

PETT SEMINAIRE HIGHER SECONDARY SCHOOL, PUDUCHERRY

14. TRANSPORTATION IN PLANTS & CIRCULATION IN ANIMALS

Xstd

SELF – EVALUATION

BIOLOGY

I. Choose the correct answer :

1. Active transport involves **all of the above**.
 a) movement of molecules from lower to higher concentration
 b) expenditure of energy
 c) it is an uphill task
 d) all of the above
2. Water which is absorbed by roots is transported to aerial parts of the plant through **Xylem**.
 a) cortex
 b) epidermis
 c) phloem
 d) xylem
3. During transpiration, there is loss of **water**.
 a) carbon-dioxide
 b) oxygen
 c) water
 d) none of the above
4. Root hairs are **both b and c**.
 a) cortical cell
 b) projection of epidermal cell
 c) unicellular
 d) both b and c
5. Which of the following process requires energy? **Active transport**.
 a) active transport
 b) diffusion
 c) osmosis
 d) all of them
6. The wall of human heart is made of **all of the above**.
 a) Endocardium
 b) Epicardium
 c) Myocardium
 d) all of the above
7. Which is the correct sequence of blood flow? **Atrium – Ventricle – Arteries – Vein**.
 a) ventricle – atrium – vein - arteries
 b) atrium – ventricle – veins – arteries
 c) atrium – ventricle – arteries - vein
 d) ventricles – vein – atrium - arteries
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? **O group**.
 a) O group
 b) AB group
 c) A or B group
 d) all blood group
9. 'Heart of Heart' is called **SA node**.
 a) SA node
 b) AV node
 c) Purkinje fibres
 d) Bundle of His
10. Which one of the following shows correct composition of blood?
 a) Plasma – Blood + Lymphocyte
 b) Serum – Blood + Fibrinogen
 c) Lymph – Plasma + RBC + WBC
 d) Blood – Plasma + RBC + WBC + Platelets

II. Fill in the blanks :

01. **Transpiration** involves evaporative loss of water from aerial parts.
02. Water enters into the root hair cell through a **plasma** membrane.
03. Part of the root that absorbs water from the soil is **root hairs**.
04. Normal blood pressure is **120 mm / 80 mm Hg**.
05. The normal human heart rate is about **72 - 75** time per minute.

III. Match the following :

Section I

01. Symplastic pathway	-----	Plasmodesmata
02. Transpiration	-----	Leaf
03. Osmosis	-----	Pressure gradient
04. Root Pressure	-----	Pressure in Xylem

Section II

01. Leukemia	-----	Blood cancer
02. Platelets	-----	Thrombocytes
03. Monocytes	-----	Phagocyte
04. Leucopenia	-----	decrease in Leucocytes
05. AB blood group	-----	absence of antibody
06. O blood group	-----	absence of antigen
07. Eosinophil	-----	allergic condition
08. Neutrophils	-----	Inflammation

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

01. The phloem is responsible for the translocation of food. **TRUE**
02. Plants lose water by the process of transpiration. **TRUE**
03. The form of sugar transported through the phloem is glucose. **FALSE**
Correct Statement : The form of sugar transported through the phloem is **sucrose**.
04. In apoplastic movement the water travels through the cell membrane and enter the cell. **FALSE**
Correct Statement : In apoplastic movement the water travels through the **intercellular space and the walls of the cells**.
05. When guard cells lose water the stoma opens. **FALSE**
Correct Statement : When guard cells lose water the stoma **closes**.
06. Initiation and stimulation of heart beat take place by nerves. **FALSE**
Correct Statement : Initiation and stimulation of heart beat take place by **SA node**.
07. All veins carry deoxygenated blood. **FALSE**
Correct Statement : All veins carry deoxygenated blood **except pulmonary veins**.
08. WBC defend the body from bacterial and viral infections. **TRUE**
09. The closure of the mitral and tricuspid valves at the start of the ventricular systole produces the first sound 'LUBB'. **TRUE**

V. Answer in a word or sentence :

01. Name 2 layered protective covering of human heart.
The two – layered protective covering of human heart is Pericardium.
02. What is the shape of RBC in human blood?
The Human RBC, biconcave and disc-shaped.
03. Why is the colour of the blood red?
The colour of the blood is red due to presence of respiratory pigment haemoglobin
04. Which kind of cells are found in the lymph?
Lymph contains all types of cells (Plasma, WBC, Platelets, Proteins) except RBC
05. Name the heart valve associated with the major arteries leaving the ventricles.
The heart valves associated with the major arteries leaving the ventricles are Pulmonary and Aortic semilunar valves.
06. Mention the artery which supplies blood to the heart muscle.
The artery that supplies blood to the heart muscle is Coronary artery.

