

Chapter-16

DIGESTION AND ABSORPTION

POINTS TO REMEMBER

Digestion : The process in alimentary canal by which the complex food is converted mechanically and biochemically into simple substances suitable for absorption and assimilation.

Food : A substance which on taken and digested in the body provides materials for growth, repair, energy, reproduction, resistance from disease or regulation of body processes.

Thecodont : The teeth embedded in the sockets of the jaw bone. *e.g.*, in mammals.

Diphyodont : The teeth formed twice in life time *e.g.*, in mammals.

Dental formula of man :

$32 = 2 \times$	I	C	PM	M		
	2	1	2	3		Lower Jaw
	2	1	2	3		Upper Jaw

Peristalsis : The involuntary movement of the gut by which the food bolus is pushed forward.

Deglutition : The process of swallowing of food bolus. It is partly voluntary and partly involuntary.

Ruminants : The herbivours animals (*e.g.*, cow, buffalo etc.) which have symbiotic bacteria in the rumen of their stomach which synthesize enzymes to hydrolyse cellulose into short chains fatty acids.

Diarrhoea : The abnormal frequent discharge of semisolid or fluid faecal matter from the bowel.

Vomitting : The ejection of stomach contents through the mouth, caused by antiperistalsis.

Dysentery : Frequent watery stools often with blood and mucus and with pain, fever and causes dehydration.

Chyme : The semifluid mass into which food is converted by gastric secretion and which passes from the stomach into the small intestine.

Hepatic - Anything associated with liver is given a prefix 'hepatic'.

Gastric - Anything associated with stomach is given a prefix 'gastric'.

Proenzyme - The inactive forms of enzymes.

Sphincter - A flap like structure at various junctions of the alimentary canal which facilitates one way traffic in the alimentary canal.

Bolus - The masticated food mixed with saliva.

Goblet cells : The cells of intestinal mucosal epithelium which secrete mucus.

Glisson's capsule : The connective tissue sheath which covers the hepatic lobules of liver.

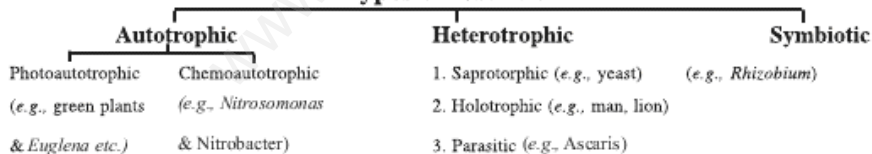
Hepatic lobules : The structural and functional units of liver containing hepatic cells which are arranged in the form of cords.

Sphincter of Oddi : The sphincter which guard the opening of common hepato-pancreatic duct.

Villi : The small finger-like folding in the innermost layer of the alimentary canal which increase the absorpion surface area.

PEM : Protein Energy Malnutrition.

Types of Nutrition



Basic steps of Holozoic Nutrition :

- (1) **Ingestion** : Intake of food.
- (2) **Digestion** : Breaking down of complex organic food materials into simpler, smaller soluble molecules.
- (3) **Absorption and assimilation** : Absorption of digested food into blood or lymph and its use in the body cells for synthesis of complex components.
- (4) **Egestion** : Elimination of undigested food as faeces.

Digestive glands :

(A) **Salivary glands** (found in mouth). Three types are : (i) Parotid, (Cheek)
(ii) (Below the tongue) Sublingual, (iii) Submaxillary or sub-mandibular
(lower jaw)

Secrete saliva which contains ptyalin (Salivary Amylase)

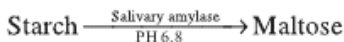
(B) **Pancreas** : Secretes pancreatic juice.

(C) **Liver** : Secretes bile.

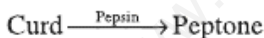
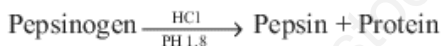
(D) **Gastric glands** : Secretes gastric juice.

(E) **Intestinal glands** : Secretes intestinal juice or succus entericus.

Digestion in mouth : Saliva contains enzyme Ptyalin. (Salivary Amylase)



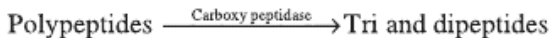
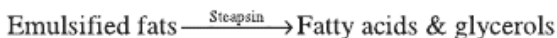
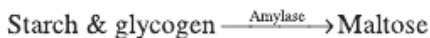
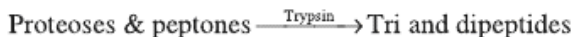
Digestion in stomach : Gastric juice contains HCl and enzymes pepsin, rennin and gastric lipase.



Digestion in small intestine : Liver secretes bile.



Pancreatic juice contains trypsin.



