

**MULTIPLE CHOICE QUESTIONS**

1. Which of the following is not true of intestinal villi?

- a. They possess microvilli
- b. They increase the surface area
- c. They are supplied with capillaries and the lacteal vessels
- d. They only participate in digestion of fats

**Solution:**

Option (d) is the answer.

2. Hepato-pancreatic duct opens into the duodenum and carries

- a. Bile
- b. Pancreatic juice
- c. Both bile and pancreatic juice
- d. Saliva

**Solution:**

Option (c) is the answer.

3. Which of the following is not a common disorder associated with the digestive system?

- a. Tetanus
- b. Diarrhoea
- c. Jaundice
- d. Dysentery

**Solution:**

Option (a) is the answer.

4. A gland not associated with the alimentary canal is

- a. Pancreas
- b. Adrenal
- c. Liver
- d. Salivary glands

**Solution:**

Option (b) is the answer.

5. Match the two columns and select the correct among options given

Column I	Column II
A. Biomacromolecules of food	i. Alimentary canal and associated gland
B. Human digestive system	ii. Embedded in jawbones.
C. Stomach	iii. The outer wall of visceral organs
D. Thecodont	iv. Converted into simple substances
E. Serosa	v. J-shaped bag-like structure

Options:

- a. A-ii, B-i, C-v, D-iii, E-iv
- b. A-iv, B-i, C-v, D-ii, E-iii
- c. A-i, B-ii, C-iii, D-iv, E-v
- d. A-i, B-iii, C-ii, D-iv, E-v

**Solution:**

Option (b) is the answer.

**6. Match the two columns and select the right one among options given**

Column I	Column II
A. Duodenum	i. A cartilaginous flap
B. Epiglottis	ii. Small blind sac
C. Glottis	iii. 'U' shaped structure emerging from the stomach
D. Caecum	iv. Opening of windpipe

**Options**

- a. A-i, B-ii, C-iii, D-iv
- b. A-iv, B-iii, C-ii, D-i
- c. A-iii, B-i, C-iv, D-ii
- d. A-ii, B-iv, C-i, D-iii

**Solution:**

Option (c) is the answer.

**7. Match the enzyme with their respective substrate and choose the right one among options given**

Column I	Column I	Column II
A. Lipase	i.	Carbohydrates
B. Nuclease	ii.	Fats
C. Carboxypeptidase	iii.	Nucleic acids
D. Glycosidases	iv.	Proteins, peptones and proteoses

**Options:**

- a. A-ii, B-iii, C-i, D-iv
- b. A-iii, B-iv, C-ii, D-i
- c. A-iii, B-i, C-iv, D-ii
- d. A-ii, B-iii, C-iv, D-i

**Solution:**

Option (d) is the answer.

**8. The dental formula in human beings is**

- a. 3 2 2 3  
3 2 2 3
- b. 2 1 2 3  
2 1 2 3
- c. 1 2 3 2  
1 2 3 2
- d. 2 2 3 3  
2 2 3 3

**Solution:**

Option (b) is the answer.

**9. The liver is the largest gland and is associated with various functions. Choose which is not correct from the following.**

- a. Metabolism of carbohydrate
- b. Digestion of fat
- c. Formation of bile
- d. Secretion of a hormone called gastrin

**Solution:**

Option (d) is the answer.

**10. Mark the right statement among the following**

- a. Trypsinogen is an inactive enzyme
- b. Trypsinogen is secreted by intestinal mucosa
- c. Enterokinase is secreted by pancreas
- d. Bile contains trypsin

**Solution:**

Option (a) is the answer.

**VERY SHORT ANSWER TYPE QUESTIONS**

**1. The food mixes thoroughly with the acidic gastric juice of the stomach by the churning movements of its muscular wall. What do we call the food then?**

**Solution:**

The food mixes thoroughly with the acidic gastric juice of the stomach by the churning movements of its muscular wall and is called the chyme.

**2. Trypsinogen is an inactive enzyme of pancreatic juice. An enzyme, enterokinase, activate it. Which tissue/ cells secrete this enzyme?/ How is it activated?**

**Solution:**

Enterokinase is secreted by the intestinal mucosa. The Trypsinogen is activated by Enterokinase into active trypsin.

**3. In which part of the alimentary canal does absorption of water, simple sugars and alcohol take place?**

**Solution:**

Absorption of water, simple sugars, and alcohol etc. take place in the stomach part of the alimentary canal.

**4. Name the enzymes involved in the breakdown of nucleotides into sugars and bases?**

**Solution:**

Nucleotidases and Nucleosidases are the enzymes involved in the breakdown of nucleotides into sugars and bases

**5. Define digestion in one sentence****Solution:**

Digestion is the process of conversion of complex food substances to simple absorbable forms.

