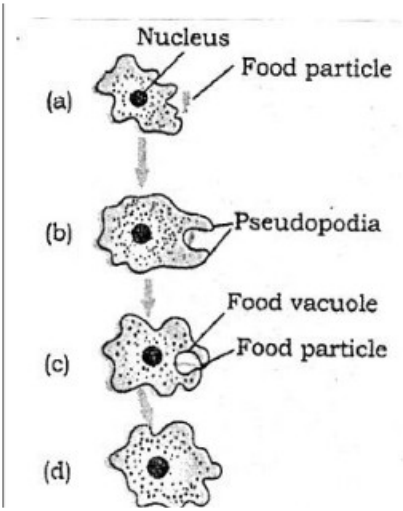
5. Life Processes - Board Exam Questions

2 Mark Questions

1) *Give a diagrammatic representation of nutrition in Amoeba.*



2) *Name the type of nutrition exhibited by Amoeba. Explain how food is taken in and digested by this organism.*

Heterotrophic nutrition.

Amoeba makes finger-like extensions of its cell around the food. These join over the food and form a food vacuole.

Inside the food vacuole, the complex food is broken down into simple substances.

3) *List the steps for the synthesis of glucose by the plants. What special feature is found in desert plants related to this process?*

• Chlorophyll absorbs light energy.
• Light energy changes into chemical energy, and water splits into hydrogen and oxygen.
• Carbon dioxide is reduced to carbohydrates.

Desert plants take in carbon dioxide at night and make an intermediate compound. In the day, the energy absorbed by chlorophyll acts on it.

4) *List the events in proper sequence that take place during the process of photosynthesis.*

(i) Chlorophyll absorbs light energy.
(ii) Light energy changes into chemical energy, and water splits into hydrogen and oxygen.
(iii) Carbon dioxide is reduced to carbohydrates.

5) *Two green plants are kept separately in oxygen free containers, one in the dark and other in sunlight. It was observed that plant kept in dark could not survive longer. Give reason for this observation.*

The plant in the dark cannot do photosynthesis. With no oxygen in the container, it also cannot respire, so it dies.

The plant in sunlight does photosynthesis and makes oxygen. It uses this oxygen to respire.

6) *State one role of each of the following in human digestive system: (i) Hydrochloric acid (ii) Villi (iii) Anal Sphincter (iv) Lipase*

(i) Hydrochloric acid: makes the medium acidic, so the enzyme (pepsin) can act.
(ii) Villi: increase the surface area for absorbing digested food.
(iii) Anal sphincter: controls the exit of waste from the anus.
(iv) Lipase: breaks down emulsified fats.

7) *Explain the role of the following enzymes in the process of digestion of food in humans: (i) Salivary amylase (ii) Pepsin (iii) Trypsin (iv) Lipase*

(i) Salivary amylase: breaks down starch into sugar.
(ii) Pepsin: digests proteins in the stomach.
(iii) Trypsin: digests proteins into amino acids.
(iv) Lipase: breaks down emulsified fats into fatty acids and glycerol.

8) *In the process of digestion of food in human beings, two protein-digesting enzymes are secreted. Name the enzymes along with the glands that secrete them.*

Pepsin: made by the gastric glands.

Trypsin: made by the pancreas.

9) *Give the name of the enzyme present in the fluid in our mouth cavity. State the gland which produces it. What would happen to the digestion process if this gland stops secreting this enzyme?*

Enzyme: Salivary amylase. Gland: Salivary gland.

Starch will not be broken down into sugar in the mouth.

10) *A. Due to narrowing of the bile duct, the bile secretion from the liver to the small intestine was obstructed. How will the process of digestion be affected? B. How does the length of the intestine depend on the nature of food habit in different animals?*

A. Bile makes the food alkaline so that the pancreatic enzymes can act. Bile salts also break fats into small droplets, so the enzymes work better. If bile cannot reach the intestine, fats will not be digested properly.

B. Herbivores eat grass, so they need a longer small intestine to digest the cellulose. Meat is easier to digest, so carnivores like tigers have a shorter small intestine.

11) *Patients whose gallbladder are removed are recommended to eat less oily food. Why?*

The gallbladder stores bile. Bile breaks fats into small droplets (emulsification).

Without stored bile, fats are hardly emulsified, so fat digestion is slow. That is why such patients should eat less oily food.

12) *What kind of respiration provides more energy and why?*

Aerobic respiration. In the presence of oxygen, glucose is broken down completely, so more energy is released.

