

LIFE PROCESSES NUTRITION

Question 1: *What is nutrition?*

Answer: Nutrition is the process by which an organism obtains food which is used to provide energy and materials for its life sustaining activities.

Question 2: *What are nutrients?*

Answer: Nutrients are various organic and inorganic substances required by the organisms to carry out their functions.

Question 3: *What is the importance of nutrients?*

Answer: The various nutrients carry out different functions such as

- 1) energy production
- 2) synthesis of materials for growth and repair of the tissues
- 3) synthesis of materials necessary for carrying out and maintaining life functions
- 4) synthesis of materials for immune system

Question 4: *What are the various modes of nutrition?*

Answer: The two main methods of nutrition are autotrophic and heterotrophic. These are further divided into different types as follows:

Autotrophic nutrition

In this type, the organisms synthesize their own food. It is of two types:

- 1) Photoautotrophic - The source of energy is sunlight.
- 2) Chemoautotrophic - The source of energy are the chemicals.

Heterotrophic nutrition

In this type, the organisms are directly or indirectly dependant on the autotrophs. It is of the following types:

- 1) Holozoic - The organisms ingest food and then digest, absorb and assimilate it.
- 2) Saprotrophic - The organisms feed on dead plants and animals digesting them before feeding.
- 3) Symbiotic - The association between dissimilar individuals. May be
- 4) Mutualistic - where both the partners benefit.
- 5) Parasitic - where one partner benefits and the other is harmed.
- 6) Commensalism - where one partner benefits and the other is not affected.

Question 5: *What is autotrophic nutrition?*

Answer: The process by which the organisms synthesise their own food using carbon dioxide and water is called autotrophic nutrition. For example, green plants, sulphur bacteria, etc.

Question 6: *How are the autotrophs classified?*

Answer: Autotrophs are classified based on their source of energy. If they use the light energy of the sun, they are called photoautotrophs. If they use chemical energy of certain compounds such as ammonia and nitrites, they are called chemoautotrophs.

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Question 7: *What are photoautotrophs?*

Answer: Those organisms that synthesize food with the help of the light energy of the sun, carbon dioxide and water are called photoautotrophs. The process of synthesis of food in this manner is called photosynthesis. For example - cyanobacteria (blue-green bacteria, prokaryotes), algae and all green plants.

Question 8: *What is heterotrophic nutrition?*

Answer: The process of nutrition where the organisms obtain their food from other organisms. For example, most of the bacteria, fungi and all animals. They are all dependant on autotrophs directly or indirectly.

Question 9: *Why are the green plants called producers?*

Answer: The green plants trap the sun's energy and the raw materials in food molecules. They form the basis of sustenance for all the organisms directly or indirectly. They are also called the producers as they produce food for all other organisms.

Question 10: *What is photosynthesis?*

Answer: Photosynthesis is a process which utilises carbon dioxide and water in the presence of sunlight and chlorophyll to synthesize carbohydrates like glucose.

Question 11: *What are the raw materials required for photosynthesis?*

Answer: Photosynthesis requires the radiant energy of the sun, chlorophyll, carbon dioxide, water and minerals.

Question 12: *From where do the green plants get carbon dioxide?*

Answer: Many processes like respiration, combustion, volcanic activity, etc. release carbon dioxide into the atmosphere. This carbon dioxide of the atmosphere is used by the terrestrial plants and the hydrophytes use the carbon dioxide dissolved in the water.

Question 13: *How do the green plants get water?*

Answer: Water is absorbed by the roots of the green plants from the surrounding soil.

Question 14: *Which are the two types of photosynthetic pigments?*

Answer: Chlorophylls and carotenoids are the two types of photosynthetic pigments.

Question 15: *Which are the two types of chlorophylls?*

Answer: Chlorophyll a and chlorophyll b are the two types of chlorophylls.

Question 16: *Which is the pigment present in carrot?*

Answer: Carotene.

Question 17: *How is the radiant energy of the sun utilized in the green plants?*

Answer: Radiant energy consists of both light and heat energy. The light energy is trapped into chlorophyll molecules and then used to split water into hydrogen and oxygen in order to release energy. The heat energy maintains the optimum temperature required for the enzymes to function.

Question 18: *Why are minerals essential in photosynthesis?*

Answer: Minerals like magnesium form essential compounds such as chlorophyll. Hence, they are important for photosynthesis.

