16 Digestion and Absorption

Question: Diacetyl morphine is also called as :
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A Amphetamine

B Barbiturate

C Crack

D Smack

Answer: D

Explanation

The correct answer is Option D : Smack.

Diacetylmorphine is a semi-synthetic opioid synthesized from morphine, a derivative of the opium poppy. It is more commonly known by its street name "heroin," but it is also sometimes referred to as "smack."

Amphetamine, barbiturates, and crack are different types of drugs. Amphetamines are a type of stimulant, barbiturates are depressants, and crack is a form of cocaine that can be smoked.

Question: Select the correct sequential steps regarding absorption of fatty acids and glycerol, in intestine.

(A) Micelles are reformed into small protein coated fat globules called chylomicrons.

(B) Micelles move into intestinal mucosa.

(C) Fatty acids and glycerol are incorporated into small droplets called micelles.

(D) Lacteals release the absorbed substances into blood stream.

(E) Chylomicrons are transported into lacteals.

Choose the correct answer from the options given below :

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A (A), (E), (B), (D), (C)

B (D), (E), (B), (C), (A)

C (C), (B), (A), (E), (D)

D (B), (C), (E), (A), (D)

Answer: C

Explanation

The correct answer is :

Option C : (C), (B), (A), (E), (D)

Explanation :

The steps in the digestion and absorption of fatty acids and glycerol in the intestine are as follows :

(C) Fatty acids and glycerol are incorporated into small droplets called micelles. These micelles are formed in the lumen of the small intestine.

(B) Micelles move into intestinal mucosa. They break down, releasing the fatty acids and glycerol, which then diffuse into the cells of the intestinal mucosa.

(A) Within these cells, the fatty acids and glycerol are reassembled into triglycerides. These triglycerides are then packaged with proteins and other substances into tiny, protein-coated fat globules called chylomicrons.

(E) The chylomicrons are extruded from the cells into the lymphatic system - specifically into tiny lymph vessels in the intestinal wall called lacteals.

(D) These lacteals ultimately transport the chylomicrons, and therefore the digested fat, into the bloodstream. The absorbed substances are then circulated to cells throughout the body.

Question: Match List I with List II

	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:

A A-II, B-I, C-III, D-IV

B A-III, B-I, C-IV, D-II

C A-II, B-IV, C-I, D-III

D A-IV, B-III, C-II, D-I

Answer: B

Explanation

Option (B) is the correct answer because gastric glands have three major types of cells namely-

(i) Mucus neck cells which secrete mucus

(ii) Peptic or chief cells which secrete the proenzyme pepsinogen

(iii) Parietal or oxyntic cells which secrete HCl and intrinsic factor for absorption of vitamin B12.

Question: Once the undigested and unabsorbed substances enter the caecum, their backflow is prevented by

NEET 2023

A Ileo-caecal valve

B Gastro-oesophageal sphincter

C Pyloric sphincter

D Sphincter of Oddi

Answer: A

Explanation

Option (A) is the correct answer because the undigested food (faeces) enters into caecum of the large intestine through ileo-caecal valve, which prevents the backflow of the faecal matter.

Option (B) is not the answer because a muscular sphincter i.e., the gastro-oesophageal sphincter regulates the opening of oesophagus into the stomach.

Option (C) is not the answer because pyloric sphincter regulates the opening in between stomach and duodenum.

Option (D) is not the answer because the opening of common hepato-pancreatic duct is guarded by sphincter of Oddi.

Question: Match List I with List II.

	List I		List II
(A)	CCK	(I)	Kidney
(B)	GIP	(II)	Heart
(C)	ANF	(III)	Gastric gland
(D)	ADH	(IV)	Pancreas

Choose the correct answer from the options given below :

A A-III, B-II, C-IV, D-I

B A-II, B-IV, C-I, D-III

C A-IV, B-II, C-III, D-I

D A-IV, B-III, C-II, D-I

Answer: D

Explanation

The correct answer is option (D) as

· Cholecystokinin (CCK) acts on both gall bladder and pancreas and stimulates the secretion of bile juice and pancreatic enzymes respectively.

· GIP inhibits gastric secretion and motility.

· Atrial Natriuretic Factor (ANF) is released from the atrial wall of our heart.

· Anti-diuretic hormone (ADH) acts mainly on the kidney and stimulates resorption of water and electrolytes by the distal tubules.

2022

MCQ (Single Correct Answer)

Q.1. Role of enamel is to

A Give basic shape to the teeth

B Connect crown of tooth with its root

C Masticate the food

D Form bolus

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Ans. (C)

Explanation

Option (c) is the correct answer because enamel is the hardest substance of the body which covers the exposed part of tooth called crown and helps in mastication of food.