13) *With the help of a schematic flow chart, show the breakdown of glucose in a cell to provide energy – (i) in the presence of oxygen (ii) in lack of oxygen*

(i) Glucose —(in cytoplasm)→ Pyruvate —(oxygen, in mitochondria)→ CO_2 + Water + Energy

(ii) Glucose —(in cytoplasm)→ Pyruvate —(lack of oxygen, in muscle cells)→ Lactic acid + Energy

14) *Sometimes while running, the athletes suffer from muscle cramps. Why? How is the respiration in this case different from aerobic respiration?*

Lactic acid forms in the muscles and causes cramps.

Aerobic respiration happens with oxygen. Here, respiration happens when there is a lack of oxygen.

15) *What is the function of diaphragm in human respiratory system? Where is it present in human body?*

When we breathe in, the diaphragm flattens. This makes the chest cavity larger, and air is drawn into the lungs.

It is at the base of the chest cavity.

16) *Separation of right side and left side of the heart is useful to keep oxygenated and deoxygenated blood from mixing. Various organisms have different types of heart. (I) Fill in the blanks (i) to (iii) correctly according to the type of organisms and their evolution in terms of blood circulation. (II) Which type of circulation is most efficient?*

Organisms	Chambers in heart	Type of blood circulated	Type of circulation
Fish	(i) _____	Mixed	Single
(ii) _____	3--chambered	Mixed	Incomplete double circulation
Birds and Mammals	4--chambered	Separate paths for oxygenated and deoxygenated blood	(iii) _____

I. (i) 2-chambered (ii) Amphibians (iii) Double circulation
II. Double circulation

17) *How many chambers are there in the heart of the following organisms? How is mixing of oxygenated and deoxygenated blood prevented in their body? (i) Fishes (ii) Humans*

(i) Fish: two chambers. Blood is pumped to the gills, gets oxygen there, and goes straight to the rest of the body.

(ii) Humans: four chambers. A wall (septum) separates the right and left sides of the heart, so the two kinds of blood do not mix.

18) *(a) Why is it important to prevent oxygenated and deoxygenated blood from mixing in birds and mammals? (b) Which animals can tolerate some mixing of the oxygenated and deoxygenated blood streams? On what factor does the body temperature of these animals depend?*

(a) Birds and mammals need a lot of energy to keep their body temperature. Keeping the two kinds of blood apart gives a very good supply of oxygen for this.

(b) Amphibians. Their body temperature depends on the temperature of the surroundings.

19) *State the main function of veins in human circulatory system. Why do they not need thick walls?*

Veins bring deoxygenated blood from the organs back to the heart.

The blood in veins flows at low pressure, so they do not need thick walls.

20) *Why do arteries have thick and elastic walls whereas veins have valves?*

Blood comes out of the heart at high pressure and flows in the arteries. So the arteries have thick, elastic walls to bear this pressure.

Veins have valves so that the blood flows in only one direction.

21) *Name the type of blood (oxygenated / deoxygenated) transported by each of the following mentioning the path (i.e. from one organ (which place) to another (which place)). (i) Vena cava (ii) Pulmonary artery*

(i) Vena cava: deoxygenated blood, from the body to the heart.

(ii) Pulmonary artery: deoxygenated blood, from the heart to the lungs.

22) *Besides minimising the loss of blood, why is it essential to plug any leak in a blood vessel? Name the component of blood which helps in this process and state how this component perform this function.*

A leak would lower the blood pressure.

Platelets plug the leak. They help the blood to clot at the place of injury.

23) *How is lymph formed? State its important function.*

Some plasma, proteins and blood cells come out through the pores in the walls of capillaries into the spaces in the tissues. This fluid is lymph.

Lymph carries digested and absorbed fat from the intestine.

24) *Write the other name given to lymph. State its two functions.*

Tissue fluid. Functions:

(i) It carries digested and absorbed fats from the intestine.

(ii) It drains extra fluid from the spaces between cells back into the blood.

25) *(i) The transport system in plants is relatively slower than in animals. Give reasons. (ii) State the role of phloem in the transport of materials in plants.*

(i) Plants need little energy, because many of their tissues have a large number of dead cells.

(ii) Phloem carries the food made by photosynthesis from the leaves to the other parts of the plant (translocation).

26) *Photosynthesis takes place in the leaves and the food prepared by it reaches other parts of the plants. Name the process involved and explain it.*

Translocation.

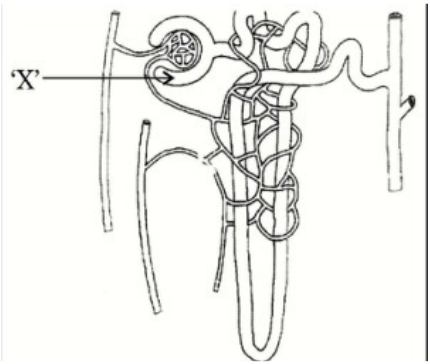
The food made by photosynthesis is carried through the phloem, in the sieve tubes with the help of companion cells. It moves both upwards and downwards, and this uses energy.

