# PETIT SEMINAIRE HIGHER SECONDARY SCHOOL, PUDUCHERRY

## 12. PLANT ANATOMY AND PLANT PHYSIOLOGY

X std SELF – EVALUATION BIOLOGY

### I. Choose the correct answer :

01. Casparian strips are present in the **endodermis** of root.
a) Cortex b) Pith c) Pericycle d) Endodermis

02. The endarch condition is the characteristic feature of **stem.**
a) root b) stem c) leaves d) flower

03. The Xylem and Phloem arranged side by side on same radius is called **conjoint.**
a) radial b) amphivasal c) conjoint d) none of these

04. Which is formed during anaerobic respiration? **Ethyl alcohol.**
a) Carbohydrate b) Ethyl alcohol c) Acetyl CoA d) Pyruvate

05. Kreb's cycle takes place in **Mitochondrial matrix.**
a) Chloroplast b) Mitochondrial matrix c) stomata d) inner mitochondrial membrane

06. Oxygen is produced at what point during Photosynthesis? **When $H_2O$ is splitted.**
a) when ATP converted to ADP b) when $CO_2$ is fixed
c) when H2O is splitted d) all of these

### II. Fill in the blanks :

01. The innermost layer of cortex in root is called **Endodermis.**
02. Xylem and Phloem are arranged in an alternate radii constitute a vascular bundle called **Radial bundle.**
03. Glycolysis takes place in **Cytoplasm.**
04. The source of $O_2$ liberated in photosynthesis is **Water.**
05. **Mitochondrion** is ATP factory of the cells.

### III. State whether the statements are True or False. Correct the False statement :

01. Phloem tissue is involved in the transport of water in plant. **FALSE**

*Correct Statement* : Phloem tissue is involved in the transport of **food** in plant.

02. The waxy protective covering of a plant is called as cuticle. **TRUE**

03. In monocot stem, cambium is present in-between Xylem and Phloem. **FALSE**

*Correct Statement* : In **dicot** stem, cambium is present in-between Xylem and Phloem.

04. Palisade parenchyma cells occur below upper epidermis in dicot root. **FALSE**

*Correct Statement* : Palisade parenchyma cells occur below upper epidermis in dicot **leaf**.

05. Mesophyll contains chlorophyll. **TRUE**

06. Anaerobic respiration produces more ATP than aerobic respiration. **FALSE**

*Correct Statement* : **Aerobic** respiration produces more ATP than **Anerobic** respiration.

## IV. Match the following :

| | | |
|---|---|---|
| 01. Amphicribal | ------- | **Fern** |
| 02. Cambium | ------- | **Secondary growth** |
| 03. Amphivasal | ------- | ***Dracaena*** |
| 04. Xylem | ------- | **Conduction of Water** |
| 05. Phloem | ------- | **Translocation of food** |

## V. Answer in a sentence :

01. What is Collateral Vascular bundle?
In a conjoint vascular bundle, if the xylem is towards the centre and the phloem towards Periphery, it is called collateral vascular bundle. Eg: **Monocot Stem**.

02. Where does the carbon that is used in photosynthesis come from?
The carbon that is used in photosynthesis comes from **carbon dioxide**; present in the atmosphere. It enters into the leaf through **stomata**.

03. What is the common step in aerobic and anaerobic pathway?
The common step in aerobic and anaerobic pathway is **glycolysis**.

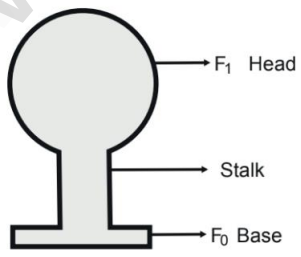
04. Name the phenomenon by which carbohydrates are oxidized to release ethyl alcohol.
Carbohydrates are oxidized to release Ethyl alcohol by **Anaerobic respiration**.

## VI. Short answer questions :

01. Give an account on Vascular bundle of dicot stem.
In dicot stem the vascular bundles are conjoint, collateral, endarch and open. They are arranged in the form of a ring around the pith.

02. Write a short note on Mesophyll.
- It is the ground tissue in dicot leaf. It is present between the upper and lower epidermis.
- It is differentiated into an upper palisade parenchyma and a lower spongy parenchyma.
- In palisade parenchyma the cells are vertically elongated and arranged in two rows. It contains chloroplast and do photosynthesis
- In spongy parenchyma the cells irregularly arranged with inter–cellular space.

03. Draw and label the structure of oxysomes.




04. Name the three basic tissues system in flowering plants.
Sachs in 1875 classified three tissue systems in flowering plants. They are :
- Dermal or epidermal tissue system
- Ground tissue system
- Vascular tissue system

05. What is photosynthesis and where in a cell does it occur ?

Photosynthesis (Photo = Light; synthesis = to build) is a process by which autotrophic organisms like green plants algae and chlorophyll containing bacteria utilize the energy from sunlight to synthesis their own food.

In this process carbon dioxide combines with water in the presence of sunlight and chlorophyll to form carbohydrates. During this process oxygen is released as a byproduct.

$$6CO_2 + 12H_2O \xrightarrow[\text{chlorophyll}]{\text{Light}} C_6H_{12}O_6 + 6H_2O + 6O_2\uparrow$$

Carbon dioxide + Water ⟶ Glucose + Water + Oxygen

Photosynthesis occurs in all green parts of the plant especially in green leaves.

