

Chapter 14

Transportation in Plants and Circulation in Animals

I. Choose the best Answer:

Question 1.

Active transport involves:

- (a) movement of molecules from lower to higher concentration
- (b) expenditure of energy
- (c) it is an uphill task
- (d) all of the above

Answer:

- (d) all of the above

Question 2.

Water which is absorbed by roots is transported to aerial parts of the plant through ____.

- (a) cortex
- (b) epidermis
- (c) phloem
- (d) xylem.

Answer:

- (d) xylem.

Question 3.

During transpiration there is loss of:

- (a) carbon dioxide
- (b) oxygen
- (c) water
- (d) none of the above

Answer:

- (c) water

Question 4.

Root hairs are ____.

- (a) cortical cell
- (b) projection of the epidermal cell
- (c) unicellular
- (d) both b and c.

Answer:

- (b) projection of the epidermal cell

Question 5.

Which of the following process requires energy?

- (a) active transport
- (b) diffusion
- (c) osmosis
- (d) all of them

Answer:

- (a) active transport

Question 6.

The wall of the human heart is made of _____.

- (a) Endocardium
- (b) Epicardium
- (c) Myocardium
- (d) All of the above.

Answer:

- (d) All of the above.

Question 7.

Which is the sequence of correct blood flow?

- (a) ventricle – atrium – vein – arteries
- (b) atrium – ventricle – veins – arteries
- (c) atrium – ventricle – arteries – vein
- (d) ventricles – vein – atrium – arteries

Answer:

- (c) atrium – ventricle – arteries – vein

Question 8.

A patient with blood group O was injured in an accident and has blood loss. Which blood group the doctor should effectively use for transfusion in this condition?

- (a) O group
- (b) AB group
- (c) A or B group
- (d) all blood group.

Answer:

- (d) all blood group.

Question 9.

'Heart of heart' is called:

- (a) SA node
- (b) AV node
- (c) Purkinje fibres
- (d) Bundle of His

Answer:

- (a) SA node

Question 10.

Which one of the following regarding blood composition is correct?

- (a) Plasma – Blood + Lymphocyte
- (b) Serum – Blood + Fibrinogen
- (c) Lymph – Plasma + RBC + WBC
- (d) Blood – Plasma + RBC + WBC + Platelets.

Answer:

- (d) Blood – Plasma + RBC + WBC + Platelets.

II. Fill in the blanks:

1. involves evaporative loss of water from aerial parts.
2. Water enters the root cell through a plasma membrane.
3. Structures in roots that help to absorb water are
4. Normal blood pressure is
5. The normal human heartbeat rate is about time per minute.

Answer:

1. Transpiration
2. Semipermeable
3. Root hairs
4. 120 mm / 80 mm Hg
5. 72 – 75 times

III. Match the following:

Section – I

Column I		Column II	
A	Symplastic pathway	(i)	Leaf
B	Transpiration	(ii)	Plasmodesmata
C	Osmosis	(iii)	Pressure in xylem
D	Root Pressure	(iv)	Pressure gradient

Answer:

- A. (ii)
- B. (i)
- C. (iv)
- D. (iii)

Section – II

Column I		Column II	
A	Leukemia	(i)	Thrombocytes
B	Platelets	(ii)	Phagocyte
C	Monocytes	(iii)	Decrease in leucocytes
D	Leucopenia	(iv)	Blood Cancer
E	AB blood group	(v)	Allergic condition
F	O blood group	(vi)	Inflammation
G	Eosinophil	(vii)	Absence of antigen
H	Neutrophils	(viii)	Absence of antibody

Answer:

- A. (iv)
- B. (i)
- C. (ii)
- D. (iii)
- E. (viii)
- F. (vii)
- G. (v)
- H. (vi)

IV. State whether True or False. If false write the correct statement:

- The phloem is responsible for the translocation of food.
- Plants lose water by the process of transpiration.
- The form of sugar transported through the phloem is glucose.
- In apoplastic movement the water travels through the cell membrane and enter the cell.
- When the guard cells lose water the stoma opens.
- Initiation and stimulation of heart beat take place by nerves.
- All veins carry deoxygenated blood.
- WBC defend the body from bacterial and viral infections.
- The closure of the mitral and tricuspid valves at the start of the ventricular systole produces the first sound 'LUBB'.

