

Q1. What is the importance of nutrition?

Or

What are the functions of food that we eat?

Q2. Why in single-celled organism, specific organs for taking in food, exchange of gases or removal of waste are not required?

Q3. Define nutrition.

Q4. Fill in the blanks:

(a) are organisms which obtain nutrition from dead decaying organic matter.

(b) are organisms which obtain nutrients from the body of other living organism and harm them.

Q5. Name a plant parasite.

Q6. What is the mode of nutrition in fungi?

Q7. What is the mode nutrition in *Plasmodium*?

Q8. Name the factors which affect photosynthesis.

Q9. How many pairs of salivary glands are present in human beings?

Q10. Name the digestive enzyme present in saliva.

Q11. In which type of medium pepsin and gastric lipase work?

Q12. What are villi?

Q13. Where in our body is bile secreted by the liver?

Q14. Where is the pancreas located?

Q15. Name the hormones secreted by the pancreas.

Q16. What is *succus entericus*?

Q17. Name the chemical which changes the acidic medium of food into alkaline in the intestine.

Q18. Water is absorbed from undigested food in which part of the alimentary canal?

Q19. Name the structure, which separates the abdominal and thoracic cavity.

Q20. Which term is used for the gradual softening of enamel and dentine of teeth?

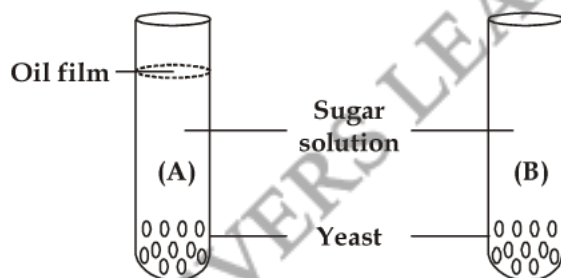
Q21. Why is brushing the teeth after eating a good habit?

Q22. Name the green dot-like structures in some cells observed by a student when a leaf peel was viewed under a microscope. What is this green colour due to?

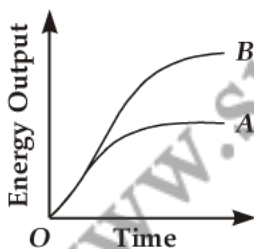
Q23. Stomata of desert plants remain closed during daytime. How do they take up CO_2 and perform photosynthesis?

- Q24.** Two green plants are kept separately in oxygen free containers, one in the dark and the other in continuous light. Which one will live longer and give appropriate reason for the same?
- Q25.** Which protein digesting enzyme is present in pancreatic juice?
- Q26.** Name the element used in the synthesis of proteins and is taken up in the form of nitrates and nitrites.
- Q27.** What is meant by assimilation of food?
- Q28.** If you chew a piece of bread for a long time it tastes sweet. Why?
- Q29.** Name two enzymes present in pancreatic juice and give their functions.
- Q30.** Define peristalsis movements and give its significance.
- Q31.** How dental caries is caused?
- Q32.** How are the fats digested in our bodies? Where does this process take place?
- Q33.** How do the guard cells regulate opening and closing of stomata pore?
- Q34.** Which is the largest digestive gland in human body? What is the name and function of its secretion?
- Q35.** Give reasons why?
- (a) Herbivores have longer small intestine as compared to carnivores.
 - (b) Mucus is secreted along with hydrochloric acid in the stomach.
- Q36.** "Bile juice do not contain any enzyme but is essential for digestion." Justify the statement.
- Q37.** Define the following terms: (a) Holozoic nutrition, and (b) Emulsification.
- Q38.** Give reasons why?
- (a) Rings of cartilage are present in trachea.
 - (b) Lungs always contain a residual volume of air.
- Q39.** Why plants appear green in colour?
- Q40.** Name the various heterotrophic mode of nutrition. Give one example each.
- Q41.** Explain the events that occur during the process of photosynthesis.
- Q42.** Draw a labelled diagram of cross-section of a leaf.
- Q43.** Describe the process of digestion of food in man.
- Q44.** Describe an experiment to show that carbon dioxide is essential for photosynthesis.
- Q45.** Explain the process of nutrition in *amoeba*. Supplement it with a well-labelled diagram.
- Q46.** Draw a well-labelled diagram to show open stomatal pore. State two junctions of stomata.
- Q47.** Draw a diagram of human alimentary canal and label the following:
- (a) Part in which starch digestion is initiated.
 - (b) Organ in which bile is stored.
 - (c) The gland that secretes digestive enzymes as well as hormones.
 - (d) Part of alimentary canal where water is reabsorbed.
 - (e) Part of gut where finger like projections are present to facilitate absorption of digested food.

- Q48.** Name the various digestive glands associated with human digestive system. Also give the name of secretion of these glands along with their functions.
- Q49.** Write full name of: (a) ADP and (b) ATP.
- Q50.** Why land plants die if their roots remain water logged?
- Q51.** Name the chemical energy giving molecule released during respiration.
- Q52.** What is the breathing rate under normal condition?
- Q53.** Name the cell organelle in which cellular respiration takes place.
- Q54.** Name the equipments which are used to facilitate respiration in persons who fail to breath normally.
- Q55.** Why aquarium fish open and close their mouths at regular intervals?
- Q56.** Give one reason why multicellular organisms require special organs for exchange of gases between their body and their environment.
- Q57.** What are catabolic reactions?
- Q58.** When a sportsman runs, he gets muscle cramps. Why?
- Q59.** What is difference between breathing and respiration?
- Q60.** How exchange of gases takes place in roots of plants?
- Q61.** Which is larger - your body surface area or alveolar surface area? Give reasons for your answer.
- Q62.** In the test tubes *A* and *B* shown below, yeast was kept in sugar solution. Which products of respiration would you expect in tubes *A* and *B*?

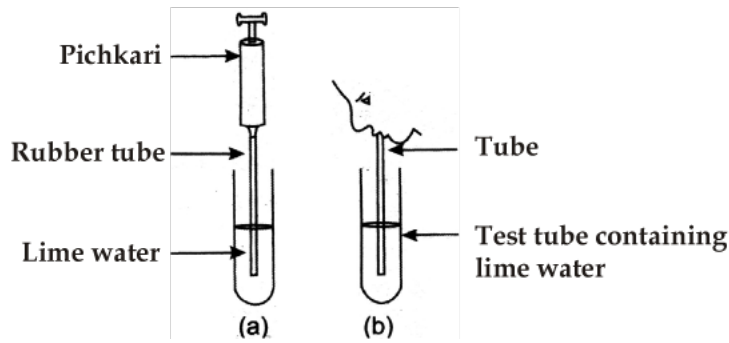


- Q63.** A graph was plotted to show the energy output of two types of respiration. Identify the types of respiration denoted by curves *A* and *B*.



