# DIGESTION AND ABSORPTION
## SOLUTIONS

### LEVEL – I

**Nutrition**

**1.** Type of nutrition where the whole food is taken into body and digested is called
(1) Saprozoic (2) Holophytic
(3) Holozoic (4) Autotrophic
Holozoic nutrition is a type of heterotrophic nutrition in which organic food is ingested followed by digestion , absorption, assimilation and finally ejection.

**2.** Vitamins and water are included under:
(1) Micronutrients or proximate principles of food
(2) Micronutrients or protective principles of food
(3) Macronutrients or proximate principles of food
(4) Macronutrients or protective principles of food
Vitamins, minerals and water are not directly involved in energy production and they control the body metabolism. Thus they are considered as micronutrient or protective principles (as they prevent many metabolic disorders) of food.

**Digestive system (Alimentary canal)**

**3.** In Coelenterates digestion is:
(1) Intracellular (2) Intercellular (3) Both (1) and (2) (4) None of these
In coelenterates partial digestion takes place in gastro-vascular cavity (extracellular) and complete digestion takes place inside the cell (intracellular ) .

**4.** Function of metabolism includes all except:
(1) Extraction of nutrients from food
(2) Breakdown of substrate
(3) Equilibrium of biochemicals with intracellular components
(4) Using building blocks for synthesis
Metabolism takes place inside cells as a series of catabolic and anabolic reactions. Extraction of nutrients from food involves extracellular digestion and hence non metabolic.

**5.** When teeth are embedded in the sockets of jaw bone, then this type of attachment is called:
(1) Thecodent (2) Lophodont (3) Secodont (4) Solenodont
Thecodont teeth is seen in mammals and some reptiles belonging to order crocodilia like crocodile , alligator and gravialis.

**6.** 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 humans is:
(1) $\frac{2132}{2132}$ (2) $\frac{2123}{2123}$ (3) $\frac{2312}{2312}$ (4) $\frac{3212}{3213}$
This is the dental formula for adult teeth in human.

**7.** Thecodont, diphyodont and heterodont teeth are the characteristic of:
(1) Reptiles (2) Aves (3) Amphibians (4) Mammals

Aves are edentulous ie no teeth. Reptiles teeth is acrodont, pleurodont and thecodont .Amphibian teeth is homodont ,pleurodont and polyphyodont.

**8.** Oral cavity leads into a short pharynx which serves as a common passage for:
(1) Food only (2) Air only
(3) Food and Air (4) Digestive juices
Pharynx serves as a common passage for both digestive tract and respiratory tract. Through pharynx both oesophagus(food pipe) and trachea(wind pipe) arises.

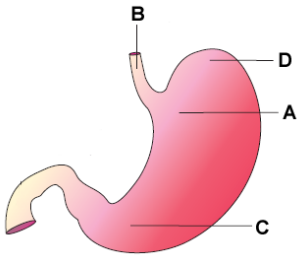
**9.** Which of the following structures prevents food from entering the trachea?
(1) Larynx. (2) Pharynx.
(3) Epiglottis (4) Cardiac sphincter
Epiglottis is a cartilaginous(elastic cartilage) flap which guards the glottis of larynx and during swallowing epiglottis bends to close the glottis (opening of larynx) to prevent the passage of food in wind pipe.

**10.** Stomach has four major portions. In which portion of stomach does the oesophagus open?
(1) Fundic (2) Pyloric (3) Cardiac (4) Corpus
Oesophagus opens into the cardiac region of stomach and the opening is guarded by cardiac sphinchter /gastro-esophageal sphinchter.

**11.** Select the odd one w.r.t. human stomach
(1) Cardiac (2) Fundus (3) Pyloric (4) Reticulum
Reticulum is the part of the stomach present in ruminants like cows and buffalo. Ruminants have 4 stomach that is omasum, abomasum , reticulum and rumen(1$^{st}$ and largest).

**12.** In which layer of stomach are the gastric glands located?
(1) Serosa (2) Mucosa
(3) Submucosa (4) Muscularis mucosa
Gastric glands are located in the lamina propria of innermost mucosa layer in the wall of alimentary canal.

**13.** Which part in the given diagram is filled with air/gas.




(1) A (2) B (3) C (4) D
Fundus is a dome shape upper portion of stomach filled with air /gas.

**14.** The innermost layer lining the lumen of the alimentary canal is the mucosa. This layer forms irregular folds in the stomach called
(1) Villi (2) Microvilli (3) Chonchae (4) Rugae
Rugae (gastric rugae) are the folding in the mucosa layer of stomach in order to increase the volume for storage and digestion .

**15.** Which of the following is mismatched regarding the cells of gastric glands and their functions?

(1) Mucus neck cells : Secrete mucus
(2) Chief cells : Secrete proenzyme (pepsinogen)
(3) Parietal cells : Secrete intrinsic factor for the absorption of Vitamin $B_{12}$
(4) Peptic cells : Secrete HCl

HCl is secreted by oxyntic cell/parietal cell of gastric gland. Chief cells or peptic cells or zymogenic cells secrete pepsinogen.

**16.** Zymogen cells or chief cells secrete:
(1) HCl (2) Mucus (3) Pepsinogen (4) Trypsin

Chief cells or peptic cells or zymogenic cells secrete pepsinogen,, prorennin (in infants) and gastric lipase.

**17.** Without functional parietal cells, which of the following would you expect for an individual?
(1) Not be able to initiate protein digestion in the stomach
(2) Not be able to initiate mechanical digestion in the stomach
(3) Only be able to digest fats in the stomach
(4) Not be able to produce pepsinogen

For initiation of protein digestion pepsin is required. Inactivated pepsinogen is converted to activated pepsin wih the help of HCl secreted by parietal cells.

**18.** Gastric juice contains: **OR** The correct composition of gastric juice is:
(1) Pepsin, rennin, lipase (2) Trypsin, rennin, pepsin
(3) Pepsin, rennin, ptyalin (4) Pepsin, lipase, trypsin

Zymogen cell of gastric gland secrete all these enzymes.Trypsin is enzyme of pancreatic juice.Ptyalin means salivary amylase.

**19.** One of the role of hydrochloric acid in the stomach is to
(1) kill bacteria. (2) hydrolyze fats.
(3) digest proteins. (4) activate trypsin

HCL make the pH in the stomach acidic which kills various pathogens including bacteria if present in the food.

**20.** Regurgitation of food from stomach is prevented by:
(1) Pyloric sphincter (2) Cardiac sphincter
(3) Circular muscle (4) Muscularis mucosa

Cardiac sphinchter muscle is itself under the control of medulla oblongata which controls vomiting (regurgitation).

**21.** Which of the following sphincter controls the passage of food into the stomach?
(1) Upper oesophageal sphincter (2) Gastro-oesophageal sphincter
(3) Pyloric sphincter (4) Oesophageal sphincter

Oesophagus opens into the cardiac region of stomach and the opening is guarded by cardiac sphinchter /gastro-esophageal sphinchter.

**22.** A patient complains of a burning sensation in the chest. This was found to be caused by gastric juice in the esophagus. The structure most likely not functioning properly is the
(1) pharynx. (2) epiglottis.
(3) pyloric sphincter. (4) cardiac sphincter.

When cardiac sphinchter muscle fails to contract properly some of the acidic gastric contents moves to the esophagus results in the acidity in esophagus called heart burn or pyrosis or GERD ( Gastro Esophageal Reflux Disorder).

**23.** Brush border columnar epithelium is found in the lining of:
(1) Stomach (2) Oesophagus (3) PCT (4) Small intestine
Brush border columnar epithelium is present on the villi of small intestine to increase the surface area for absorption.

**24.** Chyme is propelled forward in small intestine by
(1) Segmentation (2) Haustrations
(3) Migratory motor complexes (MMC) (4) Peristalsis
Peristalsis is a strong waves of contraction which occurs throughout the alimentary canal and it itself is under the control of medulla oblongata. Segmentation is muscular movement of small intestine to slow down food passage. Haustrations is muscular movement of large intestine .MMC occurs during fasting or in empty stomach and small intestine to propel the undigested food or electrolytes ahead.

**25.** A function of the small intestine is to
(1) secrete bile. (2) filter wastes.
(3) make vitamins. (4) absorb nutrients.
The inner surface area of small intestine is 600 times greater than other parts of digestive tract, thus maximum digestion and absorption takes place in small intestine.

**26.** The presence of large numbers of mitochondria in the cells lining the small intestine allows it to:
(1) releaseHCl. (2) produce bile.
(3) absorb glucose. (4) synthesize vitamins.
The absorption of glucose is an active process (secondary active transport)

**27.** Digestion is completed in
(1) Duodenum (2) Ileum (3) Stomach (4) Cloaca
Large intestine does not play any role in digestion and Ileum is the last part of small intestine.

**28.** Select the **incorrect** option w.r.t. function of large intestine:
(1) Absorption of water, minerals, and certain drugs
(2) Secretion of mucus which helps in adhering the waste particles together and lubricating it for an easy passage.
(3) Chyle enters into the caecum of the large intestine through ileocaecal valve.
(4) Significant digestive activity occurs in large intestine.
Digestion does not occur only absorption occurs in large intestine.

**29.** Which of the following statement is incorrect w.r.t. histology of alimentary canal?
(1) Serosa is the outermost layer made up of a thin mesothelium with some connective tissue.
(2) Muscularis is formed by smooth muscles usually arranged into an inner longitudinal layer and outer circular layer
(3) Submucosal layer is formed of loose connective tissue.
(4) An oblique muscle layer is be present in stomach
Muscularis layer is made up of outer longitudinal and inner circular smooth muscles.

**30.** Which of the following is the correct sequence of layers in the alimentary canal starting from outwards to inwards?
(1) Serosa, Muscularis mucosa, Muscularis Externa, Lamina Propria, Epithelial mucosa
(2) Muscularis mucosa, Muscularis Exterma, Lamina Propria, Epthelium, Serosa
(3) Serosa, Muscularis Externa, Muscularis Mucosa, Lamina Propria, Epithelial mucosa
(4) Epithelial mucosa, Lamina Propria, Muscularis mucosa, Muscularis Externa, Serosa
Serosa – muscularis externa – submucosa – muscularis mucosa – lamina propria – epithelial mucosa.

**31.** Lamina propria is associated with which part of the alimentary canal?
(1) Mucosa (2) Submucosa (3) Muscularis externa (4) Serosa
Lamina propria is also called areolar connective tissue consist of loose connective tissue ,blood vessels , lymphatic vessels and nerves. Serosa – muscularis externa – submucosa – muscularis mucosa – lamina propria – epithelial mucosa.

**Digestive Glands and Digestion**

**32.** The part of the digestive tract where starch **first** undergoes chemical digestion is the
(1) mouth. (2) stomach. (3) large intestine. (4) small intestine.
The digestion of starch is initiated in buccal cavity by salivary amylase present in the saliva.

