

## Chapter 6: Life Processes

### SHORT ANSWER TYPE QUESTION

**Q1: Do you agree, “The plants at night give out carbon dioxide and oxygen during day”? Give reason.**

**Solution:**

Yes, it is true that plants give out carbon dioxide at nights and oxygen during days because photosynthesis process takes place only during daytime. The respiration takes place both during days and nights, and because the rate of respiration is less than the rate of photosynthesis, the net result is giving out oxygen during day time and carbon dioxide during nights.

**Q2: How opening and closing of stomatal pores is regulated by guard cell?**

**Solution:**

Due to absorption of water, the guard cell swells, resulting in the opening of stomatal pores whereas shrinking causes the guard cells to close the pores. Opening and closing of stomata in guard cells is regulated by turgor changes. When guard cells are turgid, stomatal aperture closes.

**Q3: Why is it so that fishes die when taken out of water?**

**Solution:**

Fishes breathe with the help of gills, which means they can only take in oxygen dissolved in water. Thus, when they are taken out of water they die because they cannot take in oxygen directly from the atmosphere.

**Q4: Is ‘nutrition’ a necessity for an organism? Discuss.**

**Solution:**

Food is vital for the following purposes:

- (i) It is the source of energy for all the metabolic processes in our body.
- (ii) It is vital for the repair and replacement of worn out cells, and for the growth of new cells.
- (iii) It is used to strengthen the immune system.

**Q5: What would happen if all the green plants died out?**

**Solution:**

Green plants are the sources of energy for all organism. So if all the green plants died out herbivores would die from starvation followed by the omnivore and carnivore. Thus, almost all of life would go extinct except for a few microbes.

**Q6: What adaptations has a leaf undergone to carry out photosynthesis?**

**Solution:**

- (i) Leaves provide large surface area for maximum light absorption.
- (ii) Leaves are arranged at right angles to the light source in a way that causes overlapping.
- (iii) The extensive network of veins enables quick transport of substance to and from the mesophyll cells.
- (iv) Presence of numerous stomata for gaseous exchange.
- (v) The chloroplast are more in number on the upper surface of leaves to absorb more light energy.

**Q7: Why is small intestine in herbivores longer than in carnivores?**

**Solution:**

Digestion of cellulose takes a longer time. Hence, herbivores eating grass need a longer small intestine to allow complete digestion of cellulose. Carnivore's animal cannot digest cellulose; hence, they have a shorter intestine.

**Q8: What will happen if the gastric glands do not secrete mucus?**

**Solution:**

Gastric glands in stomach release hydrochloric acid, enzyme pepsin and mucus. Mucus protects the inner lining of stomach from the action of stomach from the action of hydrochloric acid and enzyme pepsin. If mucus is not released, it will lead to erosion of inner lining of stomach, leading to acidity and ulcers.

**Q9: What is the significance of emulsification of fats?****Solution:**

Fats are present in food in the form of large globules, which makes it difficult for enzymes to act on them. Bile salts present in bile break them down mechanically into smaller into smaller globules, which increases the efficiency of fat digestion enzymes lipase.

**Q10: Why does absorption of digested food occur mainly in the small intestine?****Solution:**

Maximum absorption occurs in small intestine because:

- (a) Digestion is completed in small intestine.
- (b) Inner lining of small intestine is provided with villi which increases the surface area for absorption.
- (c) Wall of intestine is richly supplied with blood vessels (which take the absorbed food to each cell of the body).

**Q11: What is the advantage of having four-chambered heart?****Solution:**

In four-chambered heart, left half is completely separated from right held by septa. This prevents oxygenated and deoxygenated blood from mixing. This allows a highly efficient supply of oxygenated blood to all parts of the body. This is useful in animals that have high-energy needs, such as birds and mammals and maintain body temperature.

**Q12: Mention the major events during photosynthesis.**

**Solution:**

The major events during photosynthesis are:

- (i) Absorption of light energy by chlorophyll.
- (ii) Conversion of light energy by chlorophyll.
- (iii) Splitting of  $H_2O$  into  $H_2$ ,  $O_2$
- (iv) Reduction of  $CO_2$  to carbohydrates.

**Q13: Name the energy currency in the living organism. When and where is it produced?**

**Solution:**

Adenosine triphosphate (ATP) produced during respiration in living organism and during photosynthesis in plants.

**Q14: What is common for cuscuta, ticks and leeches?**

**Solution:**

All the parasites, they derive nutrition from the plants or animals without killing them.