- Q64.** Differentiate between aerobic and anaerobic respiration.

Q65. In experimental set up (a) air is being passed by pichkari/syringe in freshly prepared lime solution. While in experimental set up (b) air is being exhaled in lime water. By doing so we observe that lime water in set up (b) turns milky immediately while in set up (a) it does not turn milky immediately. Explain giving reasons.



Q66. During respiration pyruvic acid is produced as end-product of glycolysis. State the end-products formed from it on further breakdown in each of the following cases:

- (a) Yeast in absence of oxygen. (b) Lack of oxygen in muscles.
 (c) Presence of oxygen in mitochondria.

Q67. Write one feature which is common to each of the following pairs:

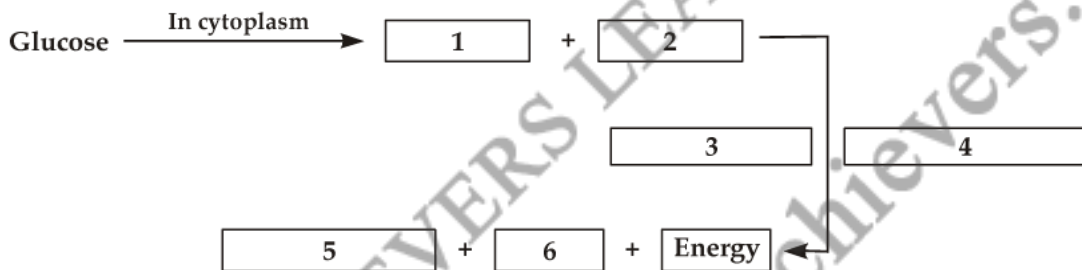
- (a) Glycogen and starch (b) Chlorophyll and haemoglobin (c) Gills and lungs.

Q68. How are alveoli designed in human beings to maximize the exchange of gases?

Q69. Draw a neat diagram of human respiratory system and label following parts.

- (a) Pharynx (b) Larynx (c) Trachea (d) Alveoli
 (e) Bronchi (f) Bronchioles (g) Diaphragm

Q70. Complete the glucose break-down path-way in case of aerobic respiration by filling the blanks.



- (a) Name the molecule in the cell which stores the energy produced at the end of the path-way.
 (b) Why do we get cramps during sudden muscular activity?

Q71. Describe the mechanism of breathing in man. Draw the diagram of human respiratory system

Q72. In which part of body new RBC's are formed?

Q73. Name the special muscle cells of heart.

Q74. Name the major veins which pour blood into right atrium.

Q75. Name a circulatory fluid other than blood.

Q76. Why lymph is called extracellular fluid?

Q77. What is the normal range of haemoglobin content in human beings?

Q78. What is systole?

- Q79.** What is diastole?
- Q80.** Name the instrument used to measure blood pressure.
- Q81.** Name the instrument used to hear heart sounds.
- Q82.** What is the range of normal systolic and diastolic blood pressure?
- Q83.** What is meant by high blood pressure (Hypertension)?
- Q84.** How high blood pressure can harm us?
- Q85.** What will happen to a plant if its xylem is removed?
- Q86.** What would be the consequence of deficiency of haemoglobin in our bodies?
- Q87.** Name the water and minerals conducting element of flowering plants. Also mention how conduction takes place through it?
- Q88.** The separation of the right side and left side of the heart is useful to prevent the intermixing of oxygenated and deoxygenated blood. Give appropriate reason for the same.
- Q89.** Draw a sectional view of human heart and label the following:
Aorta, Left atrium, Right ventricle, Vena cave, Pulmonary vein, Pulmonary artery.
- Q90.** Differentiate between arteries, veins and capillaries.
- Q91.** Transpiration is a necessary evil. Justify the statement by highlighting the harmful and useful aspects of this process.
- Q92.** Leakage of blood from vessels reduces the efficiency of pumping system. How is the leakage prevented?
- Q93.** What does blood clotting occur?
- Q94.** What is blood pressure? Name the instrument used to measure blood pressure.
- Q95.** State the importance of lymph in human system.
- Q96.** During one cycle how many times blood goes to heart of a fish and why?
- Q97.** Give reasons for the following:
(a) The muscular walls of ventricles are thicker than the walls of atria.
(b) Arteries have thick elastic walls.
(c) Veins have valves.
- Q98.** Name the excretory organs of amoeba.
- Q99.** Briefly describe the process of transport of water and minerals in extremely tall plants.
- Q100** Describe double circulation in human beings. Why is it necessary?
- Q101** Briefly describe any five functions of blood.
- Q102** Differentiate between xylem and phloem.
- Q103**(a) Transport of food in plants require living tissues and energy. Justify the statement.
(b) Name the component of food translocated by living tissues.
- Q104** What is meant by excretion and osmoregulation?

Q105 Define the terms dialysis.

Q106 Name the factors on which the amount of water reabsorbed along the tubular part of nephron depends.

Q107 Give the functional aspect of an artificial kidney.

Q108 Though the volume of kidney filters 180 L then, why the volume of urine is only one to two litres?

Q109 What is the volume of urine produced each day?

Q110 What is the structural and functional unit of kidney and tell about its role in our body?

Q111 What is the volume of initial kidney filtrate each day?

Q112 Name the procedure used in the working of an artificial kidney.

Q113 Draw a well-labelled diagram of excretory unit of human kidney and label the following parts:

- (a) Glomerulus (b) Bowman's capsule (c) Renal artery (d) Collecting duct

Q114 Draw a neat diagram of human excretory system and label the following parts:

- (a) Kidney (b) Left renal artery (c) Left renal vein (d) Urinary bladder
(e) Ureter (f) Urethra (g) Right renal artery (i) Aorta
(j) Vena cava

Q115 Describe the working of artificial kidney.