**33.** Saliva contains an enzyme that partially digests
(1) fats. (2) starch. (3) proteins. (4) nucleic acids.
30% starch is digested in buccal cavity and 70% digested in duodenum by pancreatic amylase.

**34.** pH of saliva is:
(1) 6.7 (2) 7.4 (3) 8.0 (4) 2.5
The pH in the buccal cavity is around 6.5 to 6.8.

**35.** When a piece of bread is chewed it tastes sweet because
(1) The sugar contents are drawn out
(2) Saliva converts starch into maltose
(3) It does not taste sweet
(4) The taste buds are stimulated by chewing
As bread contains starch which breaks down into maltose by salivary amylase present in saliva. Maltose is a dissacharide which is sweet in taste.

**36.** Bread that has been partially digested by saliva tends to have a sweet taste. Which enzyme and substrate are involved?
(1) Pepsin and starch. (2) Pepsin and protein.
(3) Amylase and starch. (4) Amylase and protein.
As bread contains starch which breaks down into maltose by salivary amylase present in saliva. Maltose is a dissacharide which is sweet in taste.

**37.** When salivary amylase enters the stomach, it becomes
(1) Basic (2) Buffered (3) Activated (4) Denatured

The optimum pH of salivary amylase is 6.8 while gastric juice containing HCl present inside the stomach turns pH acidic (pH 1.8) . Thus in strong acidic condition salivary amylase get denatured.

**38.** Select the incorrect statement:
(1) About 60% starch is hydrolyzed in buccal cavity by the enzyme salivary amylase
(2) Salivary amylase acts on starch and is converted into maltose
(3) Salivary amylase acts at optimum pH 6.8
(4) Stomach stores the food for 4-5 hours.
30% starch is digested in buccal cavity and 70% digested in duodenum by pancreatic amylase.

**39.** Largest gland in the body of man is
(1) Liver (2) Pancreas (3) Gastric gland (4) Adrenal
Liver is the largest gland while pancreas is the 2nd largest gland.

**40.** Abnormal liver function in humans affects the digestion of
(1) Fats. (2) Sugars. (3) Proteins. (4) Starches
As liver secretes bile juice which contain bile salts, it plays a role in emulsification of fats

**41.** The organ which detoxifies toxic substances in the diet in human body is:
(1) Liver (2) Kidney (3) Lungs (4) Stomach
Liver plays an important role in detoxification.

**42.** If a person's liver fails, which process listed below would stop?
(1) Digestion of proteins.
(2) Destruction of red blood cells.
(3) Storage of starch between meals.
(4) Reabsorption of water from the digestive tract.
RBC breakdown takes place in liver by kupffer cells and also continued in spleen (graveyard of RBCs)

**43.** Products of the liver include
(1) pepsin, gastrin and bile. (2) bile, proteases and urea
(3) bile, urea and blood proteins. (4) proteases, amylases and lipase.
Liver secrets bile juice, urea is also synthesized in liver from ammonia by urea cycle and many blood proteins like albumin , clotting factors like prothrombin , fibrinogen etc are also synthesized in liver .Bile juice is devoid of any digestive enzymes.

**44.** High levels of toxins in the blood may indicate a problem with the functioning of the
(1) liver. (2) stomach. (3) pancreas. (4) small intestine.
Liver plays an important role in detoxification of blood.

**45.** The liver plays vital roles in all of the following systems **except** the
(1) nervous system. (2) digestive system.
(3) excretory system. (4) circulatory system.
Liver secrets bile juice (digestive system), synthesizes urea (excretory system) and clotting factors (circulatory system) out of which it does not play any significant role in nervous system.

**46.** Duct of the gall bladder is called:
(1) Hepatic duct (2) Common bile duct (3) Cystic duct (4) Stenson's duct
XI NCERT pg 261,1st para

**47.** Surgical removal of gall bladder in human beings would lead to
(1) Jaundice
(2) Increased acidity in the intestine
(3) Impairment of the digestion of fat
(4) Inhibition of production of bile salts and bile pigments
Bile is formed in liver and stored in gall bladder.Concentrated bile salt present in the bile juice performs emulsification of fats. The wall of the gall bladder absorbs water makes bile juice 20 times concentrated. Thus surgical removal of gall bladder (chole-cystectomy) results improper digestion of fats . Hence person undergone chole-cystectomy are recommended for low fat diet.

**48.** Fats in the duodenum lumen
(1) Stimulates gall bladder contraction (2) Inhibits gall bladder contraction
(3) Inhibits CCK secretion (4) Releases secretin
Presence of fats in duodenum stimulates secretion of hormone CCK that constricts gallbladder for emulsification of fats.

**49.** Alkaline nature of bile is due to
(1) NaCI (2) $NaHCO_3$ (3) KOH (4) NaOH
Bile juice contains bile salts (sodium glycocholate and sodium taurocholate) , bile pigments(bilirubin and biliverdin), NaHCO3, phospholipid , cholesterol and water . 80% of bile juice contains water.

**50.** The role of bile during digestion is to
(1) Stimulate the release of glycogen.
(2) Hydrolyze neutral fats into fatty acids.
(3) Catalyze the breakdown of peptides into amino acids.
(4) Break fats into droplets thereby increasing surface area.
As fats digesting enzyme are water soluble therefore firstly fats needs to convert into water soluble so it undergoes emulsification with the help of bile salt present in bile juice.

**51.** Mark the **incorrect** statement w.r.t bile juice
(1) Bile is yellowish green alkaline solution with large amount of water
(2) Bile released into the duodenum contains Bilirubin and Biliverdin.
(3) Bile contains enzymes for digesting lipids.
(4) Bile emulsifies fats into small micelles.
Bile juice does not contain any digesting enzyme.

**52.** Opening of hepatopancreatic duct into the duodenum is guarded by:
**OR**
Before opening into the duodenum, hepatopancreatic ampulla has a thickening called:
(1) Pyloric sphincter (2) Sphincter of Boyden
(3) Sphincter of Oddi (4) Cardiac Sphincter
Sphinchter of oddi is present at the opening of hepatopancreatic duct into duodenum. It controls the secretion of both bile juice and pancreatic juice.

**53.** Increasing the secretion of insulin would have which of the following effects?
(1) Decreased blood sugar (2) Decreased metabolic rate
(3) Increased protein synthesis (4) Increased digestion of carbohydrate
Insulin is a hypoglycemic hormone which decreases the blood glucose level.

**54.** If sodium bicarbonate ($NaHCO_3$) is **not** released as part of the pancreatic juice, the pH of the
(1) stomach will remain basic (2) pancreas will become acidic
(3) large intestine will become basic (4) small intestine will remain acidic
Sodium bicarbonate (alkali) present in the pancreatic juice reacts with the acidic chyme(food) and neutralizes it.

**55.** Which of the following is **not** a function of pancreatic juice?
(1) Raising pH. (2) Emulsification.
(3) Starch digestion. (4) Protein digestion.
Emulsification of fat is performed by bile salts present in bile juice.

**56.** Which of the following enzymes is **correctly** matched with its site of production?
(1) Pepsin – liver. (2) Ptyalin – stomach.
(3) Amylase – pancreas. (4) Trypsin – salivary glands.
Pancreatic amylase ( amylopsin) is synthesized by acinar cells of pancreas and it is present in pancreatic juice. Pepsin – Gastric glands. Ptyalin – salivary glands. Trypsin –pancreas.

**57.** Succus entericus is:
(1) A junction between ileum and large intestine.
(2) Intestinal juice
(3) Swelling in gut
(4) Appendix
Succus entericus is secreted by intestinal gland called crypts of Lieberkuhn present in the mucosa of small intestine.

**58.** Two glands that are responsible for secreting protein-digesting enzymes are:
(1) Salivary and gastric (2) Gastric and pancreas
(3) Thyroid and pancreas (4) Intestinal and thyroid
Gastric gland secretes gastric juice contains pepsin and pancreas secretes pancreatic juice containing trypsinogen , chymotrysinogen , procarboxypeptidase etc for digestion of proteins.

**59.** Lipase enzyme which helps in the digestion of fats is secreted by
(1) Gastric glands (2) Pancreatic glands (3) Intestinal glands (4) All of these
Gastric gland secretes gastric lipase (only in infants), in negligible amounts. Pancreatic gland secretes pancreatic lipase or steapsin .Intestinal gland secretes intestinal lipase.

**60.** Which of the following does not produce any digestive enzymes?
(1) Pancreas (2) Colon (3) Stomach (4) Duodenum
Colon is a part of large intestine which does not produce any digesting enzyme, hence no digestion takes place in large intestine.

**61.** The enzyme amylase is produced by which organs?
(1) Liver and duodenum. (2) Thyroid and pancreas.

(3) Salivary glands and liver. (4) Pancreas and salivary glands

Pancreas produces pancreatic amylase/alpha amylase /amylopsin whereas salivary gland produces salivary amylase/ptyalin/diastase.

**62.** Which of the following enzymes is stable at acidic pH

(1) Pepsin (2) Trypsin

(3) Chymotrypsin (4) Carboxypeptidase

The optimum pH for pepsin is 2 .

**63.** Pepsinogen is activated by

(1) Enterokinase (2) Low pH (3) Trypsin (4) Chymotrypsin

HCL present in the gastric juice makes pH in the stomach acidic.

**64.** Trypsin functions **best** in which of the following conditions?

(1) basic (2) acidic (3) neutral (4) low pH

Bicarbonate ions present in bile juice and pancreatic juice makes the condition slightly alkaline (7.8) in the small intestine .

**65.** Milk protein casein is coagulated by

(1) Pepsin (2) Trypsin

(3) Rennin (4) Both (1) and (3)

Both Rennin (in infants) and pepsin (in adults) digest the milk protein casein.

**66.** Pepsin differs from trypsin in that it digests

(1) Protein in alkaline medium in stomach

(2) Protein in acidic medium in duodenum

(3) Protein in acidic medium in stomach

(4) Protein in alkaline medium in duodenum

Pepsin digest protein in acidic medium in stomach while trypsin digest protein in alkaline medium in small intestine.

