

## **LIFE PROCESSES**

- 1. Why is diffusion insufficient to meet the oxygen requirements of multicellular organisms like humans?
- A. i) In multicellular organisms, all the cells are not in direct contact with the surrounding environment.
  - ii) Hence, simple diffusion will not meet the oxygen requirements of all the cells of multicellular organisms like humans.
- 2. What criteria do we use to decide whether something is alive?
- A. The criteria (features) we use to decide something alive are:
  - i) movement ii) respiration
  - iii) nutrition iv) growth, development, etc.
- 3. What are outside raw materials used for by an organism?
- A. Outside raw materials are used by an organism for obtaining energy which is needed for maintenance processes to prevent damage and breakdown.
- 4. What processes would you consider essential for maintaining life?
- A. I consider life processes like respiration, nutrition, transportation, excretion, etc. as essential for maintaining life.
- 5. What are the differences between autotrophic nutrition and heterotrophic nutrition?
- Α.

	AUTOTROPHIC NUTRITION		HETEROTROPHIC NUTRITION
i)	It is a mode of nutrition in which organisms prepare their own food.	i)	It is a mode of nutrition in which organisms depend on others for their food.
ii)	All green plants and some bacteria exhibit this type of nutrition.	ii)	All animals and fungi exhibit this type of nutrition.

- 6. Where do plants get each of the raw materials required for photosynthesis?
- A. Plants get:
  - i) carbon dioxide from the atmosphere.
  - ii) water from the soil.
  - iii) light energy from the sun.
- 7. What is the role of the acid in our stomach?
- A. i) Hydrochloric acid (HCl) produced by gastric glands of stomach creates an acidic medium in the stomach which is necessary for the activation of enzyme pepsin.
  - ii) It also helps in killing the germs that enter along with the food.
- 8. What is the function of digestive enzymes?



- A. i) The food materials we consume are very complex in nature.
  - ii) Digestive enzymes help to breakdown these complex molecules into smaller molecules, so that they can be absorbed by the cells.

Eg: Amylase, lipase, pepsin, trypsin, etc.

#### 9. How is the small intestine designed to absorb digested food?

- A. i) The inner lining of small intestine has a large number of fingers like projections called villi.
  - ii) These villi provide a large surface area for absorption of digested food.
  - iii) The villi are richly supplied with blood vessels. These blood vessels carry the absorbed food to each and every cell of the body.

## 10. What advantage over an aquatic organism does a terrestrial organism has with regard to obtaining oxygen for respiration?

- A. i) Aquatic organisms obtain oxygen dissolved in water whereas terrestrial organisms take in oxygen from the air directly.
  - ii) The aquatic organisms have to utilize more energy to extract sufficient oxygen from water as the volume of oxygen is quite low in the water.
  - iii) Whereas terrestrial organisms relatively need less energy to obtain oxygen from surroundings as the amount of oxygen is very high in the atmosphere.
  - iv) Hence, it is an advantage for terrestrial organisms with regard to obtaining the oxygen for respiration.

## 11. What are the different ways in which glucose is oxidized to provide energy in various organisms?

- A. i) In the first phase of respiration, glucose is broken down into two molecules of pyruvate. This is common in all kinds of organisms (in all kinds of respiration).
  - ii) The fate of pyruvic acid is different in different organisms.



12. How are oxygen and carbon dioxide transported in human beings?



A. **Transport of Oxygen:** The oxygen of the air in lungs combines with the haemoglobin present in blood to form oxyhaemoglobin and is carried to the cells.

**Transport of carbon dioxide:** Carbon dioxide is more soluble in water. Hence, it is mostly transported from body tissues in the dissolved form through blood plasma to lungs.

- 13. How are the lungs designed in human beings to maximize the area for exchange of gases?
- A. i) In the lungs, the air passage (wind pipe) divides into smaller tubes, called 'bronchi' which in turn divide and form 'bronchioles'.
  - ii) The bronchioles terminate in balloon like structures, called 'alveoli'. Each lung contains 300 350 million of alveoli.
  - iii) The alveoli present in the lungs provide maximum surface for the exchange of gases.
  - iv) The alveoli have very thin walls and contain an extensive network of blood vessels to facilitate exchange of gases.



- 14. What are the components of the transport system in human beings? What are the functions of these components?
- A. Transport system in human beings consists of heart, blood and blood vessels.

### Functions:

Heart -

- i) Heart is a pumping organ to push and pull blood around the body.
- ii) Heart receives the deoxygenated blood from various parts of the body. It sends this impure blood to lungs for oxygenation.
- iii) After receiving pure blood from lungs, it sends this oxygenated blood throughout the body.

Blood -



- i) It is a fluid connective tissue. It consists of: (a) plasma, (b) RBC, (c) WBC and (d) blood platelets.
- Plasma transports food, hormones, CO<sub>2</sub> and nitrogenous wastes in dissolved form.
  RBC transports respiratory gases.
- iii) WBCs protect the body from infections and platelets prevent the loss of blood at the time of injury by forming blood clots.

