200 million people have chronic obstructive pulmonary disease (COPD), 65 million endure moderate-to-severe COPD, more than 100 million adult population experience sleep disordered breathing, 8.7 million people develop tuberculosis (TB) annually, millions live with pulmonary hypertension and more than 50 million people struggle with occupational lung diseases. At least 2 billion people are exposed to the toxic effects of biomass fuel consumption, 1 billion are exposed to outdoor air pollution and 1 billion are exposed to tobacco smoke. Each year, 4 million people die prematurely from chronic respiratory disease. Infants and young children are particularly susceptible. Nine million children under 5 years of age die annually and lung diseases are the most common causes of these deaths. Pneumonia is the world's leading killer of young children. Asthma is the most common chronic disease, affecting about 14% of children globally and is still rising. COPD is the fourth leading cause of death worldwide and the numbers are growing. The most common lethal cancer in the world is lung cancer, which kills more than 1.4 million people each year, and the numbers are growing. Respiratory tract infections caused by influenza kill 250 000–500 000 people and cost 71–167 billion US dollars annually. Respiratory infections are ranked as the greatest single contributor to the overall burden of disease in the world.

- (a) Write one difference between respiration in plants and respiration in animals.
- (b) Define cilia.
- (c) How are lungs designed to maximize exchange of gases?

Or

- (c) 'While breathing cycle is rhythmic, exchange of gases is a continuous process.' Justify.
4. The heart is a pumping organ that receives blood from the veins and pumps it into the arteries. It is

situated in the thoracic cavity which lies above the diaphragm between the two lungs. It is enclosed in a double walled membranous sac.

- Name the double walled membranous sac that encloses the heart.
- What is the function of valves in the heart?
- The left ventricle of the heart has a thicker wall than the right ventricle. Explain.

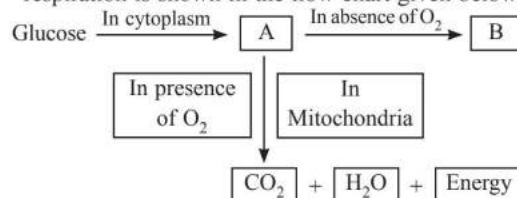
**Or**

- Give two differences between auricles and ventricles.
5. During photosynthesis, green plants synthesise organic materials they require from inorganic source. Light is a source of energy for this synthesis.
- Mention the raw materials required for photosynthesis.
  - Where does photosynthesis mostly take place in a plant?
  - Write the balanced chemical equation for the process of photosynthesis.

**Or**

- When do the desert plants take up carbon dioxide and perform photosynthesis?
6. Plants lose water in vapour form from the aerial parts by the process of transpiration. Besides removal of excess water, transpiration also helps in upward movement of cell sap, to regulate temperature of the plant and helps to absorb and distribute the salt.
- What is ascent of sap?
  - Name the vascular tissues which conduct water and translocate food.
  - Write two difference(s) between transpiration and translocation.
- Or**
- Explain the mechanism of opening and closing of stomata.

7. The glucose breakdown pathway in case of aerobic respiration is shown in the flow chart given below.



- Identify A and B in the flow chart.
- Give one point which is common for both aerobic and anaerobic respiration.
- Why is anaerobic respiration less efficient?

**Or**

- State the basic difference between the process of respiration and photosynthesis.
8. Green plants are called the life supporters of the world as they synthesise food by using the sunlight by the process of photosynthesis. The food prepared by green plants supports all other life on our planet earth. The leaves are called kitchen of the plants. Water also plays an important role in plant life processes like transpiration and photosynthesis.
- You must have seen the plants on the road side are mostly covered with certain deposits like dust and smoke. Mention three processes which may be hampered due to the dust and smoke on the leaves. Write a chemical reaction to show the process of photosynthesis.
  - The food prepared by the leaves is transported to other parts of the plant. How is food transported in plants?

**Or**

- Name the elements of xylem which transport water and minerals in the upward direction. Explain the mechanism of transport of water and minerals in plants.



## NCERT ZONE

### NCERT INTEXT QUESTIONS

Page 81

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

**Ans.** In multicellular organisms, only the cells of skin are in direct contact with the environment. Diffusion is a very slow process and it will take very long time to reach all the cells of the body part. Diffusion is insufficient to meet oxygen requirement.

