Life Processes

40 Name three life processes which are essential for maintaining life and briefly explain the functioning of any of them.

2014/2015/2016 [3 Marks]

(*a*) Nutrition (*b*) Respiration (*c*) Excretion (*d*) Transportation (*any three*)
Nutrition: It is a process of obtaining and utilizing the food (nutrients), which is the source of energy. The food is needed for growth, development, and maintenance of life.

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41. Explain the process of assimilation of proteins in human digestive system.

2015/2016 [3 Marks]

• The different types of protein in the food are converted into 'amino acids' after digestion.
• The amino acids are absorbed by blood and transported through blood vessels to cell and tissues.
• In the cells, the amino acids are used up for building components of cells and tissues.
• These are the basic materials for growth.

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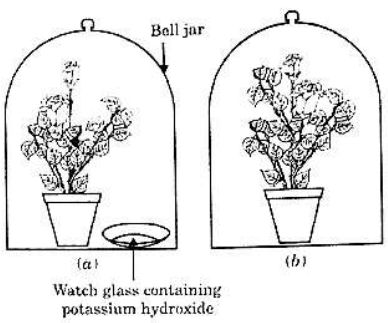
42. Explain an activity with diagram to show that carbon dioxide is essential for photosynthesis.

2014/2015 [3 Marks]



(*a*) Take two healthy potted plants and place them in the dark for about three days.
(*b*) Place each plant on separate glass plate.
(*c*) Put a petri dish containing KOH (Potassium hydroxide) by the side of first plant pot. KOH is used to absorb carbon dioxide.
(*d*) Cover both the plants with separate bell jars.
(*e*) Use Vaseline to seal the bottom of the jars to glass plates to make the setup air tight.
(*f*) Keep the plants in sunlight for about two hours.
(*g*) Pluck a leaf from each plant and boil them separately in 70% alcohol and test for the presence of starch.
(*h*) The leaf of the plant having petri dish containing KOH remains colourless, while the leaf of another plant turns blue in iodine solution.
(*i*) It happened because CO_2 of first plant jar was absorbed by KOH, and, in absence of CO_2, it did not perform photosynthesis.
(*j*) This activity shows that CO_2 is necessary for photosynthesis.

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43. State the necessary conditions of autotrophic nutrition and name the by-product. Mention the source of this by-product.

2014/2015/2016 [3 Marks]

(*a*) Carbon dioxide, water, sun and energy are the basic requirements of autotrophic nutrition. Chlorophyll utilizes carbon dioxide and water, taken from the surroundings and energy of the sun to synthesize food, *i.e.*, carbohydrates.
(*b*) The by-product of this process is oxygen, which is produced from the splitting of water.

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44. Explain the significance of photosynthesis. Write the balanced chemical equation involved in the process.

2014/2015/2016 [3 Marks]

(*a*) Photosynthesis is considered to be an ultimate source of food for almost all plants and animals. It is the process by which green plants synthesize food.
(*b*) It consumes carbon dioxide and releases oxygen which is a source of respiration to all living organisms.
(*c*) This process keeps the concentration of two gases *i.e.,* oxygen and carbon dioxide almost constant in the atmosphere.

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

(*d*) Coal, petroleum, and natural gas represent the photosynthetic capital of the past geological ages.

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45. Represent the equation of photosynthesis. Explain the steps involved in photosynthesis. In what way are the steps of photosynthesis different in desert plants?

2010/2011/2013/2014/2015/2016 [3 Mark]

- $6CO_2 + 12H_2O \xrightarrow[Sunlight]{Chlorophyl} C_6H_{12}O_6 + 6O_2 + 6H_2O$
- Three events that occur during photosynthesis are:
  (*i*) Absorption of light energy by chlorophyll
  (*ii*) Conversion of light energy into chemical energy and splitting of water into hydrogen and oxygen.
  (*iii*) Reduction of CO_2 into carbohydrates.
- Desert plants take up CO2 at night and prepare an intermediate molecule. The intermediate molecule is acted upon by the energy absorbed by the chlorophyll during the day to make carbohydrates.

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46. (*a*) With the help of a neat labelled diagram show how *Amoeba* captures its food.
(*b*) What is the mode of nutrition in *Amoeba*?

