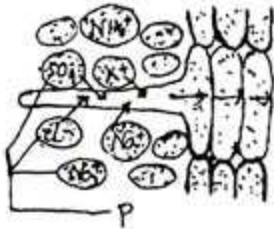


# EV SSC BIOLOGY

## Chapter-6: Transport in Organisms

### Ques. ► 1



- What is phytohormone? 1
- Why meiosis is called the reductional division? 2
- How does the 'P' marked elements of the mentioned stem reach to leaf from soil in plant? Explain. 3
- The process mentioned in the above stem is necessary for plants — analyze. 4

[R.B.-17]

### Answer to the question no. 1

**a** Phytohormones are hormones produced by plants. These are actually small chemical substances, and they are mainly associated with growth along with other physiological activities of plants.

**b** During meiosis division, the nucleus is divided twice whereas the chromosomes are divided once. As a result, the daughter cells get half of the number of chromosomes compared to their mother cell. Due to the decrease in chromosome numbers in the progeny cells, meiosis is specially called as reductional division.

**c** The "P" elements mentioned in the stem are mineral salts. These salts are taken up by plant in the form of ions along with water. Osmosis, diffusion and the driving force of transpiration etc. play important roles in the uptake and transportation of minerals. Water and minerals absorbed by the root hair enter into the adjacent cell via osmosis. The driving force of transpiration maintains the flow of water and minerals from cell to cell. In this way, vascular tissues of root and stem allow minerals and water to enter into the mesophyll tissue of plant leaves.

**d** In the stem, mineral absorption process of plant is illustrated. Absorption of minerals is related to water absorption process, because minerals are taken up in the form of ions dissolved in water. This process is very crucial for the plant. Minerals also serve as nutrients, as they are required for normal and healthy growth of plants. Deficiency of minerals can cause various plant diseases, which might cause plant deaths in extreme cases. For example, deficiency of phosphorous leads to formation of zones of dead cells in plant leaves, also plant growth is stopped. Deficiency of calcium causes death of apical meristems. Production of chlorophylls is stopped in absence of magnesium, which results in decreased rate of photosynthesis and leads to chlorosis. Besides, the interrelated processes of mineral and water absorption helps maintain physiological balance inside plants.

And so, mineral absorption event of plant is extremely important.

**Ques. ► 2** Mr. Rahim picked up an injured boy and immediately went to the hospital. After examining the boy doctor advised that the patient needed to blood. The blood group of the boy is AB. At that time Mr. Rahim agreed to donate his blood to the boy. The doctor gave thanks to Mr. Rahim and also said everybody must be donating blood like you.

[R.B.-17]

- What is blastocyst? 1
- What do you mean by synovial joint? 2
- Explain the characteristics of the mentioned patient blood group of the stem. 3
- Analyze the doctor's statement of the mentioned stem. 4

### Answer to the question no. 2

**a** The blastocyst is a phase during embryo development prior to implantation of the embryo in the mother's uterus.

**b** A bone joint which is composed of a capsule, synovial membrane, a synovial cavity with a kind of lubrication fluid or synovial fluid, is called synovial joint. The parts of the joint are the articulating surface of bone, covered with smooth cartilage, synovial fluid and synovial membrane. Synovial joints have ligaments for holding the bones together collectively to form a strong fibrous capsule. The synovial fluid and the cartilage of the joint reduce friction and less energy is used for the movement of the joint.

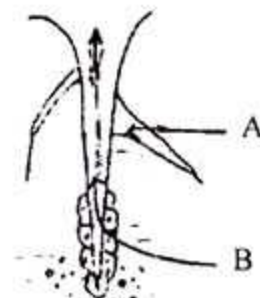
**c** The patient mentioned in the stem has AB blood group. This group of blood contains A and B antigens but no antibodies. Individuals with AB blood group is called universal recipient, because having no antibodies in the blood gives them the advantage of accepting blood from every other blood groups (A, B, O, AB) without the risk of clotting, but they can donate blood to the AB groups only. This is why people with AB blood group are named as universal recipient.

**d** Donating blood is a noble cause. Excessive bleeding due to serious injury, accident, surgeries, natural calamities or for any other reasons human body can lose a huge amount of blood, which may lead to anemia. In case of emergencies like these the patient requires blood transfusion, which involves the procedures of collecting blood from a healthy individual and giving it to the patient. But before transfusion it is a must to crosscheck the blood types of the patient and donor to see if it's a match. Otherwise the patient may die due to complications emerged from mismatch blood transfusion.

Donating blood does not cause any harm to a healthy person. A healthy and fit individual's body produces 2 million red blood cells every second. Besides, the red blood cells have a life span of 120 days. So donating blood once in every 4 months is not harmful at all for the donor. As there is no replacement for human blood yet and critical situation requires a good amount of blood supply, everyone is encouraged to donate blood.

So, when the doctor appreciated Mr Rahim by saying "Everyone should donate blood like you", he did the right thing. A person can donate blood to the blood bank where it is stored to be used in emergencies.

### Ques. ► 3



[D]. B.-17]

- What is cristae? 1
- What is meant by C4-plant? 2
- Explain the absorption process of part A in the stem. 3
- Absorption process of part 'A' and 'B' are different. — Evaluate. 4

**Answer to the question no. 3**

**a** The infoldings or inward projections of the inner membrane of the mitochondrion is known as cristae.

**b** In  $C_4$  plants, at the same time both the Hatch and Slack cycle and the Calvin cycle are carried out. These plants can effectively carry out photosynthesis at much lesser density of  $CO_2$ .  $C_4$  plants have chloroplasts in their bundle sheath cells of leaves. Maize, sugarcane, motha grass etc. are examples of  $C_4$  plants.

**c** The stem shows a figure of root hair labeled with A. Plants by their roots, generally, absorb capillary water from the soil. The diffusion pressure deficit in a cell of a leaf is developed because of transpiration, and then water from the adjacent cell moves towards the cell. In the same way diffusion pressure deficit is developed in the second cell and water is moved to it from the adjacent cell. This way a continuous diffusion pressure deficit is extended up to root hair and a suction force is developed. Because of this suction force, capillary water continues to enter the cell root hair. Water enters into the root hair cell through the process of osmosis and diffusion. Through this way, water taken up into the root hairs moves through the cortex tissue. This way of movement of water is called cell-to-cell osmosis. Then water moves from the cortex tissue to the endodermis, the pericycle, and finally into the vascular bundles. Water having once entered into the vascular bundles, it continues to be taken up and flowed laterally through xylem tissue. The water flowing through different branches and branchlets of plant, ultimately, reaches the leaves and this is accomplished by the active involvement of the two processes named osmosis and transpiration.

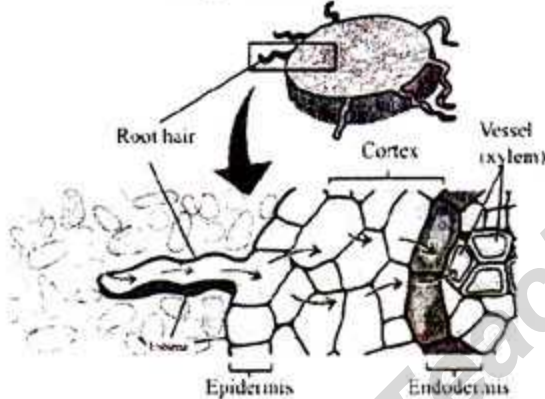
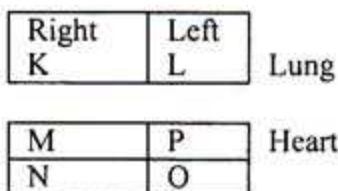


Figure: Absorption and conduction of water

**d** In the stem, A and B labeled parts represent root hair and tip of the root. Plants absorb capillary water from soil with the help of root hairs, and the tip of roots help in absorbing minerals. These two uptake processes are different.

Water Absorption	Mineral Absorption
1. Requires no energy.	1. Requires energy (active absorption)
2. Root hair is involved.	2. Tip of the root is involved.
3. Water uptake process requires no carrier or transporter.	3. Mineral uptake process requires carrier or transporter.

**Ques. ▶ 4**



[Ctg.B.-17]

- What is Tendon? 1
- What do you understand by synovial joint? 2
- Explain the blood flow from part 'M' to parts 'K' and 'L'. 3
- Analyse the process of the 'M, N, O, P' marked organ to separate oxygenated and carbon-dioxide enriched blood. 4

**Answer to the question no. 4**

**a** A tendon or sine is a tough band of fibrous connective tissue that usually connects muscle to bone and is capable of withstanding tension.

**b** A joint, which is composed of a capsule, synovial membrane, a synovial cavity with a kind of lubrication fluid or synovial fluid, is called synovial joint. The synovial fluid and the cartilage of the joint reduce friction and less energy is used for the movement of the joint.

**c** The "M" part shown in the stem is the right atrium of heart, "K" is pulmonary artery and "L" is pulmonary vein. From the superior venacava,  $CO_2$  rich blood enters into relaxed right atrium. Later, the muscles of right atrium contracts and  $CO_2$  rich blood enters right ventricle through tricuspid valve. Then right ventricle contracts and blood passes through the pulmonary artery and reaches the lungs. In lungs, the blood is purified and replenished with  $O_2$ . Oxygenated blood enters pulmonary vein and enters the heart through pulmonary vein. Thus blood flows from M to K and L part, as illustrated in the stem.

**d** In the stem, the different parts M, N, O and P altogether indicates the most vital organ heart. This organ functions very effectively and keeps the  $O_2$  and  $CO_2$  rich blood separated. From the superior venacava,  $CO_2$  rich blood enters into relaxed right atrium. Later, the muscles of right atrium contracts and  $CO_2$  rich blood enters right ventricle through tricuspid valve. Then right ventricle contracts and blood passes through the pulmonary artery and reaches the lungs. In lungs, the blood is purified and replenished with  $O_2$ . Oxygenated blood enters pulmonary vein and enters the relaxed left atrium through pulmonary vein. Contraction of the left atrium pushes the blood flow towards left ventricle through bicuspid valve. Due to the barrier between pairs of right and left atrium-ventricle,  $CO_2$  and  $O_2$  rich blood never get mixed up. From the left ventricle,  $O_2$  rich blood circulates throughout the body using aorta as a medium.

**Ques. ▶ 5** In the morning Rimi bought some vegetables from the market and carried it in a polythin bag. At noon she took out the vegetables from the bag and observed some drops of water inside the polythin. [S.B.-17]

- The high rate of photosynthesis is most in which part of leaf? 1
- Why is water called "Fluid of life"? Explain. 2
- Explain the process which is occur in the above stem. 3
- The importance of the process described in the stem to keep the metabolic system active is very essential for tree. — Explain it. 4

**Answer to the question no. 5**

**a** Mesophyll tissues of the leaves have the highest rate of photosynthesis.

**b** Water is named as the "fluid of life". We know that no animal can live without water. Again, the physical basis of life is the protoplasm, where water comprises 90% of its total weight. This is why water is named "fluid of life".

**c** In the stem, transpiration process have been indicated. Life cannot be imagined without water. Plants mainly absorb water they require at their roots. They use a very little part of the absorbed water for their metabolic activities. The remaining part of the water is lost outside the plant body. The physiological process by which generally the land plants through their aerial part lose water in the form of water vapour is called transpiration. On the basis of aerial parts through which this process occurs, transpiration is categorized into three: stomatal transpiration, cuticular transpiration and lenticular transpiration.

- 1. Stomatal transpiration:** There are special types of openings with two guard cells in the leaves, young stems and sepals and petals of flowers. These openings are called stomata. 90-95% of the total transpiration in a plant occurs through the stomata.
- 2. Cuticular transpiration:** There is a layer of cutin on the epidermal layers of a plant, especially on the upper and lower surface of every leaf. This layer is called cuticle. An amount of water being evaporated is lost through the cuticle. The process is called cuticular transpiration.
- 3. Lenticular transpiration:** After the occurrence of the secondary growth in plants, the airy aggregation of cells that functions as a pore called lenticel is developed on the ruptured bark of some plants. The cells aggregated around a lenticel are loosely fitted and water from inside can be lost through it. This is called lenticular transpiration.

**d** Because of transpiration a suction force is developed in xylem channel and that is called transpiration suction. With the suction force, a plant absorbs water and mineral salts through its root hairs and the absorbed water and mineral salts are conducted to the leaves. If the force decreases, the absorption of water will be decreased and the metabolic activities along with the production of food will be slothful. In the mesophyll of leaf, diffusion pressure deficit is developed because of transpiration and helps the absorption of water. A plant keeps the temperature in the cells of leaves always in a tolerable state by continuously reducing the thermal energy absorbed by the mesophyll.

And thus transpiration is very crucial for the plants to carry out its metabolism.

**Ques. ▶ 6** Nilu was watching different advanced plants and animals including tigers on a TV Channel. He is a lazy and ease type of a young man, who always likes to eat Biryani and Berger. LDL level in his blood is 5.68 gm/deciliter. [B.B.-17]

- What is an artery? 1
- What do you understand by active and passive absorption? 2
- Describe the symptoms of the disease which may develop in Nilu's body. 3
- The plants and animals mentioned in the stem above are under the same super kingdom but they are under different kingdom. – Explain it. 4

#### Answer to the question no. 6

**a** An artery is a blood vessel that takes oxygenated blood from the heart to all parts of the body.

**b** Passive absorption is accomplished through the root hairs of plants with the process of imbibition and osmosis, and no metabolic energy is required for it.

Active absorption is the absorption of ions with the help of metabolic energy produced in the cells.

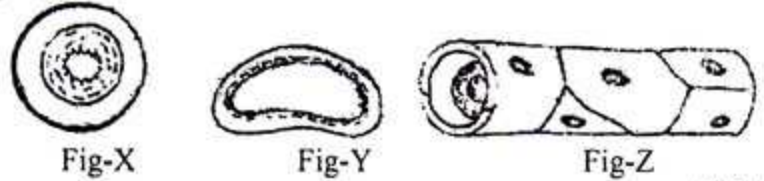
**c** By a thorough examination of the physical characteristics that Nilu has, it could be concluded that she is highly likely to get a heart attack from hypertension.

Nilu likes to eat biriyani, burgers etc. all the time. The amount of LDL in her blood is 5.68 gram/deciliter. For this, the fats deposited on the walls of her blood vessel could narrow down the lumen, which later may hinder natural blood flow. At this stage, she will be developing hypertension and as a consequence she will be suffering from headaches, restlessness, palpitations and weakness. She will get tired easily and might be at risk of heart attack when the arteries will be blocked by fats deposited on their wall. Heart attack might cause severe pain in the chest starting from the left side and later slowly progress to every other part of the body.

**d** The plant and tiger mentioned in the stem belong to the kingdoms Plantae and Animalia, respectively.

Both of the two organisms belong to the super kingdom Eukaryota, as their cells are eukaryotic in nature, containing well developed and membrane bound nucleus. But due to the differences in their characteristics and appearances, they are under two different kingdoms. For example, plants are capable of producing their own foods by photosynthesis, whereas tigers depend on other animal sources for food. Besides, tiger or any animal cells do not contain cell wall, plastids and vacuoles that are distinctly present in plant cells. Moreover, embryonic layers are developed at the time of embryonic development in animals unlike plants where no such events occur.

