

Students Learning Outcomes

After Studying this chapter, students will be able to:

- Describe the needs of ingestion, digestion, absorption, assimilation and egestion.
- Identify and describe the structures of the main regions of the alimentary canal and the associated organs.
- Describe swallowing and peristalsis.
- Sort out the action of enzymes in specific regions of alimentary canal, with respect to their substrates and products.
- State the role of the liver.
- Describe the structure of a villus, including the roles of capillaries and lacteals.
- State the signs and symptoms, causes, treatments and preventions of the disorders of gut i.e., diarrhoea, constipation, and ulcer.

Subjective Type Questions

Long Questions prepared in the light of new Examination Techniques
(Knowledge, Understanding, Application, Analytical & Conceptual)

Nutrition and its Importance

Q.1: Why is nutrition essential for living organisms also describe the main steps involved in nutrition?

OR Explain nutrition and discuss its importance for growth, energy and maintenance of the human body.

Ans. Nutrition:

Nutrition is the process by which living organisms take in food and utilize it.

Nutrients: Nutrients are the chemical substances present in food that provides energy, support, growth and repair.

Importance of nutrition:

Nutrition is essential for proper growth, stay healthy and repair the body.

Steps involved in nutrition:

In animals, nutrition takes place in the following main steps:

- Ingestion:** Ingestion is the process of taking in food and drinks through the mouth.
- Digestion:** Digestion is breaking food into smallest parts which the body can absorb.

Q. Differentiate between autotrophic and heterotrophic nutrition.

Ans. Autotrophic nutrition is a mode of nutrition in which organisms produce their own food from inorganic substances using light or chemical energy.

Heterotrophic nutrition is a mode of nutrition in which organisms obtain their food by consuming other organisms or organic matter.

- (iii) **Absorption:** Absorption is the process of moving nutrients from the digested food into the blood or lymph.
- (iv) **Assimilation:** Assimilation is the process of using the absorbed nutrients in cells and tissues.
- (v) **Egestion:** The process of removing undigested food and waste from the body.

Q.2: What is meant by digestion? Briefly explain.

Ans. The process of breaking up complex substances into simpler substances is called digestion. The food we eat consists of polymers i.e., large molecules like carbohydrates, proteins, and fats. They cannot pass through cell membranes. These polymers must be broken down into smaller, soluble parts called monomers - like sugars, amino acids, and fatty acids. These small molecules can enter the cells.

1.2

Human Digestive System

Q.3: What is oral cavity. Explain how both mechanical and chemical digestion are initiated here?

OR Explain the role of oral cavity in digestive system.

Ans. Oral Cavity:

The space behind mouth is called oral cavity or mouth cavity. It consists of taste buds on the surface of tongue for the taste of food.

Mechanical digestion:

The mechanical digestion of food begins in oral cavity. During mechanical digestion, the teeth cut and grind food into smaller pieces.

Chemical digestion:

In oral cavity, partial chemical digestion of carbohydrates is done by three pairs of salivary glands. These glands are attached with oral cavity and secrete saliva. Saliva is the mixture of water, mucus and a digestive enzyme called salivary amylase.

Water and mucous moisten the food pieces. Salivary amylase breaks down the starch present in food into maltose.

Swallowing:

After the physical and partial chemical digestion, the food mass in oral cavity is called bolus. It is swallowed by pushing it into the pharynx. For swallowing, the tongue moves the bolus to the back of the oral cavity. The swallowed food enters the pharynx.

Q. What is the role of tongue during grinding?

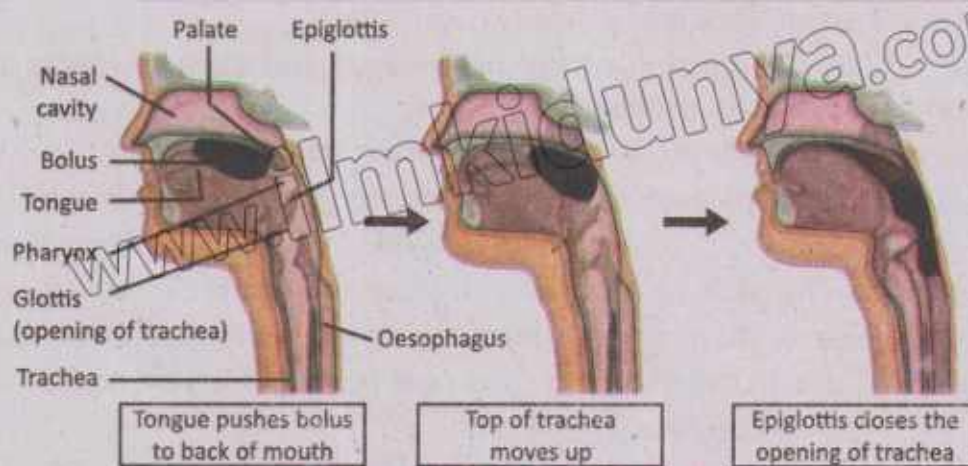
Ans. During this grinding, tongue keeps the food between the teeth.

Q. Differentiate between starch and maltose.

Ans. Starch is a polysaccharide (made up of many sugar molecules). Maltose is a disaccharide (made of two sugar molecules).

Q. How opening of nasal cavity closed during swallowing?

Ans. During swallowing, the palate (roof of oral cavity) moves upward to close the opening of the nasal cavity.



Oral cavity and steps in swallowing

Q.4: What is alimentary canal? Describe the structure and function of pharynx.

Ans. Alimentary Canal: The human digestive system consists of a long tube and some other helper organs. This is called alimentary canal.

Pharynx: Pharynx is a short tube-like part behind oral cavity. It connects oral cavity to oesophagus and also connects nose to windpipe (trachea).

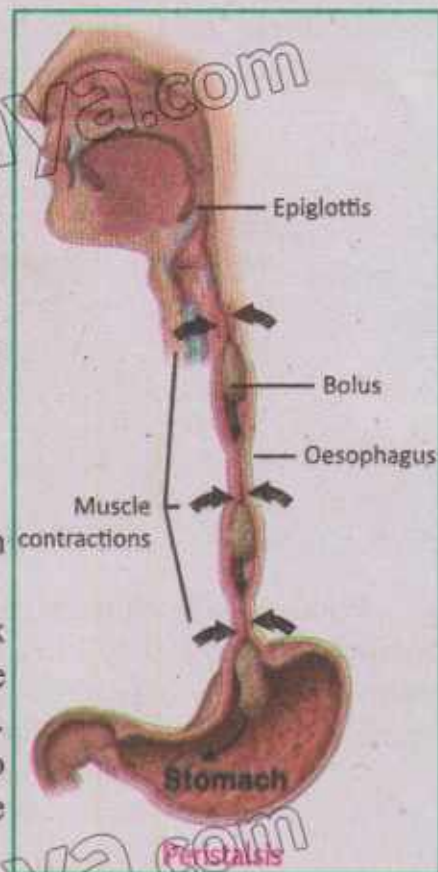
Functions of pharynx:

- The process of chemical digestion that started in oral cavity continues in pharynx.
- Pharynx prevents the entry of food particles into lungs. It is done with the help of an elastic cartilage tissue called epiglottis.
- When swallowed food passes through pharynx, the top of trachea (windpipe) is pushed up against epiglottis. In this way, the opening of trachea (glottis) closes and the swallowed food passes over it.

