



INDIAN SCHOOL AL WADI AL KABIR



CLASS: XI	DEPARTMENT: SCIENCE 2024 –025 SUBJECT: BIOLOGY	DATE: 25. 10. 2024
WORKSHEET: 9 WITH ANSWERS	UNIT – STRUCTURAL ORGANISATION IN PLANTS AND ANIMALS CHAPTER: ANATOMY OF FLOWERING PLANTS	NOTE: A4 FILE FORMAT
CLASS & SEC:	NAME OF THE STUDENT:	ROLL NO.

I. MULTIPLE CHOICE QUESTIONS (1M)

- Each stoma is composed of two bean shaped cells known as -
 - Guard cells
 - Bean cells
 - Stomatal pore
 - Subsidiary cells
- Which among the following statements are applicable for the vascular bundle of monocot stem?
 - Cambium is present in between xylem and phloem, open condition
 - Cambium is absent in between xylem and phloem, closed condition
 - Xylem and phloem are situated in the same bundles, conjoint condition
 - Xylem and phloem are situated in different bundles, radial condition
 - Both (ii) and (iii)
 - Both (i) and (iii)
 - Both (ii) and (iv)
 - Both (i) and (iv)
- In leaves, the ground tissue consists of thin-walled chloroplast containing cells and is called
 - Cortex
 - Pericycle
 - Mesophyll
 - Endodermis
- In dicotyledonous stems, cambium is present between phloem and xylem. Such vascular bundles are called:

- (a) Closed
 - (b) Open
 - (c) Conjoint
 - (d) Radial
5. The tangential as well as radial walls of the endodermal cells have a deposition of water-impermeable, waxy material _____ in the form of casparian strips:
- (a) Pectin
 - (b) Suberin
 - (c) Cutin
 - (d) Cellulose

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)** In the monocotyledons stem, the vascular bundles are referred to as closed.
Reason (R) In the monocotyledons, the vascular bundles have no cambium present in them.
7. **Assertion (A)** The abaxial epidermis generally bears more stomata.
Reason (R) This is to facilitate transpiration.
8. **Assertion (A)** The 'ring' arrangement of vascular bundles is a characteristic of dicot stem.
Reason (R) In dicot stem each vascular bundle is conjoint, open, and with endarch protoxylem.
9. **Assertion (A)** In an isobilateral leaf, the stomata are present on the upper surfaces of the epidermis.
Reason (R) In an isobilateral leaf, the mesophyll is not differentiated into palisade and spongy parenchyma

II. VERY SHORT ANSWER TYPE QUESTIONS(2M)

- 10. Differentiate between collateral and radial vascular bundle. Draw diagrams
- 11. What are trichomes and what are their functions?
- 12. What does a stomatal apparatus consist of?

III. SHORT ANSWER TYPE QUESTIONS (3M)

- 13. Give a comparative account of dicot and monocot roots

14. What is epidermal tissue system? Explain its functions.
15. Answer the following questions with reference to the anatomy of monocot stem:
- (a) How are vascular bundles arranged?
 - (b) How are xylem vessels arranged in each bundle?
 - (c) Are vascular bundles closed ones? What type of tissue they lack?
16. Name the three basic tissue systems in the flowering plants. Give the tissue names under each system.
17. Distinguish between:
- (a) Exarch and endarch condition
 - (b) Metaxylem and protoxylem
 - (c) Open vascular bundles and closed vascular bundles

IV. CASE STUDY BASED QUESTIONS (4M)

The epidermal tissue system forms the outer-most covering of the whole plant body and comprises epidermal cells, stomata and the epidermal appendages – the trichomes and hairs. The epidermis is the outermost layer of the primary plant body. It is made up of elongated, compactly arranged cells, which form a continuous layer. Epidermis is usually single layered. Epidermal cells are parenchymatous with a small amount of cytoplasm lining the cell wall and a large vacuole. The outside of the epidermis is often covered with a waxy thick layer called the cuticle which prevents the loss of water. Cuticle is absent in roots. Stomata are structures present in the epidermis of leaves. Stomata regulate the process of transpiration and gaseous exchange. Each stoma is composed of two bean shaped cells known as guard cells which enclose stomatal pore. In grasses, the guard cells are dumb-bell shaped. The outer walls of guard cells are thin and the inner walls are highly thickened. The guard cells possess chloroplasts and regulate the opening and closing of stomata. Sometimes, a few epidermal cells, in the vicinity of the guard cells become specialised in their shape and size and are known as subsidiary cells. The stomatal aperture, guard cells and the surrounding subsidiary cells are together called stomatal apparatus.