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

- Ans.** If something shows any one of the following characteristics, then it is a living being:
- It can move on its own.
  - It needs food to get energy and nutrients.
  - It respire.
  - It responds to changes that take place in its surroundings.

- (v) It exhibits growth and development.  
(vi) It removes its metabolic wastes.

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

Ans. All organisms take in oxygen, water and food as raw material from the outside. As plants make their own food by the process of photosynthesis and they need carbon dioxide and water as raw material for photosynthesis.

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

Ans. Nutrition, respiration, transportation, excretion are some processes that are essential for maintaining life.

**Page 87**

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

Or

List in tabular form three distinguishing features between autotrophic nutrition and heterotrophic nutrition.

[Allahabad 2019]

Ans.	Autotrophic nutrition	Heterotrophic nutrition
(a)	Autotrophic nutrition implies that the organism prepares its own food and is not dependent on any other organism for its food.	(a) Heterotrophic nutrition implies that the organism is not able to prepare its own food and is dependent on other organisms for its food.
(b)	In autotrophic nutrition, organic material is prepared from inorganic materials like carbon dioxide and water by utilizing the sunlight energy.	(b) In heterotrophic nutrition organic material cannot be prepared from inorganic materials like carbon dioxide and water.
(c)	Green plants and certain bacteria perform autotrophic mode of nutrition.	(c) Animals and non-green plants perform heterotrophic mode of nutrition.

**2. Where do plants get each of the raw materials required for photosynthesis?**

Ans.	Raw material for photosynthesis	Source
	Carbon dioxide	Atmosphere
	Water	Ground water
	Solar energy	Sun

**3. What is the role of the acid in our stomach? [D0E]**

Ans. The acid found in our stomach is hydrochloric acid. It helps to kill harmful germs which may have come along with food. Stomach acid activates the enzyme pepsin for digestion of protein.

**4. What is the function of digestive enzymes?**

Ans. The function of digestive enzyme is to speed up the process of breaking up of complex molecules into simpler and absorbable molecules so that it is easier for the body to absorb food.

**5. How is the small intestine designed to absorb digested food?**

Ans. In the small intestine, the innermost layer is in the shape of finger like projections known as villi. Several folds of villi increase the absorbing surface area of small intestine. The blood capillaries in villi help to absorb simpler molecules from food.

**Page 91**

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

Ans. The amount of oxygen dissolved in water is very low as compared to the amount of oxygen present in the air. Because of this, terrestrial organisms have to make less efforts for obtaining oxygen for respiration than the aquatic organisms.

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

Ans. There are two types of respiration for oxidation of glucose.

(a) **Aerobic respiration:** In this process, complete oxidation of glucose is involved hence, optimum output of energy is achieved. This process takes place in presence of oxygen.

(b) **Anaerobic respiration:** This process takes place in the absence of oxygen hence, complete oxidation of glucose does not take place. Usually, bacteria shows anaerobic respiration. Even sometimes in our calf muscles, anaerobic respiration takes place.

**3. How is oxygen and carbon dioxide transported in human beings?**

Ans. Oxygen and carbon dioxide are transported in human beings with a gas transportation system. This system is mainly composed of following parts:

**Lungs:** Lungs help in breathing in oxygen-rich air and breathing out carbon dioxide-rich air.

**Heart:** Heart pumps deoxygenated blood to lungs for oxygenation and pumps oxygenated blood to different organs of the body.

**Veins:** Veins usually carry deoxygenated blood from different parts of the body to the heart. One exception is the pulmonary vein which carries oxygenated blood from lungs to heart.

**Arteries:** Arteries usually carry oxygenated blood from heart to different parts of the body. One exception is the pulmonary artery which carries deoxygenated blood from heart to lungs.

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

**Ans.** In the lungs, the air-passage divides into smaller tubes called bronchi which form bronchioles. The bronchioles terminate in balloon-like structures called alveoli. The alveoli present in the lungs provide maximum surface for exchange of gases. The alveoli have very thin walls and contain an extensive network of blood vessels to facilitate exchange of gases.

**Page 96**

**1. What are the components of the transport system in human beings? What are the functions of these components?**

**Ans.** In human beings, for the transport of various substances, a well-developed circulatory system is present. Main components of circulatory system are Heart, blood vessels and blood.

**Heart:** It pumps the blood and circulate the blood in the whole body continuously.

**Blood vessels:**

Arteries are thick blood vessels which carry oxygenated blood from the heart to all the parts of the body.

