SHORT QUESTIONS

2. Describe the gastrointestinal tract of man.

Ans: Digestive system of Man:

Anatomically and functionally the digestive system can be divided into a tubular **gastrointestinal tract (GIT)** or **digestive tract** or alimentary canal and **accessory digestive organs.** The organs of **GI tract** include oral cavity, pharynx, oesophagus, stomach, small intestine. The accessory digestive organs include the teeth, tongue, salivary glands, liver, gall bladder and pancreas.

Alimentary Canal-Structure and Function:

The GIT, which extends from the mouth to the anus, is a continuous tube. It is a locally differentiated structure. It is specialized at various points along its length, with region designed to carry out a different role. GIT is approximately 9m (0 ft) long. It traverses (passing across) enter the thoracic cavity and enters the abdominal cavity at the level of diaphragm.

The digestive tube consists of four major layers, or **tunics:** an inter mucosa and an external serosa with a submucosa and muscularis in between. These four tunics are present in all areas of the digestive tract from the oesophagus to the anus.

3. Describe the human tongue.

Ans: Human tongue:

The mouth is surrounded by the lips, cheeks, tongue and a

plate and includes a chamber between the plate and tongue called **oral cavity.** The tongue nearly fills the oral cavity when the mouth is closed. Rough projections called **papillae** on the surface of the tongue causes friction which is useful in handling the food. These papillae also contain **taste buds.** The tongue forms the chewed and moistened food into a ball like mass called **bolus** and pushes it into the **pharynx** (aoropharynx).

4. Describe and writes the function of each type of teeth.

Ans: There are32 teeth. Different teeth are adapted to handle food in different ways.

Incisors Teeth:

The incisors (front teeth) are chisel shaped and their sharp edges are used to bite off relatively large pieces of food.

Canine Teeth:

The **canine teeth** are cone shaped and they are useful in grasping food.

Premolars and Molars:

The **premolars** and **molars** have somewhat flattened surfaces and are specialized for grinding food particles.

5. What is mechanical digestion?

Ans: Functions of oral Cavity:

In the oral cavity mechanical and chemical digestion

takes place. Mechanical digestion is the physical division of a mass of food into smaller masses while chemical digestion is the chemical conversion of lager molecules into smaller molecules.

Mechanical digestion:

Cooking and thorough chewing of food destroys the cellulose of starch covering and increases the efficiency of the digestive process. Food taken into the mouth is chewed, or masticated by the teeth. Mastication breaks large food particles into smaller ones, which have a much larger total surface area for the action of digestive enzymes.

6. What is chemical digestion?

Ans: Chemical digestion:

Saliva is secreted by salivary glands. The serous (watery) part of saliva contains a digestive enzyme called **salivary amylase (**meaning starch splitting enzyme), which breaks the covalent bond between glucose molecules in starch and other polysaccharides to produce the disaccharides, maltose and isomaltose. Only about 3%-5% of the total carbohydrates are digested in the mouth.

7. What is pharynx? Write its function.

Ans: Pharynx:

The pharynx is a cavity behind the mouth.

Functions:

The pharynx connects the nasal and oral cavities with larynx and oesophagus.

(a) The nasopharynx communicates with nasal cavity and provides a passage way for air during breathing.

(b) The oropharynx opens behind the soft palate into nasopharynx. It functions as a passage way for moving food downwards from the mouth and air moving to and from the nasal cavity.

(c) The laryngopharynx is located just below the oropharynx. It opens into the larynx and oesophagus.

8. Describe the part of human pharynx.

Ans: The pharynx can be divided into three

(i) Nasopharynx:

The nasopharynx communicates with nasal cavity and provides a passage way for air during breathing.

(ii) Oropharynx opens:

The oropharynx opens behind the soft plate into nasopharynx. It functions as a passageway for moving food downwards from the mouth and air moving to and from the nasal cavity.

(iii) Laryngopharynx:

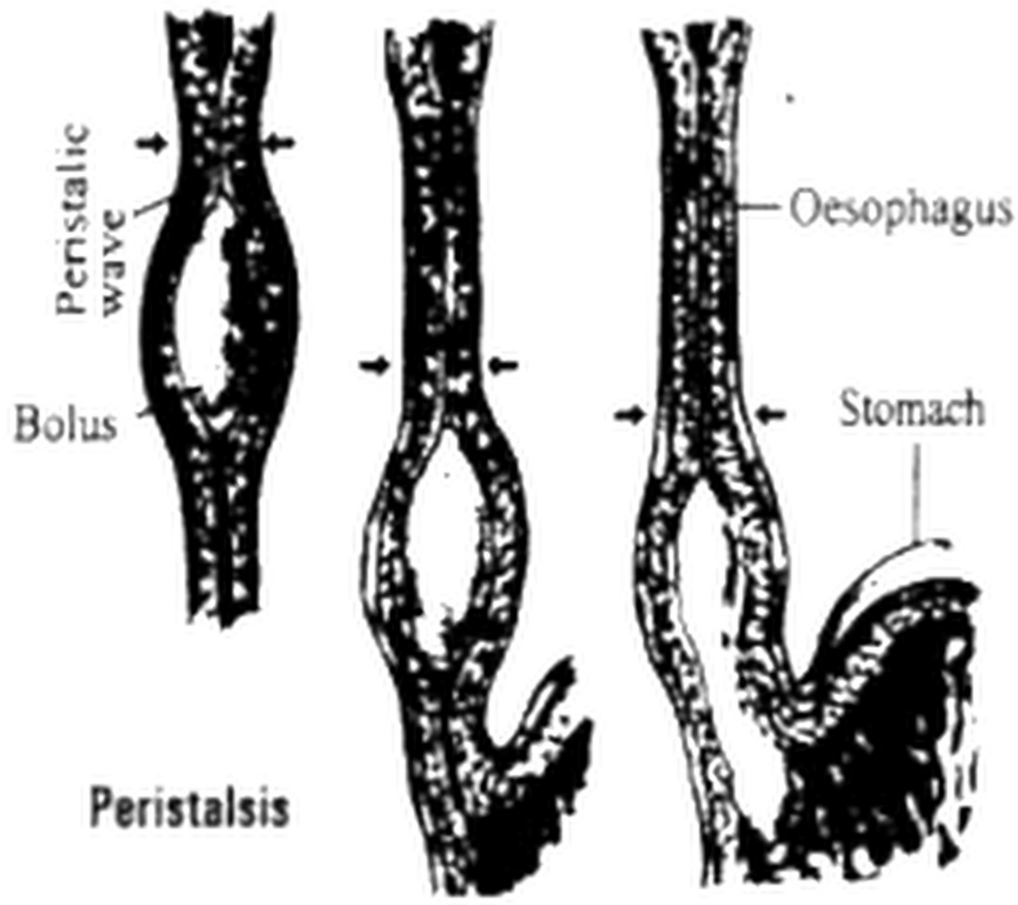
The laryngopharynx is located just below the oropharynx. It opens into the larynx and oesophagus.

9. Explain peristalsis with diagram.

Ans: Peristalsis:

In peristalsis a wave of relaxation of circular muscles in front of food is followed by a wave of strong contraction of circular muscles behind food. Propels the

mass of the food through the digestive tract. As the food moves it expand the tube **wall**, the expansions stimulate peristalsis.



Peristalsis

10. **Describe human oesophagus. Write its function.**

Ans: **Oesophagus:**

The oesophagus (meaning passageway) (North American spelling esophanguus0 is the part of digestive tube that extend between the pharynx and the stomach. It is about 25 cm long. It begins at the base of the pharynx and descends behind the trachea. Passing through mediastinum (space between the right and left lungs). The oesophagus penetrates the diaphragm and is continuous with the stomach on abdominal side of the diaphragm.

Function:

Digestion, which started in the oral cavity, continues in the oesophagus oesophangs is a passageway so no digestion takes place here.

11. **Name and write the function of epithelial cells of stomach of man.**

Ans: The epithelial cells of stomach can be divided into four main types. The first type is **surface mucous cells,** which produce mucus is on the surface and lines the gastric pit. The remaining three are in the gland.

They are

(1) **Parietal (oxyntic) cell** produce hydrochloric acid and intrinsic factors.

(2) **Principal cells** or **chief (zymogenic) cell** secrets pepsinogen.

(3) **Endocrine cells** secrete the hormone gastrin into the blood.

12. Give one reason as to why some enzymes in stomach and intestine are secreted inactive form?

Ans: The major proteolytic enzymes are **trypsin, chymotrypsin, and carboxypeptidase.** They are secreted in their inactive forms as trypsinogen chymotrypsin and procarboxypeptidase and are activated by the removal of certain peptides from the larger precursor proteins. If these were produced in their forms, they would digest the tissue producing them.

13. Name the enzymes involved in protein digestion.

Ans: Trypsinogen:

The intestinal glands secrete an activator enzyme called enterokinase. The enterokinase converts trypsinogen into trypsin. The trypsin is the active form. This acts on protein and converts them into polypeptides.

