पु•ना International School
Shree Swaminarayan Gurukul, Zundal

CLASS - X

SUBJECT – SCIENCE

[SAMPLE PLAN]

BIOLOGY

APRIL -MAY

SESSION – 2021 - 2022

INDEX

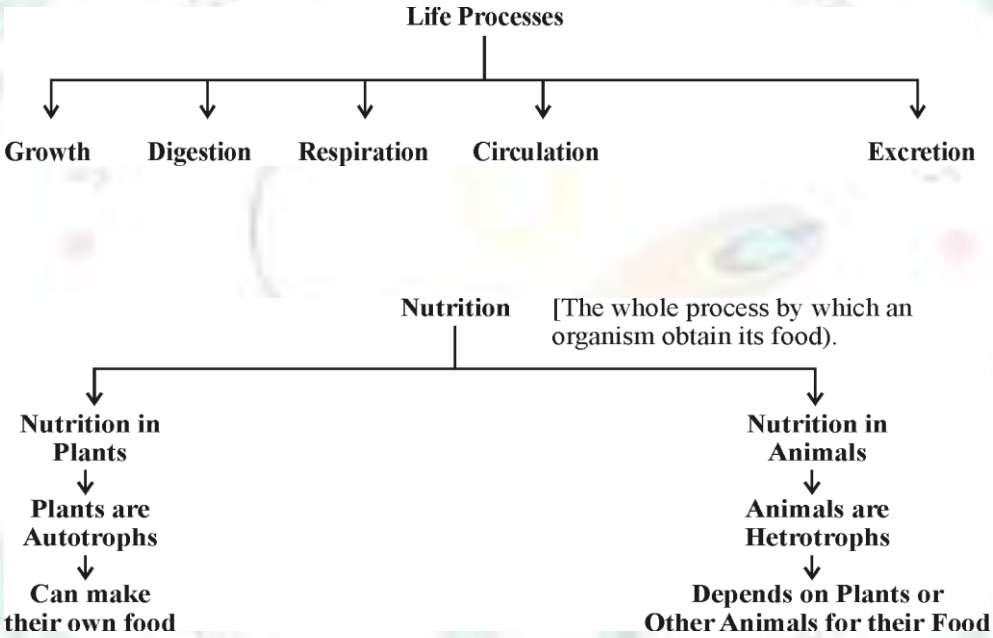
S.NO	MONTH	NAME OF THE LESSON
1.	APRIL – MAY	CH – 6 LIFE PROCESS
2.	JUNE – JULY	CH – 7 CONTROL AND COORDINATION
3.	AUGUST	CH – 8 HOW DO ORGANISMS REPRODUCE
4.	SEPTEMBER	REVISION

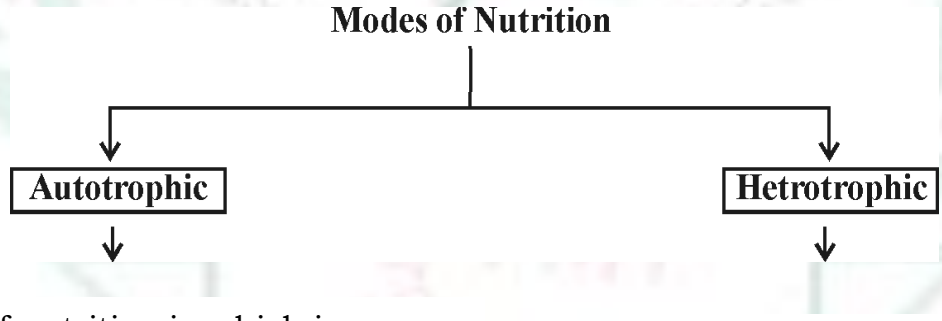
CLASS - 10
SUB – BIOLOGY

CH – 6 LIFE PROCESS

All living things perform certain life processes like growth, excretion, respiration, circulation etc. **All the processes like respiration, digestion, which together keep the living organisms alive and perform the job of body maintenance are called life processes.**

All living beings has to perform these Life Processes.





Kinds of nutrition in which in organic materials like CO2, water etc are utilized to prepare organic food by the process of photosynthesis.

Eg. Green Plants

Kinds of nutrition in which in organisms do not possess the ability to synthesize their own food. They depend on autotrophs for their food supply directly or indirectly.

Eg – Animals , Fungi

Autotrophic Nutrition - The organisms which carry out autotrophic nutrition are called autotrophs (greenplants)

Autotrophs ⟶ Simple in organic material ⟶ (Convert into) Complex high energy molecules Carbohydrates

Autotrophic nutrition is fulfilled by the process by which autotrophs take in CO_2 and H_2O and convert these into carlohydrates in the presence of chlorophyll, sunlight iscalled **PHOTOSYNTHESIS**

Equation :

$$6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyle}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2 + 6H_2O$$

Raw Materials for Photosynthesis :

- Sunlight
- Chlorophyll → Sunlight absorbed by chlorophyll
- CO_2 → enters through Stomata, and Oxygen (O_2) is released as by productthrough stomata on leaf.
- Water → water + dissolved minerals like Nitrogen phosphorous etc are takenup by the roots from the soil.

