CHAPTER **09**

Life Processes in Animals

Every living animal needs energy to grow, move and carry out daily activities. This energy comes from food and is released inside the body through special processes. Two important life processes that help animals to obtain and use energy are **nutrition** and **respiration**. In nutrition, animals take in food to get useful substances called **nutrients**. In respiration, the body breaksdown these nutrients to release energy. Both these processes are essential for survival.

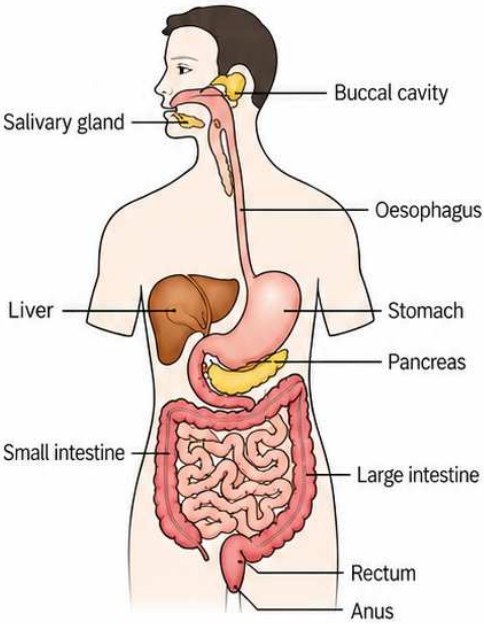
Nutrition in Animals

Animals depend on food to get the energy and nutrients they need to survive. However, the food obtain by an organism is made up of complex substances like carbohydrates, proteins and fats, which the body cannot use directly. These complex substances must first be broken down into simpler forms through a process called **digestion**. Once broken down, the simpler substances can be absorbed and used by the cells for energy, growth and repair.

Different Ways of Taking Food

Animals use various methods to take in food, depending on their body structure and feeding habits. Bees and sunbirds suck nectar from flowers. Babies of humans and many animals feed on their mother's milk. Snakes, such as pythons, swallow their whole food. Some aquatic animals take in water and filter tiny food particles from it. These examples show the variety of feeding methods in animals.

nutrients are absorbed and transported to various parts of the body for use.



Human digestive system

9.1 Digestion in Human Beings

In humans the process of digestion is completed in a tube like structure called **alimentary canal**.

Food is broken down into simpler forms as it moves through this canal. Along the way, digestive juices help to break the food into smaller pieces. The journey of food through the different parts of the alimentary canal involves several stages. Once the food is broken down, the simpler

The alimentary canal is made up of several parts that assist in digestion. It begins with the **buccal cavity**, followed by the **oesophagus**, **stomach**, **small intestine** and **large intestine**, ending at the **rectum and anus**. Digestive glands such as the salivary glands, pancreas and liver secrete juices that help to breakdown the food as it moves through the canal. Each part of the canal serves a specific function in digestion.

function in digestion and absorption. Which will be explained below.

1. Mouth

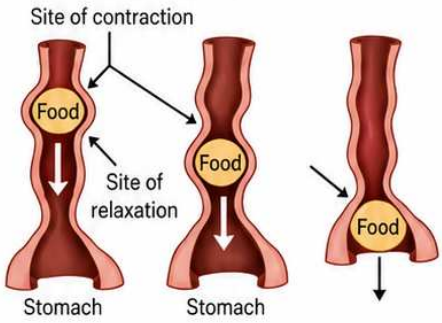
The process of digestion begins in the mouth, where the teeth breakdown food into smaller pieces through crushing and chewing. This initial breakdown is called **mechanical digestion**. As food enters the mouth, the salivary glands secrete a watery liquid called **saliva**, which contains digestive enzymes.

These enzymes help in the partial digestion of food by breaking down starch into sugars. Food is partially digested in the mouth before moving further along the digestive system.

Good oral hygiene is essential for a healthy mouth. Brushing twice a day, cleaning the tongue and rinsing after meals help to prevent **tooth decay** and **bad breath**.

2. The Food pipe or Oesophagus

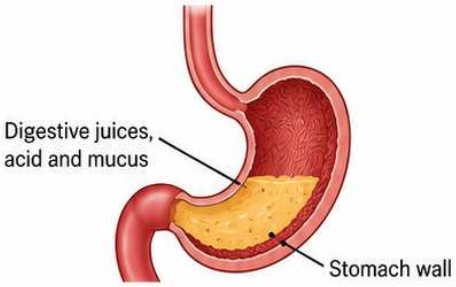
It is a tube-like structure, which connects the mouth to the stomach and runs along the neck and chest. It carries slightly digested food from the mouth to the stomach. Food is pushed downward by a wave-like movement of the wall of food pipe as a result of alternate **contraction and relaxation**. This movement takes place throughout the alimentary canal and pushes the food downwards.



3. Stomach

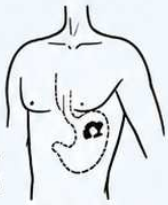
It is the widest part of the alimentary canal. In the stomach, the walls contract and relax to churn the food and mix it with secretions from the inner lining. These secretions include digestive juice, acid and mucus.

The digestive juice helps to breakdown proteins into simpler forms. The acid not only aids in digestion, but also kills harmful bacteria, while mucus protects the stomach lining from the acid. Food is partially digested in the stomach and turned into a semi-liquid mass, preparing it for the next stage of digestion.



Know the Scientist

The working of the stomach was discovered by a strange accident. In 1822, a man named Alexis St. Martin was hit by a gunshot. The bullet made a hole in his stomach. He was brought to an American army doctor **William Beaumont**. The doctor saved the patient, but was unable to close the hole properly and left it bandaged. He saw the inside of the stomach through the hole and observed that stomach was churning food. Its wall secreted a fluid, which could digest the food. He also observed that the end of the stomach opens into the intestine only after the digestion of the food inside the stomach is completed.


Alexis St. Martin's shotgun wound

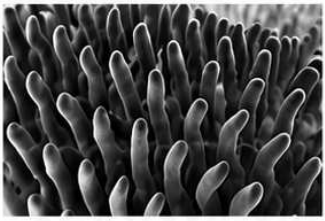
4. Small Intestine

It is a long, coiled tube, where complete digestion and absorption of food take place. It receives digestive secretions from three sources: its own **inner lining**, the **liver** and the **pancreas**.

The liver produces bile, a mildly basic fluid that neutralises stomach acid and breaks down fats into small droplets. The pancreas secretes pancreatic juice, which also neutralises acid and helps breakdown carbohydrates, proteins and fats. The digestive juice from the small intestine further simplifies these nutrients.