Option (a) is incorrect because basic shape of teeth is provided by dentine which is present in crown, root and neck.

Option (b) is incorrect because neck of tooth connects crown with root.

Option (d) is incorrect because bolus is masticated food mixed with saliva which is ready for swallowing.

Q.2. Given below are two statements:

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 of the above statements, choose the most appropriate answer from the options given below:

A Both Statement I and Statement II are correct

B Both Statement I and Statement II are incorrect

C Statement I is correct but Statement II is incorrect

D Statement I is incorrect but Statement II is correct

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Ans. (A)

Explanation

Option (a) is the correct answer because both the statements I and II are correct as fatty acids and glycerol being insoluble in water, cannot be absorbed into the blood. They are first incorporated into small droplets called micelles which move into the intestinal mucosa. They are re-formed into very small protein coated fat globules called chylomicrons which are transported into the lymph vessels (lacteals) in the villi. The lymph vessels ultimately release the absorbed substances into the blood stream.

Q.3. Which of the following functions is not performed by secretions from salivary glands?

A Control bacterial population in mouth

B Digestion of complex carbohydrates

C Lubrication of oral cavity

D Digestion of disaccharides

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Ans. (D)

Explanation

Option (d) is the correct answer because digestion of polysaccharides like starch occurs in mouth and digestion of disaccharides occurs in small intestine.

Option (c) is incorrect because saliva contains mucus which helps in the lubrication of oral cavity.

Option (a) is incorrect because saliva contains an antibacterial agent-lysozyme so that it controls bacterial population in mouth.

Option (b) is incorrect because digestion of complex carbohydrates are performed by secretions from salivary glands.

Q.4. Which of the following is present between the adjacent bones of the vertebral column?

A Intercalated discs

B Cartilage

C Areolar tissue

D Smooth muscle

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Ans. (B)

Explanation

Option (b) is the correct answer because cartilage forming the intervertebral disc is present between the adjacent bones of the vertebral column and it is a type of cartilaginous joint.

Option (c) is incorrect because areolar tissue present beneath the skin is a type of loose connective tissue.

Option (d) is incorrect because smooth muscles are present in the visceral organs.

Option (a) is incorrect because intercalated discs are characteristic feature of cardiac muscles present in heart.

TOPIC 1
Components of Food and Digestive System

01 Sphincter of Oddi is present at **[NEET 2021]**

(a) ileo-caecal junction
(b) junction of hepato-pancreatic duct and duodenum
(c) gastro-oesophageal junction
(d) junction of jejunum and duodenum

Ans. *(b)*

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.

02 Identify the correct statement with reference to human digestive system. **[NEET (Sep.) 2020]**

(a) Serosa is the innermost layer of the alimentary canal
(b) Ileum is a highly coiled part
(c) Vermiform appendix arises from duodenum
(d) Ileum opens into small intestine

Ans. *(b)*

The option (b) is correct as ileum is a highly coiled tube with reference to human digestive system. Other option can be corrected as

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.

03 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
(a)	(ii)	(iv)	(i)	(iii)
(b)	(iii)	(iv)	(i)	(ii)
(c)	(iii)	(ii)	(i)	(iv)
(d)	(iii)	(i)	(ii)	(iv)

Ans. *(b)*

(A)–(iii), (B)–(iv), (C)–(i), (D)–(ii)

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 layer of 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.

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

(a) Pleurodont, Monophyodont, Homodont
(b) Thecodont, Diphyodont, Heterodont
(c) Thecodont, Diphyodont, Homodont
(d) Pleurodont, Diphyodont, Heterodont

Ans. *(b)*

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.

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

(a) vitamin-B_{12}
(b) vitamin-A
(c) vitamin-D
(d) vitamin-E

Ans. *(a)*

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.

06 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]**

(a) Incisors
(b) Canines
(c) Premolars
(d) Molars

Ans. *(c)*

In human beings, after birth the first set of teeth that develops are deciduous teeth or temporary teeth. These are 20 in number. The dental formula of child is 2102/2102.

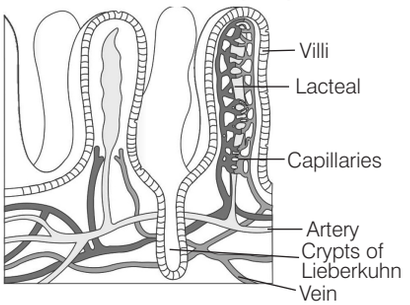
Thus, they have 2 incisors, 1 canine, 0 premolars and 2 molars. Therefore, the baby boy would not have premolars.

07 Which cells of 'Crypts of Lieberkuhn' secrete antibacterial lysozyme ? **[NEET 2017]**

(a) Argentaffin cells
(b) Paneth cells
(c) Zymogen cells
(d) Kupffer cells

Ans. *(b)*

The mucosa present in between the bases of villi of small intestine (Crypts of Lieberkuhn) contain paneth, which secrete antibacterial lysozyme.



