

UNIT – II: WORLD OF LIVING

CHAPTER-5 LIFE PROCESSES

Topic-1

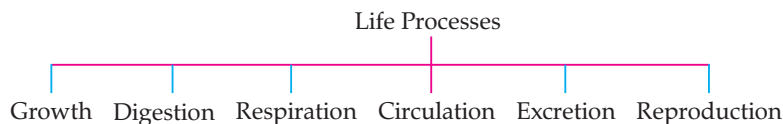
Nutrition

Concepts Covered • Modes of nutrition- Autotrophic and heterotrophic
• Process of photosynthesis • Nutrition in human beings • Human digestive system



Revision Notes

- ▶ All living things perform certain life processes like growth, excretion, respiration, circulation and reproduction etc.
- ▶ The basic functions performed by living organisms for their survival and body maintenance are called life processes.
- ▶ **Basic life processes are:**



- ▶ Energy required to carry out the different life processes, is obtained from carbon-based food sources through nutrition.
- ▶ There are two modes of nutrition:
 - Autotrophic nutrition:** It is a kind of nutrition in which organism prepare its own food by a process called photosynthesis for e.g., Green plants and some photosynthetic bacteria.
 - Heterotrophic nutrition:** It is a kind of nutrition in which an organism takes food from another organism for e.g., Animals and fungi. It is of three types: Holozoic (e.g. *Amoeba*, animals), Saprophytic (e.g., fungi) and Parasitic (e.g., *Cuscuta*, ticks and mites)
- ▶ Depending on the mode of nutrition, organisms are classified as autotrophs and heterotrophs.
 - Autotrophs** can prepare their own food from simple inorganic sources like carbon dioxide and water. (e.g., green plants, some bacteria).
 - Heterotrophs** cannot synthesise their own food and are dependent on the autotrophs for obtaining complex organic substances for nutrition. (e.g., animals)
- ▶ Green plants manufacture their own food by the process of **photosynthesis**. Here, they utilise CO₂ and H₂O in presence of sunlight, with the help of chlorophyll and gives out O₂ as a by-product.
- ▶ **Main Events of Photosynthesis are:**
 - Absorption of light energy by chlorophyll.
 - Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen.
 - Reduction of CO₂ to form carbohydrates.
- ▶ Site of photosynthesis in the leaf is chloroplast. It contains a green colour pigment called chlorophyll.
- ▶ *Amoeba* is a unicellular organism, which follows holozoic mode of nutrition. *Amoeba* captures food with the help of temporary finger-like processes called pseudopodia.
- ▶ Plants carry out exchange of gases with surrounding atmosphere through stomata.
The opening and closing of stomatal pores are controlled by the turgidity of guard cells.
 - When guard cells uptake water from surrounding cells, they swell to become a turgid body. This enlarges the pore in between and causes stomatal opening.
 - When water is released, guard cells become flaccid. This closes the pore in between causing stomatal closing.
- ▶ **Nutrition in human beings:** The human digestive system comprises of alimentary canal and associated digestive glands.
- ▶ The alimentary canal is a long muscular tube extending from the mouth to the anus. Various regions are specialised to perform different functions.
- ▶ Associated glands include **salivary gland**, gastric gland, Liver and Pancreas.