27) *"Transpiration in plants is a necessary evil." Comment on the statement giving two reasons.*

Necessary: It helps to pull water and minerals from the roots to the leaves.

Evil: The plant loses water.

28) *(a) Identify 'X' in the figure of human nephron shown below. What role does it play in the process of urine formation? (b) Why some substances are selectively reabsorbed from the initial filtrate of urine, as it flows along the tubular part of nephron?*



(a) X: Bowman's capsule. It collects the filtrate.
(b) The body keeps the useful substances and the water it needs. The amount taken back depends on how much extra water there is and how much dissolved waste has to be removed.

29) *Name the part of the human excretory system where nephrons are found. Write the structure and function of nephrons.*

Kidneys.

Structure: A cluster of thin-walled capillaries (glomerulus) sits in a cup-shaped end of a tube called Bowman's capsule. The tube continues and ends in a collecting duct.

Function: It filters nitrogenous waste from the blood and forms urine.

30) *Write one specific function each of the following organs in relation with excretion in human beings: (i) Renal Artery (ii) Urethra (iii) Glomerulus (iv) Tubular part of nephron*

(i) Renal artery: brings blood with nitrogenous waste into the kidney.
(ii) Urethra: removes urine from the body.
(iii) Glomerulus: filters the blood.
(iv) Tubular part: takes back useful substances (selective reabsorption).

31) *What is the purpose of making urine in the human body? Name the organs that stores and releases the urine.*

To remove nitrogenous wastes like urea and uric acid from the blood.

Stores urine: Urinary bladder. Releases urine: Urethra.

32) *Name the substances other than water, that are reabsorbed during urine formation. What are the two parameters that decide the amount of water that is reabsorbed in the kidney?*

Glucose and amino acids are taken back as the urine flows along the tube.

The amount of water taken back depends on (i) how much extra water there is in the body, and (ii) how much dissolved waste has to be removed.

33) *Differentiate between alveoli and nephron on the basis of the following points: (1) Structure and location (2) Function*

	Alveoli	Nephron
Structure and location	Balloon-like sacs at the ends of the bronchioles in the lungs	Tube-like structures in the kidneys
Function	Exchange of gases	Filtering blood to form urine

34) *"Plants use a variety of techniques to get rid of waste material." Justify this statement giving any four ways.*

1. Oxygen (a waste of photosynthesis) goes out through the stomata.
2. Extra water is removed by transpiration.
3. Waste is removed when leaves fall off.
4. Waste is stored as resins and gums in old xylem.

35) *Unlike animals, plants do not have any excretory products as they do not eat food. Comment upon the statement with justification.*

The statement is wrong. Plants do have waste, but they remove it in different ways from animals:
(i) Oxygen, a waste of photosynthesis, goes out through the stomata.
(ii) Extra water is removed by transpiration through the stomata.

36) *Explain in brief two ways by which leaves of a plant help in excretion.*
(i) Extra water is removed by transpiration.
(ii) Oxygen, a waste of photosynthesis, goes out through the stomata.

3 Mark Questions

1) *(i) What is the internal energy reserve in plants and animals? (ii) How desert plants perform photosynthesis if their stomata remain closed during the day?*
(i) Plants: starch. Animals: glycogen.
(ii) Desert plants take in carbon dioxide at night and make an intermediate compound. In the day, the energy absorbed by chlorophyll acts on it to make food.

2) *Write in sequence the steps for experimental verification of the fact that "sunlight is essential for photosynthesis".*
• Keep a potted plant in the dark for 24 hours to remove its starch.
• Cover a part of a leaf with black paper, so that part gets no sunlight.
• Keep the plant in sunlight for 24 hours.
• Pluck the leaf and remove the paper. Boil the leaf in alcohol, then dip it in iodine solution to test for starch.
• The covered part does not change colour, so no starch was made there without sunlight.
• The rest of the leaf turns blue-black, so starch was made. This shows sunlight is needed for photosynthesis.

3) *The leaves of a plant were covered with aluminium foil, how would it affect the physiology of the plant?*

• There will be no photosynthesis, so no glucose is made. There will also be no respiration, as no oxygen is taken in.

• There will be no transpiration, so there is no pull to move water and minerals up from the soil.

• The leaf will not be able to control its temperature.

4) *(i) How does Paramecium obtain its food? (ii) List the role of each of the following in our digestive system: (a) Hydrochloric acid (b) Trypsin (c) Muscular walls of stomach (d) Salivary amylase*

(i) Food enters at a fixed spot, pushed in by the movement of cilia.

