

UNIT II: WORLD OF LIVING

CHAPTER

6

LIFE PROCESSES

Syllabus

Living Being; Basic concept of nutrition, respiration, transport and excretion in plants and animals.

Trend Analysis

List of Concepts	2018	2019	2020
Nutrition		1Q (3 M)	1Q (3 M)
Circulation and Transportation	1Q (5 M)	1Q (3 M)	1Q (5 M)
Excretion	Or 1Q (5 M)	Or 1Q (3 M)	

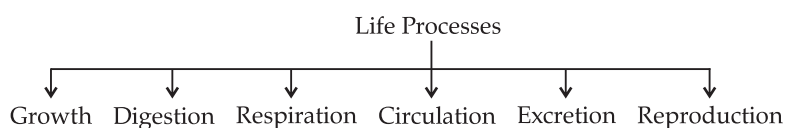


TOPIC - 1 Nutrition



Revision Notes

- All living things perform certain life processes like growth, excretion, respiration, circulation and reproduction etc.
- The basic functions performed by living organisms for their survival and body maintenance are called life processes.
- **Basic life processes are:**



- Energy required to carry out the different life processes, is obtained from carbon-based food sources through nutrition.

TOPIC - 1

Nutrition

TOPIC - 2

Respiration

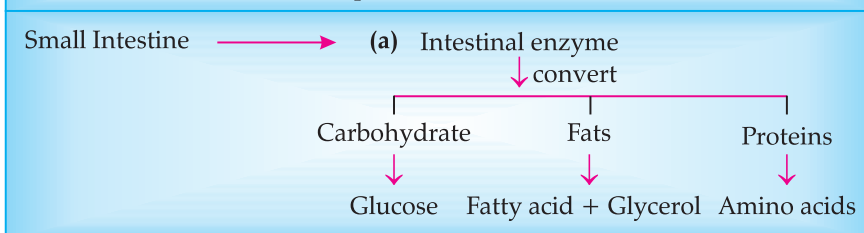
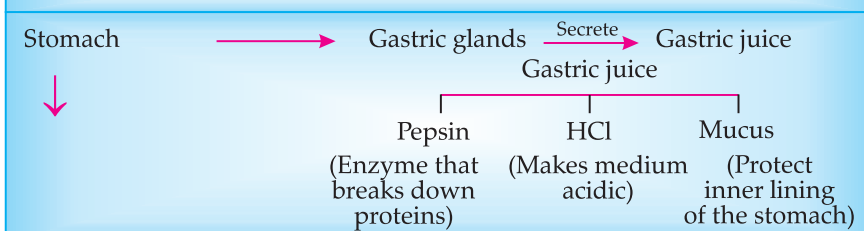
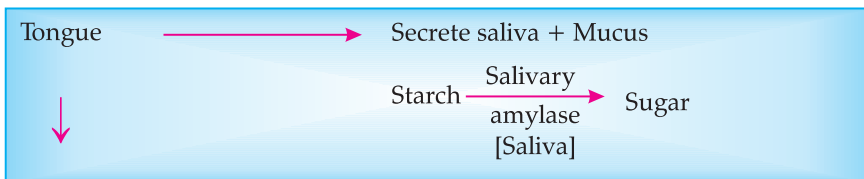
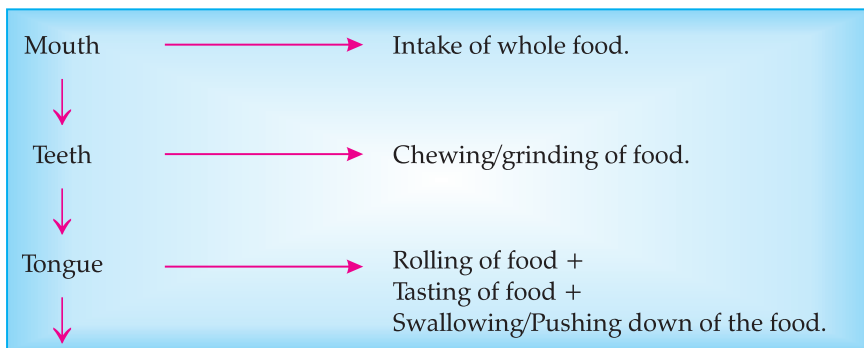
TOPIC - 3

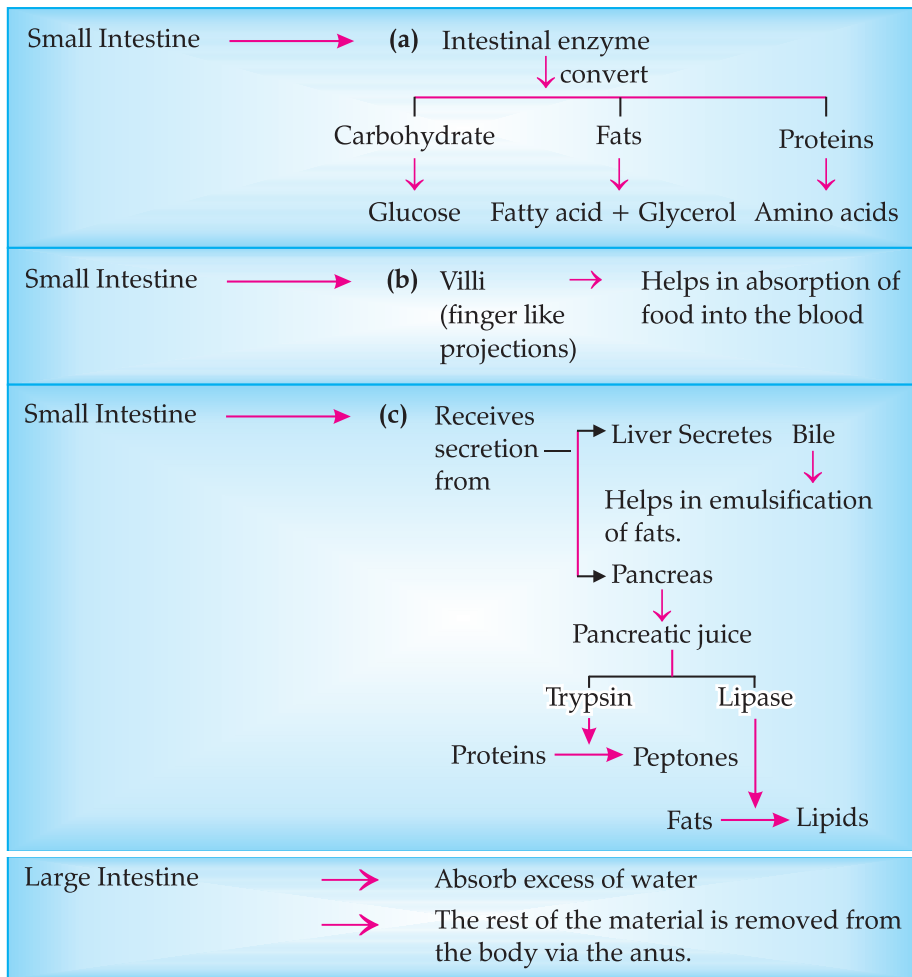
Circulation and Transportation

TOPIC - 4

Excretion

- Depending on the mode of nutrition, organisms are classified as autotrophs and heterotrophs.
 - (i) **Autotrophs** can prepare their own food from simple inorganic sources like carbon dioxide and water. (e.g., green plants, some bacteria).
 - (ii) **Heterotrophs** cannot synthesise their own food and are dependent on the autotrophs for obtaining complex organic substances for nutrition. (e.g., animals)
- Green plants manufacture their food by the process of **photosynthesis**. Here, they utilise CO_2 and H_2O in presence of sunlight, with the help of chlorophyll and gives out O_2 as a by-product.
- In the light reaction of photosynthesis, light energy is absorbed and converted into chemical energy in the form of ATP and NADPH. Also, water molecules split into hydrogen and oxygen.
- Carbon dioxide is reduced to carbohydrates in the dark phase of photosynthesis.
- Plants carry out exchange of gases with surrounding atmosphere through stomata.
- In humans, digestion of food takes place in the alimentary canal, made up of various organs and glands.
- Liver secretes bile, which emulsifies fat.





Mnemonics

Concept: Parts of an alimentary canal in humans.

Mnemonics: MOSS DJ I LA - remember this as "Kate MOSS is a DJ In LA"

Interpretation:

M = Mouth

S = Stomach

D = Duodenum

I = Ileum

A = Anus

O = Oesophagus

S = Small Intestine (made up of)

J = Jejunum

L = Large Intestine

How is it done on the GREENBOARD?

Q.1. Mention the organ and site of photosynthesis in green plants. What are the raw materials essential for this process? How are they obtained? Write complete balanced chemical equation for the process. Name the by-products. 5

Solution:

Step I: Photosynthesis takes place in the grana and stroma of the chloroplast (Plastid) in green parts of plants.

Step II: The raw materials required for this process are carbon dioxide and water in the presence of sunlight and chlorophyll.

Step III: Carbon dioxide enters the leaves through stomata and cells of the roots absorb water from the soil.

Step IV: Balanced equation for photosynthesis is:



✓ Objective Type Questions

1 mark each

A Multiple Choice Questions

Q. 1. 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. Correct option : (c)

Explanation : Autotrophs take in food from the outside world and convert them into stored forms of energy. This material is taken in the form of carbon dioxide and water which is converted into carbohydrates in the presence of sunlight and chlorophyll.

Q. 2. In which of the following groups of organisms, food material is broken down outside the body and absorbed?

- (a) Mushroom, green plants, *Amoeba*
- (b) Yeast, mushroom, bread mould
- (c) *Paramecium*, *Amoeba*, *Cuscuta*
- (d) *Cuscuta*, lice, tapeworm

Ans. Correct option : (b)

Explanation : These are saprotrophs and digestion in saprotrophs takes place before ingestion. They break down and convert complex organic molecules present in dead and decaying matter into simpler substances outside their body.

Q. 3. Which is the correct sequence of parts in human alimentary canal?

- (a) Mouth → stomach → small intestine → oesophagus → large intestine
- (b) Mouth → oesophagus → stomach → large intestine → small intestine
- (c) Mouth → stomach → oesophagus → small intestine → large intestine
- (d) Mouth → oesophagus → stomach → small intestine → large intestine [NCERT Exemp.]

Ans. Correct option : (d)

Explanation : The sequence of organs in human alimentary canal are mouth, oesophagus, stomach, small intestine, large intestine and anus.

Q. 4. If salivary amylase is lacking in the saliva, which of the following events in the mouth cavity will be affected?

- (a) Proteins breaking down into amino acids
- (b) Starch breaking down into sugars
- (c) Fats breaking down into fatty acids and glycerol
- (d) Absorption of vitamins

Ans. Correct option : (b)

Explanation : If salivary amylase is lacking in the saliva, the process of starch digestion will get disturbed as salivary amylase helps in digestion of starch.

Q. 5. Select the correct statement.

- (a) Heterotrophs do not synthesise their own food.

- (b) Heterotrophs utilise solar energy for photosynthesis.
- (c) Heterotrophs synthesise their own food.
- (d) Heterotrophs are capable of converting carbon dioxide and water into carbohydrates.

Ans. Correct option: (a)

Explanation: Heterotrophs are organisms which cannot make their own food from inorganic substances like CO_2 and water as they do not have chlorophyll to trap solar energy. They depend on other organisms for their food. Autotrophs synthesize their own food through photosynthesis by utilizing solar energy, e.g., green plants.

