

Unit 9: Human Digestive System

Short Questions

SHORT ANSWER QUESTIONS EXERCISE

Q1. What is the main function of the digestive system?

Ans. Function of digestive system is to break down food into smaller and absorbable components.

Q2. What is the mode of action of saliva in mouth?

Ans. Saliva has following actions.

1. It moistens and lubricates food.
2. Bicarbonate ions kill microorganisms.
3. Salivary amylase partly digests the polysaccharides (starch and glycogen) to disaccharide (maltose).

Q3. What is role of tongue in the mouth?

Ans. During swallowing the tongue moves upwards and backwards against the roof of the mouth. With this bolus is pushed to the back of the mouth and is swallowed through the pharynx.

Q4. What role does the epiglottis play during swallowing?

Ans. During swallowing the epiglottis closes the opening of trachea. In this way bolus passes over the trachea and enters oesophagus.

Q5. What is the composition of gastric juice?

Ans. Gastric juice contains

1. **Mucous** secreted by mucous cells.
2. **Hydrochloric acid** by parietal (oxyntic) cells.
3. Enzyme **pepsinogen** by chief cells.

Q6. Why is hydrochloric acid (HCl) important in the stomach?

Ans. Hydrochloric acid is important in following ways.

1. It adjusts the pH of stomach content to about 2-3.
2. It softens the food.
3. It activates the pepsinogen.
4. It kills the microorganisms.

Q7. What is the difference between bolus and chyme?

Ans. 1. Bolus: After mechanical and chemical digestive processes in the oral cavity food mass is in the form of a small moist mass called bolus.

2. Chyme: About three to four hours after a meal the stomach contents have been sufficiently mixed into a semi-liquid mass called chyme.

Q8. Which organ produces bile, and what is its function?

Ans. Bile is secreted by liver. It contains salts which emulsify fats and break them into small droplets (emulsion) this provides large surface area for effective action of lipids digesting enzymes.

Q9. Differentiate between physical and chemical digestion.

Ans. Physical (mechanical) digestion: In this ingested food is physically broken down by the teeth through a process called mastication. This converts food into smaller pieces thus increasing the surface area for enzymatic action.

Chemical digestion: It is process of breaking down large insoluble food

molecules into smaller, soluble molecules using enzymes e.g. conversion of starch into maltose by enzyme amylase.

Q10. What do you understand by emulsification of fats?

Ans. During emulsification, fats are broken down into small droplets. These droplets provide large surface areas for effective action of lipid digesting enzymes.

Q11. What is the role of the pyloric sphincter in digestion?

Ans. Pyloric sphincter is a muscular valve at the bottom of stomach. It regulates the release of chyme from the stomach to the small intestine.

Q12. How do villi and microvilli help in nutrient absorption?

Ans. Each villus is richly supplied with blood capillaries and lymphatic vessels. These are covered by single cell thick epithelium. The epithelial cells of villi have countless cytoplasmic projection called microvilli. The total surface area of absorption becomes extraordinarily large due to villi and microvilli.

Q13. What are the main functions of the large intestine?

Ans. Following are the main functions of large intestine.

- i. It is involved in the absorption of water, salts and vitamin K.
- ii. Many bacteria live and divide in this large intestine (colon). They produce amino acids and vitamin K, necessary for coagulation of blood.

Q14. What causes jaundice in the digestive system?

Ans. When bile pigments are prevented from leaving the digestive tract, they may accumulate in blood causing a condition known as jaundice.

Q15. How does stress negatively impact digestion?

Ans. Stress impacts digestion by

- (i) Decreased production of digestive enzymes.
- (ii) Slowing down the process, i.e. slow gut motility.

(iii) Increasing stomach acid due to release of stress hormones like cortisol.

(iv) Cause entering of bacteria into blood stream.

(v) Increased gas production or diarrhoea.

SLO BASED SHORT QUESTION ANSWERS

Anatomy and Physiology of Digestive System

Q16. Give parts of digestive system of man.