Answer:

- True
- True
- False – The form of sugar transported through the phloem is sucrose.
- False – Apoplastic movement does not involve crossing the cell membrane.
- False – When the guard cells lose water the stoma closes.
- False – Initiation and stimulation of heart beat take place by Sino-atrial node.

7. False – All veins carry deoxygenated blood except the pulmonary veins,
8. True
9. True.

V. Answer in a word or sentence:

Question 1.

Name two layered protective covering of human heart.

Answer:

Pericardium is the two layered protective covering of human heart.

Question 2.

What is the shape of RBC in human blood?

Answer:

The shape of RBC in human blood is biconcave and disc – shaped.

Question 3.

Why is the colour of the blood red?

Answer:

The blood is red in colour due to the presence of respiratory pigment – haemoglobin.

Question 4.

Which kind of cells are found in the lymph?

Answer:

Lymphocytes in the lymph, which defend the body from infection.

Question 5.

Name the heart valve associated with the major arteries leaving the ventricles.

Answer:

Aortic valve present at the base of aorta.

Question 6.

Mention the artery which supplies blood to the heart muscle.

Answer:

Coronary arteries.

VI. Short Answer Questions.

Question 1.

What causes the opening and closing of guard cells of stomata during transpiration?

Answer:

The general mechanism of stomatal movement is based on entry and exit of water molecules in guard cells. When the turgidity increases within the guard cells the stomata open. When the guard cells lose water it becomes flaccid and the stomata closes.

Question 2.

What is cohesion?

Answer:

The force of attraction between molecules of water is called Cohesion.

Question 3.

Trace the pathway followed by water molecules from the time it enters a plant root to the time it escapes into the atmosphere from a leaf.

Answer:

Soil → root hair → cortex → endodermis → Pericycle → xylem → stem → leaves.

Question 4.

What would happen to the leaves of a plant that transpires more water than its absorption in the roots?

Answer:

When transpiration exceeds than water absorption by roots, the plant dehydrates. It affects plant processes such as growth, Photosynthesis and transpiration.

Question 5.

Describe the structure and working of the human heart.

Answer:

The heart is thick muscular organ located in the thoracic cavity. It is covered by a two layered sac called pericardium. The heart is four chambered with two auricles and two ventricles. Right Auricle receives deoxygenated blood from superior and inferior vena cava and passes to right ventricles impure blood passes to pulmonary artery and reaches the lungs.

Question 6.

Why is the circulation in man referred to as double circulation?

Answer:

The blood circulates twice, through the heart in one complete cycle, in the circulation of blood in man. So it is called double circulation.

Question 7.

What are heart sounds? How are they produced?

Answer:

'Lubb' and 'Dupp' are the sounds of the heart. 'Lubb' sound is produced by the ventricle-contraction. It arises due to closing of mitral and tricuspid valve.

'Dupp' is produced by ventricular diastole. This arises due to the closing of the semi-lunar valves of two auricles.

Question 8.

What is the importance of valves in the heart?

Answer:

The valves are the muscular flaps, that regulate the flow of blood in a single direction and prevent backflow of blood.

Question 9.

Who discovered Rh factor? Why was it named so?

Answer:

Landsteiner and Wiener discovered Rh factor of blood in 1940. Rh factor is a protein CD antigen present on the surface of the red blood cells in majority of humans. This protein is similar to the protein present in Rhesus monkey, hence the term Rh.

Question 10.

How are arteries and veins structurally different from one another?

Answer:

Arteries	Veins
Arteries are made up of thick walls.	Vein are made up of thin walls.
They carry the blood from the heart to different parts of the body except pulmonary artery.	They carry the blood from different parts of the body to the heart except pulmonary vein.
Arteries carries oxygenated blood.	Veins carries deoxygenated blood.

Question 11.

Why is the Sinoatrial node called the pacemaker of the heart?

Answer:

Sinoatrial node is called the pacemaker of the heart because it is capable of initiating impulse, which can stimulate the heart muscles to contract.

Question 12.

Differentiate between systemic circulation and pulmonary circulation.

Answer:

Systemic circulation	Pulmonary circulation
In systemic circulation, the oxygenated blood entering the aorta from the left ventricles is carried by a network of arteries to the tissues.	In pulmonary circulation, the blood from the heart (right ventricle) is taken to the lungs by pulmonary artery.
The deoxygenated blood from the tissue is collected by veins and vena cava, emptied into the right atrium.	The oxygenated blood from lungs is emptied into the left auricle by the pulmonary veins.