Q.5: How food moves from oesophagus to stomach?

Ans. Oesophagus: Oesophagus is a long tube (about 25cm long).

Functions of Oesophagus: Oesophagus connects the pharynx to the stomach. When food enters oesophagus, successive waves of contraction are generated in its muscular walls. These waves of contractions move food along oesophagus to the stomach. These waves of muscular contraction are called peristalsis.



Q.6: Describe the anatomical structure of the stomach and explain in detail its role in digestion of food.

OR Explain the structure and function of stomach.

Ans. Structure of stomach:

Stomach is J-shaped organ located in the upper left side of abdominal cavity, below the diaphragm. The part of stomach immediately after oesophagus is called cardiac end

while the part before small intestine is called pyloric end.

Cardiac Sphincter: At the junction of the oesophagus and stomach, there is sphincter (ring of muscles) called cardiac sphincter.

- It prevents food from flowing back from stomach into oesophagus.

Pyloric Sphincter: Pyloric sphincter is present between stomach and small intestine.

Mechanical Digestion of food: Stomach stores food. The walls of stomach are made of thick smooth muscles. When food arrives in stomach, these muscles contract rigorously. Their contractions helps in the churning (breaking down) of food into smaller particles. Heat is also produced due to this churning. This heat helps to melt the lipids.

Gastric juice secretion: Many small gastric glands present in the inner walls of stomach secrete gastric juice. It contains:

Q. How our stomach is protected from HCl?

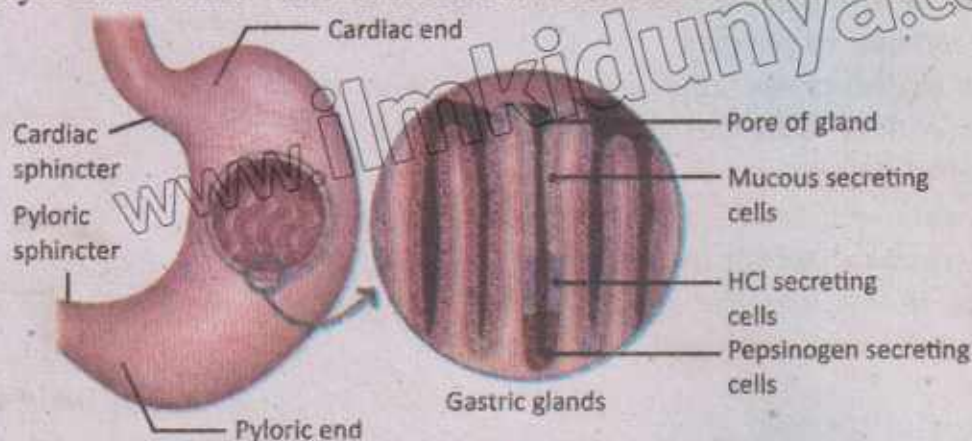
Ans. The stomach's HCl is so strong it can dissolve metal But your stomach is protected by the thick mucus lining that keeps it safe from its own acid.

(i) Hydrochloric acid

(ii) Pepsinogen

(iii) Mucus

Chemical Digestion of food: Hydrochloric acid converts pepsinogen into an active enzyme pepsin. Pepsin breaks large proteins into shorter chains of amino acids called peptides. Hydrochloric acid also kills pathogenic bacteria present in food. Mucus forms a protective layer on the inner walls of stomach. Where it neutralizes the HCl.



Structure of stomach

Food usually remains in stomach for three to four hours. Due to the actions in stomach, the food becomes a soup-like mixture called chyme. The pyloric sphincter controls the flow of chyme. Each time the pyloric sphincter opens about 5 to 15ml of chyme moves into the small intestine.

Q.7: Describe the structure of the small intestine and explains how its various parts contribute to the complete digestion.

Ans. Small Intestine: Small intestine is highly coiled tube and is nearly 7m long. Where the majority of digestion and nutrient absorption occurs.

Parts of small intestine: Small intestine consists of three parts:

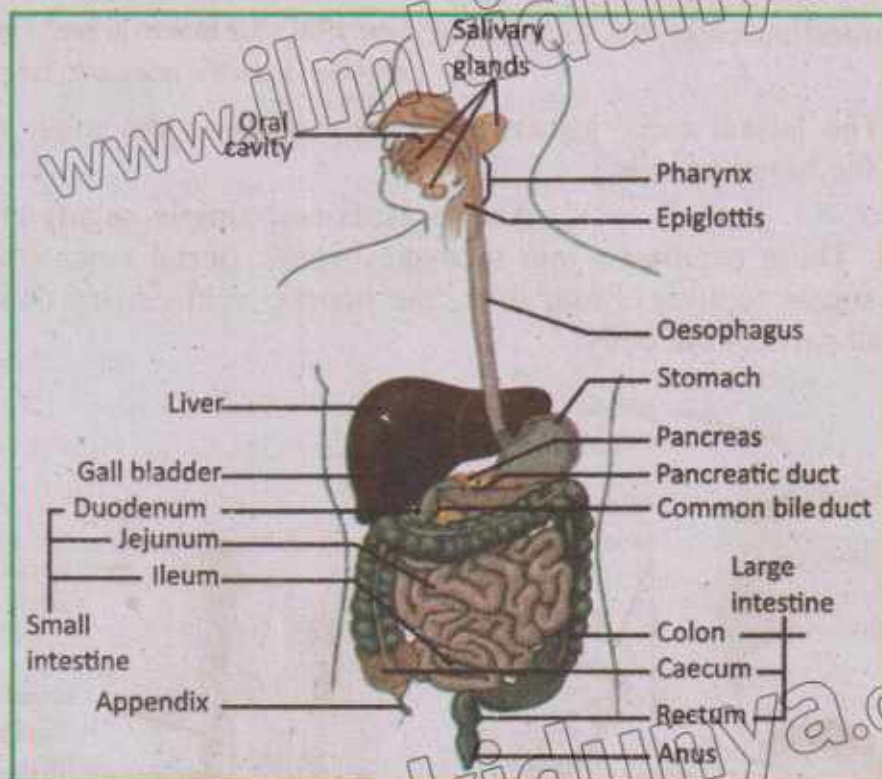
(i) **Duodenum:** It is the first part. It is about 25cm long.