Veins are thin walled blood vessels which carry deoxygenated blood from all the parts of the body back to the heart.

Capillaries are thin and narrow blood vessels in which exchange of material between the blood and surrounding cells takes place.

**Blood:** It acts as a connective tissue which transport food, oxygen, waste materials, hormones, etc. from one part of the body to another.

**2. Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?**

**Ans.** Mammals and birds are warm blooded animals. This means they can control their body temperature and they need not to depend on environment for body temperature regulation. Because of this birds and mammals need optimum oxidation of glucose which is possible with good supply of oxygen without mixing of oxygenated and deoxygenated blood.

**3. What are the components of the transport system in highly organised plants?**

**Ans.** The main components of transport system in highly organised plants are two conducting tissues called xylem and phloem.

- Xylem consists of vessels and tracheids.
- Phloem consists of sieve tubes and companion cells.

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

**Ans.** Mechanism of Transport of Water and Minerals in a Plant

- The vessels and tracheids of roots, stems and leaves in xylem tissue are interconnected to form a continuous system of water-conducting channels reaching all parts of the plant.
- The cells of the roots in contact with the soil actively take up ions which creates a difference in the ion concentration between the root and the soil.
- Thus, there is steady movement of water into root xylem from the soil, creating a column of water that is pushed upwards.
- Plant uses another strategy to move water in the xylem upwards to the highest points of the plant body.
- The water which is lost through the stomata is replaced by water from the xylem vessels in the leaf.
- Evaporation of water molecules from the cells of a leaf creates a suction which pulls water from the xylem cells of roots.
- This loss of water is transpiration which helps in the absorption and upward movement of water and minerals dissolved in it from roots to the leaves.
- Transpiration becomes the major driving force in movement of water in the xylem during the day when the stomata are open.
- This mechanism is also known as cohesion of water theory or transpiration pull.

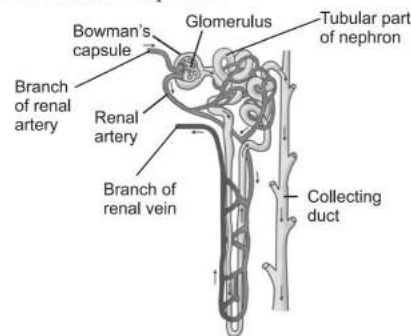
**5. How is food transported in plants?**

**Ans.** In the plants, the food is transported through phloem to the storage organs like roots, fruits, seeds and growing parts. This process is called translocation. In the phloem, sieve tubes are present, which with the help of companion cells, translocate food both in upward and downward directions. For the translocation, energy is required which is provided by ATP.

**Page 98**

**1. Describe the structure and functioning of nephron.**

**Ans.** Structure of nephron:



**Structure of a nephron**



Each nephron is a long-coiled tubule whose one end is cup-shaped called Bowman's capsule while its other end connects to a urine collecting duct of the kidney. The Bowman's capsule contains a bundle of blood capillaries which is called glomerulus.

**Function of nephron:**

It is the functional unit of kidney. It filters uncleaned blood so that waste substances can be removed from the blood.

2. **What are the methods used by plants to get rid of excretory products?** [DoE]

Ans. Plants get rid of carbon dioxide and oxygen through diffusion. Old branches and leaves are shed off when

they become useless. Plants have a mechanism to release some waste products through roots also. Some waste products are deposited near bark as raisins or gums.

3. **How is the amount of urine produced regulated?**

Ans. The kidney is equipped with a mechanism to reabsorb water from the filtrate. This depends on how much water is left in the body and in the filtrate. The comparative concentration of water gives a signal to the brain which then takes the required corrective action of either reabsorbing water or releasing more water. Thus, the amount of urine formation is regulated by kidneys.

### NCERT EXERCISES

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

- (a) nutrition. (b) respiration.  
(c) excretion. (d) transportation.

Ans. (c) Nitrogenous wastes such as urea are removed from blood in the kidneys.

2. **The xylem in plants are responsible for**

- (a) transport of water.  
(b) transport of food.  
(c) transport of amino acids.  
(d) transport of oxygen.

Ans. (a) Xylem transports water and minerals from soil to leaves.

3. **The autotrophic mode of nutrition requires**

- (a) carbon dioxide and water.  
(b) chlorophyll.  
(c) sunlight.  
(d) all of the above.

Ans. (d) Autotrophic mode of nutrition requires carbon dioxide, water, chlorophyll and sunlight for photosynthesis.