A section of small intestinal mucosa showing villi and the Crypts of

Concept Enhancer Kupffer cells are phagocytic cells of liver.

Zymogen cells produce enzyme.

Argentaffin cells produce hormones.

08 The hepatic portal vein drains blood to liver from **[NEET 2017]**

(a) heart (b) stomach
(c) kidneys (d) intestine

Ans. *(d)*

In the hepatic portal system, the hepatic veins takes blood from intestine to the liver. This way, it takes all the nutrients absorbed from intestine to the liver first, where screening and storing of nutrition takes place.

Concept Enhancer

The portal system is a system of veins in which vein takes blood to some organ/tissue of the body other than heart. In this, the vein has capillary network at it's both ends.

There is one more portal system in human body named hypophyseal portal system present in the hypothalamus, which brings neuro secretions of hypothalamus to pituitary gland.

The renal portal system is found in fishes and amphibians. It supplies blood from posterior region of the body to the kidneys by renal portal veins to remove waste products before sending it to heart *via* renal veins and post canal veins.

09 Which of the following guards the opening of hepatopancreatic duct into the duodenum? **[NEET 2016, Phase I]**

(a) Ileocaecal valve
(b) Pyloric sphincter
(c) Sphincter of Oddi
(d) Semilunar valve

Ans. *(c)*

Sphincter of Oddi guards the opening of hepatopancreatic duct into the duodenum. Hepatopancreatic duct brings secretion of liver as well as pancreas to the duodenum.

10 The primary dentition in human differs from permanent dentition in not having one of the following type of teeth **[CBSE AIPMT 2015]**

(a) Canine (b) Premolars
(c) Molars (d) Incisors

Ans. *(b)*

There are four classes of teeth, i.e. incisors, canines, premolars and molars.

There are no premolars in primary dentition (deciduous or boby teeth). These are found only in permanent dentition (adult teeth).

11 Two friends are eating together on a dining table. One of them suddenly starts coughing while swallowing some food. This coughing would have been due to improper movement of **[CBSE AIPMT 2011]**

(a) diaphragm (b) neck
(c) tongue (d) epiglottis

Ans. *(d)*

The epiglottis is a flap that is made of elastic cartilage tissue covered with a mucous membrane, attached to the entrance of the larynx. It prevents the entry of food into the larynx and directs it to the oesophagus.

Due to the improper movement of epiglottis, one may suddenly start coughing while swallowing some food.

12 Epithelial cells of the intestine involved in food absorption have on their surface **[CBSE AIPMT 2005]**

(a) pinocytic vesicles
(b) phagocytic vesicles
(c) zymogen granules
(d) microvilli

Ans. *(d)*

The mucosa and sub-mucosa of small intestine are thrown into folds. Surfaces of these folds are covered by fine, finger-like projections of the epithelium.

These projections are called villi. In addition, the epithelial cells of the villi are covered on their exposed surface by cytoplasmic projections called microvilli.

13 The richest sources of vitamin-B_{12} are **[CBSE AIPMT 2004]**

(a) goat's liver and *Spirulina*
(b) chocolate and green gram
(c) rice and hen's egg
(d) carrot and chicken's breast

Ans. *(a)*

Vitamin-B_{12} (cyanocobalamin) is the only vitamin which is not found in vegetables. It is present in animal protein such as meat, liver, fish and *Spirulina* (single cell protein). It promotes DNA synthesis, maturation of RBCs and myelin formation.

14 Which one is correctly matched ? **[CBSE AIPMT 2001]**

(a) Vit-E–Tocopherol
(b) Vit-D–Riboflavin
(c) Vit-B–Calciferol
(d) Vit-A–Thiamine

Ans. *(a)*

Option (a) is correctly matched. Thiamine, riboflavin, calciferol, tocopherol are also known as vitamin-B_1, vitamin-B_2, vitamin-D_2 and vitamin-E respectively.

15 The layer of cells that secrete enamel of tooth is **[CBSE AIPMT 1998]**

(a) dentoblast (b) amiloblast
(c) osteoblast (d) odontoblast

Ans. *(d)*

The pulp cavity contains a mass of dense but soft connective tissue which is called pulp. A single layer of odontoblast cells is lined by the pulp cavity.

These cells secrete enamel which is a bluish white, shiny translucent and the hardest substance of the body.

16 A dental disease characterised by moltting of teeth is due to the presence of a certain chemical element in drinking water. Which of the following is that element? **[CBSE AIPMT 1995]**

(a) Mercury (b) Chlorine
(c) Fluorine (d) Boron

Ans. *(c)*

Increased amount of fluorine in drinking water causes fluorosis, responsible for moltting of teeth.