2010/2012/2014/2015 [3 Marks]

(*a*)

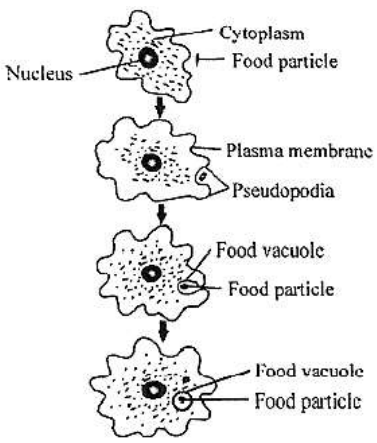

Fig. *Stages of intake of food in Amoeba*

Amoeba takes in food using temporary finger-like extensions called pseudopodia which fuse over the food particle forming a food vacuole. Inside the food vacuole, complex substances are broken down into simpler ones which then diffuse into the cytoplasm. The undigested material is thrown out. Pseudopodia are also helpful in locomotion.
(*b*) Holozoic nutrition

47. Draw a neat diagram of human digestive system. Label all of its parts.
2010/2011/2012/2014 [5 Marks]

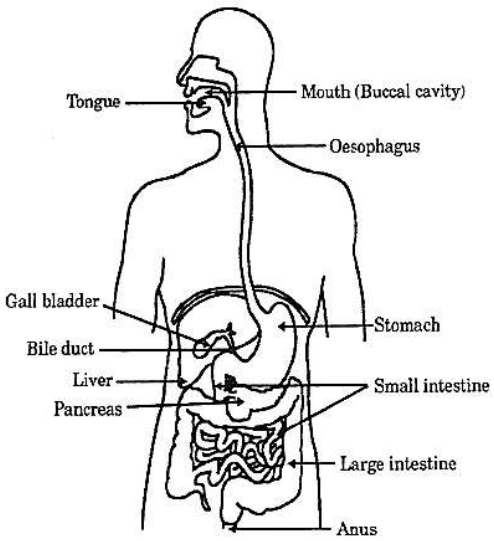

Fig. *Human digestive system*

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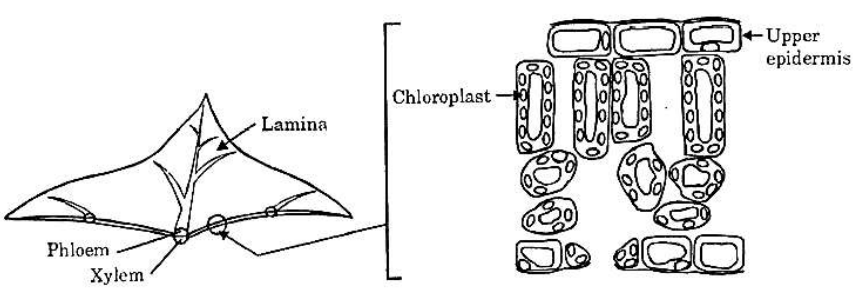
48. (*a*) Differentiate between autotrophic and heterotrophic nutrition.
(*b*) Draw a labelled diagram showing cross-section of a leaf and label on it:
(*i*) Phloem, (*ii*) Vascular bundle, (*iii*) Xylem, (*iv*) Lamina
2011/2013/2014 [5 Marks]

(*a*)

Autotrophic nutrition	Heterotrophic nutrition
(*i*) In this mode of nutrition, organisms make their own food. (*ii*) Presence of green pigment (chlorophyll) is necessary.	(*i*) In this mode of nutrition, organisms are dependent on other organisms for their food requirements. (*ii*) Presence of chlorophyll is not necessary.

(*b*)



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49. Write three points of difference between breathing and respiration.
2015/2016 [3 Marks]

Breathing	Respiration
1. It is mechanical process.	1. It involves both physical/mechanical and chemical processes.
2. It involves only intake of O_2 and release of CO_2.	2. It involves the use of O_2 to oxidize food in the cells.
3. In this process, energy is utilized.	3. In this process, energy is liberated in the form of ATP.
4. It is restricted to higher animals (mostly mammals) only.	4. It is found in all living organisms.
	(*Any three*)

50. Draw a neat diagram of human respiratory system and label the following parts:
- Pharynx
- Larynx
- Trachea
- Alveoli
- Rings of cartilage
- Bronchi
- Bronchioles
- Diaphragm
- Lungs
- Bronchus
- Alveolar sac

2010/2011/2012/2013 [5 Marks]