B Assertions and Reasons Type Questions

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
- (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
- (c) Assertion (A) is true but reason (R) is false.
- (d) Assertion (A) is false but reason (R) is true.

Q. 1. Assertion (A): HCl converts pepsinogen into active enzyme pepsin.

Reason (R): Pepsin converts protein into proteoses and peptones.

Ans. Correct option : (b)

Explanation: HCl creates an acidic medium, which facilitates activation of pepsinogen into pepsin. The active enzyme pepsin converts proteins into proteoses and peptones.

Q. 2. Assertion (A): Digestion breaks large complex molecules to simple smaller molecules which can be easily absorbed.

Reason (R): Digestion is necessary for the absorption of all molecules.

Ans. Correct option : (c)

Explanation: Digestion breaks large complex organic molecules to simple smaller ones which can be easily absorbed. However, certain molecules such as glucose, vitamin C etc, do not need any digestion before their absorption.

Q. 3. Assertion (A): Muscles of stomach wall possess thick layers of muscle fibers.

Reason (R): These muscles help in mixing the food with the enzymes present in the alimentary canal.

Ans. Correct option : (a)

Explanation: The lining of alimentary canal has muscles that contract rhythmically in order to push the food forward. This is known as *peristaltic movement*.

Q. 4. Assertion (A): Lipases help in emulsification of fats.

Reason (R): Lipases hydrolyse fats and oils.

Ans. Correct option : (d)

Explanation: Bile helps in emulsification of fats whereas lipases are the enzymes which hydrolyze fats and oils.

Q. 5. Assertion (A): Photosynthesis is an anabolic process.

Reason (R): The process of photosynthesis occurs in chlorophyll.

Ans. Correct option : (c)

Explanation: Photosynthesis is an anabolic process as it takes CO_2 and H_2O and then assembles them into glucose. The process of photosynthesis occurs in chloroplast.

C Very Short Answer Type Questions

Q.1. How is the wall of small intestine adapted for performing the function of absorption of food ?

[U] [CBSE SQP, 2021]

Ans. The inner lining of the small intestine has numerous finger-like projections called villi which increase the surface area for absorption. 1

Q.2. Out of a goat and a tiger, which one will have a longer small intestine? Justify your answer.

[A] [CBSE SQP, 2021]

Ans. Goat, because herbivores eating grass need a longer small intestine to allow the cellulose to be digested. 1

Q.3. State the role of pancreas in digestion of food.

[R] [CBSE SQP, 2021]

Ans. The pancreas secretes digestive juice which contains enzymes like trypsin for digesting proteins and lipase for breakdown of emulsified fats. 1

Q. 4. Name a common nutrient that is absorbed in the small intestine and reabsorbed by the kidney tubules.

[R] [CBSE SQP, 2018-19]

Ans. Glucose/Amino acid 1
[CBSE Marking Scheme, 2018]

[AI] Q. 5. What is the role of saliva in the digestion of food ?

[U] [DDE, 2017]

Ans. Saliva moistens the ingested food with mucus, sterilises it with lysozyme and partially digests starch part of food into sugar with the help of salivary amylase or ptyalin. 1

Q. 6. What is the role of acid in our stomach ?

[A] [DDE, 2017]

Ans. HCl of gastric juice disinfects the food and acidifies it for proper functioning and activation of proteolytic enzyme pepsin. 1



Short Answer Type Questions-I

2 marks each

Q. 1. Bile juice does not have any digestive enzyme but still plays a significant role in the process of digestion. Justify the statement.

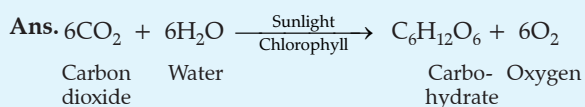
[U] [CBSE SQP, 2020-21]

Ans. Bile juice makes the acidic food coming from the stomach alkaline for the action of pancreatic enzymes. Bile salts break the large globules of fat in the intestine to smaller globules increasing the efficiency of enzyme action. This is similar to the emulsifying action of soaps on dirt.

[CBSE SQP Marking Scheme, 2020-21] 2

Q. 2. State the events occurring during the process of photosynthesis. Is it essential that these steps take place one after the other immediately?

[U] [CBSE SQP, 2020-21] 2



Absorption of light energy by chlorophyll.

- Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen.

- Reduction of carbon dioxide to carbohydrates.

These steps need not take place one after the other immediately. For example, desert plants take up carbon dioxide at night and prepare an intermediate which is acted upon by the energy absorbed by the chlorophyll during the day. 2

[CBSE SQP Marking Scheme, 2020-21] 2

Q. 3. List the steps of preparation of temporary mount of a leaf peel to observe stomata.

[A] [CBSE, Delhi, O.D. 2018]

Ans. The steps are:

- Removal of peel from leaf
- Stain with safranin
- Mount it with glycerine and cover slip

[CBSE Marking Scheme, 2018]

Q. 4. What are final products of carbohydrates, proteins and fats after their digestion ? [R]

Ans. Carbohydrates: Glucose $\frac{1}{2}$
Proteins: Amino acid $\frac{1}{2}$
Fats: Glycerol + Fatty acid $\frac{1}{2} + \frac{1}{2}$



Short Answer Type Questions-II

3 marks each

Q.1 State the role played by the following in the process of digestion: (i) Enzyme trypsin (ii) Enzyme lipase List two functions of finger like projections present in the small intestine.

[U] [Outside Delhi, Set-I, 2020]

Ans. (a) (i) Trypsin acts upon proteins and converts it into peptides and amino acids (ii) Lipase is an enzyme that breaks down dietary fats into smaller molecules called fatty acids and glycerol.

(b) Functions of villi:

- Villi are richly supplied with blood vessels which take the absorbed food to each and every cell of the body.
- It also absorb water.
- They increase the surface area for the absorption of food.

(Any one) 2 + 1 = 3

[AI] Q. 2. What is photosynthesis ? Explain its mechanism.

[R] [CBSE Board Delhi, Set-III, 2019]

Ans. A process in which green plants take carbon dioxide and water and convert it into carbohydrates/food in the presence of sunlight and chlorophyll. 1

Mechanism:

- Absorption of light energy by chlorophyll.
- Conversion of light energy to chemical energy.
- Splitting of water molecules into hydrogen and oxygen.
- Reduction of carbon dioxide to carbohydrate.

[CBSE Marking Scheme, 2019] $\frac{1}{2} \times 4$

[AI] Q. 3. List in tabular form three distinguishing features between autotrophic nutrition and heterotrophic nutrition. [U] [Board Outside Delhi, Set-I, 2019]

Ans.

	Autotrophic Nutrition	Heterotrophic Nutrition
1.	They can prepare their own food.	They cannot prepare their own food.
2.	They require raw materials like CO_2 , H_2O in the presence of sunlight and chlorophyll to prepare their food.	They depend on other plants and animals for their food.
3.	They store the food in the form of starch.	They store the food in the form of glycogen.

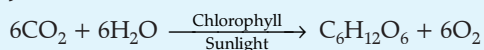
(Any three point)

[CBSE Marking Scheme, 2019] 1×3

Q. 4. A variegated leaf with green and yellow patches is used for an experiment to prove that chlorophyll is required for photosynthesis. Before the experiment, the green portions (A), and the pale yellow portions (B), are observed. What will be the colour of 'A' just before and after the starch test? Also write the equation of photosynthesis and mark, as well as validate from which molecule the by-product is obtained. [C] [CBSE, SQP 2019]

Ans. Just before Starch test — Pale yellow

Just after Starch test – Blue black



O₂ is obtained from water (H₂O), as splitting of water results in formation of hydrogen (used for making glucose) and oxygen (by-product).

[CBSE Marking Scheme, 2018-19] 3

Q. 5. Where does digestion start in our alimentary canal? Name the enzyme secreted in that part and write its function.

[U] [Board Term I, 2016]

Ans. Digestion starts in the buccal cavity in the mouth. The enzyme secreted in buccal cavity is salivary amylase. Salivary amylase helps in breakdown of starch into maltose and dextrin. 1 + 1 + 1

[AI] Q. 6. State the necessary conditions for autotrophic nutrition and name the by-product. Mention the source of this by-product. [U] [Board Term I, 2015]

Ans. Conditions necessary for autotrophic nutrition are: Sunlight, chlorophyll, carbon dioxide and water. The by-product is oxygen. The source of by-product (oxygen) is water.

1+1+1



Long Answer Type Questions

5 marks each

Q. 1. (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? [U] [Delhi II, 2020]

Ans. (a) The gas released during the process of photosynthesis is oxygen. Oxygen is liberated during photosynthesis which comes from water.

During photosynthesis, plants absorb carbon dioxide and sunlight to produce carbohydrates. The solar energy trapped by chlorophyll breaks down water molecules by the process of photolysis. Photolysis of water releases oxygen.

(b) Stomata are tiny pores present on the surface of the leaves.

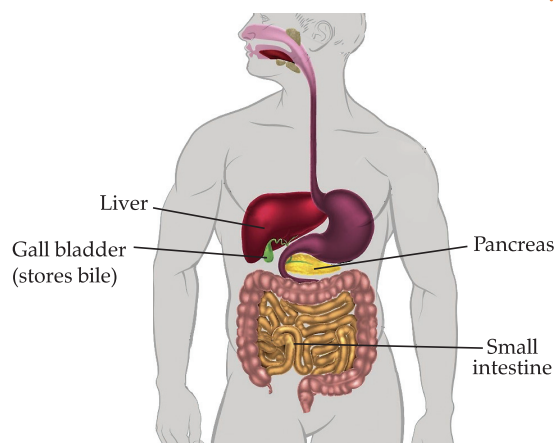
The opening and closing of stomatal pores are controlled by the turgidity of guard cells. When guard cells uptake water from surrounding cells, they swell to become a turgid body. This enlarges the pore in between and cause stomatal opening. When water is released, they become flaccid. This closes the pore in between causing stomatal closing.

2 + 3 = 5

Q. 2. (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. [U] [Delhi III, 2020]

Ans. (a)



(b) Absorption of digested food occurs mainly in the small intestine because it has finger like projections called villi which help in absorption of food into blood. Villus contains a lymph capillary called lacteal in the center. Lacteal in turn is surrounded by a network of thin and small blood vessels called blood capillaries close to its surface. As the food moves slowly between, over and around the villi, the surface of villi absorbs the digested food materials into blood flowing through them. Blood, in turn, carries the absorbed food materials to all the parts of the body. In the cells food is used for energy, repair and growth. The process is known as assimilation.

2+3=5

[AI] Q. 3.(i) 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.

(ii) Write three events that occur during this process.

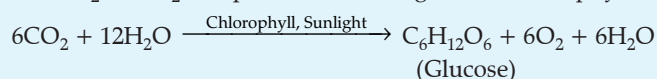
[U] [Board Term I, 2018]

Ans. (i) Process: Photosynthesis

½

Type of nutrition: Autotrophic

Explanation: Autotrophic nutrition is the process where plants prepare their own food, using inorganic materials such as CO₂ and H₂O in presence of Sunlight and Chlorophyll. ½+½



1

Raw material: CO₂, H₂O

½+½

(ii) (a) Absorption of light energy by chlorophyll.

(b) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen.

(c) Reduction of Carbon dioxide to Carbohydrates.

[CBSE Marking Scheme, 2018] 1½

AI Q. 4. Mention the organ and site of photosynthesis in green plants. What are the raw materials essential for this process? How are they obtained? Write complete balanced chemical equation for the process. Name the by-products.