**Q15: Explain the role of mouth in digestion of food.**

**Solution:**

- (i) Food is crushed into small pieces by the teeth.
- (ii) Tongue helps in thorough mixing of food with saliva and the enzymes amylase (found in saliva) breaks down starch into sugar.

**Q16: What are the function of gastric glands present in the wall of the stomach?**

**Solution:**

- (i) Production of pepsin enzyme that digest proteins.
- (ii) Secretion of mucus for protection of inner lining of stomach.

**Q17: Name the correct substrates for the following enzymes**

- (a) Trypsin
- (b) Amylase
- (c) Pepsin
- (d) Lipase

**Solution:**

- (a) Protein
- (b) Starch
- (c) Protein
- (d) Fats

**Q18: What will happen if platelets were absent in the blood?**

**Solution:**

In the absence of platelets, the process of clotting will be affected. When cut, the blood will not stop oozing out.

**Q19: Plants have low energy needs as compared to animals. Explain.**

**Solution:**

Plants do not move. In a large plant body there are many dead cells like sclerenchyma as a result it requires less energy as compared to animals. Animals need more energy, as they have to move in search of food, shelter and mates.

**Q20: Why and how does water enter continuously into root xylem?**

**Solution:**

Cells of root are in close contact with soil and so actively take up ions. The ion-concentration, increases inside the root and hence osmotic pressure increases the movement of water from the soil into the root, which occurs continuously. Transpiration also plays a big role in causing, osmotic pressure.

**Q21: Why is transpiration important for plants?**

**Solution:**

Transpiration is important because:

- (i) it helps in absorption and upward movement of water and minerals from roots to leaves.
- (ii) It prevents the plant parts from heating up.

### **LONG ANSWER TYPE QUESTION**

**Q1: Explain the process of nutrition in Amoeba.**

**Solution:**

The mode of nutrition in amoeba is Holozoic, and the process of obtaining food by amoeba is called phagocytosis. The different processes involved in the nutrition of amoeba are:

**(i) Ingestion:** Ingestion is the process of taking food in the body. Amoeba is a unicellular animal, so it does not have a mouth for ingestion of food. Amoeba ingest the food by encircling it by forming pseudopodia. When the food is completely encircled, the food is engulfed in the form of a bag called food vacuole.

**(ii) Digestion:** Digestion is the process of breaking the large and insoluble molecules in small and water soluble molecules. In amoeba, several digestive enzymes react on the food present in the food vacuoles and break it down into simple and soluble molecules.

**(iii) Absorption:** The food digested by digestive enzymes is then absorbed in the cytoplasm by the process of diffusion. While the undigested food remains in the food vacuole. If amoeba absorbs a large amount of food, the excess food is stored in the cytoplasm in the form of glycogen and lipids.

**(iv) Assimilation:** During the step the food is absorbed by the cytoplasm is used to obtain energy, growth and repair. This process of utilizing absorbed food for obtaining energy, repair and growth is called assimilation.

**(v) Egestion:** When sufficient amount of undigested food gets collected in the food vacuole, it is thrown out of the body by rupturing cell membrane. The process of removal of undigested food from the body is called egestion.

**Q2: Describe the alimentary canal of man.**

**Solution:**

**(i) Mouth:** Food is ingested (taking of food or liquid into the body), chewed and swallowed. Chemicals in saliva (spit) soften it. When you swallow, food travels down the esophagus into the stomach. The food that leaves the mouth is called bolus.

**(ii) Stomach:** The stomach is a bag with a muscular wall. It mashes food into a pulp, helped by chemicals called gastric juices. When empty it is about 0.5 L in size, but when it is full after a meal, it can stretch to 4L in size. Food that leaves the stomach is called chime. It passes into the small intestine after about 4 hours of eating.

**(iii) Small intestine:** where chime is further broken down a 6-meter long tube. Carbohydrates and fat are broken down and absorbed through the intestine walls into the blood.

**(iv) Large intestine:** Food that cannot be digested passes into the large intestines. It is then pushed towards the anus where it is excreted as feces.

**Q3: Explain the importance of soil for growth of plant.**

**Solution:**

Materials required for plant growth are obtained from soil, eg. Nitrogen, phosphorus, other minerals and water. They have to be transported to long distances depending upon the size of the plants. Xylem moves water and minerals from soil to aerial parts. Soil also helps in anchoring plant, availability of oxygen for respiration of root cells and symbiotic associated with microbes.