The digested food is then absorbed through the thin inner lining of the small intestine, which has thousands of finger-like projections. These projections increase the surface area, allowing nutrients to pass into the blood. The

absorbed nutrients are transported by the blood to different parts of the body, providing energy, aiding in growth and repair and support the body functions.



Inner lining of the small intestine

Did You Know?

Celiac disease is a condition in which the body shows a harmful reaction to gluten, a protein found in wheat, barley and rye. This reaction damages the inner lining of the small intestine, making it difficult for the body to absorb nutrients properly. As a result, digestion and overall health are affected. The only way to manage this disease is to avoid gluten-containing foods. Millets like jowar, bajra and ragi are excellent alternatives, as they are naturally gluten-free and safe for people with celiac disease.

Try These 9.1

1. Which glands secrete juices that convert complex food substances into simpler ones?
2. Name the organ that produces enzymes to digest carbohydrates, proteins and fats.
3. Name the compartments of a canal through which food is passed down once ingested.
4. Name the organ that releases an acid that kills harmful bacteria which enters along with the food.

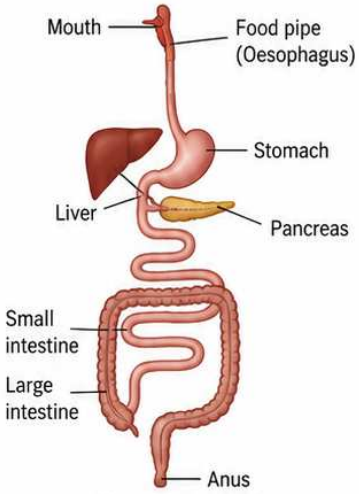
5. Large Intestine

After most nutrients are digested and absorbed in the small intestine, the remaining material passes into the large intestine, which measures about 1.5 metres in length. Its main function is to absorb water and some salts from the undigested food, turning it into a semi-solid waste called **stool.**

Do You Know?

The large intestine is home to many small living organisms, like bacteria, that help with digestion and keep our digestive system healthy. These bacteria breakdown undigested food, especially fibre and produce important nutrients. Eating fibre-rich foods and fermented foods like curd, buttermilk, shrikhand, kanji, pickles, gundruk and poita bhat can help to keep the digestive system healthy and improve overall well-being.

The stool is stored in the rectum (the lower part of the large intestine) until it is removed from the body through the anus. This process is called **egestion.** Including fibre-rich foods like fruits, vegetables and whole grains in the diet helps the large intestine work smoothly and supports healthy removal of waste.



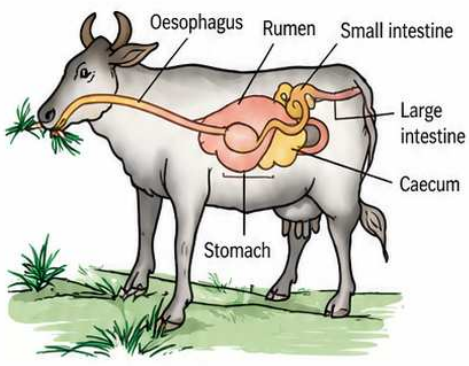
Alimentary canal

Do You Know?

The importance of digestion in maintaining good health has been recognised for centuries. The Charaka Samhita, an ancient Ayurvedic text, highlights the role of easily digestible foods and the judicious use of spices like ginger, black pepper and cumin to enhance digestion. Advances in science in the area of nutrition also emphasise eating meals at proper timings, practising mindful eating and avoiding overeating as key factors in maintaining digestive health.

9.2 Digestion in Grass-Eating Animals (Ruminants)

Grass-eating animals like cows and buffaloes first partially chew the grass and swallow it into their stomach.

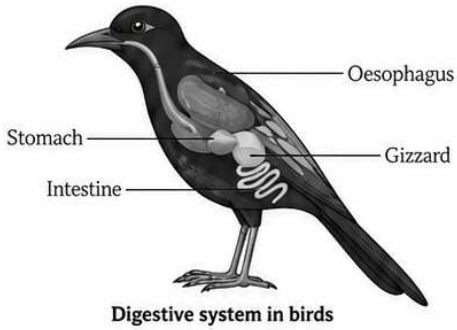


Digestive system of a ruminant

In the stomach, the food undergoes partial digestion. The partially digested food is then brought back to the mouth to be chewed again. This process is known as **rumination** and animals that do this are called **ruminants**. After through chewing, the food moves down the alimentary canal for further digestion.

9.3 Digestion in Birds

Birds do not have teeth, but they have a special chamber called the **gizzard**. The food in the gizzard is broken down by the contraction and relaxation of the gizzard walls. Sometimes, grit (small stones) that birds swallow also helps in grinding the food.



Digestive system in birds

This shows, how animals have different adaptations in the structure and function of their alimentary canals, allowing them to digest various types of food in unique ways.

Try These 9.2

1. What is the process called when partially digested food is brought back to the mouth for further chewing?
2. What chamber in birds helps to grind food?
3. What small objects do birds sometimes swallow to help grind food?

9.4 Respiration in Humans

The process of breakdown of food in the cells of living beings with the release of energy is called **cellular respiration**. During respiration, an individual breathe in oxygen rich air and breathe out air rich in carbon dioxide. The air rich in oxygen is transported to all parts of the body and ultimately to each cell. This oxygen is utilised by the cells for **respiration**. The process can be depicted with the help of following equation.

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{Energy}$$

This process is crucial because it provides energy to every cell, enables growth, movement and various functions which are necessary for survival.

In humans, the respiratory system is highly developed, ensuring a continuous supply of oxygen and the removal of carbon dioxide, which supports the body's energy needs and overall functioning.

Human Respiratory System

The respiratory system in humans is made up of various parts that work together to facilitate breathing and gaseous exchange.

1. Nostrils and Nasal Passages

Breathing begins with a pair of nasal openings called **nostrils**. Air enters and exits the body through these nostrils. Just beyond them are the nasal passages, which contain tiny hairs and mucus. These helps to trap dust and dirt from the air, making it cleaner before it reaches the lungs. This is why breathing through the nose is healthier than breathing through the mouth.

2. Windpipe (Trachea)

From the nasal passages, the cleaned air travels down a tube called the **windpipe or trachea**. This is the main airway that connects the throat to the lungs.

3. Bronchi and Lungs

The windpipe divides into two branches known as **bronchi**, with each branch leading to one of the lungs. Inside the lungs, the bronchi further split into smaller tubes and finally end in tiny balloon-like structures called **alveoli**.