Ans. Following are the parts of digestive system of man.

- a) Gastrointestinal tract (GI)
- b) Accessory digestive organs i.e. liver and pancreas, gall bladder and salivary glands.

Q17. Define GI tract and accessory digestive organs.

Ans. The GI tract is a continuous tube that extends from mouth to anus. It includes oral cavity, pharynx, oesophagus, stomach, small intestine and large intestine. The accessory digestive organs include the salivary glands, liver, gallbladder and pancreas.

Q18. Define mastication. Write its role in digestion.

Ans. It is also known as chewing. In this process the food is broken down into smaller and more manageable pieces by using teeth. Mastication increase the surface area of food for enzymatic action.

Q19. Name three pairs of salivary glands. Give composition of saliva.

Ans.

- i. Sublingual glands
- ii. Sub maxillary glands
- iii. Parotid gland

Composition of saliva: Saliva is composed of following components.

- Water and mucous

- Bicarbonate and thiocyanate ions

- Salivary amylase (enzyme)

Q20. Digestion is crucial for converting food into energy. Comment.

Ans. Digestion is crucial for converting food into energy and raw materials required for growth, repair and maintenance of body functions. It supports the immune system, provides essential nutrients and ensures overall health. Efficient digestion prevents nutrient deficiencies, supports metabolism and maintains energy levels, making it vital for sustaining life.

Q21. What is bolus? In which part of respiratory system it is produced?

Ans. Bolus is a soft and moist mass of chewed food, which is produced after mastication due to physical and chemical digestion of food in oral cavity.

★Q22. Is swallowing action voluntary or involuntary action.

Ans. The beginning of the swallowing action is voluntary but once the bolus reaches the back of the mouth, swallowing becomes involuntary.

Q23. What is function of epiglottis.

Ans. During swallowing epiglottis closes the opening of trachea. In this way bolus passes over the trachea and enters the oesophagus.

Q24. What are lips? Give their functions.

Ans. 1. Lips: Lips are made of highly vascularized (with blood vessels) skeletal

muscle tissues and many sensory nerve endings.

2. Functions of Lips

- i. Lips help to retain food as is being chewed.
- ii. They also play a role in phonation of sound (it means to control airflow and shaping the vocal tract to produce sounds).

Q25. Define peristalsis.

Ans. It is rhythmic sequence of waves of contraction in the smooth muscles of the walls of alimentary canal. Peristalsis squeeze the food down along oesophagus and other parts of alimentary canal.

Q26. What is meant by segmentation?

Ans. The contraction and relaxation of the rings of smooth muscles in small and large intestine is called segmentation. This creates back and forth movement in the same place. This movement mixes the food with digestive secretions and improves absorption.

Q27. What is antiperistalsis?

Ans. The reverse movements of peristalsis are called antiperistalsis. In this food is pushed from intestine back into the stomach and oral cavity, leading to vomiting.

Q28. What is hunger pang?

Ans. It is an uncomfortable sensation created by peristaltic movements triggered by low blood glucose levels.

★Q29. What is pyrosis or heartburn?

Ans. Sometimes there is a back flush of acidic chyme from stomach into the oesophagus. It causes a painful burning sensation in the chest. This is called heart burn.

Q30. Name three portions of stomach.

- Ans.**
1. Cardiac portion
 2. Fundus portion
 3. Pyloric portion

Q31. Give composition of middle layer of stomach.

Ans. The middle layer of stomach is made of smooth muscles. There are three layers of these muscles.

1. Outer longitudinal muscles.
2. Middle circular muscles.
3. Inner oblique muscles.

Q32. Give composition of gastric glands.

Ans. Each gastric gland contains epithelial cells and three secretory cell.

1. **Mucous cells** – which secrete mucous.
2. **Parietal cells** – which secrete hydrochloric acid.
3. **Chief cells** – which secrete enzyme pepsinogen.

Q33. What do you know about Rennin?