#### Ques. ▶ 7



- Define Adhesion. 1
- Why transpiration is called necessary evil? 2
- Distinguish between Fig-'X' and Fig-'Y'. 3
- In order to maintain a healthy life the role of Fig-'X', 'Y' and 'Z' inevitable – Explain with logic. 4

#### Answer to the question no. 7

**a** The adhereness of water molecules to any substance is known as adhesion.

**b** Plants give up excess of water present in the body in the form of water vapour. When excess of water is present in the body, it may cause several problems. So it should be eliminated from the body. This process is known as transpiration. Transpiration also helps plants in absorption of water and minerals. The absorbed water is used in photosynthesis. It also helps in translocation of materials within the body. Transpiration keeps the plant body cool. On the other hand, transpiration plays some harmful role. When the rate of transpiration becomes in excess than the rate of water absorption, there occurs water deficiency and the plant organ wilts. If wilting continues for prolonged period. The plant may die. For this reason transpiration is called a 'necessary evil.'

**c** The figure 'X' in the stem is the Artery and 'Y' is the vein. There are differences in these two in several characteristics. The artery originates from the heart and ends in the capillaries. While the veins originate from the capillaries and ends in the heart. Artery carries blood from the heart to the different parts of the body. On the other hand veins collect blood from different parts of the body and carry it to the heart. The blood in the arteries generally is oxygen enriched and looks bright red but the blood in the veins are carbon dioxide enriched and looks blackish in colour. Wall of the artery is thick and elastic while the wall of the vein is thin and less elastic. There is no valve in the artery but valves are present in the veins.

**d** The figures X, Y and Z are artery, vein and capillary respectively. Their role for keeping the sound and healthy is enormous. Food and oxygen is essential for all living cells. The digested food substances are carried to the body cells from the digestive system by blood through arteries and capillaries. Oxygen is also required by every living cell. In presence of oxygen food materials present in the living cell, specially carbohydrate and fat are oxidized in the process of respiration which produce the energy required for the physiological activities. Oxygen is carried from the lung to the living cells by these blood vessels. During respiration CO<sub>2</sub> is produced due to oxidation of food which is poisonous for living cells. Blood carries CO<sub>2</sub> from the cells through capillary walls by diffusion. This carbon dioxide enriched blood is then carried from the

capillaries by the veins to the lung via heart. From the lung CO<sub>2</sub> is expelled out of the body and blood becomes CO<sub>2</sub> free and accepts oxygen from the lung to the cell by these blood vessels. During different metabolic activities within the body nitrogenous wastes are also produced in the cells which should be eliminated. Blood carry these excretory materials from the cells by the process of diffusion through the capillary wall and transfer them to the excretory system. From the excretory system excretory materials are passed out of the living body. Thus the blood vessels like X, Y & Z (artery, vein and capillaries) which remain distributed through body like a network supply food and oxygen to the cells and collect harmful carbon dioxide and excretory substances from the cells and pass them out of the body and keep body sound and healthy.

**Ques. ▶ 8** A blood donation program was arranged on the last Victory Day on the behalf of the club of Mr. Hasan. Many people came to donate blood inspired by Mr. Hasan. The volunteers collected blood after they checking the blood group and deposited to the Blood Bank. [C.B.-16]

- What is nephron? 1
- What do you understand by dialysis? 2
- Why the volunteers collected blood after checking the blood group? Explain it. 3
- Evaluate the responsibility of Mr. Hasan to the society. 4

#### Answer to the question no. 8

**a** The functional unit and secondary part of the uriniferous tubule of kidney is known as *nephron*.

**b** When kidney fails its normal function of purifying blood, then this process of purification is done artificially and scientifically outside the body which is known as Dialysis. By using dialysis machine nitrogenous wastes like urea, uric acid are taken out from the blood in this process. The impure blood is collected from a artery in arm and sent to the dialysis machine. The purified blood from the dialysis machine is then sent a vein in the arm by another tube. Dialysis is a very costly process which also takes much time.

**c** The volunteers collected blood after cheeeking the blood group and deposited to the Blood Bank. Many a times blood is required for the dying patients or by the person severely wounded in any accident. On emergency basis blood from the blood bank is required for transfusion far those patients. It is necessary to know the patient's blood group. Because blood is grouped into 4 groups and a patient can not always take blood from all groups. Antibody of one group of blood may coagulate the other group of blood by its reaction with the antigen when the two groups do not match properly. As for example, 'b' antigen of blood group 'A' reacts with the antibody of 'B' group and causes blood clotting. As a result life of the patient becomes threatened and the patient may die. Similarly negative Rh factor reacts with the positive Rh factor. It is not only causes blood clotting but also creates other problems. To avoid all these critical problems blood group should be matched before transfusion of blood. For this reason, before collecting blood, the volunteers checked the donor's blood group and noted it on the colletion bag, so that the blood sample could be easily matched when necessary.

**d** It has been observed that inspired by the blood donation programme by Mr. Hasan, many people were encouraged. Blood donation is a great social work. During accident, surgery, natural calamity or by any means, excess bleeding may take place and blood becomes critically less and the patient suffers from blood deficiency. To remove blood deficiency, blood transfusion is essential on emergency basis. In case of blood transfusion, the blood group and its Rh factor must be checked and matched before transfusion. In case of

mismatching blood group and Rh factor it may affect the patient severely and it may cause even death.

Blood donation during emergency for saving the life of a patient is a great work. All of us should keep it in mind that blood donation does not hamper the health of the donor. In the body of a normal healthy person, 20 lac of RBC are produced per second. The older ones become replaced by these new cells and destroyed simultaneously. If any healthy person donates blood after each four month, it will create him no problem. On the other hand, there is no alternative of blood incase of emergency for a dying patient. So we should inspire people around us for blood donation which may save several lives. Saving life of people in our society is a humanitarian responsibility for all of us.

So we can say that Mr. Hasan's blood donation programme which is a social responsibility is a praiseworthy work.

**Ques. ▶ 9**



Fig- M

- What is dialysis? 1
- What do you understand by blood pressure? 2
- Write the structural features of the tissue related to the activities of Fig- M. 3
- "Appropriate and sufficient food intake, regular exercise and walking make possible to maintain healthy life." Analyze the relationship of Fig- M with the statement. 4

#### Answer to the question no. 9

**a** Dialysis is the artificial purification of blood outside the human body by using scientific machineries when kidney becomes dysfunctional.

**b** The pressure created by the blood on the arterial wall during its flow is known as the blood pressure. When the heart contracts, pressure on the artery wall becomes high and when the heart relaxes, pressure on the artery wall becomes less, systolic pressure remains higher than the diastolic pressure. In case of a normal healthy person systolic pressure should be 120 and diastolic pressure should be 80 approximately.

**c** The fig- M in the stem is the heart. Heart can be compared with the pump machine. Because it continuously contracts and relaxes and maintains the blood circulation within the body. The tissue associated with the blood circulation by heart is the cardiac muscle tissue. Characteristics of cardiac muscle tissue are mentioned below:

- Cardiac muscle tissue is one special type of involuntary muscle tissue.
- The cells of this tissue are tubuler (more or less similar to the voluntary tissue).
- Cells are branched and contain transverse striations.
- Intercallated discs are present between the cells of this tissue and the contraction and relaxation of the cells are not under the control of the animal.
- The cells of cardiac muscle remain attached with each other by their branches.
- The cells of these tissue contracts and relaxes all together rhythmically and maintains blood circulation within the body from embryonic stage to death.

**d** The importance of taking sufficient nutrient food, regular exercise and walking is enormous for keeping normal, sound health, The fig- M (heart) of the stem has a close relationship will the above activities. Taking balanced food is essential for

the maintenance of proper body growth, development and sound normal health of an organism. The foods taken by an animal is digested into simple, absorbable components. These components are then carried by the blood to the different parts of the body and supplied to the living cells. Heart (M) maintains the continuous blood circulation within the body by rhythmic contraction and relaxation. If, due to any cause, the heart (M) beat is disturbed, the normal life of the animal will be hampered, even it may cause death also. So, to keep the normal healthy life, it requires a healthy, sound heart. Excess of only and fatty foods disturbs the normal functioning of the heart. It deposits cholesterol within the blood vessels and protects the normal blood flow within the body which affects the heart. Regular walking and exercise prevents the cholesterol deposition in blood vessels and keeps the heart sound and healthy. The sound healthy heart keeps the blood circulation normal. As a result all the living cells get plenty nutrients and  $O_2$  and their growth and development take place properly. There by the body grow sound and its vitality increases. As such, it is essential to avoid oily and fatty foods in excess and to take sufficient balanced nutrient food and exercise and walking regularly for maintaining the sound healthy life by keep in the heart (M) sound and healthy. So that its circulatory function may remain normal which are inter related closely.

**Ques. ► 10** Suddenly Mr. Habib feel unbearable pain in chest and sweat excessively. He feels that pain is spreading to neck and left hand. Quickly he came to a doctor for safety. The doctor give him necessary medicine and advise after doing ECG.

[J.B.-16]

- What is blood pressure? 1
- What do you mean by cholesterol? 2
- What is the problem of Mr. Habib's? Explain the reasons of that. 3
- Evaluate the advises which are given by the doctor for keeping the good health. 4

#### Answer to the question no. 10

**a** Blood pressure is the pressure of the blood against the wall of the arteries.

**b** Cholesterol is a lipid molecule with four ringed steroid structure. It is an important component of plasma membrane at animal cells and blood plasma, but not present in plant cells. It is the precursor at steroid hormones and bile acids. It is made up of lipo-protein. It may be of three types, LDL or low density lipoproteins, HDL or high density lipoproteins and triglycerides. LDL is also known as bad cholesterol as it increases the risk of heart disease and HDL is called good cholesterol as it decreases the risk of heart disease. High cholesterol containing foods are Butter, Prawn, Oyster, Liver of cattle, egg yolk etc. Cholesterol is deposited on the inner wall of arteries and thus prevents blood circulation.

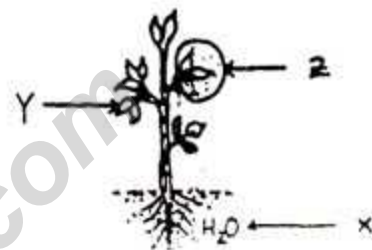
**c** From the symptoms of the stem it appears that Mr. Habib suffered from heart attack. There are several reasons for heart attack. When blood clots at any part of the heart that stops blood circulation or the circulation is obstructed. It causes heart attack. The main cause of this disease is the obesity. Unhealthy food habit such as taking foods with higher amount of oils or fats, fast food like burger, patties etc., and leading idle life without any physical labour are principal causes of this disease. Besides those, smoking, taking jorda and drugs have also been identified as the cause of this disease. Depression, emotional stress, anxiety, sadness increase the risk of heart attack at any age.

**d** The Heart starts its function before the birth of the man and it continues functioning till death. Heart play an important role in life and death of a man. To keep the healthy, it is To keep the healthy, it is

important to follow proper life style and select proper nutrient foods. Fatty and oily food contains high cholesterol and affects the normal function of the heart. Cholesterol deposits on the inner wall of blood vessels and create obstruction in blood circulation which may damage the heart.

Smoking and nicotin of the jorda (tobacco) not only damage the heart but also the other organs too. We can keep our heart healthy by selecting proper foods and taking regular exercise and physical labour. We should avoid foods that cause obesity such as- oil, fats, excess carbohydrates and taking balanced nutrient foods regularly. Physical labour, physical exercise, walking etc. keeps the heart healthy and sound. During his illness, Mr. Habib consulted a doctor and the doctor prescribed him necessary medicine. He also advised Mr. Habib to keep his heart healthy. These advises include- to avoid smoking, taking regular exercise and walking, changing food habit, taking fresh fruits and vegetables in enough amount. Besides these he also advised Mr. Habib to avoid fried, spicy and oily food, fast food etc. So, the advise of the doctor was correct and justified to keep Mr. Habib's heart healthy and sound.

#### Ques. ► 11



[Mirzapur Cadet College, Tangail]

- What is cuticle? 1
- Why the leaves of rain tree drops out during winter season? Explain. 2
- How the 'X' element reached to 'Y'? Explain. 3
- Describe how the process 'Z' shown on stem play role in rainfall of Sylhet forest. 4

#### Answer to the question no. 11

**a** The upper and the lower layer leaf is called cuticle.

**b** when winter arrives, the trees are no longer able to get enough water to replace it. And so now we know. Leaves fall — or are pushed — off trees so that the tree can survive the winter and grow new leaves in the spring.

**c** "X" and "Y" mentioned in the stem is  $H_2O$  and leaf bag respectively. How water reached to the leaves is given below —

Plants absorb water from the soil through process osmosis. This is accomplished mainly through the root hairs. Water and mineral salts are collectively learn as cell sap. Roots absorb water and mineral salts. The cell sap ascends slowly upwards. Simultaneously, the lateral translocation of cell sap also occurs. Translocation of cell sap is categorized into two steps: 1) the arrival of soil water and mineral salts from root hairs to the vascular tissue of the root and 2) translocation from vascular bundle of the root to leaves. At first osmosis, diffusion and suction from transpiration, play an important role in the absorption and translocation of water and mineral salts. The water absorbed by root hairs move to the adjacent cells by the process of osmosis. From there it moves again to the next cell. In this way water and mineral substances reach the vascular bundle of the root, and ultimately, reach the mesophyll tissue of leaves through the vascular bundle of the stem.

**d** "z" mentioned in the stem is a cellophane bag and the process is transpiration. In the rainfall of Sylhet forest, cellophane bag plays an important role in transpiration. This is analyzed below —

The ratio of the amount of water vapour in the air of the atmosphere and the amount of water vapour that the air can hold at a given temperature is its relative humidity. For instance, the air may be dry in spite of having high water vapour because the air may have a high water vapour holding capacity. Conversely, in spite of the presence of low amount of water vapour in atmosphere, the atmosphere may be humid if there is low water vapour holding capacity in the air. When relative humidity is low, the air remains unsaturated, and can retain more water vapour. If the relative humidity is high, the air loses its water vapour holding capacity. When the relative humidity is low, the rate of transpiration increases and when high, the rate of transpiration declines. In this case, the cellophane bag helps a lot.

**Ques. ► 12** Human have a muscle made strong pumping organ to circulate the blood. Artery and vein are the vessels for reaching the blood to a specific place.

[Mymensingh Girls' Cadet College, Mymensingh]

- What is Rheumatic fever? 1
- What do you mean by hypertension? 2
- What are the differences between mentioned two vessels? 3
- Describe the circulation process through the strong organ mentioned in the stem. 4

#### Answer to the question no. 12

**a** Rheumatic fever is the result of a streptococcus infection such as inflammation of trachea, scarlet fever, tonsillitis or middle ear infection.