Chymotrypsin:

The inactive chymotrypsin is converted to active from by trypsin

14. How could no secretion of HCl in our stomach affect food digestion?

Ans: Hydrochloric acid produces the low pH of the stomach, which is normally between 1 and 3, but is usually close to 2. Although the hydrochloric and secreted into the stomach has a minor digestive effect on digested food. One of its main function is to kill bacteria that are ingested with essentially everything humans pt into their mouths. The low pH of the stomach also stops carbohydrate digestion by inactivating salivary amylase. The low pH also denatures many proteins so that proteolytic enzymes can reach internal peptide bonds, and it provides the proper PH environment for the function of pepsin.

OR (Seconds Answer)

The glands present on the stomach walls. It dissolves bits of food and creates an acidic medium secrete hydrochloric acid. The acidic medium allows pepsinogen to be converted into pepsin. Pepsin plays an important role in the digestion of proteins. Therefore, if HCl were not secreted in the stomach, then pepsin would not be activated by HCl.

15. How the stomach does protect itself from the damaging effect of HCl?

Ans: The gastric glands secrete HCl which has a Ph of 2 tò 2.5. This is highly acidic and can itself digest the stomach. But the gastric glands with pro-enzymes also release mucus. This mucus forms inner lining of the stomach and prevent HCl from corroding the tissues of stomach.

OR (Second Answer)

Our **Stomach protects itself** from being digested by its own enzymes, or burnt by corrosive **hydrochloric acid**, by secreting sticky, neutralizing mucus that clings to the **stomach** walls. If this layer becomes damaged in any way it can result in painful and unpleasant **stomach** ulcers.

OR (Second Answer)

Small pores called gastric pits contain many exocrine cells secrete digestive enzymes and **hydrochloric acid** into the lumen or hollow region of the stomach. Mucous cells found throughout the **stomach lining** and **gastric** pits secrete mucus to protect the stomach from its own digestive secretion.

16. Why there are villi in the intestine and not in stomach?

Ans: The digested food is passed into **intestine** for absorption. The villi are present here to increase the surface area for the absorption of the digested food.

OR (Second Answer)

Because the stomach doesn't absorb nutrient.

Explanation:

Villi of the small intestine are small finger-like projection on the surface. One villus contains many cells and thereby increase area see image below) This is required because a lot of cells on a small area makes this process efficient.

The stomach collects the food, adds gastric acid and enzymes for digestion of food. The stomach does not absorb any nutrients and therefore does not require a larger surface area.

17. Trypsin acts at alkaline pH. What provides the alkalinity.

Ans: Bicarbonates present in bile juice. pancreatic juice and intestine juice provide alkalinity.

OR (SECOND Answer)

The mucus secreted by goblet cells of intestinal mucosal epithelium and bicarbonate ions of pancreatic juice together makes the medium alkaline in small intestines. Two actions performed by trypsin are:

OR (SECOND Answer)

Digestion will not be proper systematic. Due to acidic medium, it will create acidity, which Is harmful for human being. Soon it happens as, it may be affecting our digestive system.

19. How does the absorption of fat differ from absorption of glucose?

Ans: Fat is absorbed by lacteals in the small intestine these have large surface areas to with absorption and capillaries to absorbs the fatty acids. Glucose and Amino acids is absorption into the glomerulus in the kidney transported by the blood to the heart etc then it is reabsorbed in the bowman's capsule in the kidney

OR (Second Answer)

Fats are absorbed into cells as fatty acids and monoglycerides but are then modified for absorption into the blood, amino acids and glucose are not modified further.

20. Describes defecation reflex in adults.

Ans: Defecation reflex in adults.

When it is appropriate a person usually can initiate the defecation reflex (North America spelling defecation) by holding a deep breath and contracting the adnominal muscles. The action increases the internal pressure and forces the forces into the rectum. When the rectum is filled, its wall is descending colon as stimulated and the internal and anal sphincter relaxes. The

external anal sphincter is signaled to relax and the faces are forced to the outside. The defecation reflex only for a few minutes and quickly dies. A Person usually can inhibit defecation voluntarily by keeping the external sphincter contracted.

21. Describe defecation reflex in infants.

Ans: Defecation reflex in infants:

In infants the defecation reflex cases automating emptying of the lower bowel at inconvenient times during the day because of lack of conscious control exercised through voluntary contraction of the external anal sphincter.

22. Bile juice contains no digestive enzymes, yet it is important for digestion.

Why? Ans: The liver produces and secretes bile. It is stored in the gall bladder. Bile contains no digestive enzymes. Bile consists of water bile salts; sodium glycocholate and sodium taurocholate bile pigment, bilirubin, cholesterols, Lecithin (a phospholipids) mucus cell and cell debris.