(ii) (a) Hydrochloric acid: makes the medium acidic, so the enzyme can act.

(b) Trypsin: digests proteins.

(c) Muscular walls: mix the food well with the digestive juices.

(d) Salivary amylase: changes starch into sugar.

5) *The digestion of food in human alimentary canal is a complex process. State the enzyme/salt present in the following and mention their function in the process of digestion: (i) Saliva (ii) Bile Juice (iii) Pancreatic Juice*

(i) Saliva: salivary amylase. It changes starch into sugar.

(ii) Bile juice: bile salts. They make the acidic food alkaline.

(iii) Pancreatic juice: trypsin. It digests proteins.

6) *(i) Name the movements that occur all along the gut in human digestive system. How do they help in digestion? (ii) Where is bile juice stored in human body? List two roles of bile juice.*

(i) Peristaltic movements. The muscles of the gut contract again and again to push the food forward slowly, so it is digested properly.

(ii) In the gall bladder.

Roles: It breaks fats into small droplets (emulsification). It makes the acidic medium alkaline.

7) *(a) With the help of an activity, explain the action of saliva on the food we eat. (b) Why is bile juice important in the process of digestion?*

(a) Take 1 ml of 1% starch solution in two test tubes, A and B.

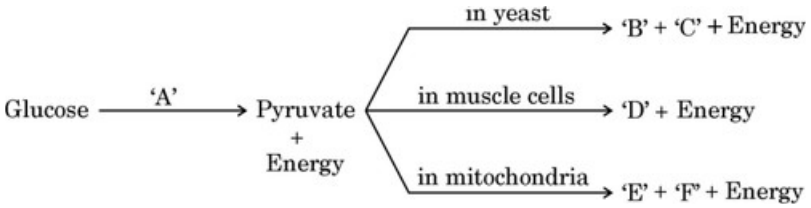
Add 1 ml of saliva to test tube A. Leave both for 20 to 30 minutes. Then add a few drops of iodine to both.

Test tube A: the iodine does not change colour, because the saliva has changed the starch into sugar.

Test tube B: the colour turns blue-black, because it has only starch.

(b) Bile makes the acidic food alkaline, so that the pancreatic enzymes can act on it.

8) *Complete the pathways given below, showing the breakdown of glucose. Identify 'A', 'B', 'C', 'D', 'E' and 'F'.*



A: Cytoplasm B: Ethanol C: Carbon dioxide

D: Lactic acid E: Carbon dioxide F: Water

9) *On the basis of the characteristics of the processes given in the brackets in each case, differentiate between the following: (a) Products of breakdown of pyruvate in aerobic and anaerobic respiration in human beings (product(s) of the processes) (b) Respiration and photosynthesis in plants (gas released) (c) Respiration in terrestrial animals and fishes (organs involved)*

(a) Aerobic: carbon dioxide and water. Anaerobic: lactic acid.

(b) Respiration releases carbon dioxide. Photosynthesis releases oxygen.

(c) Land animals use lungs. Fish use gills.

10) *(i) What is the first step in the breakdown of glucose during aerobic and anaerobic respiration? Where does it take place? (ii) ATP is called the energy currency of the cell. Why? (iii) What is meant by "residual volume of air" in a breathing cycle?*

(i) Glucose is broken into pyruvate. This happens in the cytoplasm.

(ii) ATP is used as the fuel for all the activities of a cell.

(iii) The lungs always keep some air in them, even after we breathe out. This is the residual volume. It gives enough time for oxygen to be absorbed and carbon dioxide to be released.

11) *(i) State the role of ATP in cellular respiration. (ii) What ensures sufficient exchange of gases in plants? (iii) State the conditions on which the direction of diffusion of gases in plant depend upon.*

(i) ATP is the energy currency for the work done in the cell.

(ii) Stomata, and the surface of the leaves, stems and roots.

(iii) The surroundings (environmental conditions) and the needs of the plant.

12) *(a) Write the name and one function of respiratory pigment found in human beings. (b) Why do lungs always contain a residual volume of air? (c) Why is ATP known as energy currency of the living beings?*

(a) Haemoglobin. It takes oxygen from the lungs to the tissues that need oxygen.

(b) It gives enough time for oxygen to be absorbed and carbon dioxide to be released.

(c) ATP gives energy for the different processes in the cell.