**b** When blood pressure rises above the normal pressure then it is considered as hypertension. In other words, when systolic and diastolic pressures rise more than the normal pressure, it is called hypertension.

**c** Difference between artery and vein is given below.

Feature	Artery	Vein
Definition	The blood vessels, which carry oxygenated blood away from the heart to different organs of the body, are called arteries.	The blood vessels which carry blood from the various organs of the body towards the heart are called veins.
Walls	The walls of the arteries are elastic and thick.	Veins are thinly walled, less elastic and with fewer muscles.
Valves	The arteries do not have any valves.	The veins have valves
Lumen	The arteries have narrow passage or lumen.	The veins have wider passage or lumen.

**d** The strong organ mentioned on the stem is heart.

**Blood Circulation through the heart:** Due to the relaxation of atria the blood enters the heart coming from different parts of the body. At the same time, the oxygenated blood enters the left atrium through the pulmonary veins from the lungs. The atriums contract, ventricle relax and the deoxygenated blood from the right enters into the right ventricle. At the same time, oxygenated blood from the two ventricles contracts together. Then, the right ventricle passes through the pulmonary artery towards the lungs. At the same time, oxygenated blood leaves the left ventricle through the aorta towards the body and the opening of both the artery. Thus, successive contraction and relaxation of atrium and ventricle help in the continuous transportation of blood.

#### **Ques. ► 13**

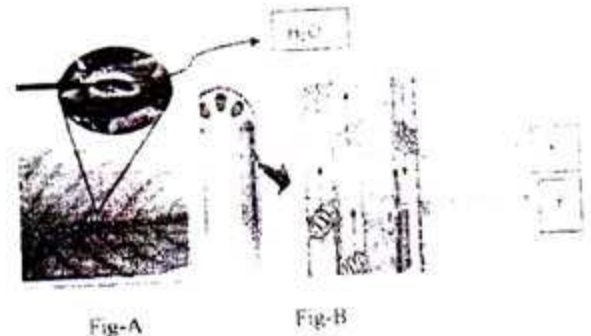


Fig-A

Fig-B

[Rajshahi Cadet College, Rajshahi]

- What is endosperm? 1
- Why are phytohormones necessary in plant? 2
- Describe the process through X and Y of the above figure B. 3
- Describe the significance of the process given in figure A and B. 4

#### Answer to the question no. 13

**a** The endosperm is the tissue produced inside the seeds of most of the flowering plants following fertilization.

**b** Without photosynthesis, plants would not have carbohydrates for respiration. In addition, the carbohydrates produced in photosynthesis are also used to build plant cell structures, like the cellulose cell wall.

**c** "X" and "Y" mentioned in fig: "B" indicates the synthesized compounds and the the compounds in the lower region respectively. The mentioned process is known as translocation. The process is described below —

Translocation in plants represents the movement or flow of water and mineral salts and of the food produced in the leaves. We know that water and mineral salts are taken up the stem through the vessels of the xylem tissue. Scientists think that the force produced by transpiration, capillary action and root pressure causes the cell sap to reach the leaves of plants. In this way water reaches the leaves, and food is produced there. Then the phloem tissue takes active part in the translocation of food produced by photosynthesis. The food is translocated through the sieve tubes of the phloem tissue. Different organic compounds in plants move through phloem tissue at the same time in opposite directions. The compounds in the lower region flow downwards and compounds synthesized in the upper region flow upwards and the substances synthesized in the middle region flow in both directions.

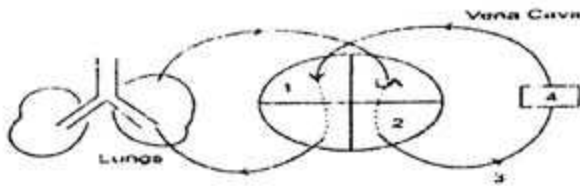
**d** Fig: "A" and fig: "B" mentioned in the stem states the transpiration process and the translocation process respectively. Their significance are given below —

**Significance of transpiration:** The metabolic activities of a living plant cell are dependent on transpiration process. Because of transpiration a suction force is developed in the xylem channel, called the transpiration suction. With this suction force, a plant absorbs water and mineral salts through its root hairs and the absorbed water and mineral salts are conducted to the leaves. In the mesophyll of the leaf, a diffusion pressure deficit is developed because of transpiration and helps the absorption of water. A plant keeps the temperature in the cells of leaves within a certain range by continuously reducing the thermal energy absorbed by the mesophyll.

**Significance of translocation:** All scientists agree with the necessity of translocation of water and mineral substances in plants. Now, the matter of consideration is that the water and mineral substances, that are to be used, must be taken to the places where the reactions will occur. This is why translocation of water and mineral salts is very important. Water and mineral salts being absorbed through the root hair

go through the vessels of the xylem tissue, cross the cortex region, and gradually reach the leaves with the flow of transpiration. Food is produced in the leaves. The food produced in the leaf reaches the different regions of a plant through sieve tubes of the phloem tissue.

**Ques. ► 14**



[Rajshahi Cadet College, Rajshahi]

- What is dendron? 1
- What is meant by reflex action? 2
- Describe the function of 1 & 2. 3
- "3 is badly needed for 4"— Explain. 4

**Answer to the question no. 14**

**a** Dendrons are branched protoplasmic extensions of a nerve cell that propagate the electrochemical stimulation received from other neural cells to the cell body.

**b** A reflex action is a sudden response or automatic reaction.

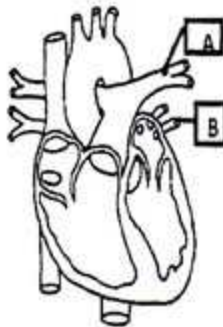
**c** Fig: "1" and "2" mentioned in the stem states right atrium and left ventricle respectively. Their functions are given below —

Function of right atrium: The right atrium is one of the four chambers of the heart. The heart is comprised of two atria and two ventricles. Blood enters the heart through the two atria and exits through the two ventricles. Deoxygenated blood enters the right atrium through the inferior and superior vena cava.

Function of left ventricle: The left ventricle is the thickest of the heart's chambers and is responsible for pumping oxygenated blood to tissues all over the body. By contrast, the right ventricle solely pumps blood to the lungs.

**d** "3" mentioned in the stem states aorta and pulmonary artery and "4" mentioned in the stem is body. Aorta and pulmonary artery is badly needed for body. The aorta and the pulmonary artery are the two most important arteries in the human body. The aorta is the biggest artery and channels oxygenated blood to the rest of the body. The pulmonary artery carries deoxygenated blood to the lungs for purification. Then the blood travels back to the heart and is pumped to the aorta and the rest of the body. Babies with an aortopulmonary window have a hole in between the aorta and pulmonary artery. Because of this hole, blood from the aorta flows into the pulmonary artery, and as a result too much blood flows to the lung.

**Ques. ► 15**



[Joypurhat Girls' Cadet College, Joypurhat]

- What is periosteum? 1
- Write down the symptoms of osteoporosis. 2
- Write down the difference between A and B according to above figure. 3
- Explain the histological structure of the stem with figure. 4

**Answer to the question no. 15**

**a** The membrane covering the bone is called periosteum.

**b** Osteoporosis is a calcium deficiency disease. Symptoms of this disease are:

- Thickness decrease
- Muscle strength reduces
- feel back pain
- Pain in bones.

**c** The figure A refers to pulmonary artery and B refers to pulmonary vein. The difference between pulmonary artery and pulmonary vein are as follows:

Pulmonary Artery	Pulmonary Vein
1. Carries deoxygenated blood from heart to lungs.	1. Carries oxygenated blood from lungs to the heart.
2. Thick wall.	2. Thin wall.
3. High blood pressure.	3. Low blood pressure.
4. No valves.	4. Valves

**d** The figure refers to the heart. The histological structure of the heart consists of cardiac muscle cells. It is described below: The cells of this muscle tissue are tubular (very similar to those of voluntary muscle), branched and provided with transverse striations. Between the cells of this tissue intercalated disc are present. The contraction and relaxation of this tissue is not dependent on the will of the animal. That is, the structure of heart muscle is like that of voluntary muscle and the function is like that of involuntary muscle. The cells of heart muscle remain joined together by branched, so they contracts and relaxes all together. Through rhythmic contraction and relaxation, the cardiac muscle controls the circulation of blood within the body from a particular stage of the embryonic condition till the last moment of death.

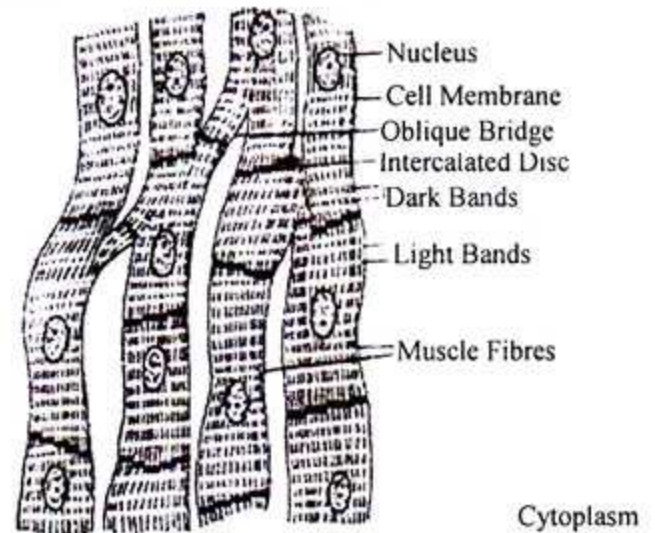
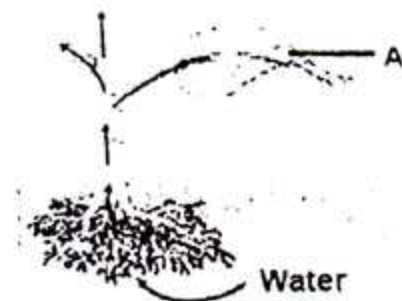


Fig. Cardiac Muscle Tissue

**Ques. ► 16**

[Pabna Cadet College, Pabna]



- What is kinetochore? 1
- Write down the features of meiosis cell division? 2
- Find out the significance of above substances translocation in plant life. 3
- How above substances from soil reaches in the mentioned part "A"? Analyze 4

**Answer to the question no. 16**

**a** Kinetochore is a protein complex that assembles at the centromeric region of the chromosome during mitosis and meiosis.

**b** In meiosis cell division, four daughter cells are produced from an eukaryotic cell. The Nucleus divides twice and the chromosomes divide once in this process, and the number of chromosomes becomes half in the daughter cells from that of the mother cell. As the number of chromosome decreases this process of cell division is called reductional division.

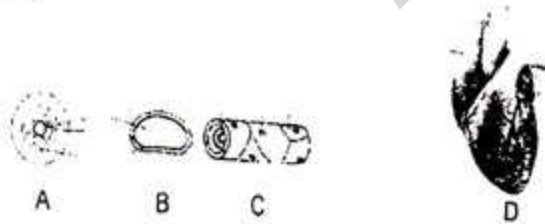
**c** The substance mentioned in the stem is mineral salt. The significance of translocation in plants life is given below —  
 Movement or transportation of water and mineral salts in plants is called translocation in plants. All scientists agree with the necessity of translocation of water and mineral substances in plants. Now, the matter of consideration is that the water and mineral substances, that are to be used, must be taken to the places where the reactions will occur. This is why translocation of water and mineral salts is very important. Water and mineral salts being absorbed through the root hair go through the vessels of the xylem tissue, cross the cortex region, and gradually reach the leaves with the flow of transpiration. Food is produced in the leaves. The food produced in the leaf reaches the different regions of a plant through sieve tubes of the phloem tissue. If the flow in the xylem vessels or phloem sieve tubes is blocked, for any reason, the plant would die.

**d** The substance mentioned in the stem is mineral salt and "A" mentioned in the stem is leaf. How mineral salts are reached in the leaves from soil are explained below —  
 Most plants absorb some mineral salts with water along. Though some salts are absorbed through the root hair, the meristematic region of the tip of root functions as the main region of absorbing mineral salts. Mineral salts are absorbed in the form of ions. Absorption of salts is done in two ways, passive absorption and active absorption.

**Passive absorption:** Salt absorption in this way is accomplished through the root hairs of plants with the process of imbibition and osmosis, and no metabolic energy is required for it.

**Active absorption:** Active absorption is the absorption of ions with the help of metabolic energy produced in the cells.

**Ques. ► 17**



[Pabna Cadet College, Pabna]

- What is Hemoglobin? 1
- What do you mean by Rheumatic fever? 2
- What are the differences among the figure A, B and C? Explain. 3
- Describe the structure and circulation process of the above figure D. 4

**Answer to the question no. 17**

**a** Hemoglobin: The oxygen-carrying pigment and predominant protein in the red blood cells.

**b** Rheumatic fever is a disease brought on by streptococcal infections such as strep throat, scarlet fever, tonsillitis or middle ear infection. The initial attack of the disease usually occurs in childhood and may affect many parts of the body, especially the heart. If rheumatic heart disease develops, it sometimes injures the heart muscle and its valves. So, the heart cannot pump adequate blood and the flow of blood

within the body decreases.

**c** Figure "A" mentioned in the stem is artery, Figure "B" mentioned in the stem is vein and Figure "C" mentioned in the stem is blood capillary. The differences between among them are given below —

	Arteries	Capillaries	Veins
Function	Carry blood away from the heart at high pressure	-Supply all cells with their requirements - Take away waste products	Return blood to the heart at low pressure
Structure of wall	- Thick, strong - Contain muscles, elastic fibres and fibrous tissue	Very thin, only one cell thick	-Thin - Mainly fibrous tissue - Contain far less muscle and elastic tissue than arteries
Lumen	- Narrow - Varies with heartbeat (increases as a pulse of blood passes through)	- Very narrow - Just wide enough for a red blood cell to pass through	Wide
Valves	(-)	(-)	(+) Prevent backflow
How structure fits function	- Strength and elasticity needed to with stand the pulsing of the blood, prevent bursting and maintain pressure wave -Helps to maintain high blood pressure, preventing blood flowing backwards	- No need for strong walls, as most of the blood pressure has been lost - Thin walls and narrow lumen bring blood into close contact with body tissue, allowing diffusion of materials between capillary and surrounding tissues. - White blood cells can squeeze between cells of the wall	- No need for strong walls, as most of the blood pressure has been lost - Wide lumen offers less resistance to blood flow

**d** Figure "D" mentioned in the stem is heart. The structure and blood circulation process of heart is described below —

**Structure of heart:** The heart is a triangular shaped, hollow, muscular pumping organ. It is situated in the left side between the two lungs. The heart consists of special involuntary muscles. It is surrounded by a thin membrane named the pericardium. The heart of the wall consists of three layers: epicardium myocardium and endocardium.