**67.** Match column I with column II

| **Column I** | **Column II** |
|---|---|
| (a) Pancreatic juice | (i) Bilirubin and biliverdin |
| (b) Intestinal juice | (ii) Maltase |
| (c) Bile juice | (iii) Trypsin, Carboxypeptidase |
| (d) Succus entericus | (iv) Enterokinase |

(1) a(iv), b(iii), c(ii), d(i) (2) a(iii), b(iv), c(ii), d(i)

(3) a(iii), b(iv), c(i), d(ii) (4) a(ii), b(iii), c(i), d(iv)

**68.** Which of the following reaction is not catalyzed by brush border enzymes?

(1) Maltose $\xrightarrow{\text{Maltase}}$ glucose + glucose (2) Lactose $\xrightarrow{\text{Lactase}}$ glucose + galactose

(3) Nucleotides $\xrightarrow{\text{Nucleotidase}}$ Nucleosides (4) Nucleic acids $\xrightarrow{\text{Nucleases}}$ Nucleotides

Brush border enzymes means enzymes of intestinal juice. Nuclease enzyme is present in the pancreatic juice and not in the succus entericus(small intestinal juice)

**69.** The enzymes of which of the following juice acts on the end products of reactions to form simple absorbable forms?

(1) Pancreatic juice (2) Succus entericus (3) Saliva (4) Bile juice

The enzyme present in succus entericus are such as maltase which act on maltose to produce two molecules of glucose (monomer) , lactase acts on lactose to produce glucose and galactose , sucrose to produce glucose and fructose, Nucleotidase and nucleosidase act on nucleotide to produce sugar and nitrogen base and phosphate.

**70.** All of the following are secreted in proenzyme form except:
(1) Trypsin (2) Chymotrypsin (3) Pepsin (4) Ribonuclease
Only Proteolytic enzymes are secreted in inactive state to prevent digestion of intracellular proteins. Ribonuclease digests RNA and not proteins.

**71.** Which of the following enzymes is correctly matched with its substrate?
(1) Amylase–fat. (2) Lipase–starch.
(3) Pepsin–protein. (4) Trypsin–glycogen.
Pepsin digest protein into peptones and proteoses. Amylase–starch. Lipase–fats. Trypsin–proteins.

**72.** In a demonstration, 10 grams of raw meat were suspended in an enzyme solution. After several hours the meat was weighed and was found to have a mass of 3 grams. The solution **most likely** contained:
(1) Bile (2) Pepsin (3) Maltase (4) Amylase
Raw meat mostly contains proteins and pepsin present in solution digested proteins and hence reduced the mass of meat..

**73.** Which of the following correctly matches a digestive enzyme with its source?
(1) Pepsin / pancreas (2) Bile / gall bladder
(3) Trypsin / stomach (4) Amylase / pancreas
Amylases are secreted in and pancreatic juice and saliva.

**74.** Which of the following enzymes is correctly matched with its source?
(1) Amylase – stomach (2) Peptidase – pancreas
(3) Trypsin – small intestine (4) Maltase – small intestine
Amylases are secreted in and pancreatic juice and saliva. Trypsin in pancreatic juice.Maltase is present in small intestinal juice/succus entericus.

**75.** Which two enzymes break down the same substrate?
(1) Trypsin and pepsin (2) Pepsin and peptidase
(3) Lipase and salivary amylase (4) Pancreatic amylase and maltase
Trypsin and pepsin both digest protein in peptones and proteoses .Pepsin digest proteins and peptidase digest byproducts of proteins ie small peptides. Amylase breaks starch and maltase breaks byproducts of starch ie maltose.

**76.** What would occur if sodium bicarbonate ions were removed from pancreatic juice?
(1) Decreased amounts of bile would be released.
(2) Increased $H_2O$ absorption would occur in the colon.
(3) The cells lining the small intestine would be damaged.
(4) Digestion of nutrients in the small intestine would increase.
Sodium bicarbonate (alkali ) and mucous protects the inner lining of small intestine from acidic condition.

**77.** Sodium bicarbonate ($NaHCO_3$) in pancreatic juice

(1) emulsifies fats. (2) activates pepsin.
(3) neutralizes acid chyme. (4) stimulates the release of insulin.
Sodium bicarbonate is alkaline in nature ,it reacts with acidic chyme to neutralize chyme.

**78.** Lactase converts lactose into:
(1) Glucose + maltose (2) Glucose + fructose
(3) Fructose (4) Glucose + galactose
Lactose is a disaccharide made up of glucose and galactose.

**79.** After ingestion, the first type of macromolecule to be worked on by enzymes in the human digestive system is
(1) Protein (2) Carbohydrate (3) Cholesterol (4) Glucose
Starch is the carbohydrate whose digestion starts in the buccal cavity by salivary amylase.

**80.** The **main** source of energy for the body's metabolic processes comes from the breakdown of
(1) Lipids. (2) Proteins. (3) Nucleic acids. (4) Carbohydrates.
Carbohydrates such as glucose serves as the primary source of energy while fats serves as secondary source of energy.

## Absorption

**81.** Which of the following is a nutritional monomer that can be transported in the blood?
(1) sucrose (2) maltose (3) fatty acid (4) dipeptide
Fatty acid is the monomer while rest are dimer.

**82.** The blood capillaries of intestinal villi cannot absorb:
(1) Glucose (2) Salts
(3) Fatty acids and glycerides (4) Amino acids
Fatty acid modified to form chylomicron in microvilli which is a hydrophilic lipid ,and due to its large size cannot be absorbed into the blood capillary. The lumen of lymphatic capillaries is quite broader and more permeable as compare to blood capillary , hence absorption of fatty acid takes place in lymphatic capillary of small intestine called lacteals .

**3.** Protein coated fat globules are called __(i)__, which are transported into __(ii)__ in villi.
(1) Cholesterol, capillaries (2) Chylomicrons, lacteals
(3) Chylomicrons, capillaries (4) Micelles, lacteals
Fatty acid modified to form chylomicron in microvilli which is a hydrophilic lipid ,and due to its large size cannot be absorbed into the blood capillary.

**84.** In villi some of the glycerol and fatty acids are combined to form fats, coated with proteins and then transported as chylomicrons to the
(1) Lacteals (2) Capillaries
(3) Lumen of small intestine (4) Lumen of large intestine
Fatty acid modified to form chylomicron in microvilli which is a hydrophilic lipid ,and due to its large size cannot be absorbed into the blood capillary.

**85.** Fats are transported from intestinal cells to blood plasma primarily in the form of
(1) Micelle (2) Chylomicrons (3) Triglycerides (4) Fatty acids
Fatty acid modified to form chylomicron in microvilli which is hydrophilic lipid ,

**86.** Absorbed fats are released into lacteals as
(1) Glycerol (2) Fatty acids (3) Monoglycerides (4) Chylomicrons.
Fatty acid modified to form chylomicron in microvilli which is a hydrophilic lipid ,and due to its large size cannot be absorbed into the blood capillary.

**87.** The physical digestion of fats is a result of the release of secretions from the
(1) pancreas (2) gall bladder
(3) small intestine (4) salivary glands
Chemical digestion takes place with the help of enzyme . Emulsification (physical or mechanical digestion ) of fats is carried out by bile salts and not enzymes.

**88.** One function of the lymphatic system is to
(1) deliver oxygen to body tissues. (2) store fluids during dehydration.
(3) absorb fats from the digestive system. (4) carry platelets to sites of vessel injury
Fatty acid modified to form chylomicron in microvilli which is a hydrophilic lipid ,and due to its large size cannot be absorbed into the blood capillary.

**89.** Which one of the following statement is **true** regarding digestion and absorption of food in humans?
(1) About 60% of starch is hydrolysed by salivary amylase in the mouth
(2) Oxyntic cells in our stomach secrete the proenzyme pepsinogen.
(3) Glucose and amino acids are absorbed through intestinal mucosa with the help of carrier ions like $Na^+$
(4) Chylomicrons are small lipoprotein particles that are transported from intestine into blood capillaries.
Glucose and some amino acids are absorbed with help of sodium ions by facilitated diffusion that is through channel protein without expenditure of energy. Such transport is called facilitated transport.

**90.** Which of the following nutrient(s) is/are absorbed in the stomach?
(1) Water (2) Simple sugar (3) Alcohol (4) All of these
In stomach sugar ,water and alcohol are primarily absorbed .

**91.** Which of the following are absorbed into the lymphatic system from the small intestine?
(1) Lipids. (2) Nucleotides.
(3) Amino acids. (4) Monosaccharides.
Fatty acid modified to form chylomicron in microvilli which is a hydrophilic lipid ,and due to its large size cannot be absorbed into the blood capillary.

**92.** Lacteals **primarily** absorb
(1) lipids. (2) proteins. (3) minerals. (4) carbohydrates.
Fatty acid modified to form chylomicron in microvilli which is a hydrophilic lipid ,and due to its large size cannot be absorbed into the blood capillary.

**93.** How does the digestion and absorption of fat differ from that of carbohydrates?
(1) Processing of fat does not require any digestive enzymes, whereas the processing of

carbohydrates does
(2) Fat absorption occurs in the stomach, whereas carbohydrates are absorbed from the small intestine
(3) Carbohydrates need to be emulsified before they can be digested, whereas fats do not
(4) Most absorbed fat first enters the lymphatic system, whereas carbohydrates directly enter the blood
Glucose being small and hydrophilic is easily absorbed in blood.Fatty acid modified to form chylomicron in microvilli which is a hydrophilic lipid ,and due to its large size cannot be absorbed into the blood capillary.

**94.** Absorption of **most** nutrients from the digestive tract occurs in the
(1) Liver. (2) Stomach.
(3) Pancreas. (4) Small intestine.
The surface area of small intestine is 600 times greater than other parts of digestive tract. Hence maximum digestion and absorption takes place.

**95.** Most digestion and maximum absorption of food takes place in the
(1) Stomach (2) Small intestine (3) Caecum (4) Large intestine
The surface area of small intestine is 600 times greater than other parts of digestive tract. Hence maximum digestion and absorption takes place.

**96.** The functional units for absorption of digested food are
(1) Crypts of Lieberkuhn (2) Peyer's patches
(3) Villi (4) Brunner's glands
Villi are the foldings of the mucosa layer of small intestine on which brush border columnar epithelium containing microvilli is present.

**97.** An example of absorption is the:
(1) Movement of food by peristalsis.
(2) Active transport of glucose into a villus.
(3) Hydrolysis of a peptide into amino acids.
(4) Release of secretin in the presence of HCl.
The absorption of glucose takes place passively, actively and via facilitated transport.

**Disorder of digestive system**

**98.** In jaundice, skin and eyes turn yellow due to the deposition of bile pigments. The disease is due to malfunctioning of which organ?
(1) Liver (2) Intestine (3) Brain (4) Pancreas
During jaundice liver fails to release bile due to obstruction of hepatic ducts. Hence conc. of bile pigments in blood increases causing many body parts to appear yellowish.

**99.** Vomiting is a reflex action and is controlled by the vomit centre. This is present in _____
(1) Cerebrum (2) Hypothalamus (3) Medulla (4) Cerebellum
Medulla has vomit or regurgitation centre.