Bile salts reduce the surface tension of fat globules and emulsify them into droplets and thus increase their total surface area. This process is called emulsification. These small droplets are then acted upon by the enzyme lipase **Bilirubin** results from the breakdown of hemoglobin. In the intestine bacteria convert bilirubin into pigment that gave the faces is characteristic brown color. Some of these pigments are absorbed from intestine, modified, in the kidneys and excreted in the urine, contributing to the characteristic yellowish color of the urine. Bile salts help in the absorption of fatty acids from the intestinal tract

OR (Second Answer)

Bile is a digestive juice secreted by the liver. Although it does not contain any digestive enzymes. It plays an important role in digestion of fats. Bile juice

has bile pigments such as bilirubin and biliverdin. These break down large fat globules into smaller is known globules so that the pancreatic enzymes can easily act on them This process is known as emulsification of fats. Bile juice also makes the medium alkaline due to presence of $NaHCO_3$ and also activate lipase.

23. What is the role of hormone in digestion?

Ans: Gastrin is a peptide hormone that stimulates secretion of gastric acid (HCl) BY YHE Parietal cells of the stomach and aides in gastric motility. It is released by G cells in the pyloric antrum of the stomach, duodenum, and the pancreas.

Role of nervous system and gastrin hormone on the secretion of gastric juice:

Approximately 2-3 litres of gastric secretions (gastric juice) are produced each day. Both nervous and hormonal mechanisms regulate gastric secretions.

Hormones that regulate secretion:

Hormones that regulate stomach secretion include gastrin, secretin, gastric inhibitory polypeptide and cholecystokinin.

Gastric Secretion:

The sensations of the taste and smell of food, stimulation of receptors during the process of chewing, swallowing, and pleasant thoughts of food stimulate centres within the medulla that influences **gastric secretion.** Neuronal stimulate of the stomach mucosa results in the secretion of **acetylcholine**, which stimulates the secretory activity of both the parietal and chief cells and stimulates the secretion of gastrin from endocrine cell. Gastrin is released into the circulation and travels to the parietal cells, where it stimulates additional

gastric juice (hydrochloric acid and pepsinogen) secretion.

Volume of Gastric Secretions:

The greatest volume of gastric secretions is initiated by presence of food in the stomach. The primary stimuli are distention of the stomach and the presence of amino acids and peptides in the stomach. Peristaltic waves occur less frequently are significantly more powerful than mixing waves and force the chime near the periphery of the stomach toward the pyloric sphincter. The pyloric sphincter usually remains partially closed because of mid tonic contraction. Each peristaltic contraction is sufficiently strong to force a small amount of chime through the pyloric opening and into the duodenum.

24. What is the role of hormone secretin in digestion?

Ans: When hydrochloric acid passes from the stomach into the duodenum secretin is released into the bloodstream and stimulates the acinar cells of the pancreas to secrete water and bicarbonate into the pancreatic ducts that drain into the duodenum.

Secretion of pancreatic juice is related to secretin hormone:

Pancreatic juice secretion is regulated by the hormones secretin and cholecystokinin which is produced by the walls of the duodenum upon detection of acid food, protein, fats, and vitamins. Pancreatic secretion consists of an aqueous bicarbonate component from the duct cells and enzymatic that aid acinar cells. A clear alkaline secretion of the pancreas containing enzymes that aid in the digestion of proteins, carbohydrates and fats. The Predominant effect of secretin on the pancreas is to stimulate duct cells to secrete water and bicarbonate. As soon as this occurs, the enzymes by the acinar cells are flushed

out of the pancreas though the pancreatic duct into the duodenum.

25. Describe the storage role of liver.

Ans: Storage role of liver:

Hepatocytes can remove sugar from the blood and store it in the form of glycogen. They can also store fat, vitamins (A. B12. D.E. and k), copper and iron. This **storage** function is usually short-term and the amount of stored material in the hepatocytes varies, thus the cell size fluctuates during a given day.

26. What is gall bladder? What its function.

Ans: Gall bladder:

The gall bladder is a saclike structure on the interior surface of the liver that is about 8 cm long and 4cm wide. The gall bladder id connected to the common blue duct by the cystic **Bile** is continually secreted by the liver and stored in the gall bladder (North American spelling gallbladder)

OR (second Answer)

The gallbladder is a small organ located on the underside of the liver its **primary purpose** is bile storage. The liver makes bile, substances that help that body break down fats. The **gallbladder** then stores the extra bile the liver makes releasing it when you eat a meal with fats that need to be digested.