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- S1.** (a) Food provides us energy which is needed to maintain a state of order in our body.
(b) It helps us to grow, develop synthesises proteins and other substances needed in the body.
(c) Food provides immunity to fight against diseases.
(d) It helps in reproduction.
- S2.** In single-celled organism, specific organs for taking in food, exchange of gases or removal of waste are not required because the entire surface of organism is in contact with the environment and simple diffusion meet all the requirements.
- S3.** Nutrition is a process of intake as well as utilisation of nutrients by an organism.
- S4.** (a) Saprophytes. (b) Parasites.
- S5.** Amarbel (*cuscuta*) is an example of parasitic plant.
- S6.** Saprophytic or parasitic mode of nutrition is seen in the members of kingdom fungi.
- S7.** Plasmodium exhibits parasitic mode of nutrition.
- S8.** Light, CO₂ concentration, temperature and water are the factors which affect photosynthesis.
- S9.** Three pairs of salivary glands are present in human beings.
- S10.** Ptyalin or salivary amylase is present in saliva.
- S11.** Pepsin and gastric lipase work best in acidic medium.
- S12.** Finger-like projections present on the inner lining of small intestine are called villi.
- S13.** Bile is stored in gallbladder
- S14.** Pancreas is located beneath the stomach in between the limbs of the 'U' shaped duodenum.
- S15.** Insulin and glucagon are the hormones secreted by pancreas.
- S16.** Juice secreted by glands present in intestinal wall is known as succus entericus, it contains digestive enzymes.
- S17.** Bicarbonate ion secreted by the duodenal wall and bile make the medium alkaline.
- S18.** Large intestine is the part of alimentary canal which is the site for absorption of water from undigested food.
- S19.** Diaphragm separates abdominal and thoracic cavity.
- S20.** Dental caries is the term used for gradual softening of enamel and dentine of teeth.
- S21.** Brushing the teeth after eating removes the plaque before the bacteria can produce acid and damage teeth enamel and dentine.
- S22.** The green dots indicate chloroplast and the green colour is due to chlorophyll pigment present in chloroplast.

- S23.** Desert plants take up CO_2 at night and prepare an intermediate molecule. This intermediate molecule is acted upon by the energy absorbed by the chlorophyll during the day.
- S24.** Plant kept in continuous light will live longer because it will be able to provide oxygen required for its respiration, by the process of photosynthesis.
- S25.** Trypsin is a proteolytic enzyme present in the pancreatic juice.
- S26.** Nitrogen is the element involved in the synthesis of proteins and is taken up in the absorbable form of nitrates and nitrites.
- S27.** Assimilation means utilisation of food for release of energy, building up new tissues and repair and replacement of worn out tissues.
- S28.** The saliva in our mouth contains an enzyme called salivary amylase that breaks down starch into glucose hence the bread tastes sweeter.
- S29.** Pancreatic juice contains protein digesting enzyme trypsin and fat digesting enzyme lipase.
- S30.** Rhythmic contraction and relaxation of muscles of alimentary canal are called as peristaltic movements. The significance of these movements is that they help the food to move forward in alimentary canal.
- S31.** Dental caries is initiated when bacteria acting on sugars produce acids that soften or demineralise the enamel. Masses of bacterial cells together with food particles stick to the teeth to form dental plaque. Saliva cannot reach the tooth surface to neutralise the acid as plaque covers teeth as a result dental caries is caused.
- S32.** Fats are digested in small intestine. When food enters small intestine bile juice secreted by liver emulsifies fat and then the enzyme lipase which is secreted by pancreas converts fat into fatty acid and glycerol.
- S33.** Opening and closing of stomata occurs due to turgor changes in guard cells. Moreover guard cells have differentially thickened walls *i.e.*, outer walls are thin and inner walls are thick. Absorption of water causes guard cells to swell up and get curved out resulting in the opening of stomatal pore whereas during flaccid conditions, shrinking of guard cells takes place that causes closure of stomatal pore.
- S34.** Liver is the largest digestive gland in human body. It secretes bile juice which helps in emulsification of fats.
- S35.** (a) Herbivores have longer small intestine so as to facilitate digestion of cellulose.
(b) Mucus is secreted along with HCl so as to protect the inner lining of stomach from excoriation.
- S36.** Bile is a yellowish green alkaline fluid secreted by liver. It contains bile pigments (bilirubin and biliverdin) and bile salts. Although it does not contain any digestive enzyme but is still essential due to following reasons:
(a) Bile neutralises the acidity of chyme and protects the duodenal wall from corrosion.
(b) It makes the food alkaline for the action of pancreatic juice.
(c) It breaks down complex fat into fine small globules for the action of lipase of pancreatic juice. Breaking of fat into fine small globules is referred as emulsification.
- S37.** (a) **Holozoic nutrition:** A mode of nutrition in which solid food material is engulfed. It is seen in unicellular organism like amoeba as well as in multicellular organism like human beings. This mode of nutrition involves five steps namely ingestion, digestion, absorption, assimilation and egestion.
(b) **Emulsification:** It is the process of breaking down complex fat molecules into small fine globules of fatty acids for action of enzyme lipase.
- S38.** (a) Incomplete C-shaped rings of cartilage present in trachea ensures that the air passage does not collapse when there is no air in it.
(b) Lungs always contain a residual volume of air to provide sufficient O_2 to be absorbed and CO_2 to be released.

S39. Chlorophyll pigment absorbs mostly the red and blue light regions of the visible spectrum. It reflects the green colour as it is not capable of absorbing the green region of spectrum. Hence, the plants appear green in colour.

S40. The various heterotrophic mode of nutrition are:

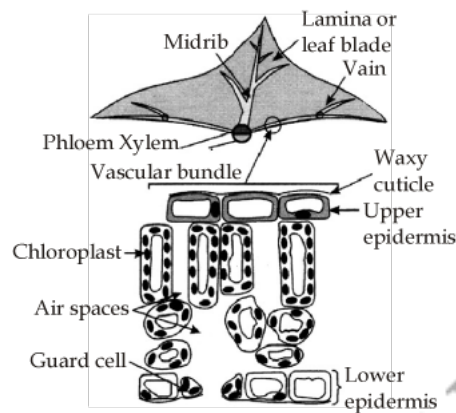
- (a) Saprophytic *e.g.*, fungi. (b) Parasitic *e.g.*, tapeworm (c) Holozoic *e.g.*, amoeba, man.

S41. Photosynthesis is formation of organic food from carbon dioxide and water with the help of sunlight inside chlorophyll containing cells.

