SCIENCE

CHAPTER 11: TRANSPORTATION IN ANIMALS AND PLANTS

Transportation in Animals and Plants

Circulatory System

- The **circulatory system** is defined as the system which moves blood, oxygen and nutrients through the body.
- An example of the circulatory system is the functioning of the **human heart**, **blood** and **blood vessels**.

Blood

- Blood is a **fluid** which flows in blood vessels and transports substances such as digested food from the small intestine to other parts of the body.
- It **carries oxygen** from the lungs to the other cells of the body.
- It **transports waste** for removal from the body.
- Blood is a liquid containing many kinds of cells suspended in it. The fluid part of the blood is called **plasma**.

Red Blood Cells (RBCs)	White Blood Cells (WBCs)	Platelets	Plasma
•They contain a red pigment called hemoglobin which binds with oxygen and transports it to all parts of the body.	•They fight against the germs which enter the body. •Some WBCs make chemicals known as antibodies to fight against infection.	•They are tiny fragments of special cells which are formed in the bone marrow. •They help in clotting of blood and prevent the loss of blood.	•It is the liquid part of blood and is a pale yellow, sticky liquid. •It carries dissolved substances such as digested food and waste products from one part to another.

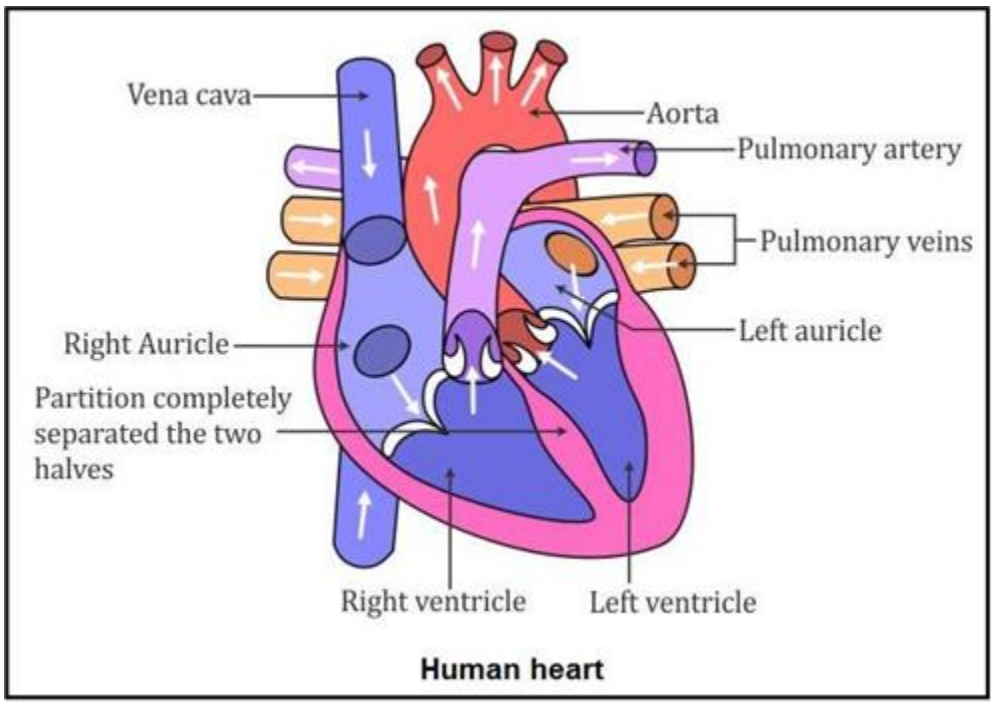
- Blood carrying oxygen is called **oxygenated blood** and the blood lacking oxygen is called deoxygenated blood.
- Animals such as **Hydra** and **sponge** lack a circulatory system. The water in which they live carries food and oxygen when it enters the body. The waste materials and carbon dioxide are carried away with water when it moves out.
- Unicellular animals such as **Amoeba** and **Paramoecium** living in water also have no blood in them.

Blood Vessels

- **Arteries** carry oxygen-rich blood from the heart to all parts of the body. The walls of the arteries are thick and elastic because the blood flow is rapid and at high pressure.
- **Capillaries** are present throughout the body. The exchange of substances (Examples - food, oxygen and carbon dioxide) between the blood and the body cells occurs through capillaries.
- **Veins** carry carbon dioxide-rich blood from all parts of the body back to the heart. They have thin walls.
- The number of pulse beats per minute is known as the **pulse rate**. The pulse rate is the same as the heart rate.