13) *(i) Why is respiratory pigment needed in multicellular organisms with large body size? (ii) Give reasons for the following: (a) Rings of cartilage are present in the throat. (b) Lungs always contain a residual volume of air. (c) The diaphragm flattens and ribs are lifted up when we breathe in. (d) Walls of alveoli contain an extensive network of blood vessels.*

(i) In a large body, diffusion alone cannot take oxygen to all the parts.

(ii) (a) So that the air passage does not collapse.
(b) To give enough time for oxygen to be absorbed and carbon dioxide to be released.
(c) To make the chest cavity larger, so that air is drawn in.
(d) Because exchange of gases takes place in the alveoli.

14) *Give reasons for the following: (i) Alveoli in lungs are richly supplied with blood capillaries. (ii) Respiratory pigment in the blood takes up oxygen and not carbon dioxide. (iii) During anaerobic respiration, a 3-carbon molecule is formed as an end product instead of CO_2 in human beings.*
(i) To help in quick exchange of gases.
(ii) It has a very high affinity (attraction) for oxygen.
(iii) Without oxygen, glucose is not broken down completely. So a 3-carbon molecule (lactic acid) is formed.

15) *Explain the process of transport of oxygenated and deoxygenated blood in a human body.*
• Oxygen-rich blood from the lungs comes to the left atrium.
• The left atrium contracts and sends the blood to the left ventricle.
• The left ventricle contracts and pumps the blood out to the body.
• Deoxygenated blood from the body comes to the right atrium.
• The right atrium contracts and sends the blood to the right ventricle.
• The right ventricle pumps it to the lungs to get oxygen.

16) *Name the blood vessel that brings (i) oxygenated blood (ii) deoxygenated blood, to the human heart. Also name that chamber of the heart which receives deoxygenated blood and state how deoxygenated blood from this chamber is sent to lungs for oxygenation.*
(i) Pulmonary vein (ii) Vena cava
Right atrium.

The right atrium contracts, and the blood goes into the right ventricle. The ventricle contracts, and the blood goes to the lungs through the pulmonary artery.

17) *(i) What is double circulation? (ii) Why is the separation of the right side and the left side of the heart useful? How does it help birds and mammals?*

(i) The blood passes through the heart twice in each cycle.

(ii) It stops oxygenated and deoxygenated blood from mixing, so the body gets a very good supply of oxygen.

Birds and mammals need a lot of energy to keep their body temperature, so this helps them.

18) *How is lymph an important fluid involved in transportation? If lymphatic vessels get blocked, how would it affect the human body? Elaborate.*

• Lymph carries digested and absorbed fat from the intestine.

• It drains extra fluid from the spaces between cells back into the blood.

If the lymph vessels are blocked, water will collect in the body (swelling).

19) *In xylem tissue, vessels and tracheids of the roots, stems and leaves are interconnected to form a continuous system of water-conducting channels reaching all parts of the plant. Explain how this is achieved.*

Root pressure: Root cells take in ions from the soil. This makes a difference in concentration between the root and the soil, so water moves from the soil into the root.

Transpiration pull: Water evaporates from the leaves. This makes a suction that pulls water up through the xylem from the roots.

20) *Water is used by the leaves of the plants for photosynthesis but rather than watering the leaves, we water the plant through the soil. How does this water reach the leaves of the plant?*

• The roots take in water from the soil. The xylem of the roots, stems and leaves is joined, making one continuous water channel.
• In the day, when the stomata are open, transpiration pull is the main force that moves the water.
• Water evaporating from the stomata makes a suction. This pulls water from the roots, through the stem, to the leaves.

21) *We water the soil but it reaches the topmost leaves of the plants. Explain in brief the process involved.*

When water is lost through the stomata of the leaves (transpiration), it makes a suction force (transpiration pull).

This pulls water up through the xylem, from the roots to the leaves.

4 Mark Questions (Case Study)

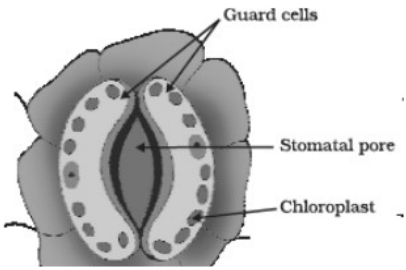
1) *The maintenance functions of all living organisms must go on even when they are not doing anything particular. Even when we are just sitting in a class or even asleep, this maintenance job has to go on. These maintenance processes require energy to prevent damage and break-down of cells and tissues, which is obtained by the individual organism from the food prepared by the autotrophs, called producers.*
(a) Name and define the process by which green plants prepare food. (1)

Photosynthesis: green plants make carbohydrates from carbon dioxide and water, using sunlight and chlorophyll.
(b) Write chemical equation involved in the above process. (1)

$6CO_2 + 12H_2O$ —(chlorophyll, sunlight)→ $C_6H_{12}O_6 + 6O_2 + 6H_2O$
(c) (i) State in proper sequence the events that occur in synthesis of food by desert plants. (2)
(refer 3rd 2 mark question)
OR (c) (ii) Explain giving reasons what happens to the rate at which the green plants will prepare food (I) during cloudy weather, and (II) when stomata get blocked due to dust.

