6 TRANSPORTATION IN ANIMALS AND PLANTS

INTRODUCTION

Food, water and oxygen are required by organisms for their survival. These materials are required for carrying out various life processes. Even those materials which are produced in one part of the body must reach the other parts where they are needed. Further, wastes produced within the body need to be carried to parts or organs from where they can be removed. Methods of transporting materials within the body are thus essential and is called **transportation**.

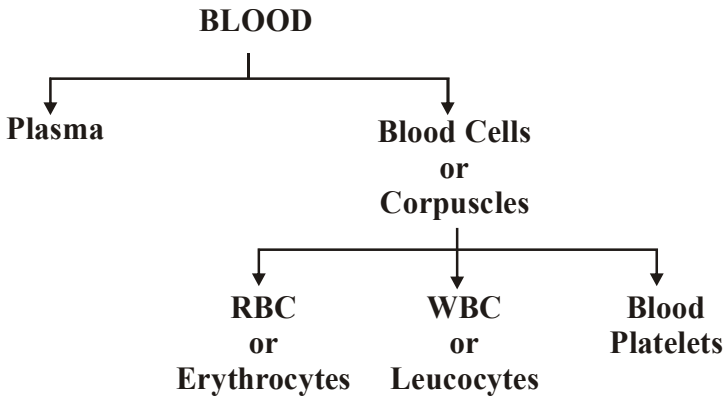
In single-celled organisms like *Amoeba*, *Paramecium*, bacteria, *Chlamydomonas* and simple multicellular organisms like *Hydra* and *Spirogyra*, materials move by **diffusion**. Diffusion is a slow process and cannot transport materials in more complex organisms like humans or trees. A faster process is required in these organisms.

In animals, the transport system is called the **circulatory system**. In the case of plants, there is a system of pipe-like channels called **conducting tissues** or **vascular tissues** to transport water, minerals and food materials within the plant bady.

CIRCULATORY SYSTEM OF HUMAN BEING

- Circulatory system consists of blood, blood vessels and heart.

BLOOD : Blood has following components -



- Blood is a liquid, which has cells of various kinds suspended in it. The fluid part of the blood is called **plasma**.
- One type of cells are the **red blood cells** (RBC) which contain a red pigment called **haemoglobin**. Haemoglobin binds with oxygen and transports it to all the parts of the body and ultimately to all the cells. It will be difficult to provide oxygen efficiently to all the cells of the body without haemoglobin. The presence of haemoglobin makes blood appear red.
- The blood also has **white blood cells** (WBC) which fights against germs that may enter our body. Another type of cells in the blood are called as **platelets**, which helps in the clotting of blood.

Function of Blood

- Blood is the fluid connective tissue, which flows in blood vessels.
- It transports substances like digested food from the small intestine to the other parts of the body.
- It carries oxygen from the lungs to the cells of the body.
- It also transports waste for removal from the body.
- It maintains equal temperature throughout of the body.

BLOOD VESSELS

In body three types of blood vessels are present. These are **arteries, veins and capillaries.**

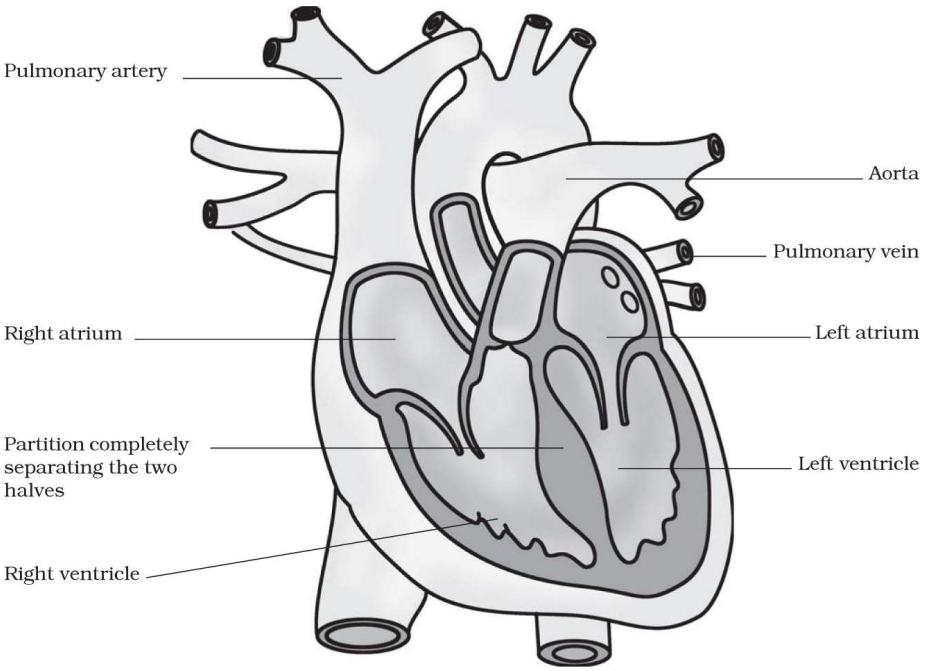
- **Arteries** carry oxygen-rich blood from the heart to all parts of the body except pulmonary artery. Since the blood flow is rapid and at a high pressure, the arteries have thick, elastic walls.
- **Veins** are the vessels, which carry carbon dioxide rich blood from all parts of the body back to the heart except pulmonary vein. The veins have thin walls.
- There are valves present in veins which allow blood to flow only towards the heart or prevent backward flow of blood.
- The arteries divide into smaller vessels. On reaching the tissues, they divide further into extremely thin tubes called **capillaries**. The capillaries join up to form veins, which empty into the heart.