The various events that occur during this process are as follows:

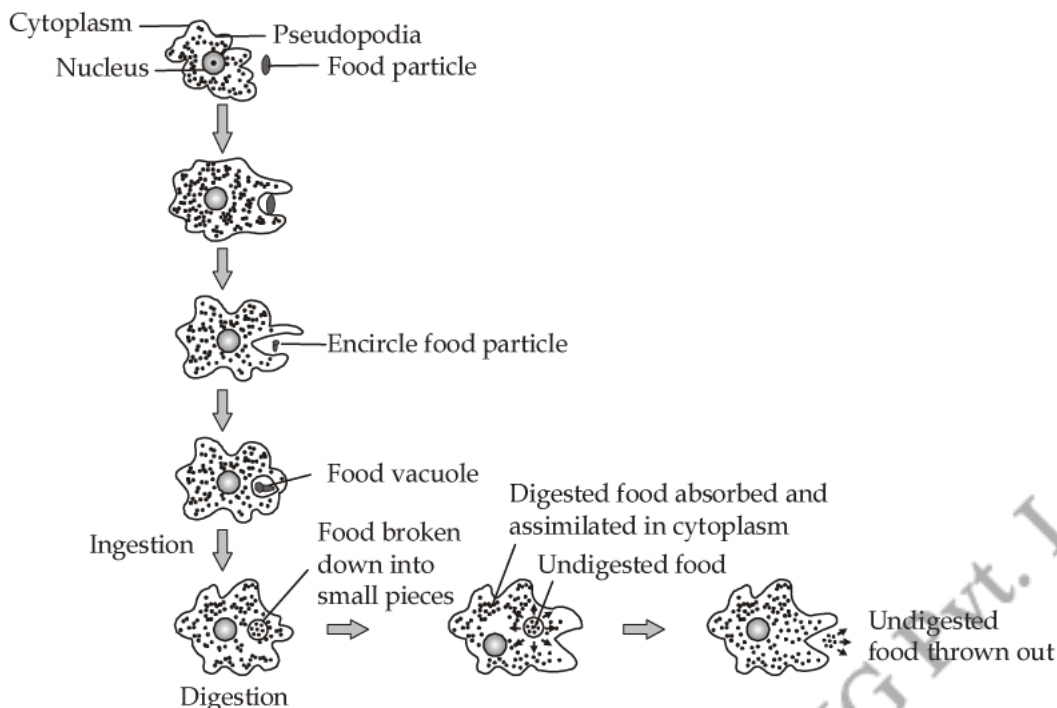
- (a) Absorption of light energy by chlorophyll.
(b) Light energy splits water molecules into hydrogen and oxygen. Secondly conversion of light energy into chemical energy *i.e.*, synthesis of ATP from ADP (adenosine diphosphate) and inorganic phosphate takes place.
(c) Reduction of carbon dioxide into carbohydrates takes place. This process is light independent reaction which can occur in day time as well as night.

S42.



S45. Amoeba is a unicellular eukaryotic organism that exhibits holozoic mode of nutrition. Five steps are involved in this mode of nutrition namely ingestion, digestion, absorption, assimilation and egestion.

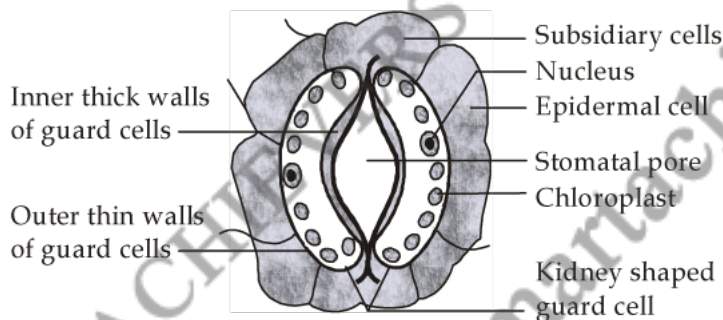
Ingestion: Amoeba feeds on microscopic organisms. It takes in food using finger-like projections called pseudopodia. It encircles the food and engulfs or ingests it by a process called phagocytosis. The food comes to lie in a vesicle called phagosome or food vacuole.



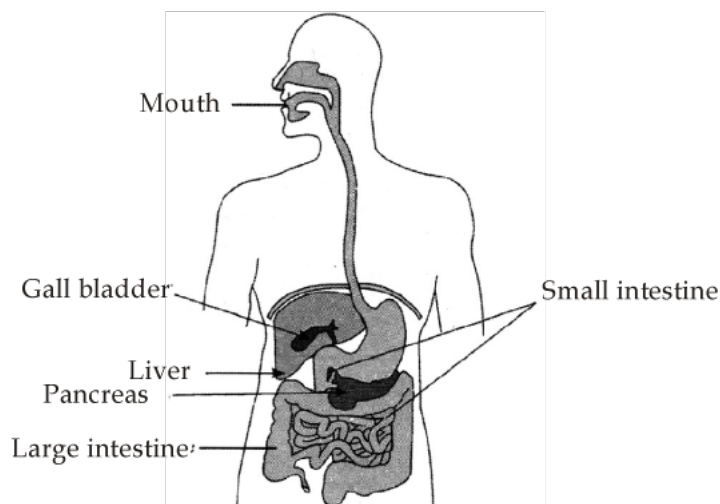
Digestion: A lysosome fuses with phagosome and complex substances are broken down into simpler ones. Such type of digestion which occurs within a cell is referred as Intra cellular digestion. The digested food then diffuses into cytoplasm.

Egestion: The undigested food material reaches the rear end of the organism and is thrown out by the process of exocytosis. The membrane of the vacuole fuses with the surface membrane.

S46. Stomata are the respiratory organs of plant. They play a vital role in exchange of gases as well as transpiration.



- S47.** (a) Mouth (b) Gall Bladder (c) Pancreas (d) Large Intestine (e) Small Intestine.



- S48.** The various digestive glands associated with human digestive system are:

Sl. No.	Name of glands	Name of secretion	Function of secretion
1.	Salivary gland	Saliva which contains enzyme ptyalin/salivary amylase.	Ptyalin digests starch and converts it to sugar maltose. Mucus present in saliva makes the food slippery so that it can be easily swallowed.
2.	Gastric glands	HCl and Pepsin	HCl makes the food acidic and pepsin digests protein.
3.	Liver	Bile juice	Emulsifies fat and bicarbonates present in it, turn the acidic food into alkaline.
4.	Pancreas	Pancreatic Juice which contain Trypsin and Lipase	Trypsin - Digestion of protein. Lipase - Digestion of fat.
5.	Intestinal glands	Intestinal juice	Complete digestion of fat, protein and carbohydrate.

- S49.** (a) ADP – Adenosine Di Phosphate.

- (b) ATP – Adenosine Tri Phosphate.

- S50.** Land plants die if their roots remain water logged because roots do not get oxygen for respiration as the lenticels present on bark of root get choked.

- S51.** ATP (Adenosine Tri Phosphate).

- S52.** 16 to 20 times per minute is the breathing rate under normal condition.

- S53.** Mitochondria is the site for cellular respiration.

- S54.** Oxygen masks and ventilator are equipments which are used to facilitate respiration in persons who fail to breath normally.

- S55.** They gulp water by opening mouth and when they close it, the water moves out from operculum which covers the gill. Thus, they do breathing, as the dissolved O_2 in water is absorbed by blood capillaries present in gills and CO_2 is given out.