Question 19: *How do plants obtain minerals?*

Answer: Plants obtain the minerals from the soil by their dissolution in water.

Question 20: *Give an account of the reactants of the photosynthetic reaction.*

Answer: The reactants of photosynthesis are:

Carbon Dioxide During photosynthesis, carbon dioxide is converted into carbohydrates and this is called fixing of carbon dioxide. The carbon dioxide of the atmosphere is used by the terrestrial plants whereas the hydrophytes use the carbon dioxide dissolved in the water.

Water During photosynthesis, hydrogen of water is used to fix carbon dioxide and its oxygen is released. Water is obtained through the root hairs by absorption.

Chlorophyll: They are pigments capable of absorbing radiant energy of the sun. There are two types of photosynthetic pigments - chlorophylls and carotenoids. Chlorophylls are the main pigments as they are involved in the conversion of light energy into chemical energy. The carotenoids also absorb light energy but they pass it to the chlorophyll molecules.

Radiant Energy: The radiant energy from the sun is the source of both light and heat energy for photosynthesis. Light energy is harvested by the pigments in order to carry out the breaking down of water molecule into hydrogen and oxygen. The temperature required by the enzymes to function is maintained by the heat energy of the sun.

Minerals Minerals like magnesium are essential as they form the structure of the pigment molecules. Minerals are obtained through water in form of dissolved salts.

Question 21: *What are the photosynthetic organs of the plant?*

Answer: Leaves are the photosynthetic organs of the plant as they contain chlorophyll pigments.

Question 22: *How do the plants obtain carbon dioxide and water?*

Answer: Carbon dioxide is obtained from the atmosphere through the stomata that are present on the leaves. Water is drawn from the soil by the roots of the plant and then transported to the leaves through the vascular bundles.

Question 23: *What is the equation for photosynthesis?*

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Question 31: *What are saprotrophs?*

Answer: Saprotrophs are organisms that feed on dead and decaying matter. They secrete substances that decompose the dead matter and then take in the food. For example: Rhizopus, mushroom, etc.

Question 32: *Give two examples each of saprophytes and saprozoans.*

Answer: 1) Saprophytes - Mucor, yeast
2) Saprozoans - Chilomonas, Mastigamoeba.

Question 33: *What is symbiosis?*

Answer: An association between two organisms of different species is called symbiosis. 'sym' means together and 'bio' refers to living thing. For example, cattle and egret, man and intestinal bacteria, etc.

Question 34: *What is parasitism?*

Answer: An association between two individuals where one is harmed and the other is benefitted. The dependant one is called the parasite and the other one is called the host. For example, leech is an ectoparasite which sucks blood of the host, tapeworm lives in the digestive tract of man and causes disease.

Question 35: *How are parasites classified?*

Answer: Parasites may be classified as:

- 1) Ectoparasites that which live on the outer surface of the host (ticks, mites, leeches) and
- 2) Endoparasites that which live inside the body of the host (tapeworm, liver fluke). Parasites are also classified as obligate or facultative.
- 3) Obligate parasites have to live parasitically at all times. For example, Phytophthora
- 4) Facultative parasites may feed parasitically or saprophytically. For example, Candida, Pythium.

Question 36: *Name two parasitic plants.*

Answer: 1) *Cuscuta*
2) *Viscum*

Question 37: *What are haustoria?*

Answer: Haustoria are specialised structures found in saprophytes that are used to draw nutrients directly from the vascular system of the host. They are modified roots. For example, in *Cuscuta*.

Question 38: *What is coprophagy?*

Answer: Feeding on faeces is called coprophagy.

Question 39: *What are carrion feeders?*

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Answer: The organisms that feed on decomposing animal bodies are called carrion feeders.

Question 40: *What are insectivorous plants?*

Answer: The plants that trap and feed on insects are called insectivorous plants. These plants do have photosynthetic apparatus. However, they grow in nitrogen-deficient soil and hence, feed on insects to meet this deficiency. For example: pitcher plant, sundew, venus fly catcher.

Question 41: *How are all the plants and animals dependant on green plants?*

Answer: The green plants are fed on by the herbivores which in turn by carnivores. Ultimately, the decomposers derive their nutrition from the dead plants and animals. Thus, all organisms are directly or indirectly dependent on the green plants.