HEART

Heart in Different Organisms

- The heart of different organisms have different chambers like:
- Two chamber - In fishes
- Three chamber - In Amphibians & reptiles eg. Frog
- Incomplete four chamber - Eg. Crocodile
- Complete four chamber - In Birds & Mammals

Structure of The Human Heart



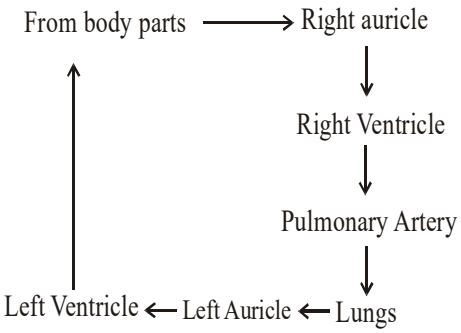
Sections of human heart

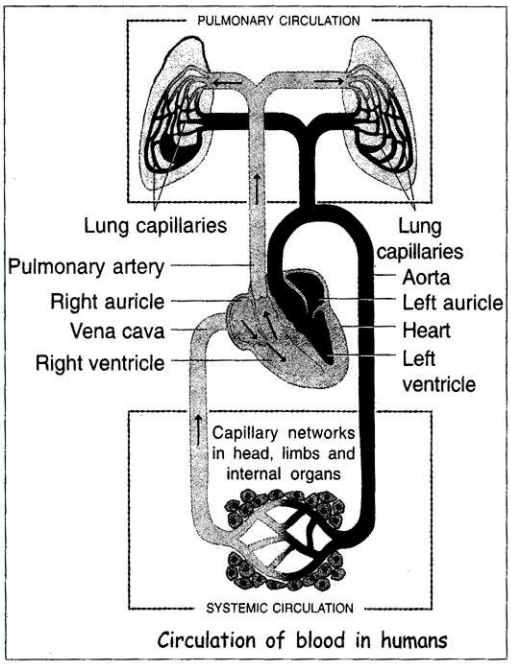
- The heart is an organ which beats continuously to act as a pump for the transport of blood, which carries other substances with it.
- The heart is located in the chest cavity with its lower tip slightly tilted towards the left. Size of heart is of our fist.
- The heart has four chambers. The two upper chambers are called the **atria** (singular: atrium) and the two lower chambers are called as the **ventricles**. The partition between the chambers helps to avoid mixing up of blood rich in oxygen with the blood rich in carbon dioxide.
- The blood flow from the heart to the lungs through pulmonary artery and back to the heart through pulmonary vein from where it is pumped to the rest of the body.

Working of Heart

- **Pacememaker:** SA node is called pacemaker which is found in right auricle. it is also called distributing station of heart and the heart beat originates here.
- The impure blood (have CO_2) from different parts of the body enters the right auricle and is sent to right ventricle. From here, the blood is pumped through the pulmonary artery to the lungs for oxygenation.
- In lungs this blood gives up carbondioxide and absorbs oxygen from the inhaled air. This oxygenated blood returns to the left auricle and then enters the left ventricle . From here the blood is pumped to different parts of the body.
- So blood is passd in heart two times, first in right side then left side. This type of circulation is called **double circulation**. Right side of heart has impure blood whereas left side has pure blood.

Route of Blood in Heart





Circulation of blood in humans

Heart Beat

- The pressure applied on the wall of arteries due to contraction of heart is called **blood pressure** (BP).
- Due to blood flow in the arteries, wall of arteries show **throbbing movements** called **pulse beat** or **pulse**.
- **The number of beats per minute is known as the pulse rate.** A resting person has a pulse rate between **72-80 beats per minute.**

- The walls of the chambers of the heart are made up of muscles. These muscles contract and relax rhythmically. This rhythmic contraction (systole) followed by its relaxation (diastole) constitute a heartbeat. Heart beat can be felt on left side of our chest. Heart beats can be felt with the help of an instrument called as **stethoscope**.
- **The stethoscope is a device to amplify the sound of the heart.** It consists of a chest piece that carries a sensitive diaphragm, two ear pieces and a tube joining the parts.