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

- (a) cytoplasm. (b) mitochondria.  
(c) chloroplast. (d) nucleus.

Ans. (b) Breakdown of pyruvate using oxygen takes place in the mitochondria. This process breaks up the three-carbon pyruvate molecules to give three molecules of carbon dioxide and the other product is water. Since the process takes place in presence of oxygen, it is called aerobic respiration.

5. **How are fats digested in our body? Where does this process take place?**

Ans. Fats are digested in our body in the small intestine. Fats entering the small intestine are in the form of large globules. The digestion of fats complete in the following steps.

- (i) Bile salts break large globules into small globules.

- (ii) Pancreatic juice secreted by pancreas has enzyme lipase which breaks down emulsified fats.

- (iii) Enzymes secreted from the walls of small intestine finally converts fats into fatty acids.

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

Ans. Saliva contains water, salts, mucin and an enzyme salivary amylase that breaks down starch present in the food into sugar.

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

Ans. The necessary conditions for autotrophic nutrition are as follows:

- (i)  $\text{CO}_2$  is necessary for photosynthesis.

- (ii) Water is required.

- (iii) Sunlight is necessary for photosynthesis.

- (iv) Chlorophyll is also essential for photosynthesis. Oxygen is liberated as a by-product.

8. **What are the differences between aerobic and anaerobic respiration? Name some organisms that use the anaerobic mode of respiration. [KVS]**

Aerobic Respiration	Anaerobic Respiration
(i) When oxidation of food nutrients occurs in the presence of molecular oxygen, it is called aerobic respiration.	(i) When oxidation of nutrients occurs without the utilisation of molecular oxygen, it is called anaerobic respiration.
(ii) More energy is produced as oxidation is complete.	(ii) Less amount of energy is produced as oxidation is not complete.

(iii) Takes place in cytoplasm and mitochondria.	(iii) Takes place in the cytoplasm.
--	-------------------------------------

Anaerobic mode of respiration occurs in some organisms like Bacteria and Yeast.

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

**Ans.** In human beings, to maximise the area for exchange of gases, inner surface of lungs has smaller tubes that terminate into balloon-like structures called alveoli. The walls of alveoli have extensive network of blood vessels.

**10. What would be the consequences of a deficiency of haemoglobin in our bodies?**

**Ans.** Deficiency of haemoglobin in our bodies will affect the supply of oxygen to tissues and cells because haemoglobin is the carrier of oxygen. Thus, a person shows symptoms of breathlessness, tiredness with indications of iron deficiency, i.e. anaemia.

**11. Describe double circulation in blood of human beings. Why is it necessary?**

**Ans.** The circulatory system of man is called double circulation as the blood passes through the heart twice in one complete cycle of the body. It involves two circulations:

- (i) **Pulmonary circulation:** It begins from the right ventricle which expels the blood into the pulmonary trunk. The blood flowing into the vascular system of the lungs, becomes oxygenated and returns to the heart (left atrium) through pulmonary veins.
- (ii) **Systemic circulation:** This circulation starts from the left ventricle which sends the blood into the aorta. The aorta divides into arteries, arterioles and finally to capillaries and thereby, supplies oxygenated blood to various parts of the body. From there deoxygenated blood is collected by venules which join to form veins and finally vena cava and pour blood back into the right auricle of heart.

**Necessity of double circulation:** The right side and the left side of the human heart are useful to prevent deoxygenated and oxygenated blood from mixing. This type of separation of oxygenated and deoxygenated blood ensures a highly efficient supply of oxygen to the body. This is useful in case of humans because it constantly gives energy to maintain their body temperature.

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

**Ans.** Differences between the transport of materials in xylem and phloem are as follows:

Xylem	Phloem
(i) In xylem, transport of water and minerals occurs from roots to leaves.	(i) In phloem, transport of food occurs from leaves to other parts of plant.
(ii) Conduction of water and materials takes place through xylem vessels and tracheids (dead tissues).	(ii) Conduction of food takes place through sieve tube and companion cells (living cells).

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

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

Alveoli in Lungs	Nephrons in Kidneys
(i) Alveoli are balloon-like structures.	(i) Nephrons are long tubular structures.
(ii) It is made up of one-celled thick wall which contains extensive network of blood capillaries.	(ii) It is made up of glomerulus, Bowman's capsule and a long renal tube.
(iii) Alveoli are the site of gaseous exchange in lungs.	(iii) Nephrons are the basic filtration unit of kidney.
(iv) Here exchange of oxygen and carbon dioxide takes place between the blood flowing in capillaries which surround the alveoli and gases present in the alveoli.	(iv) Each nephron filters the blood and separates the nitrogenous waste in the form of urine.