- S56.** In multicellular organisms all the cells are not in direct contact with the surrounding environment. Thus, simple diffusion does not meet the requirement of all the cells.

- S57.** Catabolic reactions or destructive reactions are those in which complex organic molecules are broken down into two or more simple inorganic molecules. Example: Respiration.



S58. During running, the sportsman requires large amount of energy instantly. In order to release more energy, pyruvate is converted into lactic acid in the absence of oxygen. Accumulation of lactic acid in the muscles causes cramps.

S59. Differences between breathing and respiration:

<i>Breathing</i>	<i>Respiration</i>
(a) The mechanism by which an organism obtains oxygen from the environment and release carbon dioxide is termed breathing.	(b) It is a process in which glucose is oxidised to give energy.
(b) Breathing is a physical process.	(b) Oxidation of food occurs in the cells resulting in release of energy which is utilised for carrying out various functions.

S60. Root cells take up oxygen from soil by the process of diffusion. Root hair remain in contact with O_2 present in between the soil particles. O_2 diffuses into the root hair and passes into other cells of root. Simultaneously, CO_2 moves out into the soil. Older portions of root do not have root hair. In such areas tiny openings called lenticels are present through which gaseous exchange takes place.

Note: In older stem, also lenticels are present for gaseous exchange while in young herbaceous stems, stomata are present for this purpose.

S61. The alveolar surface area is larger than body surface area. It covers about 80 m^2 . Large surface area of alveoli allows efficient exchange of gases.

S62. In test tube A, carbon dioxide and alcohol (anaerobic respiration will take place because the oil layer will not allow air to enter the solution).

In test tube B, carbon dioxide and water (aerobic respiration will take place).

S63. Curve A – Anaerobic respiration (less energy).

Curve B – Aerobic respiration (more energy).

S64.

<i>Aerobic Respiration</i>	<i>Anaerobic Respiration</i>
(a) A type of respiration that occurs in presence of oxygen.	(a) A type of respiration that occurs in absence of oxygen.
(b) Complete oxidation of food takes place.	(b) Incomplete oxidation of food takes place.
(c) End-products are CO_2 , H_2O and energy.	(c) End-products are CO_2 , lactic acid or alcohol and energy.
(d) More amount of energy is released (36-38 ATP molecules).	(d) Less amount of energy is released (<i>i.e.</i> , 2 ATP molecules).
(e) It occurs partly in cytoplasm, and partly in mitochondria.	(e) It occurs in cytoplasm.

S65. Because the exhaled air contains high percentage of CO_2 as compared to normal air, hence the lime water in experimental set up (b) turns milky immediately as compared to set up (a).

S66. (a) In yeast, pyruvate is converted into ethanol and carbon dioxide in the absence of oxygen. A small amount of energy is also released.

(b) In our skeletal muscles pyruvate is converted into lactic acid and energy where there is deficiency of oxygen. Accumulation of lactic acid results in muscular cramps.

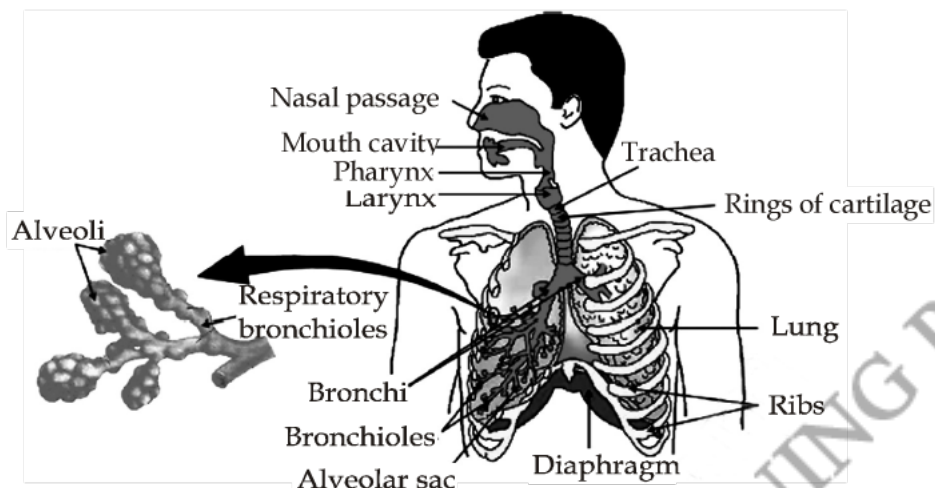
(c) Aerobic oxidation of pyruvate occurs in the mitochondria where pyruvate molecule gives rise to three molecules of CO_2 and water and energy is released in the form of Adenosine tri phosphate (ATP).

- S67.** (a) Glycogen and starch both are complex (carbohydrates) macromolecules made up of glucose units.
 (b) Chlorophyll and haemoglobin are pigments. Chlorophyll is a plant pigment that aids in photosynthesis, whereas haemoglobin is a red colour pigment found in human blood which is a carrier of oxygen.
 (c) Gills and lungs are respiratory organs. Gills occur in aquatic organisms like fish whereas lungs are seen in terrestrial organisms like mammals and birds.

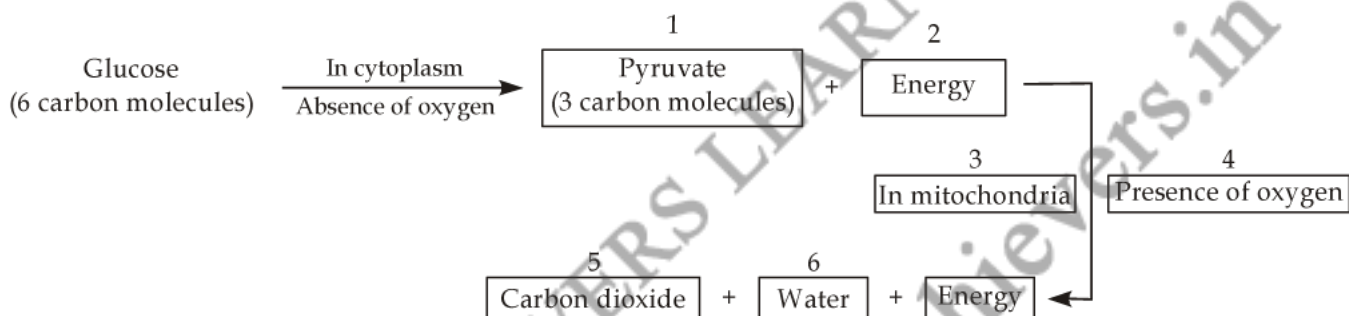
S68. Alveoli are the ultimate respiratory units in human beings where gaseous exchange occurs. They are designed in the following ways to maximise the exchange of gases:

- (a) Alveoli provides large surface area for gaseous exchange. it is 80 m^2 .
 (b) The epithelial lining of alveoli is extremely thin, permeable, single layered moist wall.
 (c) Alveolar walls have an extensive network of blood capillaries that facilitate easy and quick diffusion.