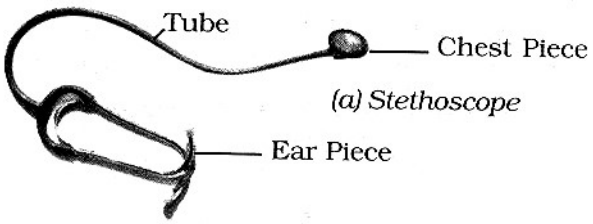


Figure: Instrument to hear Heartbeat

- Each heart beat generate one pulse in arteries and the pulse rate per minte indicates the rate of heart beat.
- The rhythmic beating of the various chambers of the heart maintain circulation of blood and transportation of substances to different parts of the body. **William Harvey** (1578-1657) discovered the circulation of blood.
- Animals such as Sponges and Hydra do not possess any circulatory system. The water in which they live brings food and oxygen as it enters their bodies. The water carries away waste materials and carbon dioxide as it moves out. Thus, these animals do not need a circulatory fluid like the blood.

EXCRETION IN ANIMALS

- When our cells perform their functions, certain waste products are released. These are toxic and hence need to be removed from the body. The process of removal of wastes produced in the cells of the living organisms is called **excretion**. The parts involved in excretion forms the excretory system.
- The way in which waste chemicals are removed from the body of the animal depends on the availability of water. Aquatic animals like fishes, excrete cell waste in gaseous form (ammonia) which is directly dissolved in water so called **Ammonotelic**.
- Some land animals like birds, lizards, snakes excrete a semi-solid, white coloured compound (uric acid) so called **Uricotelic**.
- The major excretory product in humans is urea so called **Ureotelic**.

Excretory System in Humans

Excretory system in humans consists of the following organs.

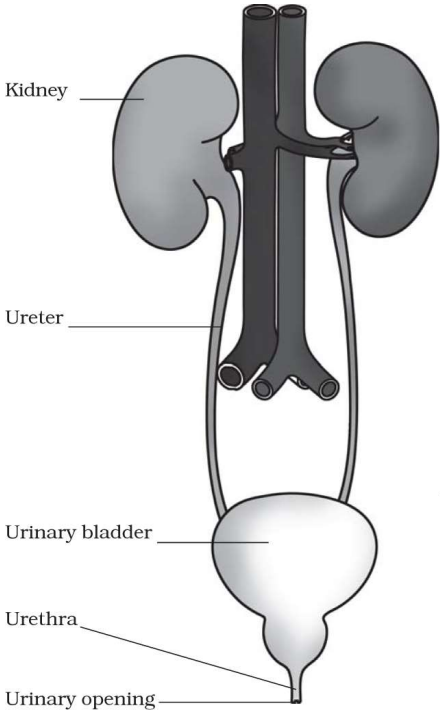
- A pair of kidneys
- Ureters
- Urinary bladder
- Urethra

Kidneys are bean-shaped structures located just above the waist. Each kidney consists of a large number of coiled tubes called **nephrons**. They act as filters and filter waste products from the blood which reach the two kidneys. The useful substances are absorbed back into the blood.

Waste products dissolved in water form the liquid urine. The urine contains 95% water, 2.5% urea and 2.5% other waste products.

A narrow tube called ureter runs from the inner side of each kidney. The two ureters from the two

kidneys are connected to a large sac called bladder. Urine passes out from the kidney through the two ureters into the urinary bladder. It is stored in the urinary bladder. From the bladder, urine passes through another muscular tube called the urethra and is finally passed out through a urinary opening at the end of the urethra.



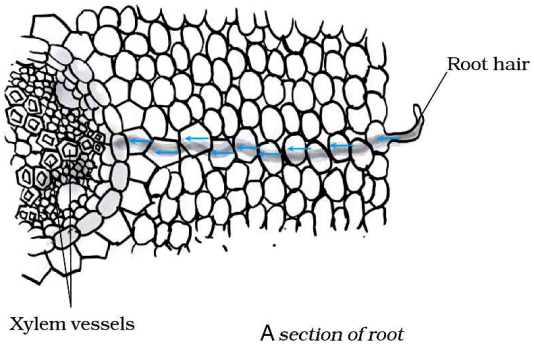
Human excretory system

Other Organs of Excretion in Humans

1. **Lungs:** They remove carbon dioxide and water produced during respiration.
2. **Skin:** It removes urea, salt and excess water through sweat glands present in the skin.
3. **Large intestine:** The large intestine removes solid wastes.
4. **Liver:** It removes excess sugar by converting it into glycogen.

- Sometimes a person's kidneys may stop working due to infection or injury. As a result of kidney failure, waste products start accumulating in the blood. Such persons cannot survive unless their blood is filtered periodically through an artificial kidney. This process is called **dialysis**.
- The sweat in human beings contain water and salts, which is also regarded as dilute wine. Sweat helps in keeping our body cool, besides removing waste materials.

TRANSPORT OF SUBSTANCES IN PLANTS



A *section of root*

Plants absorb water and minerals from the soil through the roots. These are transported to the leaves for preparation of food (photosynthesis).