Do You Know?

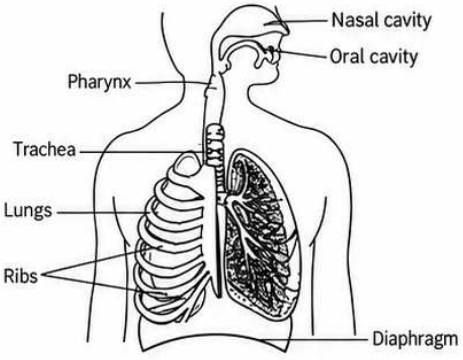
While a lot of the dust is filtered out from the inhaled air, often small infectious particles can get through the lungs. For example, during the COVID-19 pandemic, the SARS-CoV-2 virus affected the respiratory system, leading to breathing difficulties and often causing serious lung problems.

4. Alveoli

The alveoli are the main sites for the exchange of gases. Oxygen from the inhaled air passes into the blood and carbon dioxide from the blood is transferred into the alveoli to be exhaled.

5. Rib Cage

The lungs, being soft and delicate, are well protected by the rib cage, which also assists in the movement involved in breathing.



Human respiratory system

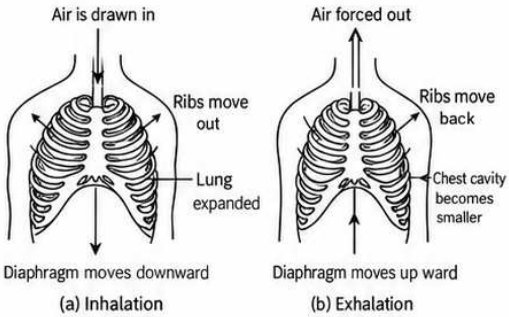
Harmful Effects of Smoking

Smoking is very harmful to health. It damages the lungs and increases the risk of diseases like lung cancer and breathing problems. It can also cause constant coughing and infections. Smoking doesn't just harm the smoker it also pollutes the air with toxic chemicals. People nearby, especially children, pregnant women and the elderly, can suffer from passive smoking. Avoiding smoking protects your health and the health of others.

9.5 Mechanism of Breathing

Breathing is a physical process that consists of two steps: **inhalation** and **exhalation**.

Inhalation, is the process of drawing oxygen-rich air into the lungs. During this step, the chest expands as the ribs move upward and outward. At the same time, the diaphragm-a dome-shaped muscle below the lungs-moves downward.



Mechanism of breathing in human beings

This increases the space inside the chest cavity, creating a vacuum that pulls air into the lungs.

Exhalation, occurs when air is pushed out of the lungs. The ribs move downward and inward and the diaphragm moves upward, reducing the space in the chest cavity. This pushes the air, now rich in carbon dioxide, out of the lungs. This exchange of gases helps supply oxygen to body cells and removes carbon dioxide as a waste product.

Do You Know?

Breathing exercises have been practised across different cultures in India and worldwide for centuries. Pranayama is well known for improving respiratory health, mind relaxation and concentration. In Ladakh, people practise Tummo breathing, a technique that improves-lung function and helps keep the body warm even in cold weather. Similarly, deep breathing techniques are used to promote well-being. Some traditions combine deep breathing with chanting, using rhythmic breath control to enhance relaxation and mental clarity.

9.6 Gaseous Exchange

Once the air reaches the lungs, gas exchange takes place in the alveoli. In which the gas exchange occurs as carbon dioxide from the blood enters the alveoli and is exhaled from the body. At the same time, oxygen from the alveoli diffuses into the blood. The oxygen-rich blood is then carried to all-parts of the body, providing cells with the oxygen required for energy production. This process ensures the delivery of oxygen to the body and the removal of carbon dioxide, a waste product.

The human body has a unique system known as the circulatory system, which is responsible for transporting nutrients, oxygen and other essential substances. This system includes the heart, blood and blood vessels. The heart acts as a pump, pushing blood through the vessels to supply the entire body, while also carrying away waste products for disposal.

9.7 Breathing in Other Animals

Animals have different ways of breathing based on their environment and body structure. Many land animals like birds, elephants, lions, cows, goats, lizards and snakes breathe through lungs, although the structure of their lungs may vary.

1. Aquatic Animals

Most aquatic animals, such as fish, use gills for breathing. Gills are filled with blood vessels and allow the exchange of oxygen and carbon dioxide from the water.

2. Amphibians

Amphibians like frogs live both on land and in water. Tadpoles breathe through gills, while adult frogs use lungs on land and their moist skin for breathing in water.

3. Earthworm

Earthworms breathe through their moist skin. Oxygen and carbon dioxide passes directly through the skin into the bloodstream.

Try These 9.3

1. The inhaled air is a mixture of different gases. During breathing, which gas is used by us from all of those present in air?
2. During the process of breathing, our chest move in and out. This movement is caused by two organs. Identify and name them.
3. The exhaled air contains a mixture of gases. Which gas is present in large amount in the exhaled air?
4. Name two animals that have lungs for respiration.
5. How do earthworms breathe?

Science Glossary

Digestion	The process in which complex substances are broken down into smaller, simpler substances.
Absorption	The uptake of simple substances produced during digestion.
Liver	The largest gland in the body. It is reddish brown in colour and located in the upper part of the abdomen on the right side.
Bile	A juice secreted by the liver that helps in the digestion of fats.
Saliva	A liquid secreted by salivary glands. It breaks down starch into sugars.
Ruminants	Herbivorous animals that eat grass and have a special digestive system to break down cellulose, including the process of rumination.
Respiration	The process of breaking down food to release energy. It can occur with oxygen (aerobic) or without oxygen (anaerobic).
Breathing	The physical process of taking in oxygen (inhalation) and releasing carbon dioxide (exhalation).
Trachea	A tube in the respiratory system that carries air to and from the lungs; in insects, tracheae are air tubes connected to spiracles for breathing.
Alveoli	Tiny air sacs in the lungs, where the exchange of oxygen and carbon dioxide takes place.
Ribs	Bony framework in the chest that protects the lungs and helps in breathing.
Gills	Breathing organs in aquatic animals like fish that allow exchange of gases in water.
Inhalation	The process of breathing oxygen-rich air in.
Exhalation	The process of breathing carbon dioxide air out.