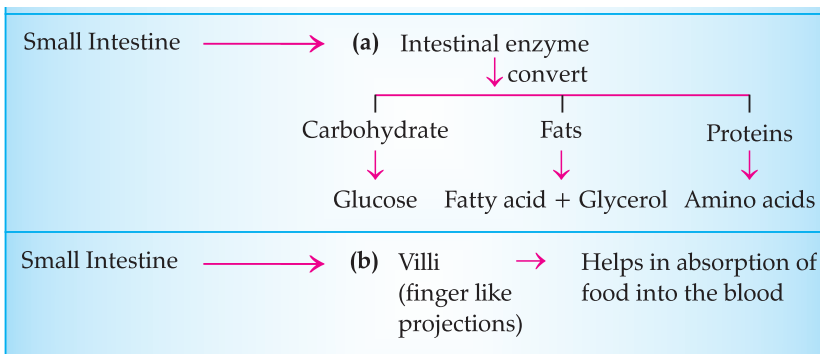
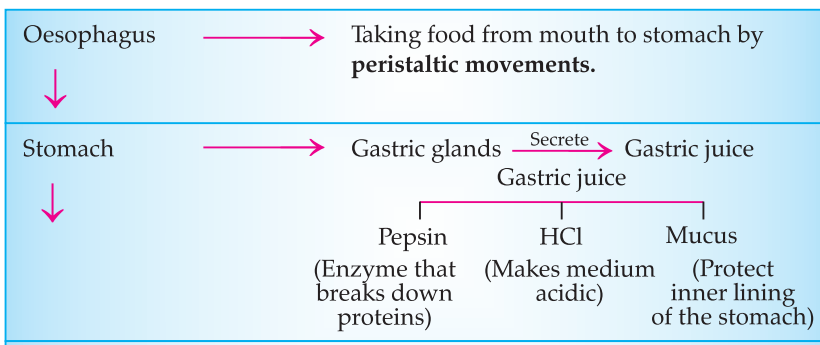
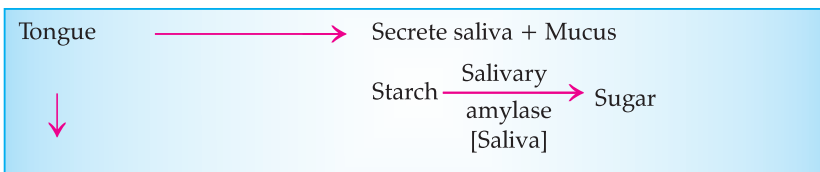
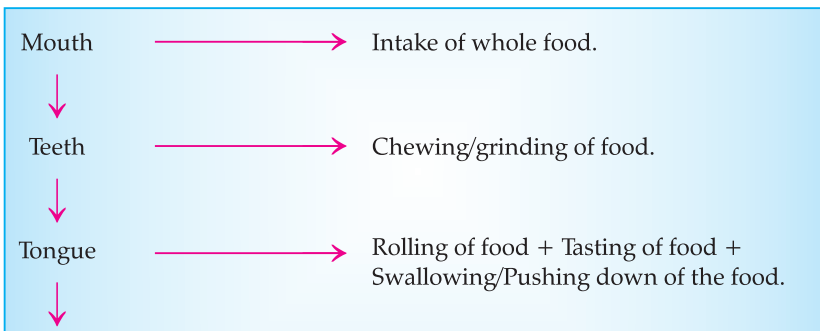
Mnemonics

Concept: Parts of an alimentary canal in humans.

Mnemonics: MOSS DJ I LA – remember this as “Kate MOSS is a DJ In LA”

Interpretations:

M = Mouth **O** = Oesophagus
S = Stomach **S** = Small Intestine
D = Duodenum **J** = Jejunum
I = Ileum **L** = Large Intestine
A = Anus