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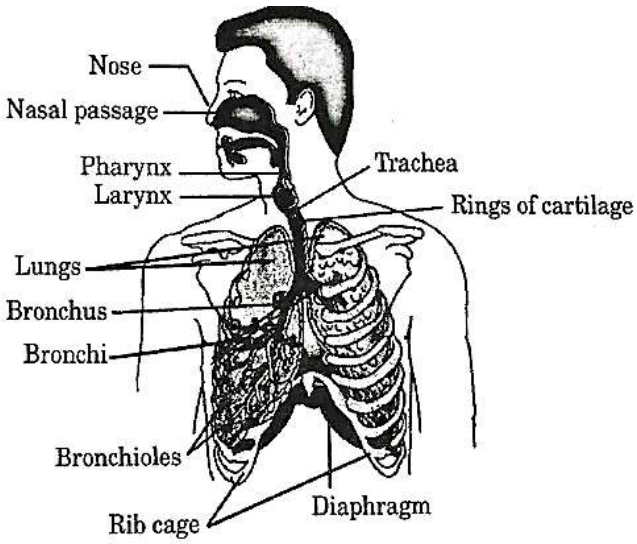

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51. Explain different pathways by which breakdown of glucose occurs in various organism.

2013/2014/2015/2016 [5 Marks]

(*i*) The first step is the breakdown of 6C-compound glucose into a 3C-compound pyruvate. This process takes place in the cytoplasm.
(*ii*) Further oxidation of pyruvate occurs in the following ways:

(a) In yeast, pyruvate is converted into ethanol and carbon dioxide in the absence of oxygen.

$$\underset{\text{(6-Carbon molecule)}}{\text{Glucose}} \xrightarrow{\text{Cytoplasm}} \underset{\text{(3-Carbon molecule)}}{\text{Pyruvate}} \xrightarrow[\text{No oxygen}]{\text{Cytoplasm}} \underset{\text{(2-Carbon molecule)}}{\text{Ethanol}} + CO_2 + \text{Energy}$$

(b) In our skeletal muscles, pyruvate is converted into lactic acid, when there is deficiency/lack of oxygen.

$$\underset{\text{(6-Carbon molecule)}}{\text{Glucose}} \xrightarrow{\text{Cytoplasm}} \underset{\text{(3-Carbon molecule)}}{\text{Pyruvate}} \xrightarrow[\text{No oxygen}]{\text{Cytoplasm}} \underset{\text{(3-Carbon molecule)}}{\text{Lactic acid}} + \text{Energy}$$

(c) The aerobic oxidation of pyruvate forms in the mitochondria; which gives rise to three molecules of carbon dioxide and water.

$$\underset{\text{(6-Carbon molecule)}}{\text{Glucose}} \xrightarrow{\text{Cytoplasm}} \underset{\text{(3-Carbon molecule)}}{\text{Pyruvate}} \xrightarrow[\text{Oxygen}]{\text{Mitochondria}} CO_2 + H_2O + \text{Energy}$$

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52. Name the pigment which transports oxygen and carbon dioxide in human body.

2015/2016 [1 Mark]

Haemoglobin which is present in red blood corpuscles.

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53. Explain the mechanism of transport of water and minerals in the plants.

2013/2014/2015 [3 Marks]

Water and minerals are transported through xylem cells from soil to the leaves. The xylem cells of roots, stems and leaves are interconnected to form a conducting channel. The root cells take ions from the soil. This creates a difference between the concentration of ions of roots and soil. Therefore, there is a steady movement of water into the xylem. An osmotic pressure is formed and water and minerals are transported from one cell to the other cell due to osmosis. The continuous loss of water takes place due to transpiration. Thus, there is continuous movement of water and mineral molecules and thus transportation of water and minerals take place.

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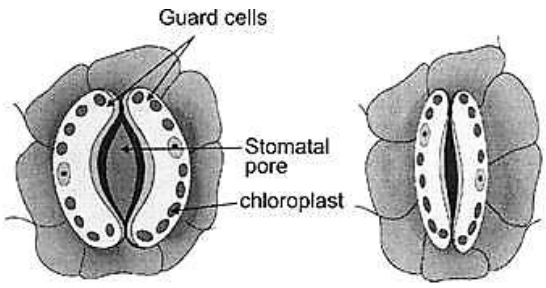
54. (*a*) It was observed that the leaves of a plant started getting wilted. Name the tissue which might have blocked. State the role of this tissue in plants.
(*b*) Explain opening and closing of stomata with the help of labelled diagrams.
(*c*) Name the physical phenomenon by which exchange of gases occurs between plant body and atmosphere.