The cells of epidermis bear a number of hairs. The root hairs are unicellular elongations of the epidermal cells and help absorb water and minerals from the soil. On the stem the epidermal hairs are called trichomes. The trichomes in the shoot system are usually multicellular. They may be branched or unbranched and soft or stiff. They may even be secretory. The trichomes help in preventing water loss due to transpiration.

- (a) Write short note on stomata?
- (b) How are root hairs formed?
- (c) Define cuticle and give its function.
- (d) Mention the shape of guard cells in monocot and dicot leaf.

V. LONG ANSWER TYPE QUESTIONS (5M)

18. Distinguish between dicot stem and monocot stem based on their anatomical peculiarities.
19. Draw neat labelled diagrams of different types of vascular bundles in dicot stem and root. Give the differences.
20. Leaf of dicot plant is known as dorsiventral leaf.
- (a) Which part of this leaf is known as mesophyll and how are they differentiated?
- (b) How this leaf is different from isobilateral leaf?
- (c) What are bulliform cells?
21. Describe the internal structure of a isobilateral leaf with the help of labelled diagrams.

Answer Key

Q. No.	Answer
1	(a) Guard cells
2	(a) Both (ii) and (iii)
3	(c) Mesophyll
4	(b) Open
5	(b) Suberin
	ASSERTION & REASONING
6	A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
7	C. Assertion (A) is true, but Reason (R) is false
8	B. Both Assertion (A) and Reason (R) are true, but Reason (R) is the correct explanation of the Assertion (A).
9	D. Assertion (A) is false, but Reason (R) is true.
II	VERY SHORT ANSWER TYPE QUESTIONS(2M)
10	(Hints: collateral – same radius, radial – different radii, diagrams-Fig-6.2)
11	(Hints: epidermal appendages, multicellular, on stem and leaves, function - protection)
12	(Hints: Made up of stomatal aperture, guard cells and the surrounding subsidiary cells)
I	SHORT ANSWER TYPE QUESTIONS (3M)

13			Dicot root	Monocot root
	Epidermis		Rectangular shaped cells, presence of root hairs	Rectangular shaped cells, presence of root hairs
	Hypodermis		Absent	Absent
	Endodermis		Barrel shaped, Radial walls have a deposition of suberin (water impermeable substance) in the form of casparian strips.	Barrel shaped, Radial walls have a deposition of suberin (water impermeable substance) in the form of casparian strips
	Pericycle		- Barrel shaped parenchymatous cells. - Initiation of lateral roots and vascular cambium during the secondary growth.	- Barrel shaped parenchymatous cells. - They do not undergo secondary growth.
	Vascular bundle		Radial, Vascular bundles ranges from 2-4.	Radial, Vascular bundles are more than 6 (polyarch)
	Pith		Small or inconspicuous	Large pith
14	Epidermis Outermost covering of the whole plant body. Is single layered & made up of elongated compactly packed parenchymatous cells. Epidermis is covered with cuticle to prevent transpiration. Cuticle is absent in roots. Stomata Present in epidermis of leaf. Help in transpiration & exchange of gases. Stoma is made of 2 kidney shaped guard cells. Guard cell are dumb bell shaped in monocots. Outer wall of guard cells (away from pore) is thin while walls near the pore is thick. Guard cells possess chloroplasts & regulate the opening and closing of stomata. Subsidiary cells near the guard cells become specialised in shape & size. Stomatal apparatus comprises of stomatal aperture, guard cells & subsidiary cells. Epidermal hairs Root hairs:-unicellular elongations. Help in absorption of water & minerals. Trichomes:- Epidermal hairs on stem. They are multicellular/unicellular, branched or unbranched.			
15	(Hints: (i) – conjoint and collateral, scattered – explanation, (ii) – endarch, protoxylem lacunae, (iii) – yes – they lack cambium)			
16	(Hints: Epidermal Tissue System - The Ground Tissue System - The Vascular Tissue System, give tissue names)			
17	(Hints: (a) exarch – protoxylem facing towards outside, endarch – protoxylem towards inside, examples; (b) Metaxylem – later formed xylem vessels, protoxylem – first formed xylem vessels, size difference; (c) presence of cambium in between xylem and phloem – open, absence of cambium in between xylem and phloem – closed)			
IV	CASE STUDY BASED QUESTIONS (4M)			
18	(a) Stomata are structures present in the epidermis of leaves. Stomata regulate the process of transpiration and gaseous exchange. Each stoma is composed of two bean shaped cells known as guard cells which enclose stomatal pore. In grasses, the guard cells are dumb-bell shaped. The outer walls of guard cells are thin and the inner walls are highly thickened. The guard cells possess chloroplasts and regulate the opening and closing of stomata. Sometimes, a few epidermal cells, in the vicinity of the guard cells become specialised in their shape and size and			