#### **Blood vessels -**

- i) There is a network of blood vessels which contain arteries, veins and capillaries.
- ii) They help in the circulation of blood throughout the body.
- 15. Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?
- A. It is necessary to separate oxygenated and deoxygenated blood to maintain efficient supply of oxygen in the body.

#### 16. Write a note on the components of the transport system in highly organised plants.

- A. The main components of transport system in highly organised plants are Xylem and Phloem.
  - **Xylem:** a) It consists of vessels and tracheid's.
    - b) It helps to conduct water and minerals from soil to the leaves.
  - **Phloem:** a) It consists of sieve tubes and companion cells.
    - b) It helps to transport food materials from leaves to various parts of the plant. This process is called translocation.

### 17. How are water and minerals transported in plants?

- A. i) In xylem tissue, vessels and tracheid's of the roots, stems and leaves are interconnected to form a continuous system of water-conducting channels reaching all parts of the plant.
  - ii) At the roots, cells in contact with the soil actively take up ions.
  - iii) This creates a difference in the concentration of these ions between the roots and the soil.
  - iv) Water, therefore, moves into the root from the soil to eliminate this difference.
  - v) This means that there is a steady movement of water into root xylem, creating a column of water that is steadily pushed upwards.

#### 18. How is food transported in plants?

A. i) The products of metabolic processes, particularly photosynthesis, are moved from leaves, where they are formed, to other parts of the plant.



- ii) This transport of soluble products of photosynthesis is called translocation and it occurs in the part of the vascular tissue known as phloem.
- iii) Besides the products of photosynthesis, the phloem transports amino acids and other substances.
- iv) These substances are especially delivered to the storage organs of roots, fruits and seeds and place in the sieve tubes with the help of adjacent companion cells both in upward and downward directions.

#### **19.** Describe the structure and functioning of nephron.

#### A. Structure of Nephron:

- i) Nephron is the filtration (functional) unit of kidney. It consists of a tubule which is connected with collecting duct at one end and a cup-shaped structure at the other end.
- ii) This cup-shaped structure is called 'Bowman's capsule'. Every Bowman's capsule contains a cluster of capillaries, called 'Glomerulus'.
- iii) The blood enters into Glomerulus through afferent arteriole of renal artery and leaves it through efferent arteriole.
- iv) The tubular portion consists of proximal convoluted tubule, loop of Henle, distal convoluted tubule and collecting duct.



#### **Functions of Nephron:**

i) **Filtration:** Filtration of blood takes place in Bowman's capsule from the capillaries of glomerulus.



- ii) **Reabsorption:** As the filtrate flows along the tubule, useful substances such as glucose, amino acids, salts and water are selectively reabsorbed into the blood by capillaries surrounding the nephron tubule.
- Urine formation: The filtrate which remains after the reabsorption is called urine.
  Urine contains dissolved nitrogenous wastes, i.e. urea, uric acid, excess salts and water.

#### 20. What are the methods used by plants to get rid of excretory products?

- A. i) Some waste products are stored in the leaves. They are removed as the leaves fall off.
  - ii) Some waste products such as resins and gums are stored, especially in nonfunctional old xylem.
  - iii) Some waste products such as tannins, resins, gums are stored in bark, thereby removed or peeled off.
  - iv) Plants excrete some waste products through roots into the soil around them.
  - v) Plants also get rid of excess water through transpiration.

#### 21. How is the amount of urine produced regulated?

- A. i) The reabsorption of the urine produced by Bowman's capsule takes place in the tubular portion.
  - ii) When filtrate reaches the tubular portion the epithelial cells of the tubule reabsorb several substances (water and salts) in a selective manner and transport them back to blood. Thus, the amount of urine produced is regulated.
  - iii) The amount of urine is also regulated by volume of blood that is filtered and the amount **of** Antidiuretic hormone (ADH).

#### 22. How are fats digested in our body? Where does this process takes place?

- A. i) Bile salts break the large globules of fats into smaller globules increasing the efficiency of enzyme action (emulsification).
  - ii) An enzyme called lipase present in the intestinal juice finally breaks down the fats into fatty acids and glycerol.
  - iii) This process takes place in the small intestine.

#### 23. What is saliva? What is the role of saliva in the digestion of food?

- A. i) Saliva is a watery fluid secreted by salivary glands.
  - ii) Saliva moistens the food and help in the movement of food around the mouth while chewing.
  - iii) Enzyme present in the saliva, salivary amylase (ptyalin) breaks down the starch into sugars.



### 24. What are the necessary conditions for autotrophic nutrition and what are its byproducts?

#### A. i) The necessary conditions for autotrophic nutrition are:

- a) Presence of chlorophyll
- b) Provision of water
- c) Availability of sufficient sunlight to provide the energy
- d) Sufficient supply of carbon dioxide
- ii) The by-products of autotrophic nutrition are carbohydrates, oxygen and water.