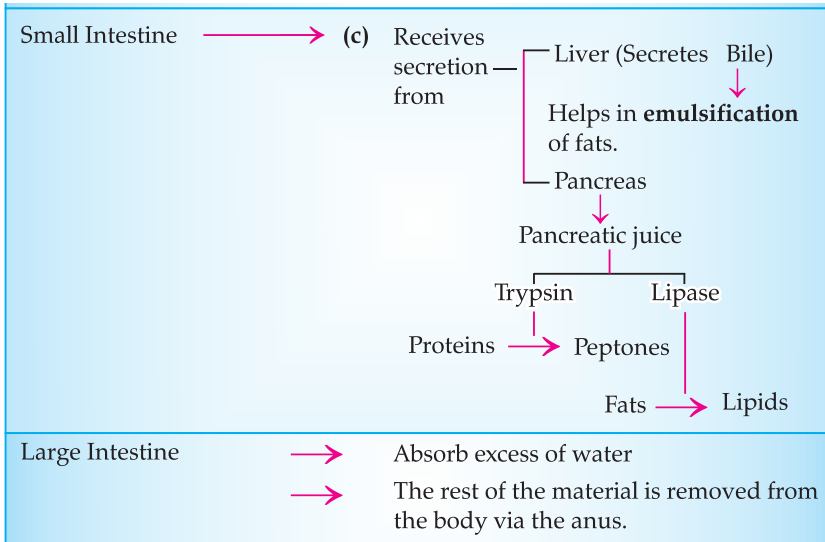
Key Words

Salivary glands: Secrete an enzyme called salivary amylase or ptyalin. It degrades starch into simple sugar.

Peristaltic movement: It is a wave of contraction behind the food and expansion in the region of contained food that occurs in the alimentary canal for pushing the food from anterior to posterior ends.

Key Facts

- Small intestine is the site of the complete digestion of carbohydrates, proteins and fats.
- Bile is secreted by liver and stored in gall bladder.



Key Word

Emulsification of fats is conversion of large fat pieces into very fine fat globules.

Topic-2

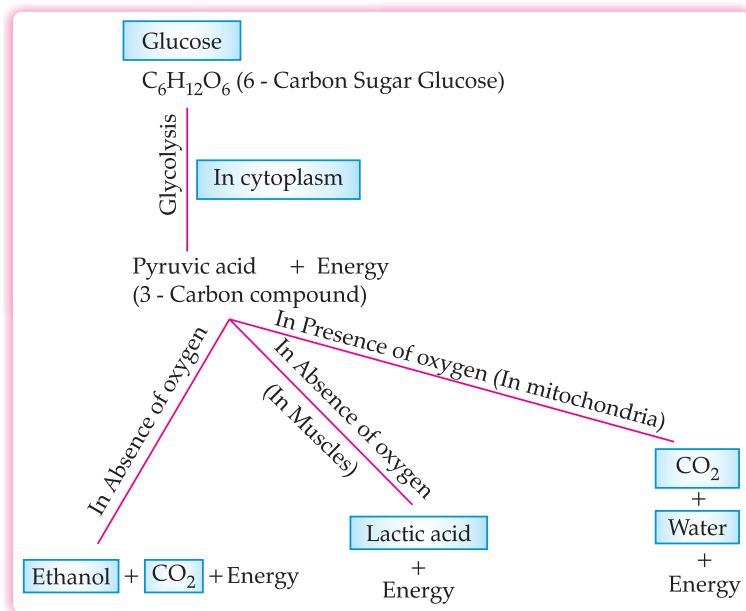
Respiration

Concepts Covered • Breakdown of glucose by various pathways • Types of respiration • Human respiratory system • Process of Breathing • Respiration in plants • Respiration in animals.



Revision Notes

- ▶ Respiration is the process in living organisms, which involves:
 - Breathing (Gaseous exchange):** Intake of oxygen from the atmosphere and release of CO_2
 - Breakdown of simple food in order to release energy inside the cell
- ▶ **Important Flowchart:**
Breakdown of Glucose by Various Pathways:



Key Facts

- The breakdown of sugars by yeast to make alcohol in the absence of air is called fermentation.
- The accumulation of lactic acid causes muscle cramps.
- Pharynx contains rings of cartilage which ensure that air passage does not collapse.
- Respiration in plants occurs all through the day, but the photosynthesis process occurs in the daytime, in the presence of sunlight only.

