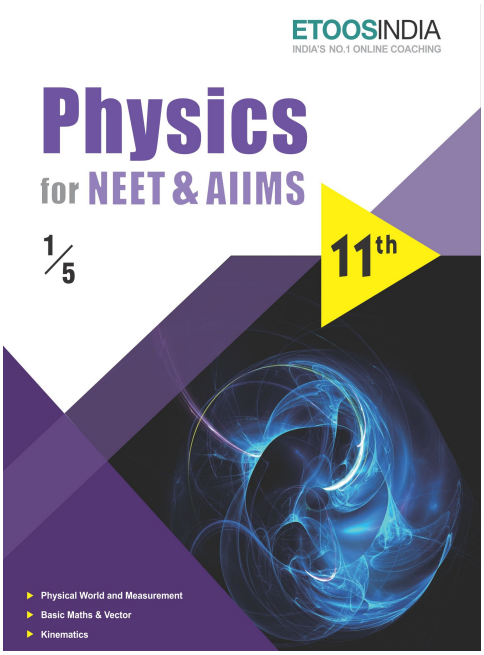
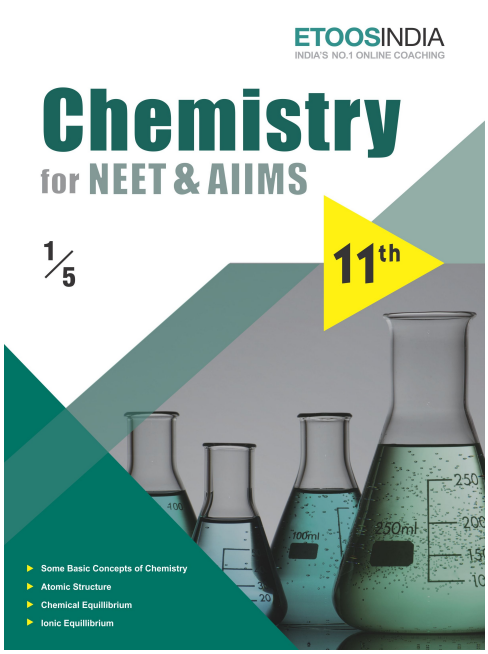
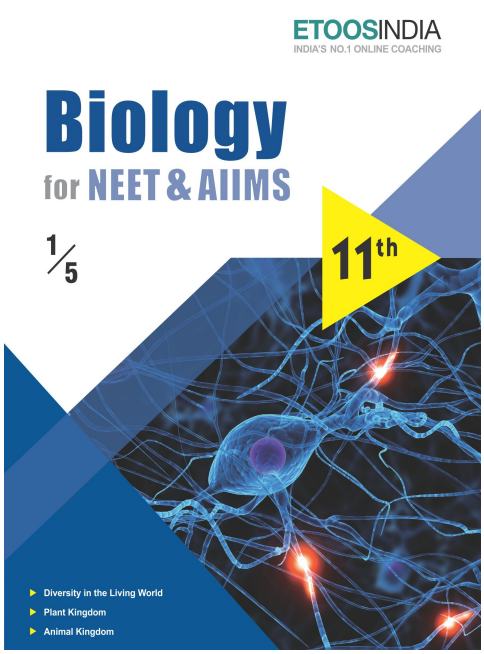
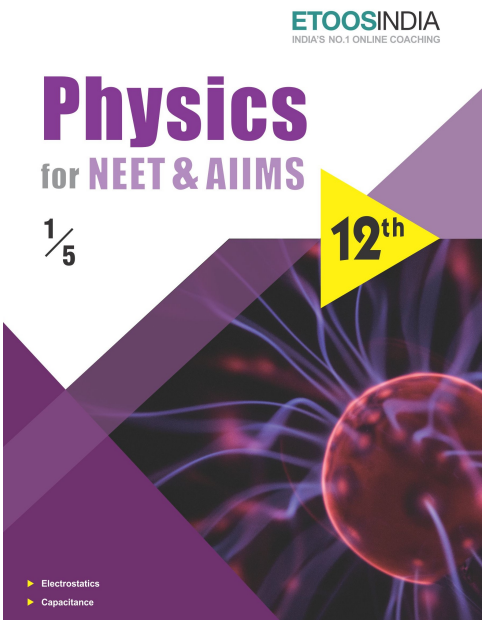
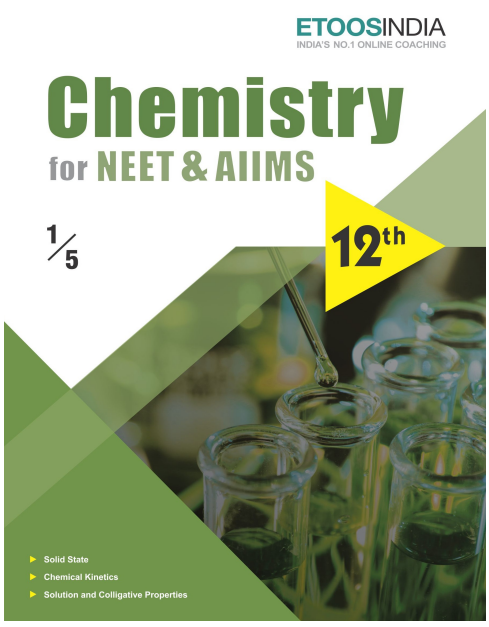
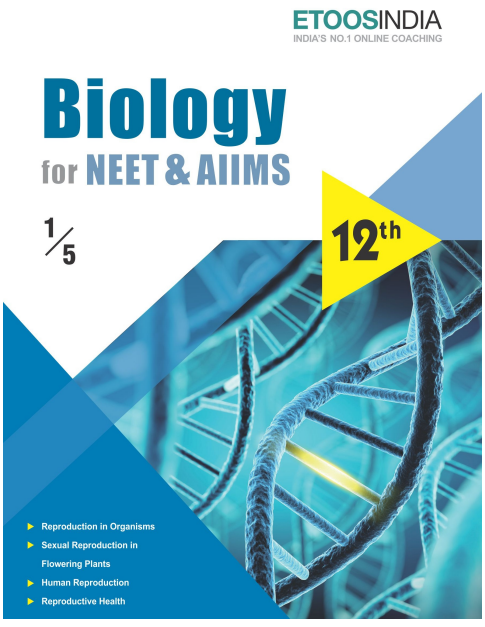