**Epicardium:** This consists of connective tissue. This layer is covered with epithelial

**Myocardium:** This layer is in between the epicardium and endocardium. It consists of strong involuntary muscles.

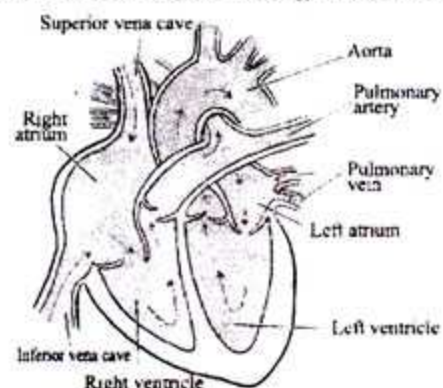


Fig: Heart



**Endocardium** : This is the inner most layer. The chambers of the heart are surrounded by the endocardium. This layer also covers the valves. The inner part of the heart is hollow and four-chambered. The upper chambers are the right and left auricle or atrium and the lower chambers are the right and left ventricles. The atria are comparatively thin walled and the ventricle walls are muscular and thick. The two atria and ventricles are separated by inter auricular and the interventricular septum respectively. The aperture between the two atria (singular-atrium) and ventricles are guarded by valves. The right auriculoventricular aperture guarded by a tricuspid valve is made up of three flaps. Similarly the left atrium and ventricle is guarded by a bicuspid valve made up of two flaps. The opening of the aorta and the pulmonary artery is guarded by valves called semilunar valves, which allow the transport of blood in one direction and prevents the back flow of blood.

**Circulation of blood through the heart:** We have learned earlier that the heart acts like a pump. The Heart works by contraction and relaxation. The continuous contraction and relaxation transport blood throughout the whole body. The contraction of heart is called systole, and the relaxation of heart is called the diastole. A complete contraction (systole) and relaxation (diastole) of the heart constitutes a heartbeat. Due to the relaxation of atria (auricles) the blood enters the heart from different parts of the body. Such as - deoxygenated blood from the superior vena cava enters the right atrium. At the same time, the oxygenated blood enters to the left atrium through the pulmonary veins from the lungs. The walls of the two atrium contract and then the muscles of the ventricle relax.

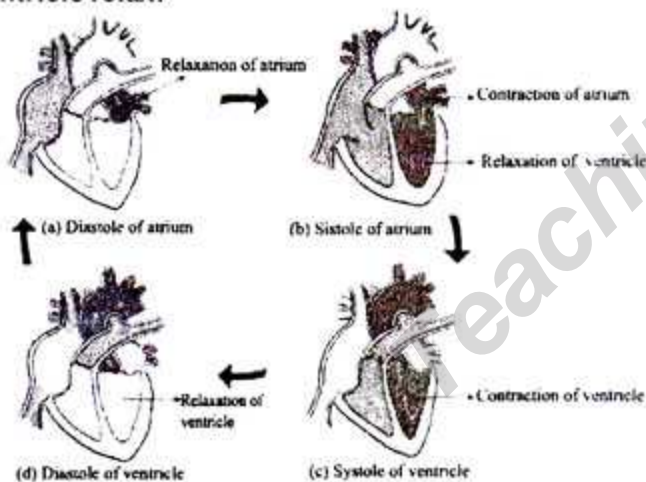
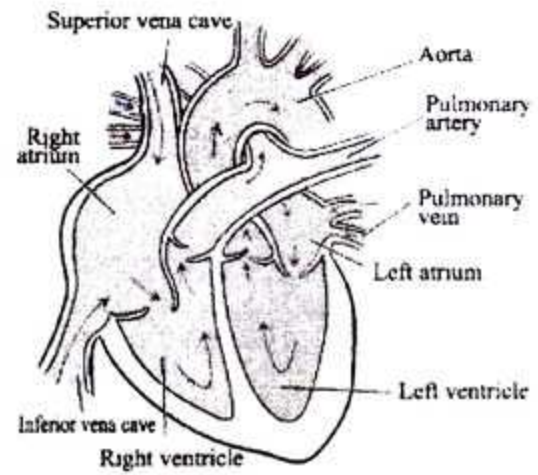


Fig: Blood circulation process

As a result the tricuspid valve situated between the right sino auricular ventricular apertures opens. So, the deoxygenated blood from the right auricle enters into the right ventricle. At the same time, the left sino auricular ventricular aperture, guarded by the bicuspid valve, opens. Then oxygenated blood enters the left ventricle from the left auricle. During this period the left and right auriculoventricular apertures are closed by their tricuspid and bicuspid valves. So, blood of the ventricle cannot return to the atrium. When the two ventricles relax, deoxygenated blood from the right ventricle passes through the pulmonary artery towards the lungs. Here the blood becomes purified. At the same time the oxygenated blood leaves the left ventricle through the aorta towards the body and the opening of both the arteries (aorta and pulmonary artery) are closed by the semi lunar valves which prevent blood from returning into the ventricle. Thus successive contraction and relaxation of atrium and ventricle help in continuous transportation of blood.

**Ques. ► 18**



[Cumilla Cadet College, Cumilla]

- What is antibiosis? 1
- What are the symptoms of brain hemorrhage? 2
- Draw the label diagram of L.S of above figure. 3
- How does blood circulate through above figure? 4

**Answer to the question no. 18**

- If the growth and development of any organism is partly or wholly interrupted by the biochemical substance produced by other organism or even the organism may die, then this process is called antibiosis.
- The symptoms of brain hemorrhage are —
  - A sudden severe headache.
  - Weakness in an arm or leg.
  - Nausea or vomiting.
  - Changes in vision.
- The figure mentioned in the stem is heart. The labeled diagram of left side of heart is drawn below —

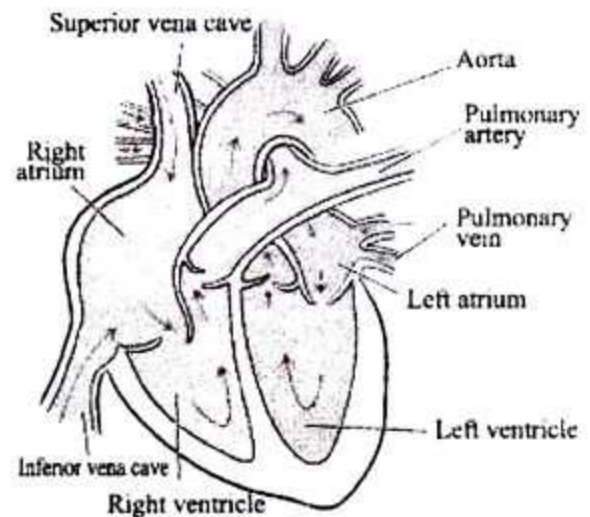


Fig: Left side of heart.

- The figure mentioned in the stem is heart. The blood circulation process through heart is given below —
 

The Heart works by contraction and relaxation. The continuous contraction and relaxation transports blood throughout the whole body. The contraction of heart is called systole, and the relaxation of heart is called the diastole. Due to the relaxation of atria (auricles) the blood enters the heart from different parts of the body. Such as - deoxygenated blood from the superior vena cava enters the right atrium. At the same time, the oxygenated blood enters to the left atrium through the pulmonary veins from the lungs. The walls of the two atrium contract and then the muscles of the ventricle relax. As a result the tricuspid valve situated between the right sino auricular ventricular apertures opens. At the same time, the left sino auricular ventricular aperture, guarded by the bicuspid valve, opens. Then oxygenated blood enters the left ventricle from the left auricle. When the two ventricles

relax, deoxygenated blood from the right ventricle passes through the pulmonary artery towards the lungs. Here the blood becomes purified. Thus successive contraction and relaxation of atrium and ventricle help in continuous transportation of blood.

**Ques. ► 19** There is a pumping organ in our body which is responsible for the flow of the red colour fluid throughout the body. *[Feni Girls' Cadet College, Feni]*

- What is Hilus? 1
- Differentiate the Artery from Vein. 2
- Draw a labeled diagram of the organ which is mentioned in the stem. 3
- 'The fluid of the stem has many important functions' Explain it. 4

**Answer to the question no. 19**

- The outer side of the kidney is convex and the inner side is concave with an indentation called the hilus.
- Arteries carry blood from the heart to the rest of the body, whereas veins carry blood from the rest of the body back to the heart. Arteries have a much narrower lumen than veins. Veins have valves and arteries do not.
- The organ mentioned in the stem is heart. A labeled diagram of heart is given below —

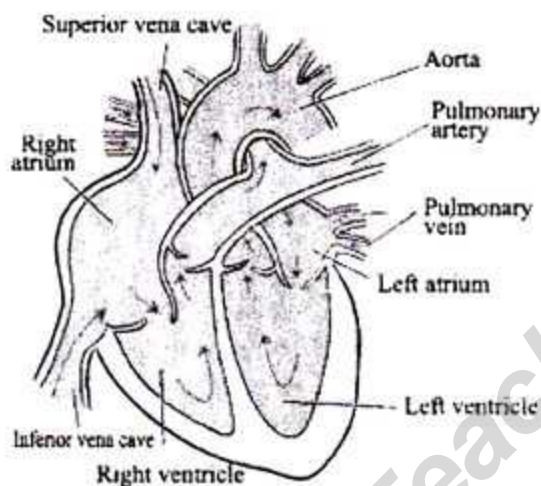


Fig: Heart

**d** The fluid mentioned in the stem is blood which has many important functions. They are explained below —

**Oxygen transport:** Red blood corpuscles transports oxygen as oxyhaemoglobin to the cells.

**Removal of carbon dioxide:** Due to the chemical reaction in the tissue, carbon dioxide is produced. Carbon dioxide is transported in the form of sodium bicarbonate dissolved in the plasma. It carries carbon dioxide from the tissue to the lungs which is then expelled during expiration.

**Transportation of digested food:** It provides plasma, glucose, amino acid, and fat granules to the cell.

**Balancing of temperature condition:** Blood helps to maintain uniform body temperature by distributing it throughout the body.

**Elimination of waste products:** Blood carries all the waste products and eliminates (urea, uric acid and carbon dioxide).

**Prevention of Diseases:** Some types of white blood cells attack and engulf germs by the process of phagocytosis, thus preventing the body from the attack of germs. It increases the resistance power against diseases by producing antibodies and antigens.

**Ques. ► 20**

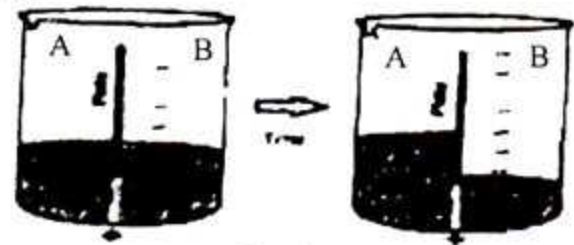


Fig-A

*[Feni Girls' Cadet College, Feni]*

- What is active absorption? 1
- What you mean by lenticular transpiration? 2
- Process of figure 'A' a special type of diffusion— discuss the reason. 3
- Process of figure 'A' is very much important for plant— Analyze it. 4

**Answer to the question no. 20**

**a** Active absorption is the absorption of ions with the help of metabolic energy produced in the cells.

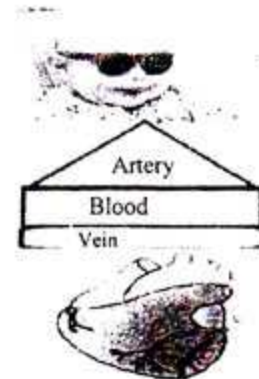
**b** Lenticular transpiration is the type of transpiration which occurs through the small pores called as lenticels present in the bark.

**c** Fig: "A" mentioned in the stem is osmosis which is a special type of diffusion. The reason is discussed below— Osmosis is the movement of the water molecules from a region of higher concentration to a region of lower concentration through a semipermeable membrane. Semipermeable membrane is the membrane that allows only water through pass through and not the solute. Diffusion is the process in which molecules of a substance move from the place of their higher concentration to the place of their lower concentration (no membrane is required). But during osmosis, the solvent (water) molecules move from the place of their higher concentration to the place of their lower concentration through a semi-permeable membrane. Thus, osmosis is termed as a special kind of diffusion.

**d** Fig: "A" mentioned in the stem is osmosis which is very important for plants. This is analyzed below —

- Osmosis helps in absorption of water by plants.
- The turgidity of plant organs is dependent on water which is absorbed due to osmosis.
- Movement of water from one cell to another is due to osmosis.
- The resistance of plants to drought and frost is brought about by osmosis.
- Opening and closing of stomata is brought about by osmosis.
- Expansion of cells is dependent upon turgidity.

**Ques. ► 21**



*[Sylhet Cadet College, Sylhet]*

- What is sphignomanometer? 1
- Why hormonal gland is called endocrine gland? 2
- How B works inside your body? 3
- Circulatory process of C is not important for cellular metabloism give your logic on it. 4

### Answer to the question no. 21

**a** sphygmomanometer is an instrument for measuring blood pressure.

**b** Endocrine glands are glands of the endocrine system that secrete hormones into the blood rather than through a duct. The major glands of the endocrine system include the pituitary gland, pancreas, ovaries, testes, thyroid gland, parathyroid gland, adrenal glands etc. That is why hormonal glands are called endocrine glands.

**c** "B" mentioned in the stem is blood. Functions of blood in inside our body are given below —

**Oxygen transport:** Red blood corpuscles transports oxygen as oxyhaemoglobin to the cells.

**Removal of carbon dioxide:** Due to the chemical reaction in the tissue, carbon dioxide is produced. Carbon dioxide is transported in the form of sodium bicarbonate dissolved in the plasma. It carries carbon dioxide from the tissue to the lungs which is then expelled during expiration.

**Transportation of digested food:** It provides plasma, glucose, amino acid, and fat granules to the cell.

**Balancing of temperature condition:** Blood helps to maintain uniform body temperature by distributing it throughout the body.

**Elimination of waste products:** Blood carries all the waste products and eliminates (urea, uric acid, and carbon dioxide).

**Prevention of Diseases:** Some types of white blood cells attack and engulf germs by the process of phagocytosis, thus preventing the body from the attack of germs. It increases the resistance power against diseases by producing antibodies and antigens.

**d** "C" mentioned in the stem is the heart. The circulatory process of the heart is most important for cellular metabolism. My logic is given below —

Blood cells are pumped from the right ventricle of the heart to the lungs where they absorb oxygen. The oxygenated blood cells then return to the heart and the heart's left ventricle pumps them out to the body's cells. The oxygen is used for cell respiration and to produce energy for cell growth. In addition to oxygen, cells need nutrients such as sugars, water for staying hydrated and hormones to govern some of their cell processes. The blood system distributes these substances to cells as they are needed. For example, blood absorbs sugars and other nutrients from the digestive system and delivers them to the cells that need them. Water for cells is also absorbed from the digestive system.

**Ques. ► 22** Plants performs a physiological process by which they are releasing water vapor to atmosphere. It occurs only at day time. The rate of this process depends on different surrounding factors. Sometimes this process is harmful to the plant itself.

[Sylhet Cadet College, Sylhet]

- What is respiration? 1
- What will be the measures if crops leaves turn yellow? 2
- What are the environmental factors which influence the above process? 3
- What happen if the above process is stopped? Give your opinion. 4

### Answer to the question no. 22

**a** Respiration is the biochemical process in which the cells of an organism obtain energy by combining oxygen and glucose, resulting in the release of carbon dioxide, water, and ATP.