27. Name three eating disorder.

Ans: Eating Disorders:

Ulcer, food poisoning, dyspepsia, obesity, anorexia, nervosa and bulimia nervosa.

28. Define/Describe/Explain:

tunic, oral, cavity, peristalsis, mixing waves, parietal cell, chief cells, intrinsic factor, acetylcholine, gastrin, secretin mesentery, villi, pancreatic juice, micelles, chylomicrons, bilirubin, biliverdin.

Ans: Tunic:

The digestive tube consists of four major layers, or tunics: an internal mucosa and an external serosa with a submucosa and muscularis in between. These four-tunic s are present in all areas of the digestive tract from the oesophagus to the anus.

Oral Cavity:

The lips surround the mouth. Cheeks tongue and a plate and a plate and includes a chamber between the palate and tongue called **oral cavity.**

Peristalsis:

In peristalsis a wave of relaxation of circular muscles in front of food is followed by a wave of strong contraction of circular muscle behind food, propels the mass of the food through the digestive tract. As the food moves it expends the tube well, the expansions stimulate peristalsis.

Mixing Waves:

The mixing action of the stomach walls allows mechanical digestion to occur in the stomach. The smooth muscle of the stomach produce contraction known as mixing waves.

Parietal cell:

Parietal cell in the gastric glands of the pyloric region secrete intrinsic factor and concentrated solution of hydrochloric acid.

Chief Cell:

The gastric cell (also known as a zymogenic cell or peptic cell) is a cell in the stomach that releases pepsinogen and chymosin. Pepsinogen is activated into the digestive enzyme pepsin when it comes in contact with acid produced by gastric parietal cells.

Intrinsic Factor:

Intrinsic factor is a glycoprotein that binds with vitamin B12 and makes the vitamin more readily absorbed in the ileum.

Acetylcholine:

Neuronal stimulation of the stomach mucosa results in the secretion of **acetylcholine**, which stimulates the secretory activity of both the parietal and chief cells and stimulates the secretion of **gastrin** from endocrine cells.

Gastrin:

Gastrin is a peptide hormone that stimulates secretion of gastric acid by the parietal cells of the stomach and aids in gastric motility. It is released by G cells in the pyloric antrum of the stomach duodenum, and the pancreas.

Secretin:

Secretin produced by the duodenum is carried through the circulatory system to the liver and stimulates duct cells in the liver to release bicarbonate into the bile.

OR

Secretin is a hormone that regulates water homeostasis throughout the body and influences the environment of the duodenum by regulating secretion in the stomach pancreas and liver.

Mesentery:

The entire small intestine is about 6 m long (range:4.6.9m). The duodenum is about 25 cm long and 5 cm in diameter, and the ileum is about 3.5 m long. These portions are suspended from the posterior abdominal wall by a double – layered fold of peritoneum called **mesentery.**

Villi:

The mucosal wall of the small intestine forms millions of tiny fingers – like projections known as villi. These increase the surface area for more efficient food absorption.

OR

Villi are specialized for absorption in the small intestine as they have a thin wall one cell thick. Which enable a shorter diffusion path. They have a large surface area so there will be more efficient absorption of fatty acids and glycerol into the blood stream.

Pancreatic juice:

The secretion of pancreas is called pancreatic juice. It is poured through the pancreatic duct. Pancreatic juice is slightly alkaline. Its pH is about 8. It neutralizes the acidic action of digestive enzymes secreted by the pancreas.

The important of enzymes are (a) Pancreatic amylase (b) Pancreatic lipase (c) Trypsinogen (4) Chymotrypsin.

Micelles:

Once lipids are digested in the intestine, bile salts aggregate around small droplets to form micelles (meaning a small morsel). When a micelle comes into

contact with the epithelial cell of the small intestine the contents of micelle pass by means of diffusion through the lipid cell membrane of the epithelial cell.

OR

A micelle or micelle is an aggregate of surfactant molecules dispersed in a liquid colloid.

Chylomicrons:

The fats are then mixed cholesterol and proteins, forming small globules called **chylomicrons**, most of which are transported by exocytosis out of epithelial cells into lacteals. Lymph containing chylomicrons, eventually drains from the lymphatic system into large veins that return blood to the heart.

OR

Chylomicrons are lipoprotein particles that consist of triglycerides phospholipids, cholesterol, and proteins. They transport dietary lipids from intestines to other locations in the body.

Bilirubin:

The bile pigment **bilirubin (**orange pigment) is formed the breakdown of hemoglobin.