CHAPTER 15

DIGESTION AND ABSORPTION

"Happiness: a good bank account, a good cook, and a good digestion"

" JEAN-JACQUES ROUSSEAU (1712-1778)"

INTRODUCTION

Food is one of the basic requirements of all living organisms. The major and important component of our food are carbohydrates, proteins and fats. Vitamins and minerals are also required in small quantities. Bio-macromolecules in food cannot be utilized by our body in thir original form. They have to be broken down and convered into simple substance in the digestive system.This process of conversion of complex food substances to simple absorbable forms is called digestion and is carried out by our digestive system by mechanical and biochemical methods.

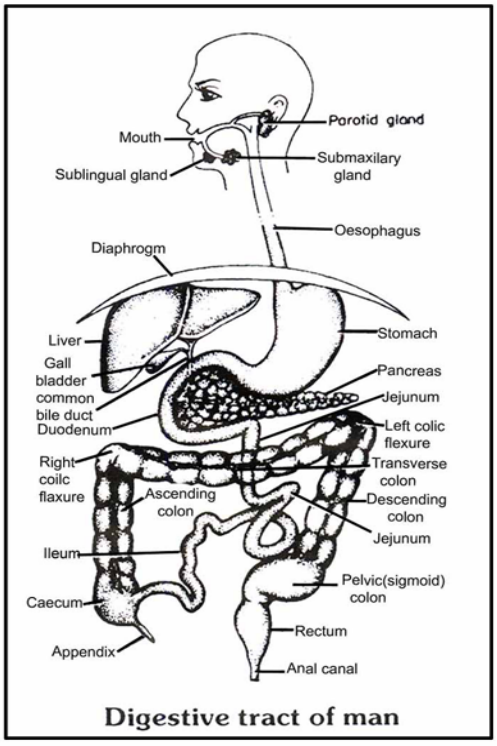
The water we take in, plays an important role in the metabolic processes and also prevents dehydration of the body.

DIGESTION & ABSORPTION

INTRODUCTION

Food is one of the basic requirement of the living organisms. To perform various functions of the body energy is required, which is obtained from food. The process of conversion of complex food material in to simple and diffusible forms by hydrolysis is termed as **Digestion.**

Major component of food are carbohydrates, proteins and fats, vitamins minerals are also required in small quantities.



Digestive tract of man

The alimentary canal is tubular structure which extends from mouth to anus. It develops from ectoderm & endoderm.