Ans. In infants, the gastric juice contains large amounts of rennin enzyme. This enzyme coagulates milk proteins and delays the passage of milk into small intestine. This helps other enzymes to digest milk proteins.

Q34. What is chyme and pyloric sphincter?

Ans. Chyme is a semi-liquid acidic mass formed after three to four hours after a meal. **Pyloric sphincter** is located between pyloric end of stomach and duodenum. It controls the release of chyme into the small intestine.

★Q35. How mucosa of stomach is protected?

Ans. The mucosa of stomach can get damaged by hydrochloric acid and pepsin. So mucosa is protected in two ways.

1. By coating of viscous mucous.
2. Bicarbonate ions which neutralize acid.

Q36. Name the hormones secreted by stomach. Also write its function.

Ans. Gastrin is the hormone secreted by stomach. It is carried by blood to gastric

glands where it stimulates them to produce and secrete more gastric juice.

Q37. What is pancreatic juice? Write the names of enzymes present in it.

Ans. It is the secretion of pancreas and is poured into duodenum. It is slightly alkaline (pH 8) due to presence of bicarbonate. It neutralizes the acidity of chyme. The important enzymes in pancreatic juice are:

(i) **Pancreatic amylase** which digests polysaccharides into maltose and even glucose.

(ii) **Trypsinogen** which is in inactive form. Another enzyme **enterokinase** (secreted by the walls of duodenum) activates trypsinogen into trypsin which digests proteins into polypeptides.

(iii) **Chymotrypsin and carboxypeptidase**, which digest proteins into smaller peptides and then into amino acids.

(iv) **Pancreatic lipase** which digests lipids to glycerol and fatty acids.

(v) **Pancreatic nucleases** which digest DNA and RNA into nucleotides.

★Q38. What is jaundice?

Ans. If bile pigments are prevented from leaving digestive tract, they may accumulate in blood, causing a condition known as jaundice.

Q39. Write function of enterokinase.

Ans. It converts inactive trypsinogen into active trypsin, which digest proteins into smaller peptides and then into amino acids.

Q40. Give composition and action of bile.

Ans. Bile contains salts, water and bilirubin pigment. Its function is emulsification of fats.

Q41. Differentiate between chyme and chyle.

Ans. **Chyme** is a semi-liquid acidic mass formed in stomach after three to four hours of meal. While **chyle** is the chyme converted

into alkaline emulsion by the action of intestinal juice.

Q42. Differentiate between villi and microvilli and give their significance.

Ans. Villi are the finger like projections present on the folds on inner side of wall of jejunum and ileum. Epithelial cells of villi have many cytoplasmic projections called microvilli.

Q43. What is lacteal? Give its function.

Ans. It is a small lymphatic vessel found in the villi of small intestine. It absorbs fats and fat-soluble vitamins.

★Q44. What is significance of villi and microvilli?

Ans. They increase the total surface area of absorption. Due to presence of folds and numerous villi, the internal surface of jejunum and ileum appears velvety.

Q45. What are chylomicrons?

Ans. The products of fat digestion i.e. fatty acids and glycerol are absorbed into epithelial cells of villi. Here they combine to form triglycerides. The triglycerides are coated with proteins to form small droplets called chylomicrons.

Q46. What is appendix?

Ans. Caecum is a blind sac that projects from the area of large intestine between ileum and colon. From the blind end of caecum there arises a finger-like process called vermiform appendix. In human digestive system appendix performs no function so it is vestigial (non-functional).

★Q47. What is appendicitis and appendectomy?

Ans. **Appendicitis** is the inflammation of the appendix. It is usually due to bacterial infection. The infected appendix must be removed surgically otherwise it may burst and inflammation may spread in entire living of abdomen. The surgical removal of appendix is called **appendectomy**.

Q48. What is composition of Faeces?

Ans. Faeces contains large number of bacteria, indigestible plant fibers, undigested food stuff, sloughed off mucosal cells, bile pigments and water.

Q49. Name parts of large intestine and their function.

Ans.