**100.** In which of the following disorder of digestive system, there is an abnormal frequency of bowel movement and increased liquidity of the faecal discharge?
(1) Vomiting (2) Diarrhoea (3) Constipation (4) Indigestion

In case of diarrhoea the stool/faeces is watery with loss of electrolytes results in dehydration. It generally occurs when there is certain kind of infection in the digestive tract.

**101.** Which of the following can cause indigestion?
(1) Inadequate enzyme secretion (2) Food Poisoning and spicy food.
(3) Anxiety and over eating (4) All of these
Spicy food results in excess secretion of gastric juice results in acidity in stomach and can lead to stomachache, whereas in case of anxiety sympathetic nervous system gets activated which decreases the digestive secretion and peristalsis.

**102.** A prolonged constipation may cause:
(1) Hemorrhoids (2) Ulcers (3) Cholera (4) Dysentery
Swollen and inflamed veins in the rectum and anus that cause discomfort and bleeding. Hemorrhoids are usually caused due to constipation .

## LEVEL – II

**Nutrition**

**1.** Largest reserve of energy in body is stored as
(1) Liver glycogen (2) Muscle glycogen (3) Adipose tissue (4) Blood glucose
Adipose tissue stores fats. Fats even though are the secondary source of energy but on metabolism produces more energy than carbohydrates.

**2.** Find the odd one out:
(1) Vit K, Prothrombin (2) Zinc, Carbonic Anhydrase
(3) Vitamin $B_1$, Paralysis (4) Sulphur, Phosphatase
Phosphatase requires Mg2+ ions for activation.

**3.** Which one is wrong about vitamins?
(1) Vitamins help in cellular metabolism
(2) Vitamins are accessory food factors
(3) Plants can synthesize vitamins but animals are unable to synthesize vitamins except vitamin D
(4) Citrus fruits are rich source of vitamin A
Citrus fruits are rich in vitamin C.

**4.** Tonics made out of the liver are very effective curing haemopoietic disorders because:
(1) They contain proteins (2) They contain RBCs
(3) They contain bile juice (4) They contain vitamin $B_{12}$
Liver stores vitamins like A,D,E,K and Vit $B_{12}$. Vitamin $B_{12}$ helps in the maturation of RBC.

**Digestive system (Alimentary Canal)**

**5.** The link between the tongue and the buccal floor is:
(1) Labial frenulum (2) Lingual frenulum
(3) Lingual papilla (4) Sulcus terminalis
Lingual frenulum (fibrous connective tissue) attaches the tongue to the floor of the buccal cavity and it restricts the posterior movement of tongue.

**6.** Which of the following papillae are without taste buds in human tongue?
(1) Vallate (2) Fungiforrn (3) Fusiform (4) Filiform

Filiform papillae contain the taste buds only in children and it is absent in adult.

**7.** Dental formula for the monophyodont teeth of human is:

(1) $\frac{0021}{0021}$ (2) $\frac{0003}{0003}$ (3) $\frac{2120}{2120}$ (4) $\frac{2102}{2102}$

Premolar (8) and molar (4) are monophyodont teeth in human and it is absent in milk teeth.

**8.** The hard chewing surface of teeth which helps in mastication of food is called_____

(1) Dentine (2) Cementum

(3) Enamel (4) Both (1) and (2)

Enamel is the white coated hardest substance present around the dentine of teeth in the human body. Enamel consist of calcium phosphate .

**9.** Lower molars in human dentition have :

(1) Four roots (2) Three roots (3) Two roots (4) Single root

Upper or maxillary molars have 3 roots whereas lower or mandibular molars have 2 roots.

**10.** Enamel part of tooth is secreted by_____, and it is_____.

(1) Odontoblast, mesodermal (2) Ameloblast, mesodermal

(3) Odontoblast, ectodermal (4) Ameloblast, ectodermal

Tooth buds made of 2 stem cells layer- odontoblast (mesodermal ) secretes dentine and ameloblast (ectodermal ) secretes enamel of tooth.

**11.** Lower esophageal sphincter

(1) Has no tonic activity

(2) Has a tone which is provided by the sympathetic system

(3) Relaxes on increasing abdominal pressure

(4) Relaxes ahead of the peristaltic wave

Lower esophageal sphincter ie cardiac sphincter is made of circular smooth muscle and its tonicity depends on the state of muscle whether it's in contracted or relaxed state largely controlled by parasympathetic neural system.

**12.** First and largest chamber in stomach of ruminants like cattle, buffalo, sheep, goat and camel is:

(1) Reticulum (2) Rumen (3) Omasum (4) Abomasum

Ruminants have compound stomach with 4 defined chambers such as rumen, omasum, abomasum and reticulum.

**13.** How many teeth in man are monophydont?

(1) 8 premolars 4 molars (2) 2 premolars 6 molars

(3) 4 premolars 2 molars (4) 4 canines 8 premolars

Premolar (8) and molar (4) are monophyodont teeth in human and it is absent in milk teeth.

**14.** Types of teeth in human are:

(1) Homodont, Lophodont, Diphyodont

(2) Heterodont, Selenodont, Monophyodont

(3) Diphyodont, Thecodont, Heterodont

(4) Diphyodont, Heterodont, Acrodont

Mammalian dentition is mostly Diphyodont, Thecodont, Heterodont

**15.** Which of the following can be taken as true stomach in ruminants?
(1) Rumen (2) Reticulum (3) Omasum (4) Abomasum
Abomasum secretes digestive juice.

**16.** Odd one out
(1) Plicae circularis (2) Valves of Kerkering
(3) Valvulae conniventes (4) Taenia coli.
Taenia coli are the 3 bands of longitudinal muscles on large intestine. Plicae circularis or Valves of Kerkering or Valvulae conniventes , associated with small intestine for segmentation movement.

**17.** The peristaltic movement of alimentary canal is controlled by:
(1) Myenteric plexus (2) Auerbach plexus
(3) Meissner's plexus (4) Both (1) and (2)
Auerbach plexus is also called myenteric plexus which is a parasympathetic ganglion that stimulates peristalsis.

**18.** Ileum is characterized by the presence of:
(1) Brunner's glands and villi (2) Brunner's gland and Peyer's patches
(3) Peyer's patches and villi (4) Brunner's gland and Taeniae coli
Villi is mucosal fold of entire small intestine. Brunner's glands are located in sub mucosa of duodenum only Taeniae coli is longitudinal muscles of large intestine. Peyers patches is mucosal associated lymphoid tissue which are a type of secondary lymphoid organ.

**19.** Which of the following statement is correct regarding motility of alimentary canal?
(1) Peristalsis plays a major role in propelling food through the stomach to large intestine.
(2) Segmentation is the most common type of intestinal contraction
(3) Churning movement is the segmentation of small intestine
(4) Segmentation is required during gastric emptying.
Segmental contraction is a type of intestinal motility of small intestine to slow down food passage for better digestion and absorption. Peristalsis plays a major role in propelling food through the oesophagus to large intestine. Churning movement is the movement of stomach.

**20.** Paneth cells are found in:
(1) Crypts of Lieberkuhn (2) Peyer's patches
(3) Islets of Langerhans (4) Gastric glands
Paneth cells found in mucosa of small intestine secrete lysozyme which is an antibacterial enzyme .

**21.** Location of the Brunner's gland is
(1) Mucosa, duodenum (2) Mucosa ileum
(3) Submucosa duodenum (4) Submucosa, ileum
Brunner's glands are located in sub mucosa of duodenum only.

**22.** Brunner's glands are intestinal glands and secrete
(1) Mucus (2) Enzymes
(3) Enzymes and mucus (4) None of these
Bicarbonates (for neutralization of chyme) and Mucus protects the inner lining of small intestine.

**23.** Brunner's gland are located in
(1) Serosa of duodenum (2) Muscularis of large intestine
(3) Submucosa of duodenum (4) Mucosa of jejunum.
Brunner's glands are located in sub mucosa of duodenum only.

**24.** Auerbach's plexus is present in:
(1) Submucosa
(2) Between mucosa and submucosa
(3) Between circular and longitudinal muscles of muscularis interna
(4) Between circular and longitudinal muscles of muscularis externa
Auerbachs plexus is the parasympathetic ganglia present withun the muscularis externa to control the peristalsis.

**25.** Oblique muscle layer is present in
(1) Stomach (2) Duodenum (3) Colon (4) All of these
The muscularis layer of stomach has 3 layer of smooth muscles that is outer longitudinal , middle circular and inner oblique smooth muscles.

**26.** Crypts of Lieberkuhn are present in:
(1) Pancreas and secrete pancreatic juice
(2) Small intestine and secrete digestive enzymes
(3) Stomach and secrete dilute HCl
(4) Stomach and secrete trypsin
Crypts of leiberkehn also called intestinal gland secrete small intestinal juice containing intestinal enzymes.

**27.** *E. coli* are beneficial to humans because they
(1) Convert pepsinogen to pepsin.
(2) Produce vitamins and amino acids.
(3) Absorb water from the large intestine.
(4) Synthesize urea from the breakdown of amino acids.
E.coli (a symbiotic bacterium) produces vitamins like vitamin B-complex ,vitamin K , and few amino acids like phenyl-alanine,alanine , threonine.

**Digestion**

**28.** The purpose of physical digestion is to
(1) hydrolyze large molecules. (2) increase the amount of feces.
(3) increase the surface area of food (4) slow the action of digestive enzymes.
Physical digestion by chewing or churning or emulsification break down the large food particles into small particles, so that enzyme get more surface area to act.

**29.** Chewing food aids digestion by
(1) stimulating the release of bile.
(2) increasing the surface area of the food
(3) breaking up large protein molecules into peptides.
(4) completing the chemical breakdown of carbohydrates
Physical digestion by chewing or churning or emulsification break down the large food particles into small particles, so that enzyme get more surface area to act.

**30.** Which of the following statement is true?
(1) Pepsin and HCl activate inactive pepsinogen into active pepsin.
(2) Pepsin is an active proteolyic enzyme and it does not act, if pH rises above 2.
(3) Intrinsic factor is required for the activity of pepsin.
(4) Activity of pepsin continues in the jejunum part of small intestine.
Pepsin requires low ph for activation (pH1.5 to pH2). Pepsin being autocatalytic converts inactive pepsinogen to active pepsin.

**31.** Which of the following will increase the gastric juice secretion?
(1) Sympathetic stimulation (2) Vagal stimulation
(3) Excess of proteins in diet (4) Both (2) and (3)
Vagus nerve and parasympathetic nerves effects are stimulatory for digestion and sympathetic is inhibitory for digestion. Presence of proteins in stomach stimulates secretion of hormone gastrin that stimulates secretion of gastric juice.

**32.** Chyme formed in stomach is further transformed into
(1) Chyle (2) Colloidal material
(3) Soft solid substance (4) Fats
Chyme is the acidic liquid paste formed in stomach that on neutralization and digestion in small intestine is converted to alkaline chlye.