Ectoderm – up to hard palate

Endoderm – from soft palate to rectum

Ectoderm – from anal canal to Anus

The alimentary canal is divided into following parts–

(1) Mouth and Buccopharyngeal cavity, Pharynx

(2) Oesophagus

(3) Stomach

(4) Intestine

ETOOS KEY POINTS

1. Spoil hay of Sweet clover (melilotus indica) (Fodder and green manure) contains a substance called dicumarol. Dicumarol prevents the action of vitramin 'K'
2. Non-secretion of HCl is called as achlorhydria condition.
3. Chalogogues are substances which cause. The contraction of gall bladder
4. Choloretic are substances which increase bile juice from liver.
5. ''Achalasia Cardia'' condition is characterized by failure of cardiac sphincter to relax completely on swallowing causing accumulation of food in oesophagus and proximal oesophagus dialates.
6. One pair of vomerine teeth is found in the palate of frog.
7. Fangs are the poison teeth of snakes, these are the maxillary teeth.
8. Upper incisor teeth are modified in tusk in elephant.
9. Upper canine teeth are modified in tusk in walrus.
10. Homodont type dentition are found in toothed whale.
11. Enamel is absent in sloth and Armadillo.
12. Salivary glands are absent in whale.
13. The tongue is non-motile in whale.
14. Gall bladder is absent in lemprey, whale, rat and horse.
15. The main pancreatic duct is also known as **duct of wirsung** while accessory pancreatic duct is known as **duct of santorini.**
16. Citrin is also known as vitamin 'P' and controls vascular permeability.
17. Vitamin B_{17} – It is recently discovered anticancer vitamin.
18. Vitamin Q – helps in blood clotting.
19. Vita B_{15} – It is also known as pogonic acid, deficiency causes disorder in liver.
20. Vitamin B_6 also used in the treatment of tuberculosis.
21. Thecodont teeth are also found in crocodile.

Etoos Tips & Formulas

→ Biomacromalecules in food cannot be utilised by our body in their original form. They have been broken down and conveted into simple substances in the digestive system. This proces of conversion of complex food subtances to simple absorbable forms is called digestion.

→ No significant digestive activity occurs in the large intestine."The functions of large intesitine are

(a) absorption of some water, minerals and certain drugs.

(b) secretion of mucous, which helps on adhering the waste particles together and lubricating it for an easy passage.

→ The undigested, unabsorbed substances called faeces enters into the caecum of large intestine through ileocaecal value, which prevents the backflow of the faecal matter. It is temporarily store in the rectum till defaecation.

→ Absorption of digested product :

→ Absorption is the process by which the end products of digestion pass through the intestinal mucosa into the blood or lymph.

1. Disorders of digestive system :

→ Jaundice : The liver is affected, skin and eyes tum yellow due to the deposite of bile pigments.

→ Vomitting : It is the ejection of stomach contents through the mouth. This reflex action is controlled by the vomit centre in the medulla. A feeling of nausea precedes vomitting.

→ Diarrhoea : The abnormal frequency of bowel movement and increased liquidity of the faecal discharge is known as diarrhoea. It reduces the absorption of food.

→ Constipation : In constipation, the faeces are retained within the rectum as the bowel movements occur irregularly.

→ Indigestion : In this condition, the food is not properly digested leading to a feeling of fullness. The causes of indigestion are inadequate enzyme secretion, anxiety, food poisoning, over eating and spicy food.

→ When chyme enter into doudenum HCL of chyme stimulate different enteroendocrine cells of intestine to secrete following hormones.

1. Secretin - 1st discovered hormone, stimulate pancreas to synthesise and secrete nonenzymatic part of pancreatic juice.
2. Pancreozymin stimulate pancreas to synthesise and secrete enzymatic part of pancreatic juice.
3. Hepatocrinin stimulate liver cells for synthesis and secretion of bile juice.
4. Cholecystokinin stimulate liver and Gall Bladder for secretion of bile juice.

SOLVED EXAMPLE

Ex.1 In mammals the lower jaw is made up of
(A) Dentary **(B)** Maxilla
(C) Premaxilla **(D)** Palatine
Sol. **(A)** : The lower jaw of man is formed by the fusion of dentary bone only.