Site of Photosynthesis :

Chloroplast in the leaf. Chloroplast contain chlorophyll. (green pigment)

Main Events of Photosynthesis :

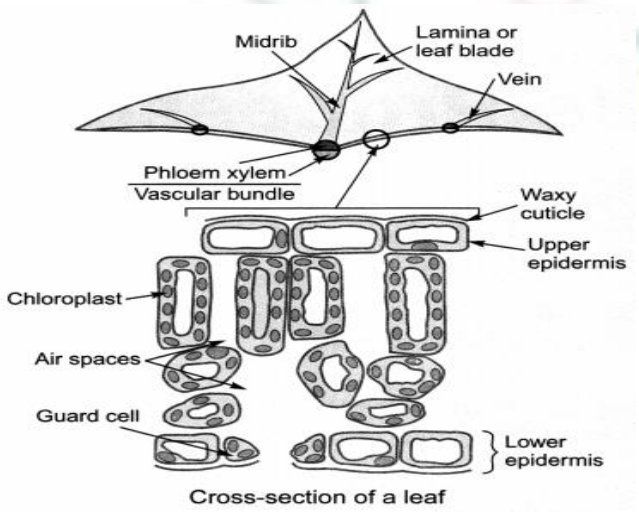
- Absorption of light energy by chlorophyll
- Conversion of light energy into chemical energy + splitting (breaking) of waterinto hydrogen and oxygen.
- Reduction of CO_2 to carbohydrates.

STOMATA : Tiny pores present on the surface of the leaves

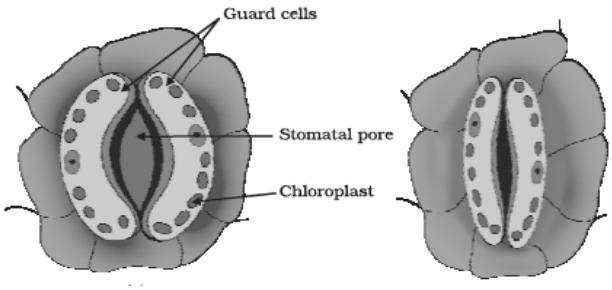
FUNCTIONS :

(i) Exchange of gases O_2/CO_2

(ii) Loses large amount of water [water vapour] during transpiration.



Cross-section of a leaf

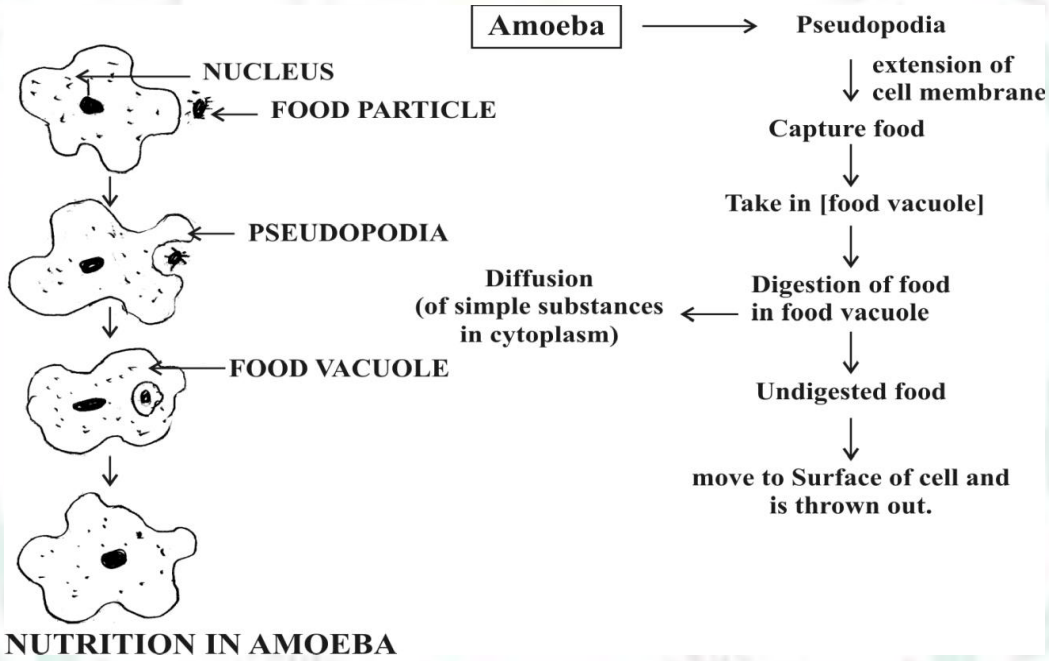


Hetrotrophic nutrition

HOLOZOIC	SAPROPHTIC	PARASITIC
Animals take in solid food and breakdown inside the body	Organisms feed on dead, decaying matter	Parasites live inside or outside other organism (host) and derive nutrition from it.
eg. Amoeba, animals	eg. fungi	eg. cuscuta (plant parasite ticks etc.