**b** If crops leaves turn yellow, following measure should follow —

- Adding composted manure to the soil.
- Planting a green manure crop, such as borage.

- Planting nitrogen-fixing plants like peas or beans.
- Adding coffee grounds to the soil.

**c** The process mentioned in the stem is transpiration. The environmental factors that influence transpiration are given below —

**Temperature:** The rate of transpiration fluctuates with the changes of temperature. Water can easily be vapourized at high temperature and thus transpiration is accelerated.

**Relative humidity:** If the relative humidity is high, the air loses its water vapour holding capacity. When the relative humidity is low, the rate of transpiration increases and when high, the rate of transpiration declines.

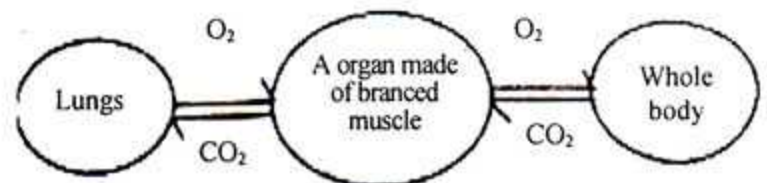
**Light:** In presence of light, stomata open, and so, the rate of transpiration increases. In the dark, the process is ceased because the stomata are closed. Light also affects transpiration by increasing the temperature of the plant.

**Wind:** With the change of wind velocity, the rate of transpiration also changes. If the atmospheric pressure rises, evaporation declines and the rate of transpiration also decreases. Again, at low atmospheric pressure, evaporation increases, and so, the rate of transpiration increases.

**d** What will happen if the transpiration process stops is given below —

Transpiration is important as it regulates the temperature of the leaf to prevent it wilting. It also allows a continuous process to occur; as long as water leaves the plant by transpiration, root hair cells can continue to take up water and mineral ions from the soil, and these can be transported around the plant through xylem vessels. So, if transpiration stops, mineral ions will also stop being transferred, meaning that they do not reach where they need to be. For example, potassium ions are needed by enzymes for photosynthesis, so without these, the plant cannot photosynthesis and produce its food (glucose). Without glucose, it cannot respire and so cannot obtain energy to carry out its functions.

**Ques. ► 23** Observe the process—



[Jhenidah Cadet College, Jhenidah]

- Why is passive absorption? 1
- Why phloem translocation is important? 2
- Discuss about the components of the fluid that carry out the process shown in stem. 3
- For what reasons the organ mentioned in stem stops functioning properly? Explain and mention the remedy. 4

### Answer to the question no. 23

**a** Passive absorption is the process where salt absorption is accomplished through the root hairs of plants with the process of imbibition and osmosis, and no metabolic energy is required for it.

**b** Movement or transportation of water and mineral salts in plants is called translocation in plants. The food produced in the leaf reaches the different regions of a plant through sieve tubes of the phloem tissue. If the flow in the xylem vessels or phloem sieve tubes is blocked, for any reason, the plant would die.

**c** The fluid mentioned above in the stem is blood. The components of blood are discussed below —

Blood is a type of liquid connective tissue. It has mainly two components, Plasma and Blood cells.

**Plasma:** The colourless fluid part of plasma constitutes about 55% volume of whole blood. The main component of plasma is water. A small amount of protein, organic substances and a small portion of inorganic salts are dissolved in it. The substances which are present are as follows— Protein, such as, albumin, globulin, fibrinogen glucose, small droplets of fats, mineral salts, vitamins, hormones, antibodies, waste products such as carbon dioxide, urea, uric acid etc. It also contains a small amount of sodium chloride, sodium bicarbonate and amino acids.

**Blood corpuscles:** Blood is made of three type of cells. They are Red blood corpuscles or erythrocytes, White blood corpuscles or leucocytes and Platelets or thrombocytes.

**Red Blood Corpuscles:** Red blood cells (also called erythrocytes) make up about 40% of the blood's volume. Red blood cells contain hemoglobin, a protein that gives blood its red color and enables it to carry oxygen from the lungs and deliver it to all body tissues. Oxygen is used by cells to produce energy that the body needs, leaving carbon dioxide as a waste product. Red blood cells carry carbon dioxide away from the tissues and back to the lungs.

**White Blood Corpuscles:** White blood cells (also called leukocytes) are fewer in number than red blood cells, with a ratio of about 1 white blood cell to every 600 to 700 red blood cells. White blood cells are responsible primarily for defending the body against infection. There are five main types of white blood cells.

Neutrophils, the most numerous type, help protect the body against infections by killing and ingesting bacteria and fungi and by ingesting foreign debris.

**Lymphocytes consist of three main types:** T cells (T lymphocytes) and natural killer cells, which both help protect against viral infections and can detect and destroy some cancer cells, and B cells (B lymphocytes), which develop into cells that produce antibodies.

Monocytes ingest dead or damaged cells and help defend against many infectious organisms.

Eosinophils kill parasites, destroy cancer cells, and are involved in allergic responses.

Basophils also participate in allergic responses.

White blood cells accomplish this by engulfing and digesting organisms and by producing antibodies that attach to organisms so that they can be more easily destroyed.

**Platelets:** Platelets (also called thrombocytes) are cell-like particles that are smaller than red or white blood cells. Platelets are fewer in number than red blood cells, with a ratio of about 1 platelet to every 20 red blood cells. Platelets help in the clotting process by gathering at a bleeding site and clumping together to form a plug that helps seal the blood vessel. At the same time, they release substances that help promote further clotting.

**d** The mentioned organ in the stem is heart. The reasons for which heart stops functioning properly are explained below —

When blood clots in any part of the heart, that stops blood circulation. This causes the damage of cardiac cells. It results in Myocardial infarction or coronary thrombosis which are commonly known as heart attack. The main causes of this disease are being over weight, uncontrolled proportion of glucose in blood, eating unhealthy diet, such as: oily food, fast food etc. Lack of physical exercise. Depression, emotional strain, anxiety, and sadness increase the risk of this disease at any age.

**Remedy:** To keep free from this disease some rules should be followed, so that blood pressure can be controlled.

- Avoid smoking, do regular exercise like walking.
- Eat sufficient amount of fruits and vegetables.
- Avoid fatty, fried, spicy and fast food.

**Ques. ▶ 24** While Kushum was watering the plants during day her younger sister saw it and asked her whether the plants intake water like them. Kushum replied that the plants absorb water and other substance from the soil first and then giving up of water from the aerial parts as water vapour.

[Barishal Cadet College, Barishal]

- a. What is osmosis process? 1
- b. Write down the difference between diffusion and transpiration. 2
- c. Draw labeled diagram of the organ through which water goes out as vapour. 3
- d. The later process affects the plants life in what ways? Analyze it. 4

**Answer to the question no. 24**

**a** Osmosis is the scientific process of transferring fluid between molecules.

**b** Diffusion is a process by which molecules move down their concentration gradient. The process does not require any membrane. On the other hand, Transpiration is the process of water movement through a plant and its evaporation from aerial parts, such as leaves, stems, and flower.

**c** The organ mentioned in the stem is root. A labeled diagram of the root is drawn below —

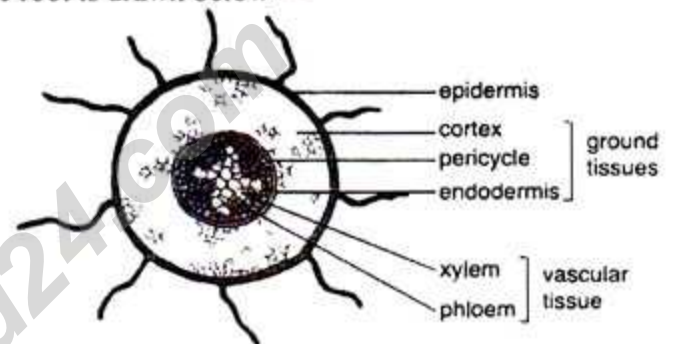


Fig: Root

**d** The later process mentioned in the stem is transpiration which affects the plant life some ways. This is analyzed below —

Though transpiration contributes many uses to a plant. it also plays some harmful roles. For instance, if the rate of loss of water is greater than the rate of its absorption, this will cause a deficiency of water and minerals in the plant. As a result, the plant may die. If water is deficient in the soil, absorption will be very little, though transpiration will continue as before. To deal with this, nature causes many plants to shed leaves in winter. Because of the lacking of transpiration, the required diffusion pressure deficit will not develop and as a result, the rate of osmosis will be slow. So, it can be said that transpiration is an essential activity for a plant though it causes some harms to it. For the contrary character, the scientist Curtis designated the process transpiration as a 'necessary evil'.

**Ques. ▶ 25**

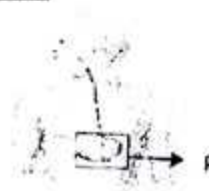


Figure-M



Figure-N (Red coloured)

[Barishal Cadet College, Barishal]

- a. What is feromen? 1
- b. Why fungi are dependent on other for food? Explain. 2
- c. P-marked organ of Figure-M formed of which muscle? Explain. 3
- d. Figure-N is essential substance for human body — analyze it. 4

**Answer to the question no. 25**

**a** Feromons are chemical signals released by an organism that influence the behavior of another.

**b** Fungi which are not green plants because they do not contain chlorophyll, cannot make their own food and so they depends on other things. Most fungi feed on the remains of dead plants and animals. Their mode nutrition is mainly absorption.

**c** P-marked organ of figure-M is stomach which is made of involuntary muscles. This is explained below —

The contraction and expansion of involuntary muscle tissue does not depend on the will of the animal. This muscle tissue is spindle-shaped and faintly branched. Transverse striations are not present. That is why this muscle is called unmarked smooth muscle. Involuntary muscles are found on the walls of blood vessels, alimentary canal, etc. of vertebrate animals. Involuntary muscles mainly take part in the internal circulation of body.

**d** Fig- N mentioned in the stem is blood which is an essential substance for human body. This is analyzed below —

It is a specialized bodily fluid that supplies essential substances around the body, such as sugars, oxygen, and hormones. Blood is composed of the following living cells which support and maintain our body tissues: Red blood cells, which are filled with hemoglobin and carry oxygen from our lungs to the rest of our bodies. White blood cells, which defend against infection. Platelets, which help blood to clot when injuries occur. It also removes waste from the cells in the body. Heat is produced in the body tissues, especially in the muscles and liver. As a result, the temperature varies in different organs but blood helps maintaining uniform body temperature by distributing it throughout the body. Hormone is a biochemical substance which is produced in ductless glands. It mixes with the blood directly and is circulated to the different organs of the body. It helps in different important biological processes.

**Ques. ▶ 26**



fig-X

[RAJUK Uttara Model College, Dhaka]

- What is imbibition? 1
- Why transpiration is considered as a necessary evil? 2
- Explain the differences among the cells in fig-X. 3
- The cells in the fig-X play important role in our body- Analyze. 4

**Answer to the question no. 26**

**a** Imbibition is the process of absorption of water by substances without forming a solution.

**b** Since water is one of the most important compounds needed for various important life processes, a loss of water by transpiration is obviously harmful. This harmful effect becomes dangerous when excessive transpiration leads to the wilting of the plants. Besides wilting, other harmful effects of excessive transpiration include inhibition of protein synthesis and breakdown of proteins and retardation of metabolic processes like photosynthesis. This is the reason why transpiration is often called as a necessary evil.

**c** Fig- "X" is the figure of blood cells. They are red blood cells, white blood cells and platelets. The differences between the blood cells are given below —

Feature	Red Blood Cells	White Blood Cells	Platelets
Name	Erythrocytes	Leucocytes	Thrombocytes
Color	Red	Colorless	Colorless
Formation	Liver and spleen (embryonic life), red bone marrow of sternum, ribs, vertebrae (adult life)	Redbone marrow and lymphatic system	Red bone marrow
Size	6-8 μm	Larger than Red Blood Cells, 12 to 15 μm	Smaller than Red Blood Cells
Shape	Biconcave	Different	Plate-like
Number per mm <sup>3</sup> of Blood	5-5.5 million (male), 4-4.5 million (female)	7000-8000	250,000
Structure	Elastic cell membrane, no nucleus	Have Nucleus	No nucleus, membrane-bounded, Cytoplasmic fragments of cells
Life Span	4 months (120 days)	Variable	The average life span of circulating platelets is 8 to 9 days. Transfused platelets have 3-4 days of life span.
Function	Transport of Gases	Immunity	Blood Clotting

**d** Fig- "X" is the figure of blood cells. They are red blood cells, white blood cells and platelets. Their roles in our body are analyzed below —

**Oxygen transport:** Red blood corpuscles transports oxygen as oxyhaemoglobin to the cells.

**Removal of carbon dioxide:** Due to the chemical reaction in the tissue, carbon dioxide is produced. Carbon dioxide is transported in the form of sodium bicarbonate dissolved in the plasma. It carries carbon dioxide from the tissue to the lungs which is then expelled during expiration.

**Transportation of digested food:** It provides plasma, glucose, amino acid, and fat granules to the cell.

**Balancing of temperature condition:** Heat is produced in the body tissues, especially in the muscles and liver. As a result, the temperature varies in different organs but blood helps to maintain uniform body temperature by distributing it throughout the body.

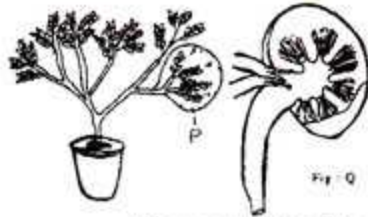
**Elimination of waste products:** Blood carries all the waste products and eliminates (urea, uric acid and carbon dioxide).

**Hormone transport:** Hormone is a biochemical substance which is produced in ductless glands. It mixes with the blood directly and is circulated to the different organs of the body. It helps in different important biological processes.

**Prevention of Diseases:** Some types of white blood cells attack and engulf germs by the process of phagocytosis, thus preventing the body from the attack of germs. It increases the resistance power against diseases by producing antibodies and antigens.

**Blood clotting:** If there is a wound at any part of the body, the clotting of blood heals the wound, preventing excess loss of blood.

**Ques. ▶ 27**



[Viqarunnisa Noon School and College, Dhaka]

- What is blood — pressure? 1
- What is meant by phototropism? 2
- Describe the structure of 'Q' of the stem. 3
- Analyze the importance of the process 'P' for releasing outside of excess water of plant body. 4

**Answer to the question no. 27**

**a** Blood pressure is the pressure of blood on the walls of arteries as heart pumps blood around the body.

**b** Phototropism is the ability of a plant's stem to grow towards light source. The stem and branches of a plant always move towards light and the root always moves away of light. The movement of stem towards light is called positive phototropism and the movement of root away of light is called negative phototropism.