Heart

- The heart is a fist-sized muscular organ found in the chest cavity towards the left lungs. It pumps blood to all parts of the body. It beats 60-80 times a minute throughout our life.
- The heart is made up of four chambers. The Upper two chambers are called right atrium and left atrium. The two lower chambers are called right ventricle and left ventricle.
- A muscular wall called septum separates the right and left side of the heart, preventing the mixing of oxygenated blood with the deoxygenated blood and have valves. Valves allow the blood to flow in only one direction.
- The blood rich in carbon dioxide flows through the right side of the heart, while the blood rich in oxygen flows through the left side of the heart.



Human heart

The arteries and veins in the heart connect to other parts of the body. The blood vessels that enter or leave the heart are:

Vena cava: It is a large vein that collect blood rich in carbon dioxide from all parts of the body through smaller veins and empties the blood from the right atrium.

Pulmonary artery: It carries blood rich in carbon dioxide from the right ventricle of the heart to the lungs.

Pulmonary vein: It brings oxygenated blood from the lungs to the left atrium of the heart.

Aorta: It is the largest artery which receives blood rich in oxygen from the left ventricle. The oxygenated blood is then circulated to different parts of the body.

Working of heart:

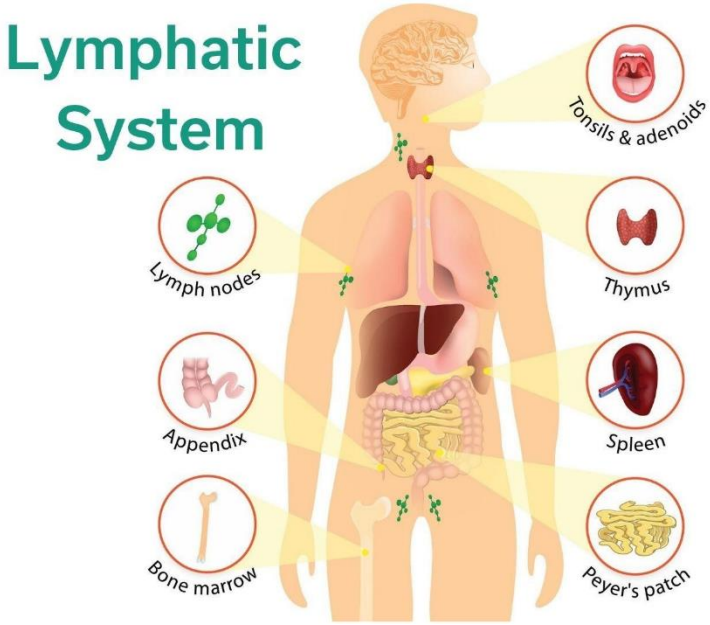
- The heart functions as a double pump. Impure (deoxygenated) blood from the veins flows into the right Atrium of the heart.
- From here, the blood enters the right ventricle through an opening.
- The impure blood is transported from the right ventricle to the lungs by the Pulmonary artery.
- Gaseous exchange takes place in the lungs.
- The blood gives off carbon dioxide and takes in oxygen.
- Oxygen-rich blood is carried to the left Atrium by the Pulmonary vein.
- From here, the blood flows through an opening into the left ventricle.
- The left ventricle pumps oxygen rich blood to every part of the body through the aorta.
- The oxygen is then used by the cells and the cell produces carbon dioxide.
- The blood takes in carbon dioxide and returns to the right ventricle of the heart.

Heartbeat

- The walls of the chambers of the heart are made of muscles which contract and relax rhythmically. This rhythmic contraction and relaxation of muscles constitute a **heartbeat**.
- The rhythmic beating of the heart maintains the circulation of blood and the transport of substances to different parts of the body.
- The average heartbeat of an adult person while resting is **72 to 80 per minute**. It increases during and after physical exercise.
- The heartbeat can be heard by using an instrument called a **stethoscope**. It amplifies the sound of a heartbeat.

Lymphatic system of the human body

- The lymphatic system is made up of lymph vessels and lymph nodes.
- As the blood flows through the capillary some of the plasma oozes out of the walls. Most of the fluid enters the lymph vessels and is drained back into the blood vessels.
- Before this blood is returned to the circulatory system, it is filtered through lymph nodes. lymph nodes contain special types of cells called Lymphocytes which protect the human body from disease causing organisms and harmful substances.