VI. Short answer questions :

1. What causes the opening and closing of guard cells of stomata during transpiration?
The opening and closing of stomata is due to the change in turgidity of the guard cells. When water enters the guard cells, the turgidity is increased and keeps the stoma open. When the guard cells lose water, the guard cells become flaccid and the stoma is closed.
2. What is Cohesion?
The force of attraction between molecules of water is called cohesion. It helps in the ascent of sap.
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.
 - i) Water from soil enters the root hairs by osmosis.
 - ii) By root pressure the water moves up to the base of the stem.
 - iii) Water then rises up to certain height in stem because of capillary action.
 - iv) Water molecules form a continuous column in the xylem because of forces of adhesion and cohesion among the molecules.
 - v) The transpiration pull sucks the water column from the xylem tubes.
 - vi) Thus water is able to rise to great heights even in the tallest plants.
4. What would happen to the leaves of a plant that transpires more water than its absorption in the roots?
When the leaves of a plant that transpires more water than its absorption in the roots, the leaves will be wilting or dropping. It leads to retarded growth.
5. Describe the structure and working of the human heart.

Structure of the heart:

- ❖ The human heart is a pumping organ made up of cardiac muscle. It is surrounded by double walled sac called pericardium. It is four chambered namely right auricle, right ventricle, left auricle and left ventricle.
- ❖ Right auricle receives deoxygenated blood from the body through vena cava.
- ❖ The deoxygenated blood from the right ventricle goes to lungs for purification through pulmonary artery (oxygenation).
- ❖ The oxygenated blood from lungs is brought back to the left auricle by pulmonary veins.
- ❖ The oxygenated blood from the left ventricle is distributed to all part by Aorta.

Working of the heart:

- ❖ The right atrium receives deoxygenated blood through superior vena cava, inferior vena cava and coronary sinus.
- ❖ Pulmonary veins bring oxygenated blood to left atrium from the lungs.
- ❖ The left and right ventricles have thick walls as they have to pump out blood with force away from the heart.
- ❖ The right and left pulmonary arteries supplies deoxygenated blood to the lungs.
- ❖ The left ventricles gives rise to aorta which carries oxygenated blood to the parts of the body.
- ❖ During cardiac cycle blood flows through the chambers of the heart in a specific direction.

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

In man, the blood circulates twice through the heart in one complete cycle. Hence, it is called double circulation. In double circulation the oxygenated blood do not mix with the deoxygenated blood.

7. What are heart sounds? How are they produced?

The rhythmic closure and opening of the valves cause the sound of the heart.

- The first sound LUBB is longer and is produced by the closure of tricuspid and bicuspid valves.
- The second sound DUPP is shorter and is produced by the closure of semilunar valves.

8. What is the importance of valves in the heart?

Valves are the muscular flaps that regulate the flow of blood in a single direction. Valves prevent the back flow of blood.

9. Who discovered Rh factor? Why was it named so?

Rh factor was discovered by Landsteiner and Weiner in 1940 in Rhesus monkey. Hence it is named as Rh factor. Antibodies developed against this Rh antigen are called Rh antibodies.

10. How are arteries and veins structurally different from one another?

Sl.No.	ARTERY	VEIN
01.	Distributing vessel	Collecting vessel
02.	Pink in colour	Red in colour
03.	Deep location	Superficial in location
04.	Blood flow with high pressure	Blood flow with low pressure
05.	Wall of Artery is Strong, Thick and Elastic	Wall of Vein is Weak, Thin and Non-elastic
06.	All arteries carry oxygenated blood except pulmonary arteries	All veins carry deoxygenated blood except pulmonary vein
07.	Internal valves are absent	Internal valves are present

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

Sinoatrial node acts as the 'pacemaker' of heart because it is capable of initiating Impulse which can stimulate the heart muscles to contract. The impulse spreads to auricles and later to ventricles through atrioventricular bundle and purkinje fibres.