17 Brunner's glands occur in **[CBSE AIPMT 1992]**

(a) sub-mucosa of duodenum
(b) sub-mucosa of stomach
(c) mucosa of oesophagus
(d) mucosa of ileum

Ans. *(a)*

Brunner's glands are convoluted and branched glands found only in duodenum and located in sub-mucosa.

18 In man the zymogen or chief cells are mainly found in **[CBSE AIPMT 1990]**

(a) cardiac part of stomach
(b) pyloric part of stomach
(c) duodenum
(d) fundic part of stomach

Ans. *(d)*

Chief cells or zymogen are mainly found in fundic part of stomach which secretes two proenzymes, pepsinogen and prorennin and an enzyme gastric lipase.

19 Whartson's duct is associated with **[CBSE AIPMT 1988]**

(a) sub-lingual salivary duct
(b) parotid salivary gland
(c) sub-maxillary salivary gland
(d) Brunner's glands

Ans. *(c)*

Whartson's duct is associated with sub-maxillary salivary gland. These lie beneath the jaw angles, their secretion is carried by Whartson's duct which open below the tongue. These are compound acinar gland.

20 Duct leading from parotid gland and opening into vestibule is **[CBSE AIPMT 1988]**

(a) Haversian duct
(b) Stenson's duct
(c) Wolffian duct
(d) Infra-orbital duct

Ans. *(b)*

Parotid glands are largest salivary glands, present just below the external ear. These are compound tubulo-acinar glands. Saliva is secreted by Stenson's duct which open opposite to the second upper molar tooth.

21 Lamina propria is connected with **[CBSE AIPMT 1988]**

(a) acini
(b) liver
(c) Graafian follicle
(d) intestine

Ans. *(d)*

Lamina propria of ileum shows yellow coloured oval, granular masses of lymph nodules called 'Peyer's patches.'

TOPIC 2
Functioning of Digestive System

22 Succus entericus is referred to as **[NEET 2021]**

(a) pancreatic juice
(b) intestinal juice
(c) gastric juice
(d) chyme

Ans. *(b)*

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.

23 Intrinsic factor that helps in the absorption of vitamin-B_{12} is secreted by **[NEET (Oct.) 2020]**

(a) goblet cells (b) hepatic cells
(c) oxyntic cells (d) chief cells

Ans. *(c)*

Parietal cells or oxyntic cells secrete HCl 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.

24 The proteolytic enzyme renin is found in **[NEET (Oct.) 2020]**

(a) intestinal juice (b) bile juice
(c) gastric juice (d) pancreatic juice

Ans. *(c)*

The proteolytic enzyme rennin is found in gastric juice of infants which helps in the digestion of milk proteins, casein into paracasein.

25 The enzyme enterokinase helps in conversion of **[NEET (Sep.) 2020]**

(a) trypsinogen into trypsin
(b) caseinogen into casein
(c) pepsinogen into pepsin
(d) protein into polypeptides

Ans. *(a)*

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.

26 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
(a)	(iii)	(iv)	(ii)	(i)
(b)	(iv)	(iii)	(i)	(ii)
(c)	(iv)	(iii)	(ii)	(i)
(d)	(iii)	(iv)	(i)	(ii)

Ans. *(d)*

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_{12} from food.
4. Fructose is absorbed by facilitated transport into the blood capillaries.

27 Identify the cells whose secretion protects the lining of gastrointestinal tract from various enzymes. **[NEET (National) 2019]**

(a) Goblet cells (b) Oxyntic cells
(c) Duodenal cells (d) Chief cells

Ans. *(a)*

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 HCl. On the other hand, oxyntic or parietal cells secrete hydrochloric acid. Chief cells or peptic cells secrete proenzymes-pepsinogen and prorenin.

28 Which of the following options best represents enzyme composition of pancreatic juice? **[NEET 2017]**

(a) Amylase, peptidase, trypsinogen, rennin
(b) Amylase, pepsin, trypsinogen, maltase
(c) Peptidase, amylase, pepsin, rennin
(d) Lipase, amylase, trypsinogen, procarboxypeptidase

Ans. *(d)*

Pancreas consist of exocrine and endocrine part. Exocrine part secrets alkaline pancreatic juice. This juice contains trypsinogen, chymotrypsinogen, procarboxypeptidase, lipase, amylase, elastase.

Concept Enhancer Renin and pepsin enzymes are present in gastric juice. Maltase is present in the intestinal juice.

29 In the stomach, gastric acid is secreted by the **[NEET 2016, Phase I]**

(a) parietal cells
(b) peptic cells
(c) acidic cells
(d) gastrin secreting cells

Ans. *(a)*

In stomach, gastric acid (HCl) is secreted by parietal cells of gastric gland. It makes the medium of food in stomach acidic for stimulation of proteolytic enzymes of stomach.