**6. What do we call the type of teeth attached to jawbones in which each tooth is embedded in a socket of jaws bones?****Solution:**

Thecodont is the type of teeth attached to jawbones in which each tooth is embedded in a socket of jaws bones

**7. The stomach is located in the upper-left portion of the abdominal cavity and has three major parts. Name these three parts.****Solution:**

The three major parts are Cardiac portion, Fundic region and pyloric portion.

**8. Does gall bladder make bile?****Solution:**

No, gall bladder does not produce bile. Gall bladder only stores and concentrates bile.

**9. Correct the following statements by deleting one of the entries (given in bold).**

**a. Goblet cells are located in the intestinal mucosal epithelium and secrete chymotrypsin/mucus.**

**b. Fats are broken down into di- and monoglycerides with the help of amylase/ lipases.**

**c. Gastric glands of stomach mucosa have oxyntic cell/chief cells which secrete HCl.**

**d. Saliva contains enzymes that digest starch /protein.**

**Solution:**

a) Goblet cells are located in the intestinal mucosal epithelium and secrete mucus.

b) Fats are broken down into di- and monoglycerides with the help of lipases.

c) Gastric glands of stomach mucosa have an oxyntic cell which secretes HCl.

d) Saliva contains enzymes that digest starch.

**SHORT ANSWER TYPE QUESTIONS****1. What is the pancreas? Mention the major secretions of the pancreas that are helpful indigestion.****Solution:**

The pancreas is an organ which is located between the limbs of U shaped duodenum. It is a compound elongated organ. The exocrine portion secretes an alkaline pancreatic juice containing enzymes and the endocrine portion secretes hormones, insulin and glucagon.

**2. Name the part of the alimentary canal where major absorption of digested food takes place. What are the absorbed forms of different kinds of food materials?****Solution:**

Small intestine is the part of the alimentary canal where major absorption of the digested food takes place. Amino acids, carbohydrates like glucose, fructose, fatty acids and glycerol are the various forms of absorbable types of food forms.

**3. List the organs of the human alimentary canal and name the major digestive glands with their location.****Solution:**

The mouth is the first human alimentary canal and followed by oral cavity. Then it will lead to the short pharynx then oesophagus and followed by the stomach. There are two parts in the stomach which is small intestine and large intestine. The last part is the anus. The digestive glands associated with the alimentary canal are:

- Salivary glands which are present in the mouth
- Gastric glands which are present in the stomach
- The liver is next to the stomach and located in the abdominal cavity just below the diaphragm
- The pancreas is situated below the stomach. It is located between the limbs of the 'C'-shaped duodenum

**4. What is the role of the gall bladder? What may happen if it stops functioning or is removed?****Solution:**

The role of the gall bladder is that it stores and concentrates bile juice secreted by the liver it also releases the bile juice. If the gall bladder is removed or if it stops functioning, the bile juice will directly move to the small intestine.

**5. Correct the statement given below by the right option shown in the bracket against them**

- a. Absorption of amino acids and glycerol takes place in the. (small intestine/ large intestine)
- b. The faeces in the rectum initiate a reflex causing an urge for its removal. (neural /hormonal)
- c. Skin and eyes turn yellow in infection. (liver /stomach)
- d. Rennin is a proteolytic enzyme found in gastric juice in (infants/adults).
- e. Pancreatic juice and bile are released through. (intestine pancreatic/ hepatopancreatic duct)
- f. Dipeptides, disaccharides and glycerides are broken down into simple substances in the region of the small intestine. (jejunum/ duodenum)

**Solution:**

- a. Absorption of amino acids and glycerol takes place in the small intestine.
- b. The faeces in the rectum initiate a neural reflex causing an urge for its removal.
- c. Skin and eyes turn yellow in liver infection.
- d. Rennin is a proteolytic enzyme found in gastric juice in infants.
- e. Pancreatic juice and bile are released through the hepatopancreatic duct.
- f. Dipeptides, disaccharides and glycerides are broken down into simple substances in the region of the small intestine called the jejunum.

**6. What are the three major types of cells found in the gastric glands? Name their secretions.****Solution:**

- i. Mucous Neck cells – they secrete mucus
- ii. Peptic or chief cells – they secrete Proenzyme Pepsinogen and Prorennin
- iii. Parietal or oxyntic cells – they secrete HCl and intrinsic factor.

**7. How is the intestinal mucosa protected from the acidic food entering from the stomach?****Solution:**

The mucus and bicarbonates help and protect the mucosal epithelium from excoriation of the secreted hydrochloric acid in a higher concentration. They provide an alkaline medium also.

**8. How are the activities of the gastro-intestinal tract regulated?****Solution:**

They are regulated by a neural system and hormonal system and are connected by many intrinsic and extrinsic nerves. This helps in the proper functioning of the different parts of the alimentary canal.

**9. Distinguish between constipation and indigestion. Mention their major causes.****Solution:**

Constipation, the faeces are retained within the rectum and the bowel movement occurs regularly.