1. **Caecum:** It helps in absorption of water and electrolytes.
2. **Colon:** It absorbs water and maintain electrolyte balance and formation of faeces.
3. **Rectum:** It stores faeces temporarily.

Q50. Name the portions of pancreas.

Also write their secretions.

Ans. It has exocrine and endocrine portions. The **exocrine** (ducted) portion secretes its secretion i.e., pancreatic juice into pancreatic duct. Pancreatic juice contains enzymes for the digestion of all groups of food. Its major enzymes include trypsin, chymotrypsin, lipases, amylases, nucleases etc. The **endocrine** (ductless) portion of pancreas secretes its secretion i.e., insulin and glucagon hormones into extracellular fluid from where they diffuse into nearby capillaries.

★Q51. How gall stones are formed?

Ans. Cholesterol secreted by the liver, may precipitate in the gall bladder to

produce gall stones which may block release of bile.

Q52. Give functions of secretin and cholecystokinin.

Ans. Both these hormones stimulate pancreas to release pancreatic juice and gall bladder to release bile.

Q53. Describe the role of liver in the storage of nutrients.

Ans. The liver performs many important functions, especially in storing nutrients and regulating metabolism. It stores excess nutrients from the food and releases them when the body needs energy or building materials. These nutrients stored in the liver include glucose (stored as glycogen), vitamins (like A, D, B12, and K), minerals (e.g., iron and copper) and fats and fat-soluble substances.

Q54. Liver play role in metabolism. Justify.

Ans. It helps in breaking down, building up, and converting substances in the body. For example, it converts excess glucose into glycogen and back when needed. It also breaks down fats to produce energy and forms cholesterol and lipoproteins. It converts amino acids and removes harmful ammonia by turning it into urea, which is excreted in urine. It breaks down and removes toxins, drugs and alcohol from the blood. The liver also helps in breaking down and regulating hormones.

LONG QUESTIONS (EXERCISE)

Q1. Explain the complete process of digestion, starting from ingestion in the mouth to egestion in the large intestine. Include the roles of mechanical and chemical digestion at each stage.

Ans. See Q1. of theory.

Q2. Describe the structure and function of the stomach in digestion.

Ans. See Q4. of theory.

Q3. Compare and contrast the roles of the small intestine and large intestine in digestion.

Ans. See Q5. and Q7. of theory.

Q4. Explain the absorption of food from the small intestine?

Ans. See Q6. of theory.

Q5. Discuss accessory organs (liver, gallbladder and pancreas) and their contributions in digestion.

Ans. See Q9., Q10. and Q11. of theory.

Q6. Describe the hormonal and nervous regulation of gastric acid secretion.

Ans. See Q12. of theory.

INQUISITIVE QUESTIONS

Q.1 Why does the small intestine need both peristalsis and segmentation?

Ans. Because peristalsis squeezes the food down the gastrointestinal tract. While in segmentation contractions and relaxation of rings of smooth muscles mixes the food with digestive secretion and increase the efficiency of absorption as well.

Q.2 How does the liver help digestion without using enzymes?

Ans. Liver helps in digestion by production of bile. Bile contains salts which emulsify fats and break them into small droplets. These droplets provide large surface areas for effective action of lipids digesting enzymes.

Q.3 Why do we need bile if we already have enzymes for fat digestion?

Ans. Fats are insoluble in water. So they cannot be attacked readily by lipase (fat digesting enzymes) of pancreatic juice. Also the bile salts act as detergent molecules they break fats into droplets and keep them separate from one another.

Q.4 How does the pancreas “know” when to release its enzymes?

Ans. Secretin and cholecystokinin (CCK) hormones released by duodenal stimulate pancreas to release pancreatic juice and gallbladder to release bile.

Q.5 Why are pancreatic secretions alkaline, not acidic?

Ans. Pancreatic secretions are alkaline, not acidic because;

1. To neutralize the acidic chyme from the stomach.
2. Creating an optimal environment for pancreatic enzymes to function effectively.