30 Which hormones do stimulate the production of pancreatic juice and bicarbonate? **[NEET 2016, Phase II]**

(a) Angiotensin and epinephrine
(b) Gastrin and insulin
(c) Cholecystokinin and secretin
(d) Insulin and glucagon

Ans. *(c)*

Cholecystokinin (CCK) and secretin are the peptide hormones that stimulate the production of pancreatic juice and bicarbonates within the alimentary canal.

Secretin acts on the exocrine pancreas and stimulates the secretion of water and bicarbonate ions.

CCK acts on both pancreas and gall bladder and stimulates the secretion of pancreatic enzymes and bile juice respectively. Hence, option (c) is correct.

31 The enzyme that is not present in succus entericus is **[CBSE AIPMT 2015]**

(a) maltase (b) nucleases
(c) nucleosidase (d) lipase

Ans. *(b)*

Succus entericus or intestinal digestive juice contains a variety of enzymes like disaccharidases (e.g. maltase), dipeptidases, lipases, nucleosidases. Nucleases are enzymes present in pancreatic juice that break nucleic acids into nucleotides.

32 The initial step in the digestion of milk in humans is carried out by? **[CBSE AIPMT 2014, 11]**

(a) Lipase (b) Trypsin
(c) Rennin (d) Pepsin

Ans. *(d)*

In humans, the milk protein digesting enzyme in stomach is pepsin. In calves it is rennin. It is also present in small amounts in human infants but not adults. Pepsin acts on water soluble 'caseinogen (milk protein) to form soluble 'casein'. This combines with calcium salts to form insoluble calcium paracaseinate, which gets readily digested enzymatically.

33 Fructose is absorbed into the blood through mucosa cells of intestine by the process called **[CBSE AIPMT 2014]**

(a) active transport
(b) facilitated transport
(c) simple diffusion
(d) co-transport mechanism

Ans. *(b)*

Fructose is absorbed into the blood through mucosa cells of intestine by the process called facilitated transport thus, facilitated transport is the process of spontaneous passive transport of the molecules or ions across a biological membrane *via* specific transmembrane integral protein.

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

	Column I	Column II
(a)	Glycine and glucose	Small intestine and active absorption
(b)	Fructose and Na^+	Small intestine passive absorption
(c)	Glycerol and fatty acids	Duodenum and move as chilomicrons
(d)	Cholesterol and maltose	Large intestine and active absorption

Ans. *(a)*

Amino acids, monosaccharides like glucose, electrolytes like Na^+ are absorbed into the blood by active transport. Fructose and some amino acids are absorbed with the help of the carrier ions like Na^+ by facilitated transport. Fatty acid and glycerol cannot be absorbed into the blood. They are first incorporated into small droplets called micelles, which move into the intestinal mucosa.

35 If for some reason our goblet cells are non-functional, this will adversely affect **[CBSE AIPMT 2010]**

(a) production of somatostatin
(b) secretion of sebum from the sebaceous glands
(c) maturation of sperms
(d) smooth movement of food down the intestine

Ans. *(d)*

Goblet cells are something like a wineglass that present in the columnar epithelium of the mammalian intestine and secrete mucin, a mucoprotein that forms mucus when in solution. If Goblet cells become non-functional, this will adversely affect smooth movement of food down the intestine due to the absence of mucin.

36 Carrier ions like Na^+ facilitate the absorption of substance like **[CBSE AIPMT 2010]**

(a) amino acids and glucose
(b) glucose and fatty acids
(c) fatty acids and glycerol
(d) fructose and some amino acids

Ans. *(d)*

Active transport occurs with the help of energy, usually against concentration gradient. For this, cell membrane possesses carriers and gated channels. Active transport of one substance is often accompanied by permeation of other substances.

The phenomenon is called secondary active transport. It is of two main types, i.e. Co-transport, (e.g. glucose and some amino acids along with inward pushing of excess Na^+) and counter transport (Ca^{2+} and H^+ movement outwardly as excess Na^+ passes inwardly).

37 A young infant may be feeding entirely on mother's milk, which is white in colour but the stools, which the infant passes out is quite yellowish. What is this yellow colour due to? **[CBSE AIPMT 2009]**

(a) Intestinal juice
(b) Bile pigments passed through bile juice
(c) Undigested milk protein casein
(d) Pancreatic juice poured into duodenum

Ans. *(b)*

The stools, which the infant passes out is quite yellowish due to the bile pigments. These bile pigments are released in the bile juice.