**33.** In small intestine, pH value is
(1) 7.00 (2) 8.00 (3) 8.5-9.00 (4) 2.5-4.5
Due to secretion of pancreatic juice ,intestinal juice and bile juice containing bicarbonate ions.

**34.** True about high roughage in diet is
(1) Decreases stool transit time (2) Increase stool transit time
(3) Normalize stool transit time (4) No effect on stool transit time
Roughage/cellulose/fibre decreases stool transit time ie makes stool travel faster through large intestine to prevent excessive absorption of water and electrolytes that may cause constipation.

**35.** True regarding action of alpha amylase
(1) Breaks glucose from carbohydrate end (2) Cleaves only at $\alpha 1 - 4$
(3) Cleaves only at $\alpha$ 1 – 6 (4) both (2) & (3)
Alpha amylase is cleaves glycosidic bonds of starch and starch being branched as both $\alpha 1 - 4$ and $\alpha$ 1 – 6 linkages.

**36.** Amylase is synthesized at the
(1) Nucleus. (2) Ribosome.
(3) Lysosome. (4) Mitochondrion.
Enzymes are made up of proteins and proteins are synthesized in ribosome, as ribosome are considered as protein factory.

**37.** Eating which of the following would slow the rate of chemical digestion in the mouth?
(1) Cheese. (2) Ice cream.
(3) Potato chips. (4) Bread with butter.
Ice cream shall lower the temperature of mouth and enzymes being proteins are temperature sensitive and hence its activity shall be lowered.

**38.** In humans, the bacteria *E. coli* are **normally** found within the
(1) Colon. (2) Mouth.
(3) Pancreas. (4) Small intestine.
Caecum is a blind sac pouch which are associated with symbiotic bacteria like E.coli and from caecum it spreads in colon.

**39.** Bile acid has a detergent action due to
(1) Formation of soap (2) Formation of zwitter ion
(3) Amphipathic nature of bile acids (4) Formation of medium chain triglycerides
Bile salts being derivative of cholesterol, has properties of lipids as it have one end hydrophobic and other end hydrophilic ,shows detergent like action.

**40.** The following events take place after eating a protein-rich meal. Place these events in the correct order for digestion.
1. The pancreas releases sodium bicarbonate ($NaHCO_3$).
2. Pepsinogen is converted into pepsin.
3. Gastrin is released into the bloodstream.
4. Acid chyme stimulates the release of secretin.
(1) 3, 2, 4, 1. (2) 3, 4, 2, 1. (3) 4, 2, 3, 1. (4) 2, 4, 1, 3

**41.** Enterokinase or enteropeptidase found in intestinal juice helps in converting:
(1) Casein into paracasein (2) Pro-rennin into rennin
(3) Trypsinogen into trypsin (4) Proteins into peptides
Enterokinase or enteropeptidase found in intestinal juice is an activator that converts inactive Trypsinogen into active trypsin

**42.** Which of the following is not a brush border enzyme?
(1) Maltase (2) Lactase (3) Sucrase (4) Amylase.
Amylase is found in salivary and intestinal juice.

**43.** Which of the following statement is not true regarding protein digestion?
(1) Most protein digestion occurs principally in the upper small intestine
(2) Trypsin digest collagen proteins present in meat
(3) Pepsin only provide 10–20% of total protein digestion
(4) Last protein digestion takes place by the brush border cells of small intestine.
Meat being muscle is not rich with collagen and Collagen resist action of both pepsin and trypsin.

**44.** Which enzyme would be used for curdling of milk in adult humans?
(1) Rennin (2) Pepsin (3) Lactase (4) Both (2) & (3).
In infants, Rennin digest the casein into paracasein which further reacts with calcium to form calcium para-caseinate, thus para-caseinate is responsible for curdling of milk. The same is done in adults by pepsin.

**45.** Which of the following carries out chemical digestion?
(1) Insulin. (2) Gastrin. (3) Trypsin. (4) Secretin.
Digestion occurs with the help of enzyme is called chemical digestion. Trypsin is a proteolytic enzyme. All others are hormones.

**46.** In human gut, in order of secretion, the proteolytic enzymes are

(1) Rennin, trypsin, steapsin (2) Pepsin, trypsin, dipeptidase
(3) Trypsin, steapsin, dipeptidase (4) Trypsin, chymotrypsin, steapsin
Protein digesting enzymes are called proteolytic enzymes. Pepsin (stomach ), trypsin (Pancreas), dipeptidase (intestinal glands). Steapsin means pancreatic lipase.

**47.** Chymotrypsinogen is a
(1) Zymogen (2) Carboxypeptidase (3) Transaminase (4) Chymotrypsin
Zymogen are inactivated form of enzyme. Eg. Pepsinogen, trypsinogen, chymotrypsinogen, pro-carboxypeptidase, pro-rennin etc.

**48.** Which of the following would prevent maltase from forming an enzyme-substrate complex?
(1) pH of 8.5 (2) A competitive inhibitor
(3) Increased production of bile (4) An increase in substrate concentration
Maltase an intestinal enzyme woks best in alkaline pH. Enzymatic activity is inhibited by presence of random inhibitors.

**Disease**

**49.** Cholecystitis refers to inflammation of:
(1) Gall bladder (2) Stomach (3) Spleen (4) Lungs.
Gall bladder stores bile and its duct is called cystic duct. Inflammation of it is called cholecystitis.

**50.** Tonsils are enlargements of
(1) Lymphoid tissue (2) Adenoid tissue
(3) Larynx (4) Sub-lingual gland
Tonsils are the secondary lymphoid organ present in the wall of pharynx.

**51.** The final sugars in intestinal chyme are
(1) Glucose and fructose (2) Ribose and mannose
(3) Ribose and xylulose (4) Xylulose and fructose
Food being rich with starch and hence final carbohydrate breakdown product is mostly glucose.

**52.** Gastric secretions stimulated by all of the following except
(1) Secretin (2) Gastric distension
(3) Gastrin (4) Vagal stimulus
Secretin stimulates liver to secrete bile juice, inhibits gastric motility and stimulate pancreas to secrete bicarbonate and water.

**Digestive glands**

**53.** The maximum amount of saliva is secreted by
(1) Sub maxillary glands (2) Sub lingual glands
(3) Parotid glands (4) Both (2) and (3).
Sub maxillary or sub mandibular gland secrete about 70% of saliva.

**54.** Duct of gall bladder is called:

(1) Hepatic duct (2) Bile duct
(3) Ductus choledochus (4) Cystic duct
Duct of gall bladder is called cystic duct that unites with common hepatic duct to form common bile duct.

**55.** Which of these is not a component of saliva?
(1) Electrolytes $Na^+$, $K^+$, $Cl^-$ and $HCO^{3-}$ ions (2) Ptyalin/α-salivary amylase
(3) Mucin, lysozyme and thiocyanate ions (4) Antibody (IgG)
Saliva contains IgA antibody.

**56.** Which of the following statement(s) are **incorrect**?
(i) About 100 – 500 ml of saliva is secreted per day
(ii) Saliva is acidic with a pH ranging from 3 – 5.0
(iii) Salivary glands are situated just outside the buccal cavity
(iv) Saliva is produced by 3 pairs of salivary glands
(1) (i), (iii), (iv) (2) (ii), (iii) (3) Only (ii) (4) (i) & (ii)
About 1 to 2 litre saliva is secreted per day and pH of saliva is around 6.5 to 6.8

**57.** Which of the following is a function of insulin?
(1) Initiating the 'fight or flight' response.
(2) Decreasing glucose concentration in the blood
(3) Increasing the calcium ions concentration in the blood
(4) Decreasing the sodium ions concentration in the blood
Insulin is a hypoglycemic hormone by stimulating especially the liver cells to absorb glucose.

**58.** Blood glucose levels are lowered by insulin because it stimulates
(1) Gluconeogenesis.
(2) The uptake of glucose by cells.
(3) The conversion of glucose to fatty acids.
(4) The conversion of glucose to amino acids.
Insulin is a hypoglycemic hormone by stimulating especially the liver cells to absorb glucose.

**59.** Which of the following secretions has a very high pH?
(1) Gastric juice (2) Pancreatic juice
(3) Bile in gall bladder (4) Saliva
As pancreatic juice contain bicarbonate ions its pH ranges from 7.5 to 8.Bile secreted by liver is alkaline but when stored in gall bladder, it undergoes concentration and that lowers its pH value.

**60.** Which of the following statement is not true regarding pancreatic secretion?
(1) Presence of HCl in chyme stimulate secretin secretion, which in turn stimulate pancreatic secretion
(2) Presence of proteoses and peptones increases cholecystokinin, which in turn stimulate pancreatic secretion
(3) Presence of long chain fatty acids also stimulates pancreatic secretion.
(4) Secretin stimulates secretion of pancreatic enzyme from the acinar cell.
Secretin stimulates the pancreas acinar cells to secrete water and bicarbonate ions.

## Absorption

**61.** Which of the following process is not involved in the absorption of amino acids?
(1) Secondary active transport (2) $Na^+$ – couple transport
(3) Facilitated diffusion (4) $K^+$ – couple transport.
Amino acids are absorbed passively, actively and via facilitated transport done with help of $Na^+$ – couple transport.

**62.** Which of the following process is not involved in the absorption of amino acids?
(1) Secondary active transport (2) $Na^+$ – couple transport
(3) Facilitated diffusion (4) $K^+$ – couple transport.
Amino acids are absorbed passively, actively and via facilitated transport done with help of $Na^+$ – couple transport .

**63.** Which of the following are absorbed by the mechanism of facilitated transport with the help of the carrier ions like $Na^+$?
(1) Glucose and fructose (2) Glucose and some amino acids
(3) Fats and glucose (4) Fats and amino acids
Glucose and some amino acids are absorbed by facilitated transport with the help of carrier ions like Na+.

**64.** $Na^+$ dependent transport is responsible for the absorption of all of the following except:
(1) Amino acid (2) Glucose (3) Bile salt (4) Vitamin A.
Vitamin A is a fat- soluble vitamin generally absorbed by process called diffusion.

**65.** All of the following are absorbed in the large intestine except:
(1) Sodium (2) Fats (3) Water (4) Vitamin K.
Large intestine only absorbs vitamins , drugs ,water and minerals.

## Regulation of digestion

**66.** Mark the incorrect match
(1) Acetylcholine – Increases secretion of pancreatic enzyme
(2) Cholecystokinin – Increases secretion of pancreatic enzyme
(3) Secretin – Increases secretion of bicarbonate ions and pancreatic enzymes
(4) Secretin – No stimulation of enzyme secretion.
Secretion of pancreatic enzyme is stimulated by PZ/ CCK hormone.