**c** The "Q" of the stem represents a human kidney which is an active organ in urinary excretion system.

Two kidneys lie at the back of the abdominal cavity, on either side of the vertebral column and lower part of the ribcage attached to the back wall. They are red brown and bean shaped. The outer side of the kidney is convex and inner side is concave having an indentation called hilus. The chamber in the hilus is pelvis. There are two ureter (urinary duct) one arising from the pelvis of each kidney and proceeding downwards to open into the urinary bladder. From the hilus the renal vein comes out and renal artery enters the kidney. Pelvis is the enlarged funnel shaped part of the ureter.

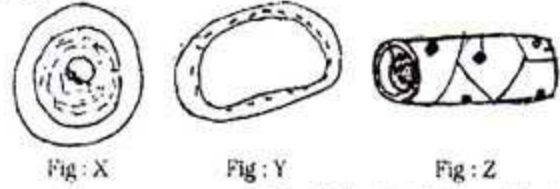
Each kidney is enclosed by one type of fibrous membrane. This is capsule. In longitudinal section of each kidney shows two regions. The outer one is cortex and part is inner medulla. The regions are composed of connective tissues and blood vessels. Generally, there are 8 – 12 renal pyramids in the medulla. The apex of each pyramid is called papilla. This papilla projects directly into the ureter. Each kidney contains a particular type of tubules, these are uriniferous tubules. Each uriniferous could has two parts, such as— nephron and collecting tubule.

**d** Process "P" of the stem denotes the transpiration process where excess water is removed from plant body.

This process is very important for a plant to live. For example

- Due to transpiration, capillary action and root pressure cause the cell sap to reach the leaves of plants. In this way water reaches leaves, food is produced there. If it doesn't reach the leaf, then photosynthesis will not occur.
- Reactions occur simultaneously in active cells due to which water is needed. Due to transpiration water reaches to all the cells properly.
- Transpiration saves the leaf from extreme heat and controls the temperature.
- Transpiration helps indirectly to take food to every cell. In this way, translocation plays an important role in plants' life. So, it can be said that translocation is really important for a plant to live.
- This process maintains water balance, uptake of minerals with water due to diffusion pressure deficit created by transpiration force, removing excess water from plant body.
- Excessive transpiration may lead to dehydration and nutrition depletion in plants.

**Ques. ▶ 28**



[Ideal School & College, Motijheel, Dhaka]

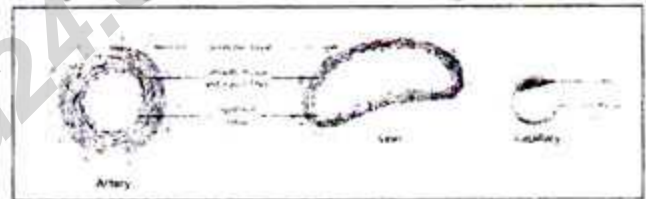
- What is called sphygmomanometer? 1
- What do you mean by ideal blood pressure? 2
- Introduce the above mentioned figures X, Y and Z. Then draw and label them. 3
- Find out the differences between the two above mentioned figures 'X' and 'Y' in all aspects. 4

**Answer to the question no. 28**

**a** Sphygmomanometer is the instrument used to measure the blood pressure of a person.

**b** According to the physician a normal adult man's blood pressure is generally near about 120/80. This indicates two digits. That indicates two ranges one for higher and the next one for lower. The blood pressure in the arteries is the highest during systolic blood pressure ranging from 120 or slightly less than that. The blood pressure in the arteries decreases during diastole. This is diastolic blood pressure ranging from 80 or slightly less than that. In between the time of two heartbeats this pressure is created. This is called ideal blood pressure.

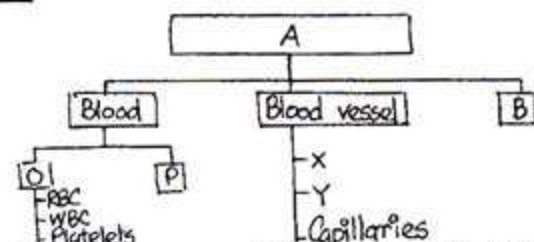
**c** The figures X, Y and Z are artery, vein and capillary respectively. They are drawn with labeling below:



**d** The figure X is that of artery and B is that of vein. Comparison between artery and vein is given below:

Artery	Vein
i. the place of origin is heart.	i. The place of origin is capillaries.
ii. Direction of blood flow is from heart to different parts of body.	ii. Direction of blood flow is from different parts of body to heart.
iii. The color of blood is fresh red due to having much oxygen.	iii. The color of blood is darkish red or blue due to having much carbon-di-oxide.
iv. Pulse exists.	iv. There is no pulse.
v. Walls are elastic and thick.	v. Walls are thin.
vi. There is no valve	vi. Valves are present.
vii. Amount of O <sub>2</sub> is much in the blood.	vii. Amount of CO <sub>2</sub> is much in the blood.
viii. Blood pressure is high.	viii. Blood pressure is low.
ix. Position is little inside from body skin.	ix. Located below the body skin.
x. It ends in capillary.	x. It ends in heart.

**Ques. ▶ 29**



[Dhaka Residential Model College, Dhaka]

- What is taxonomic rank?

- b. Write down the function of P. 2  
 c. Distinguished between X and Y of the above stem. 3  
 d. Explain the above 'B' works like a pumping machine in human. 4

**Answer to the question no. 29**

**a** In biological classification, taxonomic rank is the relative level of a group of organisms (a taxon) in a taxonomic hierarchy. Examples of taxonomic ranks are species, genus, family, order, class, phylum, kingdom.

**b** "P" of the stem is called blood plasma. Plasma contains proteins that help blood to clot, transport substances through the blood, contains glucose, and dissolved nutrients.

**c** "X" and "Y" of the stem are artery and vein, respectively.  
 - arteries originate from the heart whereas veins originate from capillaries  
 - artery carries away blood from the heart to different parts of the body. On the other hand, vein carry blood from the various organs of the body toward the heart  
 - artery carries oxygenated blood, but vein carries deoxygenated or carbon dioxide enriched blood  
 - walls of arteries are thick, whereas walls of veins are thin

**d** "B" of the stem represents human heart. It works as a pumping machine because it pumps blood throughout the body.

A pumping mechanism is performing spontaneously by the help of heart this is explained below—

The heart works like a pump and beats 1000, 000 times a day. The heart has two sides, separated by an inner wall called the septum. The right side of the heart pumps blood to the lungs to pick up oxygen. The left side of the heart receives the oxygen-rich blood from the lungs and pumps it to the body. The contraction of heart muscles allows it to work like a pumping machine.

**Ques. ► 30** Blood is a fluidal connective tissue which is originated from embryonic mesoderm. Human embryo is developed in the womb of a female. The developing embryo is attached with mother with a particular disc like organ.

[St. Joseph Higher Secondary School, Dhaka]

- a. What is lymph? 1  
 b. What are the characteristics of Diatom? 2  
 c. Explain the role of the stem indicated organ. 3  
 d. Analyze how the stem mentioned connected tissue will circulated within body. 4

**Answer to the question no. 30**

**a** Lymph is of mildly alkaline and transparent yellow colored fluid stored in the spaces between different tissues and is collected through some channels.

**b** Diatom is a member of the Kingdom Protista. They are unicellular or multicellular, individual or colonial or filamentous and the nuclei in their cells are well structured. Their cells contain nuclear materials bounded by a nuclear membrane. In chromatin material, there are DNA, RNA and protein. All types of cell organelles are there in their cells. Their modes of nutrition are absorption, ingestion or photosynthesis.

**c** The organ mentioned in the stem which connects fetus to its mother is the placenta. The role of the indicated organ is given below:

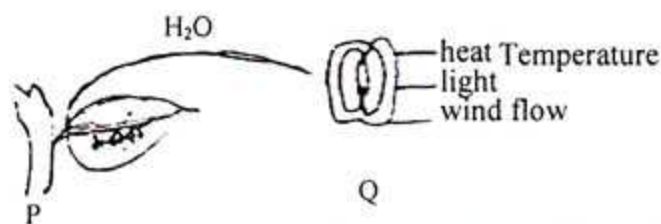
Carbohydrate, (glucose), protein (amino acid), essential minerals, water etc. are transferred from maternal to fetal blood to nourish the developing embryo through the placenta. Placenta acts more or less like a lung. The dissolved oxygen in the blood of the maternal blood diffuses into the fetal blood and exchange carbon dioxide from the fetus to the mother. Placenta also acts as kidney; metabolic waste product is

diffused from the embryonic blood capillaries into the mother's blood stream. In this way the waste products are eliminated. Placenta produces some important hormones. Hormones protect the embryo and helps in normal development. During pregnancy exchange of waste products and essential materials which are exchanged between the mother and fetus through placenta. At the time of pregnancy it secretes some hormones which help to produce milk and easy childbirth.

**d** The stem indicated connective tissue is blood. It circulates within the body in the following way:

Blood circulates within the body through the heart. The continuous contraction and relaxation of the heart transport blood throughout the whole body. Systole: the contraction of heart (ventricle) and the Diastole, the relaxation of heart ventricle. A complete contraction (systole) and relaxation (diastole) of the heart constitutes a heartbeat. Due to the relaxation of atria (auricles) the blood enters the heart coming from different parts of the body. Such as – deoxygenate blood from the superior vena cava enters right atrium. At the same time, the oxygenated blood enters to the left atrium through the pulmonary veins from the lungs. The walls of the two atrium contract and then muscles of the ventricle relax. As a result the tricuspid valve situated between the right Sino auricular ventricular apertures opens. So the deoxygenated blood from the right (auricle) enters into the right ventricle at the same time left Sino auricular ventricular aperture guarded by bicuspid valve opens. Then oxygenated blood from the two ventricles contract together and during this period the left and right auriculo-ventricular apertures are closed by their tricuspid and bicuspid valves. So blood of the ventricle cannot return to the atrium when the two ventricles relax deoxygenated blood, the right ventricle passes through the pulmonary artery towards the lungs. Here blood becomes purified. At the same time oxygenated blood leaves the left ventricle through the aorta towards the body and the opening of both the artery (aorta and pulmonary artery) are closed by semilunar valves which prevent blood returning into the ventricle. Thus successive contraction and relaxation of atrium and ventricle help in continuous transportation of blood.

**Ques. ► 31**



[Adamjee Cantonment Public School, Dhaka]

- a. What is tissue culture? 1  
 b. What is meant by Bio diversity? 2  
 c. Describe the process of carbohydrate, Fig-P in above stem. 3  
 d. Explain with logic that all the mentioned factor in above stem to occur the process in Fig-Q. 4

**Answer to the question no. 31**

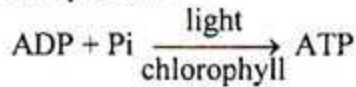
**a** Tissue culture is a method that involves growing and maintaining a particular tissue on a nourishing and sterilized medium under aseptic conditions in the laboratory.

**b** Biodiversity generally refers to the variety and variability of life on Earth. Abbreviated from the terms 'biological' and 'diversity', biodiversity encompasses the variety of life forms found at all scales of biological organisation, ranging from genes to species to ecosystems. It can be said that biodiversity is the abundance and variability among organisms existing on the earth.

**c** The process that is shown in the figure – P is called photosynthesis.

Photosynthesis is a very unique feature to all green plants as food carbohydrate from carbon dioxide and water is produced in this way in presence of sunlight. Photosynthesis is divided into two stages —

**1. Light dependent stage:** With the help of chlorophyll pigment, solar energy is transformed into chemical energy in the form of ATP in this phase and  $\text{NADPH} + \text{H}^+$  is formed along with this reaction. The formation of ATP is known as the photophosphorylation process.



Oxygen, hydrogen and electrons are evolved through the hydrolysis of water with the help of sunlight and chlorophyll. The process is called the photolysis of water.

**2. Light independent phase:** This phase can be carried out with or without the presence of light. Carbon dioxide is fixed and formed into glucose upon reaction with water in two different reaction pathways —

- **$\text{C}_3$  or Calvin Cycle:** The first stable compound of this cycle is a 3-carbon phosphoglyceric acid.
- **$\text{C}_4$  cycle or Hatch-Slack pathway:** the first stable compound is a 4-carbon oxaloacetic acid.  $\text{C}_4$  plants carry out both of the cycles —  $\text{C}_4$  and  $\text{C}_3$ , whereas  $\text{C}_3$  plants carry out only Calvin cycle.

**Q** Figure Q of the stem represents a stomata of plant leaf. The process which occurs in plant stomata is named as transpiration. It is a physiological process by plants in which water in the form of water vapour is lost through the aerial parts of plants.

According to the stem, three factors affect transpiration, and they are heat, light and wind flow. These are external factors.

- **Effect of temperature or heat:** The amount of heat applied is directly proportional to the rate of transpiration. At high temperature, water can easily be vaporized and transpiration is accelerated as well and vice versa.
- **Effect of light:** Light controls the opening and closing of stomata. In presence of light, temperature is increased, leading towards the opening of stomata and transpiration process gets accelerated.

**Effect of wind flow:** Increased movement of the air around a plant will result in a higher transpiration rate. Because of transpiration, air around the plant gets moist, and causes the rate of transpiration slow. When wind removes the saturated air, the rate of transpiration increases. With the wind, the leaves are swung and a kind of pressure is exerted on stomata and, so water vapour at a high rate comes out through them.

**Ques. ▶ 32** Last night Mr. Jamal was feeling severe pain in his mid-chest that gradually spread from the left to all over the chest. He took some antacid but could not get relieved of pain.

[Birshreshtha Noor Mohammad Public College, Dhaka]

- What is blood pressure? 1
- What do you mean by imbibition? 2
- Write the structure of the organ related to disease of Mr Alim? 3
- If necessary measures are not taken being concerned about the causes of the disease, severe accident may happen in Jamal's life — Analyze. 4

#### Answer to the question no. 32

**a** The pressure created by the blood on the arterial wall during its flow is known as the blood pressure.

**b** Imbibition is the process in which dry or half-dry colloidal substances absorb water. The substances such as cellulose, starch, gelatin etc. are hydrophilic. When they come in contact with water, they absorb it, and conversely, they become constricted when they face a deficiency of the liquid. As the cell wall and protoplasm are colloidal in nature, absorbing water they become swelled up. It is a unique process for absorbing water.

**c** The organ related to the disease of Mr. Jamal is the heart. The structure of the heart is given below:

The heart is a triangular shaped, hollow muscular pumping organ. It is situated on the left side in between the two lungs. The heart consists of special involuntary muscles. It surrounded by a thin membrane named pericardium. The heart of the wall consists of three layers, Example- (1) Epicardium (2) Myocardium and (3) Endocardium.

- 1. Epicardium:** Basically it consists of connective tissue. This layer is covered with epithelial tissue. Fat bodies remain scattered on it.
- 2. Myocardium:** This layer is in between epicardium and endocardium. It consists of strong involuntary muscles.
- 3. Endocardium:** It is the innermost layer. The chambers of the heart are surrounded by this the endocardium. This layer also covers the valves. The upper chambers are right and left auricle or atrium and lower chambers are right and left ventricles. The aperture between the two atria (atrium singular) and ventricle are guarded by valves. The right auriculo-ventricular aperture guarded by a tricuspid valve made up of three flaps. Similarly left atrium and ventricle is guarded by a bicuspid value made up of two flaps. The opening of the aorta and the pulmonary artery is guarded by valves called semilunar valves allow the transport of blood in one direction and prevents the backflow of blood.