12. Differentiate between SYSTEMIC circulation and PULMONARY circulation.

S.No	SYSTEMIC CIRCULATION	PULMONARY CIRCULATION
01.	Circulation of oxygenated blood from the left ventricle of the heart to various organs of the body	Circulation of deoxygenated blood from the right ventricle to the lungs.
02.	Return of deoxygenated blood to the right atrium	Return of oxygenated blood to the left atrium

13. The complete events of cardiac cycle last for 0.8 sec. What is the timing for each event?
Each cardiac cycle lasts about 0.8 second. The events during a single cardiac cycle involves:

- ❖ Atrial systole : Contraction of auricles (0.1 s)
- ❖ Ventricular systole : Contraction of ventricles (0.3 s)
- ❖ Ventricular Diastole : Relaxation of ventricles (0.4 s)

VII. Give reasons for the following statements :

01. Minerals cannot be passively absorbed by the roots.

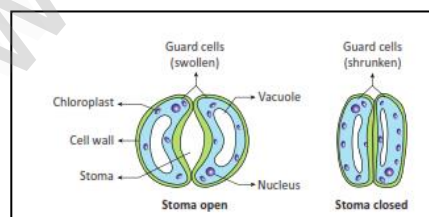
Plants depend on minerals from soil for its nutritional requirements. All mineral cannot be passively absorbed by the roots. Two factors accounts for this:

- (i) minerals are present in the soil as charged particles (ions) that cannot move across cell membranes and
- (ii) the concentration of minerals in the soil is usually lower than the concentration of minerals in the root.

So, minerals are absorbed by active absorption using the energy ATP.

02. Guard cells are responsible for opening and closing of stomata.

The opening and closing of stomata is due to the change in turgidity of the guard cells. When turgidity increases within the two guard cells the stoma open. When the guard cells lose water, it becomes flaccid and the stoma closes.



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

Phloem transport food (sucrose) from a source to a sink. Source is part of the plant that synthesize food. i.e., the leaf. Sink is the part that needs or stores the food. But, the source and sink may be reversed depending on the season, or the plant's need.

Since the source – sink relationship is variable, the direction of movement in the phloem can be upwards or downwards, i.e., bidirectional.

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

Minerals are remobilized from older dying leaves to younger leaves (seen in deciduous plants). Elements like Phosphorus, sulphur, Nitrogen and Potassium are easily mobilized while elements like Calcium are not remobilized.

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

The right ventricle when contracts, pushes the blood to the lungs with a force. Therefore, the walls are thick to pump the blood.

But, the right auricle receives only the blood. Therefore, the walls are thin.

06. Mature RBC in mammals do not have cell organelles.

The matured mammalian RBC's do not have cell organelles because their main function is to carry oxygen to all parts of the body. For this they need the respiratory pigment, haemoglobin only.

Loss of mitochondria allows the RBC to transport all the oxygen to tissues. Loss of Endoplasmic Reticulum allows more flexibility for RBC to move through the narrow capillaries.

VIII. Long answer questions :

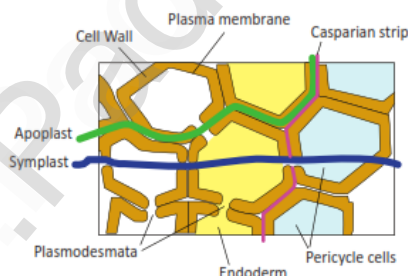
01. How do plants absorb water? Explain.

Water and minerals are absorbed by root hairs purely by diffusion. Osmosis also helps the plant to absorb water. The absorbed water moves from the epidermis to xylem through the cells of the cortex.

This movement is of two types:

(i) Apoplast pathway: In apoplast pathway, the water moves through the intercellular space and cell wall. This movement does not involve crossing the cell membrane. It is dependent on the gradient.

(ii) Symplast pathway: In symplast pathway, the water moves from one cell to another through plasmodesmata. This movement is relatively slower. The absorption of water by osmosis is proved by Thistle funnel experiment.



02. What is transpiration? Give the importance of transpiration.

The evaporation of excess of water in the form of water vapour through stomata in the leaves.

Transpiration pull: As water is lost from the leaves, pressure is created at the top to pull more water from the soil.

Importance of transpiration:

- ❖ Creates transpiration pull to absorb more water from the soil.
- ❖ Supplies water for photosynthesis.
- ❖ Transport mineral from the soil to all parts of the plant.
- ❖ Cools the surface of the leaves by evaporation.
- ❖ Keeps the cells turgid; hence maintain the shape.

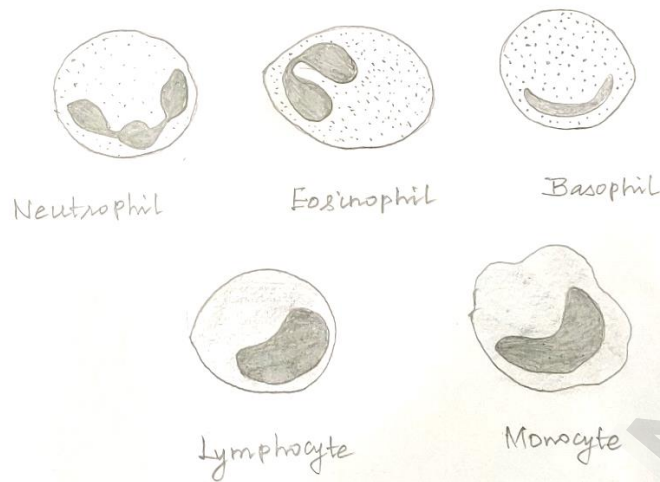
- Q3. Why are Leucocytes classified as Granulocytes and Agranulocytes? Name each cell and mention its functions.