Question 13.

The complete events of the cardiac cycle last for 0.8 sec. What is the timing for each event?

Answer:

1. Atrial Systole: Contraction of auricles (0.1 sec)
2. Ventricular Systole: Contraction of ventricles (0.3 sec)
3. Ventricular diastole: Relaxation of Ventricles (0.4 sec).

VII. Give reasons for the following statements:

Question 1.

Minerals cannot be passively absorbed by the roots.

Answer:

All minerals cannot be passively absorbed by the roots because, minerals are present in the soil as charged particles that cannot move across the cell membranes and the concentration of minerals in the soil is usually lower than the concentration of minerals in the root. So, the minerals enter the root by active absorption through the cytoplasm of epidermal cells which needs energy.

Question 2.

Guard cells are responsible for opening and closing of stomata.

Answer:

Guard cells are responsible for the opening and closing of stomata because, during transpiration, the movement of ions (Potassium) in and out of the guard cells causes the opening and closing of Stomata. When the water moves inside the guard cells, causing them to swell up and become turgid making the stomata open. When guard cells cause water to move out of the cell and make guard cells shrunk and stomata pores close.

Question 3.

The movement of substances in the phloem can be in any direction.

Answer:

Phloem transports food from the source to sink. The source is part in which plant synthesizes food, sink is the part that needs or stores food. Since the source-sink relationship is variable, the direction of movement in the Phloem can be upwards or downwards, i.e., bidirectional.

Question 4.

Minerals in the plants are not lost when the leaf falls.

Answer:

Minerals like Phosphorus, Sulphur, Nitrogen and Potassium are remobilised in the soil from older dying leaves to younger leaves. This phenomenon is seen in deciduous plants. So minerals in the plants are not lost, when the leaf falls.

Question 5.

The walls of the right ventricle are thicker than the right auricles.

Answer:

Because the right ventricle has to pump out the deoxygenated blood with force away from the heart through pulmonary artery to lungs.

Question 6.

Mature RBC in mammals does not have cell organelles.

Answer:

Mature RBC in mammals does not have cell organelles because

- The lack of Nucleus in RBC makes the cells, biconcave and disc – shaped. RBC involved in the transport of oxygen from lungs to tissues.
- They do not have cell organelles in order to accommodate maximum space for haemoglobin.
- The loss of endoplasmic reticulum allows more flexibility, for RBC to move through narrow capillaries.

VIII. Long Answer Questions:

Question 1.

How do plants absorb water? Explain.

Answer:

Water present in the soil must reach the xylem of roots. Root hair is in contact with soil water. Their cell wall is thin and water easily diffuses in the passage of water from the soil to leaf is

Soil water → Root hair → Epidermis → Cortex → Endodermis → Pericycle → Xylem → Stem and leaf.

Once water is absorbed by the root hairs, it can move deeper into root layers by two pathways. Apoplast and Symplast.

1. Apoplast : This is the non living path in plants. It occurs through the intercellular spaces and walls of the cells. This movement dependent on the gradient.
2. Symplast : This is the living passage. The movement of water from cell to cell through plasmodesmata and cytoplasm, Movement is again down a potential gradient.

Question 2.

What is transpiration? Give the importance of transpiration.

Answer:

Transpiration is the evaporation of water in plants through stomata in the leaves.

Importance of Transpiration

- Creates transpirational pull for the transport of water.
- Supplies water for photosynthesis.
- Transports minerals from the soil to all parts of the plant.
- Cools the surface of the leaves by evaporation.
- Keeps the cells turgid; hence, maintains their shape.

Question 3.

Why are leucocytes classified as granulocytes and agranulocytes? Name each cell and

mention its functions.

Answer:

Depending on the presence and absence of granules, leucocytes are divided into two types Granulocytes and Agranulocytes.

Granulocytes : They are characterised by the presence of granules in cytoplasm. The granulocytes include neutrophils, eosinophils and basophils.