(ii) **Jejunum:** It is the middle part. It is about 2.5m long.

(iii) **Ileum:** It is the last part. It is about 4m (about 13 feet) long.

- **Secretion of liver:** The secretion of liver i.e., bile enters duodenum through

common bile duct. It contains salt which break large fats into smaller droplets. In this way, a milky fluid is formed in which fat droplets are kept separate.



Human digestive system

- **Secretion of pancreas:** The secretion of pancreas i.e. pancreatic juice enters duodenum through pancreatic duct, which joins the common bile duct before entering duodenum.

- **Enzymes of pancreatic juice:** Pancreatic juice contains many enzymes e.g.

- (i) Trypsin (ii) Pancreatic amylase (iii) Lipase

These enzymes digest proteins, carbohydrates and lipids respectively. Pancreatic juice also contains sodium bicarbonate that neutralizes the acidity of chyme. The glands present in the walls of small intestine also secrete enzymes for the complete digestion of all types of food.

Q.8: Describe the absorption of food in small intestine.

Ans. The absorption of food in the small intestine is the process by which the final products of digestion pass through the intestinal mucosa into the blood or lymph. This is the most critical stage of the digestive process. The end products i.e. amino acids, simple sugars, glycerol and fatty acids etc move from alimentary canal into the circulatory system.

Villi: The inner walls of small intestine are highly folded. These folds have millions of finger like projections called villi. The wall of villus is made of a single layer of cells. Inside the villus, there are blood capillaries and a lymph vessel called lacteal.

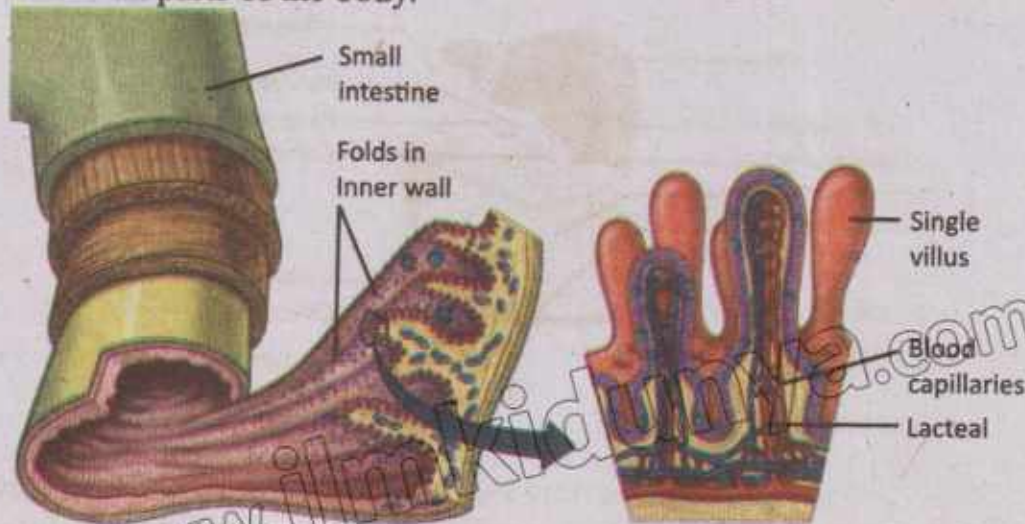
Role of villi:

- Villi provide a large surface area for the absorption of food.
- Food molecules are absorbed through diffusion and active transport.

Lacteal: Lacteal is a lymph vessel present inside the villi. The glycerol and fatty acids present in small intestine enter the lacteals of villi.

Role of Lacteal: The lacteal carry glycerol and fatty acids to the main lymph vessels, which empty into the blood vessels.

Absorption in liver and all body parts: Amino acids and simple sugars enter the blood capillaries of villi. These capillaries join to make hepatic portal vein which carries the amino acids and sugars to liver. From liver, the hepatic vein carries these nutrients to heart and then to all parts of the body.



Small intestine and Villi

Q.9: Explain the structure and primary functions of the large intestine.

Ans. Large Intestine: After the absorption of digested food material and some water, the undigested material and water moves to large intestine by peristalsis.

Parts of large intestine: Large intestine has three parts:

- (i) **Caecum:** A pouch that forms junction with small intestine.
- (ii) **Colon:** Absorb remaining water and salts from undigested food material and solidifying it.
- (iii) **Rectum:** Act as storage site for faeces.

Functions of Large Intestine: Absorption of more water occurs in large intestine. Due to it, the undigested material solidifies and is now called faeces. The faeces contain the undigested material, large number of bacteria, broken cells of alimentary canal, bile pigments and water. Faeces are temporarily stored in the rectum. During ejection, faeces are expelled out through anus.

Q. How pigments are removed?

Ans. Bile also contains pigments that are formed when RBCs are broken in liver. These pigments are removed from the body with faeces.

Q. Write short note on appendix.

Ans. There is a small finger-like appendix at the blind end of caecum. It may seem like an unimportant organ, but it actually plays a role in your immune system.

Infection in appendix causes severe pain. If infected appendix is not removed surgically, it can burst and infection may spread in abdomen.

Q. What do you know about carotene?

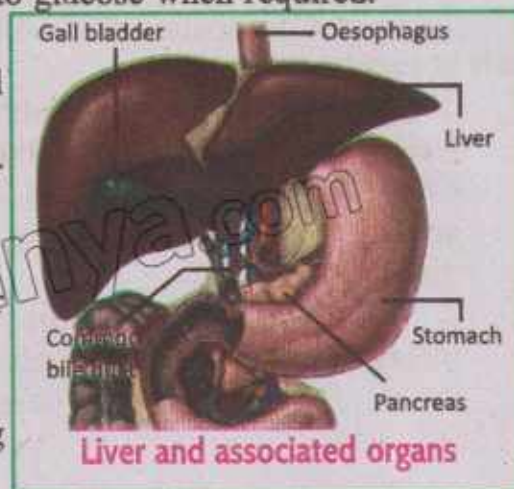
Ans. Carotene is a natural organic pigment found in fruits and vegetables e.g. carrots and mangoes which are essential for vision, growth and immunity.

Q.10: Justify the importance of liver in digestion.

Ans. Liver: Liver is a large organ located on the right of stomach. In an adult human it weighs about 1.5kg. There is a sac-like organ, called gall bladder on the ventral side of liver.

Role of bile in digestion: The liver's primary contribution to digestion is the secretion of bile, which is stored in the gall bladder.