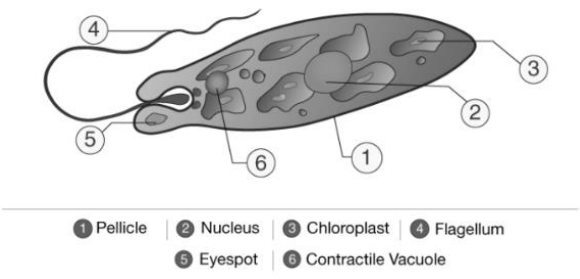
How do organisms obtain their food

Unicellular / single celled organism : food is taken up through entire surface.Example : (i) Amoeba. (ii) Paramaecium



NUTRITION IN AMOEBA

(ii) Paramecium → Cilia (present all over the body) → take in food ↓ At a specific spot



NUTRITION IN HUMAN BEINGS

The human digestive system comprises of alimentary canal and associated digestive glands.

Mouth ⟶ **Intake of whole food**

Teeth ⟶ **Chewing / grinding of food**

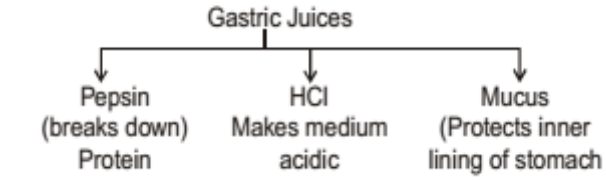
Tongue ⟶ **Rolling of food**
+
Tasting of food
+
Swallowing / pushing down of the food

Salivary Glands ⟶ **Secrete Saliva + Mucus**

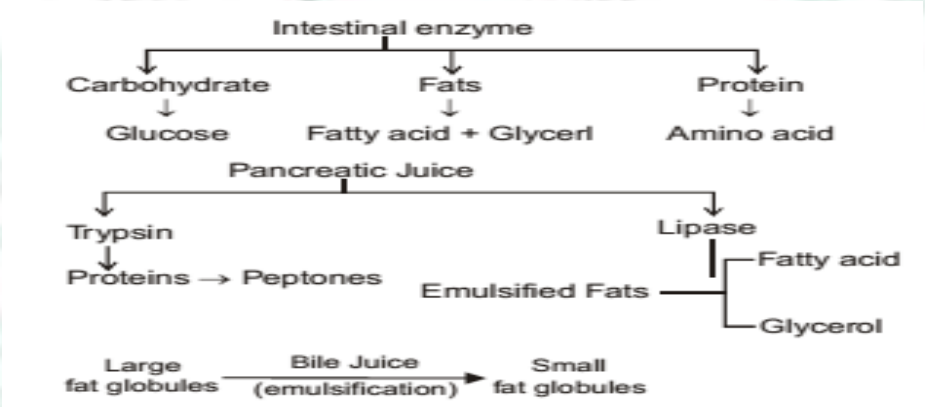
Starch —(Salivary Amylase [Saliva])→ **Sugar**

Oesophagus ⟶ **Taking food from mouth to stomach Peristaltic movements [Contraction and expansion of muscles of the Oesophagus]**