Ex.2 The hardest substance of vertebrate body is
Or
Crown of teeth is covered by
(A) Keratin **(B)** Enamel
(C) Dentine **(D)** Chondrin
Sol. **(B)** : Crown of the teeth is covered by the hardest substance of the body called enamel

Ex.3 In mammals the teeth are
(i) Of different types
(ii) Embedded in the cup-like socket of the jaw bones
(iii) Only two sets, present throughout life
These conditions are reffered as
Or
Teeth of rabbits are
(A) Heterodont, thecodont and diphyodont
(B) Thecodont, heterodont and diphyodont
(C) Diphyodont, thecodont, and heterodont
(D) Heterodont, diphyodont and thecodont
(E) Thecodont, diphyodont and heterodont
Sol. **(A)**

Ex.4 The mucosal layer in the stomach form irregular folds known as
(A) Villi
(B) Lumen
(C) Rugae
(D) Crypts of Lieberkuhn
(E) Lacteals
Sol. **(C)**

Ex.5 Dental formula of human beings is
(A) I_2, C_2, P_1, M_3 **(B)** I_2, C_1, P_2, M_3
(C) I_3, C_1, P_2, M_2 **(D)** I_2, C_2, P_3, M_1
Sol. **(B)** : Dental formula of human is $\frac{2,1,2,3}{2,1,2,3} = \frac{8}{8} \times 2 = 32$. It shows the number of incisor 2, canine 1, premolar 2 molar 3 in each half upper and half lower jaw with 32 teeth in buccal cavity.

Ex.6 The site of protein digestion is
Or
A rabbit eats a lot of gram, Then its digestion starts in
(A) Gullet **(B)** Stomach-Fat
(C) Small intestine-Protein **(D)** Mouth-Starch
Sol. **(B)** : The site of protein digestion is stomach where pepsin enzyme occur which changes protein to peptones + proteases.

Ex.7 Which of the following statement is not correct
(A) Goblet cells are present in the mucosa of intestine and secrete mucus
(B) Oxyntic cells are present in the mucosa of stomach and secrete HCl
(C) Acini are present in the pancreas and secrete carboxypeptodase
(D) Brunner's glands are present in the submucosa of stomach and secrete pepsinogen
Sol. **(D)** : Brunner's glands are present in the submucosa of duodenum and secrete HCO^-_3

Ex.8 The predominant antibody in saliva is
(A) IgG **(B)** IgA
(C) IgM **(D)** IgD
Sol. **(B)**

Ex.9 In man, Glisson's capsule is associated with the
(A) Digestive system
(B) Excretory system
(C) Nervous system
(D) Reproductive system
(E) Endocrine system
Sol. **(A)**

Ex.10 Which of the following is the symptom of Ulcerative colitis
(A) Watery stools containing blood and mucus
(B) Difficulty in swallowing
(C) Loss of appetite
(D) Eyes turn yellow
Sol. **(A)**

Exercise # 1 SINGLE OBJECTIVE NEET LEVEL

1. Bacteria entering with contaminated food are killed in stomach by –
(A) Pepsin (B) Renin
(C) Sodium bicarbonate (D) HCl

2. Glycogen is stored in –
(A) Blood (B) Liver
(C) Lungs (D) Kidney

3. Chymotrypsin is –
(A) Proteolytic enzyme
(B) Fat digestive Enzyme
(C) Vitamin
(D) Hormone

4. Excess amino acids are deaminated & converted into urea in –
(A) Kidneys (B) Liver
(C) Spleen (D) Pancreas

5. Secretin hormone is produced in –
(A) Stomach and stimulates gastric glands
(B) Intestine and stimulates Pancreatic glands
(C) Liver and stimulates gall bladder
(D) Intestine and stimulates crypts of lieberkuhn

6. Digestion of Carbohydrates, Proteins and fats completes in –
(A) Stomach (B) Liver
(C) Small intestine (D) Colon

7. Number of teeth which are monophyodont in man is
(A) 4 (B) 22
(C) 32 (D) 12

8. Absorption of digested food chiefly occurs in –
(A) Stomach (B) Colon
(C) Small Intestine (D) Large Intestine

9. Pancreatic juice takes part in digestion of –
(A) Proteins Carbohydrate and fats
(B) Proteins and fats
(C) Protein, Carbohydrate
(D) Proteins only