**67.** All of the following effects are caused by secretin except:
(1) Stimulation of pancreatic bicarbonate secretion
(2) Increases bile acid secretion
(3) Stimulate CCK
(4) Inhibit gastric motility.
CCK is another hormone whose secretion is stimulated due to presence of neutralised chyme in duodenum rich in proteins and fats.

**68.** Following are gastrointestinal hormones except
(1) CCK – PZ (2) GIP (3) Motilin (4) Chymotrypsin
Chymotrypsin is an enzyme present in pancreatic juice.

**69.** Mark the odd one out:
(1) Gastrin (2) Trypsin (3) Secretin (4) Enterocrinin
Trypsin is enzyme whereas rest are hormone.

**70.** Enterocrinin acts on
(1) Gall bladder (2) Intestinal glands (3) Trypsinogen (4) Gastric glands
Enterocrinin hormone stimulates intestinal gland/crypts of leiberkehn to secrete intestinal juice also called succus entericus.

**71.** Which of the following is absorbed in the colon?
(1) Iron (2) Proteins (3) Bile salts (4) Electrolytes
Iron absorb in duodenum
Bile salts absorbs in ileum of small intestine
Proteins being macromolecules cannot be absorbed.
Electrolytes , water, vitamins and drugs are absorbed in large intestine . Colon is a part of large intestine.

**72.** Which of the following hormones inhibit the release of gastric juice?
(1) Enterogastrone (2) GIP
(3) Both (1) & (2) (4) Enterocrinin
Secretin, CCK, GIP are collectively called as enterogastrone that inhibits gastric secretion.Only gastrin hormone stimulates gastric secretion.

**73.** Pancreatic juice rich in water and electrolytes, poor in enzymes is secreted in response to
(1) Pancreozymin (2) Cholecystokinin (3) Secretin (4) Proteins
Secretin stimulates pancreas to release pancreatic juice rich with water, bicarbonates etc but devoid of enzymes.

**74.** Gastrin, Secretin, choleocystokinin (CCK) and gastric inhibitory peptide (GIP) are four major peptide hormones secreted by-
(1) Only stomach (2) Only small intestine
(3) Gastro-intestinal tract (4) Only pancreas
These hormones are called entero-endocrine hormone secreted by entero-endocrine cell present in the lining of gastro-intestinal tract.

**75.** The release of cholecystokinin (CCK) would **most likely** be triggered after a meal of
(1) fruit. (2) meat. (3) bread (4) lettuce.
CCK are stimulated by protein and some fats in the intestine. Meat contains high amount of proteins and fats.

**76.** Bile is released as a result of
(1) gastrin entering the blood
(2) sympathetic nerves being stimulated
(3) the duodenum secreting CCK (cholecystokinin).
(4) the presence of carbohydrates in the digestive tract.
CCK stimulates cystic duct of gall bladder to release bile juice.

**77.** A piece of stomach wall is grafted into the skin of a mammal. The presence of food in the stomach causes this patch of stomach wall on the skin to produce gastric juice. This is an evidence that the secretion of gastric juice is most likely brought about by
(1) Peristalsis.

(2) Nervous stimulation.
(3) The secretion of a hormone.
(4) Mechanical stimulation of the stomach wall
The presence of food in the stomach causes secretion of hormone gastrin that stimulates gastric glands (and in this case gastric glands present on the skin ) to produce gastric juice.

**78.** Which of the following supports the idea that the secretion of enzymes from the pancreas is controlled by hormones?
(1) The sight and smell of food causes the pancreas to secrete enzymes.
(2) If the nerves leading to the pancreas are cut, no enzymes are secreted.
(3) If there is no food in the stomach, the pancreas will not secrete enzymes.
(4) If the nerves leading to the pancreas are cut and weak acid is placed in the intestine, the pancreas secretes enzymes.
Acidic chyme stimulates the secretion of secretin . Secretin stimulates pancreas to secrete water and bicarbonate of pancreatic juice .After neutralization of chyme, hormone PZ shall be secreted that shall stimulate secretion of pancreatic enzymes.

**79.** The secretion of cholecystokinin (CCK) will be stimulated by the presence of
(1) Polypeptides and glucose.
(2) Partially digested protein and fats.
(3) Partially digested starch and water.
(4) Completely digested carbohydrates and water.
Proteins and fats in intestine stimulates the secretion of CCK hormone which stimulates gall bladder contraction to secrete bile juice.

## PREVIOUS YEARS QUESTIONS

**1.** An adolescent human below 17 years of age normally has dental formula as:
(1) $\frac{2,1,2,0}{2,1,2,0}$ (2) $\frac{2,1,2,2}{2,1,2,2}$ (3) $\frac{2,1,3,2}{2,1,3,2}$ (4) $\frac{2,2,3,2}{2,2,3,2}$.
Third molar (wisdom teeth) comes after 17 years of age.

**2.** Brunner's glands are found in:
**[Kerala PMT 2001]**
(1) Wall of rectum (2) Mucosa of ileum
(3) Submucosa of stomach (4) Submucosa of duodenum.
Brunner's glands are found in Submucosa of duodenum only .

**3.** Identify the correct set which shows the name of the enzymes from where it is secreted and substrate upon which it acts: **[Orissa JEE 2002]**
(1) Pepsin – Stomach wall – Caesin
(2) Ptyalin – Intestine – Maltose
(3) Chymotrypsin – Salivary gland – Lactose
(4) Ptyalin – Pancreas – Lipid.
Ptyalin – Buccal cavity – Starch . Chymotrypsin – Pancreas – Proteose.

**4.** The release of pancreatic juice from the pancreas in a mammal is stimulated by:
(1) Secretin (2) Trypsinogen

(3) Enterokinase (4) Cholecystokinin.

Secretin stimulates release of pancreatic juice rich with water and bicarbonates from the pancreas .

**5.** Match the type of cells listed under Column I and their secretions given under Column II Choose the answer which gives the correct combination of the alphabets of the two columns. **[Karnataka CET 2003]**

| | **Column I (Type of cells)** | | **Column II (Secretions)** |
|---|---|---|---|
| A | Peptic cells | p | Mucus |
| B | Oxyntic cells | q | Alkaline fluid |
| C | Goblet cells | r | Pro-enzymes |
| | | s | HCl |

(1) A = q, B = p, C = s (2) A= s, B = r, C = q

(3) A = s, B = p, C = q (4) A = r, B = s, C = p

**6.** The wave like contraction of the smooth muscles of digestive tract is called: **[CMC, Vellore 2003]**

(1) Peristalsis (2) Deglutition (3) Fibrillation (4) Mastication.

Peristalsis is the chief muscular movement from oesophagus to large intestine.

**7.** Which one of the **following** pairs of the kind of cells and their secretion is correctly matched?

(1) Oxyntic cells – a secretion with pH between 2.0 and 3.0 **[AIIMS 2006]**

(2) Kupffer cells – a digestive enzyme that hydrolyses nucleic acids

(3) Sebaceous glands – a secretion that evaporates for cooling

(4) Alpha cells of islets of Langerhans – secretion that decreases blood sugar level.

Oxyntic cells secrete HCl which makes the pH of the stomach acidic (pH 1.5 to 2). Kupffer cells-macrophages of liver. Sebaceous glands-secretes sebum or oil that does not evaporate, sweat evaporates. Alpha cells of islets of Langerhans secrete glucagon that increases blood sugar level.

**8.** Examination of blood of a person suspected of having anaemia, shows large, immature, and nucleated erythrocytes without haemoglobin. Supplementing his diet with which of the following, is likely to alleviate his symptoms? **[CBSE 2006]**

(1) Thiamine (2) Riboflavin

(3) Iron compounds (4) Folic acid and cobalamin.

Folic acid (Vitamin B9) and cobalamin (Vitamin B12) are required for the maturation of RBC in bone marrow..

**9.** Oxyntic cells are located in **[DPMT 2006]**

(1) Islets of Langerhans (2) Kidney and secrete rennin

(3) Gastric epithelium and secrete HCl (4) Gastric epithelium and secrete pepsin.

Oxyntic cells or parietal cells are part of gastric gland.

**10.** Enterogastrone is **[CPMT 2007]**

(1) Enzyme secreted by mucosa

(2) Hormone secreted by gastric mucosa

(3) Hormone secreted by intestinal mucosa

(4) Secreted by endocrine gland related to digestion.

Hormone CCK, secretin and GIP are hormones secreted by mucosa of small intestine and are collectively called as enterogastrone as they all inhibit gastric motility.

**11.** Find out the correctly matched pair: **[Kerala PMT 2007]**

(1) HCl – Goblet cells (2) Ptyalin – Acinar cells

(3) Mucus – Oxyntic cells (4) Pepsinogen – Zymogenic cell

Pepsinogen is secreted by zymogenic cells of gastric glands. HCl – Oxyntic cells . Ptyalin – Salivary glands . Mucus – Mucus neck cells or goblet cells

**12.** Find out the correct match: **[Kerala PMT 2007]**

| | **Column I** | | **Column II** |
|---|---|---|---|
| A | Hepatic lobule | 1 | Submucosal glands |
| B | Brunner's glands | 2 | Base of villi |
| C | Crypts of Lieberkuhn | 3 | Glisson's capsule |
| D | Sphincter of Oddi | 4 | Gall bladder |
| E | Cystic duct | 5 | Hepato-pancreatic duct |
| | | 6 | Serous glands. |

(1) A = 3, B = 4, C = 2, D = 5, E = 1 (2) A = 3, B = 1, C = 2, D = 5, E = 4

(3) A = 4, B = 6, C = 5, D = 2, E = 1 (4) A = 4, B = 2, C = 6, D = 5, E = 3

**13.** Bile can be prevented to release into the duodenum by: **[CMC, Vellore 2007]**

(1) Pyloric valve (2) Sphincter of Oddi

(3) Cardiac sphincter (4) Sphincter of Boyden.

Sphincter of oddi is present at the junction of hepato-pancreatic duct and it controls the secretion of bile juice and pancreatic juice into the duodenum.

**14.** What is a correct dental formula for the child falling under age group 5-6 yrs:

**[Gujarat CET 2007]**

(1) i = 2/2, c = 1/1, pm = 0/0, m = 2/2 (2) i = 2/2, c = 1/1, pm = 2/2, m = 3/3

(3) i = 1/1, c = 2/2, pm = 2/2, m = 3/3 (4) i = 2/2, c = 2/2, pm = 1/1, m =3/3

Childrens falling under the age of 6 have milky teeth which are 20 in number. In milk teeth premolar and 3rd molar (wisdom teeth) are absent.