Stomach ⟶ **Gastric Glands secrete Gastric juice**



Small intestine ⟶ **Liver** ⟶ **secrete bile**



Pancreas ⟶ **secrete pancreatic juice**

Large intestine ⟶ **(absorbs excess water)**

Rectum **(Temporary collection of waste)**

Anus **(Helps in egestion)**

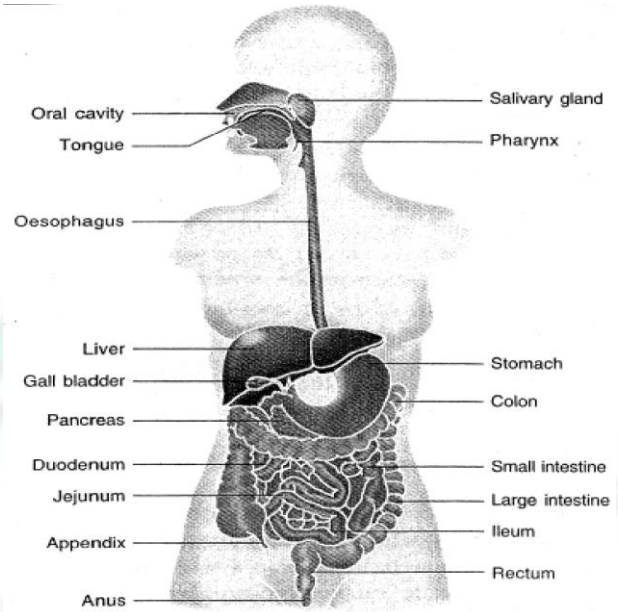


Fig. Human digestive system

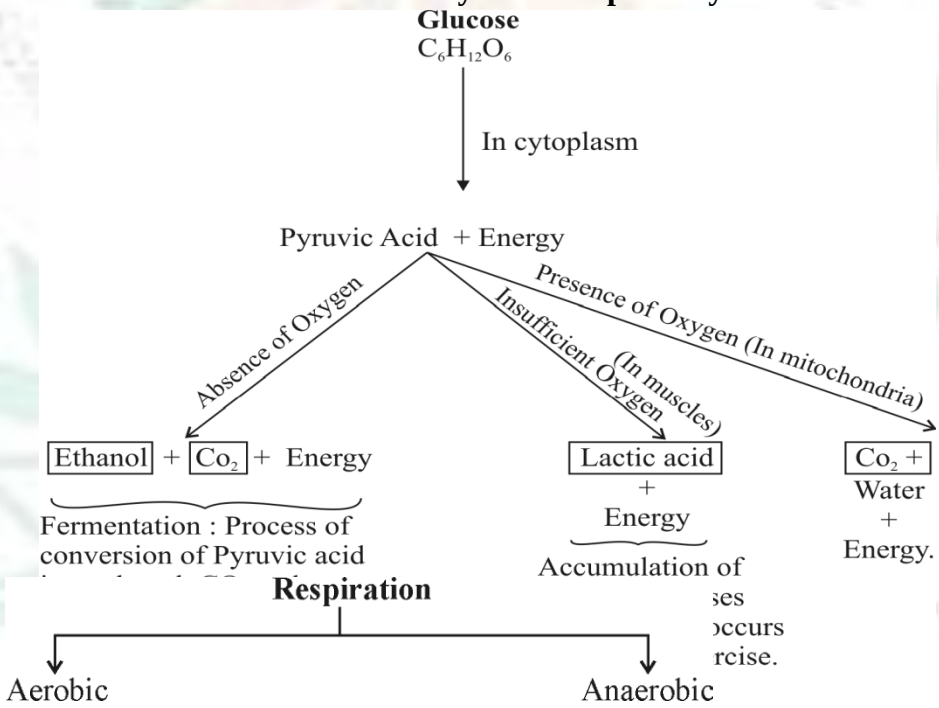
RESPIRATION

Respiration involves

(i) Gaseous exchange : Intake of oxygen from the atmosphere and release of CO_2 ⟶ Breathing

(ii) Breakdown of simple food in order to release energy inside the cell ⟶ CellularRespiration

Breakdown of Glucose by various pathways



***Takes place in the presence of oxygen**

***Occurs in mitochondria**

***End products are CO_2 and H_2O**

***More amount of energy is released.**

***Takes place in the absence of oxygen**

***Occurs in cytoplasm**

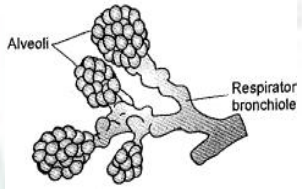
***End products are alcohol or lactic acid**

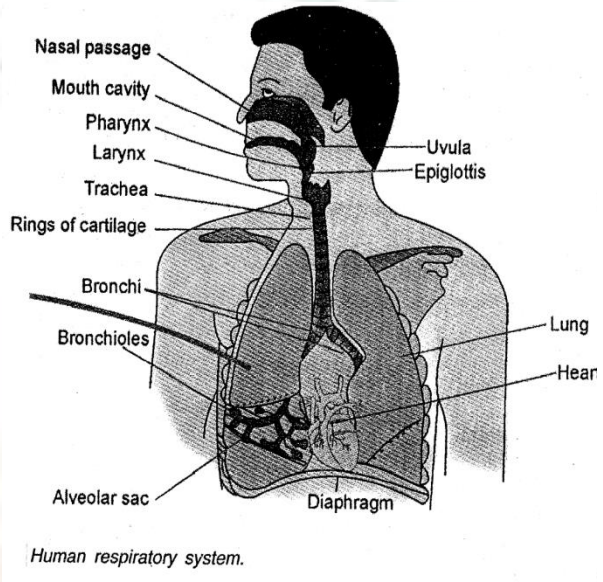
***Less amount of energy is released.**

HUMAN RESPIRATORY SYSTEM

Passage of air through the respiratory system.

Nostril
↓
Nasal Passage
↓
Nasal Cavity
↓
Pharynx
↓
Larynx
↓
Trachea
↓
Bronchi
↓
Lungs
↓
Bronchioles
↓
Alveolar
↓
Blood Capillaries





Human respiratory system.

Exchange of Gases between alveolus, blood and tissues.