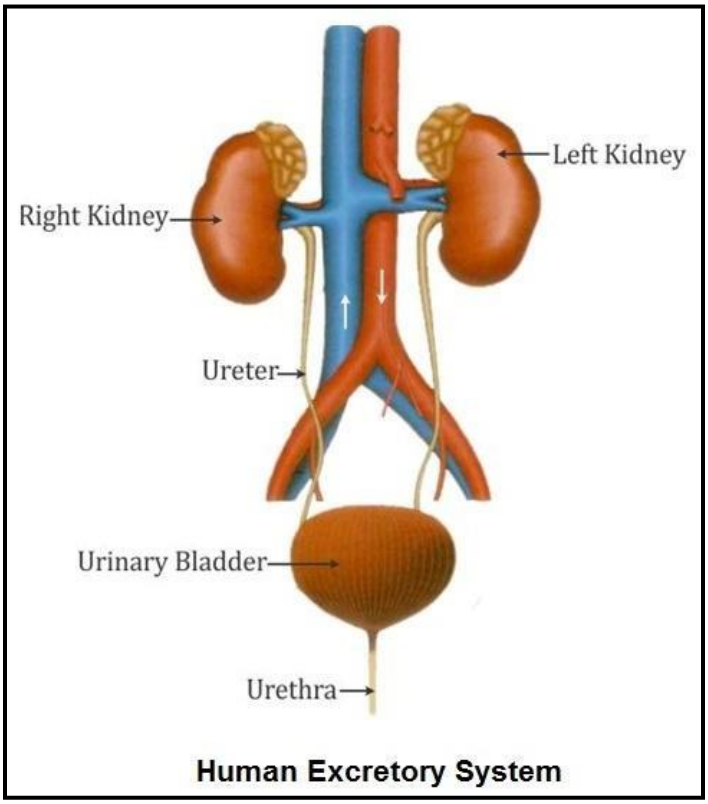


Excretion

- When cells perform their functions, certain waste products which are toxic in nature need to be removed. The process of removal of wastes is called **excretion**.

Excretory System in Humans

- The different parts of the human excretory system are two **kidneys**, two **ureters**, **urinary bladder** and
  urethra.



Human Excretory System

- Of the useful and harmful substances in the blood which reach the **kidneys**, the useful substances are reabsorbed into the blood. The wastes dissolved in water are removed as **urine**.
- From the kidneys, the urine goes into the **urinary bladder** through tube-like **ureters**.
- The bladder stores urine till the time it is passed out through the urinary opening at the end of a muscular tube called **urethra**.
- An adult human being passes about **1-1.8 litres of urine** which consists of 95% water, 2.5% urea and 2.5% waste products.
- **Sweat** is also a type of excretory product containing water and salts. It is removed from the body by sweat glands through the **skin**.

Excretion in Animals

- Aquatic animals excrete cell waste in gaseous form (**ammonia**) which directly dissolves in water.
- Birds and land animals such as lizards, snakes and insects excrete a white-coloured semi-solid waste called **uric acid**.