NCERT FOLDER

Complete Explanations of all NCERT's Questions

Intext Questions

Q.1 **How are complex food components broken down into simpler forms and used by the body in different animals? Is this process the same in all animals?** Page 122

Ans. In animals, complex food is broken down into simpler substances through digestion so the body can absorb and use the nutrients. Although the goal is the same, the process differs from one animal to another based on their body structure and eating habits. For example, cows have a special stomach to digest grass, while birds have a crop and gizzard to help breakdown and digest the food.

Q.2 **Think about your favourite food. Does your mouth feel watery?** Page 122

Ans. Yes, when I think about my favourite food, my mouth feels watery. This happens because more saliva gets released when we recall or imagine tasty food.

Q.3 **What do you think is the role of saliva in your mouth?** Page 123

Ans. Saliva plays an important role in our mouth-it helps to moisten the food, making it easier to chew and swallow.

Q.4 **What do you feel when you eat other types of food, such as chapati? Do you notice a change in taste, while chewing? Have you ever wondered why this happens?** Page 123

Ans. Yes, when i eat food like chapati and chew it for a longer time, i notice that it starts to taste slightly sweet. This happens because chapati contains starch, which is a type of carbohydrate. Our saliva has a digestive juice that starts breaking down the starch into sugar, while chewing. That's why the taste changes-the longer you chew, the sweeter it becomes. Saliva plays an important role in breaking down food into simpler substances.

Q.5 **How does the food move down through the food pipe?** Page 124

Ans. The walls of the food pipe move in a wave-like motion by gently contracting and relaxing. It helps to push the food down into the stomach. It continues throughout the alimentary canal to move the food forward during digestion.

Q.6 **How are these nutrients absorbed from the small intestine?** Page 126

Ans. Nutrients are absorbed from the small intestine through tiny finger-like structures, which line the inner walls of the intestine. These structures increase the surface area for absorption.

Q.7 **After most of the nutrients are digested and absorbed in the small intestine, what happens to the undigested food?** Page 126

Ans. The undigested food moves into the large intestine, where water and minerals are absorbed.

Q.8 **The large intestine is shorter than the small intestine. Why is it called the large intestine?** Page 126

Ans. It is called the large intestine because it has a larger diameter than the small intestine, even though it is shorter in length.

Q.9 **Isn't it fascinating how the digestive system works, absorbing nutrients from food and eliminating waste?** Page 127

Ans. Yes, it is fascinating! The digestive system efficiently breaks down food, absorbs essential nutrients and eliminates waste. It ensures that the body gets the necessary energy and nutrients for various functions, while removing unwanted materials.

Q.10 **Is the process of respiration same in all animals?** Page 128

Ans. No, the process of respiration is not the same in all animals. Some animals, like humans, breathe through lungs, while fish use gills to get oxygen from water. Insects breathe through tiny tubes called tracheae. Each animal has its own way of breathing.

Q.11 **How is the oxygen used in the body?** Page 129

Ans. Oxygen is used in the body to produce energy. It is carried by the blood to the cells, where it helps breakdown food into energy. This energy is then used by the body for various functions, such as movement, growth and maintaining body temperature.

Q.12 **Are breathing and respiration different?** Page 129

Ans. Yes, breathing and respiration are different. Breathing is the physical process of taking in oxygen and releasing carbon dioxide through the lungs. On the other hand, respiration, is a chemical process that takes place inside the cells, where oxygen is used to breakdown food and produce energy.

Q.13 Without breathing, we usually cannot survive more than a few minutes. Why is that? Page 129

Ans. Without breathing, the body cannot get oxygen, which is needed for cells to produce energy. Without oxygen, cells cannot function properly and the body cannot survive for long. That's why we usually cannot survive more than a few minutes without breathing.

Q.14 How do we breathe? Page 129

Ans. We breathe by inhaling air through the nose or mouth, which travels down the trachea into the lungs. The diaphragm and rib muscles help expand the chest to allow air to enter. When the diaphragm moves up, air is pushed out of the lungs during exhalation.

Q.15 Have you noticed tiny hair inside your nostrils? Page 129

Ans. Yes, the tiny hairs inside the nostrils help filtre out dust, dirt and other particles from the air we breathe. This helps prevent harmful substances from entering the lungs and keeps the respiratory system clean.

Q.16 Have you ever wondered how the food you eat gives you energy? Page 132

Ans. Yes, the food we eat provides energy because it contains nutrients like carbohydrates, proteins and fats. These nutrients are broken down in the body and converted into energy, which is used for all our activities, such as movement, growth and maintaining body functions.

Q.17 You may have observed birds flying and fish swimming. How do they breathe? Page 133

Ans. Birds breathe through their lungs, just like humans, but they have a special system of air sacs that helps them get more oxygen while flying. Fish, on the other hand, breathe using gills, which extract oxygen from the water as it passes over them, allowing fish to breathe underwater.

Exercise

Q.1 Complete the journey of food through the alimentary canal by filling up the boxes with appropriate parts.

Food → Mouth → [ ] → Stomach
→ [ ] → [ ] → Anus

Ans. Food → Mouth → Oesophagus → Stomach → Small intestine → Large intestine → Anus

Q.2 Sahil placed some pieces of chapati in test tube A. Neha placed chewed chapati in test tube *B* and Santushti took boiled and mashed potato in test tube C. All of them added a few drops of iodine solution to their test tubes-A, B and C, respectively. What would be their observations? Give reasons.

Ans. Sahil observed that the solution will turn blue-black because chapati contains starch, which reacts with iodine to form a blue-black colour.

Neha observed that the solution may turn light blue-black or stay mostly unchanged because chewing the chapati mixes it with saliva, which contains enzymes that begin breaking down starch into simpler sugars. Since less starch is present after chewing, the colour change is weaker.

Santushti observed that the solution will turn blue-black because boiled and mashed potatoes still contain starch, which reacts with iodine to form the blue-black colour.

Q.3 What is the role of the diaphragm in breathing?

(i) To filtre the air
(ii) To produce sound
(iii) To help in inhalation and exhalation
(iv) To absorb oxygen

Ans. (iii)

Q.4 Match the following name of the part functions.

(i)	Nostrils	(a)	Fresh air from outside enters
(ii)	Nasal passages	(b)	Exchange of gases occurs
(iii)	Windpipe	(c)	Protects lungs
(iv)	Alveoli	(d)	Tiny hair and mucus help to trap dust and dirt from the air we breathe
(v)	Ribcage	(e)	Air reaches our lungs through this part

Ans. (i) Nostrils - (a) fresh air from outside enters
(ii) Nasal passages - (d) tiny hair and mucus help to trap dust and dirt from the air we breathe
(iii) Windpipe - (e) air reaches our lungs through this part
(iv) Alveoli - (b) exchange of gases occurs
(v) Ribcage - (c) protects lungs

Q.5 Anil claims to his friend Sanvi that respiration and breathing are the same process. What question(s) can Sanvi ask him to make him understand that he is not correct?

