

MULTIPLE CHOICE QUESTIONS

1. A transverse section of the stem is stained first with safranin and then with fast green following the usual schedule of double staining for the preparation of a permanent slide. What would be the colour of the stained xylem and phloem?

- a. Red and green
- b. Green and red
- c. Orange and yellow
- d. Purple and orange

Solution:

Option (a) is the answer.

2. Match the followings and choose the correct option from below

Column I	Column II
A. Meristem	i. Photosynthesis, storage
B. Parenchyma	ii. mechanical support
C. Collenchyma	iii. Actively dividing cells
D. Sclerenchyma	iv. Stomata
E. Epidermal tissue	v. sclereids

Options:

- a. A-i, B-iii, C-v, D-ii, E-iv
- b. A-iii, B-i, C-ii, D-v, E-iv
- c. A-ii, B-iv, C-v, D-i, E-iii
- d. A-v, B-iv, C-iii, D-ii, E-i

Solution:

Option (b) is the answer.

3. Match the following and choose the correct option from below

Solution:

Column I	Column II
A. Cuticle	i. guard cells
B. Bulliform cells	ii. single layer
C. Stomata	iii. waxy layer
D. Epidermis	iv. empty colourless cell

Options:

- a. A-iii, B-iv, C-i, D-ii
- b. A-i, B-ii, C-iii, D-iv
- c. A-iii, B-ii, C-iv, D-i
- d. A-iii, B-ii, C-i, D-iv

Solution:

Option (a) is the answer.

4. Identify the simple tissue system from the following

- a. Parenchyma
- b. Xylem

- c. Epidermis
- d. Phloem

Solution:

Option (a) is the answer.

5. Cells of this tissue are living and show angular wall thickening. They also provide mechanical support. The tissue is

- a. Xylem
- b. Sclerenchyma
- c. Collenchyma
- d. Epidermis

Solution:

Option (c) is the answer.

6. Epiblema of roots is equivalent to

- a. Pericycle
- b. Endodermis
- c. Epidermis
- d. Stele

Solution:

Option (c) is the answer.

7. A conjoint and open vascular bundle will be observed in the transverse section of

- a. Monocot root
- b. Monocot stem
- c. Dicot root
- d. Dicot stem

Solution:

Option (d) is the answer.

8. Interfascicular cambium and cork cambium is formed due to

- a. Cell division
- b. Cell differentiation
- c. Cell dedifferentiation
- d. Redifferentiation

Solution:

Option (c) is the answer.

9. Phellogen and Phellem respectively denote

- a. Cork and cork cambium
- b. Cork cambium and cork
- c. Secondary cortex and cork
- d. Cork and secondary cortex

Solution:

Option (b) is the answer.

10. In which of the following pairs of parts of a flowering plant is the epidermis absent?

- a. Root tip and shoot tip
- b. Shoot bud and floral bud
- c. Ovule and seed
- d. Petiole and pedicel

Solution:

Option (a) is the answer.

11. How many shoot apical meristems are likely to be present in a twig of a plant possessing 4 branches and 26 leaves

- a. 26
- b. 1
- c. 5
- d. 30
- e. 4

Solution:

Option (c) is the answer

12. A piece of wood having no vessels (trachea) must belong to

- a. Teak
- b. Mango
- c. Pine
- d. Palm

Solution:

Option (c) is the answer.

13. A plant tissue, when stained, showed the presence of hemicellulose and pectin in the cell wall of its cells. The tissue represents

- a. Collenchyma
- b. Sclerenchyma
- c. Xylem
- d. Meristem

Solution:

Option (a) is the answer.

14. In conifers, fibres are likely to be absent in

- a. Secondary phloem
- b. Secondary xylem
- c. Primary phloem
- d. Leaves

Solution:

Option (b) is the answer.

15. When we peel the skin of a potato tuber, we remove

- a. Periderm

- b. Epidermis**
- c. Cuticle**
- d. Sapwood**

Solution:

Option (a) is the answer.