10. The enzyme trypsinogen is secreted by –
(A) Duodenum (B) Pancreas
(C) Liver (D) Stomach

11. Rickets is caused by the def. of –
(A) Vit A (B) Vit C
(C) Vit D (D) Vit B

12. Which is the sources of vitamin 'C' –
(A) Banana (B) Potato
(C) Orange (D) Mango

13. Our food mainly contains –
(A) Carbohydrates (B) Cellulose
(C) Sucrose (D) Glucose

14. Which one is differ from the category of other three
(A) Gastrin (B) Glucagon
(C) Secretin (D) Ptyalin

15. How many teeth in man grow twice in life–
(A) 20 (B) 28
(C) 30 (D) 32

26. The cells of the epithelial lining in the vertebrate stomach are not damaged by HCl because of –
(A) Mucus secretion covering the epithelium
(B) Neutrilizatioin of HCl by alkaline gastric juice
(C) HCl being to dilute
(D) Crypts of Lieberkuhn

17. Stomach is the main site for the digestion of
(A) Fats (B) Carbohydrate
(C) Protein (D) All of these

18. The hormone involved in the discharge of pancreatic juice in mammal is called –
(A) Gastrin (B) Secretin
(C) Secretin & CCK (D) Enterogastrin

19. Function of HCl in stomach is to –
(A) Kill micro-organism of food
(B) Facilitate absorption of food
(C) Dissolve enzymes secreted by gastric glands
(D) Active trypsinogen to trypsin

20. Which is sweet in taste but is not sugar –
(A) Starch (B) Saccharine
(C) Lactose (D) Protein

Exercise # 2 SINGLE OBJECTIVE AIIMS LEVEL

1. If a man is allowed to live exclusively on the diet of milk, egg & bread he would suffer from -
(A) Rickets (B) Beri-Beri
(C) Night blindness (D) Scurvey

2. Islets of langerhans are –
(A) Modified lymph glands
(B) Ductless glands in pancreas
(C) Specialized area in pituitary
(D) Small tubules in kidney

3. Scurvy is a disease caused by –
(A) A virus
(B) Deficiency of Vit E
(C) Def. of Vit. C
(D) Def. of Vit. D

4. Bilirubin and bilivirdin are found in –
(A) Blood (B) Bile
(C) Saliva (D) None of these

5. Vitamins are –
(A) Inorganic substances and can't be synthesised by animals.
(B) Inorganic substances and can be synthesised by animals.
(C) Organic substances which cannot mostly be synthesised by animals.
(D) Organic substances which can mostly be synthesised by animals.

6. Which of the following is the best source of Vit-A
(A) Carrot (B) Apple
(C) Peanuts (D) Honey

7. Vitamin necessary for blood clotting –
(A) A (B) E
(C) C (D) K

8. Dental formula of adult man is –
(A) $\frac{2,1,2,3}{2,1,2,3}$ (B) $\frac{2,1,2,3}{2,1,2,2}$
(C) $\frac{2,1,2,3}{2,1,2,4}$ (D) $\frac{2,1,3,2}{2,1,3,2}$

9. Islets of Langerhans are found in –
(A) Testis (B) Adrenal
(C) Pancreas (D) Ovary

10. Man needs carbohydrates as a source of energy nd gets these from –
(A) Starch (B) Cellulose
(C) Both (D) None of these

11. To keep people healthy, strong and energetic and long lived, it is necessary to provide them –
(A) high energy food
(B) large amt. of food
(C) Balanced diet
(D) Initiative and spirit

12. Beri-Beri is caused due to –
(A) Def. of Vit B_1 (B) Def. of Vit B_2
(C) Det. of Vit. B_{12} (D) Def. of Vit C

13. Which one of these are most essential for body growth and formation of new cells –
(A) Sugar (B) Fats
(C) Nucleic acid (D) Protein

14. The most common concentrated source of proteins for vegetarians in our country is –
(A) Potatoes (B) Meat
(C) Eggs (D) Pulses

15. Casien present in milk, which is –
(A) Bacterium (B) Sugar
(C) Protein (D) Fat

16. The largest gland in human body is –
(A) Pancreas (B) Liver
(C) Thyroid (D) Pituitary

17. Sucrose is found in -
(A) Milk (B) Honey
(C) Sugarcane (D) Orange

18. Vit A from carotene is synthesised in –
(A) Spleen (B) Skin
(C) Pancreas (D) Liver

Exercise # 3 PART - 1 MATRIX MATCH COLUMN

1. Match Column - I with Column - II and select the correct option from the codes given below.

Column - I (Types of cell)	Column - II (Secretions)
A. Peptic cells	i. Mucus
B. Oxyntic cells	ii. Alkaline fluid
C. Goblet cells	iii. Pro-enzymes
	iv. HCl