## 25. What are the differences between aerobic and anaerobic respiration? Name some organisms that use the anaerobic mode of respiration.

Α.

	AEROBIC RESPIRATION		ANAEROBIC RESPIRATION
i)	Aerobic respiration takes place	i)	Anaerobic respiration takes place in
	in the presence of oxygen.		the absence of oxygen.
ii)	In this, glucose is completely	ii)	In this, the glucose molecule is
	oxidized.		incompletely broken down.
iii)	Large amount of energy (686	iii)	Small amount of energy (56 K. Cal.) is
	K.Cal.) is released, i.e. 36 ATP		released, i.e., 2 ATP molecules per
	molecules per glucose		glucose molecule.
	molecule.		
iv)	It takes place in all higher	iv)	It takes place in lower organisms like
	organisms.		Yeast and muscle cells of man, etc.

The organisms which perform anaerobic mode of respiration are Yeasts, bacteria and parasites like tapeworm, Ascaris, etc.

#### 26. How are the alveoli designed to maximise the exchange of gases?

- A. i) Alveoli are thin walled balloon like structures present in lungs.
  - ii) The balloon like structure of alveoli increase their surface area.
  - iii) The walls of alveoli are richly supplied with a network of blood vessels which helps to maximise the exchange of gases.

#### 27. What would be the consequences of deficiency of haemoglobin in our bodies?

- A. i) If haemoglobin is deficient in the blood, its oxygen carrying capacity decreases.
  - ii) It results in the deficiency of oxygen in our body cells.
  - iii) This condition leads to breathlessness and anaemia.

#### 28. Describe double circulation in human beings. Why is it necessary?

A. i) In human beings, the blood passes through the heart twice in a circulation and is called double circuit heart.



ii) This kind of circulation in which blood circulates twice through the heart is called double circulation.

#### The double circulation of blood includes:

i) Systemic Circulation

ii) Pulmonary Circulation

#### Systemic circulation:

- i) In this circulation, oxygenated blood from the left atrium is pumped into the left ventricle.
- ii) From the left ventricle, blood is pumped into the systemic aorta.
- iii) This aorta supplies blood to various organs in the body.
- iv) The deoxygenated blood from the various organs is collected by inferior and superior vena caveat and finally into the right atrium.

#### **Pulmonary circulation:**

- i) In this circulation, deoxygenated blood from the right atrium is sent into right ventricle.
- ii) From right ventricle, blood is pumped to the lungs.
- iii) In the lungs, the blood is oxygenated and the oxygenated blood is returned to the left atrium by pulmonary veins.
- iv) From the left atrium, the oxygenated blood is again transported to various body parts through aorta.



#### Necessity (importance) of double Circulation:

- i) Double circulation is useful to prevent mixing of deoxygenated blood with oxygenated blood.
- ii) This ensures the high and efficient supply of oxygen to the cells of the body.

#### 29. What are the differences between the transport of materials in xylem and phloem?



## Α.

	XYLEM		PHLOEM
i)	Xylem conducts water and	i)	Phloem conducts prepared food
	dissolved minerals from roots		material from leaves to other parts of
	to leaves and other parts.		plant in dissolved form.
ii)	In xylem, transport of materials	ii)	In phloem, transport of materials takes
	takes place through vessels and		place in the sieve tubes with the help
	tracheid's which are dead		of companion cells, which are living
	tissues.		cells.
iii)	In xylem, upward movement of	iii)	In phloem, translocation of food and
	water and dissolved materials		other substances takes place both in
	is mainly achieved by		upward and downward directions.
	transpiration pull.		
iv)	Movement of water is achieved	iv)	The translocation in phloem is an
	by simple physical forces. There		active process and requires energy.
	is no expenditure of energy. So,		This energy is taken from ATP.
	ATP molecules are not required.		

# **30.** Compare the functioning of alveoli in the lungs and nephrons in the kidneys with respect to their structure and functioning.

Α.

			ΝΕΡΠΡΟΝ
	ALVEULI		NEPHRON
i)	Alveoli are the structural and	i)	Nephrons are the structural and
	functional units of lungs		functional units of kidneys
	(respiratory system).		(excretory system).
ii)	Alveolus has thin walled	ii)	Nephron has thin walled cup-shaped
	balloon-like structure. Surface is		structure attached with thin walled
	fine and delicate.		tubule
iii)	Alveoli are supplied with	iii)	Bowman's capsule is supplied with a
	extensive network of thin		cluster of capillaries called glomerulus
	walled blood vessels. (i.e.		for filtration. A network of blood
	capillaries for exchange of		vessels is present around the tubular
	gases).		part of nephron for reabsorption of
			useful substances and water.
iv)	Alveoli increase surface area for	iv)	Nephrons also increase surface area
	diffusion of O2 from air to blood		for filtration of blood and reabsorption
	and CO2 from blood to air.		of useful substances and water from
			filtrate leaving behind urine.