16. A vessel less piece of stem possessing prominent sieve tubes would belong to

- a. Pinus**
- b. Eucalyptus**
- c. Grass**
- d. Trochodendron**

Solution:

Option (d) is the answer.

17. Which one of the following cell types always divides by anticlinal cell division?

- a. fusiform initial cells**
- b, root cap**
- c. protoderm**
- d. phellogen**

Solution:

Option (c) is the answer.

18. What is the fate of primary xylem in a dicot root showing extensive secondary growth?

- a. It is retained in the centre of the axis**
- b. It gets crushed**
- c. Mayor may not get crushed**
- d. It gets surrounded by primary phloem**

Solution:

Option (a) is the answer.

VERY SHORT ANSWER TYPE QUESTIONS

1. Product of photosynthesis is transported from the leaves to various parts of the plants and stored in some cell before being utilised. What are the cells/ tissues that store them?

Solution:

Parenchyma which is thin and made up of cellulose stores the product of photosynthesis before being transported or utilized by the various parts of the plants.

2. Protoxylem is the first formed xylem. If the protoxylem lies next to phloem what kind of arrangement of xylem would you call it?

Solution:

If the protoxylem lies next to phloem, this type of arrangement of xylem is known as Exarch which is present in the roots.

3. What is the function of phloem parenchyma?**Solution:**

The function of phloem parenchyma is to store food material and other substances like resins, latex and mucilage and also help in translocation of foods.

4. What is present on the surface of the leaves which helps the plant prevent loss of water but is absent in roots?**Solution:**

The cuticle is present on the surface of the leaves which helps the plant prevent loss of water. The cuticle is absent in roots

5. What is the epidermal cell modification in plants which prevents water loss?**Solution:**

The epidermal cell modification in plants which prevents water loss is known as Bulliform Cells.

6. What part of the plant would show the following?**a. Radial vascular bundle****b. Polyarch xylem****c. Well developed pith****Solution:**

(a) Radial Vascular bundle is present in roots. Radial Vascular bundle includes xylem and phloem, and these are present in separate radii of the roots.

(b) Polyarch xylem is present in monocot root. When many strands of xylem are present, it is referred to as polyarch condition-a characteristic feature of monocot root.

(c) Well developed pith is present in dicot stem and monocot roots. Dicot stem and monocot roots have well-developed pith formed of the parenchymatous cell with intercellular spaces.

7. What are the cells that make the leaves curl in plants during water stress?**Solution:**

The cells that make the leaves curl in plants during water stress are Bulliform cells. The epidermal cell modification in plants which prevents water loss is known as Bulliform Cells.

8. What constitutes the cambial ring?**Solution:**

Interfascicular cambium and Intrafascicular cambium constitutes cambial ring. It is formed due to the meristematic activity of cambium.

9. Give one basic functional difference between phellogen and phelloderm?**Solution:**

The basic functional difference between phellogen and phelloderm is:

Phellogen is a meristematic tissue and Phelloderm is a permanent tissue. Phellogen is called as Cork Cambium, Phelloderm is called as Secondary Cortex.

10. Arrange the following in the sequence you would find them in a plant starting from the periphery – phellem, phellogen, phelloderm.**Solution:**

Phellem → Phellogen → Phelloderm

Phellem or cork is the outermost layer, followed by phellogen (cork cambium) which in turn is followed by phelloderm (secondary cortex).

11. If one debarks a tree, what parts of the plant is being removed?

Solution:

If one debarks a tree then periderm part (i.e., all tissues exterior to vascular cambium) of the plant is being removed.

12. The cross-section of a plant material showed the following features when viewed under the microscope.

a. The vascular bundles were radially arranged.

b. Four xylem strands with exarch condition of protoxylem.

To which organ should it be assigned?

Solution:

The cross-section is of dicot root. Vascular bundles are present are arranged alternately on separate radii thus called a radial arrangement.