► **Types of Respiration:**

Respiration	
Aerobic	Anaerobic
Takes place in the presence of oxygen.	Takes place in the absence of oxygen.
Occurs in mitochondria.	Occurs in cytoplasm.
End products are CO ₂ and H ₂ O.	End products are alcohol or lactic acid.
More amount of energy is released.	Less amount of energy is released.
Examples: Most plants and animals.	Examples: Muscles, bacteria, yeast and parasitic worms etc.

- **Human Respiratory system:** Respiratory system in human serves to provide fresh oxygen to all body cells and removes harmful carbon dioxide from the body.
- It comprises Nostrils, Nasal cavity, Pharynx, Larynx, Trachea, Bronchi, Bronchiole, Alveoli, Blood capillaries and Lungs.
- **Breathing involves two main processes:**
- (a) **Inspiration (Breathing IN):** Inspiration is the active intake of air from atmosphere into lungs.
- The path followed by fresh air (oxygen) is:
External nares → Nasal cavity → Internal nares → Pharynx → Glottis → Larynx → Trachea → Bronchi → Bronchioles → Alveolar duct → Alveoli
- (b) **Expiration (Breathing OUT):** It is the passive expelling of air from the lungs.
- The path followed by foul air (carbon dioxide) is:
Alveoli → Alveolar duct → Bronchioles → Bronchi → Trachea → Larynx → Glottis → Pharynx → Internal nares → Nasal cavities → External nares → Outside
- The alveoli of lungs are richly supplied with blood and are the sites where exchange of gases (O₂ and CO₂) occurs between blood and atmosphere.
- In humans, the respiratory pigment haemoglobin carries oxygen from lungs to different tissues of the body.
- In plants, gaseous exchange takes place through stomata in leaves, lenticel in stems, general surface of roots and transpiration.
- **Respiration in Animals:**
- Unicellular animals: **Diffusion**
 - Earthworm:** Breathe through the skin.
 - Aquatic animals:** Gills which extract dissolved oxygen in water.
 - Insects:** Tiny holes called spiracles
 - Land animals:** Lungs
- Terrestrial organisms use atmospheric oxygen for respiration.
 - Aquatic organisms use oxygen dissolved in water.
- The rate of breathing in aquatic organisms is much faster than that seen in terrestrial organisms.

Circulation and Transportation

Topic-3

Concepts Covered • Human circulatory system, • Double circulation system in humans, • Circulation of blood in animals, • Transportation in Plants • Transpiration.

Human Circulatory System

- The circulatory system in human beings consists of: A circulatory medium (blood and lymph), blood vessels (veins, arteries and capillaries) and heart.
- Heart is a muscular organ which is composed of cardiac muscles. It is the main pumping organ which pumps the blood to all parts of the body.
- Human heart is four chambered i.e., it is composed of four chambers: right atrium, right ventricle, left ventricle and left atrium. The chambers are separated by a muscular wall that prevents the mixing of the blood rich in oxygen with the blood rich in carbon dioxide.
- Blood pressure is the force that the blood exerts on the blood vessels.
- Humans have double circulation system. Blood travels twice through the heart in one complete cycle of the body.
- **Pulmonary Circulation:** Blood moves from the heart to the lungs and back to the heart.
- **Systemic Circulation:** Blood moves from the heart to rest of the body and back to the heart.
- Blood is a fluid connective tissue. It comprises four components- Plasma, RBCs, WBCs, and platelets.
- Lymph is a yellowish fluid that escapes from the blood capillaries into the intercellular spaces.
- **Blood Vessels:** There are three types of blood vessels: Arteries, veins and capillaries.

Key Facts

- Ventricles have thicker muscular walls as they pump blood into various organs.
- A healthy normal blood pressure reading is less than 120 mm Hg systolic and 80 mm Hg diastolic. A blood pressure of 140/90 mmHg or higher indicates high blood pressure.
- Valves ensure that blood does not flow backwards when the atria and ventricles contract.