1. Air (rich in O_2) (in alveolus) → Blood [through blood vessels] → O_2 Binds with Haemoglobin in RBC → O_2 is released in tissues

2. CO_2 (from tissue) → CO_2 released into blood → CO_2 Dissolved in blood → Blood vessels (in alveoli) → CO_2 Released in alveolar SaC → CO_2 Sent out through nostrils

Terrestrial Organism – use atmospheric oxygen for respiration

Aquatic Organisms – used dissolved oxygen for respiration

Respiration in Plants :

Respiration in plants is simpler than the respiration in animals. Gaseous exchange occur through

Stomata in leaves

Lenticels in stems

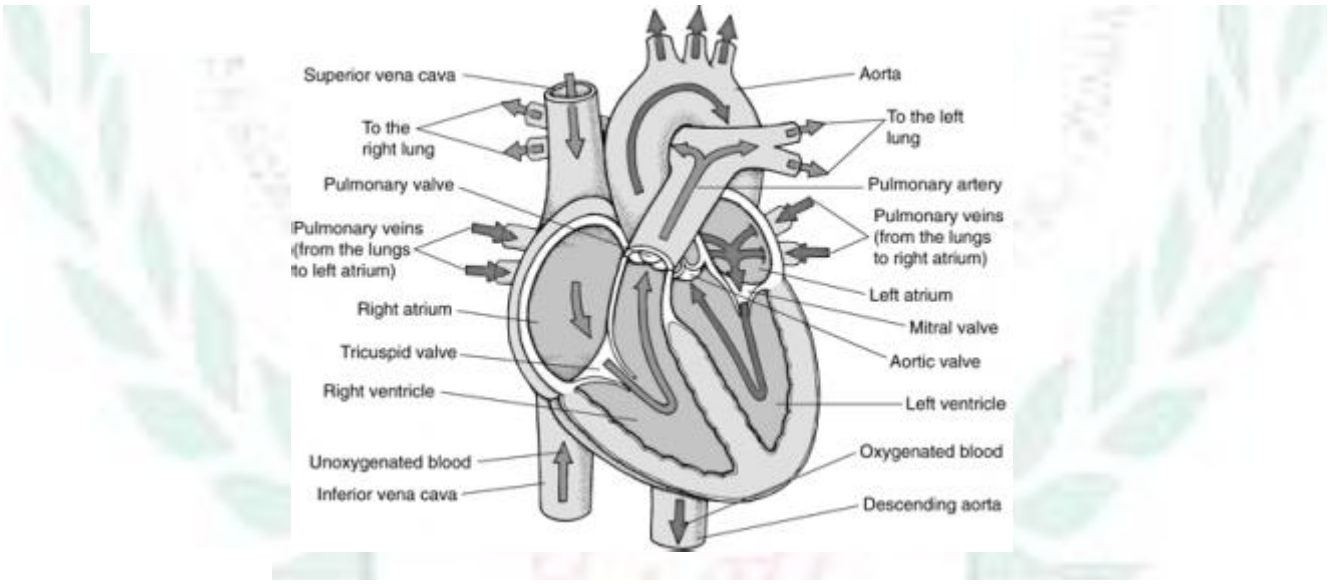
General surface of the roots.

TRANSPORATION AND EXCRETION

- Human beings like other multicellular organism need regular supply of food, oxygen etc., This function is performed by circulatory system or Transport system.
- Double circulation occurs in human beings i.e. the blood goes through the heart twice during each cardiac cycle.

- Blood and lymph are both involved in transportation
- Components of blood are RBCs, WBCs, platelets, and plasma.
- Three types of blood vessels are arteries, veins and capillaries.
- Arteries carry oxygenated blood in them, except one that is pulmonary artery
- Veins carry deoxygenated blood in them, except pulmonary vein

The Human heart is divided into four chambers – right auricle, right ventricle, left auricle, and left ventricle



- The Right side of the heart gets deoxygenated blood from different cells of the body.
- The Left side of the heart receives oxygenated blood from lungs.

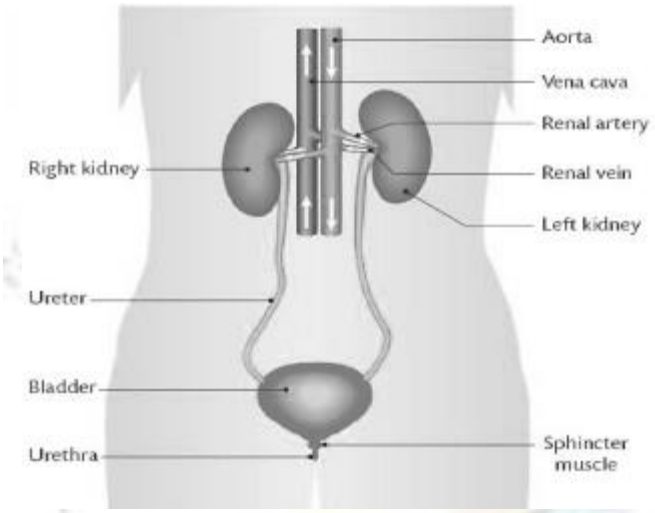
Transportation in plants

- Transportation of water is through xylem tissues
- Transport of water occurs due to transpiration pull, root pressure and difference in pressure gradient.
- Transport of food or translocation takes place through phloem and it requires energy.