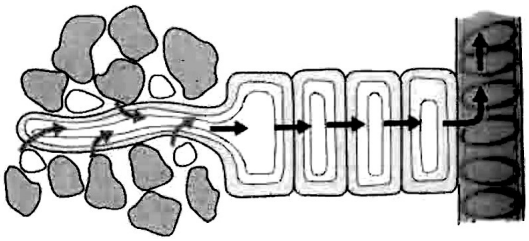
The food synthesized or prepared in the leaves is then carried to the other parts of the plant body. In plants therefore, transport involves two things :

(i) movement of water and minerals from the soil through the roots into the plant body and

(ii) movement of food prepared in the leaves to other plant parts.

Transport of Water and Minerals

- Plants absorb water and minerals through the roots. A large number of root hair are present on the roots. The root hair increase the surface area of the root for absorbing water and the minerals dissolved in water. The root hair absorb water present in between the soil particles. From the root hair, water along with the minerals enters the roots and from the roots, it moves upward towards the stem and leaves.



Movement of water and minerals through the root hair

- The upward movement of water and minerals takes place through pipe-like structures or channels present throughout the plant body. These pipe-like structures or channels are made of special cells called xylem elements. Xylem is a vascular tissue for the transport of water and minerals in the plant.

- The xylem forms a continuous channel that connects roots to the leaves through the stem and branches. In this manner, water and minerals are carried to the entire plant.

Transport of Food

The food prepared in the leaves is transported to all parts of the plant. The vascular tissue that transports food is called **phloem**. Phloem is present along with the xylem inside the plant body. Xylem and phloem together form the **vascular tissue**.

TRANSPIRATION

The excess water is given out by the plants in vapour form to the atmosphere through their leaves. The process by which plants lose water in vapour form from their leaves is called **transpiration**.

Leaves contain tiny pores called **stomata** on their lower side. It is through these stomata that loss of water takes place by the process of **transpiration**.

Advantages of Transpiration

- It helps in the transport of water and minerals from the soil to the leaves.
- It produces a cooling effect, which protects the delicate cells from the hot sun.
- It provides rigidity to the plant body.

CONCEPT APPLICATION LEVEL - I [NCERT Questions]

Q.1 Match structures given in Column I with functions given in Column II:

	Column I		Column II
(i)	Stomata	(a)	Absorption of water
(ii)	Xylem	(b)	Transpiration
(iii)	Root hairs	(c)	Transport of food
(iv)	Phloem	(d)	Transport of water
		(e)	Synthesis of carbohydrates

Ans. (i)-(b), (ii)-(d), (iii)-(a), (iv)-(c)

Q.2 Fill in the blanks:

(i) The blood from the heart is transported to all parts of the body by the _____ .

(ii) Haemoglobin is present in _____ cells.

(iii) Arteries and veins are joined by a network of _____ .

(iv) The rhythmic expansion and contraction of the heart is called _____ .

(v) The main excretory product in human beings is _____ .

(vi) Sweat contains water and _____ .

(vii) Kidneys eliminate the waste materials in the liquid form called _____ .

(viii) Water reaches great heights in the trees because of suction pull caused by _____ .

Ans. (i) arteries (ii) red blood (iii) capillaries (iv) heart beat
(v) urea (vi) salts (vii) urine (viii) transpiration

Q.3 Choose the correct option:

(i) In plants, water is transported through
(A) xylem (B) phloem (C) stomata (D) root hair

(ii) Water absorption through roots can be increased by keeping the plants
(A) in the shade (B) in dim light
(C) under the fan (D) covered with a polythene bag

Ans. **(i)** (A) **(ii)** (C)

Q.4 Why is transport of materials necessary in a plant or in animal? Explain.

Ans. In plants and animals the transport of materials is necessary.
It can be explained as below:

(i) Animals need to transport food and water from small intestine and oxygen from lungs to all other body parts.

(ii) Animals need to transport the wastes from where they are produced to parts from where they can be removed.

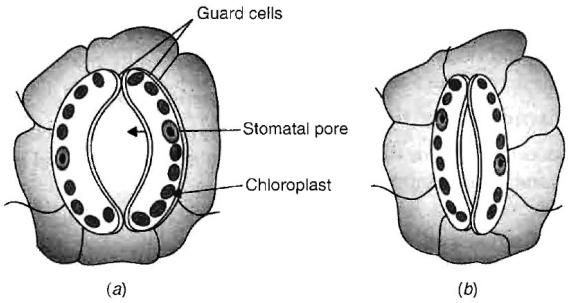
(iii) Plants need to transport the food from leaves and water and minerals to all other parts of the plant.

Q.5 What will happen if there are no platelets in the blood?

Ans. Whenever we get injured, blood comes out from the cut. The function of platelets is to make a clot which plugges the cut to stop bleedings. If there are no platelets in the blood, no clot will be formed and as a result, bleeding will not stop and leads to a disease: haemophilia. This may lead to fatal consequences.

Q.6 What are stomata? Give two functions of stomata.

Ans. Stomata are the tiny pores present on the surface of the leaves. These are surrounded by two bean shaped cells called **guard cells**.