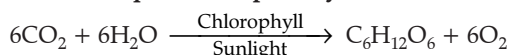
U [Board Term I, 2016]

Ans. Photosynthesis takes place in the grana and stroma of the chloroplast (Plastid) in green parts of plants.

The raw materials required for this process are carbon dioxide and water in the presence of sunlight and chlorophyll.

Carbon dioxide enters the leaves through stomata and cells of the roots absorb water from the soil.

Balanced equation for photosynthesis:



Oxygen is the by-product in this process.

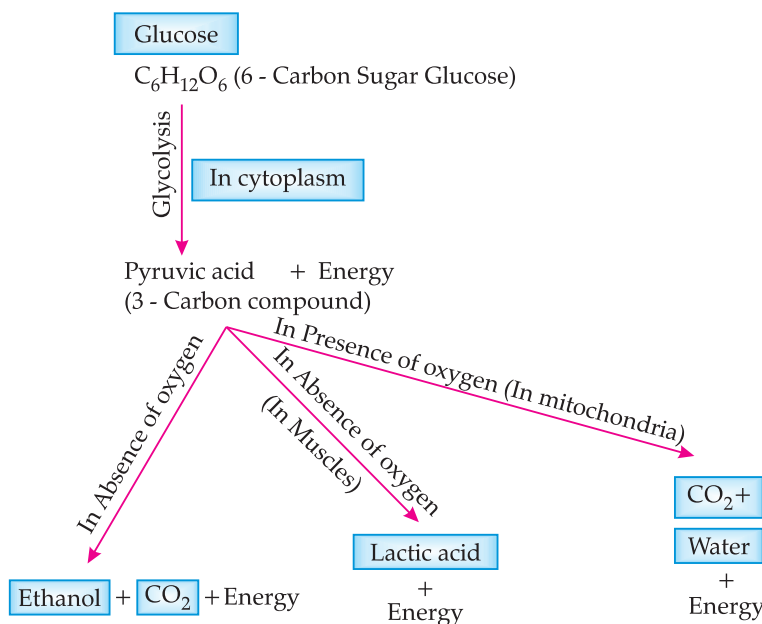
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TOPIC - 2

Respiration

Revision Notes

- Respiration is the process in living organisms, which involves:
 - (i) **Gaseous exchange:** Intake of oxygen from the atmosphere and release of $\text{CO}_2 \rightarrow$ Breathing
 - (ii) Breakdown of simple food in order to release energy inside the cell $\rightarrow$ Cellular respiration
- **Breakdown of Glucose by Various Pathways:**



- **Types of Respiration:**

Respiration	
Aerobic	Anaerobic
Takes place in the presence of oxygen	Takes place in the absence of oxygen
Occurs in mitochondria	Occurs in cytoplasm
End products are CO_2 and H_2O	End products are alcohol or lactic acid
More amount of energy is released	Less amount of energy is released
Examples: Most plants and animals	Examples: Muscles, bacteria, yeast and parasitic worm etc.

- In humans, air takes the following path on entering the nostrils:
Nostrils → Nasal passage → Pharynx → Larynx → Trachea → Bronchus → Bronchiole → Alveolus.
- The alveoli of lungs are richly supplied with blood and are the sites where exchange of gases (O_2 and CO_2) occurs between blood and atmosphere.
- In humans, the respiratory pigment haemoglobin carries oxygen from lungs to different tissues of the body.
- In plants, gaseous exchange takes place through stomata in leaves, lenticels in stems, general surface of roots and transpiration.

How is it done on the GREENBOARD?

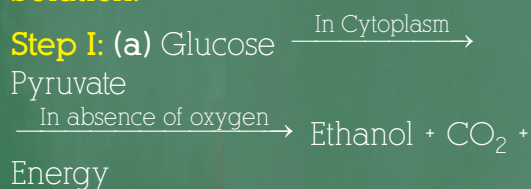
Q. (a) Write the reaction that occurs when glucose breaks down anaerobically in yeast.

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

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

(d) Name the respiratory pigment and write its role in human beings.

Solution:



Step II : (b) Fishes take in water through the mouth and force it past the gills where the dissolved oxygen is taken up by the blood.

Step III : (c) Alveoli

Step IV: Functions : They contain an extensive network of blood vessels which exchange gases.

Step V: They increase surface area of absorption of gases.

Step VI: (d) Haemoglobin

Step VII: Due to high affinity for O_2 , it helps in its transport from alveoli to the tissue.



Objective Type Questions

1 mark each

A Multiple Choice Questions

Q. 1. The breakdown of pyruvate to give carbon dioxide, water and energy takes place in

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

Ans. Correct option : (b)

Explanation : The breakdown of pyruvate to give carbon dioxide, water and energy takes place in mitochondria.

Q. 2. The correct sequence of anaerobic reactions in yeast is

- (a) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ Ethanol + Carbon dioxide
(b) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{cytoplasm}}$ Lactic acid
(c) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ Lactic acid



Ans. Correct option : (d)

Explanation : Yeast is a unicellular eukaryote which carries out ethanol fermentation. In the first phase, glucose is converted into pyruvate (glycolysis) in the cytoplasm of the cell. Due to limited oxygen availability, pyruvate remains in cytoplasm where pyruvate decarboxylase and alcohol dehydrogenase enzymes carry out the second phase of anaerobic respiration and produce ethanol and carbon dioxide.

B Assertions and Reasons Type Questions

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

- (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
 (c) Assertion (A) is true but reason (R) is false.
 (d) Assertion (A) is false but reason (R) is true.
- Q. 1. Assertion (A): Energy is used during the process of respiration.
 Reason (R): Respiration stores energy in the form of ATP.
- Ans. Correct option : (d)
Explanation: Respiration involves the oxidation of glucose inside the mitochondria to produce energy, which is stored in the high energy bonds of ATP molecules as biologically useful energy.
- Q. 2. Assertion (A): Humans are not truly aerobic.
 Reason (R): They produce lactic acid anaerobically.
- Ans. Correct option : (b)
Explanation: Humans are aerobically respiring animals, but sometimes anaerobic respiration takes place in certain tissues like skeletal muscles, which do not get immediately as much oxygen as it requires. Therefore, the muscles respire anaerobically and produce lactic acid from glucose.
- Q. 3. Assertion (A): In humans, there is a complex respiratory system.
 Reason (R): Human skin is impermeable to gases.
- Ans. Correct option : (b)

Explanation: Humans need more oxygen to maintain their high metabolic rates. Thus, a complex respiratory system has evolved so as to meet this need.

- Q. 4. Assertion (A): Alveoli contain an extensive network of blood vessels.

Reason (R): Alveoli is the site where exchange of gases occurs.

- Ans. Correct option : (a)

Explanation: The alveoli of lungs are richly supplied with blood and are the sites where exchange of gases (O_2 and CO_2) occurs between blood and atmosphere.

C Very Short Answer Type Questions

- Q. 1. Name the respiratory pigment in human beings. Where is this pigment found? [R]

Ans. The respiratory pigment in human being is haemoglobin. Haemoglobin is present in RBC's of blood in humans. $\frac{1}{2} + \frac{1}{2}$

- Q. 2. Where does aerobic respiration occur in a cell? [R]

Ans. Aerobic respiration occurs in mitochondria of the cell. 1

- Q. 3. Name the energy currency in the living organisms. When and where is it produced?

Ans. Adenosine triphosphate (ATP). It is produced during respiration in living organisms in mitochondria. 1



Short Answer Type Questions-I

2 marks each

- Q. 1. In the experimental set up on 'CO₂ is released during respiration', if one forgets to keep the vial with KOH in the conical flask, how will the result vary? Give details. [U] [CBSE SQP, 2018-19]

Ans. In absence of KOH, CO₂ released by germinating seeds is not absorbed, partial vacuum is not created in the conical flask, air pressure in the flask is not reduced, water level does not rise in the delivery tube. [CBSE Marking Scheme, 2018-19] 2

Detailed Answer:

The rise in the level of water indicates that CO₂ is produced by germinating seeds during respiration. Actually, the germinating seeds respire and produce CO₂, which is absorbed by KOH solution. This creates a vacuum in the conical flask. The air present in the bent glass tube moves into the conical flask. This pulls the water in the bent tube further up.

So, if one forgets to keep the vial with KOH solution in conical flask during experiment, then the released

CO₂ will not be absorbed due to which the level of water will not rise in the tube and the process of respiration will get very slow.

- Q. 2. When a sportsman runs, he often gets muscle cramps. Why? [U]

Ans. In order to release more energy to perform sudden activity, pyruvate is converted into lactic acid in the lack of oxygen. Formation of lactic acid in muscles cause cramps or fatigue. 2

- Q. 3. Stomata of desert plants remain closed during day time. How do they take up CO₂ and perform photosynthesis? [A]

Ans. The desert plants are scotoactive i.e., their stomata open during night. Therefore, they take up CO₂ at night and produce intermediate organic acid which breaks up to release CO₂. The CO₂ so produced internally is used in photosynthesis during day when stomata are closed. 2

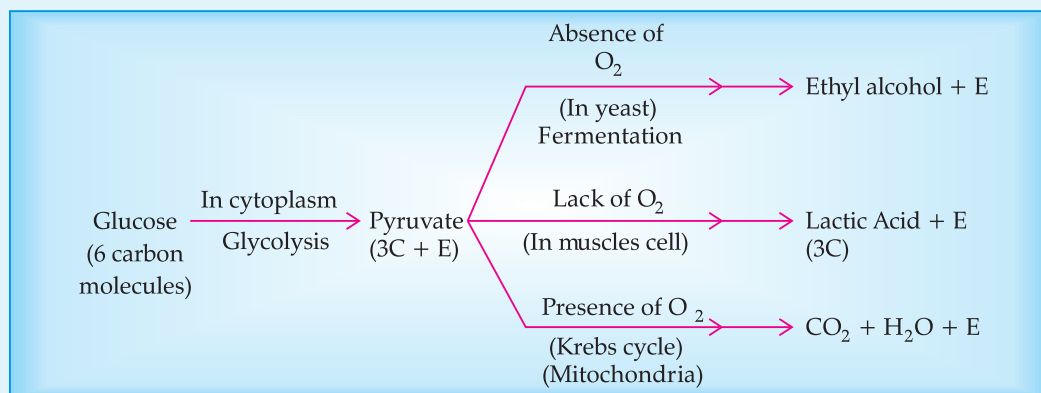


Short Answer Type Questions-II

3 marks each

- Q. 1. Explain the processes of aerobic respiration in mitochondria of a cell and anaerobic respiration in yeast and muscle with the help of word equations. [R] [Board SQP, 2020]

Ans.



1 + 1 + 1

[CBSE Marking Scheme, 2020]

Q. 2. The rate of breathing in aquatic organisms is much faster than that seen in terrestrial organisms. Give reason. [U] [Board Term I, 2014] [DDE, 2017]

Ans. A terrestrial organism can obtain oxygen directly from the air and have slow breathing rate but aquatic organisms have to obtain oxygen for respiration which is dissolved in water. Since, the amount of oxygen dissolved in water is fairly low as compared to the amount of oxygen in air, the rate of breathing in aquatic organisms is much faster. 3

COMMONLY MADE ERROR

- Students often write vague answer. It seems they are unaware of the concept of rate of breathing.

ANSWERING TIP

- Always be specific and give clear and complete answers. Incomplete and vague answers must be avoided.