1. Neutrophils : They constitute about 60-65% of total WBC's. They are large and have many lobed nucleus. They are phagocytic in nature and appear in large number in and around the infected tissue.
2. Eosinophils : They have bilobed nucleus and constitute about 2-3% of total WBC's. Eosinophil increase during certain types of parasitic infection and allergic reaction. It bring about detoxification of toxin.
3. Basophils: Basophil have lobed nucleus. They form 0.5 – 1.0% of the total leucocytes. They release chemicals during the process of inflammation.

Agranulocytes : They are characterised by the absence of granules in the cytoplasm. These are of two types Lymphocytes and Monocytes.

1. Lymphocytes: These are about 20-25% of the total leucocytes. They produce antibodies during bacterial and viral infections.
2. Monocytes: They are the largest leucocytes and amoeboid in shape. These cells form 5-6% of the total leucocytes. They are phagocytic and can engulf bacteria.

Question 4.

Differentiate between systole and diastole. Explain the conduction of the heartbeat.

Answer:

One complete contraction (Systole) and relaxation (diastole) of the atrium and ventricles of the heart constitutes Heartbeat. The human heart is myogenic. Contraction is initiated by the sino – atrial (SA) node, which is situated in the wall of the right atrium, near the opening of the superior vena cava. SA node is broader at the top and tapering below and made up of thin fibres.

SA node acts as the 'pacemaker' of the heart because it is capable of initiating impulse which can stimulate the heart muscles to contract. The impulse spreads like a wave of contraction over the right and left atrial wall, pushing the blood, through the atrioventricular valves into the ventricles and the same wave from SA node reaches the atrioventricular node (AV), to emit an impulse of contraction, spreading to the ventricular muscle, through the atrioventricular bundle and the Purkinje fibres. The expansion of the artery every time, the blood is forced into the arteries, is called pulse. Normal pulse rate ranges from 70 – 90 / min.

Question 5.

Enumerate the functions of blood.

Answer:

1. Transport of respiratory gases (Oxygen and CO₂).
2. Transport of digested food materials to the different body cells.
3. Transport of hormones.
4. Transport of nitrogenous excretory products like ammonia, urea and uric acid.
5. It is involved in protection of the body and defense against diseases.
6. It acts as buffer and also helps in regulation of pH and body temperature.
7. It maintains proper water balance in the body.

IX. Assertion and Reasoning:

Direction: In each of the following **Questions** a statement of assertion (A) is given and a corresponding statement of reason (R) is given just below it. Mark the correct statement as.

- (a) If both A and R are true and R is correct explanation of A.
- (b) If both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) Both A and R are false.

1. Assertion: RBC plays an important role in the transport of respiratory gases.

Reason: RBC do not have cell organelles and nucleus.

Answer:

- (a) If both A and R are true and R is correct explanation of A.

2. Assertion: Persons with AB blood group are called an universal recipients, because they can receive blood from all groups.

Reason: Antibodies are absent in persons with AB blood group.

Answer:

- (a) If both A and R are true and R is correct explanation of A.

X. Higher Order Thinking Skills (HOTS):

Question 1.

When any dry plant material is kept in water, they swell up. Name and define the phenomenon involved in this change.

Answer:

The process is imbibition'. The type of diffusion in which a solid absorbs water and gets swelled up is Imbibition.

Question 2.

Why are the walls of the left ventricle thicker than the other chambers of the heart?

Answer:

The walls of the left ventricle are about three times thicker than the right ventricle. The left ventricle gives rise to the aorta, which carries oxygenated blood, to various organs of the body. The ventricle walls are thick because they have to pump out blood with force away from the heart.

Question 3.

Doctors use stethoscope to hear the sound of the heart. Why?

Answer:

A stethoscope is an instrument used to detect the sound produced by the internal organs of human body. It is an useful diagnostic tool to identify and localize health problems and diagnose disease.

Question 4.

How do the pulmonary artery and pulmonary vein differ in their function when compared to a normal artery and vein?

Answer:

- All arteries carry oxygenated blood, except pulmonary arteries, which carry deoxygenated blood from the right ventricle to the lungs.
- All veins carry deoxygenated blood, except pulmonary veins, which carry oxygenated blood from the lungs and to the left atrium of the Heart.

Question 5.

Transpiration is a necessary evil in plants. Explain.

Answer:

The water is lost from the leaves due to transpiration, pressure is created in, at the top to pull more water from the xylem to the leaves through the process of transpiration pull. This ensure the continuous flow of water from the roots of the leaves.