Functions of succus entericus :

Dipeptides $\xrightarrow{\text{Dipeptidases}}$ Amino acids

Maltose $\xrightarrow{\text{Maltase}}$ Glucose + Glucose

Lactose $\xrightarrow{\text{Lactase}}$ Glucose + Galactose

Sucrose $\xrightarrow{\text{Sucrase}}$ Glucose + Fructose

Nucleotides $\xrightarrow{\text{Nucleotidase}}$ Nucleosides $\xrightarrow{\text{Nucleosidases}}$ Sugars + Bases

Di and monoglycerides $\xrightarrow{\text{Lipases}}$ Fatty acids + Glycerol

QUESTIONS**Very Short Answer Questions (1 mark each)**

1. What do you mean by the term malnutrition ?
2. Name the hardest substance in the body.
3. What is a lacteal ?
4. Name the small projections, found on the upper surface of tongue.
5. Mention the function of epiglottis.
6. Write the names of major parts of stomach.
7. Name the enzyme that digest fats. Mention the end products of fat digestion.
8. In which part of alimentary canal does absorption of water, simple sugars and alcohol takes place ?
9. Why are proteases generally released in inactive form ?
10. Trypsinogen is an inactive enzyme of pancreatic juice. An enzyme, enterokinase, activates it. Which tissue/cell secrete the enzyme ? How is it activated ?
11. What is the role of insulin ?

Short Answer Questions-II (2 marks each)

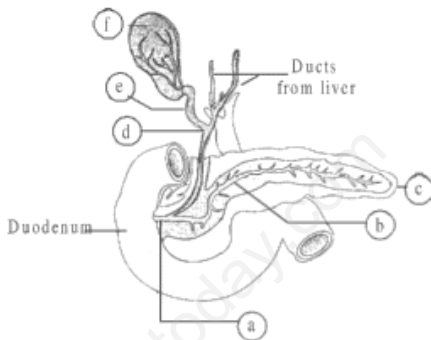
12. What is emulsification ? Where and how does it occur ?
13. Name three parts of large intestine. Which vestigial organ arises from the first part of it ?
14. Name the gland which perform/acts as exocrine and endocrine. Also name the products which are secreted by it.
15. The wall of alimentary canal is made up of four layers. Give the names of these four layers

16. In which part of the digestive system the absorption of following substances takes place ?

- (a) Certain drugs (b) Glucose, fructose and fatty acids
(c) Water, some minerals and drugs (d) Simple sugar and alcohol

Short Answer Questions-I (3 marks each)

17. In the following diagram of duct system of liver, gall bladder and pancreas, label *a, b, c, d, e* and *f*:



18. Give a diagrammatic representation of transverse section of gut.

19. Draw the sketch of anatomical regions of human stomach and label any four parts in it.

20. How does the nervous system control the activities of gastro-in-testinal tract?

Long Answer Questions (5 marks each)

21. Draw a labelled figure of digestive system of human.

22. Give a summary of cause and symptoms of following disorders of digestive system:

- (a) Jaundice (b) Vomiting
(c) Diarrhoea (d) Constipation
(e) Indigestion

ANSWERS

Very Short Answers (1 mark)

1. The state of health due to improper intake of food or nutrients. It covers both undernutrition as well as overnutrition.

2. Enamel

3. Lymph vessel found in villi.

5. Prevention the entry of food into the glottis.
6. Cardiac, fundic, pyloric.
7. Lipase, fatty acids and glycerol.
8. Stomach
9. If released in active form, they will start digesting the membranes and muscular walls of the alimentary canal.
10. Intestinal mucosa.



11. Metabolism of sugar

Short Answers Questions-II (2 marks)

12. The process of breakdown of large fat droplets into smaller ones. It occurs in small intestine. It is brought about by bile salts through reduction of surface tension of large fat droplets.
13. Caecum, colon and rectum. Vermiform appendix.
14. Pancreas. Exocrine secretion is pancreatic juice containing enzymes and exocrine secretions are hormones : insulin and glucagon.
15. Serosa, muscularis, submucosa and mucosa.
16. (a) Mouth (b) Small intestine (c) Large intestine (d) Stomach

Short Answers Questions-I (3 marks)

17. Refer Fig. 16.6, Page no. 261 (NCERT Text Book , Class XI Biology).
18. Refer Fig. 16.4, Page no. 260 (NCERT Text Book , Class XI Biology).
19. Refer Fig. 16.3, Page no. 259 (NCERT Text Book, Class XI Biology).
20. Refer page 264 (NCERT Text Book, Class XI- Biology)

Long Answers (5 marks)

21. Refer Fig. 16.1, Page no. 258 (NCERT Text Book, Class XI Biology).
22. Refer Page no. 265-266 (NCERT Text Book, Class XI Biology).