OR

Bilirubin is a yellow compound that occurs in the normal catabolic pathway that breaks down heme invertebrates.

Biliverdin:

The bile pigment **biliverdin** (green pigment) is formed from the breakdown of hemoglobin. **OR**

Biliverdins a green tetrapyrrolic bile pigment, and is a product of heme catabolism. It is the pigment responsible for a greenish color sometimes seen in bruises.

29. **Write the differences between:**

(a) **Mechanical digestion and chemical digestion.**

(b) **Pharynx and larynx**

(c) **Pancreatic amylase and pancreatic lipase**

(d) **Trypsinogen and chymotrypsin**

(e) **Pepsinogen and pepsin**

(f) **Food poisoning and anorexia nervosa**

(g) **Bulimia nervosa and anorexia nervosa**

Ans: (a) Mechanical digestion and chemical digestion:

Functions of oral cavity:

In the oral cavity, mechanical and chemical digestion takes place. Mechanical digestion is the physical division of food into smaller masses while chemical digestion is the chemical conversion of large molecules into smaller molecules.

Mechanical digestion:

Cooking and through chewing of food destroys the cellulose of starch covering and increases the efficiency of the digestive process. Food taken into

the mouth is hewed, or masticated, by teeth. Mastication breaks large food particles into smaller ones, which have a much larger total surface area for the action of digestive enzymes.

Chemical digestion:

Saliva is secreted by salivary glands. The serous (watery) part of saliva contains a digestive enzyme called **salivary amylase (**meaning starch-splitting enzyme), which breaks the covalent bonds between glucose molecules in starch and other polysaccharides to produce the disaccharides, maltose and isomaltose. Only about 3%-5% of the total carbohydrates are digested in the mouth.

OR (Second Answer)

Difference Between Mechanical and Chemical Digestion:

Mechanical Digestion	Chemical Digestion
Definition:	
Mechanical digestion refers to the breakdown of food into digestible particles, mainly by the teeth.	Chemical digestion refers to the process by which compounds with a high molecular weight in the food are breakdown into small substances that can be absorbed by the body.
Occurrence:	
Mechanical digestion occurs from the mouth to the stomach.	Chemical digestion occurs from the mouth to the intestine.
Major part:	

A major part of mechanical digestion occurs in the mouth.	A major part of chemical digestion occurs in the stomach.
Driven by:	
Mechanical digestion is driven by teeth.	Chemical digestion is driven by enzymes
Mechanism:	
The mechanical breakdown of large food particles into small food particles occur in the mechanical digestion.	Chemical digestion breakdown of compounds with high molecular weights into low molecular weight compounds occur in the chemical digestion.
Role	
Mechanical digestion increases the surface area for the enzymatic reactions in the chemical digestion.	Chemical digestion enhances the absorption of the nutrients by breaking down them into small molecules.

(b) pharynx and larynx:

Pharynx:

The pharynx is a cavity behind the mouth.

Functions:

The pharynx connects the nasal and oral cavities with larynx and oesophagus. The pharynx can be divided into three: (a) The **nasopharynx** communicates with nasal cavity produces a passageway for air during breathing (b) The **oropharynx opens** behind the soft palate into nasopharynx. It

functions as a passageway for moving food downwards from the mouth and air moving to and from the nasal cavity. (c) The **laryngopharynx** is located just below the oropharynx. It opens into the larynx and oesophagus.

Larynx:

As part of the reflex action the voice box or **larynx** rises up to meet epiglottis (meaning upon the glottis), with this action epiglottis cartilage drop over the glottis, the opening to the larynx and trachea. In this way food is passed over the traches without entering it. If you place your hand over your larynx (Adam's apple), you can feel it moves up when you swallow. After food enters the oesophagus, the soft palate lowers and the epiglottis is raised.

OR (Second Answer)

Difference Between Pharynx and Larynx:

Pharynx	Larynx
Definition	
Pharynx is a membrane–lined cavity behind the mouth and the nose, connecting them to the oesophangs and the larynx respectively.	Larynx is a hollow muscular organ, which forms an air passage to the lungs and hosts in the vocal cords.
Location:	
The pharynx is located just behind the mouth.	The larynx is located at the c3-6 vertebral levels.
System:	

Pharynx is a part respiratory system and digestive system.	Larynx is a part of the respiratory system.
Walls:	
The walls of the pharynx are made up of muscles.	The walls of the larynx made up of cartilage.
Anatomy	
The pharynx is made up of three regions, nasopharynx, oropharynx, and laryngopharynx.	The larynx is made up of mainly four cartilage, thyroid, cartilage, and corniculate cartilage.
Structure:	
The pharynx is asset of regions.	The larynx is an organ.
Vocal Cords:	
The pharynx does not consist of vocal cords	The larynx consists of vocal cords.
Conclusion: Pharynx and larynx are two components of the throat. The nasal and the oral cavities open into the pharynx open into the larynx and the esophagus. The larynx opens into the trachea. Therefore, both food and air pas through the pharynx. The main difference between pharynx and larynx is the structure and the function of each component.	