Based on the presence or absence of granules in their cytoplasm, Leucocytes are classified as:

a) **Granulocytes**

and

b) **Agranulocytes**



a) GRANULOCYTES:

They contain granules in their cytoplasm. Their nucleus is irregular or lobed. The granulocytes are of three types. (i) NEUTROPHILS (ii) EOSINOPHILS and (iii) BASOPHILS

(i) NEUTROPHILS:

- They are large in size and have a 2 – 7 lobed nucleus.
- These corpuscles form 60% - 65 % of the total leucocytes.
- Their number is increased during infection and inflammation.

(ii) EOSINOPHILS:

- It has a bilobed nucleus and constitutes 2 % - 3% of the total leucocytes.
- Their number increases during conditions of allergy and parasitic infections.
- It brings about detoxification of toxins.

(iii) BASOPHILS:

- Basophils have lobed nucleus.
- They form 0.5 – 1.0 % of the total leucocytes.
- They release chemicals during the process of inflammation.

b) AGRANULOCYTES:

Granules are not found in the cytoplasm of these cells. The agranulocytes are of two types. (i) LYMPHOCYTES (ii) MONOCYTES

(i) LYMPHOCYTES:

- These are about 20 – 25 % of the total leucocytes.
- They produce antibodies during bacterial and viral infections.

(ii) MONOCYTES:

- They are the largest of the leucocytes and are amoeboid in shape.
- These cells form 5 – 6 % of the total leucocytes.
- They are Phagocytic and can engulf bacteria.

04. Differentiate between Systole and Diastole. Explain the condition of Heart beat.

SYSTOLE	DIASTOLE
Contraction phase of the heart chambers	Relaxation phase of the heart chambers

Conduction of heart beat:

- ❖ The human heart is myogenic in nature.
- ❖ Contraction is initiated by a special portion of the heart muscle, the Sino – atrial (SA) node or pacemaker.
- ❖ SA node is situated in the wall of the right atrium near the opening of superior vena cava.
- ❖ Sino – atrial node initiates impulse which can stimulate the heart muscles to contract.
- ❖ The impulse from SA node spreads as the wave of contraction over the right and left atrial wall pushing the blood through the atrio-ventricular valves into the ventricles. This is called atrial systole.
- ❖ The wave of contraction from SA node reaches the atrio-ventricular (AV) node which is stimulated to emit an impulse of contraction spreading to the ventricular muscle via the atrio-ventricular bundle and the Purkinje fibres. This is called ventricular systole.

05. Enumerate the functions of blood.

Functions of blood:

- ❖ Transport of respiratory gases (oxygen and CO₂)
- ❖ Transport of digested food materials to the different body cells.
- ❖ Transport of hormones.
- ❖ Transport of nitrogenous excretory products like ammonia, urea and uric acid.
- ❖ It is involved in protection of the body and defense against diseases.
- ❖ It acts as buffer and also helps in regulation of pH and body temperature.
- ❖ 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

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

Reason : RBC do not have cell organelles and nucleus.

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

02. **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.

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

X. Higher Order Thinking Skills :

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

The swelling up of dry material in water is called Imbibition. Imbibition is a type of Diffusion in which a solid absorbs water and gets swelled up. They do not dissolve in water.

Eg: Dry seeds or grapes soaked in water swell in size but do not dissolve.

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

The walls of the left ventricle thicker than the other chambers of the heart because It has to pump the blood to all parts of the body. Therefore, the walls are very thick.

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

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

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

A normal artery always carries oxygenated blood to all parts of the body, but the Pulmonary artery arising from the right ventricle carries deoxygenated blood to the lungs for the purification (oxygenation).

A normal vein always carries deoxygenated blood towards heart, but pulmonary veins carry oxygenated blood from the lungs to the left auricle.

05. Transpiration is a necessary evil in plants. Explain.

➤ Transpiration is a necessary evil in plants because transpiration is inevitable. As it enhances transport of water and minerals, Supplies water for photosynthesis, cools the surface of leaves.

➤ Yet it is potentially harmful

➤ Due to loss of water from the surface of the leaves on a large scale, may result in wilting, desiccation and often lead to death of a plant in case of drought condition.

➤ The water stress may result in reduced growth rate and reduction in growth.