### SELECT NCERT EXEMPLAR PROBLEMS

1. Which part of alimentary canal receives bile from the liver?  
 (a) Stomach (b) Small intestine  
 (c) Large intestine (d) Oesophagus  
 Ans. (b)
2. When air is blown from mouth into a test-tube containing lime water, the lime water turns milky due to the presence of  
 (a) oxygen (b) carbon dioxide  
 (c) nitrogen (d) water vapour  
 Ans. (b)
3. The filtration units of kidneys are called  
 (a) ureter (b) urethra  
 (c) neurons (d) nephrons  
 Ans. (d)
4. The opening and closing of the stomatal pore depends upon  
 (a) oxygen  
 (b) temperature  
 (c) water in guard cells  
 (d) concentration of  $\text{CO}_2$  in stomata  
 Ans. (c)
5. Which of the following statements about the autotrophs is incorrect?  
 (a) They synthesise carbohydrates from carbon dioxide and water in the presence of sunlight and chlorophyll.  
 (b) They store carbohydrates in the form of starch.  
 (c) They convert carbon dioxide and water into carbohydrates in the absence of sunlight.  
 (d) They constitute the first trophic level in food chains.  
 Ans. (c)
6. Which is the correct sequence of parts in human alimentary canal?  
 (a) Mouth  $\rightarrow$  stomach  $\rightarrow$  small intestine  $\rightarrow$  oesophagus  $\rightarrow$  large intestine  
 (b) Mouth  $\rightarrow$  oesophagus  $\rightarrow$  stomach  $\rightarrow$  large intestine  $\rightarrow$  small intestine  
 (c) Mouth  $\rightarrow$  stomach  $\rightarrow$  oesophagus  $\rightarrow$  small intestine  $\rightarrow$  large intestine  
 (d) Mouth  $\rightarrow$  oesophagus  $\rightarrow$  stomach  $\rightarrow$  small intestine  $\rightarrow$  large intestine  
 Ans. (d)
7. What prevents backflow of blood inside the heart during contraction?  
 (a) Valves in heart  
 (b) Thick muscular walls of ventricles  
 (c) Thin walls of atria  
 (d) Inner lining of the heart  
 Ans. (a)
8. Which of the following equations is the summary of photosynthesis?  
 (a)  $6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$   
 (b)  $6\text{CO}_2 + \text{H}_2\text{O} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 + 6\text{H}_2\text{O}$   
 (c)  $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{Chlorophyll} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$   
 (d)  $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{Chlorophyll} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{CO}_2 + 6\text{H}_2\text{O}$   
 Ans. (c)
9. Lack of oxygen in muscles often leads to cramps among cricketers. This results due to  
 (a) conversion of pyruvate to ethanol.  
 (b) conversion of pyruvate to glucose.  
 (c) non conversion of glucose to pyruvate.  
 (d) conversion of pyruvate to lactic acid.  
 Ans. (d)
10. Name the following:  
 (a) The process in plants that links light energy with chemical energy.  
 (b) Organism that can prepare their own food.  
 (c) The cell organelle where photosynthesis occurs.  
 (d) Cells that surround a stomatal pore.  
 (e) Organisms that cannot prepare their own food.  
 (f) An enzyme secreted from gastric glands acts on proteins.  
 Ans. (a) Photosynthesis (b) Autotrophs  
 (c) Chloroplasts (d) Guard cells  
 (e) Heterotrophs (f) Pepsin
11. "All plants give out oxygen during day and carbon dioxide during night". Do you agree with this statement? Give reason. [HOTS]  
 Ans. 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.
12. Two green plants are kept separately in oxygen free containers. One in dark and other in continuous light which one will longer? Give reasons.  
 Ans. The plant which kept in continuous light will live longer because in light, the plant will be able to undergo photosynthesis and able to convert carbon dioxide into oxygen whereas the plant in dark cannot perform photosynthesis and lack of oxygen will kill the plant.