13. What do hardwood and softwood stand for?

Solution:

Hardwood is wood from an angiosperm, whereas softwood is wood from gymnosperm.

SHORT ANSWER TYPE QUESTIONS

1. While eating peach or pear it is usually seen that some stone-like structures get entangled in the teeth, what are these stone-like structures called?

Solution:

The stone-like structures present in peach or pear is stone cells also known as Sclerieds. They are a type of Sclerenchyma which provides mechanical support to organs.

2. What is the commercial source of cork? How is it formed in the plant?

Solution:

The commercial source of cork is cork tissue of *Quercus suber*. Due to the activity of vascular cambium, the stem continues to increase in girth. Therefore the outer cortical and epidermis layer gets broken to provide new protection it has to be replaced.

3. Below is a list of plant fibres. From which part of the plant these are obtained

a. Coir b. Hemp c. Cotton d. Jute

Solution:

a. Coir is a natural fibre obtained from coconut husk.

b. Hemp fibre is obtained from the stem of *cannabis Sativa*.

c. Cotton fibre is obtained from epidermal growth of cotton seeds.

d. Jute is natural bast fibre is obtained from the stem of *Corchorus capsularis*.

4. What are the characteristic differences found in the vascular tissue of gymnosperms and angiosperms?

Solution:

In vascular tissues of gymnosperms, vessels are absent in Xylem instead they have tracheids. Companion cells are absent in phloem instead they have albuminous cells. In vascular tissue of angiosperms, vessels are present in xylem and lack tracheids. Companion cells are present in phloem and they lack albuminous cells.

5. Epidermal cells are often modified to perform specialized functions in plants. Name some of them and the function they perform.**Solution:**

- i. Root Hair: It increases the surface area for absorption of water and minerals from the soils
- ii. Trichomes: They are also known as stem hairs. They help in water loss prevention during transpiration.
- ii. Bulliform cells: Bulliform cells are present in grasses. They help in closing the stomata under stressful conditions and this prevents water loss.

6. The lawn grass (Cynodondactylon) needs to be mowed frequently to prevent its overgrowth. Which tissue is responsible for its rapid growth?**Solution:**

Meristematic tissue is responsible for the rapid growth of lawn grass.

7. Plants require water for their survival. But when watered excessively, plants die. Discuss.**Solution:**

Anything when goes excessive it will create a harmful cause. When excess water is poured in plants, the water removes the air trapped between the soil particles. They won't get enough oxygen for respiration

8. A transverse section of the trunk of a tree shows concentric rings which are known as growth rings. How are these rings formed? What is the significance of these rings?**Solution:**

The growth rings in the trunk of the tree are formed by cambial ring due to secondary growth. Each ring contains earlywood and latewood. Secondary growth occurs in dicot trees due to the activity of cambium which is a meristematic tissue. The concentric growth rings are called annual rings.

9. Trunks of some of the aged tree species appear to be composed of several fused trunks. Is it a physiological or anatomical abnormality? Explain in detail.**Solution:**

Trunks of some of the aged tree species appear to be composed of several fused trunks. This is an anatomical abnormality. It is an abnormal type of secondary growth, where a regular vascular cambium or cork cambium is not formed in its normal position.

10. What is the difference between lenticels and stomata?**Solution:**

Lenticels are lens-shaped openings present on the trunk or stem of the tree. Stomata are bean-shaped opening present on the lower surface of leaves.

11. Write the function of**a. Sieve tube**

b. Interfascicular cambium

c. Collenchyma

d. Aerenchyma

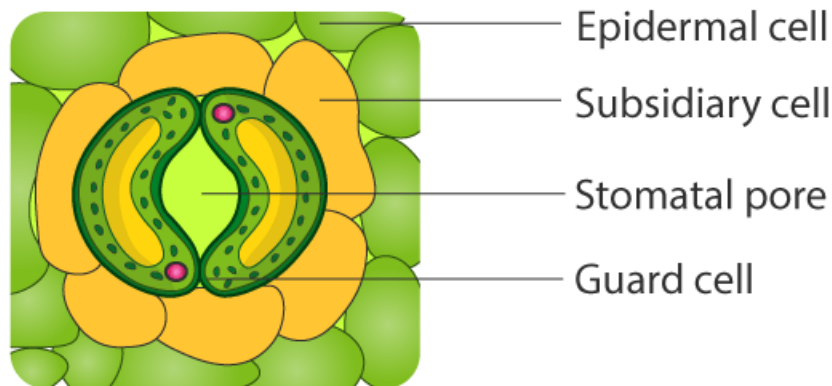
Solution:

- a. Sieve tube – They help in translocation of synthesized food throughout the plant. It is present in phloem tissue.
- b. Interfascicular cambium – It facilitates secondary growth in dicot stem and root and also helps in the formation of the vascular cambium.
- c. Collenchyma – It provides mechanical support to young stem. Its cells have angular thickening at corners.
- d. Aerenchyma – It provides buoyancy to floating plants.

12. The stomatal pore is guarded by two kidney-shaped guard cells. Name the epidermal cells surrounding the guard cells. How does a guard cell differ from an epidermal cell? Use a diagram to illustrate your answer.

Solution:

Stomata regulate the process of transpiration and gaseous exchange. The epidermal cells surrounding the guard cells are known as Subsidiary cells.

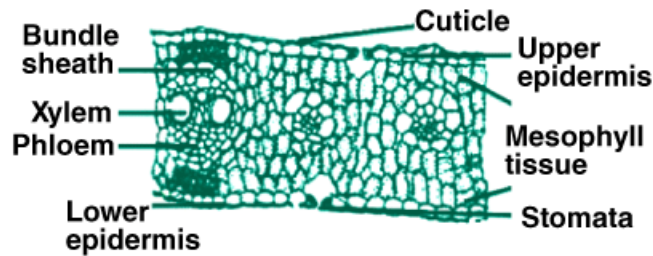


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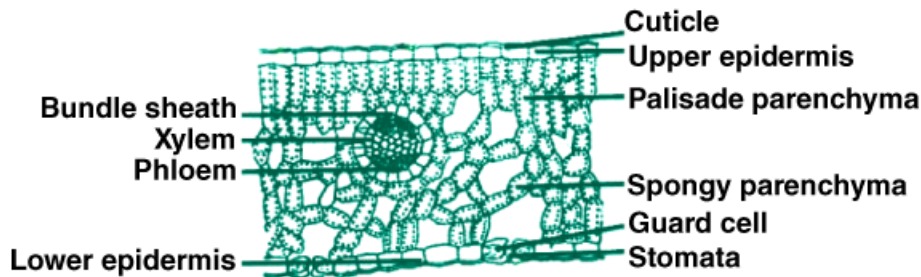
13. Point out the differences in the anatomy of the leaf of peepal (*Ficus religiosa*) and maize (*Zea mays*). Draw the diagrams and label the differences.

Solution:

Peepal is a dorsiventral leaf which is a dicot. Stomata are more on the lower surface and mesophyll is made up of two types of tissues. Maize is an isobilateral leaf which is a monocot. Stomata are equal in number on both the surfaces



T.S of monocot leaf



T.S of dicot leaf

14. Palm is a monocotyledonous plant, yet it increases in girth. Why and how?

Solution:

Palm is a monocotyledonous plant, yet it increases in girth slowly due to secondary growth. It is due to parenchymatous cell division and enlargement in the ground tissue. Thus, repeated divisions cause an increase in girth of the stem.

LONG ANSWER TYPE QUESTIONS

1. The arrangement of ovules within the ovary is known as placentation.

What does the term placenta refer to? Draw various types of placentations in the flower as seen in T.S. and V.S.

Solution:

The placenta is a tissue which is flattened, cushion-like tissue. Through the placenta, the ovule is attached to the wall of the ovary. Placentations are of many types like marginal, axile, parental, basal, central and free central.