38 Which one of the following pairs of food components in humans reaches the stomach totally undigested? **[CBSE AIPMT 2009]**

(a) Protein and starch
(b) Starch and fat
(c) Fat and cellulose
(d) Starch and cellulose

Ans. *(c)*

In humans, starch is digested in buccopharyngeal cavity. Cellulose is not digested in the humans because cellulose contains β-1, 4-linkage and vertebrates themselves do not possess any enzyme capable of hydrolysing β-1, 4-linkages. Protein is digested in stomach and fat in small intestine. Thus, in the given options, fat and cellulose reach totally undigested in the stomach of humans.

39 Which one of the following statement is true regarding digestion and absorption of food in humans? **[CBSE AIPMT 2009]**

(a) Oxyntic cells in our stomach secrete the proenzyme pepsinogen
(b) Fructose and amino acids are absorbed through intestinal mucosa with the help of carrier ions like Na^+
(c) Chylomicrons are small lipoprotein particles that are transported from intestine into blood capillaries
(d) About 60% of starch is hydrolysed by salivary amylase in our mouth

Ans. *(c)*

Chylomicrons are lipoprotein particles synthesised by intestinal epithelial cells and consisting mainly of triglycerides. Chylomicrons are the form, in which dietary fat is transported in the circulatory system.

40 Which one 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 AIPMT 2008]**

(a) Duodenum: Triglycerides trypsin monoglycerides
(b) Small intestine: Starch α-amylase disaccharide (maltose)
(c) Small intestine: Proteins pepsin amino acids
(d) Stomach: Fats, Lipase micelles

Ans. *(b)*

In small intestine food meats with the pancreatic juice containing α-amylase, which converts starch into maltose, isomaltose and α-dextrins in small intestine.

$$\text{Starch} \xrightarrow{\text{Pancreatic } \alpha\text{-amylase}} \text{Maltose (disaccharide)}$$

The pancreatic juice also contains proenzymes trypsinogen, chymotrypsinogen and procarboxypeptidase. The trypsinogen is converted to active trypsin in intestine by enterokinase of intestinal juice. The trypsin converts proteins into large peptides and the large peptides are converted to dipeptide and amino acids by carboxypeptidase.

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

(a) Gastric juice will be deficient in chymosin
(b) Gastric juice will be deficient in pepsinogen
(c) In the absence of HCl secretion, inactive pepsinogen is not converted into the active enzyme pepsin
(d) Enterokinase will not be released from the duodenal mucosa and so trypsinogen is not converted to trypsin

Ans. *(c)*

The parietal cells (oxyntic cells) are large and most numerous on the side walls of gastric glands. These secrete hydrochloric acid and castle intrinsic factor. The peptic cells (zymogen) of gastric glands secrete gastric digestive enzymes as proenzymes-pepsinogen and prorennin and small amount of gastric amylase and gastric lipase. The hydrochloric acid maintains a strongly acidic pH of about 1.5-2.5 in the stomach. HCl converts pepsinogen and prorennin to pepsin and rennin respectively.

42 Secretin and cholecystokinin are digestive hormones. They are secreted in **[CBSE AIPMT 2005]**

(a) oesophagus
(b) ileum
(c) duodenum
(d) pyloric stomach

Ans. *(c)*

Secretin and cholecystokinin (CCK) are two main gastrointestinal (GI) hormones secreted in duodenum of alimentary canal. CCK stimulates gall bladder contraction and thus increases the flow of bile salts into the intestine.

Secretin stimulates the release of an alkaline pancreatic fluid that neutralises stomach acid as it enters the intestine.

43 Duodenum has characteristic Brunner's glands which secrete two hormones called **[CBSE AIPMT 2004]**

(a) kinase, oestrogen
(b) secretin, cholecystokinin
(c) prolactin, parathormone
(d) estradion, progesterone

Ans. *(b)*

Brunner's gland secrete large amount of mucus and bicarbonates to protect duodenal mucosa and to neutralise the acidic chyme. It also secretes two hormones :

(a) Secretin
(b) Cholecystokinin (CCK)

These stimulate:

(i) Secretion of pancreatic juice by pancreas.
(ii) Release of bile from gall bladder.
(iii) Formation of bile by liver and pancreatic juice.

44 During prolonged fasting, in what sequence are the following organic compounds used up by the body? **[CBSE AIPMT 2003]**

(a) First carbohydrates, next proteins and lastly lipids
(b) First proteins, next lipids and lastly lcarbohydrates
(c) First carbohydrates, next fats and lastly proteins
(d) First fats, next carbohydrates and lastly proteins

Ans. *(c)*

During prolonged fasting, first of all carbohydrates are utilised which include glycogen stored in liver. This is followed by the breakdown of adipose tissue, thus providing lipids and lastly the body utilises proteins.