- 13. Why do fishes die when taken out of water?**  
**Ans.** Fishes die when taken out of water because they cannot obtain gaseous oxygen. They breathe through gills, which are richly supplied with blood capillaries and can readily absorb oxygen dissolved in water.
- 14. Is 'nutrition' a necessity for an organism? Discuss.**  
**Ans.** 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.
- 15. What would happen if green plants disappear from earth?**  
**Ans.** If green plants disappear from earth, then the herbivores will die of starvation followed by carnivores and then decomposers.
- 16. Leaves of a healthy potted plant were coated with vaseline will this plant remain healthy for long? Give reasons for your answer.**  
**Ans.** (a) The plant will die soon because layer of vaseline will prevent the exchange of gases for respiration.  
 (b) It will also close the stomatal openings and plant won't be able to get the necessary raw materials for photosynthesis.
- 17. What are the adaptations of leaf for photosynthesis?**  
**Ans.** 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.
- 18. Why do herbivores have longer, small intestine than carnivores?** [CBSE 2014]  
**Ans.** Cellulose is difficult to digest and hence takes a longer time for complete digestion which is why herbivores need a comparatively longer small intestine. Meat is easy to digest and hence carnivores like tigers have a comparatively shorter small intestine.
- 19. Why is small intestine in herbivores longer than in carnivores?** [HOTS]  
**Ans.** 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. What will happen if mucus is not secreted by the gastric glands?**  
**Ans.** If mucus is not secreted by the gastric glands, it will lead to corrosion 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.
- 21. Why does absorption of digested food occur mainly in the small intestine?**  
**Ans.** Absorption of digested food occurs 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.
- 22. Why is the rate of breathing in aquatic organisms much faster than in terrestrial organisms?** [DoE]  
**Ans.** The rate of breathing in aquatic organisms is much faster than in terrestrial organisms because the amount of dissolved oxygen in water is low as compared to the amount of oxygen in the air. Aquatic animals take in water through their mouths and pass it to the gills where the dissolved oxygen is taken up by blood.
- 23. What is the advantage of having four chambered heart?** [HOTS]  
**Ans.** 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 septum. 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.
- 24. In each of the following situations what happens to the rate of photosynthesis?**  
 (a) Cloudy days  
 (b) No rainfall in the area  
 (c) Good manuring in the area  
 (d) Stomata gets blocked due to dust. [HOTS]  
**Ans.** (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.

**25. Name the energy currency in the living organisms. When and where is it produced?**

**Ans.** 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.

**26. What is common for cuscuta, ticks and leeches?**

**Ans.** All are parasites and they derive their nutrition from their hosts directly without killing them.

**27. What are the functions of gastric glands present in the wall of the stomach?**

**Ans.** 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.

**28. Plants have low energy needs as compared to animals. Explain.**

**Ans.** 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.

**29. Why and how does water enter continuously into the root xylem?**

**Ans.** 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.

**30. How do leaves of plants help in excretion?**

**Ans.** (a) 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.

(b) Transpiration of gases via stomata helps in removal of gaseous waste of respiration and photosynthesis.

**31. Explain the importance of soil for plant growth.**

**Ans.** Importance of soil for plant growth:

(i) It anchors the plant.

(ii) It is the source of water and minerals.

(iii) It helps in symbiotic association with microbes.

(iv) It helps for respiration of root cells due to availability of oxygen of food material.

**32. Describe the alimentary canal of man.**

**Ans.** Alimentary canal in man is 9 metres long and consists of the following parts :

(i) **Mouth.** It leads into buccal cavity.

The floor of the buccal cavity has a tongue bearing taste buds. Man possess teeth on both the jaws. There are 32 teeth of four different types, namely incisors, canines, premolars and molars.

(ii) **Pharynx.** It is a short, conical region that lies after the mouth cavity.

(iii) **Oesophagus.** It is a long, narrow, muscular tube which leads to the stomach.

(iv) **Stomach.** It lies below the diaphragm on the left side of abdominal cavity and is J-shaped. The food is stored and partly digested in the stomach.

(v) **Small Intestine.** It is a convoluted tube and differentiated into three regions, viz., duodenum, which is the first part of small intestine and is curved C-shaped; jejunum, comparatively longer and more coiled, and ileum, which is the last part of small intestine whose inner surface is folded to form villi, which absorbs the products of digestion.

(vi) **Large Intestine.** It is much shorter and wider than small intestine and is differentiated into three regions viz., caecum, which is small rounded blind sac from which vermiform appendix arises; colon is the inverted U-shaped tube and the rectum opens to exterior through anus.