Excretion in plants

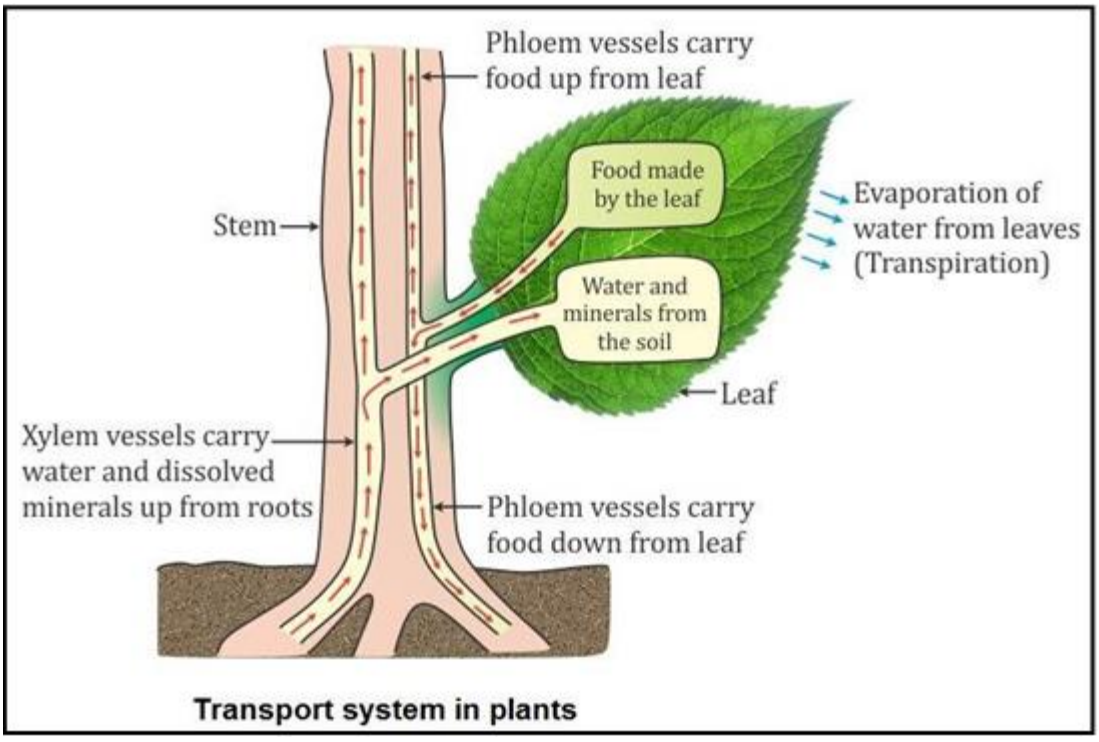
- Plants excrete waste products from their body. They get rid of their waste product in the following ways:
- Oxygen and Carbon dioxide are given out during the process of photosynthesis and respiration.
- The excess water is lost by the plants through transpiration.
- Some plants excrete their waste product in the form of gums, resins and latex. The substances are of great use as adhesive, paints, varnishes and rubber.

Transport of Substances in Plants

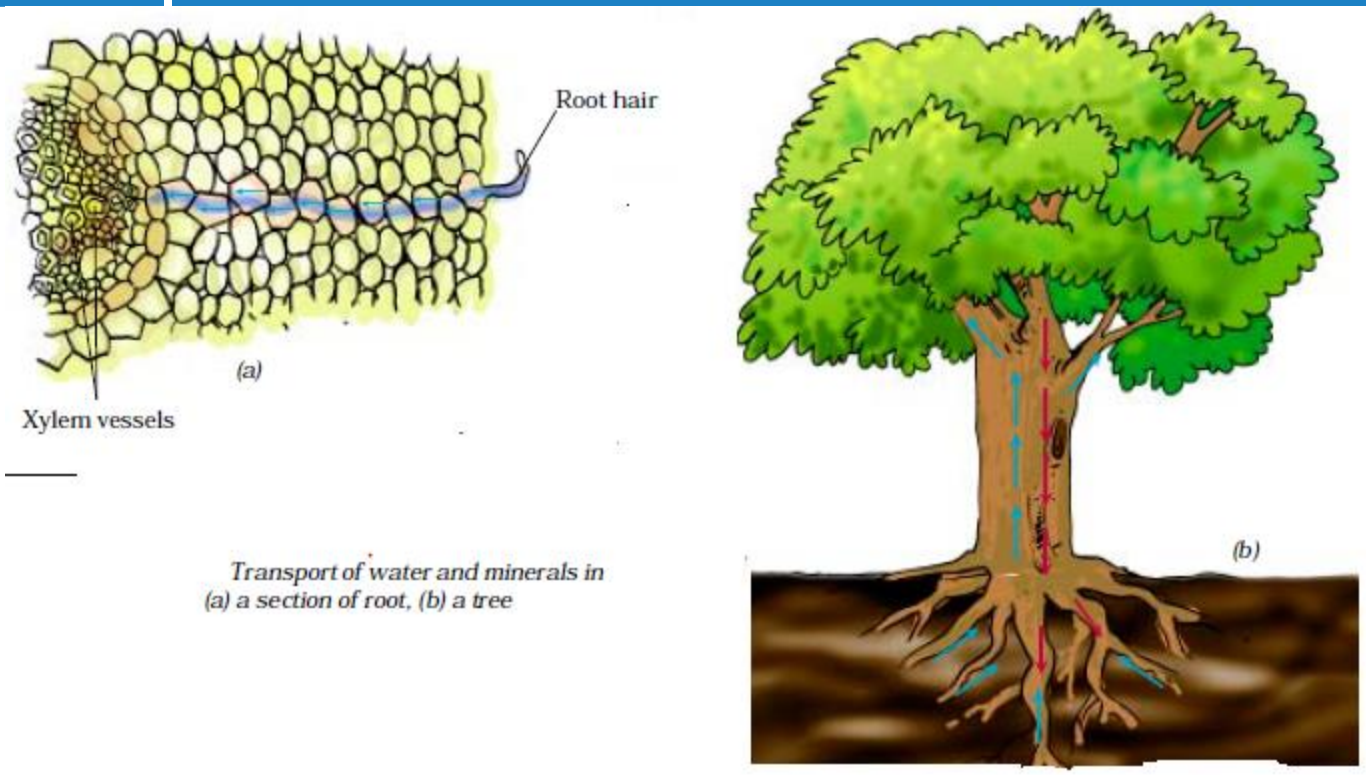
- Plants absorb water and minerals from the soil through roots and transport these to leaves, where food is prepared.
- Since food is a source of energy, it must be made available to every cell of the organism. To serve this purpose, a transport system is present in plants.