45 A certain person eats boiled potato; one of the food component in it is **[CBSE AIPMT 2000]**

(a) lactose which is indigestible
(b) starch which does not get digested
(c) cellulose which is digested by intestinal cellulase
(d) DNA which gets digested by pancreatic DNAase

Ans. *(d)*

Anything which cannot be digested cannot serve as 'food'. Therefore, starch and lactose in the present case have been automatically deleted.

Cellulose cannot be digested by human beings, thus option (c) also stands rejected. Pancreatic juice can digest DNA which is the component of every cell.

46 Cholecystokinin and duocrinin are secreted by **[CBSE AIPMT 1999]**

(a) adrenal cortex (b) thyroid gland
(c) pancreas (d) intestine

Ans. *(d)*

Both cholecystokinin and duocrinin are hormones secreted by the intestine, while the former stimulates the gall bladder to release bile and pancreas to release enzyme mixture, the latter regulates the release of mucus from Brunner's glands.

47 Which part of body secretes the hormone secretin? **[CBSE AIPMT 1999]**

(a) Oesophagus (b) Duodenum
(c) Stomach (d) Ileum

Ans. *(b)*

Secretin is a polypeptide hormone secreted by the mucosa of duodenum and jejunum.

It perform two functions : (a) It stimulates sodium bicarbonate from the pancreas which neutralises the acid in the chyme so that it will not damage the wall of the small intestine. (b) It increases the rate of bile secretion in the liver.

48 The hormone that stimulates the stomach to secrete gastric juice is **[CBSE AIPMT 1998]**

(a) gastrin
(b) renin
(c) enterokinase
(d) enterogasterone

Ans. *(a)*

The stomach controls the production of gastric juice by means of a digestive hormone called gastrin. It is produced by endocrine (hormone secreting) cells that are scattered throughout the epithelium of the stomach.

49 Lactose is composed of **[CBSE AIPMT 1998]**

(a) glucose + fructose
(b) glucose + glucose
(c) glucose + galactose
(d) fructose + galactose

Ans. *(c)*

Lactose ($C_{12}H_{22}O_{11}$) is a disaccharide found in mammalian milk. It comprises galactose and glucose units which are linked together by β, 1-4 glycosidic bonds. It is a reducing sugar.

50 In vertebrates lacteals are found in **[CBSE AIPMT 1998]**

(a) ileum
(b) ischium
(c) oesophagous
(d) ear

Ans. *(a)*

Lacteals are found in ileum they are lymph vessels draining villi of vertebrate small intestine. After digestion, reconstituted fats are released into lacteals as chylomicrons.

51 The contraction of gall bladder is due to **[CBSE AIPMT 1998]**

(a) gastrin
(b) secretin
(c) cholecystokinin
(d) enterogasterone

Ans. *(c)*

Cholecystokinin (also called pancreozymin) is a hormone of mucosa of small intestine. It is released in response to chyme. It causes pancreas to release pancreatic enzymes and gall bladder to eject bile.

52 If pancreas is removed, the compound which remain undigested is **[CBSE AIPMT 1997]**

(a) carbohydrates
(b) fats
(c) proteins
(d) All of these

Ans. *(d)*

Pancreas secretes pancreatic juice which contain enzymes that acts on proteins, carbohydrates and fats. Enzymes of pancreatic juice are

(a) Pancreatic amylase which acts on starch and glycogen (polysaccharides).
(b) Trypsin, chymotrypsin and carboxypeptidases, which act on proteins and lipase which acts on triglycerides and converts it into fatty acids and glycerol.

If pancreas is removed from the body, the digestion of all these would not occur.

53 Which one of the following vitamin can be synthesised by bacteria inside the gut? **[CBSE AIPMT 1997]**

(a) B_1 (b) C
(c) D (d) K

Ans. *(d)*

Vitamin-K_2 (menaquinone) It is formed by bacteria in the gut, while vitamin-K_1 (phylloquinone) is found in green plant leaves.

Vitamin-B_1 (thiamine) It acts as TPP-coenzyme for decarboxylases.

Vitamin-C (ascorbic acid). It helps in development of teeth gums and maintenance of capillary wall.

Vitamin-D (calciferol). It helps in maintenance of calcium and phosphorus balance within the body.

54 Which one of the following is a matching pair of a substrate and its particular digestive enzyme? **[CBSE AIPMT 1996]**

(a) Maltose — Maltase
(b) Lactose — Rennin
(c) Starch — Steapsin
(d) Casein — Chymotrypsin

Ans. *(a)*

Intestinal juices contain a number of oligosaccharidase which hydrolyse the specific oligosaccharides into their monosaccharides. Maltase is one of them, which hydrolyses maltose into two glucose molecules.