S69.



S70.



- (a) Adenosine tri phosphate (ATP).
 (b) Due to oxygen deficiency during sudden muscular activity anaerobic respiration takes place in muscles resulting in formation of lactic acid accumulation of which causes cramps.

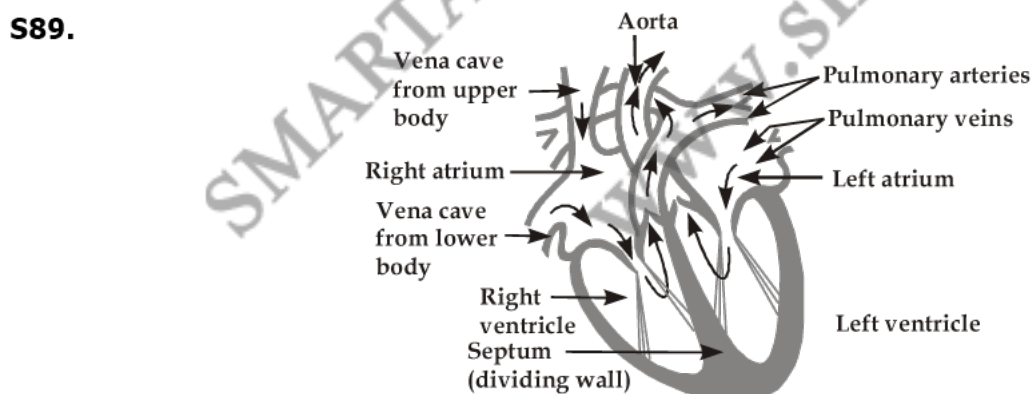
S71. Breathing is a physical process involving inflow (inspiration) and out flow (expiration) of air between atmosphere and the alveoli of the lung.

During *inspiration*, the intercostal muscles contract and pull the ribcage upwards. At the same time, the diaphragm contracts and flattens. These movements increase the volume and therefore lower the pressure in the thorax/chest cavity. As the pressure in the chest cavity falls below that of the atmosphere, air is forced into it.

During *expiration* (breathing out), relaxation of intercostal muscles and diaphragm takes place. The ribs move downwards and inwards. The volume of the lungs decreases, squeezing the air inside them. Diaphragm comes back to its original C-shaped position.



- S72.** New RBC's are formed in bone marrow from specialised cells called stem cells.
- S73.** Cardiac muscles are referred as the muscle cells of heart.
- S74.** Superior and inferior vena cava pour blood into right atrium.
- S75.** Lymph is an other circulatory fluid other than blood.
- S76.** Lymph is called extracellular fluid as all body cells bathe in it and it lies outside the cels. So, it is called as *extracellular fluid*.
- S77.** Male – 14 to 16 g per 100 mL. of blood.
Female – 12 to 14 g per 100 mL. of blood is the normal range of haemoglobin content in human beings.
- S78.** Contraction of heart chambers is termed systole.
- S79.** Relaxation of heart chambers is termed diastole.
- S80.** Sphygmomanometer is an instrument used to measure blood pressure.
- S81.** Stethoscope is an instrument used to hear heart sounds.
- S82.** Systolic – 120 mm of Hg.
Diastolic – 80 mm of Hg is the range of normal systolic and diastolic blood pressure.
- S83.** When the blood pressure rises above the normal range 120/80 mm of Hg, the condition is termed high blood pressue.
- S84.** High blood pressure can lead to the rupture of an artery and internal bleeding and damage to brain and kidneys.
- S85.** Movement of water and mineral from soil to other parts of plant will stop and the plane will ultimately die if its xylem is emoved.
- S86.** Haemoglobin is a carrier of oxygen. Deficiency of haemoglobin will adversely affect the supply of oxygen to the cells, causing anaemia. Secondly aerobic respiration will be affected leading to weakness, pain and improper metabolism.
- S87.** Tracheids and vessels present in xylem are the conducting cells of flowering plants. They are long, thin, spindle shaped cells having pits in their thick cell walls. Water flows from one tracheid to other through these pits.
- S88.** The partition between the right and left sides of the heart provides a highly efficient mechanism to supply oxygen to all body parts. This occurs in animals having high energy needs like birds and mammals. They spend a lot of extra energy for keeping the body temperature constant.



S90.	<i>Arteries</i>	<i>Venis</i>	<i>Capillaries</i>
	1. Blood vessels that carries oxygenated blood from heart to various organs except pulmonary artery.	1. Blood vessels that carries deoxygenated blood from various organs back to heart except pulmonary vein.	1. Very narrow fine blood vessels that are red in colour and bring about exchange of materials between blood and surrounding.
	2. Arteries are deeply seated.	2. Veins are superficially located.	2. Capillaries form a network inside body organs.
	3. Blood flows with a great pressure in arteries.	3. Blood flows with a low pressure in veins.	3. Blood flows very slowly in the capillaries so as to facilitate exchange of substances.
	4. So wall of arteries are thick and elastic. They have a narrow lumen.	4. Walls of veins are comparatively thinner and little elastic. They have a wider lumen.	4. Capillaries have one cell thick cell wall and a narrow lumen.

S91. "Transpiration is a necessary evil." This statement can be justified by listing the significance of transpiration which outweighs its harmful impacts.

Significance of transpiration:

- Transpiration creates transpiration pull for absorption and transport of water up through the xylem in plants.
- It supplies water for photosynthesis.
- It transports minerals from the soil to all parts of the plant.
- As evaporation causes cooling, assists in cooling of leaves. Not all the solar radiations absorbed by leaves are used in photosynthesis, but some will cause heating of leaves. Transpiration however reduces the heating of leaves.
- Transpiration maintains the shape and structure of the plants by keeping the cells turgid.
- Transpiration removes excess amount of water.