**d** The disease Mr. Jamal is suffering from is indicating a heart attack. If necessary measures are not taken against it, the following problems may take place:

- Myocardial infarction
- Impaired function of the heart
- Complete heart block
- Death

So, the necessary measures should be taken against this problem:

For life and death role of heart, exact lifestyle and selection of food is necessary to keep the heart healthy. Different kinds of fats or oils obstruct in its task, cholesterol creates an obstacle in blood vessels that is injurious to health. For alcoholism and addiction increase heartbeat than its normal amount. So the addicted person gets mental pleasure and peace for a while, but it causes serious harm to the heart. Poisoning due to smoking and nicotine of tobacco damages not only the other organs but also the heart. One can be sound in body by proper selection of food. Avoiding fatty diet, Such as- oils, fats, excess carbohydrate and taking balanced diet, regular exercise and walking can make a person healthy.

**Ques. ▶ 33** During teaching Blood circulatory system teacher said, it bleeds when blood vessels are damaged due to injury. He also informed there is one traingular organ which, helps us for circulation.

[Bangladesh International School & College, Dhaka]

- What is stone cell? 1
- What is meant by companion cell? 2
- Explain 'The traingular part mentioned in the stem acts as especial type of involuntary muscle'. 3
- Describe how the organ mentioned in the stem saves our life by its performance. 4

#### Answer to the question no. 33

**a** Sclerides are called stone cells because of their hardness. These cells compared with most fibers are shorter, isodametric or sometimes long and starshaped.

**b** **Companion cell** is the cell of phloem fiber It is assumed that the nucleus of a companion cell controls some activities of its neighbouring sieve cell. A companion cell is turgid with protoplasm and thin-walled. They are not found in the phloem of ferns and angiosperms.



**c** The triangular organ is heart and it is formed by cardiac muscle which is a special kind of involuntary muscle. The cells of this muscle tissue are tubular (very similar to those of voluntary muscle), branched and provided with transverse striations. Between the cells of this tissue intercalated disc are present. The contraction and relaxation of this tissue is not dependent on the will of the animal. That is, the structure of heart muscle is like that of voluntary muscle and the function is like that of involuntary muscle.

**d** The mentioned organ is heart. Heart is responsible for circulation of blood in our body system.

Heart is the principal organ of the circulatory system. It helps blood in keeping continuous moving. The human heart is divided into four chambers. In higher animals the chambers are completely separated so oxygenated and deoxygenated blood does not mix. So, it is indeed a significant organ of human body.

**Ques. ▶ 34** The blood cholesterol test report of above 50 aged Mr. Rahim given below :

Sl. No.	Type of cholesterol	Amount
1	LDL	7.53
2	HDL	1.45

[BIAM Model School and College, Dhaka]

- What is phagocytosis? 1
- What is the role of diaphragm? 2
- How does Mr. Rahim can suffer for the result number 1? Explain. 3
- Analyze the effectiveness of result number 2 in Mr. Rahim's body. 4

**Answer to the question no. 34**

**a** The process by which white blood corpuscles destroys the germ is called phagocytosis.

**b** Function of diaphragm is to separate the thoracic cavity from the abdominal cavity. When diaphragm contracts, thoracic cavity moves downwards and the volume of the thoracic cavity increase. When diaphragm expands it moves upward.

**c** Mr. Rahim has high level of low-density cholesterol than optimum level. High level of LDL,

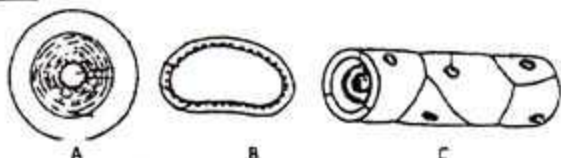
- Increases the risk of heart diseases
- Increases the possibility of having coronary heart diseases.
- Increased amount of cholesterol deposits in the gall bladder as sediments. The sediment of cholesterol forms stones which is familiar as gall bladder stone.

**d** Mr. Rahim has optimum level of HDL in blood. As a result, Cholesterol will,

- Be involved in construction cell membrane and its protection.
- Determine the permeability in blood vessels, allow different substances to enter or resist.
- Produce and reproduce hormones such as, androgen and estrogen.
- Be utilized in producing hormone of adrenal gland and in production of bile.
- Prepare vitamin 'D' in presence of sunlight in skin.

Again, Cholesterol is essential for the metabolism of fat-soluble vitamins, such as- vitamin A, D, E and K. For the activity of neurons cholesterol is essential.

**Ques. ▶ 35**



[Rajshahi Cantonment Public School and College, Rajshahi]

- Why callus is being formed for IAA? 1
- What is the advantage of close circulatory system? 2
- Why A is different from B? Explain it. 3
- Analyze the role of A, B and C in blood circulation through body. 4

**Answer to the question no. 35**

**a** Callus is being formed in IAA medium for the development of cultured tissue.

**b** The advantages of circulatory system are, (1) can reaches to different organs directly, (2) can control the flow of blood to a particular organ by changing its diameter and the distribution can be adjusted depending on demand, (3) blood goes round the whole body and returns to the heart fast.

**c** 'A' and 'B' represents artery and vein respectively Difference between artery and vein is given below —

Feature	Artery	Vein
Definition	The blood vessels, which carry oxygenated blood away from the heart to different organs of the body, are called arteries.	The blood vessels which carry blood from the various organs of the body towards the heart are called veins.
Walls	The walls of the arteries are elastic and thick.	Veins are thin walled, less elastic and with less muscles.
Valves	The arteries do not have any values.	The veins have valves
Lumen	The arteries have narrow passage or lumen.	The veins have wider passage or lumen.

**d** Artery (A), Vein (B), Capillaries (C) play significant roles in blood circulation.

**Role of artery:** Blood vessels of artery carry oxygenated blood away from the heart to different organs of the body. When the heart contracts the blood transports through the arteries and arteriole (small arteries) it proceeds like wave. Pulmonary artery carries deoxygenated blood from heart to the lungs.

**Role of vein:** The vein vessels carry deoxygenated blood from the various organs of the body towards the heart. Pulmonary veins carry oxygenated blood from lungs to the heart.

**Role of capillaries:** Blood capillaries connect with the smallest artery in one side and vein on the other side. All arteries are divided into secondary and lateral branches and form a fine network.

**Ques. ▶ 36**



[Millemium Scholastic School & College, Bogura]

- Define kinetochores. 1
- Why amitosis is called direct cell division? 2
- Explain the activities of "A" part according to above stem. 3
- Actually the activities of "A" & "B" are completely different-Explain. 4

**Answer to the question no. 36**

**a** Kinetochores are protein structures assembled on centromeres that link the chromosomes with mitotic spindles.

**b** Amitosis is called direct type of cell division because during amitosis type of cell division, the nucleus of a cell divides directly into two parts. By this time the cell wall of the cell pinching inward divides the cytoplasm of it into two parts and, ultimately, two daughter cells are produced.

**c** Absorption of capillary water takes place by the part 'A' or plant root hair from the soil. A diffusion pressure deficit in the cell of a leaf is developed because of transpiration, and then water from the adjacent cell moves towards the cell. In the same way diffusion pressure deficit is developed in the second cell and water is moved to it from the adjacent cell. This way a continuous diffusion pressure deficit is extended up to root hair and a suction force is developed. Because of this suction force, capillary water continues to enter the cell root hair. Water enters into the root hair cell through the process of osmosis and diffusion.

**d** Part 'A' and part 'B' represent root hair and root. Both are involved in the absorption process but their roles are different. Absorption of water takes place in plants by their root hair. A diffusion pressure deficit in the cell of a leaf is developed because of transpiration, and then water from the adjacent cell moves towards the cell. This way a continuous diffusion pressure deficit is extended up to root hair and a suction force is developed. Because of this suction force, capillary water continues to enter the cell root hair. Water enters through the process of osmosis and diffusion. But, Absorption of mineral salts takes place mainly by the meristematic region of the tip of the root. Mineral salts are abundant in the form of ions. Absorption of salts is done mainly by the two ways and they are passive absorption and active absorption.

**Ques. ▶ 37** Observe the figure and answer the following questions.



[BIAM Laboratory School and College, Bogura]

- What is stroke? 1
- Why the pituitary gland is called main Hormone producing gland? 2
- Discuss the circulation of blood in 'A' and 'B' part. 3
- Describe the function of different valves in the mentioned organ above. 4

**Answer to the question no. 37**

**a** A stroke occurs when the blood supply to the brain is interrupted or reduced. This deprives the brain of oxygen and nutrients, which can cause the brain cells to die.

**b** The pituitary gland is the main hormone-producing gland. Despite being small in size, the pituitary gland secretes several hormones which help in the growth and regulation of the functions of reproductive organs, breast milk secretion, contraction of the uterus etc. Some of these pituitary hormones have an influence on other endocrine glands. It is also called the master gland.

**c** In the figure of the stem, a heart's diagram is represented, where 'A' labeled part is the left atrium and 'B' labeled part is the left ventricle.

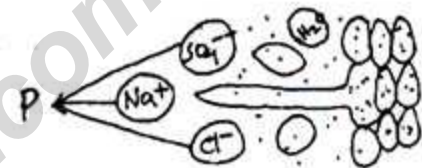
Oxygen-poor blood from the superior and inferior vena cava fills the heart's right atrium. The atrium contracts (atrial systole) and blood enters the right ventricle. Blood travels through the pulmonary arteries to the lungs to pick up oxygen. Oxygen-rich blood returns from the lungs to the heart's left atrium through the pulmonary veins. As soon as heart's left atrium fills with blood, it contracts. This event is called atrial systole. As the left ventricle fills with blood, it contracts. This event is called ventricular systole. The aortic valve located between the left ventricle and aorta opens and closes quickly. This allows blood to flow into the aorta. The aorta is the main artery that carries blood from the heart to the rest of the body. And through small arteries and arterioles, oxygen-rich blood is ensured to each cell of human body.

**d** The heart consists of valves in the endocardium layer respectively.

The chambers of the heart are surrounded by endocardium. This layer also covers the valves. The upper chambers are right and left atrium and lower chambers are right and left ventricles. Unidirectional valves guard the aperture between the two atria and ventricles. The right atriculo-ventricular aperture is guarded by a tricuspid valve made up of three flaps. Similarly, the left aperture is guarded by a bicuspid valve made up of two flaps. The opening of the aorta and the pulmonary artery is guarded by valves named semilunar valves, which allow the transport of blood in one direction and prevents the backflow of blood.

The walls of the two atrium contract and then muscles of the ventricle relax. As a result, the tricuspid valve situated between the right sino-auricular ventricular apertures opens. Oxygenated blood from the two ventricles contracts together and during this period the left and right auriculo-ventricular apertures are closed by their tricuspid and bicuspid valves. At the same time oxygenated blood leaves the left ventricle through the aorta towards the body and the opening of both the arteries are closed by semilunar valves which prevent blood returning to the ventricle.

**Ques. ▶ 38**



[Sirajganj Collectorate School and College, Sirajganj]

- What is phytohormone? 1
- Why meiosis is called the reductional division? 2
- How does the 'P' marked elements of the mentioned stem reach to leaf from soil in plant? Explain. 3
- The process mentioned in the above stem is necessary for plants-analyze. 4

**Answer to the question no. 38**

**a** The chemical substance, being produced in cells and being translocated to other distant cells, controls their activities and this substance is called phytohormone.

**b** In this special process of cell division, four daughter cells are produced from a eukaryotic cell. Nucleus divides twice and chromosome divides once in this process, and number of chromosomes becomes half in the daughter cells than that of the mother cell. As the number of chromosome decreases by half, the process of cell division is called the reductional division.

**c** The "P" elements mentioned in the stem are mineral salts. Mineral salts are taken up by plant in the form of ions along with water. Osmosis, diffusion and the driving force of transpiration etc. play important roles in the uptake and transportation of minerals. Water and minerals absorbed by the root hair enter into the adjacent cell via osmosis. The driving force of transpiration maintains the flow of water and minerals from cell to cell. In this way, vascular tissues of root and stem allow minerals and water to enter into the mesophyll tissue of plant leaves.

**d** In the stem, mineral absorption process of plant is illustrated.

Absorption of minerals is related to the water absorption process because minerals are taken up in the form of ions dissolved in water. This process is very crucial for the plant. Minerals also serve as nutrients, as they are required for normal and healthy growth of plants. Deficiency of minerals can cause various plant diseases, which might cause plant

deaths in extreme cases. For example, deficiency of phosphorous leads to formation of zones of dead cells in plant leaves, also plant growth is stopped. Deficiency of calcium causes death of apical meristems. Production of chlorophylls is stopped in absence of magnesium, which results in decreased rate of photosynthesis. Besides, the interrelated processes of mineral and water absorption help maintain physiological balance inside plants.

And so, mineral absorption event of the plant is extremely important.

**Ques. ▶ 39** A triangular shaped, hollow organ is present in our body. The organ works by contraction and relaxation. This organ transports red coloured fluid throughout the whole body.

[The Millennium Stars School and College, Rangpur]

- What is diastole? 1
- What do you mean by universal donor? 2
- Draw a labeled diagram of the organ mentioned in the stem. 3
- Analyze the circulatory diagram of the mentioned fluid throughout the whole body according to the information of the stem. 4

**Answer to the question no. 39**

**a Diastole:** Diastole is a state of heart where heart ventricles are relaxed.

**b Universal donor:** People with O are called universal donor because this blood group does not contain any surface antigen on red blood cell. So when this blood group is transfused to any human, the blood group does not trigger any antigen-antibody reaction. As a result, O group blood is safe for any blood group people to accept. That is why people with O blood group is called universal donor.

**c** The description of the stem represents heart.

**Labeled diagram of heart:**

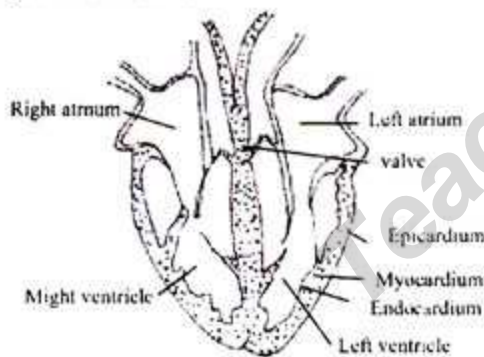


Fig: Labelled diagram of the heart.

**d Analysis of circulatory diagram of heart:**

**Circulation of blood through the heart:** We have learned earlier that heart acts as a pump. The heart works by contraction and relaxation. The continuous contraction and relaxation transport blood throughout the whole body.