(I) It goes down, because there is less sunlight.
(II) It goes down, because less gas can be exchanged.

2) *Not all plants carry out photosynthesis by the same mechanism. In most plants, it depends directly on gaseous carbon dioxide that diffuses into the leaf. However, some plants can store carbon dioxide in the vacuole of the leaf cells as part of a complex carbon compound. This compound is transported to the chloroplast and releases carbon dioxide when required for photosynthesis. This special mechanism is believed to have evolved as an adaptation in such plants which do not open stomata during the daytime to conserve water for survival in dry conditions (desert conditions).*
Attempt either (a) or (b):
(a) (i) Which process in these plants is minimised to help the plants survive in dry conditions? (ii) Which part of the leaf is responsible for exchange of gases during photosynthesis? (4)
(i) Transpiration (loss of water as vapour).
(ii) Stomata
OR (b) (i) List the events that occur during the process of photosynthesis. (ii) When are such desert plants likely to take in carbon dioxide from the environment, unlike other plants? (iii) Draw a labelled diagram of stomata with open stomatal pore. (4)
(i) (refer 4th 2 mark question)
(ii) At night
(iii)



3) *Neha consumed boiled sweet potatoes and boiled eggs for breakfast. Help her to understand some steps in the process of digestion of the food taken by her by answering the questions given below.*
Attempt either subpart A or B.
A. Which of these food items is rich in proteins? In which part of the alimentary canal is the digestion of this component initiated? Name the enzymes, conditions required and the glands associated with the digestion here. (2)

Eggs are rich in proteins. Their digestion starts in the stomach.

The gastric glands in the stomach wall release hydrochloric acid, pepsin and mucus. The acid makes the medium acidic, which helps pepsin to digest the proteins.

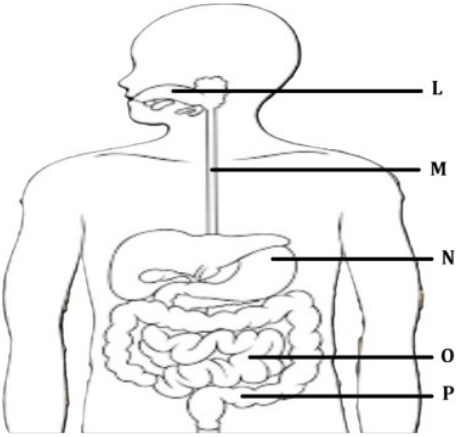
OR B. Which of these food items contains fats? How is it digested?

Eggs contain fats. Bile from the liver breaks big fat drops into small ones and makes the medium alkaline. Then lipase from the pancreas digests these fats.

C. Which of these food items is rich in starch? How is its digestion initiated? (1)

Sweet potatoes. In the mouth, salivary amylase in saliva starts breaking starch into sugar.

D. The figure given below represents parts of the human alimentary canal. Which of these parts will have the maximum amount of digested food as soon as the process of digestion is completed? (1)



The small intestine (O), because digestion is completed there.

4) *Human digestive system is a tube running from mouth to anus. Its main function is to breakdown complex molecules present in the food which cannot be absorbed as such into smaller molecules. These molecules are absorbed across the walls of the tube and the absorbed food reaches each and every cell of the body where it is utilised for obtaining energy.*

(a) Name the glands present in the buccal cavity and write the components of food on which the secretion of these glands act upon. (1)

Salivary glands. Their secretion acts on starch.

(b) Two organs have a sphincter muscle at their exit. Name them. (1)

Stomach and anus

(c) What will happen if: (i) mucus is not secreted by the gastric glands. (ii) Villi are absent in the small intestine. (2)

(i) The inner lining of the stomach will not be protected from the acid.

(ii) Digested food will not be absorbed properly, because the absorbing surface becomes small.

OR (c) "Bile juice does not contain any enzyme, yet it has important roles in digestion." Justify the statement.

(refer 6th 3 mark question)

5) *Kidneys are vital organs for survival. Several factors like infections, injury or restricted blood flow to kidneys reduce the activity of kidneys. This leads to accumulation of poisonous wastes in the body, which can even lead to death. In case of kidney failure, an artificial kidney can be used. An artificial kidney is a device to remove waste products from the blood through dialysis.*

(a) (i) Name the artery that brings oxygenated blood to the kidney.