Open (*a*) and closed (*b*) Stomatal pore

Fig. Showing stomata

Functions of stomata:

(i) The exchange of gases in plants occur through stomata.

(ii) The excess water in plants evaporates through stomata by a process called transpiration.

Q.7 Does transpiration serve any useful function in the plants? Explain.

Ans. Yes, Transpiration is useful for the plants in following ways:

(i) The evaporation of water from leave generates a suction pull which can pull water to great heights in the tall trees.

(ii) Provides cooling to the plant.

Q.8 What are the components of blood?

Ans. Blood has two components: (a) Plasma and (b) Corpuscles, suspended in the plasma, with three kinds of blood cells.

(a) **Plasma :** It is the fluid part of blood.

(b) **Corpuscles :** It is of three types:

(i) Red Blood Cells (RBCs): Contain haemoglobin and impart red colour to the blood. Haemoglobin also carries oxygen from lungs to all other body parts.

(ii) White Blood Cells (WECs): Fight against the germs.

(iii) Platelets: Help in the clotting of blood.

Q.9 Why is blood needed by all the parts of a body?

Ans. All the parts of the body need food and oxygen which is carried to them by the blood. They also release their wastes into the blood which is then transported to the parts from where they can be removed.

Q.10 What makes the blood look red?

Ans. Blood contains three kinds of blood cells. Out of which Red Blood Cells contains an iron pigment called Haemoglobin. Haemoglobin imparts red colour to the blood.

Q.11 Describe the function of the heart.

Ans. The heart acts as a pumping organ for the transport of blood. The rhythmic contraction and relaxation of the various chambers of the heart maintain circulation of blood and transport of substances to the different parts of the body.

Q.12 Why is it necessary to excrete waste products?

Ans. When our cells perform their functions, certain waste products are released. These are toxic and their accumulation in the body may lead to fatal consequences, hence need to be removed.

Q.13 Draw a diagram of the human excretory system and label the various parts.

Ans.

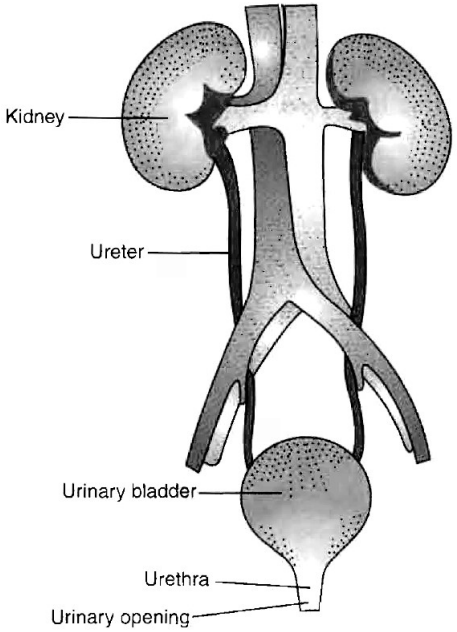


Fig. Human excretory system

CONCEPT APPLICATION LEVEL - II

Section – A

Q.1 What is blood?

Ans. Blood is a fluid connective tissue, which flows in the blood vessels.

Q.2 Discuss the functions of blood.

Ans. Blood performs various function as listed below:

(i) It transports the digested food from the small intestine to the other parts of the body.

(ii) It carries oxygen from the lungs to heart and then from there to the other parts of the body.

(iii) It also transports waste for removal from the body.

Q.3 What is plasma?

Ans. The liquid part of the blood is called plasma. It is a pale yellow, sticky liquid which is 90% water and 3.5% common salt. Plasma contains dissolved substances, such as digested food and waste products (like carbon dioxide and urea). Plasma carries water and dissolved substances from one part to another part in the body.

Q.4 What is the function of platelets?

Ans. Platelets are the tiny fragments of special cells formed in the bone marrow. Platelets help in the clotting of blood in a cut or wound due to which further bleeding stops.

Q.5 What is the function of haemoglobin in the blood?

Ans. An iron pigment present in the blood is called haemoglobin. It carries the oxygen in the body. Haemoglobin bind with oxygen and transports it to all the parts of the body and ultimately to all the cells.

Q.6 What is the importance of blood capillaries?

Ans. Blood capillaries provide the site of exchange of substances in the organs with the blood.

Q.7 What is the difference between *arteries* and *veins*?

Ans.

Arteries	Veins
1. Arteries have thick elastic walls.	1. The walls of veins are thin.
2. Arteries have no valves.	2. There are valves present in veins.
3. Blood flow is rapid and at a high pressure.	3. Blood flows slowly and at low pressure.
4. Carry oxygen rich blood.	4. Carry carbon dioxide rich blood.

Q.8 What is a pulse rate of a normal person?

Ans. A normal person, usually has a pulse rate between 72 and 80 beats per minute.

Q.9 Why in the heart, the blood rich in oxygen and the blood rich in carbon dioxide do not mix with each other?