Transport of Water and Minerals

- Plants have **pipe-like vessels** to transport water and nutrients from the soil. These vessels are made of special cells forming a vascular tissue.
- The vascular tissue for the transport of water and nutrients in plants is called **xylem**, while that for the transport of food is called **phloem**.



Transport system in plants

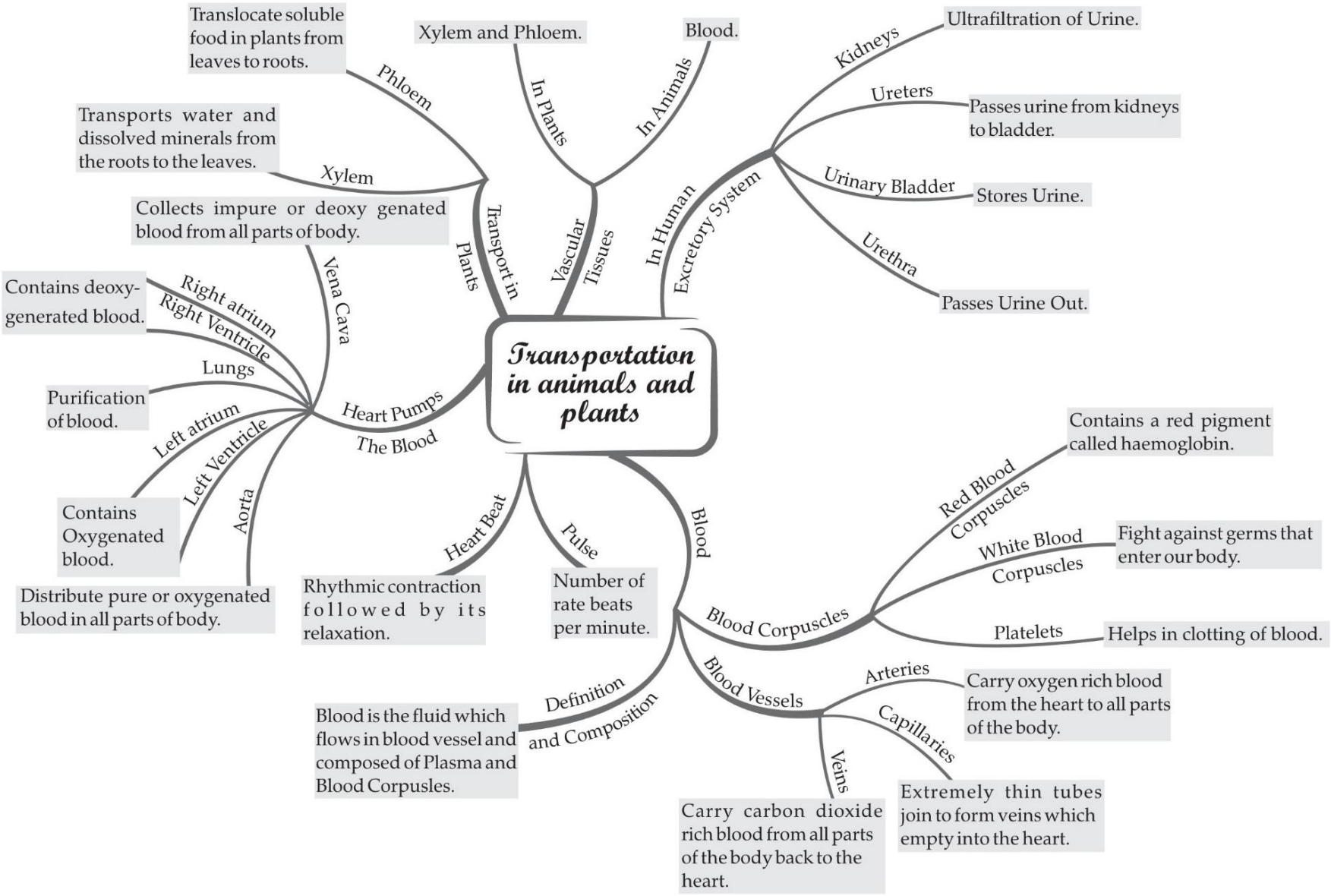


Transport of water and minerals in (a) a section of root, (b) a tree

Transpiration

- When plants absorb mineral nutrients and water from the soil, some of it is absorbed by the plant while some evaporates through the stomata present on the surface of the leaves by the process of **transpiration**.
- This evaporation of water from leaves causes a **suction pull** which is able to pull water to great heights in tall trees.
- Just like sweating helps to keep our body cool, transpiration **cools the plants**.

MIND MAP : LEARNING MADE SIMPLE CHAPTER-11



Important Questions

➢ Multiple Choice Questions:

Question 1. The pumping organ of our circulatory system is

(a) heart

(b) artery

(c) vein

(d) all of these

Question 2. What is the state of the blood?

(a) Solid

(b) Fluid

(c) Gas

(d) None of these

Question 3. They are pipe-like, consisting of a group of specialised cells. They transport substances and form a two-way traffic in plants. Which of the following terms qualify for the features mentioned above?

(a) Xylem tissue

(b) Vascular tissue

(c) Root hairs

(d) Phloem tissue

Question 4. The fluid part of the blood is known as

(a) membrane

(b) plasma

(c) RBC

(d) WBC

Question 5. The red pigment present in the RBC of the blood is

(a) haemoglobin

(b) WBC

(c) pulse

(d) none of these

Question 6. Which blood cells are a significant part of the immune system of the body?

(a) RBC

(b) WBC

(c) Platelets

(d) All of these

Question 7. The cells in the blood which help in clotting are.

(a) Haemoglobins

(b) Platelets

(c) Red blood cells

(d) White blood cells

Question 8. The part of human body which lacks sweat gland is