2014/2015/2016 [5 Marks]

(*a*) The xylem tissues might have blocked. The xylem helps in transport of water and minerals absorbed by the root to leaves where they are utilized to prepare food by the process of photosynthesis.
(*b*) Opening and closing of stomata occurs due to turgor changes inguard cells, when guard cells are turgid, stomatal pores is open while in flaccid conditions, the aperture closes.



(*c*) Photosynthesis and respiration

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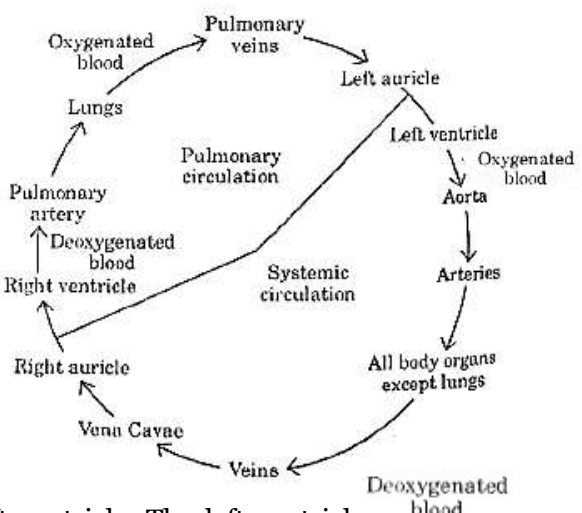
55. Describe double circulation in human beings. Why is it necessary?

2011/2012/2014/2015/2016 [5 Marks]

In human beings, the blood goes through the heart twice during each cycle, *i.e.,* the blood passes through the human heart two times to supply once to the whole body. So, it is called double circulation of blood.
The double circulation of blood includes:
(*i*) Systematic circulation and
(*ii*) Pulmonary circulation
(*i*) Systemic circulation: It supplies oxygenated blood from left auricle to left ventricle, thereby pumped to various body parts. The deoxygenated blood is collected from the various body organs by the veins to pour into vena cava and finally into the right-atrium (auricle). Right-atrium transfers the blood into the right ventricle.
(*ii*) Pulmonary circulation: The deoxygenated blood is pushed by the right ventricle into the lungs for oxygenation. The oxygenated blood is brought back to left atrium of the human heart. From left atrium, the oxygenated blood is pushed into the left ventricle. The left ventricle pumps oxygenated blood into aorta for systemic circulation.



Necessity of double circulation: The right side and the left side of the human heart are useful to prevent deoxygenated and oxygenated blood from mixing. This type of separation of oxygenated and deoxygenated blood ensures a highly efficient supply of oxygen to the body. This is useful in case of humans, because it constantly gives energy to maintain their body temperature.

56. What is the basic unit of the kidney called? Why is it composed of a cluster of very thin-walled blood capillaries?

2015/2016 [2 Marks]

- The basic unit of kidney is called nephron.
- Each nephron is covered with fine blood vessels called blood capillaries.
- Through blood capillaries, the useful components of blood are re-absorbed while the harmful (nitrogenous wastes) are released in the form of urine.
- Each capillary cluster in the kidney is associated with the cup-shaped end of a tube that collects the filtered urine.

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57. Draw a well labelled diagram of human excretory system.

2010/2011/2012/2016 [5 Marks]

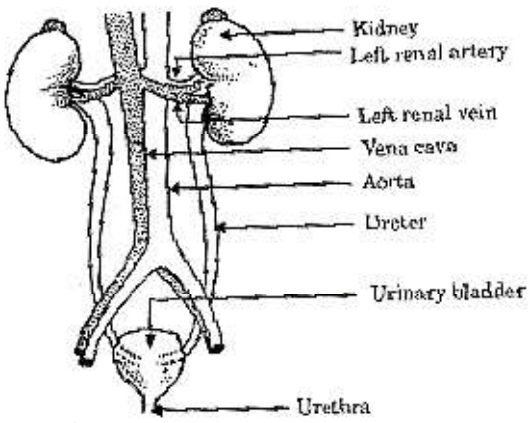

Fig.*Human excretory system*