Ans. The heart is divided into four chambers. The two upper chambers are called atria (Singular : atrium) and the two lower chambers are called the ventricles. The partition between these two as auriculo-ventricular septum, which helps to avoid mixing up of blood rich in oxygen with the blood rich in carbon dioxide.

Q.10 Why doctors use stethoscope?

Ans. Doctors use stethoscope as a device to amplify the sound of the heart.

Q.11 Name the organs involved in formation of excretory system in humans.

Ans. The kidneys, ureters, bladder and urethra form excretory system in human.

Q.12 What is dialysis?

Ans. Sometimes when kidney fails to function due to infection or injury. As a result of this kidney failure, the waste products start accumulating in the blood. Such persons cannot survive unless their blood is filtered periodically through an artificial kidney. This process is called dialysis.

Q.13 Name the tissues involved in the transportation of substances in the plants.

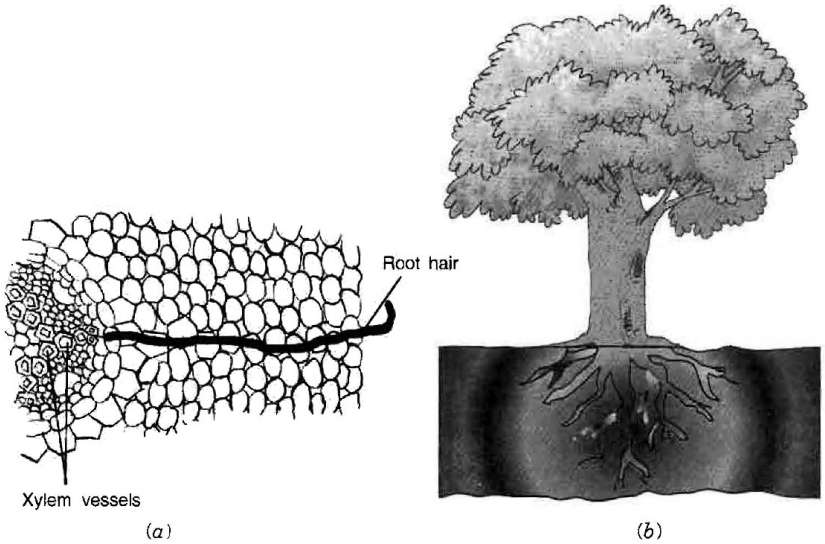
Ans. The two types of vascular tissue for the transport of substances in plants are **xylem** and **phloem**.

Q.14 Discuss how the transport of various substances in plants occurs?

Ans. **Transport of water and mineral:** Plants absorb water and minerals by the roots with the help of its root hair. The root hair is in contact with the water present between the soil particles (Fig. a). This absorbed water is transported to the upper part of the plant by arious means through xylem.

Plant have pipe-like vessels to transport water and nutrients from the soil. The vessels are made of special cell forming the **vascular tissue**.

The vascular tissue for the transport of water and nutrients in the plants is called the **xylem**. The xylem forms a continuous network of channels that connects roots to the leaves through the stem and branches and thus transports water to entire plant [Fig. (b)].



Transport of water and minerals in (a) a section of root, (b) a tree

Transport of food: We know that leaves synthesize food. The food has to be transported to all parts of the plant. This is done by the vascular tissue called the phloem.

Thus xylem and phloem transport substances in plants.

Q.15 What is transpiration? Why is it useful to plants?

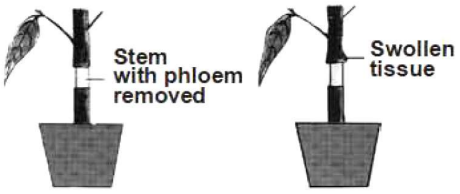
Ans. Plants absorb mineral nutrients and water from the soil. All the water absorbed is not utilised by the plant. The water evaporates through the stomata present on the surface of the leaves by the process of transpiration. The evaporation of water from leaves generates a suction pull which can pull water to great heights in the tall trees. Transpiration also provides cooling to the plant.

Section – B

PREVEIOUS YEAR'S NSO QUESTIONS

Q.1 Rohan was conducting an experiment regarding food and water movement in the plants. He removed the phloem tissue as shown in the figure. He observed the stem after few days. The stem showed swelling in the upper portion. What can be the reason behind swelling? **[NSO 2010]**

(A) Upward movement of food getting blocked.
(B) Downward movement of food getting blocked.
(C) Upward movement of water getting blocked.
(D) Downward movement of water getting blocked.



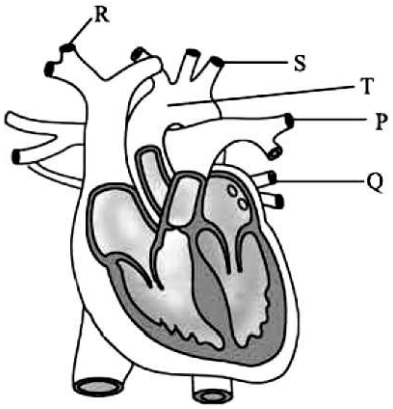
Q.2 What is peculiar about pulmonary artery and pulmonary vein? **[NSO 2011]**
(A) Pulmonary artery carries carbon dioxide-rich blood and pulmonary vein carries oxygen-rich blood.
(B) Pulmonary artery carries oxygen-rich blood and pulmonary vein carries carbon dioxide-rich blood.
(C) Both pulmonary artery and vein carry carbon dioxide-rich blood from the heart to the lungs.
(D) Both pulmonary artery and vein carry oxygen-rich blood from the lungs to the heart.