Ans. Sanvi can ask Anil the following questions to help him understand that respiration and breathing are not the same process.

1. Is it possible to breathe without using oxygen to release energy in our body?
2. Can the body still use energy, if we stop breathing for a few minutes?

3. Does the body only use oxygen while we breathe, or does it also release carbon dioxide during respiration?

These questions can help Anil realize that, while breathing is the process of taking in oxygen and releasing carbon dioxide, respiration involves using oxygen to produce energy and releasing carbon dioxide as a by-product.

Q.6 Which of the following statements is correct and why?

Anu: We inhale air.

Shanu: We inhale oxygen.

Tanu: We inhale air rich in oxygen

Ans. The correct statement is

Tanu: We inhale air rich in oxygen.

We inhale air, which contains about 21% oxygen, along with other gases such as nitrogen and carbon dioxide. While oxygen is a vital part of the air we breathe in, we donot inhale pure oxygen. Instead, we inhale air that is rich in oxygen.

Q.7 We often sneeze when we inhale a lot of dust-laden air. What can be possible explanations for this?

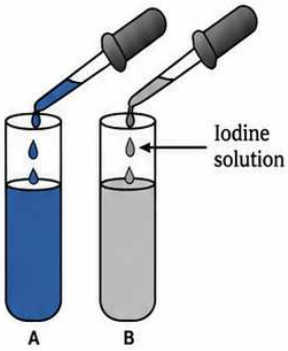
Ans. When we inhale dust-laden air, the particles irritate the sensitive lining of the nasal passages. In response, the body triggers a sneeze as a reflex to expel these irritants and protect the respiratory system. This helps clear the airways and prevent harmful substances from entering the lungs.

Q.8 Paridhi and Anusha of Grade 7 started running for their morning workout. After they completed their running, they counted their breaths per minute. Anusha was breathing faster than Paridhi. Provide at least two possible explanations for why Anusha was breathing faster than Paridhi?

Ans. Anusha might have been breathing faster than Paridhi because

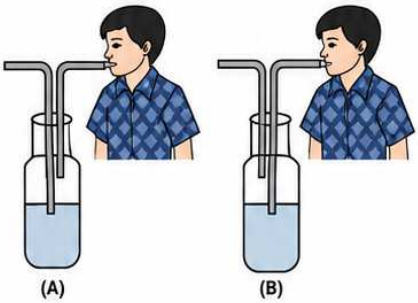
1. **Fitness Level** Anusha might not be as fit as Paridhi, so her body needs to work harder and breathe faster to get enough oxygen.
2. **Running Speed** Anusha might have been running faster or more intensely than Paridhi, which makes her breathe faster to keep up with the energy needed.

Q.9 Yadu conducted an experiment to test his idea. He took two test tubes, A and B and added a pinch of rice flour to the test tubes, half filled with water and stirred them properly. To test tube B, he added a few drops of saliva. He left the two test tubes for 35-45 min. After that, he added iodine solution into both the test tubes. Experimental results are as shown in Fig. What do you think he wants to test?



Ans. By comparing the colour change, Yadu wants to see if the saliva in test tube B has broken down the starch, resulting in little or no blue-black colour.

Q.10 Rakshita designed an experiment taking two clean test tubes, A and B and filled them with lime water as shown in the figure. In test tube A, the surrounding air that we inhale was passed on by sucking air from the pipe and in test tube B, the exhaled air was blown through the pipe (Fig.). What do you think she is trying to investigate? How can she confirm her findings?



Ans. Rakshita is trying to investigate the difference in the composition of inhaled and exhaled air. By passing inhaled air into test tube A and exhaled air into test tube B, she can observe any changes in the lime water. Lime water turns milky in the presence of carbon dioxide, so if test tube B's lime water turns milky, it would indicate that exhaled air contains more carbon dioxide than inhaled air. To confirm her findings, she can compare the appearance of lime water in both test tubes and check for the change in colour.

Part I

Multiple Choice Questions

1. Where does digestion of food start in the human digestive system?

(a) Mouth (b) Oesophagus
(c) Stomach (d) Small intestine

2. The enzymes present in the saliva convert

(a) fats into fatty acids and glycerol
(b) starch into simple sugars
(c) proteins into amino acids
(d) complex sugars into simple sugars

3. The swallowed food moves downwards in the alimentary canal because of

(a) force provided by the muscular tongue
(b) the flow of water taken with the food
(c) gravitational pull
(d) the contraction of muscles in the wall of foodpipe

4. The acid present in the stomach

(a) kills the harmful bacteria that may enter along with the food
(b) protects the stomach lining from harmful substances
(c) digests starch into simple sugars
(d) makes the medium alkaline

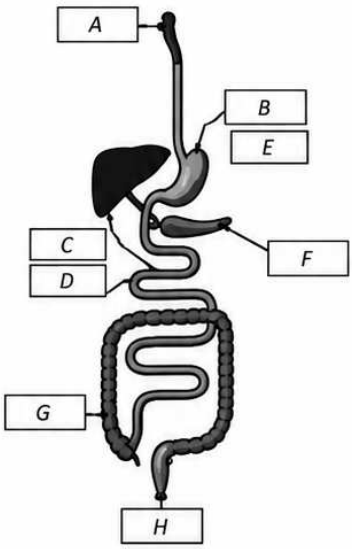
5. The greatest amount of digestion of food takes place in

(a) large intestine (b) small intestine
(c) mouth (d) stomach

6. Read carefully the terms given below. Which of the following set is the correct combination of organs that do not carry out any digestive functions?

(a) Oesophagus, large intestine, rectum
(b) Buccal cavity, oesophagus, rectum
(c) Buccal cavity, oesophagus, large intestine
(d) Small intestine, large intestine, rectum

7. Observe the given diagram of the human digestive system. Which part is responsible for the absorption of nutrients and also receives the secretion from the liver to aid in digestion?



(a) *A* (b) *D*
(c) *B* (d) *C*

8. Cud is the name given to the food of ruminants which is

(a) swallowed and undigested
(b) swallowed and partially digested
(c) properly chewed and partially digested
(d) properly chewed and completely digested

9. According to ancient practices, which of the following spices are known to enhance digestion?

(a) Turmeric and cinnamon
(b) Ginger, black pepper and cumin
(c) Cardamom and clove
(d) Mustard and fennel

10. Which ancient Ayurvedic text highlights the importance of digestion and the use of spices?

(a) Sushruta Samhita
(b) Charaka Samhita
(c) Atharva Veda
(d) Rig Veda

11. Which of the following is a good digestive habit for healthy digestive system according to both ancient and modern insights?