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

2. Match Column - I with Column - II and select the correct option from the codes given below.

Column - I	Column - II
A. Van Kupffer cells	i. Islets of Langerhans
B. β-cells	ii. Liver sinusoids
C. Oxyntic cells	iii. Thyroid gland
D. Paneth cells	iv. Stomach
	v. Small intestine

(A) A-iv, B-v, C-i, D-ii (B) A-iii, B-i, C-iv, D-ii (C) A-iv, B-v, C-iii, D-i (D) A-ii, B-i, C-iv, D-v

3. Match Column - I with Column - II and select the correct option from the codes given below.

Column - I	Column - II
A. Crypts of Lieberkuhn	i. Loop of duodenum
B. Pancreas	ii. Stomach
C. Adrenal gland	iii. Intestine
D. Gastric gland	iv. Kidney

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

4. Match Column - I with Column - II and select the correct option from the codes given below.

Column - I	Column - II
A. Goblet cells	i. Antibacterial agent
B. Lysozyme	ii. Mucus
C. Saliva	iii. HCl
D. Oxyntic cells	iv. Sublingual gland

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

5. Match Column - I with Column - II and select the correct option from the codes given below.

Column - I	Column - II
A. Sphincter of ani internus	i. Opening of hepato-pancreatic ampulla into duodenum
B. Cardiac sphincter	ii. Between duodenum and posterior stomach
C. Sphincter of Oddi	iii. Guarding the terminal part of alimentary canal
D. Ileocaecal sphincter	iv. Between oesophagus and anterior stomach
E. Pyloric sphincter	v. Between small intestine and large intestine

(A) A-iii, B-ii, C-iv, D-i, E-v (B) A-ii, B-v, C-i, D-iv, E-iii (C) A-iii, B-iv, C-i, D-v, E-ii (D) A-iv, B-iii, C-i, D-ii, E-v

Exercise # 4 PART - 1 PREVIOUS YEAR (NEET/AIPMT)

1. Which one of the following amino acids is as essential part of human diet ? [CBSE AIPMT 2000]
(A) Glycine (B) Phenylalanine
(C) Serine (D) Aspartic acid

2. In a person of advanced age, the hair become thinner gradually. It happens because of decrease in [CBSE AIPMT 2000]
(A) Synthesis of glucose
(B) Synthesis of proteins
(C) Energy availability
(D) Blood supply

3. A certain person eats boiled potato ; one of the food compnent 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

4. Which one correctly matched : - [CBSE AIPMT 2001]
(A) Vit. – E – Tocopherol
(B) Vit. – D – Riboflavin
(C) Vit. – B – Calciferole
(D) Vit. – A – Thiamine

5. Stool of a person contain whitish grey colour due to malfunction of which type of organ : [CBSE AIPMT 2002]
(A) Pancrease (B) Spleen
(C) Kidney (D) Liver

6. 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 Icarbohydrates
(C) First carbohydrates, next fats and lastly proteins
(D) First fats, next carbohydrates and lastly proteins

7. 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

8. Which one of the following is the correct matching of a vitamin, its nature and its deficiency disease : [CBSE AIPMT 2004]
(A) Vitamin A–Fat soluble – Night blindness
(B) Vitamin K–Fat soluble –Beri Beri
(C) Vitamin A – Fat soluble – Beri Beri
(D) Vitamin K – Water soluble – Pellagra

9. Duodenum has characteristic Brunner's glands which secrete two hormones called - [CBSE AIPMT 2004]
(A) Kinase, estrogen
(B) Secretin, Cholecystokinin
(C) Prolactin, parathormone
(D) Extradiol, progesterone

10. Which one of the following pairs is not correctly matched : - [CBSE AIPMT 2005]
(A) Vitamin B_{12} – Pernicious anaemia
(B) Vitamin B_1 – Beri-beri
(C) Vitamin C – Scurvy
(D) Vitamin B_2 – Pellagra

11. Which group of three of the following five statements (a-e) contain is all the three correct statements regarding beri-beri - [CBSE AIPMT 2005]
A. A crippling disease prevalent among the native population of sub-Saharan Africa.
B. A deficiency disease caused by lack of thiamine (vitamin - B_1).
C. A nutritional disorder in infants and young children when the diet is persistently deficient in essential protein.
D. Occurs in those countries where the staple diet is polished rice.
E. The symptoms are pain from neuritis, paralysis, muscle wasting, progressive oedema, mental deterioration and finally heart failure.
(A) A, B and D (B) B, C and E
(C) A, C and E (D) B, D and E