Question 42: *What are the steps involved in holozoic nutrition?*

Answer: Holozoic nutrition involves the following steps:

- 1) Ingestion - the food is taken in as small or big particles.
- 2) Digestion - the food taken in is broken down into a solution form.
- 3) Absorption - the digested food is absorbed into the cells and tissues.
- 4) Assimilation - the absorbed nutrients are utilized by the cells and tissues for various processes.
- 5) Egestion - the undigested food is then removed from the digestive tract as faeces.

Question 43: *What are the two types of digestion?*

Answer: Two types of digestion are:

- 1) Mechanical: Mechanical digestion involves grinding of food into smaller particles by the teeth.
- 2) Chemical: Chemical digestion involves treatment of food by enzymes and breaking them into the simplest form in which they can be easily dissolved and then absorbed by the body.

Question 44: *Write short notes on absorption.*

Answer: Absorption is taking in of digested food by the cells and tissues. This involves the absorption of food in the soluble form from the region of digestion into the tissues or into where it has to be utilised or into the blood stream which transports it to the different tissues. This takes place through the cell membranes.

The absorption may be passive or active. Passive absorption is through diffusion or osmosis without using energy. For example: Water is absorbed by osmosis. Active absorption needs energy. For example, absorption of glucose and sodium ions.

Question 45: *What type of nutrition is shown by amoeba? What does its diet include?*

Answer: Amoeba shows holozoic nutrition. Its diet includes bacteria, microscopic plants like the diatoms, minute algae, microscopic animals like other protozoa, nematodes and even dead organic matter.

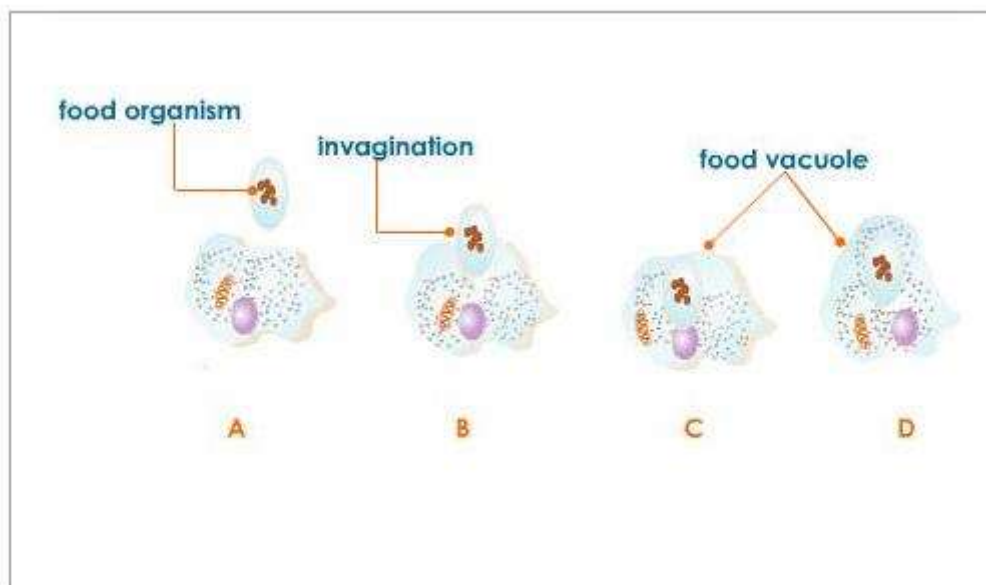
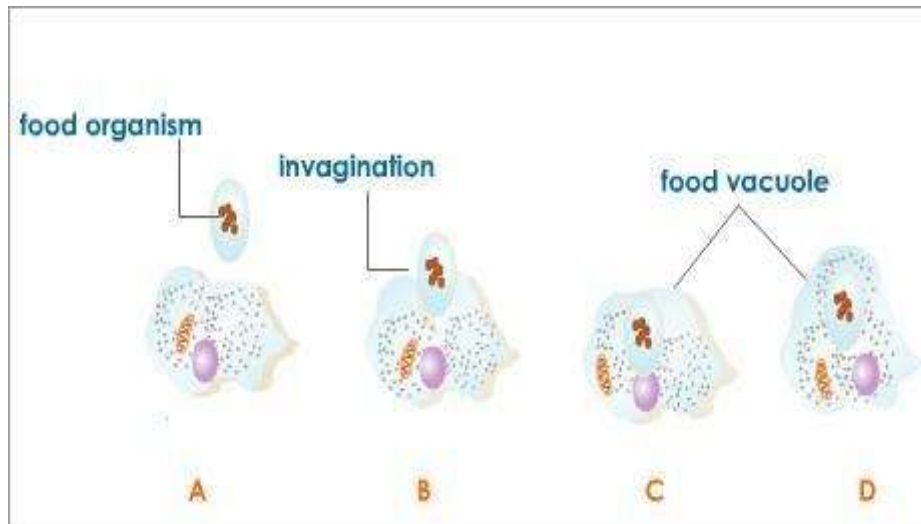
Question 46: *How is the food digested in amoeba?*