**Extra Questions:**

**1) How are fats digested in our bodies? Where does this take place?**

**Solution:**

- The small intestine is the place for complete digestion of carbohydrates, fats and proteins. It receives the secretions of the liver and pancreas for this purpose.
- The food coming from the stomach is usually acidic in nature and it has to be made alkaline so that pancreatic enzymes can act on it. Bile juice, which is produced in the liver, accomplish this process.
- Fats are usually present in the intestine in the form of larger globules, which makes it difficult for enzymes to act on them. The bile salts helps in breaking down larger globules into smaller globules. The pancreas helps in secreting pancreatic juice, which contains enzymes like trypsin for digesting proteins and lipase for breaking down emulsified fats.
- The walls of the small intestine contains glands, which secretes intestinal juice. The enzymes present in it finally converts the proteins to amino acids, complex carbohydrates into glucose and finally fats into fatty acids and glycerol.

**2) What is the main role of saliva in the digestion of food?**

**Solution:**

- When we usually eat something, our mouth 'waters'. This is actually not only water, but also a fluid named saliva secreted by the salivary glands.
- The other main aspect of the food we ingest is its complex nature, if it is to be absorbed from the alimentary canal then it has to be broken into smaller molecules.
- Therefore, this process is mainly done with the help of biological catalysts called enzymes. The saliva contains an enzyme called salivary amylase that breaks down starch, which is a complex molecule to give sugar.
- The food is mixed thoroughly with saliva and moved around the mouth while chewing the muscular tongue.

***3) What are the essential conditions for autotrophic nutrition and what are its by-products?***

**Solution:**

- The energy and carbon requirements of the autotrophic organism takes place by the process of photosynthesis.
- It is defined as the process by which autotrophs take in substances from the outside surroundings and convert them into stored forms of energy.
- This substance is taken in the form of carbon dioxide and water, which is converted into carbohydrates in the presence of sunlight and chlorophyll.
- The main purpose of carbohydrates is, providing energy to the plant. The carbohydrates are not utilized immediately for the process; they are stored in the form of starch, which serves as an internal energy reserve.
- The stored energy can be used as and when required by the plant.

***4) What are the main differences between aerobic and anaerobic respiration? Name few organisms that use the anaerobic mode of respiration.***

**Solution:**

**Aerobic respiration**

- The process takes place in the presence of free oxygen
- The products of aerobic respiration are CO<sub>2</sub>, water and energy.
- The first step of aerobic respiration (glycolysis) takes place in cytoplasm while the next step takes place in mitochondria.

- The process of aerobic respiration takes place in all higher organisms.
- In this process complete oxidation of glucose takes place.

### **Anaerobic respiration**

- The process takes place in the absence of the free oxygen.
- The products of anaerobic respiration are ethyl alcohol, CO<sub>2</sub> and a little energy.
- Even in anaerobic respiration, the first step takes place in cytoplasm while the next step takes place in mitochondria.
- The process of anaerobic respiration takes place in lower organism like yeast, some species of bacteria and parasites like tapeworm.
- In this process the glucose molecules is incompletely broken down.

### **5) How are alveoli designed to maximize the exchange of gases?**

#### **Solution:**

- The lungs is an important part of the body. The passage inside the lungs divides into smaller and smaller tubes, which finally terminate in balloon-like structures, called as alveoli.
- The alveoli provide a surface where the exchange of gases can take place. The walls of the alveoli usually contains an extensive network of blood vessels. We know that, when we breathe in, we lift our ribs, flatten our diaphragm and chest cavity becomes larger.
- Because of this action, air is sucked into the lungs and fills the expanded alveoli.
- The blood brings the essential carbon dioxide from rest of the body and supply it to alveoli; the oxygen in the alveolar air is taken up by the blood in the alveolar blood vessels to be transported to the all other cells of the body. During the normal breathing cycle, when air is taken in and let out, the lungs always contain a residual volume of air so that there is sufficient time for oxygen to be absorbed and carbon dioxide to be released.

### **6) Describe double circulation in human beings. Why is it needed?**

#### **Solution:**

Double circulation means, in a single cycle blood goes twice in the heart. The process helps in separating oxygenated and deoxygenated blood to maintain a constant body temperature.

The double circulatory system of blood includes

- Pulmonary circulation
- Systemic circulation.

**Pulmonary circulation:**

The right ventricle pumps deoxygenated blood into the lungs where it is oxygenated. The oxygenated blood is brought back to the left atrium, from there it is pumped into the left ventricle and finally blood goes into the aorta for systemic circulation.

**Systemic circulation:**

The oxygenated blood is pumped to various parts of the body from the left ventricle. The deoxygenated blood from different parts of the body passes through vena cava to reach right atrium. The right atrium transfers the blood into right ventricle.