(C) Pancreatic amylase and pancreatic lipase:

Pancreatic amylase:

It is the starch digesting enzyme. It hydrolyses the polysaccharides to maltose and even to glucose.

Pancreatic lipase:

It is the principal enzyme for the hydrolysis of fats. It hydrolyses fats to neutral fat in parts to its (i) mono and diglycerols (diglycerides) (ii) glycerol (iii) fatty acids.

OR (Second Answer)

Difference between Amylase and Lipase

Lipase	Amylase
Definition	
Lipase is an enzyme that is involved in the hydrolysis of lips.	Amylase is an enzyme involved in the hydrolysis of starch molecules into sugars.
Type of Enzyme and Classification:	
A sub- class of hydrolases known as Esterase	Hydrolases. It is further classified into three groups known as a -amylases, β-amylase and µ-Amylase.
Bond Type:	
Lipase on the ester bond in a lipid.	Amylase acts on the glycoside bonds in a carbohydrate.

Substrate:	
Fatty acids esters such as triglycerides, fats, oils.	Starch molecules.
End product:	
Glycerol, DI-glycerides, Mono-glycerides fatty acids like less complex forms of fats.	Oligosaccharides (Dextrose maltodextrin) and disaccharides (Maltose)
Enzyme Secretion Organ in the Human Body:	
Salivary lipase and pancreatic lipase are secreted by the salivary gland pancreas respectively. Other examples are hepatic lipase endothelial lipase and lipoprotein lipase.	Salivary gland secretes salivary amylase and pancreatic amylase is secreted by the pancreas.
Function:	
Lipid metabolism	Carbohydrate metabolism
Mechanism of Action:	
Fats are not water-soluble but lipase dissolves in water. Therefore, lipase cannot directly break down the fat molecules. First, fat, bile salts from the gall bladder must break up fats and	Both amylase and starch are water soluble substances, so amylase enzyme secreted into the digestive tract mix easily with food particles (chyme) and

emulsify them into water-soluble beads.	easily digest dissolved carbohydrate in that food.
Related Health Issues:	
Lysosomal lipase deficient can cause the Wolman disease as well as Cholesteryl Ester Storage Disease (CESD) which autosomal recessive diseases. Both diseases are caused by a mutation in the gene encoding the enzyme	An increased level of amylase in the blood serum is an indicator that the person could be suffering from acute. Pancreatic inflammation, pptic ulcer, ovarian cyst or even mumps.
Uses:	
It is used in baking industry, laundry detergents, biocatalyst, production of alternative sources of energy	Flour additive, amylases are used in bread making process and thereby break down complex starch in flour into simple sugars. Yeast than feeds on these simple sugars and converts it into the alcohol and CO_2 and this impart flavor and causes the bread to rise. Fermentation Both alpha and beta amylases are vital in brewing beer and alcohol made from sugar derived from starch. Amylase removes starch from starched clothes and, therefore, it is used as are detergent.

(d) Trypsinogen and Chymotrypsin:

Trypsinogen:

The intestinal glands secrete an activator enzyme called

enterokinase. The enterokinase converts trypsinogen into trypsin. The trypsin is the active form, which acts on protein and converts them into polypeptides.

Chymotrypsin:

The inactive chymotrypsin is converted to active form by trypsin.

OR (Second Answer)

Difference Between Trypsin and Chymotrypsin:

Trypsin	Chymotrypsin
Trypsin is a protein–digestion enzyme which will cleave the peptide bond at the basic amino acids such as lysine and arginine.	Chymotrypsin which is also a protein digesting enzyme cleaves the peptide bond at aromatic amino acids such as phenylalanine tryptophan, and tyrosine
Molecular Weight	
The molecular weight of trypsin is 23.3 k Da	The molecular weight of chymotrypsin is 25.6 k Da
Substrates:	
Complex protein is digested into its monomers of amino acids and are absorbed via the small intestines	Aromatic amino acids substrates such as tyrosine, tryptophan, and phenylalanine act on chymotrypsin.
Zymogen Form of the Enzyme:	
Trypsinogen is the inactive form of trypsin.	Chymotrypsin is the inactive form of chymotrypsin.
Activators:	

Lanthanides are activators of trypsin.	Cetyltrimethylammonium bromide, Dodecyltrimethyammonium bromide, Hexadecyltreimethylammonium bromide and Tetrabutylammonium bromide are activators of chymotrypsin.
Inhibitors:	
DFP, aprotinin, Ag^{+}, Benzamidine, and EDTA are inhibitors of trypsin.	Peptidyl aldehydes, boronic acids and coumarin derivatives are inhibitors of chymotrypsin.