Q. 3. Define breathing. Explain the mechanism of breathing in human beings.

[U] [Board Term I, 2016]

Q. 4. Explain the activity with diagram to show that carbon dioxide is essential for photosynthesis.

[C] [Board Term-I, 2015]

Ans. (i) Take two healthy potted plants which are nearly the same size.

(ii) Keep them in a dark room for three days.

(iii) Now place each plant on separate glass plates. Place a watch glass containing potassium hydroxide by the side of one of the plants. The potassium hydroxide is used to absorb carbon dioxide. When the leaves of both the plants were tested for starch, it was found that the leaves of the plant kept in bell jar (b), which is without potassium hydroxide gave the positive test of starch. This shows that CO₂ is essential for photosynthesis.

Ans. Breathing is the process of letting in oxygen from air into the lungs and CO₂ out of the lungs.

Mechanism: Involuntary, rate controlled by brain. Outward and inward movement of ribs increases or decreases the space of thoracic cavity, action assisted by diaphragm continues inhalation and exhalation of the air.

1+2

[CBSE Marking Scheme, 2016]

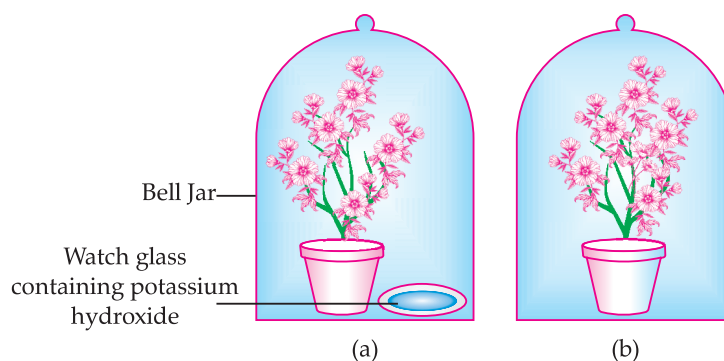
Detailed Answer:

A physical process by which oxygen is taken in and carbon dioxide is given out is called *breathing*.

Breathing in humans involve three steps:

- Inspiration:** When we breathe in, ribs move up and flatten the diaphragm due to which the chest cavity becomes larger. As a result air is sucked into the lungs and fills the expanded alveoli.
- Gaseous exchange:** Haemoglobin binds with the oxygen and carries it along the blood in the body. As blood passes through the tissues of the body, oxygen from the blood diffuses into the cell, whereas carbon dioxide which is produced during respiration diffuses into the blood and is carried to the lungs for expiration.
- Expiration:** Ribs move down and diaphragm becomes dome-shaped decreasing the chest cavity. Thus, pushing the air out from lungs.

3



Experimental set up (a) With potassium hydroxide (b) Without potassium hydroxide.

3

COMMONLY MADE ERROR

- Students write answer in essay form. Many of them get confused and write incorrect experimental steps.

ANSWERING TIPS

- Write answers point-wise rather than in the form of an essay.
- Steps should be written in the correct sequence.

Long Answer Type Questions

5 marks each

Q. 1. (a) Why is there a difference in the rate of breathing between aquatic organisms and terrestrial organisms? Explain.

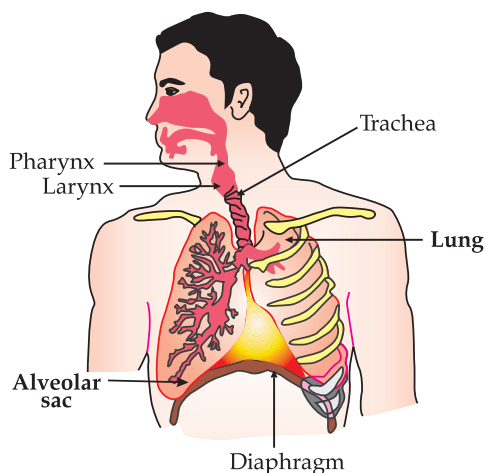
[U]

(b) Draw a diagram of human respiratory system and label - pharynx, trachea, lungs, diaphragm and alveolar sac on it.

[C] [Delhi I, 2020]

Ans. (a) Terrestrial organisms can obtain oxygen directly from the air and have slow breathing rate but; aquatic organisms have to obtain oxygen for respiration which is dissolved in water. Since, the amount of oxygen dissolved in water is fairly low as compared to the amount of oxygen in air; the rate of breathing in aquatic organisms is much faster.

(b) Diagram of human respiratory system:



2+3=5

Q. 2. (a) Write the reaction that occurs when glucose breaks down anaerobically in yeast.

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

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

(d) Name the respiratory pigment and write its role in human beings.

[U] [CBSE, Comptt. Set. I, II and III, 2018]

Ans. (a) Glucose $\xrightarrow{\text{In Cytoplasm}}$ Pyruvate
 $\xrightarrow{\text{In absence of oxygen}}$ Ethanol + CO₂ + Energy 1½

(b) Fishes take in water through the mouth and force it past the gills where the dissolved oxygen is taken up by the blood. 1

(c) Alveoli ½
Functions: They contain an extensive network of blood vessels which exchange gases. ½
 They increase surface area of absorption of gases. ½

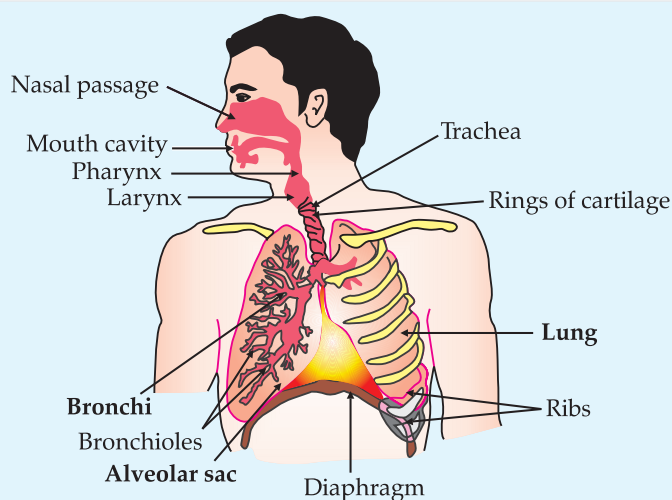
(d) Haemoglobin ½
Role: Due to high affinity for O₂, it helps in its transport from alveoli to the tissue ½

[CBSE Marking Scheme, 2018]

- AI** Q. 3. (i) Draw the human respiratory system and label the following: lung, bronchi and alveolar sac.
(ii) During breathing cycle, what is the advantage of residual volume of air in lungs ? Explain.

A [DDE, 2017]

Ans. (i)



- (ii) So that there is sufficient time for oxygen to be absorbed and for CO₂ to be released.

[CBSE Marking Scheme, 2012]

4
1

COMMONLY MADE ERROR

- Students commit errors in labelling the diagram.

ANSWERING TIP

- Practice drawing the well-labelled diagram of human respiratory system. Don't forget to answer the second part of the question.



TOPIC - 3

Circulation and Transportation



Revision Notes

Human Circulatory System

- The circulatory system in human beings consists of: A circulatory medium (blood and lymph), blood vessels (veins, arteries and capillaries) and heart.
- Humans have double circulation system. Blood travels twice through the heart in one complete cycle of the body.
- Pulmonary Circulation:** Blood moves from the heart to the lungs and back to the heart.
- Systemic Circulation:** Blood moves from the heart to rest of the body and back to the heart.
- Differences between arteries and veins:**

Arteries		Veins	
1.	Carry oxygenated blood from heart to different body parts except pulmonary artery.	1.	Carry deoxygenated blood from different body parts to the heart except pulmonary vein.
2.	Also called distributing vessel.	2.	Also called collecting vessel.
3.	Walls thick, elastic and muscular.	3.	Thin, non muscular and less elastic.
4.	Deep seated	4.	Superficial as compared to arteries.
5.	Have no valves	5.	Have valves, which prevent backward flow of blood.

- There are two main conducting channels in vascular plants. These are Xylem and Phloem.

Xylem		Phloem	
1.	Transports water and minerals from the roots to upper parts of the plant.	1.	Transports product of photosynthesis from leaves to the non-photosynthesising parts of the plants such as root & stem.
2.	No energy is used for transport.	2.	Energy is used from ATP for transport.
3.	On maturity, the xylem becomes dead tissue and gives mechanical support to the plant.	3.	Phloem exists as living soft tissue.

➤ **Transpiration:** It is the process of loss of water as vapours from aerial parts of the plant.

How is it done on the GREENBOARD?

Q. Define transpiration. State its two functions.

3

Solution:

Step I: The loss of water in the form of vapour from the aerial parts/leaves/stems is known as transpiration.

Its two functions are:

Step II : It helps in the absorption and upward movement of water.

Step III : Movement of dissolved minerals from root to leaves.

✓ Objective Type Questions

1 mark each

A Multiple Choice Questions

Q. 1. What prevents back flow of blood inside the heart during contraction?

- (a) Valves in heart
- (b) Thick muscular walls of ventricles
- (c) Thin walls of atria
- (d) All of the above

Ans. Correct option : (a)

Explanation : Valves ensure that blood does not flow backwards when the atria or ventricles contract. Semilunar valves, the valves present between ventricles and their attached vessels, serve to prevent the backflow of blood to ventricles from their respective attached vessels. Likewise, atrioventricular (AV) valve between atrium and ventricle directs the flow of blood and prevents any backflow into atria.

Q. 2. Single circulation, i.e., blood flows through the heart only once during one cycle of passage through the body, is exhibited by

- (a) Labeo, Chameleon, Salamander
- (b) Hippocampus, Exocoetus, Anabas
- (c) Hyla, Rana, Draco
- (d) Whale, Dolphin, Turtle

Ans. Correct option : (b)

Explanation : Hippocampus, Exocoetus, Anabas belong to class pisces. Fishes have two chambered heart and exhibit single circulation while three chambered heart of amphibians and reptiles and four chambered heart of birds and mammals exhibit double circulation.

Q. 3. The blood leaving the tissues becomes richer in

- (a) carbon dioxide
- (b) water
- (c) haemoglobin
- (d) oxygen

Ans. Correct option : (a)

Explanation : The anterior vena cava collects deoxygenated blood from the head, chest, and arms and enters the right atrium while the inferior vena cava collects blood from the lower body regions. Both venae cavae pass the deoxygenated blood to the right atrium. Therefore, blood from tissues is rich in carbon dioxide.

Q. 4. The xylem in plants are responsible for

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

[NCERT Ex.]

Ans. Correct option : (a)

Explanation : In a plant, the xylem is responsible for transport of water.

B Assertions and Reasons Type Questions

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
- (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
- (c) Assertion (A) is true but reason (R) is false.
- (d) Assertion (A) is false but reason (R) is true.

Q. 1. Assertion (A): The muscular walls of ventricles are thicker than auricles.

Reason (R): This helps in preventing the back flow of blood.

Ans. Correct option : (c)

Explanation: Since ventricles have to pump blood into various organs, they have thicker muscular walls than atria do. Valves prevent back flow of blood.

Q. 2. Assertion (A): In human heart, there is no mixing of oxygenated and deoxygenated blood.

Reason (R): Valves are present in the heart which allows the movement of blood in one direction only.

Ans. Correct option : (b)

Explanation: There is no mixing of oxygenated and deoxygenated blood due to presence of inter-auricular and inter-ventricular septum. On the other hand, valves are present in the heart which allows the movement of blood in one direction only.