(ii) Name the cluster the thin-walled blood capillaries present in the Bowman's capsule. (1)

(i) Renal artery (ii) Glomerulus

(b) In human excretory system name the organ which stores urine. Is this organ under hormonal control or nervous control? (1)

Urinary bladder. It is under nervous control.

(c) (i) List two major steps involved in the formation of urine and state in brief their functions. (2)

Filtration: nitrogenous wastes like urea and uric acid are removed from the blood.

Reabsorption: glucose, amino acids, salts and most of the water are taken back.

OR (c) (ii) In which part of the nephron does selective reabsorption take place? List the factors which the amount of water reabsorbed depends on.

In the tubular part of the nephron.

The amount of water taken back depends on how much extra water there is in the body and how much dissolved waste has to be removed.

6) *Kidneys help to regulate the volume of fluid and various metabolites waste products in the body. Normally, kidney filter about 180 L of fluid daily but the volume actually excreted out is only a litre or two a day. Patients with kidney failures can be saved by dialysis and kidney transplant.*

(a) Write the structure and function of Bowman's capsule. (1)

Structure: the cup-shaped end of the tube of a nephron.

Function: it collects the filtrate from the blood.

(b) Although kidneys filter a large amount (about 180 L daily) of fluids, still the excretion from the body is only about a litre or two. Why? (1)

Most of the water, salts, glucose and amino acids are taken back into the blood as the filtrate flows along the tube of the nephron.

(c) What is excretion? Why is it necessary for any living organism? (2)

Excretion is the removal of harmful nitrogenous wastes like urea and uric acid from the body.

It is needed because these wastes are poisonous to the body.

OR (c) State two similarities between lungs and kidneys.

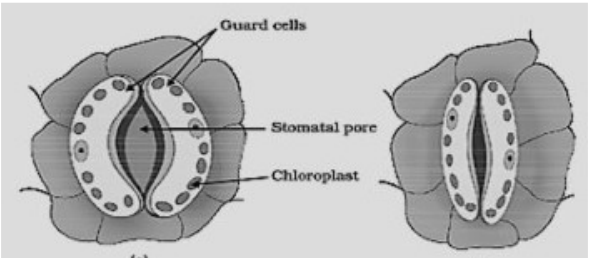
• Both remove waste from the blood: the lungs remove carbon dioxide, and the kidneys remove urea.

• Both have thin-walled capillaries: for exchange of gases in the lungs, and for filtering blood in the kidneys.

5 Mark Questions

1) *(a) Draw a labelled diagram showing open and closed stomatal pore.*
(b) List the main events that occur during the process of photosynthesis.
(c) Write a balanced chemical equation showing photo-synthesis in plants.

(a)



(a) Open and (b) closed stomatal pore

(b) (refer 4th 2 mark question)

(c) $6CO_2 + 12H_2O$ —(chlorophyll, sunlight)→ $C_6H_{12}O_6 + 6O_2 + 6H_2O$

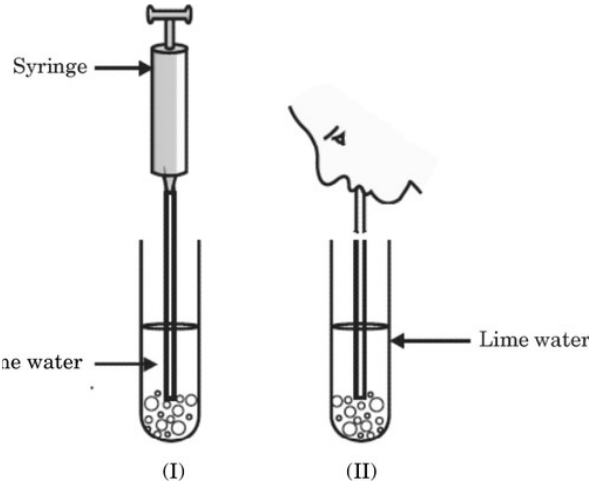
2) *Design an experiment to demonstrate that carbon dioxide is essential for photosynthesis. Write the observation and conclusion of the experiment.*

• Take two healthy potted plants, A and B, of about the same size.
• Keep them in the dark for three days to remove their starch.
• Keep a watch glass with potassium hydroxide (KOH) next to plant A, but not next to plant B.
• Cover both plants with separate glass bell jars. Seal the bottoms of the jars with vaseline.
• Keep both plants in sunlight for two hours.
• Pluck a leaf from each plant and test it for starch with iodine solution.

Observation: The leaf of plant A does not turn blue-black. The leaf of plant B turns blue-black.