MOCK TEST

1. Which one of the following vitamins is not fat soluble?
(A) A (B) B (C) D (D) E

2. The purplish red pigment rhodopsin contained in the rods type of photoreceptor cells of the human eye, isa derivative of
(A) vitamin B_1 (B) vitamin C (C) vitamin D (D) vitamin A

3. A balanced diet does not include
(A) carbohydrates and fats (B) nucleic acids and enzymes
(C) proteins and vitamins (D) minerals and salts

4. Which of the following is true for vitamin C?
(A) Also called as ascorbic acid (B) Also called as fumaric acid
(C) Obtained from citrus fruits (D) Both (A) and (C)

5. Which of the following guards the opening of hepatopancreatic duct into the duodenum?
(A) Pyloric sphincter (B) Sphincter of Oddi
(C) Semilunar valve (D) Ileocaecal valve

6. In the stomach, gastric acid is secreted by the
(A) peptic cells (B) acidic cells
(C) gastrin secreting cells (D) parietal cells

7. The primary dentition in human differs from permanent dentition in not having one of the following type of teeth.
(A) Molars (B) Incisors (C) Canines (D) Premolars

8. Choose the correct statement among the following.
(A) The intestinal mucosal epithelium has oxyntic cells.
(B) Ptyalin converts proteins nto proteoses and peptones.
(C) Crypts of Lieberkuhn is seen between the bases of villin in the intestine.
(D) Sphincter of Oddi is present at the junction of oesophagus and cardiac stomach.
(E) Goblet cells secrete hydrochloric acid in stomach.

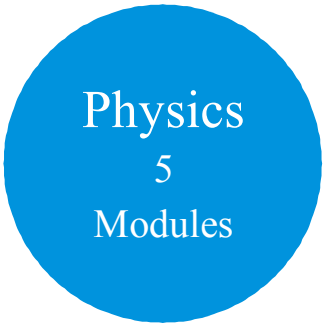
9. Column I contains names of the sphincter muscles of the alimentary canal and column II contains their locations. Match them properly and choose the correct answer.

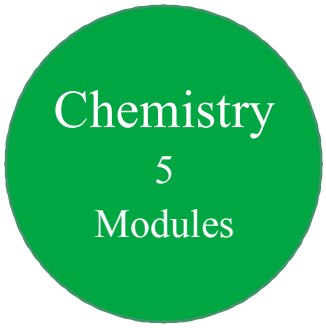
	Column I		Column II
A.	Sphincter of ani internus	1.	Opening of hepatopancreatic duct into duodenum
B.	Cardiac sphincter	2.	Between duodenum and posterior stomach
C.	Sphincter of Oddi	3.	Guarding the terminal part of alimentary canal
D.	Ileocaecal sphincter	4.	Between oesophagus and anterior stomach
E.	Pyloric sphincter	5.	Between small intestine and bowel

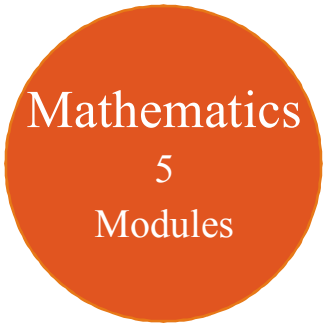
(A) A-3, B-2, C-4, D-1, E-5 (B) A-2, B-5, C-1, D-4, E-3
(C) A-3, B-4, C-1, D-5, E-2 (D) A-4, B-3, C-1, D-2, E-5

10. Identify the correctly matched structure and its secretion.
(A) Brunner's gland - Salivary amylase (B) Intestinal mucosa - Insulin
(C) Gall bladder - Bile (D) Salivary gland - Lysozme
(E) Goblet cells - HCl