**15.** Which of the following is the correct matching of the site of action on the given substrate, the enzyme acting upon it and the end product? **[CBSE 2008]**

(1) Stomach : Fat $\xrightarrow{\text{Lipase}}$ Micelles

(2) Duodenum : Triglycerides $\xrightarrow{\text{Trypsin}}$ Monoglycerides

(3) Small intestine : Starch $\xrightarrow{\alpha\text{–amylase}}$ Disaccharide(Maltose)

(4) Small intestine : Proteins $\xrightarrow{\text{Pepsin}}$ Amino acids .

Pancreatic amylase is also called as alpha amylase. Fat undergo emulsification in duodenum in presence of bile salts and not lipase .Trypsin acts on proteins and not fats .Pepsin acts in stomach .

**16.** What will happen if the secretion of parietal cells of the gastric glands is blocked with an inhibitor? **[CBSE 2008]**

(1) Gastric juice will be deficient in chymotrypsin

(2) Gastric juice will be deficient in pepsinogen

(3) In the absence of HCl secretion, inactive pepsinogen is not converted into the active enzyme pepsin

(4) Enterokinase will not be released from the duodenal mucosa and so trypsinogen is not converted to trypsin.
Parietal cells secretes HCl to convert pepsinogen to pepsin. So absence of parietal cells shall cause deficiency of pepsin .

**17.** Procarboxypeptidase is an enzyme secreted by
(1) salivary gland (2) gall bladder (3) intestine (4) pancreas
Pancreatic juice is rich with proteolytic enzymes like trypsinogen, chymptrypsinogen, procarboxypeptidase etc.

**18.** Dentition in man is **[Kerala PMT 2009]**
(1) thecodont, heterodont and polyphyodont (2) thecodont homodont and polyphodont
(3) thecodont, heterodont and diphyodont (4) acrodont, heterodont and diphyodont
Dentition in man is thecodont (tooth in socket of jaw bone ), heterodont (4 types of teeth ) and diphyodont (teeth comes twice in lifetime)

**19.** Match column I with column II and choose the correct option:

| | **Column I** | | **Column II** |
|---|---|---|---|
| A | Saliva | 1 | Proteins |
| B | Bile salts | 2 | Milk proteins |
| C | Rennin | 3 | Starch |
| D | Pepsin | 4 | Lipids |
| E | Steapsin | 5 | Emulsification of fats |

**Answer Codes:** **[Kerala PMT 2009]**
(1) (A – 5); (B – 4); (C – 1); (D – 2); (E – 3) (2) (A – 2); (B – 3); (C – 4); (D – 5); (E – 1)
(3) (A – 2); (B – 4); (C – 3); (D – 1); (E – 5) (4) (A – 3); (B – 5); (C – 2); (D – 1); (E – 4)

**20.** Which group contains biocatalysts? **[Orissa JEE 2010]**
(1) Steapsin, amylase, rennin (2) Rhodopsin, pepsin, steapsin
(3) Myosin, oxytocin, adrenaline (4) Glucose, amino acids, fatty acids.
Enzymes are considered as biocatalyst. Steapsin is also called pancreatic lipase which digest fats. Rhodopsin is photopigment. Myosin is contractile protein.

**21.** In humans, sphincter of Oddi is associated with the opening of: **[Kerala PMT 2010]**
(1) Oesophagus (2) Pyloric stomach
(3) Common hepatic duct (4) Hepatopancreatic ampulla.
Sphincter of oddi is present at the junction of hepato-pancreatic duct that opens in duodenum.

**22.** Carrier ion like $Na^+$ facilitate the absorption of substances like: **[CBSE 2010]**
(1) Glucose and fatty acids (2) Fatty acids and glycerol
(3) Amino acids and glucose (4) Fructose and some amino acids.
Some glucose and amino acid are absorbed by facilitated diffusion with the help of Na+.

**23.** If for some reason the parietal cells of the gut epithelium become partially non-functional, what is likely to happen? **[CBSE 2010]**
(1) The pancreatic enzymes and specially the trypsin and lipase will not work efficiently
(2) The pH of stomach will fall abruptly
(3) Steapsin will be more effective
(4) Proteins will not be adequately hydrolyzed by pepsin into proteoses ad peptones.
Parietal cells secrete HCL which activates pepsin.

**24.** Arrange the following enzymes in correct sequence in which these act on food in different regions of alimentary canal: **[EAMET 2010]**

1. Pepsin 2. Ptyalin
3. Dipeptidase 4. Carboxypeptidase

(1) 1 3 2 4 (2) 2 1 4 3 (3) 1 4 3 2 (4) 2 1 3 4.

2.Ptyalin- in mouth , 1.Pepsin- in stomach , 4.Carboxypeptidase- in small intestine on peptones, 3.Dipeptidase- in small intestine on dipeptides.

**25.** Aggregates of lymphoid tissue present in the distal portion of the small intestine are known as: **[DUMET 2010]**

(1) Villi (2) Rugae
(3) Choroid plexus (4) Peyer's patches.

Peyer's patches present in the ileum region of small intestine is a type of mucosal associated lymphoid tissue , a type of secondary lymphoid organ.

**26.** Which one of the following is not the reason for very high load of billirubin in a new born? **[Karnataka CET 2010]**

(1) Excessive red blood corpuscles in the new born bursts releasing the billirubin
(2) The liver of the newborn is too young to cope up with the heavy load of bilirubin
(3) Mother's milk contain a high amount of billirubin
(4) Insoluble bilirubin in the intestine is reabsorbed by the blood.

Bilirubin is byproduct of heamoglobin breakdown occurring in liver of new born .Mothers milk is slightly yellow in first few days (colostrum ) as its rich with IgA antibodies and not due to bilirubin.

**27.** The gastric juice contains: **[Kerala PMT 2010]**

(1) Trypsin, pepsin, lipase (2) Pepsin, lipase, rennin
(3) Pepsin, amylase, trypsin (4) Trypsin, pepsin, rennin

All these enzymes are secreted by chief cells of gastric gland. Trypsin-pancreatic enzyme. Amylase- salivary and pancreatic secretion.

**28.** Bile salts act as activator of which enzyme? **[MPPET 2010]**

(1) Lipase (2) Pepsinogen
(3) Trypsinogen (4) Pancreatic amylase.

Bile salts plays multiple role like neutralisation of chyme, emulsification of fats, activation of lipase and also essential for absorption of fatty acids.

**29.** The purplish-red pigment rhodopsin, contained in the rods type of photoreceptor cells of the human eye, is a derivative of **[CBSE – 2011]**

(1) Vitamin $B_1$ (2) Vitamin C (3) Vitamin D (4) Vitamin A

Vitamin A modified to form retinal or retinene which is used for formation of visual photopigment in the retina of eye.

**30.** Which one of the following enzymes carries out the initial step in the digestion of milk in humans? **[CBSE– 2011]**

(1) Pepsin (2) Rennin (3) Lipase (4) Trypsin

Rennin initiates the digestion of milk protein called casein in infants.

**31.** Alimentary canal is absent in: **[AMU 2011]**
(1) *Fasciola hepatica* (2) *Taenia solium*
(3) *Ascaris lumbricoides* (4) *Ancylostoma caninum*
Taenia solium absorbs the nutrients through its body wall surface.

**32.** The mucosal layer in the stomach forms irregular folds known as [**Kerala 2011]**
(1) Villi (2) Lumen
(3) Rugae (4) Crypts of Lieberkuhn
The mucosal layer, folds to form gastric rugae in stomach to increase volume for digestion.

**33.** The backflow of faecal matter from the large intestine is prevented by the presence of **[Kerala PMT 2011]**
(1) Epiglottis (2) Sphincter of Oddi
(3) Ileo-caecal valve (4) Gastro-oesophageal sphincter
Ileo-caecal valve present at the junction of ileum and caecum.

**34.** Where do certain symbiotic microorganisms normally occur in human body? **[AIPMT – 2012]**
(1) Vermiform appendix and rectum (2) Duodenum
(3) Caecum (4) Oral lining and tongue surface
Caecum is a blind pouch associate with E.coli which produces vitamins and amino acids.

**35.** Anxiety and eating spicy food together in an otherwise normal human, may lead to **[AIPMT- 2012]**
(1) Diarrhea (2) Vomiting (3) Indigestion (4) Jaundice
XI NCERT pg 265, last line

**36.** Select the correct match of the digested products in humans given in **Colum I** with their absorption site and mechanism in **Column II**. **[NEET- 2013]**

| | **Column I** | **Column II** |
|---|---|---|
| (1) | Cholesterol, maltose | large intestine, active absorption |
| (2) | Glycine, glucose | small intestine, active absorption |
| (3) | Fructose, $Na^+$ | small intestine, passive absorption |
| (4) | Glycerol, fatty acids | duodenum, move as chylomicrons |

Glycine(amino acid) , glucose are actively absorbed .Maltose is diasaccharide and hence cannot be absorbed. Fructose and Na ions are mainly absorbed via active absorption. Glycerol and fatty acids are absorbed as chylomicrons from mainly jejunum and ileum regions.

**37.** Fructose is absorbed into the blood through mucosa cells of intestine by the process called : **[AIPMT – 2014]**
(1) Simple diffusion (2) Co-transport mechanism
(3) Active transport (4) Facilitated transport
Fructose, some amino acid ,some glucose , vitamins are absorbed by facilitated diffusion with the help of Na+

**38.** The initial step in the digestion of milk in humans is carried out by? **[AIPMT – 2014]**
(1) Rennin (2) Pepsin (3) Lipase (4) Trypsin
Rennin initiates the digestion of milk protein called casein in infants.

**39.** Which of the following statements is not correct? **[AIPMT – 2015]**
(1) Goblet cells are present in the mucosa of intestine and secrete mucus
(2) Oxyntic cells are present in the mucosa of stomach and secrete HCl
(3) Acini are present in the pancreas and secrete carboxypeptidase
(4) Brunner's glands are present in the submucosa of stomach and secrete pepsinogen
Brunner's gland present in the submucosa of duodenum of small intestine.

**40.** Gastric juice of infants contains: **[AIPMT – 2015]**
(1) nuclease, pepsinogen, lipase (2) pepsinogen, lipase, rennin
(3) ptyalin, rennin, pepsinogen (4) maltase, pepsinogen, rennin
Gastric glands of children secretes rennin and also gastric lipase , not in adult.Nuclease – pancreatic enzyme. Ptyalin-salivary enzyme. Maltase-intestinal enzyme.

**41.** The primary dentition in human differs from permanent dentition in not having one of the following type of teeth: **[RE AIPMT – 2015]**
(1) Incisors (2) Canine (3) Premolars (4) Molars
Pre-molars are absent in Primary dentition (milk teeth).

**42.** The enzyme that is not present in succus entericus is **[RE AIPMT – 2015]**
(1) Lipase (2) Maltase (3) Nuclease (4) Nucleosidase
Nuclease enzyme is present in pancreatic juice and not in intestinal juice.