Excretion

- It involves the removal of harmful metabolic wastes from the body of organisms by various processes.

Excretion in humans



- The excretory system consists of- a pair of kidneys, a pair of ureters, a urinary bladder, and a urethra.
- Nitrogenous wastes such as urea and uric acid are removed
- Nephron- basic filtration unit
- Main components of the nephron - glomerulus, Bowman's capsule, renal tube
- The process of Removing of nitrogenous wastes through artificial kidney is called **dialysis.**

Textbook questions –

Q 1. Why is diffusion insufficient to meet the oxygen requirements of multicellular organisms like humans?

Ans. In multicellular organisms, all the cells are not in direct contact with environment, simple diffusion does not meet the requirement of all the body cells to get sufficient oxygen.

Q 2. What criteria do we use to decide whether something is alive?

Ans. All the living organism must have movement at molecular levels along with respiration and other life process like nutrition, respiration, transportation and excretion to be called alive.

Q 3. What are outside raw materials used for by an organism?

Ans. Outside raw materials used for by an organism includes:

a. Food b. water c. oxygen

Q 4. What processes would you consider essential for maintaining life?

Ans. The processes essential for maintaining life are

a. Nutrition

b. Respiration

c. Transportation

d. Excretion

Page No. 101

Q 1. What are difference between autotrophic and heterotrophic nutrition?

Ans. Difference between autotrophic and heterotrophic nutrition:

Autotrophic Nutrition	**Heterotrophic Nutrition**
The mode of nutrition in which an organism makes its own food from the simple inorganic materials like carbon dioxide and water present in the surroundings with the help of sunlight energy. All green plants.	The mode of nutrition in which an organism cannot makes its own food from the simple inorganic materials like carbon dioxide and water present in the surroundings and depends on other organisms for food. All non- green plants.

Q 2. Where do plants get each of the raw materials required for photosynthesis?

Ans. (a) Carbon dioxide from atmosphere.

(b) Light from Sun

(c) Water from Soil

(d) Chlorophyll from chloroplast of green plants.

Q 3. What is the role of acids in our stomach ?

Ans. HCl plays following role in our stomach:

(a) Make the medium acidic for action of enzyme pepsin.

(b) Kills the harmful bacteria present in food.

(c) Prevents the fermentation of food.

Q 4. What is the function of digestive enzymes?

Ans - Digestive enzymes such as amylase, lipase, pepsin, trypsin, etc. help in the breaking down of complex food particles into simple ones. These simple particles can be easily absorbed by the blood and thus transported to all the cells of the body.

Q 5. How is the small intestine designed to absorb digested food?

Ans - The small intestine has millions of tiny finger-like projections called villi. These villi increase the surface area for more efficient food absorption. Within these villi, many blood vessels are present that absorb the digested food and carry it to the blood stream. From the blood stream, the absorbed food is delivered to each and every cell of the body.

Page No 105:

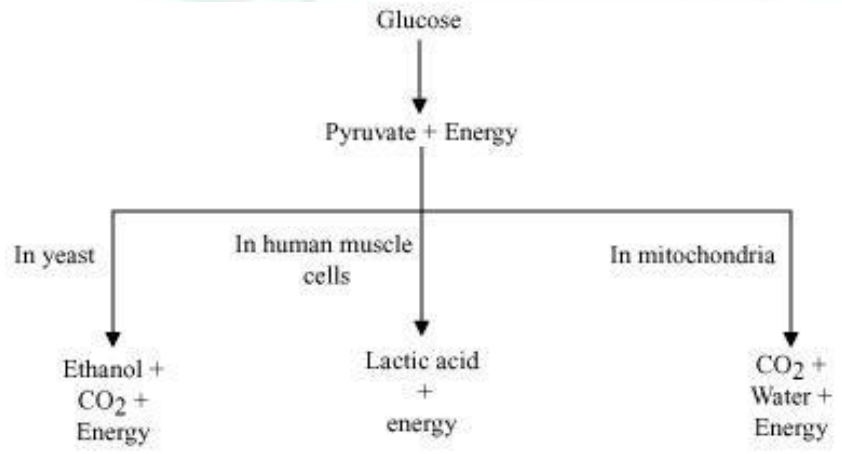
Q 1 - What advantage over an aquatic organism does a terrestrial organism have with regard to obtaining oxygen ?

Ans - Terrestrial organisms take up oxygen from the atmosphere whereas aquatic animals need to utilize oxygen present in the water. Air contains more O_2 as compared to water. Since the content of O_2 in air is high, the terrestrial animals do not have to breathe faster to get more oxygen. Therefore, unlike aquatic animals, terrestrial animals do not have to show various adaptations for better gaseous exchange.

Q 2 - What are the different ways in which glucose is oxidized to provide energy in various organisms?