	are known as subsidiary cells. The stomatal aperture, guard cells and the surrounding subsidiary cells are together called stomatal apparatus. (b) The cells of epidermis bear a number of hairs. Epidermal hairs present on the root are called as root hairs. It is unicellular. (c) Cuticle – The outside of the epidermis is often covered with a waxy thick layer called the cuticle. Function of cuticle –prevents the loss of water. (d) Monocot leaf- guard cells are dumbbell shaped and in dicot leaf -guard cells are bean shaped.																										
V	LONG ANSWER TYPE QUESTIONS (5M)																										
19	<table><tr><th></th><th>Dicot stem</th><th>Monocot stem</th></tr><tr><td>Epidermis</td><td>Single,</td><td>Single,</td></tr><tr><td>Hypodermis (GT)</td><td>Collenchymatous</td><td>Sclerenchymatous</td></tr><tr><td>Cortex (GT)</td><td>Few layered, parenchymatous</td><td>Not differentiated</td></tr><tr><td>Endodermis (GT)</td><td>Rich in starch grains (starchy sheath)</td><td>ABSENT</td></tr><tr><td>Pericycle (GT)</td><td>Few layered, sclerenchymatous, present as semilunar patches.</td><td>ABSENT</td></tr><tr><td>Vascular bundle</td><td>Conjoint ,open and arranged in ring like manner. Endarch</td><td>Conjoint and closed (2 types- peripheral bundles are smaller than centrally located ones) and scattered in cortex. Endarch. Phloem parenchyma absent and water containing cavities present in vascular bundles</td></tr><tr><td>Pith (GT)</td><td>Large pith, medullary arises and helps in secondary growth</td><td>Since VB is seen scattered in cortical region, pith is undifferentiated</td></tr></table>				Dicot stem	Monocot stem	Epidermis	Single,	Single,	Hypodermis (GT)	Collenchymatous	Sclerenchymatous	Cortex (GT)	Few layered, parenchymatous	Not differentiated	Endodermis (GT)	Rich in starch grains (starchy sheath)	ABSENT	Pericycle (GT)	Few layered, sclerenchymatous, present as semilunar patches.	ABSENT	Vascular bundle	Conjoint ,open and arranged in ring like manner. Endarch	Conjoint and closed (2 types- peripheral bundles are smaller than centrally located ones) and scattered in cortex. Endarch. Phloem parenchyma absent and water containing cavities present in vascular bundles	Pith (GT)	Large pith, medullary arises and helps in secondary growth	Since VB is seen scattered in cortical region, pith is undifferentiated
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20	(Hints: Diagrams of conjoint open (dicot stem), conjoint closed (monocot stem), radial, diarch – tetrarch (dicot root), radial polyarch (monocot root); differences)-Fig-6.4																										
21	(a) – ground tissue, differentiated into palisade and spongy – characteristic features of both (b) <table><tr><th></th><th>DICOT LEAF</th><th>MONOCOT LEAF</th></tr><tr><td>Mesophyll Tissue</td><td>is differentiated into palisade parenchyma and spongy parenchyma.</td><td>is not differentiated .</td></tr><tr><td>Stomata</td><td>A large number of stomata occur in the lower epidermis.</td><td>are found in both upper and lower epidermis.</td></tr><tr><td>Venation</td><td>Reticulate</td><td>Parallel</td></tr><tr><td>Bulliform Cells</td><td>Absent</td><td>Present in grasses</td></tr></table> (c) large, colourless, empty cells on upper epidermis of grass, function				DICOT LEAF	MONOCOT LEAF	Mesophyll Tissue	is differentiated into palisade parenchyma and spongy parenchyma.	is not differentiated .	Stomata	A large number of stomata occur in the lower epidermis.	are found in both upper and lower epidermis.	Venation	Reticulate	Parallel	Bulliform Cells	Absent	Present in grasses									
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22	(Hints: Figure 6.5 b, T.S. of leaf : Monocot																										

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