(a) scalp

(b) armpits

(c) lips

(d) palms

Question 9. Which blood vessel carries oxygen-rich blood?

(a) Arteries

(b) Veins

(c) Both (a) and (b)

(d) None of these

Question 10. The number of heart beats per minute is called

(a) pulse rate

(b) throbbing

(c) beating

(d) none of these

Question 11. What joins up to form veins which empty into the heart?

(a) Arteries

(b) Capillaries

(c) Red blood cells

(d) White blood cells

Question 12. The heart is located in the

(a) chest cavity

(b) stomach

(c) lungs

(d) all of these

Question 13. How many chambers does the human heart have?

(a) Three

(b) Four

(c) Five

(d) Two

Question 14. Name an instrument/device used to amplify the sound of heart.

(a) Stethoscope

(b) UV machine

(c) Both (a) and (b)

(d) Ultrasound machine

Question 15. The absorption of nutrients and exchange of respiratory gases between blood and tissues take place in

(a) veins

(b) arteries

(c) heart

(d) capillaries

➢ Fill In the Blanks:

1. The two upper chambers of the heart are called ……
2. …… is the device used by doctors to feel the heartbeat of a patient.
3. The rhythmic contraction and relaxation of the heart muscle is known as ……..
4. The organ and organ system involved in excretion forms the ……
5. The filtration of blood is done by the blood capillaries in the ……
6. Urine gets stored in a sac called the ……..

➢ True or False:

1. We need only oxygen for survival.
2. Right auricle receives oxygenated blood from the pulmonary veins.
3. There are two types of blood vessels.
4. Plasma is the fluid part of blood.
5. WBCs contain haemoglobin.
6. Pulmonary arteries bring oxygenated blood from lungs to heart.

➢ Very Short Question:

1. Name the system in the body responsible for removal of unwanted harmful substances and excess water in the body cells.

2. Name the fluid part of blood.

3. Name the three types of cells present in blood.

4. When a blood vessel is cut, blood comes out immediately. After some time, a dark red clot is formed on the cut. Name the cell responsible for this.