Q.3 Refer to the given figure. What are X and Y and what do they grow into? **[NSO 2011]**
(A) X-Radicle and Y-Plumule; both grow into roots.
(B) X-Plumule and Y-Radicle; both grow into shoot and leaves.
(C) X-Radicle, grows into roots; Y-Plumule, grows into shoot and leaves.
(D) X-Plumule, grows into shoot and leaves; Y-Radicle, grows into roots.

Q.4 Which of the following is correct about excretion in plants? **[NSO 2012]**
(A) Production of rubber, resin, etc., is a means of excretion for plants.
(B) Transpiration helps plants to get rid of excess water.
(C) Withering leaves accumulate excretory wastes.
(D) All of these

Q.5 Root hairs are most important to a plant because they _____ . **[NSO 2013]**
(A) Anchor a plant to the soil (B) Provide a habitat for N_2 fixing bacteria
(C) Increase the surface area for absorption (D) Contain xylem tissue.

Q.6 In the given figure, which blood vessels represent pulmonary vein, pulmonary artery and vena cava respectively? **[NSO 2013]**

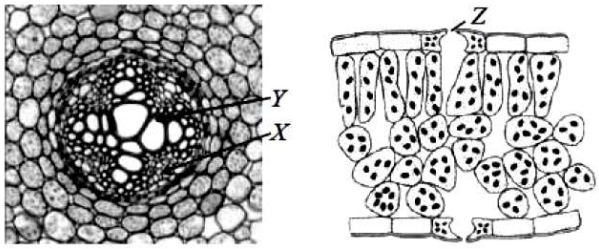


(A) P, Q and R (B) Q, P and R (C) P, Q and S (D) Q, P and T

Q.7 Which one of the following is an incorrect statement? **[NSO 2013]**
(A) Pulmonary artery carries oxygenated blood from the lungs to the heart.
(B) Ozone present in the troposphere is harmful to animals.
(C) The seeped water collects between layers of hard rocks, this is called an aquifer.
(D) Eutrophication is a natural phenomenon in freshwater bodies.

Q.8 A rare plant in a botanical garden has been infected with specific fungi that feed on sugar molecules. After careful examination, a botanist suggested the following surgical intervention : removing the infected portion i.e., a ring of bark about 2 inches in height and about 2 cms wide. This will remove the cambial cells, phloem, endodennis, cortex and epidermis of the stem. Which of the following will be the consequence of such a surgical intervention? **[NSO 2013]**
(A) Flow of food downwards will be affected but flow of water upwards will be maintained.
(B) Flow of water upwards will be affected but flow of food will be maintained.
(C) Both the flow of food and water will be affected.
(D) Neither the flow of food nor the water movement will be affected.

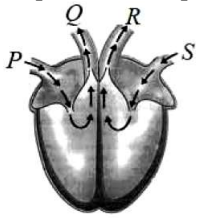
Q.9 Refer to the given figures and answer the question that follows. **[NSO 2014]**



What are the main functions of X, Yand Z?

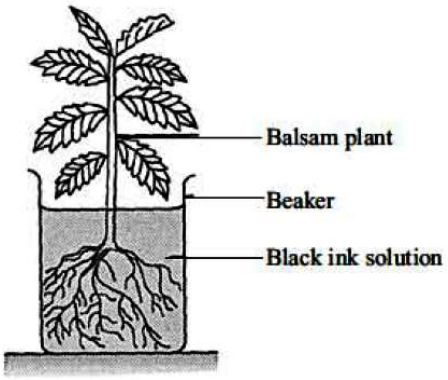
	X	Y	Z
(A)	Supports the plant	Transports food	Gaseous exchange
(B)	Transports water and minerals	Transports food	Release water vapour
(C)	Transports water and minerals	Supports the plant	Take in CO_2
(D)	Transports food	Transports water and minerals	Gaseous exchange

Q.10 The given diagram shows blood circulation pathway in the heart. Which of the following correctly shows the relative amount of oxygen and carbon dioxide at P, Q, R and S? **[NSO 2014]**



	More CO_2	More O_2
(A)	R	P, Q, S
(B)	Q and R	P and S
(C)	S	R
(D)	P and Q	R and S

Q.11 Siddhi put a balsam plant in a beaker of black ink as shown below. After 3 days, she cut open a section of the stem of the plant and observed it. **[NSO 2014]**
Which one of the following diagrams would she observe?