2. Deciduous plants shed their leaves during summer or in autumn. This process of shedding of leaves is called abscission. Apart from physiological changes what anatomical mechanism is involved in the abscission of leaves?

Solution:

- Structural: In deciduous trees, an abscission zone also known as separation zone is formed at the base of the petiole. It is composed of a top layer and bottom layer. The cells in the top layer have weak cell walls and the bottom layer expand in winter and break the cell walls of the top layer, this result in the shedding of leaves.
- The loss of chlorophyll may also result in the abscission process.
- Hormonal: Abscisic acid hormone stimulates abscission.

3. Is Pinus an evergreen tree? Comment.

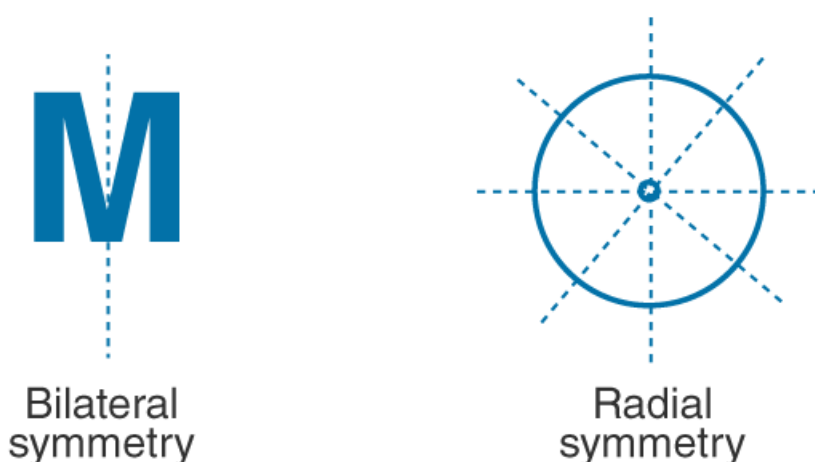
Solution:

Pinus does not shed its leaves during a particular season and is always evergreen. Hence Pinus is considered as an evergreen tree belongs to gymnosperms. The leaves in gymnosperms can withstand in the extreme temperatures, humidity and wind.

4. Assume that a pencil box held in your hand represents a plant cell. In how many possible planes can it be cut? Indicate these cuts with the help of line drawings.

Solution:

When any plane passing through the central axis of the plant cell divides the cell into two identical halves called radial symmetry



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5. Each of the following terms has some anatomical significance. What do these terms mean? Explain with the help of line diagrams.

- Plasmodesmata**
- Middle lamella**
- Secondary wall**

Solution:

- Plasmodesmata – A microscopic channels between two cells through the cell wall are called Plasmodesmata.
- Middle lamella – It is a layer in the cell wall and is made of calcium pectate (mainly) and magnesium pectate.
- Secondary wall – this is a non-extensible layer. It is made of hemicelluloses. It provides rigidity to the cell.

6. Distinguish between the following:

- Exarch and endarch**
- Stele and vascular bundle**
- Protoxylem and metaxylem**
- Interfascicular cambium and intrafascicular cambium**
- Open and closed vascular bundles**
- Stem hair and root hair**

Solution:

- Exarch is a condition where the protoxylem is present towards the periphery and metaxylem is present towards the centre. Endarch is where the protoxylem is present towards the centre and metaxylem is present towards the periphery
- A stele is the central part of the root or stems whereas a vascular bundle is a part of stele.
- Earlier formed xylem is called protoxylem and later formed xylem is called metaxylem
- Interfascicular cambium is present in between the primary xylem and primary phloem whereas intrafascicular cambium is present in between the two vascular bundles making the cambium continuous

and forming a complete ring of cambium

e. Open vascular bundles are capable of secondary growth whereas the closed vascular bundles are not capable of secondary growth

f. Stem hair is multicellular and they are epidermal outgrowths known as trichomes whereas root hair is unicellular and they are unicellular elongations of epidermal cells.



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