**Systole:** the contraction of the heart (ventricle) and the Diastole, the relaxation of the heart ventricle. A complete contraction (systole) and relaxation (diastole) of the heart constitutes a heartbeat. Due to the relaxation of atria (auricles) the blood enters the heart coming from different parts of the body. Such as – deoxygenated blood from the superior vena cava enters right atrium. At the same time, the oxygenated blood enters to the left atrium through the pulmonary veins from the lungs. The walls of the two atrium contract and then muscles of the ventricle relax. As a result, the tricuspid valve situated between the right Sino auricular ventricular apertures opens. So the deoxygenated blood from the right (auricle) enters into the right ventricle at the same time left Sino auricular ventricular aperture guarded by bicuspid valve opens. Then oxygenated blood from the two ventricles contract

together and during this period the left and right auriculoventricular apertures are closed by their tricuspid and bicuspid valves. So the blood of the ventricle cannot return to the atrium when the two ventricles relax deoxygenated blood, the right ventricle passes through the pulmonary artery towards the lungs. Here blood becomes purified. At the same time, oxygenated blood leaves the left ventricle through the aorta towards the body and the opening of both the artery (aorta and pulmonary artery) are closed by semilunar valves which prevents blood returning into the ventricle. Thus successive contraction and relaxation of atrium and ventricle help in continuous transportation of blood.

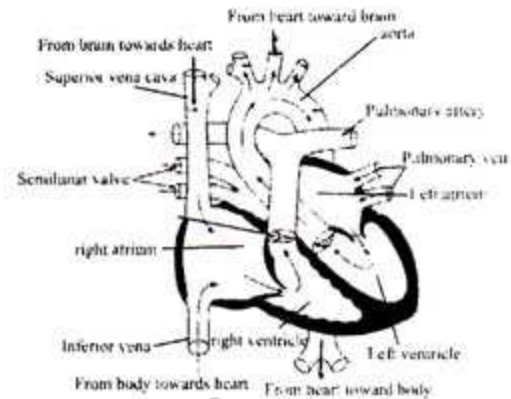


Fig: Blood circulation in the heart.

**Ques. ▶ 40**



Fig-A

[Mainamati International School, Cumilla]

- What is diffusion pressure deficit? 1
- Why transpiration is called necessary evil? 2
- Explain the structure of fig A. 3
- What will happen if inhibition occurs in the circulatory system of fig A-explain with causes. 4

**Answer to the question no. 40**

**a Diffusion Pressure Deficit:** Reduction in the diffusion pressure of water in solution or cell over its pure state due to the presence of solutes in it and forces opposing diffusion is called diffusion pressure deficit.

**b Transpiration is a necessary evil:** Plant absorbs water and mineral salts through its root hairs and the absorbed water and mineral salts are conducted to the leaves. If the force decreases, the absorption of water will be decreased and the metabolic activities along with the production of food will be slothful. In the mesophyll of leaf, diffusion pressure deficit is developed because of transpiration and helps the absorption of water. A plant keeps the temperature in the cells of leaves always in a tolerable state by continuously reducing the thermal energy absorbed by the mesophyll. On the contrary, though this important process transpiration contributes many useful acts to a plant, it also plays some harmful roles in it. For instance, if the rate of the loss of water is greater than the rate of its absorption, it will cause deficiency of water and minerals in the plant. As a result, the plant may die. If water is deficient in soil, absorption will be very little though the transpiration would continue as before. That is why, this process is called a necessary evil.

Figure 'A' represents heart.

**Structure of heart:** The heart is a triangular shaped, hollow muscular pumping organ. It is situated in the left side in between the two lungs. Heart consists of special involuntary muscles. It surrounded by a thin membrane named pericardium. The heart of the wall consists three layers:

**1. Epicardium:** Basically it consists of connective tissue. This layer is covered with epithelial tissue. Fat bodies remain scattered on it.

**2. Myocardium:** This layer is in between epicardium and endocardium. It consists of strong involuntary muscles.

**3. Endocardium :** It is the innermost layer. The chambers of the heart are surrounded by this the endocardium. This layer also covers the valves. The inner part of the heart is hollow and four-chambered. The upper chambers are right and left auricle or atrium and lower chambers are right and left ventricles. The atria are comparatively thin-walled and ventricles wall is muscular and thick. The two atria and ventricles are separated by inter auricular and interventricular septum respectively. The aperture between the two atria (atrium singular) and ventricle are guarded by valves. The right auriculoventricular aperture guarded by a tricuspid valve made up of three flaps. Similarly left atrium and ventricle is guarded by a bicuspid valve made up of two flaps. The opening of the aorta and the pulmonary artery is guarded by valves called semilunar valves allow the transport of blood in one direction and prevents the backflow of blood.

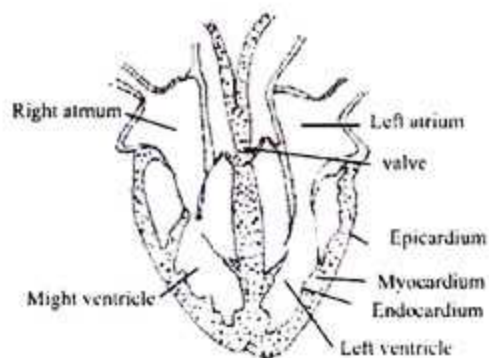


Fig: Structure of heart.

**Result of inhibition in the circulatory system of figure 'A':**

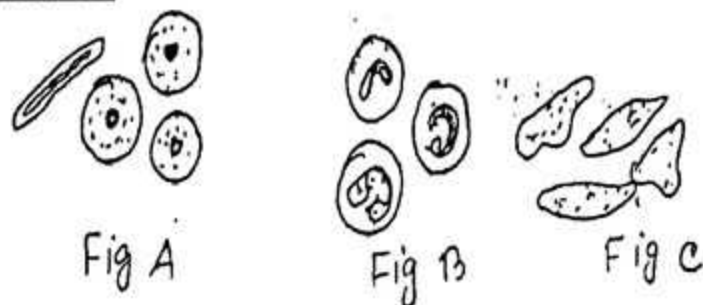
If the circulatory system of heart occurs, the patient is likely to get a heart attack. When blood clots at any parts of the heart that stops the blood circulation or is obstructed. That causes the damage of cardiac cells or cardiac muscles. It results in myocardium infarction or coronary thrombosis disease.

There are mainly three blood vessels of the heart itself to carry out its activity properly and to gain the strength of the muscles. These are called coronary artery. Sometimes there is deposition of lipid that forms a blockage in the wall of these arteries which creates an obstacle in the flow of blood stream. So it causes life-threatening heart disease. Nowadays not 40-60 years old persons are attacked with heart disease but also in many cases 18 years old young men are attacked with this disease.

**Reasons:** The main causes of this disease are overweight, taking of an unhealthy diet, example:- oil enriched food (Biriani, Tehari etc.) fast food. (Berger, Beef or chicken patties etc.) leading lazy life, lack of physical exercise causes this disease. After all depression, emotional strain, anxiety, sadness increase the risk of this disease of any age.

**Symptoms:** Symptoms of heart attack are feeling severe chest pain, particularly pain in mid-chest that does not decrease by taking antacid. The pain spreads from the left side to all over chest. Pain also spreads towards neck and left hand. The patient complains that he or she feels pressure on the chest and sweats.

Ques. ▶ 41



[Memon Grammar School, Chattogram]

- How many types of blood cells are present in blood? 1
- Mention some advantages of blood circulatory system. 2
- Describe the structure of the blood cells known in figure. 3
- Describe the work of blood cells in human body. 4

**Answer to the question no. 41**

**a** Three types of blood cells are present in blood- the red blood cells, white blood cells and platelets.

**b** The advantages of blood circulatory system are (1) Blood reaches to different organs directly, (2) can control the flow of blood to a particular organ by changing its diameter and the distribution can be adjusted depending on demand (3) blood goes around the whole body and returns to the heart fast

**c** The cells shown in the figure are red blood cells (A), white blood cells (B) and platelets (C). Their structures are as follows:

**(i) Red blood corpuscles or erythrocytes:** Red blood corpuscle is non-nucleated, appears mostly like a circle and biconcave discs. Hemoglobin of red blood corpuscles transports oxygen as oxyhemoglobin and also carbon dioxide.

**(ii) White blood corpuscles:** It is irregular in shape and less fewer in number than red blood corpuscles. White blood corpuscle is produced in red bone marrow and lymphatic glands. It is colorless but contains a nucleus. White blood corpuscles can change its shape and can move from one place to another.

**(iii) Platelets:** Platelets are small in size, colorless and spindle shaped. They remain in cluster. It helps in coagulation or blood clotting. It originates in the bone marrow.

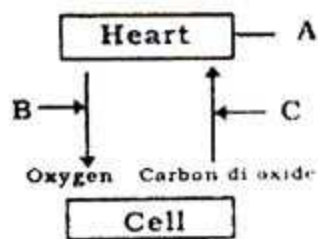
**d** The cells shown in the figure are red blood cells (A), white blood cells (B) and platelets (C). Their activities are as follows:

**(i) Red blood corpuscles or erythrocytes:** Among the three blood cells the red blood corpuscles are huge in number and play an important role for the transportation of oxygen required for respiration. Hemoglobin of red blood corpuscles transports oxygen as oxyhemoglobin and also carbon dioxide

**(ii) White blood corpuscles:** White blood corpuscle engulfs the germs by spreading pseudopodia. This process is named phagocytes. The dead white blood corpuscles turn into pus. If the white blood corpuscles in blood increase excessively, leukemia occurs. White blood corpuscles act as a guard destroys the germ by the process of phagocytosis and produces antibody.

**(iii) Platelets:** Platelet helps in coagulation or blood clotting. When blood vessels are damaged, immediately chemical substance thromboplastin is released by the platelets. It helps in blood clotting. If blood does not contain the right amount of platelets, blood does not clot easily. This may lead the patient to a life threatening situation.

**Ques. ▶ 42** See the picture given below and answer the following questions :



[Bangladesh Elementary School, Chattogram]

- What is WBC? 1
- Why we should know our blood group? 2
- Describe the structure of A. 3
- What are the roles of B and C in human blood circulation? Analyze. 4

**Answer to the question no. 42**

**a** WBC stands for White Blood Cell. WBCs' are one type of blood cells which originates from the bone marrow, circulates in blood and fights against pathogens.

**b** The importance of knowing our blood type is to prevent the risk of us receiving an incompatible blood type at a time of need, such as during a blood transfusion or during surgery. If two different blood types are mixed, it can lead to a clumping of blood cells that can be potentially fatal.

**c** The heart is a triangular shaped, hollow muscular pumping organ. It is situated on the left side, in between the two lungs. The heart consists of special involuntary cardiac muscles. It surrounded by a thin membrane named pericardium. The heart of the wall consists of three layers (1) Epicardium, (2) Myocardium and (3) Endocardium.

- Epicardium:** This layer is covered with epithelial tissue. Fat bodies remain scattered on it.
- Myocardium:** This layer is in between epicardium and endocardium. It consists of strong involuntary muscles.
- Endocardium:** It is the innermost layer. The chambers of the heart are surrounded by this. This layer also covers the valves. The inner part of the heart is hollow and chambered in four separate parts. The upper chambers are right and left atrium and lower chambers are right and left ventricles. The atria are comparatively thin walled while ventricular walls are muscular and thick. The atria and ventricles are separated by inter atricular and inter-ventricular septum, respectively. Unidirectional valves guard the aperture between the two atria and ventricles. The right atrio-ventricular aperture is guarded by a tricuspid valve made up of three flaps. Similarly, the left aperture is guarded by a bicuspid valve made up of two flaps. The opening of the aorta and the pulmonary artery is guarded by valves named semilunar valves, which allow the transport of blood in one direction and prevents the backflow of blood.

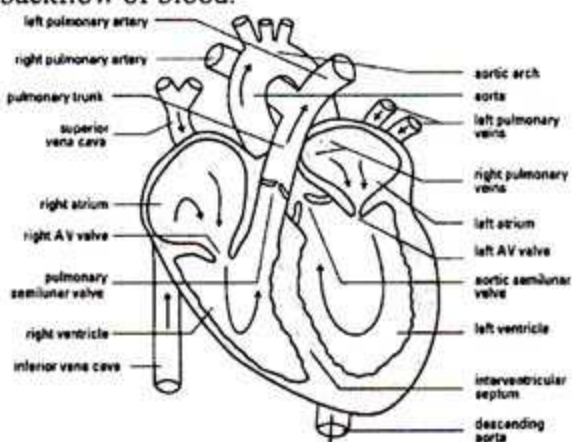


Fig: A cross-sectional diagram of the human heart

**d** "B" and "C" of the stem represents artery and vein, respectively.

Artery and vein, both are types of the blood vessel. Artery carries oxygenated blood from the heart to the cells of the body. On the contrary, vein carries carbon dioxide rich blood from cells to the heart. But the pulmonary vein and pulmonary artery are an exception. Pulmonary artery carries carbon dioxide rich blood from the heart to the lungs, whereas the pulmonary vein carries oxygenated blood from the lungs to the heart.

**Ques. ▶ 43** Prakash's mother put some dried chick pea in water to prepare food for Iftar. At afternoon he saw that the peas been extended in size. Prakash asked his mother about it and his mother told him about water absorption of plants. At that time he remembered the experiment done in the class about it using dired grapes. [Bangladesh Elementary School, Chattogram]

- What is Commensalism? 1
- Why do you mean by excretory products? Explain. 2
- Explain why the size of peas put by Prakash's mother expanded. 3
- The process that occur for chick peas is an essential process for the survival of plants. Analyze the statement. 4

**Answer to the question no. 43**

**a** Commensalism is an association between two organisms in which one benefits and the other derives neither benefit nor harm.

**b** Excretory products mean nitrogenous wastes that are excreted from the body. These are basically urea, uric acid, creatinine etc.

**c** The peas swelled up due to osmosis process. When two solutions of different concentration having the same solute and solvent are separated with a selectively permeable membrane, the solvent flows from its higher concentration to its lower concentration. Movement of solvent through a selectively permeable membrane from its higher concentration to its lower concentration is called osmosis. Dried peas lack water in them, and so the concentration in dry pea cells is higher. For this reason, an osmotic pressure is developed and it allows water to pass into the pea and pea swells up.

**d** Plants by their roots, generally, absorb capillary water from the soil. The diffusion pressure deficit in a cell of a leaf is developed because of transpiration, and then water from the adjacent cell moves towards the cell. In the same way diffusion pressure deficit is developed in the second cell and water is moved to it from the adjacent cell. This way a continuous diffusion pressure deficit is extended up to root hair and a suction force is developed. Because of this suction force, capillary water continues to enter the cell root hair. Water enters the root hair cell through the process of osmosis and diffusion. Through this way, water taken up into the root hairs moves through the cortex tissue. This way of movement of water is called cell-to-cell osmosis. Then water moves from the cortex tissue to the endodermis, the pericycle, and finally into the vascular bundles. Water having once entered into the vascular bundles, it continues to be taken up and flowed laterally through xylem tissue. The water flowing through different branches of plant, ultimately, reaches the leaves and this is accomplished by the active involvement of the two processes named osmosis and transpiration. In this way, nutrients are also absorbed with water.

So, the process mentioned in the stem is an essential process for the surviving of plants.