(A) 

(B) 

(C) 

(D) 

Q.12 Which conditions would result in the highest rate of movement of oxygen from the alveolus into the blood capillaries? **[NSO 2014]**

	Concentration of oxygen in the alveolus	Concentration of oxygen in blood capillalry	Rate of blood flow in blood capillary
(A)	High	Low	Fast
(B)	High	Low	Slow
(C)	Low	High	Fast
(D)	Low	High	Slow

CONCEPT APPLICATION LEVEL - III

SECTION - A

- **Fill in the blanks with suitable words.**

1. Blood is the fluid which flows in the _____ .
2. _____ bind with oxygen and transports it.
3. _____ fight against germs.
4. The heart has _____ chambers.
5. A doctor uses the _____ to feel the heart beat.
6. _____ discovered the circulation of blood.
7. Filtering the blood periodically through an artificial kidney is called _____ .
8. Plants absorb water and minerals by the _____ .

SECTION - B

- **Match the following (one to one)**

Q.1 Match the items given in **Column I** with **Column II**:

Column I	Column II
(i) Ammonia	(a) Food
(ii) Urea	(b) Carbon dioxide rich blood
(iii) Uric acid	(c) Water and salts
(iv) Vein	(d) Carry oxygen
(v) Artery	(e) Aquatic animals like fish
(vi) Xylem	(f) Fight against germs
(vii) Phloem	(g) Blood clotting
(viii) Sweat	(h) Absorb water
(ix) Root hair	(i) Humans
(x) Platelets	(j) Oxygen rich blood
(xi) RBCs	(k) Water and minerals
(xii) WBCs	(l) Birds, snakes, lizards

SECTION - C

- **Mark 'T' if the statment is true and 'F' if it is false:**

1. Blood carries carbon dioxide from the body parts to the lungs.
2. White blood cells are involved in the clotting of blood.
3. There are valves present in veins.
4. Heart acts as a pump for the transport of blood.
5. Arteries have thin walls while veins have thick walls.
6. Human heart has two chambers, an atrium and a ventricle.
7. Partition between the chambers of heart avoid mixing up of blood rich in oxygen with the blood rich in carbon dioxide.
8. Stethoscope is a device to amplify the sound of the heart.
9. Rhythmic breating of the various chambers of the heart maintain circulation of blood to the different parts of the body.
10. When blood reaches the two kidneys, it contains only harmful substances.
11. Birds, lizards and snakes excrete a semi-solid white coloured compound (uric acid).
12. Transpiration provides cooling to the plant.

SECTION - D

- **Choose the correct option in the following:**

1. Which of the following is the main circulatory fluid in our body?
(A) Plasma (B) Lymph (C) Blood (D) None of these

2. Which one of the following contains haemoglobin?
(A) RBC (B) WBC (C) Platelets (D) None of these

3. What is the function of WBCs?
(A) Transport of oxygen (B) Fight against germs
(C) Involved in blood clotting (D) All of these

4. Blood platelets help in
(A) formation of urine (B) excretion of urine (C) sweating (D) blood clotting

5. Which one of the following always carries oxygenated blood?
(A) Arteries except pulmonary artery (B) Veins except pulmonary vein
(C) Blood capillaries (D) None of these

6. What is the pulse rate of a resting person?
(A) 72-80 beats/min (B) 62-70 beats/min (C) 82-90 beats/min (D) 52-60 beats/min

7. Which one ot the following controls blood circulation?
(A) Lungs (B) Kidney (C) Lever (D) Heart

8. Which one of the following is an excretory product in humans?
(A) Carbon dioxide (B) Urea (C) Both (D) None of these

9. Main excretory organ in humans is
(A) urethra (B) Urinary bladder (C) ureters (D) kidney

10. Urine consists of
(A) 95% water, 2.5% urea (B) 95% water, 5% urea
(C) 97.5% water, 2.5% urea (D) None of these

11. Sweat contains
(A) water only (B) water and salts (C) water and acid (D) water and alkali

12. In fishes, excretory substance is
(A) urea (B) uric acid (C) ammonia (D) none of these

ANSWER KEY

CONCEPT APPLICATION LEVEL - II

Section – B

Q.1	B	Q.2	A	Q.3	D	Q.4	D	Q.5	C	Q.6	B	Q.7	A
Q.8	A	Q.9	D	Q.10	D	Q.11	B	Q.12	B				

CONCEPT APPLICATION LEVEL - III

SECTION - A

1. blood vessels	2. Haemoglobin	3. WBCs	4. four
5. stethoscope	6. William Harvey	7 dialysis	8. roots

SECTION - B

Q.1 (i)-(e), (ii)-(i), (iii)-(l), (iv)-(b), (v)-(j), (vi)-(k), (vii)-(a), (viii)-(c), (ix)-(h), (x)-(g), (xi)-(d), (xii)-(f)

SECTION - C

1. True	2. False	3. True	4. True	5. False	6. False	7. True
8. True	9. True	10. False	11. True	12. True		

SECTION - D

1.	C	2.	A	3.	B	4.	D	5.	A	6.	A	7.	D
8.	C	9.	D	10.	A	11.	B	12.	C				