11th Class Modules Chapter Details

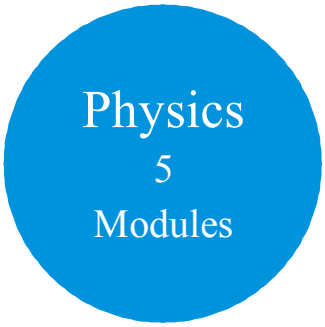


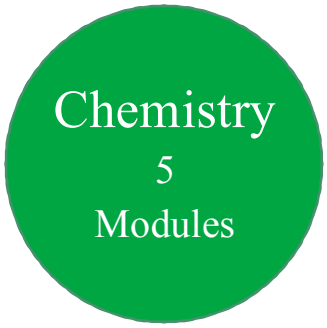


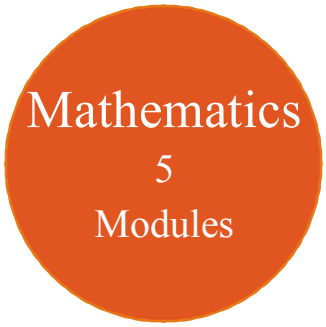


PHYSICS	CHEMISTRY	BIOLOGY
Module-1 1. Physical World & Measurements 2. Basic Maths & Vector 3. Kinematics **Module-2** 1. Law of Motion & Friction 2. Work, Energy & Power **Module-3** 1. Motion of system of particles & Rigid Body 2. Gravitation **Module-4** 1. Mechanical Properties of Matter 2. Thermal Properties of Matter **Module-5** 1. Oscillations 2. Waves	**Module-1(PC)** 1. Some Basic Conceps of Chemistry 2. Atomic Structure 3. Chemical Equilibrium 4. Ionic Equilibrium **Module-2(PC)** 1. Thermodynamics & Thermochemistry 2. Redox Reaction 3. States Of Matter (Gaseous & Liquid) **Module-3(IC)** 1. Periodic Table 2. Chemical Bonding 3. Hydrogen & Its Compounds 4. S-Block **Module-4(OC)** 1. Nomenclature of Organic Compounds 2. Isomerism 3. General Organic Chemistry **Module-5(OC)** 1. Reaction Mechanism 2. Hydrocarbon 3. Aromatic Hydrocarbon 4. Environmental Chemistry & Analysis Of Organic Compounds	**Module-1** 1. Diversity in the Living World 2. Plant Kingdom 3. Animal Kingdom **Module-2** 1. Morphology in Flowering Plants 2. Anatomy of Flowering Plants 3. Structural Organization in Animals **Module-3** 1. Cell: The Unit of Life 2. Biomolecules 3. Cell Cycle & Cell Division 4. Transport in Plants 5. Mineral Nutrition **Module-4** 1. Photosynthesis in Higher Plants 2. Respiration in Plants 3. Plant Growth and Development 4. Digestion & Absorption 5. Breathing & Exchange of Gases **Module-5** 1. Body Fluids & Its Circulation 2. Excretory Products & Their Elimination 3. Locomotion & Its Movement 4. Neural Control & Coordination 5. Chemical Coordination and Integration

12th Class Modules Chapter Details







PHYSICS

Module-1

1. Electrostatics
2. Capacitance

Module-2

1. Current Electricity
2. Magnetic Effect of Current and Magnetism

Module-3

1. Electromagnetic Induction
2. Alternating Current

Module-4

1. Geometrical Optics
2. Wave Optics

Module-5

1. Modern Physics
2. Nuclear Physics
3. Solids & Semiconductor Devices
4. Electromagnetic Waves

CHEMISTRY

Module-1(PC)

1. Solid State
2. Chemical Kinetics
3. Solutions and Colligative Properties

Module-2(PC)

1. Electrochemistry
2. Surface Chemistry

Module-3(IC)

1. P-Block Elements
2. Transition Elements (d & f block)
3. Co-ordination Compound
4. Metallurgy

Module-4(OC)

1. HaloAlkanes & HaloArenes
2. Alcohol, Phenol & Ether
3. Aldehyde, Ketone & Carboxylic Acid

Module-5(OC)

1. Nitrogen & Its Derivatives
2. Biomolecules & Polymers
3. Chemistry in Everyday Life

BIOLOGY

Module-1

1. Reproduction in Organisms
2. Sexual Reproduction in Flowering Plants
3. Human Reproduction
4. Reproductive Health

Module-2

1. Principles of Inheritance and Variation
2. Molecular Basis of Inheritance
3. Evolution

Module-3

1. Human Health and Disease
2. Strategies for Enhancement in Food Production
3. Microbes in Human Welfare

Module-4

1. Biotechnology: Principles and Processes
2. Biotechnology and Its Applications
3. Organisms and Populations

Module-5

1. Ecosystem
2. Biodiversity and Conservation
3. Environmental Issues