INDIAN SCHOOL AL WADI AL KABIR		
Class: XI	Department: SCIENCE 2026-2027 SUBJECT: BIOLOGY	Date: 31/10/2026
Worksheet: 11	UNIT- II Structural Organisation in Plants and Animals CHAPTER: Anatomy of flowering plants	Note: A4 FILE FORMAT
CLASS & SEC:	NAME OF THE STUDENT	ROLL NO.

I. OBJECTIVE TYPE QUESTIONS:

1. When xylem and phloem within a vascular bundle are arranged along the same radius, the bundle is described as:
   (A) Radial
   (B) Conjoint
   (C) Exarch
   (D) Open
2. Monocot stems differ from dicot stems because monocot stems possess:
   (A) Conjoint and open vascular bundles arranged in a ring
   (B) Conjoint and closed vascular bundles scattered in the ground tissue
   (C) Radial vascular bundles with a well-developed pith
   (D) An endodermis containing a distinct starch sheath
3. The tangential as well as radial walls of the root endodermal cells have a deposition of a water-impermeable, waxy material called suberin. This structure is known as the:
   (A) Bundle sheath
   (B) Starch sheath
   (C) Casparian strip
   (D) Trichome
4. In a dorsiventral (dicotyledonous) leaf, the palisade parenchyma is placed:
   (A) Abaxial and is made of elongated cells
   (B) Adaxial and is made of vertically elongated cells
   (C) Abaxial and is made of loosely arranged spherical cells
   (D) Adaxial and is made of loosely arranged spherical cells
   (D) Stops the process of photosynthesis completely
5. A distinct feature of a monocotyledonous stem cross-section, differentiating it instantly from a dicot stem, is the presence of:
   (A) Sclerenchymatous bundle sheaths enclosing scattered vascular bundles
   (B) Conjoint, open vascular bundles arranged symmetrically in a ring
   (C) A well-differentiated cortex, endodermis, and central pith
   (D) Collenchymatous hypodermis supporting large vascular bundles

Two statements are given - one labelled as Assertion (A) and the other labelled as Reason (R).

Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
B. Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
C. Assertion (A) is true, but Reason (R) is false.
D. Assertion (A) is false, but Reason (R) is true.

6. **Assertion (A):** Dicotyledonous stems possess open vascular bundles.
   Reason (R): Cambium is present between the xylem and phloem in dicot stems, giving them the ability to form secondary tissues.
7. **Assertion (A):** In a monocot leaf, stomata are present equally on both the upper and lower epidermis (isobilateral).
   Reason (R): Monocot leaves have a distinct differentiation of mesophyll into palisade and spongy parenchyma.
8. **Assertion (A):** Vascular bundles in monocotyledonous stems are surrounded by a sclerenchymatous bundle sheath.
   Reason (R): Monocot stems contain a large number of scattered vascular bundles.

II. VERY SHORT ANSWER TYPE QUESTIONS(2M)

9. Name the three primary tissue systems found in flowering plants. State one function of each.
10. Differentiate between open and closed vascular bundles.
11. What is the stomatal apparatus?

III. SHORT ANSWER TYPE QUESTIONS (3M)

12. Give a comparative account of
    (i) Dicot and monocot roots
    (ii) Dicot stem and monocot stem
13. Distinguish between:
    (i) Exarch and endarch condition
    (ii) Metaxylem and protoxylem

IV. CASE STUDY BASED QUESTIONS (4M)

14. A farmer notices that during hot, dry summer days, the leaves of his **maize crop** curl tightly inward. However, after a heavy rain or early in the morning, the leaves unroll completely and look flat and healthy.

A. Which specialised cells cause this rolling and unrolling?
B. How do these cells mechanically help the plant survive dry periods?
C. Distinguish between the mesophyll tissue of a dorsiventral (dicot) leaf and an isobilateral (monocot) leaf.
D. Describe the structural characteristics of vascular bundles found in flowering plant leaves.

V. LONG ANSWER TYPE QUESTIONS (5M)

14. Describe the internal structure of a dorsiventral (dicot) leaf with the help of a neat, labelled diagram.

<table>
<tr><th>S.NO</th><th>ANSWERS</th></tr>
<tr><td>1.</td><td>(A) Radial</td></tr>
<tr><td>2.</td><td>(B) Conjoint and closed vascular bundles scattered in the ground tissue</td></tr>
<tr><td>3.</td><td>(C) Casparian strip</td></tr>
<tr><td>4.</td><td>(B) Adaxial and is made of vertically elongated cells</td></tr>
<tr><td>5.</td><td>(A) Sclerenchymatous bundle sheaths enclosing scattered vascular bundles</td></tr>
<tr><td>6.</td><td>A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).</td></tr>
<tr><td>7.</td><td>C. Assertion (A) is true, but Reason (R) is false.</td></tr>
<tr><td>8.</td><td>B. Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).</td></tr>
<tr><td>II</td><td>VERY SHORT ANSWER TYPE QUESTIONS(2M)</td></tr>
<tr><td>9.</td><td>• Epidermal Tissue System: Formed by the epidermis, stomata, and trichomes; functions in protection and gas exchange.
• Ground (Fundamental) Tissue System: Consists of simple tissues like parenchyma and collenchyma; functions in photosynthesis and storage.
• Vascular Tissue System: Consists of xylem and phloem; functions in long-distance transport of water and nutrients.</td></tr>
<tr><td>10.</td><td>
<table>
<tr><td>Feature</td><td>Open Vascular Bundles</td><td>Closed Vascular Bundles</td></tr>
<tr><td>Cambium</td><td>A layer of cambium is present between the xylem and phloem.</td><td>Cambium is absent.</td></tr>
<tr><td>Secondary Growth</td><td>Due to the presence of cambium, they have the ability to form secondary xylem and phloem, resulting in an increase in the girth of the stem.</td><td>They do not possess a cambium layer, so they cannot undergo secondary growth.</td></tr>
<tr><td>Occurrence</td><td>They are a characteristic feature of dicotyledonous stems.</td><td>They are typically found in monocotyledonous stems.</td></tr>
</table>
</td></tr>
<tr><td>11.</td><td>The stomatal apparatus is the structure in the epidermis of leaves that regulates gas exchange and transpiration. It is composed of three parts working together:
• Stomatal pore (aperture): The opening for gas and water vapor exchange.
• Guard cells: A pair of specialized cells that surround the stomatal pore.
• Subsidiary cells: Epidermal cells near the guard cells that have specialized shape and size.</td></tr>
<tr><td>III</td><td>SHORT ANSWER TYPE QUESTIONS (3M)</td></tr>
<tr><td>12.</td><td>(i)
<table>
<tr><td>Feature</td><td>Dicot Root</td><td>Monocot Root</td></tr>
<tr><td>Vascular Bundles</td><td>Fewer in number, typically 2 to 6 (diarch to hexarch).</td><td>More in number, usually more than 6 (polyarch).</td></tr>
</table>
</td></tr>
</table>