06. What is respiratory quotient ?

It is the ratio of volume of carbon dioxide liberated and the volume of oxygen consumed during this respiration. It is expressed as

$$RQ = \frac{\text{volume of } CO_2 \text{ liberated}}{\text{volume of } O_2 \text{ consumed}}$$

07. Why should the light dependent reaction occur before the light independent reaction ?

The light dependent reaction (light reaction) occur before the light independent reaction (dark reaction) because the energy ATP and $NADPH_2$ required for the light independent reaction are produced during light dependent reaction.

08. Write the reaction for photosynthesis.

$$6CO_2 + 12H_2O \xrightarrow[\text{chlorophyll}]{\text{Light}} C_6H_{12}O_6 + 6H_2O + 6O_2\uparrow$$

Carbon dioxide + Water ⟶ Glucose + Water + Oxygen

## VII. Long answer questions :

01. Differentiate the following :

(a) MONOCOT root and DICOT root

| S. No. | TISSUES | DICOT ROOT | MONOCOT ROOT |
|---|---|---|---|
| 1. | NO OF XYLEM | Tetrarch | Polyarch |
| 2. | CAMBIUM | Present (open Vascular Bundle) during secondary growth | Absent (closed Vascular Bundle) |
| 3. | SECONDARY GROWTH | Present | Absent |
| 4. | PITH | Absent | Present |
| 5. | CONJUNCTIVE TISSUE | Parenchyma | Sclerenchyma |
| 6. | EXAMPLES | Bean | Maize |

(b) AEROBIC respiration and ANAEROBIC respiration.

| S. No | AEROBIC RESPIRATION | ANAEROBIC RES PIRATION |
|---|---|---|
| 1. | Oxygen required | Oxygen not required |
| 2. | Food is completely oxidized | Food is incompletely oxidized |
| 3. | The end products are carbon dioxide, water and energy (ATP). | The end products are carbon dioxide, ethyl alcohol and energy (ATP) |
| 4. | Energy produced is more | Energy produced is less |
| 5. | It occurs in higher organisms. **Eg**: man. | It occurs in lower organisms. **Eg**: Yeast. |

02. Describe and name three stages of cellular respiration that aerobic organisms use to obtain Energy from glucose.

**AEROBIC RESPIRATION**

Aerobic respiration is the type of cellular respiration in which organic food is completely oxidized with the help of oxygen into carbon dioxide, water and energy. It occurs in most plants and animals.

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + ATP$$

The three stages of cellular respiration that occurs in the aerobic organisms are :

(a) **Glycolysis**

(b) **Kreb's cycle** and

(c) **Electron transport chain**

**GLYCOLYSIS**:

- It is the first step in respiration.
- It is the breakdown of one molecule of glucose (6 Carbons) into two molecules of Pyruvic acid (3 carbons).
- Glycolysis takes place in the cytoplasm of the cell.
- It is common to both aerobic and anaerobic respiration.

**KREB'S CYCLE**:

- It occurs in the mitochondrial matrix.
- The pyruvic acid formed at the end of glycolysis enter into mitochondria are oxidized into carbon dioxide, water and the energy $NADH_2$ and $FADH_2$.
- It is also known as Tricarboxylic acid cycle (TCA cycle).

**ELECTRON TRANSPORT CHAIN**:

- It involves a system of electron carrier complex called electron transport chain (ETC).
- It is located on the inner membrane of the mitochondria.
- The energy $NADH_2$ and $FADH_2$ are oxidized to $NAD^+$ and $FAD^+$ to release the energy via electrons.
- The electrons as they move through the system produce ATP from ADP. This is called oxidative phosphorylation. In this reaction oxygen is reduced into water.

03. How does the light dependent reaction differ from the light independent reaction ? What are the end product and reactants in each ? Where does each reaction occur within the chloroplast ?

| Sl. No. | LIGHT DEPENDENT REACTION | LIGHT INDEPENDENT REACTION |
|---|---|---|
| 1. | Occurs in the presence of light. | It occurs in the day time but light is not required. |
| 2. | Occurs in grana of chloroplasts. | Occurs in stroma of chloroplasts. |
| 3. | This reaction is also known as hill reaction or light reaction. | This reaction is also known as Calvin cycle or dark reaction. |
| 4. | The reactants that take place in the reaction are photosynthesis pigments and sunlight. | The reactants that takes place in the reaction are ATP, NADPH2 and CO2 |
| 5. | The products of this reaction are ATP and NADPH2 | The products of this reaction are carbohydrates, water and oxygen. |
| 6. | Light energy is converted into chemical energy. | CO2 is reduced into carbohydrates. |

## VIII. Higher Order Thinking Skills :

01. The reactions of photosynthesis make up a bio-chemical pathway.

(a) What are the reactants and products for both light and dark reactions.

The reactants for the light reactions of photosynthesis are sunlight, water, $NADP^+$ and ADP. The products are oxygen, ATP and NADPH. The reactants for the calvin cycle are ATP, NADPH, $CO_2$ . The products are $NADP^+$, ADP and organic compounds.

(b) Explain how the biochemical pathway of photosynthesis recycles many of its own reactions and identify the recycled reactants.

ADP/ATP, $NADP^+$ / NADPH and electrons are recycled during photosynthesis. RuBP Which reacts with $CO_2$ in the calvin cycle is regenerated at each turn of the cycle.

02. Where do the light dependent reaction and the Calvin cycle occur in the chloroplast ?

The light reaction of photosynthesis occurs along the thylakoid membrane. The Calvin cycle occurs in the stroma, surrounding the thylakoids.