(a) Eating at fixed times
(b) Chewing food slowly
(c) Using spices like ginger and cumin
(d) Consuming large amounts of junk food

12. What is the process by which ruminants chew, bring back partially digested food from the stomach, chewing again?

(a) Regurgitation (b) Ingestion
(c) Rumination (d) Egestion

11. Which of the following habits is least supportive of a healthy digestive system according to both traditional and modern insights?
(a) Eating at fixed times daily
(b) Chewing food slowly and mindfully
(c) Using spices like ginger and cumin in cooking
(d) Consuming large quantities of food in one sitting

12. What is the process called when grass-eating animals bring back partially digested food to the mouth for chewing again?
(a) Regurgitation
(b) Ingestion
(c) Rumination
(d) Egestion

13. Which group of animals is adapted to bring partially digested food back to the mouth for further chewing and why is this adaptation beneficial?
(a) Carnivores - to re-chew meat for easier swallowing
(b) Ruminants - to aid in the digestion of tough plant material like cellulose
(c) Omnivores - to taste food again
(d) Herbivores - to store extra food

14. Birds do not have teeth. How do they breakdown food?
(a) Using their beak
(b) In the stomach with acid
(c) In the gizzard through muscular movement
(d) With their tongue

15. What do some birds swallow to help grind food inside their gizzard?
(a) Sand
(b) Water
(c) Grit or small stones
(d) Insects

16. A teacher asked a student to observe inhalation. The student observed an expansion in his chest during inhalation. The teacher told the student that it is because of the movement of ribs and diaphragm. What movement is likely to be found in the ribs and diaphragm of the student during inhalation?

Serial No.	Diaphragm	Ribs
(a)	Moves up	Moves up and inward
(b)	Moves down	Moves up and outward
(c)	Moves up	Moves down and inward
(d)	Moves down	Moves up and inward

17. Which of these animals breathes through its skin?
(a) Fish (b) Bird
(c) Snake (d) Earthworm

18. Choose which among the following can breathe through lungs as well as through skin?
(a) Fish (b) Frog
(c) Earthworm (d) Dolphin

Answers

1. (a)	**2.** (b)	**3.** (d)	**4.** (a)	**5.** (b)
6. (a)	**7.** (b)	**8.** (b)	**9.** (b)	**10.** (b)
11. (d)	**12.** (c)	**13.** (b)	**14.** (c)	**15.** (c)
16. (b)	**17.** (d)	**18.** (b)		

Fill in the Blanks

1. The alimentary canal stretches from ..... to ..... .
2. Digestion of food starts in ..... and gets completed in ..... .
3. ..... is the process of removing undigested waste material from the body.
4. During inhalation, the diaphragm moves ..... and the ribs move ..... to increase the chest cavity volume.
5. The process of breathing in oxygen and breathing out carbon dioxide is known as ..... .

Answers

1. mouth, anus
2. buccal cavity, small intestine
3. Ingestion
4. downward, upward and outward
5. respiration

True/False

1. In humans, the digestion of food starts in the stomach.
2. Cows are ruminants, meaning they chew their food multiple times to aid in digestion.
3. In human respiration, oxygen is absorbed and carbon dioxide is released through the gills.
4. Frogs use their lungs for breathing both on land and in water, but they also exchange gases through their skin.
5. Fish breathe by taking in oxygen through their lungs, similar to humans.

Answers

1. False
2. True
3. False
4. True
5. False

Match the Columns

1. Match the Column I with Column II.

Column I	Column II
A. Mouth	1. Absorption of nutrients takes place
B. Stomach	2. Secretes acid to kill bacteria
C. Small intestine	3. Saliva breakdown starch into simpler forms
D. Large intestine	4. Water absorption and formation of faeces

2. Match the Column I with Column II.

Column I	Column II
A. Lungs	1. Gas exchange (oxygen in, carbon dioxide out)
B. Diaphragm	2. Moves downward during inhalation
C. Trachea	3. Passage for air to reach the lungs
D. Alveoli	4. Tiny air sacs, where oxygen and carbon dioxide exchange happens

Answers

1. A–3, B–2, C–1, D–4
2. A–1, B–2, C–3, D–4

Assertion-Reason Questions

The following questions consist of two statements Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below.

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true, but R is not the correct explanation of A

(c) A is true, but R is false

(d) A is false, but R is true

1. **Assertion (A)** Bread taste sour when chewed for some time.
   Reason (R) Bread contains starch.
2. **Assertion (A)** The inner lining of stomach is protected from the effect of acid.
   Reason (R) The inner lining of the stomach secrete mucus.
3. **Assertion (A)** We exhale only carbon dioxide.
   Reason (R) Carbon dioxide turns lime water cloudy.
4. **Assertion (A)** During inhalation, the diaphragm moves downward and the ribs expand outward.
   Reason (R) The movement of the diaphragm and ribs increases the chest cavity's volume, allowing air to enter the lungs.
5. **Assertion (A)** Fish breathe through gills to extract oxygen from water.
   Reason (R) Gills allow fish to absorb oxygen dissolved in water, as they do not have lungs like land animals.

Answers

1. (d) A is false, but R is true. A can be corrected as Bread tastes sweet when chewed for some time.
2. (a) Both A and R are true and R is the correct explanation of A.
3. (d) A is false, but R is true. A can be corrected as We exhale a mixture of gases containing nitrogen, water vapour together with carbon dioxide.
4. (a) Both A and R are true and R is the correct explanation of A.
5. (a) Both A and R are true and R is the correct explanation of A.

Case Based Question

1. In a class project about respiration, Pankaj measured the chests of various students and recorded his observation in a table.

Chest Measurements	Student 1	Student 2	Student 3	Student 4
Inhalation	62 cm	58 cm	60 cm	65 cm
Exhalation	45 cm	54 cm	53 cm	56 cm

(i) Chest expansion is the difference in chest sizes during inhalation and exhalation. Which student's chest expanded the most?

(a) Student 1 (b) Student 2

(c) Student 3 (d) Student 4

(ii) What should be done to confirm the chest measurement of the four students?

(a) Repeat the chest measurement with four new students.

(b) Repeat each student's chest measurement for inhalation only.

(c) Repeat the chest measurement using a different measuring tape.

(d) Repeat each student's chest measurement for both inhalation and exhalation.