Q. 3. Assertion (A): Valves are present in the arteries.

Reason (R): Arteries carry oxygenated blood from heart to different body parts except pulmonary artery.

Ans. Correct option : (d)

Explanation: Valves are absent in arteries, whereas it is present in veins, which prevent back flow of blood.

Q. 4. Assertion (A): Plants have low energy needs.

Reason (R): Plant bodies have large proportion of dead cells.

Ans. Correct option : (a)

Explanation: Because plants have a large proportion of dead cells in many tissues. So, their energy needs are low and they can afford to have slow transport system.

C Very Short Answer Type Questions

Q. 1. Veins are thin walled and have valves. Justify.

[U] [Board SQP, 2021]

Ans. Veins have thin walls because the blood is no longer under pressure and they have valves to ensure blood flow in one direction.

[CBSE Marking Scheme, 2021] 1

[AI] Q. 2. Name the component of blood which transport:

(i) Food, carbon dioxide and nitrogenous wastes

(ii) Oxygen. [AE] [Board Term I, 2016]

Ans. (i) Plasma

(ii) Haemoglobin present in RBCs. $\frac{1}{2} + \frac{1}{2}$

Q. 3. Name the process of loss of water in the form of vapour from the aerial parts of the plants.

[R] [Board Term I, 2016]

Ans. Transpiration [CBSE Marking Scheme, 2016] 1

[AI] Q. 4. Name the tissues which (i) transport soluble products of photosynthesis in plants, (ii) transport water and minerals in a plant.

[R] [Board Term I, 2014]

Ans. (i) Phloem (ii) Xylem. $\frac{1}{2} + \frac{1}{2}$



Short Answer Type Questions-I

2 marks each

Q. 1. In birds and mammals the left and right side of the heart are separated. Give reasons.

[U] [CBSE SQP, 2020] 2

Ans. The separation keeps oxygenated and deoxygenated blood from mixing allowing a highly efficient supply of oxygen to the body. This is useful in animals that have high energy needs (birds and mammals) which constantly use energy to maintain their body temperature.

[CBSE Marking Scheme, 2020] 2

Q. 2. Explain how water and minerals are transported in plants?

[U] [Board Term I, 2015]

Ans. Water and minerals are transported through xylem cells from soil to the leaves. The xylem cells of root, stem and leaves are interconnected to form a conducting channel that reaches all parts of the plant. The root cells take ions from the soil. This creates a concentration difference between ions of roots and soil. Therefore, there is a steady movement of water into xylem. An osmotic pressure is created and water and minerals are transported from one cell to the other cell due to osmosis.

On the other hand, there is a continuous loss of water due to transpiration. This creates a suction pressure, which results in absorption of water into xylem cells of roots.

Q. 3. Name the material transported by the following:

- (i) Xylem
- (ii) Pulmonary artery
- (iii) Pulmonary veins
- (iv) Phloem.

[A]

Ans. (i) Xylem: Transport water and minerals in plants.

$\frac{1}{2}$

(ii) Pulmonary artery: Transport deoxygenated blood from heart to lungs. $\frac{1}{2}$

(iii) Pulmonary veins: Transport oxygenated blood from lungs to heart. $\frac{1}{2}$

(iv) Phloem: Transport synthesised food in plants. $\frac{1}{2}$



Short Answer Type Questions-II

3 marks each

[AI] Q. 1. Write three types of blood vessels. Give one important feature of each.

[R] [CBSE Board Delhi, Set-I, 2019]

Ans. (i) Arteries: No valves / thick walled / carry oxygenated blood / carry blood away from heart.

(ii) Veins: Presence of valves / thin walled / carry deoxygenated blood / carry blood towards heart.

(iii) Capillaries: Very fine / mixed blood / found in tissues / sites for material exchange. 1+1+1

[CBSE Marking Scheme, 2019]

Q. 2. Define the term transpiration. Design an experiment to demonstrate this process.

[R] [CBSE Board, Delhi, Set-I, 2019]

Ans. Transpiration: Loss of water in vapour form through the surface of leaf / stomata of leaf / aerial parts of the plant. 1

Experiment setup:

- Take a potted plant and water it.
- Cover the plant / branch with a transparent plastic sheet.
- Place it in bright sunlight for half an hour.
- Moisture in the form of droplets is observed inside the plastic sheet.

[CBSE Marking Scheme, 2019] $\frac{1}{2} \times 4$

Detailed Answer:

The loss of water in the form of vapour from the aerial parts of the plant is known as *transpiration*.

Experiment to demonstrate transpiration:

Requirements: Two small pots, soil, a green plant, a stick of same height as of green plant and plastic sheets.

Method:

- (i) Take two small pots of approximately equal size having equal amount of soil.
- (ii) One should have a plant and place a stick in another pot.
- (iii) Cover the soil in both the pots with a plastic sheet so that moisture cannot escape by evaporation.
- (iv) Cover both the sets with a separate plastic sheet and place in bright sunlight for half an hour.

Observation: Drop of water appear on the inner side of polythene sheet in the pot with a green plant. Whereas no such drops appear in the pot with a stick.

Result: As water drops appear only in the pot with a green plant, it can be concluded that water drops appeared due to transpiration. While the pot with stick does not have any drop as no plant was present. 1+2

COMMONLY MADE ERROR

- ➔ Sometimes it is hard for examiner to figure out that what student is trying to say in their answers as students use complex language.

ANSWERING TIP

- ➔ Always be specific and give clear and complete answers. Incomplete and vague answers must be pointed out.

Q. 3. List two types of the transport system in human beings and write the functions of any one of these.

[R] [Board Outside Delhi, Set- II, 2019]

Ans. (i) Blood circulatory system $\frac{1}{2}$

(ii) Lymphatic system / lymph or tissue fluid $\frac{1}{2}$

Functions of blood circulatory system:

- (i) Transport of oxygen
- (ii) Transport of digested food
- (iii) Transport of carbon dioxide
- (iv) Transport of nitrogenous waste
- (v) Transport of salts

Functions of lymphatic system:

- (i) Carries digested and absorbed fat
- (ii) Drains extra fluid from tissue (extra cellular space) back into the blood. 1 × 2

Note: Two functions of any one of the transport system to be given.

[CBSE Marking Scheme, 2019]

Q. 5. Define transpiration. State its two functions.

R [Board Outside Delhi Set, 2019]

Ans. The loss of water in the form of vapour from the aerial parts/leaves/stems is known as *transpiration*.

1

Functions:

- (i) It helps in the absorption and upward movement of water.
- (ii) Movement of dissolved minerals from root to leaves.
- (iii) It helps in the temperature regulation or cooling of the plant. (Any two points) 1 + 1

[CBSE Marking Scheme, 2019]

Q. 6. (a) What is translocation? Why is it essential for plants?

(b) Where do the substances in plants reach as a result of translocation?

R [Board Outside Delhi, Set-I, 2019]

Ans. (a) The transport of soluble products of photosynthesis (food or glucose) from one part to the other parts of the plant. To provide food to all parts of the plant.

(b) Root, fruits, seeds and other growing organs/parts of the plant. (Any two)

[CBSE Marking Scheme, 2019] 2

Detailed Answer:

(a) Translocation is the process of movement of materials from leaves to all other parts of the plant body. It is essential for the transfer of products of metabolic processes, particularly photosynthesis from leaves to other parts of the plant.

(b) As a result of translocation, the substances in plants reach to the storage organs such as roots, fruits and seeds and to growing organs. 2 + 1

Q. 7. Write three points of differences between artery and vein.

R [Board Term I, 2016]

Ans.	S. No.	Artery	Vein
	(i)	Wall is thick.	Wall is thin.
	(ii)	Valves absent.	Valves present.
	(iii)	Blood flows from heart to different organs.	Blood flows from different organs to heart.
	(iv)	The flow of blood is fast, jerky and with great pressure.	The flow of blood is slow, steady and with less pressure.

(Any three) 1 + 1 + 1

[CBSE Marking Scheme, 2016]

Q. 8. (i) Mention the site of exchange of material between the blood and surrounding cells.

(ii) Draw a schematic representation of transport and exchange of oxygen and carbon dioxide.

C [Board Term I, 2016]

Ans. (i) Capillaries

(ii) Diagram. [CBSE Marking Scheme, 2016] 3

Detailed Answer:

(i) Capillaries.

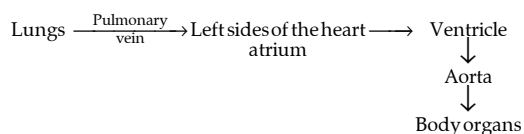
(ii)

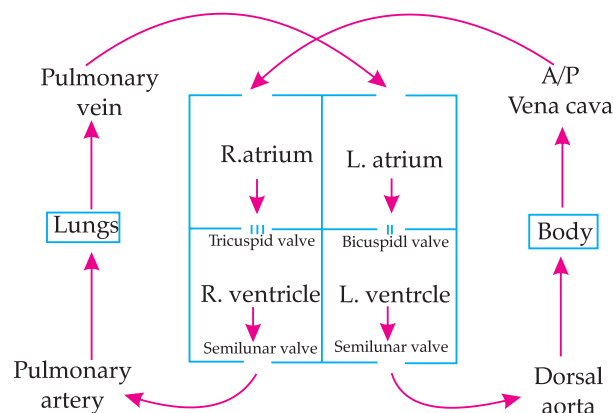
Schematic representation of transport of exchange of oxygen & carbon dioxide

Q. 1. (a) Write the correct sequence of steps followed during journey of oxygen rich blood from lungs to various organs of human body.

(b) What happens when the system of blood vessels develop a leak? A [O.D., Delhi I, 2020]

Ans. (a)

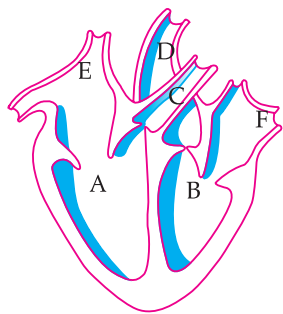




(b) The leaked blood flows into surrounding tissues leading to accumulation of blood. This condition is known as hematoma. 3 + 2 = 5

Q. 2. (i) Identify any two parts from the above diagram which carry oxygenated and deoxygenated blood.

(ii) Explain the process of double circulation with the help of a flow chart.



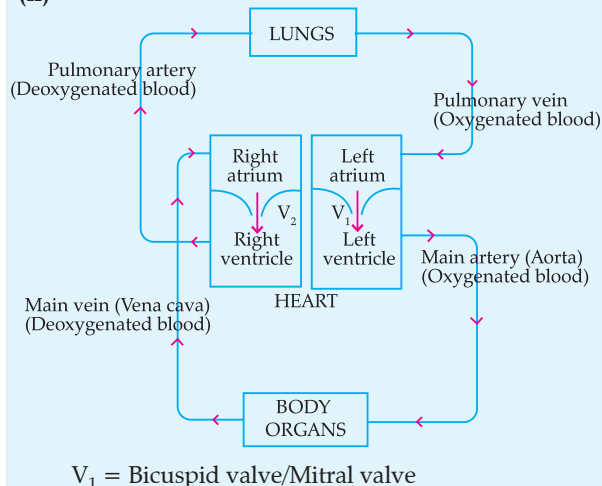
[Board SQP, 2020]

Ans. (i) Oxygenated: B/D/F [B = left ventricle/D = Aorta/F = left auricle/Pulmonary vein]

Deoxygenated: A / C / E [A = Right ventricle / C = Pulmonary artery/E = Right auricle/Vena cava]

$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$

(ii)



V_1 = Bicuspid valve/Mitral valve

V_2 = Tricuspid valve

(1 mark should be deducted if the arrows are not correctly marked) [CBSE Marking Scheme, 2020] 2 + 3

COMMONLY MADE ERROR

Some students forget labelling after drawing the diagram.