- **Transportation:** Bile travels from the gall bladder through the common bile duct into the duodenum. While bile does not contain enzymes, it contains bile salts that break fats into small droplets (emulsification).
- **Efficiency:** By keeping fat droplets separate, bile salts make it easier for enzymes to attack and break down lipids.
- **Metabolic and Regulatory functions:** Liver also performs many other functions in the body which are as follows:
 - Stores glucose as glycogen and breaks glycogen to glucose when required.
 - Stores fat-soluble vitamins.
 - Breaks amino acids. In this process, harmful ammonia is produced.
 - Converts ammonia into less toxic urea for excretion through urine.
 - Breaks toxic substances e.g., alcohol.
 - Breaks the RBCs which have completed their life spans.
 - Prepares vitamin A from carotene.
 - Produces heat in cold temperatures by speeding up metabolism.



Q.11: Describe the action of different enzymes in the regions of alimentary canal.

Ans.

The action of enzymes in the regions of alimentary canal			
Region	Enzyme	Substrate	Product
Oral Cavity	Salivary Amylase	Starch	Maltose
Stomach	Pepsin	Proteins	Peptides
	Pancreatic Amylase	Starch	Maltose
Small Intestine	Trypsin	Proteins	Peptides
	Chymotrypsin	Proteins	Peptides
	Peptidase	Peptides	Amino acids and peptides
	Lipase	Fats	Fatty acids and glycerol
	Nucleases	Nucleic acids	Nucleotides
	Maltase	Maltose	Glucose
	Sucrase	Sucrose	Glucose and Fructose
	Lactase	Lactose	Glucose and Galactose
	Dipeptidases	Dipeptides	Amino acids

Q.12: What is diarrhoea? Write its causes and symptoms.

Ans. Diarrhoea: Diarrhoea is characterized by frequent, loose, or watery stools. Diarrhoea can lead to dehydration, especially in children and the elderly.

- **Symptoms of diarrhoea:** Abdominal cramps or pain, bloating, and dehydration (thirst, dry mouth, dark urine).
- **Causes of diarrhoea:** Infections (bacterial, viral, or parasitic), food allergies, stress, certain medications (e.g., antibiotics).
- **Treatment:** Drinking plenty of fluids, use of ORS, eating a soft diet, using anti-diarrheal medications, taking antibiotics or other treatments (in severe cases).
- **Prevention:** Washing hands regularly, especially before eating or after using the bathroom, avoiding contaminated food or water, avoid stress

Q13. What do you know about constipation? Also write causes and symptoms.

Constipation: Constipation is a condition in which faeces are not eliminated from the body at regular intervals.

- **Signs and Symptoms:** Infrequent or difficult bowel movements (less than 3 times a week), hard and dry stools, abdominal discomfort or bloating.
- **Causes of constipation:** Lack of fibre in diet, dehydration, lack of physical activity, certain medicines (e.g., painkillers, iron supplements), other diseases (e.g., diabetes).
- **Treatment:** Increasing fibre intake (fruits, vegetables, whole grains), drinking plenty of water, regular exercise, use medicines as prescribed by the doctor.
- **Prevention:** Eating a high-fibre diet, drinking plenty of fluids.

Q.14: Write a note on Ulcer.

Ans. Ulcers:

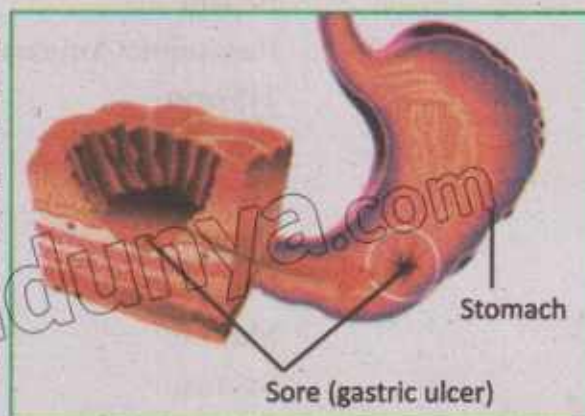
Peptic ulcers are sores that develop in the walls of alimentary canal. Ulcer usually develops in the walls of stomach and is called gastric ulcer. However ulcers may also develop in duodenum (duodenal ulcer) or oesophagus (oesophageal ulcer).

Signs and Symptoms: Burning stomach pain, rush of saliva after regurgitation, loss of appetite, weight loss, blood vomiting (in severe cases) are the major signs and symptoms of ulcers.

Causes: Infection due to *Helicobacter pylori* bacteria, long term use of non steroidal anti-inflammatory drugs (NSAIDs), excessive alcohol consumption, smoking, stress (though not a direct cause, it can make symptoms worse) are the causes of ulcers.

Treatment: Antibiotics to clear *H. Pylori* infection, medicines called antacids and proton pump inhibitors.

Prevention: Avoiding excessive use of painkillers (NSAIDs), avoiding spicy foods, eating a balanced diet.



Gastric ulcer

Objective Type Questions

Additional MCQ's

Multiple Choice Questions prepared in the light of new Examination Techniques
(Knowledge, Understanding, Application, Analytical & Conceptual)

1.1

Nutrition and Its Importance

- Everything in our body like moving, growing and staying healthy depends upon:
(a) Digestion (b) Excretion (c) Nutrition (d) Respiration
- Which process is responsible for turning food into usable nutrients for body cells?
(a) Guttation (b) Transpiration (c) Circulation (d) Digestion
- In which process organisms get and use nutrients?
(a) Digestion (b) Assimilation (c) Ingestion (d) Nutrition
- "Taking in food and drinks through the mouth" defines which process?
(a) Assimilation (b) Absorption (c) Ingestion (d) Digestion
- The process of using absorbed nutrients in cells and tissues is called:
(a) Digestion (b) Assimilation (c) Egestion (d) Absorption
- Removing undigested food and waste from the body is known as:
(a) Absorption (b) Egestion (c) Secretion (d) Ingestion
- Large molecules like carbohydrates, proteins and fats are scientifically referred as:
(a) Monomers (b) Enzymes (c) Polymers (d) Hormones
- Polymers cannot pass through:
(a) Cell wall (b) Cell membrane (c) Protoplasm (d) Cytoplasm
- Monomers are:
(a) Sugars (b) Amino Acids (c) Fatty acids (d) All of these

1.2

Human Digestive System

- The human digestive system consists of:
(a) Alimentary canal (b) Accessory organs
(c) Stomach (d) All of these
- From where alimentary canal starts:
(a) Esophagus (b) Mouth (c) Stomach (d) Anus
- Alimentary canal ends at:
(a) Small intestine (b) Anus (c) Mouth (d) Large Intestine
- Which of the following is considered an "accessory" (helper) organ of the digestive system?
(a) Heart (b) Liver (c) Lungs (d) Kidney