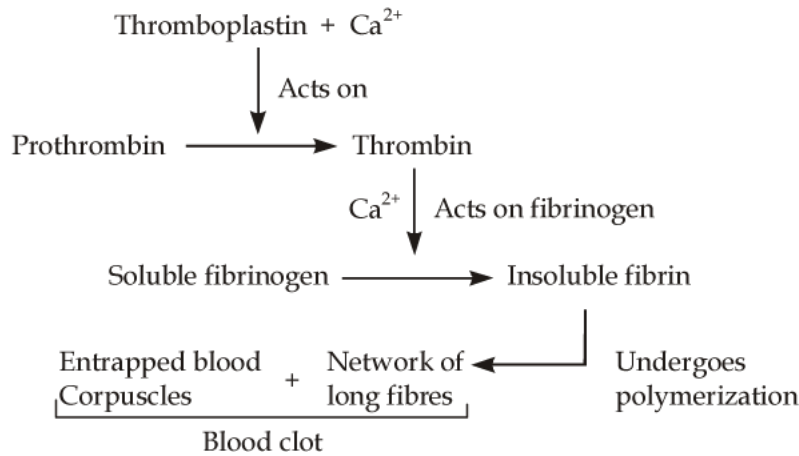
Transpirations as evil:

- Since transpiration involves removal of excess amount of water and make the cells weak.
- At high temperatures stomatal closure occurs due to transpiration.
- Plants exhibit wilting if transpiration exceeds the amount of water absorbed.

S92. Leakage of blood from vessels reduces the efficiency of pumping system. To avoid leakage the cellular component of blood has platelet cells. In the region of injury these platelets rupture and releases a substance called thromboplastin. In presence of calcium thromboplastin acts on prothrombin to form a proteolytic enzyme thrombin. Thrombin further acts on fibrinogen (soluble protein) and converts it into fibrin. The fibrin fibres forms a network over the damaged wall of blood vessel and entraps blood corpuscles. This is referred as blood clot.

S93. Blood clotting is a phenomenon brought about by blood platelets which prevents excessive loss of blood at the time of injury or leakage from a blood vessel.

Platelets reupture to release a substance called thromboplastin.



S94. Blood pressure is the pressure exerted by forceful flow of blood on the elastic walls of the arteries. It is measured in mm of Hg by an instrument call sphygmomanometer.

S95. Lymph is a light yellow viscous fluid formed from tissue fluid by special lymph capillaries.

It facilitates exchange of materials between blood and tissue fluid. Lymph also helps in maintenance of blood volume. Thirdly lymphocytes mature inside the lymph nodes and therefore helps in immunity to fight against foreign material. Lymph is specialised to carry secretions which cannot pass directly into blood like hormones, plasma proteins, fats. Last but not the least it carries waste products before they are poured into blood for separation in kidneys.

S96. Fish have 2-chambered heart which pumps only venous blood. It is oxygenated in gills from where the blood flows to the rest of the body. So during one cycle the blood goes to the heart only once.

S97. (a) The walls of ventricles are thick and muscular as compared to the walls of atria as they are required to pump blood to various organs. Right ventricle sends deoxygenated blood to lungs through pulmonary artery whereas left ventricle sends oxygenated blood to all parts of the body through aorta.

(b) Since the blood emerges from the heart under high pressure, the arteries have thick, elastic walls.

(c) Venis have valves to ensure that the blood does not flow backward when the atria or ventricles contract.

S98. Contractile vacuule is the exvretory organ in amoeba.

S99. In higher plants water is absorbed through root hair, which are in contact with soil water. From root hair, the water moves through cortex and to the xylem elements. Once the water reaches root xylem, transpiration drives the water to move to the leaves through the stem. The upward movement of water from stem base to the tree top is called as "ascent of sap". Cohesion - adhesion theory proposed by Henry Dixon in 1914 is the most accepted theory of water movement in extremely tall plants.

According to this theory the steps involved can be summarised as follows:

(a) The evaporation of water from the stomata present in the leaves results in the movement of water from the neighbouring cells *i.e.*, the xylem vessels in the leaf. So evaporation of water molecules from the cells of a leaf creates a suction which pulls water from the xylem cells of roots

(b) The suction pressure works against the gravitational pull and is able to pull the water passively from the soil as a continuous water column due to cohesive-adhesive properties of water molecules from roots to the leaves.

(c) Cohesive force develops due to mutual attraction between water molecules. Adhesive formce develops due to the the attraction of water molecules to the lignocellulosic walls of sylem.

Thus transpiration helps in the absorption and upward movement of water and minerals dissolved in it from roots to leaves in extremely tall plants.

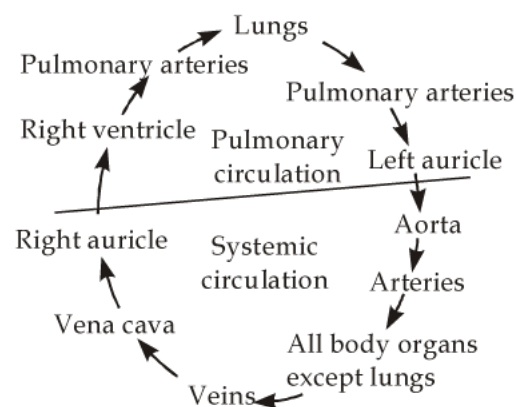
S100. Double circulation is the passage of the same blood twice through the heart; first on the right side then on the left side in order to complete one cycle. Double circulation has two components:

Pulmonary circulation and systemic circulation.

Pulmonary circulation: It is the movement of blood from heart to the lungs and back. Deoxygenated blood of the body enters the right auricle, passes into right ventricle which pumps it into pulmonary arch. With the help of two separate pulmonary arteries the blood passes into the lungs. Here the arteries break up into arterioles and then capillaries for oxygenation. Capillaries join to form venules and then veins. Oxygenated blood comes back to the left auricle of heart through pulmonary veins.

Systemic circulation: It is the circulation of blood between heart and different parts of the body except lungs. Oxygenated blood received by left auricle passes into left ventricle. The left ventricle pumps it into aorta for supply to different body parts. Inside the organs the arteries break up into arterioles and then capillaries. Capillaries provide oxygen and nutrients to tissues. They receive carbon dioxide and wastes from the tissues. Capillaries unite to form venules which join to produce veins. Veins take the deoxygenated blood to the heart but now into the right auricle.

Significance of double circulation: It ensures quick and efficient supply of oxygenated blood to all body parts for meeting higher energy needs and for thermoregulation of body in mammals and birds.



S101. Blood is a fluid connective tissue which plays a vital role in human beings. The important functions are listed as follows:

- Blood helps in transport of nutrients. Sugar, amino acids, minerals, vitamins are picked up by blood from intestine and transported to various parts of the body.
- It transports oxygen and carbon dioxide.
- Blood helps in regulation of body temperature. It distributes heat to all parts of the body.
- Blood contains leukocytes which are helpful in fighting against microbes.
- In the region of injury, the blood coagulates and seals the region to prevent the loss of body fluids and check the entry of germs.