ANSWERING TIP

Practice drawing neat, and well-labelled diagram of human heart. Incorrect labelling may deduct your marks.

Q. 3. (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 the structural difference between the composition of artery and veins.

[CBSE Delhi & O.D. Set 2018]

Ans. (a) Plasma, red blood cells, white blood cells, platelets (Any two) 2

(b) Lungs → Left side of the heart → aorta → body organs 1

(c) Prevent back flow of blood. 1

(d) Artery has thick elastic wall and vein is thin walled/valves are present in the veins and not in arteries.

[CBSE Marking Scheme, 2018] 1

Q. 5. (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 artery and veins.

[CBSE Delhi & O.D. Set, 2018]

Ans. (a) Blood components :

(i) Plasma consists mostly of water, with proteins, ions, nutrients, and wastes mixed in.

(ii) Red blood cells are responsible for carrying oxygen and carbon dioxide.

(iii) Platelets are responsible for blood clotting.

(iv) White blood cells are part of the immune system and defence system of body. (Any two) 1

(b) Path of movement of oxygenated blood in the body:

(i) Pulmonary Vein (oxygenated blood)

(ii) Left Atrium (oxygenated blood)

- (iii) Left Ventricle (oxygenated blood)
- (iv) Aorta (oxygenated blood)
- (v) Arteries → Arterioles → Capillaries (oxygenated blood)
- (vi) Tissues and cells (oxygen is released and carbon dioxide is picked up) 2

- (c) A heart valve normally allows blood to flow in only one direction through the heart. 1
- (d) Arteries have thick, elastic, muscular walls whereas veins have thin walls with few elastic fibres. Veins have one-way valves whereas arteries do not have any valves. 1



TOPIC - 4

Excretion



Revision Notes

Excretion in Human

- During excretion, the harmful metabolic nitrogenous wastes generated are removed from the body.
- Nephrons are the basic filtration units of kidneys. They carry out filtration, selective reabsorption and tubular secretion to form urine in kidney, which is then passed out through the urethra, via the ureters and urinary bladder.
- Each kidney contains many filtration units called as *nephrons*.
- Nephrons are made up of a cluster of thin walled capillaries called *glomerulus* which is associated with a cup like structure called as *Bowman's capsule* and the long tube which terminates through this capsule.
- The renal artery brings oxygenated blood to the kidneys along with the nitrogenous wastes like urea and uric acid and many other substances.
- The blood gets filtered through the glomerulus and this filtrate enters the tubular part of nephron.
- As this filtrate moves down the tubular part, glucose, amino acids, salts and excess of water gets selectively reabsorbed by the blood vessels surrounding tubules.
- **The amount of water re-absorbed depends upon:**
 - (a) How much excess of water is there in the body and,
 - (b) How much nitrogenous wastes need to be excreted out.
- The fluid now flowing in the tubular part is urine, which gets collected in collecting ducts of nephrons.
- These collecting ducts together leave the kidney at a common point by forming the ureter.
- Each ureter drains the urine in the urinary bladder where it is stored until the pressure of expanded bladder leads to an urge to pass it out through urethra.
- This bladder is a muscular structure which is under nervous control.
- 180 litres of filtrate is formed daily but only 2 litres is excreted out as urine so the rest is reabsorbed in the body.
- In case of kidney failure, haemodialysis is the process of purifying blood by an artificial kidney.
- **Excretion in plants:** In plants, excretion of oxygen, CO₂ and water takes place through stomata by the process of transpiration.



Mnemonics

Concept: Kidneys functions WET BREAD

Mnemonics: WET BREAD

Interpretation:

W - maintaining **W**ATER balance

T - **T**OXIN removal

R - **R**enin Formation

A - maintaining **A**CID-base balance

E - **E**LECTROLYTE balance

B - **B**LOOD Pressure control

E - **E**RYTHROPOIETIN making

D - **V**itamin **D** metabolism.

How is it done on the GREENBOARD?

Q.1. Name one nitrogenous waste present in urine. What is the basic filtration unit of kidney called? How is the amount of urine produced regulated ?

3

Solution:

Step I: Nitrogenous waste present in urine is uric acid or urea.

Step II : The basic filtration unit of kidney is nephron.

Urine production is regulated by :

Step III : Amount of excess water in the body.

Step IV: Amount of dissolved wastes that need to be excreted.



Objective Type Questions

1 mark each

A Multiple Choice Questions

Q. 1. The filtration units of kidneys are called

- (a) ureter (b) urethra
(c) neurons (d) nephrons

Ans. Correct option : (d)

Explanation : Nephrons are the structural and functional unit of kidney that serve in filtration, reabsorption and secretion. Ureters are small muscular tubes that extend from the kidney and carry urine into the urinary bladder. The urethra is a canal that carries urine from bladder and expels it out of body. Neurons are structural and functional unit of nervous system.

Q. 2. The kidneys in human beings are a part of the system for

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

Ans. Correct option : (c)

Explanation : In human beings, the kidneys are a part of the system for excretion.

Q. 3. Match the words of Column (A) with that of Column (B)

S. No.	Column (A)		Column (B)
A	Phloem	(i)	Excretion
B	Nephron	(ii)	Translocation of food
C	Veins	(iii)	Clotting of blood
D	Platelets	(iv)	Deoxygenated blood

Ans.

S. No.	Column (A)	Column (B)	Explanation
A	Phloem	(ii)	Phloem helps in translocation of food

B	Nephron	(i)	Nephron helps in excretion
C	Veins	(iv)	Veins carry deoxygenated blood
D	Platelets	(iii)	Platelets helps in clotting of blood

B Assertions and Reasons Type Questions

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

Q. 1. Assertion (A): Human body produces highly toxic substances, which if not eliminated may cause the death.

Reason (R): Excretory substance removes nitrogenous waste from the body.

Ans. Correct option : (b)

Explanation: The biological process which involves the removal of harmful metabolic wastes from the body is called *excretion*. If these harmful wastes are not removed from the body, then it may cause the death of the organism.

Q. 2. Assertion (A): Excretory unit of kidneys are nephrons.

Reason (R): It has no role in secretion of urine.

Ans. Correct option : (c)

Explanation: Nephrons are the basic filtration unit of kidneys. They carry out filtration, selective reabsorption and tubular secretion to form urine in kidneys, which is then passed out through the urethra, via the ureters and urinary bladder.

Q. 3. Assertion (A): Haemodialysis can save the life of patients with kidney failure.

Reason (R): Waste products like urea can be removed from the blood by haemodialysis.

Ans. Correct option : (a)

Explanation: In case of kidney failure, haemodialysis is the process of purifying blood (or removing waste products like urea) by an artificial kidney. This can save the life of the patient.

Q. 4. Assertion (A): In humans, major amount of water is absorbed by the tubular part of nephron.

Reason (R): Absorption of water depends on the dissolved waste to be excreted from the body.

Ans. Correct option : (b)

Explanation: Major amount of water is selectively

re-absorbed by the tubular part of nephron in humans. It depends on the amount of excess water present in the body and dissolved waste to be excreted from the body.

C Very Short Answer Type Questions

Q. 1. Mention the respiratory unit of lungs and excretory unit of kidneys.

[R] [Board Term I, 2015] [DDE, 2017]

Ans. Respiratory unit of lungs — Alveoli

Excretory unit of kidneys — Nephrons $\frac{1}{2} + \frac{1}{2}$

Q. 2. How is the amount of urine produced regulated?

[NCERT]

Ans. The amount of urine produced depends on the amount of excess water and dissolved wastes present in the body. Some other factors such as habitat of an organism and hormone such as Antidiuretic hormone (ADH) also regulates the amount of urine produced. **1**

[AI] **Q. 3. What is micturition?**

Ans. It is the expulsion of urine from the body. **1**



Short Answer Type Questions-I

2 marks each

Q. 1. What is excretion? How do unicellular organisms remove their wastes? **[U]**

Ans. The biological process which involves the removal of harmful metabolic wastes from the body is called excretion. **1**

Unicellular organisms remove their waste by simple diffusion. **1**

Q. 2. List two major steps involved in the formation of urine and state in brief their functions. **[U]**

Ans. Filtration: Nitrogenous waste such as urea or uric acid are removed from the blood (capillaries).

Reabsorption: Glucose, amino acids, salts and major amount of water are selectively re-absorbed.

1 + 1

Q. 3. Write two major components of human urine. **[R]**

Ans. The two major component of human urine are:

(i) Urea, (ii) Uric acid. **1 + 1**



Short Answer Type Questions-II

3 marks each

Q. 1. Mention the pathway of urine starting from the organ of its formation. Name four substances which are re-absorbed from the initial filtrate in the tubular part of the nephron.

[AE] [Board Term I, 2016]

Ans. Kidney → Ureters → Urinary bladder → Urethra.
Glucose, amino acids, salts and major amount of water. **[CBSE Marking Scheme 2016] 1 + 2**

Detailed Answer:

The pathway of urine starting from the organ of its formation is:

Kidney → Ureters → Urinary bladder → Urethra.

The four substances re-absorbed from initial filtrate are:

(i) Amino acid (ii) glucose (iii) salts (iv) major amount of water. **1 + 2**

[AI] **Q. 2. Name one nitrogenous waste present in urine. What is the basic filtration unit of kidney called? How is the amount of urine produced regulated?**

[U] [Board Term I, 2016]

Ans. Nitrogenous waste present in urine is uric acid or urea.

The basic filtration unit of kidney is nephron.

Urine production is regulated by:

(i) amount of excess water in the body.

(ii) amount of dissolved wastes that need to be excreted.

1 + 1 + 1

Q. 3. How do leaves of plants help in excretion? **[U]**

Ans. (i) Many plants store waste materials in the vacuoles of mesophyll cells and epidermal cells. When old

leaves fall, the waste materials are excreted along with the leaves.

- (ii) Gaseous waste is removed through stomata in leaves.

- (iii) Excess of water is also excreted from the plant body through the stomatal pores. The process of elimination of water is called transpiration. 3

✓ Long Answer Type Questions

5 marks each

Q. 1. (a) Name the organs that form the excretory system in human beings.

- (b) Describe in brief how urine is produced in human body. [U] [Delhi I, 2020]

Ans. (a) Human excretory system comprises: a pair of kidneys, a pair of ureters, a urinary bladder and a urethra.