Differences between arteries and veins:

Arteries		Veins	
1.	Carry oxygenated blood from heart to different body parts except pulmonary artery.	1.	Carry deoxygenated blood from different body parts to the heart except pulmonary vein.
2.	Also called distributing vessel.	2.	Also called collecting vessel.
3.	Walls thick, elastic and muscular.	3.	Thin, non-muscular and less elastic.
4.	Deep seated	4.	Superficial as compared to arteries.
5.	Have no valves	5.	Have valves, which prevent backward flow of blood.

Transportation in plants:

There are two main conducting channels in vascular plants. These are Xylem and Phloem.

Xylem		Phloem	
1.	Transports water and minerals from the roots to upper parts of the plant.	1.	Transports product of photosynthesis from leaves to the non-photosynthesising parts of the plants such as root & stem.
2.	No energy is used for transport.	2.	Energy is used from ATP for transport.
3.	On maturity, the xylem becomes dead tissue and gives mechanical support to the plant.	3.	Phloem exists as living soft tissue.

Transpiration: It is the process of loss of water as vapours from aerial parts of the plant.

Translocation: Transport of food from leaves (food factory) to different parts of the plant is called translocation.

Topic-4

Excretion

Concepts Covered • Excretion in human, • Structure of Nephron, • Urine formation, • Artificial Kidney, • Excretion in plants.

Excretion in Human beings:

- ▶ During **excretion**, the harmful metabolic nitrogenous wastes like urea and uric acid generated are removed from the body.

Key Word

Excretion is the process of the removal of the harmful metabolic wastes from the body.

- ▶ Excretory system of human beings includes a pair of Kidney, a Urinary Bladder, a pair of Ureter and a Urethra.
- ▶ Each kidney contains many filtration units called nephrons. Nephrons are the basic filtration units of kidneys. They carry out filtration, selective reabsorption and tubular secretion to form urine in kidney, which is then passed out through the urethra, via the ureters and urinary bladder.
- ▶ A Nephron is made up of a cluster of thin walled capillaries called glomerulus which is associated with a cup like structure called as Bowman's capsule and a long tube which terminates through this capsule.
- ▶ The renal artery brings oxygenated blood to the kidneys along with the nitrogenous wastes like urea and uric acid and many other substances.
- ▶ The blood gets filtered through the glomerulus and this filtrate enters the tubular part of nephron.
- ▶ As this filtrate moves down the tubular part, glucose, amino acids, salts and excess of water gets selectively re-absorbed by the blood vessels surrounding the tubules.

- ▶ **The amount of water re-absorbed depends upon:**
 - How much excess of water is there in the body and,
 - How much nitrogenous wastes need to be excreted out.
- ▶ The fluid now flowing in the tubular part is urine, which gets collected in collecting ducts of nephrons.
- ▶ These collecting ducts together leave the kidney at a common point by forming the ureter.

Key Fact

The expulsion of urine from the body is known as micturition.

- ▶ Each ureter drains the urine in the urinary bladder where it is stored until the pressure of expanded bladder leads to an urge to pass it out through urethra.
 - ▶ This bladder is a muscular structure which is under nervous control.
 - ▶ 180 litres of filtrate is formed daily but only 2 litres is excreted out as urine so the rest is re-absorbed in the body.
 - ▶ **Urine formation in Kidneys:**
Urine formation involves three steps:
 - (i) **Glomerular filtration:** Nitrogenous wastes, glucose, water, amino acids filter from the blood into Bowman's capsule of the nephron.
 - (ii) **Tubular reabsorption:** Useful substances from the filtrate are re-absorbed back by capillaries surrounding the nephron.
 - (iii) **Secretion:** Urea, extra water and salts are secreted in the tubule which open up into the collecting duct and then into the ureter.
 - ▶ **Haemodialysis:** In case of kidney failure, haemodialysis is the process of purifying blood by an artificial kidney.
 - ▶ **Excretion in plants:** In plants, excretion of oxygen, CO₂ and water takes place through stomata by the process of transpiration.
-