Indigestion, the food which consumed will not get digested properly leading to a feeling of fullness.

The causes of constipation are the fewer intakes of water and roughage in the diet whereas indigestion is caused by the inadequate enzyme secretion, anxiety and food poisoning.

**10. Describe the enzymatic action on fats in the duodenum.****Solution:**

Fats (lipases) → Diglycerides → Monoglycerides

Intestinal lipases act on di-monoglycerides and convert into fatty acids and glycerol.

Diglycerides and monoglycerides in the presence of lipases gets converted into fatty acid and glycerol.

**LONG ANSWER TYPE QUESTIONS****1. A person had roti and dal for his lunch. Trace the changes in those during its passage through the alimentary canal.****Solution:**

1. Roti and dal are chewed in the mouth which is the first part of the alimentary canal. Then it became a semisolid paste and mixed with saliva. The enzyme called salivary amylase is present in the saliva which helps in the digestion of starch to maltose.

2. The oral cavity then leads into short pharynx followed by oesophagus and stomach. The semisolid food with salivary amylase passes through this path without any reaction and reaches the stomach.

3. HCl is present in the stomach which is mixed with the food and thus kills the germs left in the food. It also makes the pH food to acidic so that pepsin acts optimally. Protein + pepsin → Peptones + Proteoses

3. The pancreas releases pancreatic juice on the way. The pancreatic juice contains pancreatic amylase.

Pancreatic juice also contains Chymotrypsin which helps in digestion of peptones and proteoses

Intestinal juice contains various enzymes which help in digestion of all the nutrients.

After all the nutrients are converted into simple substances, these are absorbed by small intestine walls.

**2. What are the various enzymatic types of glandular secretions in our gut helping digestion of food? What is the nature of end products obtained after complete digestion of food?****Solution:**

Secretion from gastric glands

Secretions in Liver

Secretions from the small intestine

The nature of end products obtained after complete digestion of food is as follows:

Dipeptides → Amino acids (presence of dipeptidase)

Maltose → Glucose + Glucose (presence of maltase)

Lactose → Glucose + Fructose (presence of lactase)

Nucleotides → Nucleosides → Sugars + bases (presence of nucleotidase and nucleosidases)  
Di and monoglycerides → Fatty acids + Glycerols (presence of Lipase)

### 3. Discuss mechanisms of absorption.

#### Solution:

- (i) Simple Diffusion: Small amounts of monosaccharide like glucose, amino acids and some electrolytes like chloride ions are absorbed by simple diffusion
- (ii) Facilitated Transport: The transport of amino acids which is absorbed with the help of carriers like sodium ions.
- (iii) Transport of water depends on the osmotic gradient.
- (iv) Transport of Fatty acids and glycerol

### 4. Discuss the role of hepatopancreatic complex in the digestion of carbohydrate, protein and fat components of food.

#### Solution:

The hepatopancreatic complex plays a major role in the digestion of carbohydrates, proteins and fats. The liver secretes bile juice. Bile helps in emulsification of fats. Bile also provides an alkaline medium which is useful for working of enzymes present in the small intestine. The pancreatic juice contains inactive enzymes trypsinogen, chymotrypsinogen, procarboxypeptidases, amylases, lipases and nucleases. Trypsinogen is activated by an enzyme, enterokinase.

The action of hepato-pancreatic secretion on digestion on carbohydrate, proteins and fats:

- (i) Carbohydrates in the chyme are hydrolysed by pancreatic amylase into disaccharides.  
Polysaccharides (starch) → Disaccharides (in the presence of amylase)
- (ii) Fats are broken down by lipases with the help of bile into di and monoglycerides  
Triglycerides → Emulsified triglycerides → diglycerides ( in the presence of lipase) → Monoglycerides
- (iii) Proteins in the chyme reaching the intestine are acted upon by the proteolytic enzymes of pancreatic juice.

### 5. Explain the process of digestion in the buccal cavity with a note on the arrangement of teeth.

#### Solution:

Two functions are performed by the buccal cavity. One is mastication of food which is chewing and another one is swallowing. The food which is eaten by us will be mixed with saliva and lubricates the food and chewing process breaks the food into smaller pieces. Digestion of carbohydrates starts in the buccal cavity. The food is mixed with saliva which contains salivary amylase. This enzyme converts starch into maltose, isomaltose and  $\alpha$ -dextrins. 30% of the starch in food is hydrolysed in the buccal cavity.

There are four types of teeth in human beings – incisors, canines, premolars and molars, denoted as I, C, PM and M respectively.

Arrangement of teeth in each half of the upper and lower jaw in the order I, C, PM, M is represented by a dental formula which in human is 2123/2123, two incisors, one canine, two premolars and three molars on each side of jaws. Thus there are 32 teeth in an adult human.