- (b) Urine formation involves three steps:

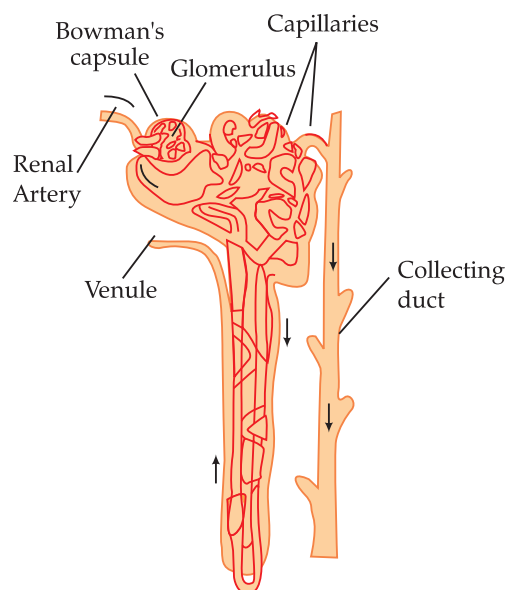
- (i) **Glomerular filtration:** Nitrogenous wastes, glucose, water, amino acids filter from the blood into Bowman's capsule of the nephron.
- (ii) **Tubular reabsorption:** Useful substances from the filtrate are re-absorbed back by capillaries surrounding the nephron.
- (iii) **Secretion:** Urea, extra water and salts are secreted in the tubule which open up into the collecting duct and then into the ureter. 2+3

Q. 2. (a) How do leaves of plants help in excretion? Explain briefly.

- (b) Describe the structure and function of a nephron. [U] [O.D. II, 2020]

Ans. (a) Leaves of plants helps in excretion in many ways:

- (i) Excess of water in plants is removed by the process of transpiration and guttation.
 - (ii) Carbon dioxide and oxygen that can be considered as waste products of respiration and photosynthesis respectively are excreted out with the help of stomata present on leaves.
 - (iii) Leaves help in excretion through a process called abscission that is falling of yellow leaves. By the help of this process, plants get rid off toxins etc.
- (b) **Structure of a Nephron:** Each kidney contains many filtration units called as nephrons. Nephrons are made up of cluster of thin walled capillaries called glomerulus which is associated with a cup like structure called Bowman's capsule and the long tube which terminates through this capsule. The artery which takes blood to the glomerulus is called afferent arteriole and the one receiving blood from the glomerulus is called efferent arteriole.



Functioning of a Nephron:

- The blood enters the kidney through the renal artery, which branches into many capillaries associated with glomerulus.
- The water and solute are transferred to the nephron at Bowman's capsule.
- In the proximal tubule, some substances such as amino acids, glucose, and salts are selectively re-absorbed and unwanted molecules are added in the urine.
- The filtrate then moves down into the loop of Henle, where more water is absorbed.
- From here, the filtrate moves upwards into the distal tubule and finally to the collecting duct. Collecting duct collects urine from many nephrons.
- The urine formed in each kidney enters a long tube called ureter. From ureter, it gets transported to the urinary bladder and then into the urethra. 2+3=5

[AI] Q. 3. (a) Define excretion.

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

(c) Draw excretory system in human being and label the following organs of 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.

[C] [CBSE Delhi, O.D., Set 2018]

Ans. (a) Process involved in removal of harmful nitrogenous wastes from the body. 1

(b) Nephron. 1

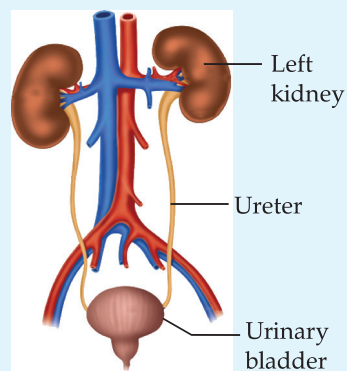
(c) Diagram of Human Excretory System.

Labelling of the following parts:

(i) Kidney

(ii) Ureter

(iii) Urinary bladder



[CBSE Marking Scheme, 2018] 3

Q. 4. (a) Draw a diagram of human excretory system and label the following parts on it:

(i) Right Renal Artery (ii) Vena cava.

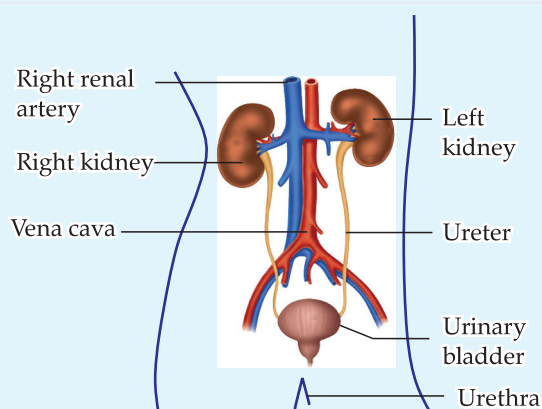
(iii) Urinary bladder

(iv) Left kidney

(b) List two vital functions of kidney.

[Board Term I, 2015; Board Term I, 2016]

Ans. (a)



3

(b) Vital functions of kidney:

(i) To regulate right amount of water in body.

(ii) Helps in filtering out nitrogenous waste like urea from blood.

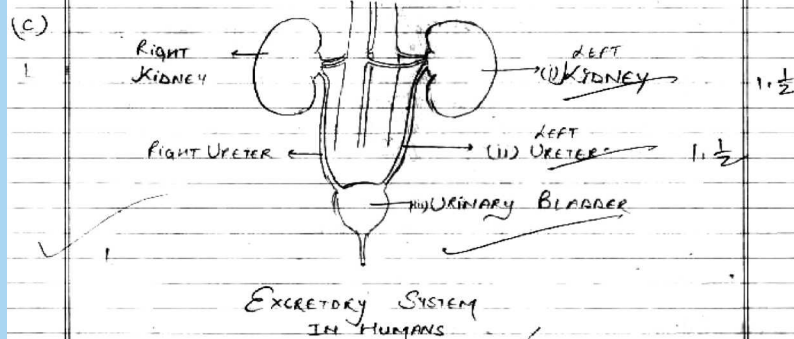
[CBSE Marking Scheme, 2016] 2



Topper Answer, 2018

'Excretion' is the biological process of removal of harmful nitrogenous wastes like urea, uric acid etc. from our body which are produced as by product of chemical reactions taking inside our body.

(b) 'Nephron' is the basic filtration unit present in kidney. 1





Visual Case-based Questions

4 marks each

Q. 1. Read the given passage and answer any of the four questions from (a) to (e).

Sanjana is suffering from a frequent stomach pain and vomiting. She went to the Doctor. The doctor asked her to go for an ultrasound. In the report, a stone was found in her gall bladder. Doctor asked her to remove the gall bladder by operation. But she was reluctant to go for the operation.

- The role played by gall bladder in human body is
 - To store bile
 - To secrete bile
 - To emulsify fats
 - To digest fats
- Removal of gall bladder
 - affects the person's health
 - Has no effect on the person's health
 - Effects the secretion of bile
 - Effects the digestion of proteins
- Which of the following statement is correct about bile?
 - It helps in emulsification of fat.
 - It helps in digestion of carbohydrates
 - It helps in absorption of digested food.
 - It helps in egestion of undigested food.
- Which part of alimentary canal receives bile from the liver?
 - Stomach
 - Small intestine
 - Large intestine
 - Oesophagus
- What is the function of bile salt in the intestine?
 - Activator of lipase
 - Emulsifier
 - Co factor of cholesteryl esterase
 - Inhibitor of lipid absorption

Ans. (a) (i) Gall bladder stores bile.

(b) (ii) The removal of gall bladder has no effect on person's health.

(c) (i) It helps in emulsification of fat.

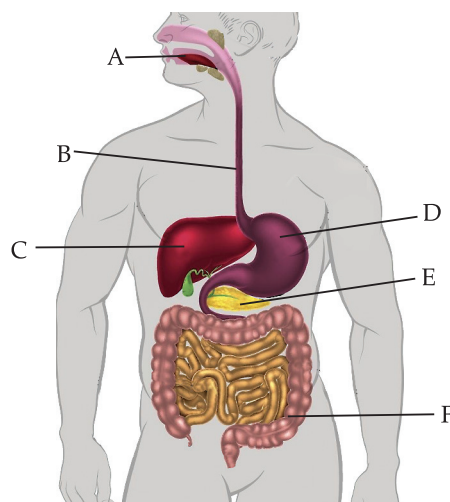
(d) (ii) Bile is dark green or a yellowish brown fluid which is produced by the liver and comes to the small intestine through hepato-pancreatic duct.

1+1+1+1

(e) (ii) The food coming from the stomach is acidic and has to be made alkaline for the pancreatic enzyme to act. Bile juice accomplishes this. Bile salts breakdown larger globules of fats into smaller globules increasing the efficiency of enzyme action.

1+1+1+1

Q. 2. The given diagram is of human digestive human. Study the diagram and answer any of the four questions from (a) to (e).



(a) Which of these correctly represent the labels B, C, D and E?

- B- Oesophagus, C- Liver, D- Stomach, E- pancreas
- B- Pancreas, C- Oesophagus, D- Liver, E- Stomach
- B- Stomach, C- Pancreas, D- Oesophagus, E- Liver
- B- Liver, C- Stomach, D- Pancreas, E- Oesophagus

(b) The secretion that is released by label C is:

- Bile
- Pepsin
- Saliva
- Gastric juice

(c) How it helps in fat digestion ?

(d) The digestion of food starts in

- A
- D
- E
- F

(e) In case of diarrhoea, which major process does not takes place normally in region F?

- Absorption of food
- Absorption of water
- Secretion of hormones
- Removal of waste material

Ans. (a) (i) B- Oesophagus, C- Liver, D- Stomach, E- pancreas

(b) (i) Label C represents liver. Liver secretes bile, which is stored in gall bladder.

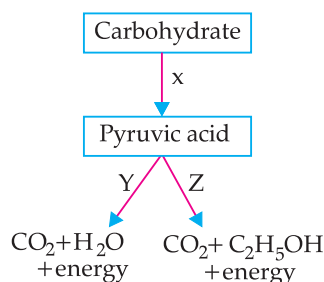
(c) Role of bile in fat digestion: (i) It makes the acidic food alkaline to facilitate the action of enzyme lipase on it. (ii) Bile salts breakdown fats present in food into small globules for enzymes to act.

(d) (i) The digestion of food starts in A i.e. mouth.

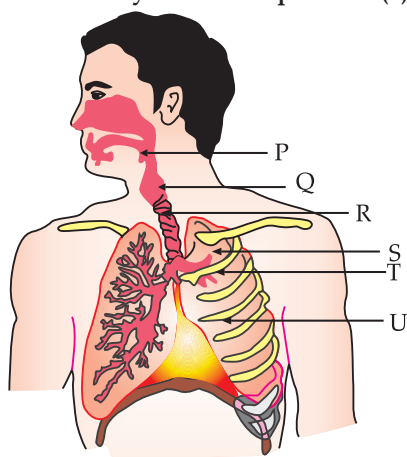
(e) (ii) Absorption of water is not occurring normally in region F (Large intestine).

1+1+1+1

Q. 3. Study the given flow chart and answer any of the four questions from (a) to (e).



- (a) Identify X, Y and Z.
 (i) X-Glycolysis, Y-Anaerobic, Z-Aerobic
 (ii) X-Krebs's cycle, Y-Aerobic, Z-Anaerobic
 (iii) X-Glycolysis, Y-Aerobic, Z-Anaerobic
 (iv) X-Glycolysis, Y-Aerobic, Z-Krebs's cycle
- (b) The process X occurs in _____ and Y occurs in _____ part of cell.
 (i) Mitochondria and cytoplasm respectively
 (ii) Cytoplasm and mitochondria respectively
 (iii) Both takes place in cytoplasm
 (iv) Both takes place in mitochondria
- (c) In which of these organisms the process Z takes place?
 (i) Bacteria (ii) Humans
 (iii) Yeast (iv) *Spirogyra*
- (d) In which part of human body do the process Z takes place?
 (i) In muscle cells (ii) In kidneys
 (iii) In liver cells (iv) In leydig's cell
- (e) Where does aerobic respiration occur in a cell ?
 (i) Mitochondria (ii) Cytoplasm
 (iii) Nucleus (iv) Plastid
- Ans. (a) (iii) X - Glycolysis, Y - Aerobic, Z - Anaerobic
 (b) (ii) Cytoplasm, mitochondria respectively.
 (c) (iii) Yeast
 (d) (i) In muscle cells
 (e) (i) Aerobic respiration occurs in mitochondria of the cell. (Any four) 1+1+1+1
- Q.4. Study the diagram of human respiratory system and answer any of the four questions (a) to (e).