14. The space behind the mouth is called:
 - (a) Nasal cavity
 - (b) Oral cavity
 - (c) Chest cavity
 - (d) Abdominal cavity
15. Taste buds are located on the surface of the:
 - (a) Teeth
 - (b) Gums
 - (c) Tongue
 - (d) Palate
16. Mechanical digestion of food begins in:
 - (a) Stomach
 - (b) Oesophagus
 - (c) Oral cavity
 - (d) Small intestine
17. During mechanical digestion in the mouth, what is the primary role of the teeth?
 - (a) To absorb nutrients
 - (b) To cut and grind food
 - (c) To produce saliva
 - (d) To taste the food
18. How many pairs of salivary glands are attached to the oral cavity?
 - (a) One
 - (b) Two
 - (c) Three
 - (d) Four
19. Saliva is a mixture of:
 - (a) Water
 - (b) Mucus
 - (c) Digestive enzyme
 - (d) All of these
20. Which digestive enzyme is found in saliva?
 - (a) Pepsin
 - (b) Lipase
 - (c) Salivary amylase
 - (d) Protease
21. After physical and partial chemical digestion, the food mass in the oral cavity is called:
 - (a) Chyme
 - (b) Bolus
 - (c) Monomer
 - (d) Polymer
22. To which part of the digestive tract is the bolus pushed during swallowing?
 - (a) Stomach
 - (b) Trachea
 - (c) Pharynx
 - (d) Small intestine
23. During swallowing, which structure moves upward to close the opening of the nasal cavity?
 - (a) Tongue
 - (b) Epiglottis
 - (c) Palate
 - (d) Glottis
24. A short tube-like part after oral cavity is:
 - (a) Stomach
 - (b) Larynx
 - (c) Pharynx
 - (d) Mouth
25. Pharynx connects the oral cavity with the:
 - (a) Small intestine
 - (b) Heart
 - (c) Lungs
 - (d) Oesophagus
26. The elastic cartilage tissue present in the pharynx is called:
 - (a) Palate
 - (b) Glottis
 - (c) Epiglottis
 - (d) Pharynx
27. The opening of the trachea (wind pipe) is called:
 - (a) Pharynx
 - (b) Bolus
 - (c) Glottis
 - (d) Oesophagus
28. Approximately how long is the oesophagus?
 - (a) 10cm
 - (b) 25cm
 - (c) 50cm
 - (d) 100cm
29. Oesophagus connects the pharynx to the:
 - (a) Small intestine
 - (b) Stomach
 - (c) Oral cavity
 - (d) Large intestine
30. What is the shape of stomach?
 - (a) C-shaped
 - (b) U-shaped
 - (c) J-shaped
 - (d) S-shaped
31. The part of the stomach immediately after the oesophagus is the:
 - (a) Pyloric end
 - (b) Cardiac end
 - (c) Sphincter
 - (d) None of these

32. The part of the stomach before the small intestine:
 - (a) Pyloric end
 - (b) Cardiac end
 - (c) Body
 - (d) Peristalsis
33. Pyloric sphincter is present between:
 - (a) Oral cavity and pharynx
 - (b) Stomach and pharynx
 - (c) Stomach and small intestine
 - (d) Small intestine and pharynx
34. Which of the following organ stores food?
 - (a) Pharynx
 - (b) Oral cavity
 - (c) Small intestine
 - (d) Stomach
35. Gastric glands are present in:
 - (a) Inner walls of stomach
 - (b) Outer walls of stomach
 - (c) Central walls of stomach
 - (d) None of these
36. Gastric juice contains:
 - (a) Hydrochloric acid
 - (b) Pepsinogen
 - (c) Mucus
 - (d) All of these
37. HCl in the stomach converts inactive pepsinogen into:
 - (a) Maltose
 - (b) Peptides
 - (c) Pepsin
 - (d) Amino acids
38. What does the enzyme pepsin break proteins into:
 - (a) Sugars
 - (b) Fatty acids
 - (c) Peptides
 - (d) Starch
39. What is the primary role of mucus in the stomach?
 - (a) To digest proteins
 - (b) To kill bacteria
 - (c) To form protective layer
 - (d) To melt lipids
40. For how much duration food usually remains in stomach?
 - (a) Three to four hours
 - (b) Three to five hours
 - (c) Two to three hours
 - (d) Five to six hours
41. In stomach, the soup-like mixture of food is called:
 - (a) Bolus
 - (b) Chyme
 - (c) Matrix
 - (d) Cristae
42. What is the approximate total length of the small intestine?
 - (a) 3m
 - (b) 5m
 - (c) 7m
 - (d) 10m
43. The shortest part of the small intestine is:
 - (a) Jejunum
 - (b) Ileum
 - (c) Duodenum
 - (d) Colon
44. How much long duodenum is:
 - (a) 10cm
 - (b) 15cm
 - (c) 20cm
 - (d) 25cm
45. The middle part of the small intestine is:
 - (a) Duodenum
 - (b) Ileum
 - (c) Jejunum
 - (d) Colon
46. The length of ileum is:
 - (a) 25cm
 - (b) 2.5cm
 - (c) 2m
 - (d) 4m
47. The secretion of liver is called:
 - (a) Colon
 - (b) Bile
 - (c) Bolus
 - (d) Matrix
48. Bile contains:
 - (a) HCl
 - (b) Pepsin
 - (c) Salts
 - (d) Pepsinogen
49. The secretion of pancreas is known as:
 - (a) Bile
 - (b) Chyme
 - (c) Gastric juice
 - (d) Pancreatic juice

50. Which enzymes are present in pancreatic juice?
(a) Trypsin (b) Pancreatic amylase
(c) Lipase (d) All of these
51. Which enzyme in pancreatic juice digests lipids (fats)?
(a) Trypsin (b) Amylase (c) Lipase (d) Mucus
52. Which enzyme in pancreatic juice digests proteins?
(a) Lipase (b) Trypsin (c) Amylase (d) Pepsin
53. Pancreatic amylase is responsible for digesting:
(a) Proteins (b) Carbohydrates (c) Fats (d) Vitamins
54. After the complete digestion of food the end products move from alimentary canal into the:
(a) Respiratory system (b) Circulatory system
(c) Digestive system (d) Heart
55. The inner walls of small intestine form finger-like projections called:
(a) Bolus (b) Chyme (c) Villi (d) Veins
56. Villi provide:
(a) Support (b) Protection
(c) Large surface area (d) Locomotion
57. Food molecules are absorbed through the surface of villi through:
(a) Active transport (b) Diffusion
(c) Passive transport (d) Both (a) and (b)
58. The wall of villi is made of a:
(a) Single layer of cells (b) Double layer of cells
(c) Multiple layer of cells (d) None of these
59. Which structures inside the villi are responsible for absorbing glycerol and fatty acids?
(a) Blood capillaries (b) Lacteals
(c) Hepatic portal vein (d) Peptidases
60. Amino acids and simple sugars enter which part of the villi?
(a) Lacteals (b) Folds in the inner wall
(c) Blood capillaries (d) Caecum
61. The hepatic portal vein carries nutrients directly from the small intestine to the:
(a) Heart (b) Liver (c) Stomach (d) Kidneys
62. Which enzyme is responsible for breaking down starch in the oral cavity?
(a) Pepsin (b) Salivary amylase (c) Trypsin (d) Lipase
63. Which of the following enzyme is produced by the pancreas to digest proteins in the small intestine?
(a) Pancreatic amylase (b) Chymotrypsin
(c) Peptidase (d) Salivary amylase