S102.	<i>Xylem</i>	<i>Phloem</i>
	1. A complex tissue that conducts water and minerals from soil to the aerial parts of plant.	1. A complex tissue that transports manufactured food from the region of availability (leaf, storage organs) to the areas of utilisation (all living cells, growing apices, developing fruits).
	2. Xylem comprises of four types of tracheary elements namely, tracheids, vessels, xylem fibres and xylem parenchyma.	2. Phloem comprises of four types of tracheary elements namely sieve tubes, companion cell, phloem parenchyma and phloem fibres.
	3. Tracheids and vessels are the conducting elements of xylem.	3. Sieve tubes are the only conducting element of phloem.
	4. Conduction of water and minerals occur in upward direction due to transpiration pull.	4. Translocation of manufactured food takes place either in downward or upward

S103(a) Food materials are translocated from the region of their manufacture or storage, to the region of their utilisation via a complex tissue known as phloem. Phloem comprises of four types of tracheary elements – sieve tubes, companion cell, phloem parenchyma and phloem fibres. Only phloem fibres are dead cells while rest are living.

Food moves into sieve tubes which are the conducting channels of phloem. They are elongated tubular channels formed by end to end union of numerous sieve tube elements. The end walls of sieve tubes have pores and are called as sieve plates. Their functioning is controlled by adjacent nucleated companion cells as it produces the force required for translocation. The direction of translocation can be downward, upward or both.

(b) The bulk of the translocating nutrients consist of soluble carbohydrate *i.e.*, sucrose. Amino acids, organic acids, hormones and other organic solutes are also translocated by sieve tubes.

S104 The process involved in removal of toxic substance and wastes from body is termed as excretion.

The process of maintaining the right amount of water and proper ionic balance in the body is termed osmoregulation.

S105 **Dialysis:** A principle or process on which artificial kidney is based. It is a process of separation of smaller solutes and ions from large sized molecules by means of ultrafiltration.

S106 Amount of water reabsorbed by nephron depends on following two factors.

- (a) How much excess water is present in the body.
- (b) How much dissolved waste is to be excreted out of the body.

S107 The functional aspect of artificial kidney is that it helps in removing toxins from the body before they are able to damage the body permanently. It also maintains the balance of sodium and potassium salts in a patient whose kidneys have failed.

S108 Though the volume of blood filtered by the kidney is 180 L the volume of urine is just 1-2 litres because the remaining nutrients and water are reabsorbed in the kidney tubules.

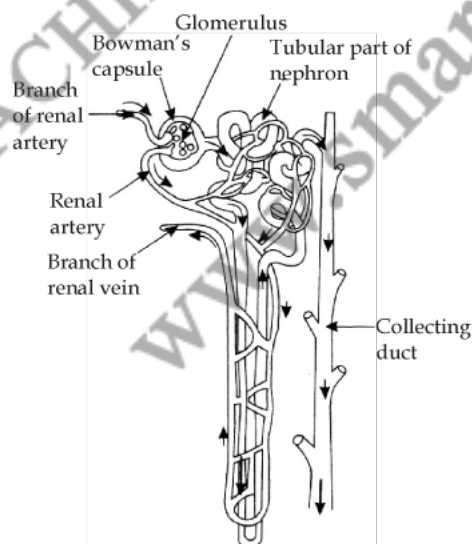
S109 Only a litre or two is the volume of urine produced each day.

S110 Nephron is the structural and functional unit of kidney. It plays a vital role in filtration of blood, reabsorption of useful components like sodium, potassium, calcium, chloride, bicarbonate and water as well as secretion of waste products from blood.

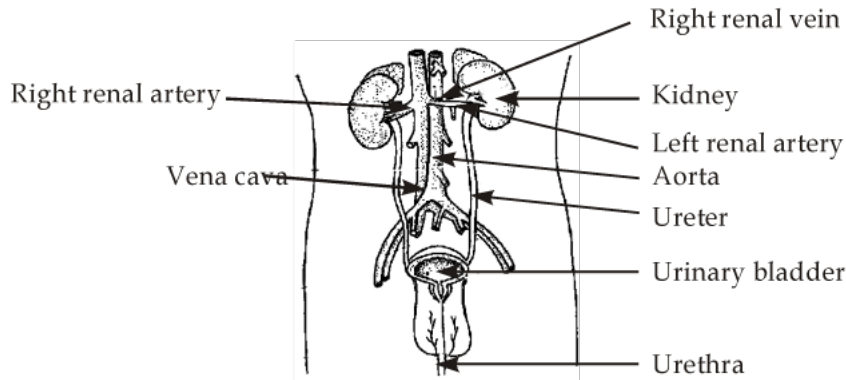
S111 180 L is the volume of initial kidney filtrate each day.

S112 Dialysis is the process used in the working of an artificial kidney.

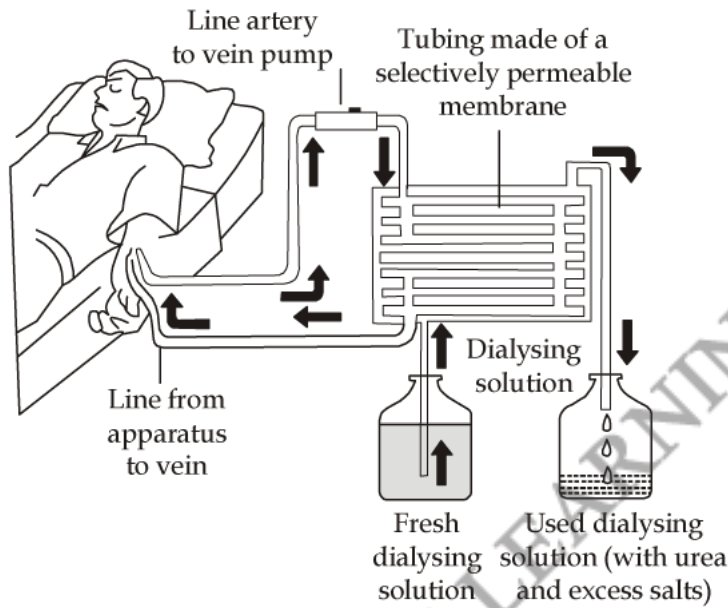
S113.



S114.



S115. Artificial kidneys contain a number of tubes with a semi-permeable lining suspended in a tank filled with dialysing fluid. This fluid has the same osmotic pressure as blood, except that it is devoid of nitrogenous wastes. This patient's blood is passed through these tubes. During this passage, the waste products from the blood pass into dialysing fluid by diffusion. The purified blood is then pumped back into the patient. This is similar to the function of the kidney, but it is different since there is no reabsorption involved.



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