Ans -Glucose is first broken down in the cell cytoplasm into a three carbon molecule called pyruvate. Pyruvate is further broken down by different ways to provide energy.

The breakdown of glucose by different pathways can be illustrated as follows.



(i) Anaerobic respiration - The respiration which takes place without oxygen is called anaerobic respiration. Example: Yeast and some bacteria break down glucose into ethanol and carbon dioxide.

(ii) Aerobic respiration - The respiration which uses oxygen is called aerobic respiration.

Example: Plants and animals break down glucose completely into carbon dioxide and water to release energy.

(iii) Lack of Oxygen – Sometimes when there is lack of oxygen , in our muscles , pyruvate is converted into lactic acid. And Lactic acid formation in muscles cause cramp.

Q 3 - How is oxygen and carbon dioxide transported in human beings?

Ans - Haemoglobin in red blood cells have large affinity for oxygen and it helps in cellular respiration. It temporarily, combines with oxygen to form oxyhaemoglobin and the blood becomes oxygenated . Thus, oxygen is carried from the lungs to various body parts. CO2 is highly soluble in water, so it is mostly transported in dissolved form in our blood plasma.. After giving away $O_2$to the body cells, blood takes away CO_2which is the end product of cellular respiration. Now the blood becomes de-oxygenated. and the blood becomes oxygenated This de-oxygenated blood gives $CO_2$to lung alveoli and takes O_2in return.

Q 4 -How are the lungs designed in human beings to maximize the area for exchange of gases?

Ans - The exchange of gases takes place between the blood of the capillaries that surround the alveoli and the gases present in the alveoli. Thus, alveoli are the site for exchange of gases. The lungs get filled up with air during the process of inhalation as ribs are lifted up and diaphragm is flattened. The air that is rushed inside the lungs fills the numerous alveoli present in the lungs.

Each lung contains 300-350 million alveoli. These numerous alveoli increase the surface area for gaseous exchange making the process of respiration more efficient.

Page No 110:

Q 1 - What are the components of the transport system in human beings? What are the functions of these components?

Ans - The main components of the transport system in human beings are the heart, blood, and blood vessels.

- **Heart** pumps oxygenated blood throughout the body. It receives deoxygenated blood from the various body parts and sends this impure blood to the lungs for oxygenation.

- Being a fluid connective tissue, **blood** helps in the transport of oxygen, nutrients, CO_2, and nitrogenous wastes.

- The **blood vessels** (arteries, veins, and capillaries) carry blood either away from the heart to various organs or from various organs back to the heart.

Q 2 - Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?

Ans - Warm-blooded animals such as birds and mammals maintain a constant body temperature by cooling themselves when they are in a hotter environment and by warming their bodies when they are in a cooler environment. Hence, these animals require more oxygen (O_2) for more cellular respiration so that they can produce more energy to maintain their body temperature.

Thus, it is necessary for them to separate oxygenated and de-oxygenated blood, so that their circulatory system is more efficient and can maintain their constant body temperature.

Q 3 - What are the components of the transport system in highly organised plants?

Ans - In highly organised plants, there are two different types of conducting tissues − xylem and phloem. Xylem conducts water and minerals obtained from the soil (via roots) to the rest of the plant. Phloem transports food materials from the leaves to different parts of the plant body.

Q 4 - How are water and minerals transported in plants?

Ans - The components of xylem tissue (tracheids and vessels) of roots, stems, and leaves are interconnected to form a continuous system of water-conducting channels that reaches all parts of the plant. Transpiration creates a suction pressure, as a result of which water is forced into the xylem cells of the roots. Then there is a steady movement of water from the root xylem to all the plant parts through the interconnected water-conducting channels.

Q 5 - How is food transported in plants?

Ans - Phloem transports food materials from the leaves to different parts of the plant body. The transportation of food in phloem is achieved by utilizing energy from ATP. As a result of this, the osmotic pressure in the tissue increases causing water to move into it. This pressure moves the material in the phloem to the tissues which have less pressure. This is helpful in moving materials according to the

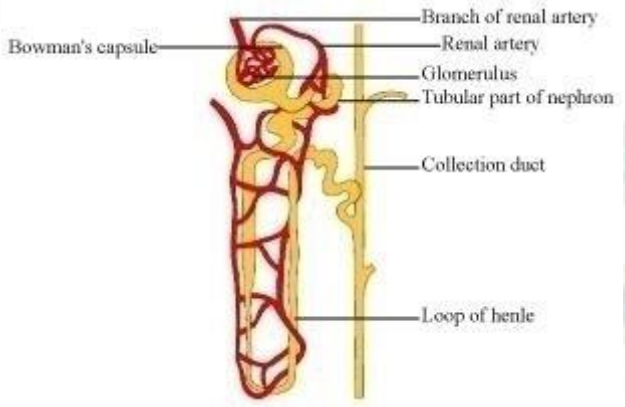
needs of the plant. For example, the food material, such as sucrose, is transported into the phloem tissue using ATP energy.