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Answer: Amoeba is a protozoan and holozoic. Since it is a unicellular organism, the digestion is intracellular. The food taken in remains in a food vacuole or gastric vacuole formed by the cell membrane and a bit of the cytoplasm.

The vacuoles are transported deeper into the cells by cytoplasmic movements. Here they fuse with lysosomes that contain enzymes such as amylase and proteinase. Thus, amoeba can digest sugars, cellulose and proteins. Fats, however, remain undigested.



Question 47: How does ingestion take place in *Paramecium*?

Answer: *Paramecium* has a specific oral apparatus. Its oral groove consists of cilia which produce water currents. Only micro food particles reach cytopharynx through the cytostome along with the water current. When cytopharynx is full with food particles it forms a food vacuole which pinches off from the cytopharynx and gets ingested.

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Question 48: *Which are the two sets of teeth in man?*

Answer: The two sets of teeth in man are the milk teeth and the permanent teeth. Milk teeth are the first to appear and are only 20 in number. They start falling by the age of 5 and are replaced by permanent teeth which are 32 in number.

Question 49: *Name the digestive glands in the human digestive system and mention their secretions.*

Answer: The digestive glands in the human digestive system are present outside the digestive tract and within the tract.

Outside the digestive tract

Salivary glands: The main salivary glands are: Parotid Submandibular or submaxillary and Sub lingual: They secrete saliva which contains salivary amylase.

Liver: It is large organ present on the right side just below the diaphragm. It secretes bile juice which emulsifies the fats and lipids.

Pancreas: It is present at the bend of the duodenum. It secretes pancreatic juice which consists of enzymes like the pancreatic amylase, trypsin and lipase.

Within the digestive tract

Gastric glands: They are present along the stomach wall and secrete gastric juice. Gastric juice contains hydrochloric acid and enzymes like pepsin and renin.

Intestinal glands: They are present on the intestinal wall in the ileum region. They secrete intestinal juice that contains maltase, sucrase, lactase and erepsin.

Question 50: *Describe the digestion of food in the small intestine.*

Answer: The first portion of the small intestine, the duodenum gets the pancreatic and the bile juice. The chyme is acted upon by the enzymes and salts present in these two secretions. The starch is converted into maltose by the pancreatic amylase and the remaining proteins, proteoses and peptones into peptides are converted and amino acids by trypsin. The bile juice emulsifies the fats and then converts them into fatty acids and glycerol by the action of lipase.

In jejunum, there is no digestion. In ileum, the food is completely broken down into the simplest of forms e.g., proteins into amino acids and carbohydrates into monosaccharides. This digested mass is now called the chyle and it is in a liquid form.

Question 51: *What is the function of the large intestine in the human digestive system?*

Answer: Functions of the large intestine are:

- 1) Storage of the undigested food temporarily or temporary storage of undigested food.
- 2) Absorption of water from the undigested food to form solid faeces.
- 3) Facilitation of the egestion of the faeces.

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Question 52: *What is the role played by the liver in addition to the digestion of food?*

Answer: Liver carries out the following after the digested food reaches the liver through the blood stream:

- 1) Glucose is converted to glycogen and stored.
- 2) Cholesterol is manufactured from some fatty acids.
- 3) The amino acids are used to form required proteins.
- 4) The ammonia produced by the above reaction is converted into the less harmful urea. The latter is then transported through the blood stream to the kidney from where it is excreted.