64. The main purpose of large intestine is:
 (a) Digestion of proteins (b) Absorption of more water
 (c) Secretion of bile (d) Breaking down amino acids
65. Undigested material that solidified after water absorption is called:
 (a) Chyme (b) Bile (c) Faeces (d) Glycogen
66. Faeces are temporarily stored in:
 (a) Liver (b) Larynx (c) Rectum (d) Gall bladder
67. Where is liver located in an adult human?
 (a) To the left of the stomach (b) Behind the pancreas
 (c) To the right of the stomach (d) Inside the large intestine
68. What is the approximate weight of Liver in an adult human?
 (a) 0.5kg (b) 1.0kg (c) 1.5kg (d) 2.5kg
69. On the ventral side of liver sac-like organ is called:
 (a) Pancreas (b) Rectum (c) Stomach (d) Gall bladder
70. Bile is produced by:
 (a) Gall bladder (b) Liver (c) Pancreas (d) Rectum
71. Bile is stored in:
 (a) Liver (b) Pancreas (c) Gall bladder (d) Rectum
72. What is the function of bile salts?
 (a) To digest proteins (b) To break fats
 (c) To convert glucose (d) To neutralize stomach
73. Liver stores:
 (a) Fat-soluble vitamins (b) Water-soluble vitamins
 (c) Fatty acids (d) Minerals
74. Which harmful substance is produced when the liver breaks down amino acids?
 (a) Urea (b) Ammonia (c) Alcohol (d) Carbon dioxide
75. The liver converts toxic ammonia into:
 (a) Carotene (b) Urea (c) Bile (d) Glycogen

1.3

Disorders of the Digestive System

76. Which disease is characterized by frequent, loose or watery stools?
 (a) Constipation (b) Ulcer (c) Asthma (d) Diarrhoea
77. Drinking plenty of fluids, eating a bland diet, using anti-diarrheal medications are the treatments for:
 (a) Ulcers (b) Constipation (c) Diarrhoea (d) Asthma
78. A condition in which faeces are not eliminated from the body at regular intervals is:
 (a) Diarrhoea (b) Constipation (c) Ulcer (d) Dengue
79. Lack of fiber in diet, dehydration, lack of physical activity are the causes of:
 (a) Pneumonia (b) Emphysema (c) Diarrhoea (d) Constipation

80. A "gastric ulcer" specifically refers to a sore that develops in:

- (a) Walls of the stomach (b) Duodenum
(c) Oesophagus (d) Large intestine

81. Common symptoms of ulcer are:

- (a) Dark urine and thirst
(b) Burning stomach pain and less appetite
(c) Frequent watery stools (d) dry mouth

Answers

- | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|
| 1. (c) | 2. (d) | 3. (d) | 4. (c) | 5. (b) | 6. (b) | 7. (c) |
| 8. (b) | 9. (d) | 10. (c) | 11. (b) | 12. (b) | 13. (b) | 14. (b) |
| 15. (c) | 16. (c) | 17. (b) | 18. (c) | 19. (d) | 20. (c) | 21. (b) |
| 22. (c) | 23. (c) | 24. (c) | 25. (d) | 26. (c) | 27. (c) | 28. (b) |
| 29. (b) | 30. (c) | 31. (b) | 32. (a) | 33. (c) | 34. (d) | 35. (a) |
| 36. (b) | 37. (c) | 38. (c) | 39. (c) | 40. (a) | 41. (b) | 42. (c) |
| 43. (c) | 44. (d) | 45. (c) | 46. (d) | 47. (b) | 48. (c) | 49. (d) |
| 50. (d) | 51. (c) | 52. (b) | 53. (b) | 54. (b) | 55. (c) | 56. (c) |
| 57. (d) | 58. (a) | 59. (b) | 60. (c) | 61. (b) | 62. (b) | 63. (b) |
| 64. (b) | 65. (c) | 66. (c) | 67. (c) | 68. (c) | 69. (d) | 70. (b) |
| 71. (c) | 72. (b) | 73. (a) | 74. (b) | 75. (b) | 76. (d) | 77. (c) |
| 78. (b) | 79. (d) | 80. (a) | 81. (b) | | | |

Additional Short Questions

Short Answer Questions prepared in the light of new Examination Techniques
(Knowledge, Understanding, Application, Analytical & Conceptual)

1.1

Nutrition and its Importance

1. How our body get nutrients?

Ans. In order to get nutrients our body first broken down the food into simpler parts so the body cells can absorb them. This process happens inside our digestive system.

2. What do you know about nutrition and nutrients?

Ans. **Nutrition:** Nutrition is a process by which living organisms take in food and utilize it.

Nutrients: Nutrients are the chemical substances present in the food that provide energy, support, growth and repair.

3. Why nutrition is important?

Ans. Nutrition helps the organisms to grow, stay healthy and repair their bodies.

4. Name the steps involved in nutrition.

Ans. Nutrition takes place in the following main steps:

- | | | |
|------------------|---------------|-----------------|
| i. Ingestion | ii. Digestion | iii. Absorption |
| iv. Assimilation | v. Egestion | |

5. Define the process ingestion.

Ans. **Ingestion:** Taking in food and drinks through the mouth is called ingestion.

6. What is meant by digestion?

Ans. **Digestion:** Digestion is the process of breaking food into smaller parts so that the body can absorb.

7. Define absorption.

Ans. **Absorption:** Absorption is the process of moving nutrients from the digested food into the blood or lymph.

8. What do you know about assimilation and egestion?

Ans. **Assimilation:** Assimilation is using the absorbed nutrients in cells and tissues.

Egestion: Egestion is the process of removing undigested food and waste from the body.

9. Differentiate between polymers and monomers.

Ans. **Polymers:** Polymers are the larger molecules make up of many repeating monomers linked together.

Examples: Carbohydrates, Proteins and Fats.

Monomers: Monomers is a small, simple molecule that acts as a basic "building block".

Examples: Sugars, amino acids and fatty acids.

1.2

Human Digestive System

10. What is meant by alimentary canal?

Ans. **Alimentary canal:** The human digestive system consists of a long tube called alimentary canal. It starts at the mouth and ends at anus.

11. How accessory organs play their role in alimentary canal.

Ans. The salivary glands, liver and pancreas send their juices into the alimentary canal and aid in digestion.