Answers

(i) (a) Student 1

(ii) (d) Repeat each student's chest measurement for both inhalation and exhalation.

Part II

Very Short Answer Type Questions

1. Define digestion.

Ans. It is defined as the process of breakdown of complex substances of food into simpler ones.

2. Describe alimentary canal briefly.

Ans. Alimentary canal is the tube running from mouth to anus in animals including humans. Here, digestion and absorption of food take place.

3. Name the secretions of stomach, that help to digest food.

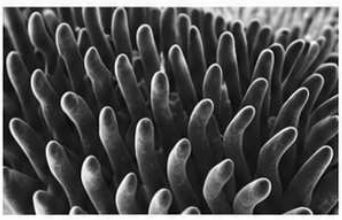
Ans. The inner lining of stomach secretes hydrochloric acid and digestive juices.

4. Name the parts of the alimentary canal where

(a) water gets absorbed from undigested food
(b) digested food gets absorbed
(c) the undigested food is eliminated
(d) bile juice is produced

Ans. (a) Large intestine (b) Small intestine
(c) Anus (d) Liver

5. Carefully examine the image and identify where this structure is found. Competency Based Que.



Ans. These structures are present in small intestine.

6. What changes are observed in diaphragm during inhalation?

Ans. During the process of inhalation, diaphragm contracts and moves downwards.

7. Which of these statement is correct for the respiratory system? Circle 'Yes' or 'No' for the correct response. Is the statement correct? Competency Based Que.

Statement	Yes/No
(i) The ribs move in during exhalation.	Yes/No
(ii) The lungs constrict during inhalation.	Yes/No
(iii) The diaphragm expands during exhalation.	Yes/No

Ans. (i) Yes
(ii) No, the lungs expand during inhalation.
(iii) No, the diaphragm moves up during exhalation.

8. What could be the role of the hair and mucus present in the nostrils in terms of protecting the respiratory system?

Ans. Our nostrils possess hairs and mucus lining. These help in preventing dirt, dust and germs from entering our respiratory system.

9. In an experiment, Ria exhale into a glass containing lime water. What changes would be observed by Ria?

Ans. When Ria exhale into lime water, its colour changes to slightly milky white because the exhaled air contains CO_2.

10. X refers to the respiratory organs in a tadpole. Identify what X stands for?

Ans. Gills

Short Answer Type Questions

1. List the preventive measures that one should adopt for avoiding tooth decay.

Ans. Good oral hygiene is essential for preventing tooth decay and bad breath. Brushing teeth twice a day removes plaque and food particles, preventing bacterial buildup. Cleaning the tongue helps reduce bacteria that cause bad breath. Rinsing after meals removes leftover food and bacteria, maintaining a clean mouth. These habits keep your mouth fresh and healthy.

2. Boojho and Paheli were eating their food hurriedly so that they could go out and play during the recess. Suddenly, Boojho started coughing violently. Think of the reasons, why he was coughing and discuss with your friends?

Ans. Sometimes, when we eat hurriedly, talk or laugh, while eating, the flap-like valve which closes the passage of windpipe remains open. Therefore, the food may enter into the windpipe. Coughing helps to clear the passage and returns the food particle back to the foodpipe.

3. 'A' had her pancreas removed surgically due to a severe medical condition. After the surgery, she faced problems in digestion of various food items. Can you tell which kind of food items would they be and why?

Ans. After the surgical removal of the pancreas, 'A' would face problems in digestion of carbohydrates, proteins and fats. This is because the pancreas produces digestive enzymes (amylase, protease and lipase) that help in breaking down these nutrients in the small intestine.

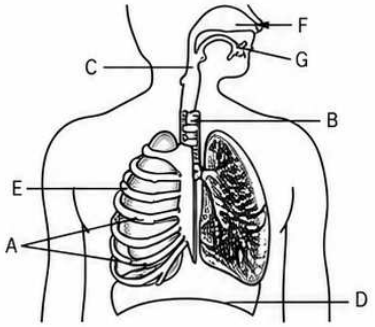
4. Ruminants such as cows and buffaloes swallow their food hurriedly and then sit restfully and chew their food. Give reason.

Ans. Ruminants such as cows and buffaloes swallow their food hurriedly and store it in a part of the stomach called rumen. The cellulose of the food is digested here by the action of certain bacteria, which are not present in humans. Later their partially digested food is returned to the buccal cavity of the animals in small lumps and animals chew it to complete the process of digestion. This process is called rumination.

5. What happens when breathe is released after holding for a few minutes? Give reason for its occurrence.

Ans. Releasing breathe after holding it for some time results in rapid breathing. It occurs to maintain a healthy balance between intake of O_2 and release of carbon dioxide.

6. Observe the given diagram of human respiratory system. List the organs from A to G.



Ans. The human respiratory system has the following organs
A- Ribs B-Trachea C- Pharynx D-Diaphragm
E- Lungs F-Nasal passage G-Oral cavity

7. Frogs are amphibians. They survive on land and water, do they have any respiratory issue? How do frogs breathe when they are in water? Do they possess lungs?

Competency Based Que.

Ans. Frogs breathe by their moist skin and also through lungs. So, they do not have any respiratory issue. When frogs enter into water, the skin of frog helps in respiration. The oxygen rich air enters through the skin. When the frog is on land, a pair of lungs helps in respiration.

8. There are three animals named A, *B* and C. Among them, A can stay on both land and water. When it is on land, it respires through lungs, but when it is in water, it respires through its moist skin. Animal *B* has specific organs to respire in water, which is not found in any other aquatic animal. Animal C is a terrestrial animal that respires through its moist skin and does not have lungs. Now, give the names of animals A, *B* and C.

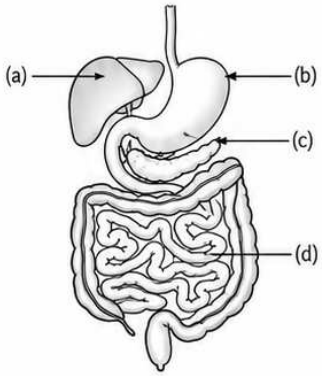
Ans. 1. Animal A can live on both land and water and respires through lungs on land and moist skin in water. The animal is a frog.

2. Animal B lives in water and respires through gills. The animal is a fish.

3. Animal C is a terrestrial animal that respires through its moist skin and does not have lungs. The animal is an earthworm.