- (a) The balloon like structures present in 'S' is:
 (i) Nephron (ii) Alveoli
 (iii) Bronchi (iv) Bronchiole
- (b) Which of these organ is surrounded by cartilaginous rings?
 (i) P (ii) Q
 (iii) R (iv) S

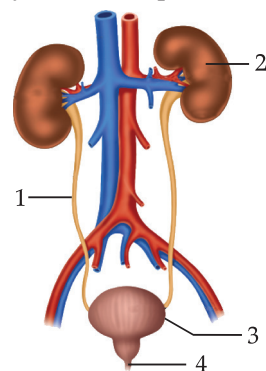
- (c) Which of these statements is incorrect regarding human lungs?
 (i) It is the secondary organ for respiration.
 (ii) It is located on the two sides of heart.
 (iii) The membrane that encloses lungs is pleural membrane.
 (iv) The alveolar epithelium of lungs is non-ciliated epithelium.
- (d) Trachea is divided into two smaller tubes called _____.

- (i) Bronchi (ii) Bronchioles
 (iii) Larynx (iv) Alveoli

- (e) Which of these is the function of balloon like structure present in lungs?
 (i) Exchange of gases
 (ii) Absorption of nutrients
 (iii) Transport of food
 (iv) Removal of waste materials

- Ans. (a) (ii) Alveoli
 (b) (iii) R (Trachea)
 (c) (i) It is not the secondary organ for respiration.
 (d) (i) Trachea is divided into two smaller tubes called bronchi.
 (e) (i) Alveoli contain an extensive network of blood vessels which exchange gases. They increase surface area of absorption of gases. (Any four) 1+1+1+1+1

Q.5. The given diagram represents the structure of a human excretory system. Study the diagram and answer any of the four questions from (a) to (e).



- (a) Identify the part 1 in excretion.
 (i) Kidney (ii) Ureter
 (iii) Urethra (iv) Nephron
- (b) Which of these is the structural and functional unit of part 2?
 (i) Alveoli (ii) Nephron
 (iii) Neuron (iv) None of these
- (c) What will happen, if one kidney of a person is removed?
- (d) The urge to urinate can be controlled. Give reason.
- (e) Choose the correct path of urine in our body:
 (i) kidney → ureter → urethra → urinary bladder
 (ii) kidney → urinary bladder → urethra → ureter
 (iii) kidney → ureters → urinary bladder → urethra
 (iv) urinary bladder → kidney → ureter → urethra

Ans. (a) (ii) Part 1 is ureter. It transports urine from kidney to urinary bladder.

(b) (ii) Nephron.

(c) If one kidney of a person is removed, he can still survive and remain normal because of same function performed by the other kidney.

(d) As the bladder is muscular, it is under the control of nervous system. Hence, we can control the urge to urinate.

(e) (iii) Kidneys are the paired organs where urine formation takes place. Small muscular tube, called as ureter, extend from kidneys and carries urine to urinary bladder. The urethra is a small tube that extends from the urinary bladder to an external opening. (Any four) 1+1+1+1

Q. 6. Read the given passage and answer any of the four questions from (a) to (e).

Oxygen-rich blood from the lungs comes to the thin-walled upper chamber of the heart on the left. The left upper chamber (A) then relaxes. It then contracts and the blood is allowed to enter the next chamber (B), as it expands. When the muscular left lower chamber of heart contracts the blood is pumped out to the body via aorta.

Deoxygenated blood reaches from the body to the upper chamber on the right side of heart (C) and it expands. As this part contracts, the corresponding lower chamber (D) dilates. This transfers the blood to right ventricle, which in turn pumps it to the lungs for oxygenated.

(a) Which of these correctly represents the label A, B, C and D in the above passage?

(i) A- Left atrium, B- Left Ventricle, C- Right atrium, D- Right ventricle

(ii) A- Right ventricle, B- Left atrium, C- Left Ventricle, D- Right atrium

(iii) A- Right atrium, B- Right ventricle, C- Left atrium, D- Left ventricle

(iv) A- Left ventricle, B- Right atrium, C- Right ventricle, D- Left atrium

(b) Which chambers of human heart contain blood?

(i) A and B (ii) A and C

(iii) C and B (iv) C and D

(c) What is the correct route of blood in a human?

(i) A → B → Lungs → C → D

(ii) A → B → D → C → Lungs

(iii) C → D → B → A → Lungs

(iv) C → D → Lung → A → B

(d) What prevents backflow of blood inside the heart during contraction?

(i) Valves in heart

(ii) Thick muscular walls of ventricles

(iii) Thin walls of atria

(iv) All of the above

(e) Assertion (A): Human heart does not allow mixing of oxygen rich blood with carbon dioxide rich blood.

Reason (R): Human heart has different chambers.

(i) Both A and R are true and R is correct explanation of the assertion.

(ii) Both A and R are true but R is not the correct explanation of the assertion.

(iii) A is true but R is false.

(iv) A is false but R is true.

Ans. (a) A- Left atrium, B- Left Ventricle, C- Right atrium, D- Right ventricle

(b) (i) A (Left atrium) and B (Left ventricle) contain oxygenated blood from lungs.

(c) (iv) C (Right atrium) → D (Right ventricle) → Lungs → A (Left atrium) → B (Left ventricle).

(d) False. Valves prevent the back flow of blood inside the heart during contraction of heart chambers (atria or ventricles). (Any four) 1+1+1+1

Q. 7. Read the passage and answer any of the four questions from (a) to (e).

Some experiments were carried out using *Croton* sp. plants to understand the process of photosynthesis. It was observed that the leaves of the plant exposed to light for longer duration accumulated more starch. However, due to presence of pre-formed starch in the leaves, it was difficult to find the net productivity on a fixed exposure to light source. Therefore, it was necessary to obtain starch free leaves in the plant before starting the experiment.

(a) Which of the following would help obtain starch free leaves in the plant?

(i) Expose the leaves to blue light for 48 hours before starting the experiment.

(ii) Keep the plant in dark for about 48 hours before starting the experiment.

(iii) Remove starch from the leaves by exosmosis, 48 hours before starting the experiment.

(iv) Keep the leaves to red light for 48 hours before starting the experiment.

(b) After a period of illumination, the leaves were boiled in alcohol to make them colourless. Which of the following could be used to test the end product stored in the leaves?

(i) Cobalt chloride paper

(ii) Litmus paper

(iii) Iodine solution

(iv) Copper sulphate solution

(c) Some of the starch free leaves were coated with wax on both the surfaces. The plant was maintained under normal environmental conditions. At the end of the experiment, the wax coated leaves are likely to show ____.

(i) Accumulation of more water.

(ii) Wilting of the wax coated leaves.

(iii) Increase in sucrose accumulation.

(iv) Decrease in number of chloroplasts

(d) During the morning hours, using a fine blade, an incision was made to the leaves such that the phloem tissue was cut open. Analysis of the liquid oozing out was found to contain high amount of:

(i) Xylose

(ii) Ribose

(iii) Sucrose

(iv) Galactose

(e) Why plants coated with vaseline or wax do not remain healthy for a long time? Give any two reasons.

Ans. (a) (ii) The starch free leaves can be obtained by keeping the plant in dark, so that already present starch is utilized in 48 hrs.

- (b) (iii) Starch presence can be tested by adding iodine solution which gives bluish black colour of starch – iodine mixture.
- (c) (ii) Wilting occurs due to wax blocks the transpiration so water transportation inhibits.
- (d) (iii) The transport of glucose, occurs in the form of sucrose, in phloem therefore, when cell sap oozes out, liquid contains sucrose.

(e) These plants will not remain healthy for a long time because:

- (i) They will not get oxygen for respiration.
- (ii) They will not get carbon dioxide for photosynthesis.
- (iii) Upward movement of water and minerals would be hampered due to lack of transpiration. (Any four) 1+1+1+1



Know the Terms

- **Metabolism:** It is the sum total of all the chemical reactions which occur in a living being due to interaction amongst its molecules. It has two components: Anabolism (build-up reactions) and Catabolism (breakdown reactions).
- **Photosynthesis:** It is the process of synthesis of organic food from inorganic raw materials like $\text{CO}_2 + \text{H}_2\text{O}$ with the help of light energy, inside chlorophyll containing cells.
- **Photolysis:** Photolysis of water is photocatalytic splitting of water into its components, hydrogen and oxygen.



- **Peristalsis:** It is a wave of contraction behind the food and expansion in the region of contained food that occurs in the alimentary canal for pushing the food from anterior to posterior ends.
- **Succus Entericus:** It is the name of digestive juice of small intestine, also known as intestinal juice.
- **Emulsification:** Emulsification of fats is conversion of large fat pieces into very fine fat globules.
- **Phagocytosis:** It is the process of ingestion of solid food particle by a cell or unicellular organism.
- **Circumvallation:** This is the method of intake of food when *Amoeba* comes in contact with a food particle or prey, it throws pseudopodia all around the prey. The tips of encircling pseudopodia fuse and the prey comes to lie in a vesicle or phagosome.
- **Cutaneous Respiration:** It is the mode of exchange of respiratory gases that occurs through skin.
- **Branchial Respiration:** It is the respiration performed with the help of gills.
- **Aerobic respiration:** It is the step-wise complete oxidative breakdown of respiratory substrate into carbon dioxide and water with the help of oxygen that act as terminal oxidant.
- **Glycolysis (EMP pathway):** It is the first step of breakdown of respiratory substrate which occurs in cytoplasm and produces two molecules of pyruvate from a molecule of glucose.
- **Kreb's Cycle:** It is a cyclic series of metabolic reactions of aerobic respiration that occur inside mitochondria.
- **Haemolysis:** It is the process of destruction of RBC's.
- **Serum:** It is a whitish watery fluid that is squeezed out from contracting blood clot.
- **Diapedesis:** It is the crawling of white blood corpuscles out of blood capillaries into surrounding tissues.
- **Pulse:** It is a repeated throb felt in a superficial artery of the body due to forceful pumping of the blood. It depends on the rate of heart beat.
- **Ascent of Sap:** It is the upward movement of absorbed water or sap from root to the top of the plant. It occurs through xylem.
- **Excretion:** It is the process of throwing out of waste products and other harmful chemicals from the body.
- **Nephric Filtrate:** It is the fluid passed out of glomerulus due to ultrafiltration in the malpighian capsule of a nephron.
- **Ultrafiltration:** It is the filtration under pressure of small particles, solutes and solvents, through a finely porous membrane.

- **Glomerulus:** It is a bunch of fine blood vessels or capillaries present in the depression of Bowman's capsule where ultrafiltration occurs.
- **Micturition:** It is the expulsion of urine from the body.
- **Bowman's Capsule:** It is a broad, blind, cup-shaped, proximal end of a nephron in which glomerulus is located for ultrafiltration.
- **Osmoregulation:** It is the maintenance of a fixed osmotic concentration of body fluids by controlling the amount of water and salts.