5. Name the two types of blood vessels

6. Which of the two carry oxygen rich blood, arteries or vein?

7. Where is heart located in human body?

8. Name the vein in the body that carries oxygen-rich blood.

9. What is heart beat?

10. What is pulse?

➢ Short Questions:

1. What do you mean by dialysis? Explain.

2. Write the two functions of kidneys.

3. State one function of the following:

- Arteries
- Vein
- Capillaries

4. Why is heart known as the pumping organ of the human body?

5. What is the significance of dividing heart into different chambers?

6. Explain pulse and pulse rate.

7. Why walls of veins are thinner than the walls of arteries?

8. How do plants absorb water and minerals from soil?

➢ Long Questions:

1. What is the function of RBCs?

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

3. Explain stomata and its function in plants.

✓ Answer Key-

➢ Multiple Choice Answers:

1. (a) heart
2. (b) Fluid
3. (b) Vascular tissue
4. (b) plasma
5. (a) haemoglobin
6. (b) WBC
7. (b) Platelets
8. (c) lips
9. (a) Arteries
10. (a) pulse rate
11. (b) Capillaries
12. (a) chest cavity
13. (b) Four
14. (a) Stethoscope
15. (d) capillaries

➢ Fill In the Blanks:

1. atria
2. Stethoscope
3. heartbeat
4. excretory system
5. kidneys
6. urinary bladder

➢ True or False:

1. False
2. False
3. False
4. True
5. False
6. False

➢ Very Short Answers:

1. Answer: Excretory system
2. Answer: Plasma
3. Answer: White blood cell, red blood cell and platelets
4. Answer: Platelets
5. Answer: Arteries and vein
6. Answer: Arteries
7. Answer: Heart is located in the chest cavity with its lower parts towards the left.
8. Answer: pulmonary vein
9. Answer: The muscles of the heart contract and relax, which constitutes a heartbeat.
10. Answer: Throbbing that occurs in arteries due to flowing of blood is called pulse or the flow of blood in an artery over a bone is called the pulse.

➢ Short Answers:

1. Answer: Dialysis is an artificial process of getting rid of waste and unwanted water from the blood by dialysis machines. Dialysis machines contain a tank with solution of water glucose and salt. Patient's blood allowed passing through solution for removal of waste. The cleaned blood pumped to vein. The dialysis continues till all blood has been purified.
2. Answer: The two functions of kidney are excretion and osmoregulation. Excretion is the elimination of metabolic waste products from the body. Osmoregulation is regulating osmotic pressure of the body fluids by controlling the amount of water and salts in the body.
3. Answer:
   - Arteries- carry blood from heart to different parts of body
   - Veins-carry blood from different parts of body to the heart.
   - Capillaries-exchange of material between blood and surrounding cells.
4. Answer: Heart is the pumping organs of a human body as it continuously act as a pump for transporting blood to all body parts. Heart pumps carbon-dioxide rich blood to lungs and oxygen rich blood to rest of the body.
5. Answer: The division of heart into different chambers ensures that there is no intermixing of oxygenated and deoxygenated blood. This ensures a better efficiency of circulation and transportation of oxygen.
6. Answer: When blood flows in arteries, it gives throbbing sensation in arteries. This throbbing sensation is known as a pulse. The rate of heart beat or throbbing is known as pulse rate. A person has a pulse rate between 72 to 80 beats per minute. A stethoscope is an instrument used to measure the sound heartbeat.

7. Answer: Veins do not have thick walls because blood in vein is no longer under pressure but blood emerges from the heart is under high pressure. So arteries have thick walls.
8. Answer: Plants absorb water and minerals from soil by the roots. The root hair absorbs water and dissolved mineral nutrients from the soil. The roots remain in contact with underground water.

➢ Long Answers:

Answer: Red Blood Cells (RBCs) contain a red pigment called haemoglobin. Haemoglobin bind 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.

Answer: Plants absorb mineral nutrients and water from the soil. Not all the water absorbed is 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 cools the plant.

Answer: Stomata are tiny pores present on the surface of the leaves. These pores are surrounded by 'guard cells'. Following are its function in plants:

- The carbon dioxide required in the process of photosynthesis is made available by Stomata, through direct absorption from the air.
- Stomata help Plants in absorption of mineral nutrients and water from the soil. Not all the water absorbed is 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 cools the plant.