**43.** Which of the following guards the opening of hepato-pancreatic duct into the duodenum? **[NEET-I 2016]**
(1) Sphincter of Oddi (2) Semilunar valve
(3) Deocaecal valve (4) Pyloric sphincter
Sphincter of Oddi is present at the opening of hepato-pancreatic duct into the duodenum.

**44.** In the stomach, gastric acid is secreted by the: **[NEET-I 2016]**
(1) acidic cells (2) gastrin secreting cells
(3) parietal cells (4) peptic cells
Parietal/oxyntic cells of gastric glands secrets HCl to make the condition in the stomach acidic.

**45.** Which hormones do stimulate the production of pancreatic juice and bicarbonate? **[NEET-II 2016]**
(1) Angiotensin and epinephrine (2) Gastrin and insulin
(3) Cholecystokinin and secretin (4) Insulin and glucagon
Cholecystokinin stimulate pancreas acinar cells to stimulate pancreatic enzyme and secretin stimulate to secrete bicarbonate and water.

**46.** Which cells of 'Crypts of Lieberkuhn' secrete antibacterial lysozyme? **[NEET- 2017]**
(1) Argentaffin cells (2) Paneth cells (3) Zymogen cells (4) Kupffer cells
Paneth cells secrete lysozyme which kills bacteria.

**47.** A baby boy aged two years is admitted to play school and passes through a dental check-up. The dentist observed that the boy had twenty teeth. Which teeth were absent? **[NEET- 2017]**
(1) Incisors (2) Canines (3) Pre-molars (4) Molars
Pre-molars are absent in Primary dentition (milk teeth).

**48.** Which one of the following terms describe human dentition? **[NEET 2018]**

(1) Pleurodont, Monophyodont, Homodont (2) Thecodont, Diphyodont, Heterodont

(3) Thecodont, Diphyodont, Homodont (4) Pleurodont, Diphyodont, Heterodont

(2)

The terms, thecodont, diphyodont and heterodont describe human dentition. In men, two types of teeth are found, milk or deciduous teeth and permanent teeth. Thus, they have diphyodont teeth. The teeth are thecodont, i.e. they remain embedded in the sockets of the jaw bones. Men have four types of teeth; incisorS, canine, premolars and molars, i.e., heterodont teeth.

**49.** Conversion of milk to curd improves its nutritional value by increasing the amount of **[NEET 2018]**

(1) vitamin-B (2) vitamin-A (3) vitamin-D (4) vitamin-E

(1)

Conversion of milk to curd improves its nutritional value by increasing the amount of vitamin-$B_{12}$, Vitamin-A is found in milk, carrot, tomato, etc. Skin can synthesise vitamin-D in the presence of sunlight. Vitamin-E is found in wheat, green leafy vegetables, etc.

**50.** Match the following structures with their respective location in organs. **[NEET (National) 2019]**

| | **Column I** | | **Column II** |
|---|---|---|---|
| A. | Crypts of Lieberkuhn | (i) | Pancreas |
| B. | Glisson's capsule | (ii) | Duodenum |
| C. | Islets of Langerhans | (iii) | Small intestine |
| D. | Brunner's glands | (iv) | Liver |

Select the CORRECT option from the following

| | A | B | C | D |
|---|---|---|---|---|
| (1) | (ii) | (iv) | (i) | (iii) |
| (2) | (iii) | (iv) | (i) | (ii) |
| (3) | (iii) | (ii) | (i) | (iv) |
| (4) | (iii) | (i) | (ii) | (iv) |

(2)

Crypts of Lieberkuhn are simple, tubular intestinal glands which occur throughout the small intestine between the villi. They secrete digestive enzymes and mucus. Glission's capsule is the inner thin layerof connective tissue in liver. Islets of Langerhans constitute the endocrine part of pancreas which secrete hormones Brunner's glands are located in the Submucosa of duodenum and they open into the crypts of Lieberkuhn.

**51.** Match the items given in Column I with those in Column II and choose the correct option. **[NEET (Odisha) 2019]**

| | Column I | | Column II |
|---|---|---|---|
| 1. | Rennin | (i) | Vitamin – $B_{12}$ |
| 2. | Enterokinase | (ii) | Facilitated transport |
| 3. | Oxyntic cells | (iii) | Milk proteins |
| 4. | Fructose | (iv) | Trypsinogen |

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| (1) | (iii) | (iv) | (ii) | (i) |
| (2) | (iv) | (iii) | (i) | (ii) |
| (3) | (iv) | (iii) | (ii) | (i) |

(4) (iii) (iv) (i) (ii)
(4)
The correct matches are
1. Rennin is a proteolytic enzyme that causes coagulation of milk.
2. Enterokinase converts trypsinogen into its active form trypsin.
3. Oxyntic cells (also called parietal cells) during digestion release stomach acid to allow release of vitamin-B, from food.
4. Fructose is absorbed by facilitated transport into the blood capillaries.

**52.** Identify the cells whose secretion protects the lining of gastrointestinal tract from various enzymes. **[NEET (National) 2019]**
(1) Goblet cells (2) Oxyntic cells (3) Duodenal cells (4) Chief cells
(1)
Secretions of goblet cells protect the lining of gastrointestinal tract from various enzymes. These cells secrete mucus which along with bicarbonate ions helps in the lubrication and protection of the mucosal epithelium from the excoriation by the highly concentrated HCI. On the other hand, oxyntic or parietal cells secrete hydrochloric acid. Chief cells or peptic cells secrete proenzymes-pepsinogen and prorenin.

**53.** Kwashiorkor disease is due to **[NEET (Odisha) 2019]**
(1) simultaneous deficiency of proteins and fats
(2) simultaneous deficiency of protein and calories
(3) deficiency of carbohydrates
(4) protein deficiency not accompanied by calorie deficiency
(4)
Kwashiorkor disease is due to protein deficiency not accompanied by calorie deficiency in the children of age 1-5 years. It's symptoms are weak muscle, thin limbs, retarded growth of the body and brain, swelling of legs due to retention of water (oedema), reddish hair, pot belly, etc.

**54.** Identify the correct statement with reference to human digestive system. **[NEET (Sep.) 2020]**
(1) Serosa is the innermost layer of the alimentary canal
(2) Ileum is a highly coiled part
(3) Vermiform appendix arises from duodenum
(4) Ileum opens into small intestine
(2)
Serosa is the outermost layer of the alimentary canal. A narrow finger-like tubular projection, the vermiform appendix arises from caecum part of large intestine. Ileum opens into the large intestine.

**55.** Intrinsic factor that helps in the absorption of vitamin-$B_{12}$ is secreted by **[NEET (Oct.) 2020]**
(1) goblet cells (2) hepatic ceils (3) oxyntic cells (4) chief cells
(3)
Parietal cells or oxyntic cells secrete HCI and intrinsic factor. These intrinsic factors are essential for absorption of vitamin-$B_{12}$. Goblet cells secrete mucus. Peptic or chief-cells secrete the proenzyme pepsinogen. Hepatic cells secrete bile.

**56.** The proteolvtic enzyme rennin is found in **[NEET (oct) 2020]**

(1) intestinal juice
(2) bile juice
(3) gastric juice
(4) pancreatic juice
(3)
The proteolytic enzyme rennin is found in gastric juice of infants which helps in the digestion of milk proteins, casein into paracasein.

**57.** The enzyme enterokinase helps in conversion of **[NEET (Sep.) 2020]**
(1) trypsinogen into trypsin
(2) caseinogen into casein
(3) pepsinogen into pepsin
(4) protein into polypeptides
(1)
The correct option is (a) because the enzyme enterokinase helps in conversion of trypsinogen into trypsin. Trypsinogen is activated by an enzyme, enterokinase, secreted by the intestinal mucosa into active trypsin. Trypsinogen is a zymogen released from pancreas.

**58.** Sphincter of Oddi is present at **[NEET 2021]**
(1) ileo-caecal junction
(2) junction of hepato-pancreatic duct and duodenum
(3) gastro-oesophageal junction
(4) junction of jejunum and duodenum
(2)
Sphincter of Oddi is the smooth muscle or a muscular valve that surrounds the end portion of the common bile duct and pancreatic duct (hepato-pancreatic duct). It controls the flow of digestive juices into the intestine.

**59.** Succus entericus is referred to as **[NEET 2021]**
(1) pancreatic juice
(2) intestinal juice
(3) gastric juice
(4) chyme
(2)
Succus entericus also known as intestinal juice. It is a fluid secreted in small intestine in small quantity. The secretion of the brush border cells of the mucosa along with the secretions of goblet cells constitute succus entericus. It consist of various enzymes like lipases, disaccharides, nucleosidases etc. and mucus.

**60.** Given below are two statements: **[NEET 2022]**
Statement I:
Fatty acids and glycerols cannot be absorbed into the blood.
Statement II:
Specialized lymphatic capillaries called lacteals carry chylomicrons into lymphatic vessels and ultimately into the blood
In the light if the above statements, choose the most appropriate answer from the options given below:
(1) Both statement I and statement II are incorrect
(2) Statement I is correct but statement II is incorrect
(3) Statement I is incorrect but statement II is correct
(4) Both statement I and statement II are correct
Fatty acid and glyces of being insoluble, cannot be absorbed into the blood. They are re-fromed into very small protein coated fat globules called chylomicrons which are transported to the lymph vessels (locteals) in the villi.

**61.** Which of the following functions is not performed by secretions from salivary glands?

**[NEET 2022]**

(1) Digestion of complex carbohydrates (2) Lubrication of oral cavity
(3) Digestion of disaccharides (4) Control bacterial population in mouth

Saliva digest starch to mattose but cannot digest maltose (disaccharides) as it lacks enzyme maltase.

**62.** Once the undigested and unabsorbed substances enter the caecum, their backflow is prevented by **[NEET 2023]**

(1) Ileo-caecal valve (2) Gastro-oesophagenalsphnceter
(3) Pyloric sphincter (4) Spincter of Oddi

Ileo-caecal valve is present at the junction ileum and caecum which prevent the backflow of undigested food from caecum to ileum.

**63.** Match List I with List II **[NEET 2023]**

| **List I (Cells)** | **List II (Secretion)** |
|---|---|
| A. Peptic cells | I. Mucus |
| B. Goblet cells | II. Bile Juice |
| C. Oxyntic cells | III. Proenzyme pepsinogen |
| D. Hepatic cells | IV. HCl and intrinsic factor for absorption of vitamin $B_{12}$ |

Choose the correct answer from the options given below

(1) A – II, B – I, C – III, D – IV (2) A – III, B – I, C – IV, D – II
(3) A – II, B – IV, C – I, D – III (4) A – IV, B – III, C – II, D – I

XI NCERT Pg. 262, 2nd paragraph

—♦—♦—♦—