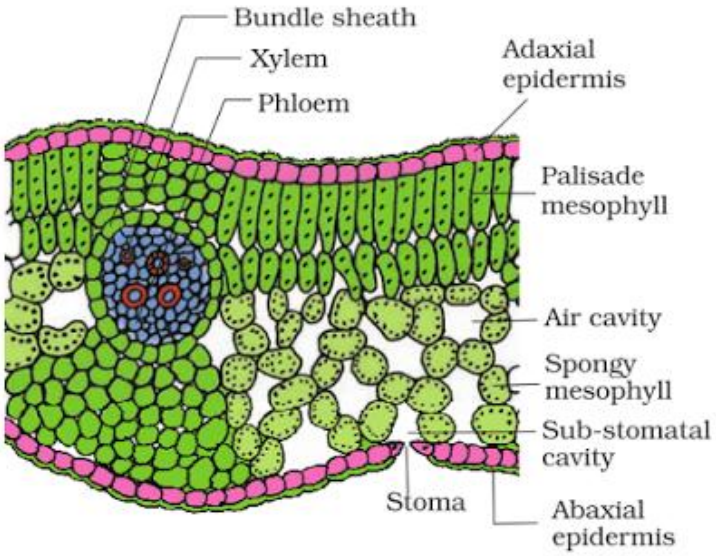
	Pith	Small or inconspicuous, sometimes absent.	Large, well-developed, and prominent.
	Secondary Growth	Undergoes secondary growth due to the presence of cambium.	Does not undergo secondary growth because cambium is absent.

(ii)

Feature	Dicot Stem	Monocot Stem
Vascular Bundles	Arranged in a ring, open (cambium present).	Scattered throughout the ground tissue, closed (cambium absent).
Ground Tissue	Differentiated into cortex, endodermis, pericycle, and pith.	Not differentiated; the entire mass of tissue is called ground tissue.
Secondary Growth	Typically undergoes secondary growth, leading to an increase in girth.	Secondary growth is absent due to the lack of vascular cambium.

13.	(i) exarch – protoxylem facing towards outside, endarch – protoxylem towards inside (ii) Metaxylem – later formed xylem vessels, protoxylem – first formed xylem vessels, size difference;
IV	**CASE STUDY BASED QUESTIONS (4M)**
14.A.	Bulliform cells (large, empty epidermal cells on the upper leaf surface).
B.	In dry conditions, these cells lose water and become flaccid, causing the leaf to roll inward to minimize water loss from transpiration. When water is available, they absorb it, become turgid, and unroll the leaf.
C.	Dorsiventral Leaf: The mesophyll is differentiated into two zones—an upper palisade parenchyma (elongated, closely packed columnar cells) and a lower spongy parenchyma (loosely arranged, spherical cells with large air spaces). Isobilateral Leaf: The mesophyll is undifferentiated. It consists entirely of uniform, spherical or oval parenchymatous cells with regular intercellular spaces.
D.	The vascular bundles in both monocot and dicot leaves are conjoint, collateral, and closed (lacking cambium). Crucially, each bundle is surrounded by a protective layer of tightly packed parenchymatous cells called the bundle sheath.
V	**LONG ANSWER TYPE QUESTIONS (5M)**

14.	A transverse section of a dicot leaf shows three main parts: **Epidermis, Mesophyll, and Vascular System.**
	• **1. Epidermis:**
	  ○ Covers both the upper (**adaxial**) and lower (**abaxial**) surfaces of the leaf and is covered by a distinct, waxy **cuticle** to prevent water loss.
	  ○ The abaxial (lower) epidermis generally contains **more stomata** than the adaxial epidermis.
	• **2. Mesophyll:**
	  ○ The tissue between the upper and lower epidermis is called the mesophyll. It contains chloroplasts for photosynthesis.
	  ○ It is **differentiated** into two types of cells:
	  ▪ **Palisade parenchyma:** Placed adaxially; made up of vertically elongated, closely packed columnar cells.
	• **Spongy parenchyma:** Placed abaxially; made up of loosely arranged, oval or round

n a m e s P P r e	cells with large intercellular spaces and air cavities. • **Vascular System:** o Includes vascular bundles which are **conjoint, collateral, and closed**. o The size of the vascular bundles varies depending on the size of the veins (larger in the midrib, smaller in lateral veins). o Each bundle is surrounded by a prominent layer of thick-walled cells called the **bundle sheath**. 

Prepared by: *Ms Sreeja Aravindakshan*	*Checked by:* *HOD Science*