55 The enzyme enterokinase helps in the conversion of **[CBSE AIPMT 1995]**

(a) pepsinogen into pepsin
(b) trypsinogen into trypsin
(c) caseinogen into casein
(d) proteins into polypeptides

Ans. *(b)*

Enterokinase helps in conversion of trypsinogen into trypsin in small intestine, which is an endoproteolytic enzyme and hydrolyses the peptones and proteoses into peptides.

56 Rennin acts on **[CBSE AIPMT 1994, 2000]**

(a) milk changing casein into calcium paracaseinate at 7.2–8.2 pH
(b) protein in stomach
(c) fat in intestine
(d) milk changing casein into calcium paracaseinate at 1-3 pH

Ans. *(d)*

Stomach secretes gastric juice pH [1–3.5] which contains prorennin secreted by the zymogen cells. Inactive prorennin is converted into rennin by HCl. Rennin acts on casein, a protein milk changing it into calcium paracaseinate, it is known as curdling of milk.

57 Inhibition of gastric and stimulation of gastric, pancreatic and bile secretions are controlled by hormones **[CBSE AIPMT 1994]**

(a) gastrin, secretin, enterokinin and cholecystokinin
(b) enterogasterone, gastrin, pancreozymin and cholecystokinin
(c) gastrin, enterogasterone, cholecystokinin and pancreozymin
(d) secretin, enterogasterone, gastrin and enterokinin

Ans. *(b)*

Enterogasterone hormone secreted by mucosa of duodenum inhibits secretion of gastric juices and slows down the gastric movements.

Gastrin is the hormone secreted by G-cells/argentaffin cells of pyloric region of stomach and stimulates the gastric glands to secrete gastric juices.

Pancreozymin is secreted by mucosa of duodenum and stimulates the acinal cells of pancreas to secrete pancreatic enzymes.

Cholecystokinin is secreted by cells of mucosa of duodenum and stimulates contraction of gall bladder to release bile.

58 Most of the fat digestion occurs in **[CBSE AIPMT 1993]**

(a) rectum (b) stomach
(c) duodenum (d) small intestine

Ans. *(d)*

Fats are emulsified in small intestine by the detergent action of bile salts. Emulsification of fat converts large fat droplets into large number of small droplets, which provide larger surface area to lipases.

Then pancreatic lipase (steapsin) which is principal fat digesting enzyme, digest about 2/3rd of fats in these stages.

Then intestinal lipase hydrolyses some tri, di and monoglycerides to fatty acids and glycerol molecules. So, the most of fat digestion occurs in small intestine.

59 Secretion of gastric juice is stopped by **[CBSE AIPMT 1993]**

(a) gastrin
(b) pancreozymin
(c) cholecystokinin
(d) enterogasterone

Ans. *(d)*

Enterogasterone is produced by small intestine and slows down the secretion of gastric juice and decreases the gastric movements.

60 Where is protein digestion accomplished? **[CBSE AIPMT 1991]**

(a) Stomach (b) Ileum
(c) Rectum (d) Duodenum

Ans. *(b)*

The cells that line the ileum contain the protease and carbohydrase enzymes responsible for the final stages of protein and carbohydrate digestion. These enzymes are present in the cytoplasm of the epithelial cells.

61 Release of pancreatic juice is stimulated by **[CBSE AIPMT 1990, 89]**

(a) enterokinase (b) cholecystokinin
(c) trypsinogen (d) secretin

Ans. *(d)*

Secretin is secreted by δ-cells of mucosa of duodenum which stimulates pancreas and controls the volume of pancreatic juice including water and electrolytes.

62 Pancreas produces **[CBSE AIPMT 1991]**

(a) three digestive enzymes and one hormone
(b) three digestive enzymes and two hormones
(c) two digestive enzymes and one hormone
(d) three digestive enzymes and no hormone

Ans. *(b)*

Pancreas produces pancreatic juice which contains trypsinogen, chymotrypsin, carboxypeptidases, lipase, pancreatic α-amylase, elastage, nucleases. Out of these enzymes, the first three are concerned with protein digestion which finally converts protein into small peptides. Pancreas also secretes insulin and glucagon hormones which acts antagonastically in controlling the blood sugar level.

63 Emulsification of fat will not occur in the absence of **[CBSE AIPMT 1990]**

(a) lipase
(b) bile pigments
(c) bile salts
(d) pancreatic juice

Ans. *(c)*

Bile is a watery greenish fluid containing bile salts, bile pigments, cholesterol and phospholipid. Bile salts play an important role in digestion of fats. Therefore in their absence emulsification of fat cannot take place.

TOPIC 3
Nutritional and Digestive Disorders

64 Kwashiorkor disease is due to **[NEET (Odisha) 2019]**

(a) simultaneous deficiency of proteins and fats
(b) simultaneous deficiency of protein and calories
(c) deficiency of carbohydrates
(d) protein deficiency not accompanied by calorie deficiency