12. What is the name of the space behind the mouth?

Ans. The space behind the mouth is called oral cavity or mouth cavity.

13. Which biological components in the oral cavity are used for the taste of food?

Ans. Oral cavity contains taste buds on the surface of tongue for the taste of food.

14. What changes takes place during the mechanical digestion?

Ans. During the mechanical digestion of food, the teeth cut and grind food into smaller pieces.

15. What happens during chemical digestion in oral cavity?

Ans. In oral cavity, partial chemical digestion of carbohydrates is done by three pairs of salivary glands. These glands are attached with oral cavity and secrete saliva.

16. State the role of salivary glands in digestion.

Ans. ● Salivary glands produce saliva which is the mixture of water and mucus.

● Salivary glands secrete digestive enzyme salivary amylase which breakdown the starch into maltose.

17. Write down the composition of saliva.

Ans. Saliva: Saliva is a mixture of water, mucus and salivary amylase.

18. What is "bolus" and how is it moved into the pharynx?

Ans. Bolus: The food mass in the oral cavity is called bolus.

- It is swallowed by pushing it into the pharynx.

19. Write down the steps of swallowing.

Ans. • After the bolus formation, the tongue pushes bolus to back of mouth.

- The palate moves upward to close the opening of nasal cavity.
- The tongue moves the bolus into the pharynx.
- The top of the trachea is pushed up against the epiglottis.
- The glottis closes as the epiglottis covers it.
- The swallowed food passes over the closed trachea and enters the esophagus.

20. What is pharynx?

Ans. Pharynx: Pharynx is a short tube like part after oral cavity. It connects oral cavity to esophagus and also connects nose to windpipe (trachea).

21. What is the important function of pharynx?

Ans. An important function of pharynx is to prevent the entry of food particles into the lungs. It is done with the help of epiglottis.

22. Define epiglottis and glottis.

Ans. Epiglottis: Epiglottis is a flap of elastic cartilage tissue located in the pharynx. It prevents the food particles from entering into the wind pipe (trachea).

Glottis: The glottis is the opening of the trachea.

During swallowing, this opening is closed off.

23. Describe the function of epiglottis during swallowing?

Ans. When swallowed food passes through pharynx, the top of trachea (windpipe) is pushed up against epiglottis. In this way, the opening of trachea (glottis) closes and the swallowed food passes over it.

24. State the length of the oesophagus.

Ans. Oesophagus is a long tube (about 25 cm or 9.84 inches long).

25. What is "peristalsis" and how does it facilitate the movement of food to stomach?

Ans. Peristalsis: Peristalsis is the series of successive waves of muscular contraction in the muscular walls of oesophagus.

- When food enters oesophagus, successive, waves of contraction are generated in its muscular walls. These waves move food along the oesophagus to the stomach.

26. Where is the stomach present in human body?

Ans. Stomach is J-shaped organ located in the upper left side of the abdominal cavity below the diaphragm.

27. What is the purpose of cardiac sphincter?

Ans. Cardiac sphincter (lower oesophageal sphincter) prevents food from flowing back from stomach into the oesophagus.

28. How does the stomach contribute the mechanical digestion of food?

Ans. The walls of the stomach are made of thick smooth muscles. When food arrives in stomach, these muscles contract rigorously. Their contraction help in churning (breaking down) of food into smaller pieces. Heat is also produced which helps to melt the lipids.

29. List the three main components of gastric juice.

Ans. Gastric juice contains hydrochloric acid, pepsinogen and mucus.

30. What is the function of mucus?

Ans. The mucus forms a protective layer on the inner walls of stomach. Here it neutralizes the HCl.

31. What is chyme?

Ans. Chyme: Due to the action in stomach, the food becomes a soup-like mixture called chyme.

32. What is the role of pyloric sphincter?

Ans. Pyloric sphincter controls the flow of chyme. Each time the pyloric sphincter opens about 5 to 15 ml of chyme moves into the small intestine.

33. What do you know about small intestine?

Ans. Small Intestine: Small Intestine is highly coiled tube and is nearly 7m (about 23 ft) long. It has three parts:
Duodenum, Jejunum, Ileum.

34. Which two major accessory organs discharge their secretions into the duodenum?

Ans. In duodenum, secretions of liver and pancreas act on food and aid in digestion.

35. State the role of bile in small intestine.

Ans. Bile contains salt which break large fats into small droplets. In this way a milky fluid is formed in which fat droplets are kept separate.

36. Which enzymes are present in pancreatic juice?

Ans. Pancreatic juice contains many enzymes e.g trypsin, pancreatic amylase and lipase.

37. Write down the functions of enzymes present in the pancreatic juice.

Ans. Trypsin: It digest proteins.

Pancreatic Amylase: It digest carbohydrates.

Lipase: It digest lipids.

38. What are the end product of digestion that move into the circulatory system?

Ans. After the complete digestion of food, the end products i.e amino acids, simple sugars, glycerol and fatty acids etc move from alimentary canal into the circulatory system.

39. Define villi and tell how it increases the efficiency of absorption?

Ans. Villi: Villi are millions of tiny finger-like projections found on the highly folded inner walls of the small intestine.

The folds and villi provide a large surface area for the absorption of food.

40. By what two biological processes are food molecules absorbed through the wall of villus?
 Ans. Food molecules are absorbed through the process of diffusion and active transport.
41. What are lacteals and what is their role in digestion?
 Ans. Lacteals: Lacteals are the lymph vessels present in the villi of small intestine.
 Role: They absorb glycerol and fatty acid and transport them.
42. How does amino acids and simple sugars enter the blood stream?
 Ans. Amino acids and simple sugars enter the blood stream by entering into the blood capillaries present in the villi of small intestine.
43. What is the function of hepatic portal vein?
 Ans. Hepatic portal vein carries the amino acids and sugars to liver.
44. How undigested material and water moves to large intestine?
 Ans. The undigested material and water move to large intestine by peristalsis.
45. Name the parts of large intestine.
 Ans. Large intestine has three parts: i. Caecum ii. Colon iii. Rectum
46. What is Faeces? Write their components.
 Ans. Faeces: Faeces are the undigested solidified material formed in large intestine.
 Components: Faeces contain the undigested material, large number of bacteria, broken cells of alimentary canal, bile pigments and water.
47. Where liver is located in human body?
 Ans. Liver: Liver is a large organ located to the right of the stomach.
48. Write down any two function of liver.
 Ans. Functions of liver: (i) Liver stores fat-soluble vitamins.
 (ii) Liver convert ammonia into less toxic urea for excretion through urine.