Page No 112

Q 1. Describe the structure and functioning of nephrons.

Ans - Nephrons are the basic filtering units of kidneys. Each kidney possesses large number of nephrons, approximately 1-1.5 million. The main components of the nephron are glomerulus, Bowman's capsule, and a long renal tubule.

Structure of a nephron



Functioning of a nephron:

- The blood enters the kidney through the renal artery, which branches into many capillaries associated with glomerulus.
- The water and solute are transferred to the nephron at Bowman's capsule.
- In the proximal tubule, some substances such as amino acids, glucose, and salts are selectively reabsorbed and unwanted molecules are added in the urine.
- The filtrate then moves down into the loop of Henle, where more water is absorbed.
- From here, the filtrate moves upwards into the distal tubule and finally to the collecting duct. Collecting duct collects urine from many nephrons.

- The urine formed in each kidney enters a long tube called ureter. From ureter, it gets transported to the urinary bladder and then into the urethra.

Q 2 - What are the methods used by plants to get rid of excretory products?

Ans - Plants can get rid of excess of water by transpiration. Waste materials may be stored in the cell vacuoles or as gum and resin, especially in old xylem. It is also stored in the leaves that later fall off.

Q 3 - How is the amount of urine produced regulated ?

Ans - The amount of urine produced depends on the amount of excess water and dissolved wastes present in the body. Some other factors such as habitat of an organism and hormone such as Anti-diuretic hormone (ADH) also regulates the amount of urine produced.

Multiple choice questions –

1. Which of the following is not a digestive enzyme contained in the pancreatic juice?

i. Lipase ii. Hydrochloric acid iii. Mucus iv. Trypsin

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

Answer: (c) (ii) and (iii)

2.The enzymes pepsin and trypsin are secreted respectively by

a) Stomach and pancreas
b) Salivary gland and stomach
c) Liver and pancreas
d) Liver and salivary gland

Answer: (a) Stomach and pancreas

3. Among the following choose the correct option which includes the organisms that have a holozoic mode of nutrition:

a) Plasmodium and Amoeba
b) Parakeet and Amoeba
c) Paramecium and Plasmodium
d) Paramecium and Parasite

Answer: (b) Parakeet and Amoeba

4. Raw materials required in the autotrophic mode of nutrition involves:

i. Carbon dioxide and water ii. Chlorophyll iii. Nitrogen iv. Sunlight

a) (i), (ii) and (iii)
b) (i) and (ii)
c) (i), (ii) and (iv)
d) All (i), (ii), (iii) and (iv)

Answer: (c) (i), (ii) and (iv)

5. The enzymes contained in pancreatic juices help in the digestion of:

a) Fats and carbohydrates
b) Proteins and fats
c) Proteins and carbohydrates
d) Proteins, fats and carbohydrates

Answer: (d) Proteins, fats and carbohydrates

6. Which of the following help in protecting the inner lining of the stomach from the harmful effect of hydrochloric acid?

a) Mucus
b) Pepsin
c) Trypsin
d) Bile

Answer: (a) Mucus

7. Sometimes we get painful cramps in our leg muscles after running for a long time due to the accumulation of:

a) Hydrochloric acid
b) Fat
c) Carbon dioxide
d) Lactic acid

Answer: (d) Lactic acid

8. The vein which brings clean blood from the lungs into the heart is known as:

a) Pulmonary vein
b) Hepatic vein
c) Superior vena cava
d) Pulmonary artery

Answer: (a) Pulmonary vein

9. Movement of the synthesized products from the leaves to the roots and other parts of a plant's body takes place through the phloem. This process is known as:

a) Translocation
b) Transpiration
c) Transportation
d) Excretion

Answer: (a) Translocation

10. The process of diffusion of solvent particles from the region of less solute concentration to a region of high solute concentration through semi-permeable membrane is known as

a) Diffusion
b) Osmosis
c) Translocation
d) Transpiration

Answer: (b) Osmosis

11. Which among the following procedures is used for cleaning the blood of a person by separating the waste substance from it?

a) Kidney transplant
b) Blood transfusion
c) Dialysis
d) Hydrolysis

Answer: (c) Dialysis

12. The excretory unit of the human excretory system is known as:

a) Nephridia
b) Neuron
c) Nephron
d) kidneys

Answer: (c) Nephron

13. Plants use the energy stored in ATP to accomplish the process of transportation of:

a) Water and minerals
b) Oxygen
c) Water, minerals and food
d) Food

Answer: (d) Food

14. Which among the following is necessary to carry out the blood coagulation in a cut or wound?

a) White Blood Cells
b) Blood plasma
c) Platelets
d) Red blood cells

Answer: (c) Platelets

15. Arteries and veins are connected by a network of extremely narrow tubes called:

a) Sieve tubes
b) Capillaries
c) Vena cava
d) Valves

Answer: (b) Capillaries