(e) Pepsinogen and pepsin:

Chief cells within the gastric glands secrete inactive **pepsinogen.** Pepsinogen is packaged in **zymogen (**meaning related to enzymes) granules which are release by exocytosis when pepsinogen secretion is stimulated. Once **pepsinogen** enters the lumen of the stomach, it is converted to **pepsin** by hydrochloric acid and previously formed pepsin molecules. Pepsin exhibits optimum enzymatic activity at a pH of 3 or less. Pepsin catalyzes the cleavage of some covalent bonds in proteins, breaking them into smaller peptide chains.

OR (Second Answer)

Difference between pepsin and pepsinogen:

. Pepsin is proteolytic, enzyme, whereas pepsinogen is the proenzyme

. Pepsin is the active from of pepsinogen while pepsinogen is the inactive precursor of pepsin.

. Unlike the pepsin, chief cells and pyloric glands secrete pepsinogen.

. Pepsinogen is covered to pepsin by hydrochloric acid or performed pepsin.

. Unlike the pepsin, pepsinogen secretion is stimulated by vagal simulation, gastrin, and histamine.

. Pepsinogen is stable in both neutral and alkaline solution, whereas pepsin is not.

. Unlike pepsinogen, pepsin can hydrolyze proteins.

. Pepsin can be activated by lowering the pH of the medium whereas pepsinogen cannot.

(e) Food poisoning and dyspepsia:

Food poisoning:	**Dyspepsia:**
It includes diarrhea (North American spelling diarrhea), vomiting and abdominal pain. It is an illness from indigestion of food coating toxic substances.	Incomplete or imperfect digestion is called dyspepsia.
Aetiology: Due to the toxins produced by bacteria *Salmonella* and *Camylobacter*.	**Aetiology:** It may occur due to excessive acidity in stomach or faulty function of stomach and intestine or insufficient quality and quantity of bile secretion.
Prevention: Basic hygiene should be followed. Avoid unboiled/unbottled water, ice, cubes, salads and peel on fruits. Consume freshly prepared hot food or thoroughly rewarmed food.	**prevention:** Avoid food that worsens symptoms. Stop smoking, weight reduction, small meals, avoid alcohol, tea, fatty food, heavy lifting, bending specially after

	meals and late night meals to reduce reflex during sleep.
Treatment: Soft easily digested diet, such as soup, fruits; tea and cold drinks are preferred. Oral rehydration salt (ORS) is given. Antidiarrheal agent such as Loperamide antibiotics are prescribed.	**Treatment:** Antibiotics to be given against this disease. Drugs which decrease HCl production such as Cimetidine; stop NSAID (Non-Steroidal Anti Inflammatory Drugs), e.g., Aspirin

(g) Bulimia nervosa and anorexia nervosa:

Bulimia nervosa:	**Anorexia nervosa:**
It is a neurotic in slightly older girls.	It includes loss of appetite due to the fear of becoming obese. Such a feeling in common in human females between the ages of 12 and 21 years. Usually just after the onset of puberty.
Symptoms: It is characterized by bouts of over eating fatting food as fried food or cream cakes. This voracious (eating a large quantity) eating followed immediately by self- induced vomiting. Fasting or purging (to empty bowels) may cause physical effects including serum electrolytes imbalance	**Symptoms:** It includes loss of appetite due to the fear of becoming obese. The anorexic girls over estimate the size of her own body and so insist that she is overweight, when in reality her weight has dropped to a dangerous level. These girls often not matured psychologically and unable to cope with the challenges of puberty and their emerging sexuality. The losses of feminine characteristics enable the girls

and frequent recurring infection.	to retreat into a childlike state in which she feels safe.
Treatment: Treatment of bulimics is likely to be prolonged. The initial treatment is to overcome the effects of weight loss and malnutrition. It is necessary to undertake the treatment in hospital under strict supervision:	**Therapy:** Psychiatric therapy is usually required to treat to anorexic girls. Such patients are fed through any other rout than alimentary canal, i. e, intravenously. The recovery is very slow. It may take 2- 4 years and in some cases longer.