1.3

Disorders of the digestive system

49. What is diarrhoea? Write down its causes.
 Ans. Diarrhoea: Diarrhoea is characterized by frequent, loose or watery stools. Diarrhoea can lead to dehydration, especially in children and the elderly.
 Causes: Infection (bacterial, viral and parasitic), food allergies, stress, certain medications (e.g. antibiotics) are the causes of diarrhoea.
50. What are the symptoms of diarrhoea?
 Ans. Symptoms: Signs and symptoms of diarrhoea includes frequent, loose or watery stools, abdominal cramps or pain, bloating and dehydration. (thirst, dry mouth, dark urine).
51. What is constipation? Mention any two causes of constipation.
 Ans. Constipation: Constipation is a condition in which faeces are not eliminated from the body at regular intervals.
 Causes: Lack of fibre in diet and lack of physical exercise are the causes.
52. How can constipation be prevented?
 Ans. Prevention: Constipation can be prevented by eating a high-fibre diet and by drinking plenty of fluids.

53. What is meant by peptic ulcer?

Ans. Peptic Ulcer: Peptic ulcers are sores that develop in the walls of alimentary canal.

54. How many types of ulcer are present?

Ans. Gastric ulcer, duodenal ulcer or oesophageal ulcer.

55. How ulcers can be treated?

Ans. Treatment: Antibiotics to clear H.Pylori infection, medicines called antacids and proton pump inhibitors.

Exercise Questions (Solved)



A. Select the correct answers for the following questions.

- The three portions of the small intestine, in the correct order, are:
(a) Duodenum, jejunum, ileum (b) Ileum, duodenum, jejunum
(c) Colon, caecum, rectum (d) Caecum, colon, rectum
- The wavelike movement of muscles that pushes food through the digestive system is called:
(a) Chemical digestion (b) Mechanical digestion
(c) Peristalsis (d) Absorption
- The part of the digestive system where no chemical digestion takes place is:
(a) Oral cavity (b) Oesophagus (c) Stomach (d) Duodenum
- Which group of enzymes breaks up starches?
(a) Proteases (b) Lipases (c) Amylases (d) Pepsin
- The pancreas produces digestive enzymes and releases them into:
(a) Colon (b) Gall bladder (c) Liver (d) Duodenum
- In stomach, pepsinogen is converted into pepsin by the action of:
(a) Bile salts (d) Hormones (c) HCl (d) Bicarbonate
- In which part are the carbohydrates, lipids and proteins digested?
(a) Oral cavity (b) Stomach (c) Small intestine (d) Large intestine
- The enzyme trypsin is found in:
(a) Pancreatic juice (b) Bile (c) Gastric juice (d) Saliva
- The common bile duct carries bile from gall bladder to:
(a) Stomach (b) Duodenum (c) Colon (d) Pancreas
- Why the small intestine has many folds and contains villi and microvilli?
(a) To slow down the passage of food. (b) To promote food absorption.
(c) To prevent the backflow of chyme. (d) To produce enzymes.

Answers

- | | | | | |
|--------|--------|--------|--------|---------|
| 1. (a) | 2. (c) | 3. (b) | 4. (c) | 5. (d) |
| 6. (c) | 7. (c) | 8. (a) | 9. (b) | 10. (b) |

B. Write short answers.

1. State the role of salivary glands in digestion.

Ans. • Salivary glands produce saliva which is the mixture of water and mucus.
• Salivary glands secrete digestive enzyme salivary amylase which breakdown the starch into maltose.

2. What do the terms swallowing and peristalsis mean?

Ans. Swallowing: Swallowing is a process by which food is moved from the oral cavity into the oesophagus.

Peristalsis: Peristalsis is a series of successive waves of muscular contraction.

3. What are the functions of HCl in gastric juice?

Ans. Functions of HCl:

- (i) HCl converts pepsinogen into an active enzyme pepsin.
- (ii) HCl kills pathogenic bacteria present in food.

4. State the role of pancreatic juice contribute in food.

Ans. Role of pancreatic juice:

- (i) Pancreatic juice contains enzymes trypsin, pancreatic amylase and lipase that digest proteins, carbohydrates and fats/lipids respectively.
- (ii) Pancreatic juice contains sodium bicarbonate that neutralize the acidity of chyme.

5. Write a brief note on the structure of villi.

Ans. Villi: Villi are millions of tiny finger-like projections found on the highly folded inner walls of the small intestine.

The folds and villi provide a large surface area for the absorption of food.

6. What are the causes and symptoms of ulcers?

Ans. Symptoms: Burning stomach pain, rush of saliva after regurgitation, loss of appetite, weight loss and blood vomiting are the symptoms of ulcer.

Causes: Infection due to *Helicobacter pylori* bacteria, long term use of non steroidal anti-inflammatory drugs (NSAIDs), excessive alcohol consumption, smoking, stress (though not a direct cause, it can make symptoms worse) are the causes of ulcers.

C. Write answers in detail.

1. Describe the absorption of food in small intestine.

Ans. For answer See Question. No. 8

2. Explain the role of oral cavity in the digestive system.

Ans. For answer See Question. No. 3

3. Explain the structure and functions of stomach.

Ans. For answer See Question. No. 6

4. Justify the importance of liver and pancreas in digestion.

Ans. Role of liver: For answer See Question. No. 40

Role of Pancreas:

● **Secretion of pancreas:** The secretion of pancreas i.e. pancreatic juice enters duodenum through pancreatic duct, which joins the common bile duct before entering duodenum.

● **Enzymes of pancreatic juice:** Pancreatic juice contains many enzymes e.g.

- (i) Trypsin (ii) Pancreatic amylase (iii) Lipase

These enzymes digest proteins, carbohydrates and lipids respectively. Pancreatic juice also contains sodium bicarbonate that neutralizes the acidity of chyme. The glands present in the walls of small intestine also secrete enzymes for the complete digestion of all types of food.

D. Inquisitive Questions:

1. Why does someone with liver disease have difficulties in digesting fats?

Ans. A person with liver disease has trouble in digesting fats because the liver is responsible for producing bile. Bile helps in the digestion of fats. In liver disease, bile production is reduced, so fats are not digested properly.

2. Why is it important to maintain a healthy balance of gut bacteria?

Ans. Maintaining a healthy balance of gut bacteria is important because a healthy balance of gut bacteria helps in proper digestion of food and prevent the growth of harmful microorganisms in the intestine.

3. How can a malfunction in the cardiac sphincter lead to acid reflux?

Ans. The cardiac sphincter is a ring of muscles at the junction of the oesophagus and the stomach. Its role is to prevent food and stomach acid from flowing back into the oesophagus. If it malfunctions or fails to close properly, the highly acidic gastric juice (HCl) moves upward into the oesophagus, causing burning sensation known as acid reflux.

4. Why is it necessary to store bile in the gallbladder before it is released?

Ans. The gallbladder acts as storage reservoir so that bile can be concentrated and released in large amount specifically when chyme enters in small intestine. This ensure there is enough bile available to immediately neutralize the acidic chyme from the stomach and begins the emulsification of fats effectively.