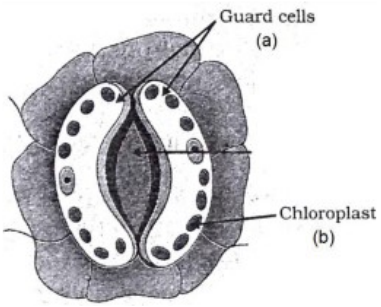
Conclusion: KOH absorbs carbon dioxide, so plant A could not do photosynthesis. So carbon dioxide is needed for photosynthesis.

3) *(i) In the experimental set-up shown above in diagram (I) atmospheric air is being passed into lime water with a syringe while in diagram (II) air is being exhaled into lime water. The time taken for the lime water to turn milky in both the test tubes is different. Give reason.*
(ii) Draw the diagram of an open stomatal pore and label (I) Guard cells, and (II) Chloroplast on it. Mention two functions performed by stomata.



(i) The lime water in set-up (I) takes longer to turn milky than in set-up (II). Breathed-out air has more carbon dioxide than ordinary air.

(ii)



Functions of stomata: exchange of gases, and transpiration.

4) *(i) "The length of the small intestine in various animals depends on the food they eat." Justify the statement.*

(ii) Discuss the role of the pancreas and bile juice in the digestion of food in human beings.

(iii) How is the small intestine designed to absorb digested food?

(i) (refer 10th 2 mark question)

(ii) Pancreas: It makes pancreatic juice. This has trypsin to digest proteins and lipase to digest emulsified fats.

Bile: It breaks fats into small droplets and makes the medium in the small intestine alkaline, so the pancreatic enzymes can act.

(iii) The inner wall of the small intestine has many finger-like villi. They increase the surface area for absorption. The villi have many blood vessels, which carry the absorbed food to every cell of the body.

5) *(i) State the role of rings of cartilage present in the throat.*
(ii) Discuss the role of the ribs and diaphragm when air is taken in during the breathing cycle.
(iii) Why do we get muscle cramps during heavy exercise? Explain.

(i) (refer 13th 3 mark question)

(ii) The ribs are lifted → the diaphragm flattens → the chest cavity becomes larger → air is sucked into the lungs.

(iii) (refer 14th 2 mark question)

6) *I. Observe both the diagrams A and B. Which diagram indicates inhalation? Describe how it occurs.*
II. If diffusion were to move oxygen in our body, it is estimated that it would take 3 years for a molecule of oxygen to get to our toes from our lungs. Then, how is oxygen delivered to all parts of our body?



I. A shows breathing in. The ribs are lifted and the diaphragm flattens. The chest cavity becomes larger and air is sucked in.

II. Haemoglobin in the red blood cells holds oxygen very strongly. The heart pumps this oxygen-rich blood to all parts of the body.

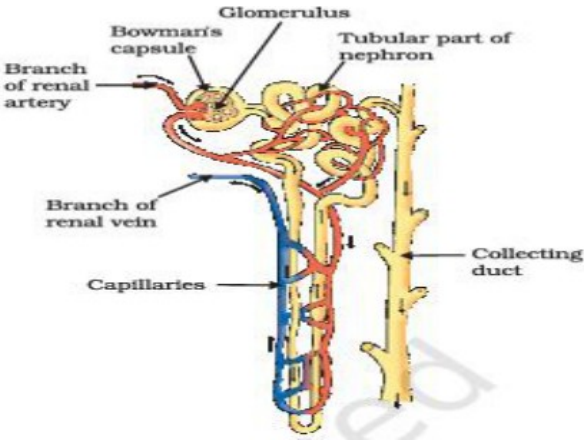
7) *Observe the structure of hearts A, B and C shown above and answer the following questions*
I. Which of the hearts depicted above is present in both birds and Mammals and how are they able to maintain their body temperature? Give reason for your answer.
II. Which of the hearts depicted above is present in fishes, how does circulation of blood take place in them?



I. C, the four-chambered heart. Its right and left sides are separate, so oxygenated and deoxygenated blood do not mix. This gives a very good supply of oxygen. Birds and mammals need a lot of energy to keep their body temperature, so this helps them.

II. A, the two-chambered heart. The blood is pumped to the gills, gets oxygen there, and goes straight to the rest of the body. So in a fish, blood passes through the heart only once in each cycle.

8) *(a) Draw a well-labelled diagram of nephron and label atleast 4 of its parts.*
(b) Write the role of capillary cluster inside Bowman's capsule.
(c) What is meant by selective reabsorption?
(a)



(b) (refer 30th 2 mark question)

(c) Useful substances like glucose, amino acids, vitamins, salts and most of the water are taken back from the filtrate into the blood. This is selective reabsorption.