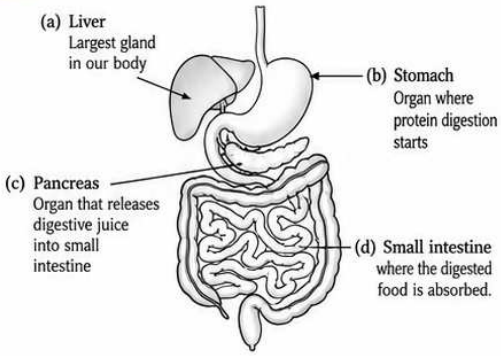
Long Answer Type Questions

1. Label the following parts of given figure and name them.



(a) The largest gland in our body.
(b) The organ where protein digestion starts.
(c) The organ that releases digestive juice into the small intestine.
(d) The organ where digested food is absorb.

Ans.



2. Describe the process of digestion in the following organisms.

(i) Cow (ii) Pigeon

Ans. **(i) Digestion in Cow** (Ruminant Animal)

Cows are ruminants that eat grass, which is rich in cellulose. They chew the grass partially and swallow it into the rumen, the first chamber of their stomach, where microbes start breaking down cellulose. The

partially digested food, called cud, is later brought back to the mouth for further chewing (rumination). After chewing, it goes through the other chambers of the stomach for complete digestion and then into the small intestine for nutrient absorption.

(ii) Digestion in Pigeon (Bird)

Pigeons do not have teeth, so food is swallowed directly. It first enters the crop, where it is stored and softened. Then it moves to the gizzard, a muscular chamber that grinds food with the help of swallowed stones or grit. The food then passes to the intestine, where enzymes digest it and nutrients are absorbed.

3. (i) The process of breathing occurs in two phases. What are these two steps? Explain each briefly.

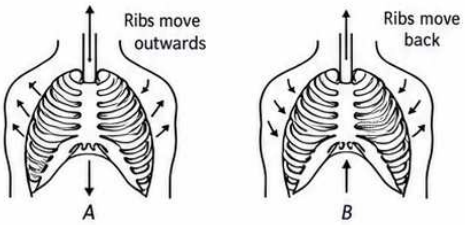
Ans. (ii) Explain the process of gaseous exchange.

(i) Breathing is the physical process by which air moves in and out of the lungs. It includes two main steps

- **Inhalation** The process of taking in oxygen-rich air into the lungs.
- **Exhalation** The process of expelling air rich in carbon dioxide from the lungs.

(ii) Gaseous exchange is the process, where oxygen from the inhaled air passes into the blood and carbon dioxide from the blood moves into the lungs to be exhaled. This exchange takes place in the lungs, mainly in the tiny air sacs called alveoli, which are surrounded by blood capillaries.

4. Observe the given figures labelled as A and B and answer the following questions.



(i) Among both figures identify which A or *B* indicates the process of inhalation and which shows the process of exhalation?

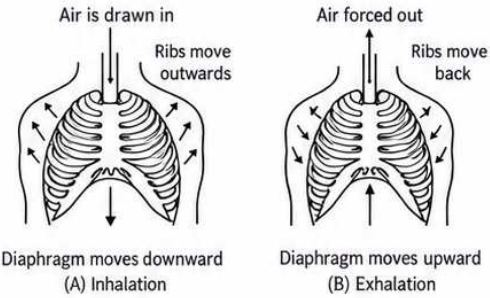
(ii) In the figure label the arrows and indicate the direction of

(a) movement of air (b) movement of diaphragm

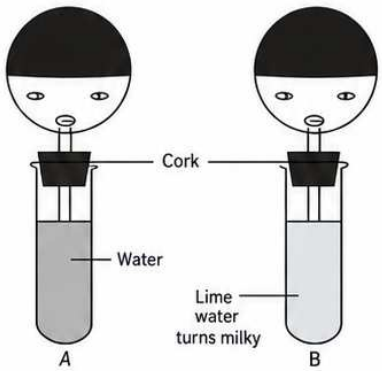
(c) movement of ribs

Ans. (i) Figure A indicates inhalation and figure *B* indicates exhalation.

(ii) Movement of air, diaphragm and ribs are indicated in below figure



5. Observe the figures carefully and answer the following questions.



(i) Which process is being tested in the activity?

(ii) What is the result of the activity? Give reasons.

Ans. (i) Exhalation process of respiration is being tested in the activity.

(ii) The lime water in test tube B turns milky, but water in test tube A remains unchanged. This is because CO_2 is present in the exhaled air, which mixes with lime water in test tube *B* and turns it milky.

Case Based Question

1. **Bile juice** is produced by the liver, a large reddish-brown gland located in the upper part of the abdomen. This juice plays a vital role in the digestion of fats. Although bile juice does not contain any digestive enzymes, it helps in the digestion process. Fats are not easy to digest because they are insoluble in water and exist as large globules. Bile juice helps by breaking down these large fat droplets into smaller ones, a process known as emulsification. These smaller droplets are then more easily acted upon by digestive enzymes released from the pancreas, allowing proper digestion in the small intestine.

(i) Which organ produces bile juice?

(ii) In which part of the alimentary canal is bile released?

(iii) How does bile juice, along with pancreatic enzymes, support digestion in the small intestine?

(iv) What is the role of the small intestine in completing the digestion process?

(v) Can bile juice alone digest fats completely? Why or why not?

Ans. 1. (i) The liver produced the bile juice.

(ii) Small intestine.

(iii) Bile juice breaks down large fat globules into smaller ones, making it easier for pancreatic enzymes to act on them and digest fats effectively.

(iv) The small intestine is where digestion is completed. It receives digestive juices from the pancreas and liver and it also absorbs nutrients into the bloodstream through its walls.

(v) No, bile juice does not digest fat completely. It only helps in breaking fats into smaller droplets, making them easier for enzymes to digest.

Skill Based Questions as per NEP 2020

1. A person met with an accident while driving. After examination, the doctor told him that since he got a fracture in the wrist, operation would be required. After the operation, the patient was put on a glucose drip and was not given food for a few hours. (i) Why was the patient not given food directly? (ii) How does glucose help the patient to recover? Thinking Skills

2. Take a chart paper and divide it into two sections longitudinally. In one section explain the process of digestion in humans and in other the process of digestion in cows. Compare both with the help of diagram and/or flowchart and write down the differences you found in both the cases. Observation Skills

3. A group of people were smoking cigarettes in a restaurant. The atmosphere was full of smoke. An old man sitting next to the group asked them to stop smoking, while sitting in the premises or move out. They agreed to do so and promised not to repeat the mistake. Answer the following questions. (i) Write any three hazards of smoking. (ii) Can smoking also affect the person who does not smoke? Thinking Skills