

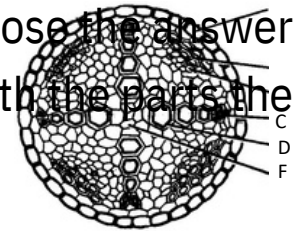
ANATOMY OF FLOWERING PLANTS

1. Mechanical tissue consisting of living cells is
(A) Sclerenchyma (B) Collenchyma
(C) Chlorenchyma (D) Parenchyma
2. Cystoliths crystals depositions found in the epidermal outgrowth of *Ficus bengalensis* leaves are made up which substance? (A) Calcium bicarbonate (C) Calcium oxalate
(B) Calcium carbonate
(D) Calcium hydroxide
3. Meristematic cells are
(A) Thin-walled, isodiametric, nucleate and less protoplasmic.
(B) Thin-walled, isodiametric, nucleate and densely protoplasmic.
(C) Thick-walled, isodiametric, non-nucleate and densely protoplasmic.
(D) Thick-walled, isodiametric, nucleate and less protoplasmic.
4. Companion cells in plants are associated with
(A) Vessels (B) Sperms
(C) Sieve elements (D) Guard cells

8. In what respect, the pericycle of a root differs from that of the stem

- (A) Sclerenchymatous in root and collenchymatous in stem
- (B) Collenchymatous in root and parenchymatous in stem
- (C) Parenchymatous in root and sclerenchymatous in stem
- (D) Parenchymatous in root and collenchymatous in stem

9. In the diagram of T.S. of Stele of Dicot Root, the different parts have been indicated by alphabets; choose the answer A in which these alphabets correctly match with the parts they indicate



(A) A = Endodermis

B = Conjunctive tissue

C = Metaxylem

D = Protoxylem

E = Phloem F = Pith

(B) A = Endodermis

B = Pith

C = Protoxylem

D = Metaxylem

E = Protoxylem

F = Conjunctive tissue

(C) A = Pericycle

B = Conjunctive tissue

C = Metaxylem

D = Protoxylem

E = Phloem

(D) A = Endodermis

B = Conjunctive tissue

C = Protoxylem

D = Metaxylem

E = Phloem F = Pith

10. Other names of secondary cortex, cork cambium and cork are

- (A) Phellem, phelloderm and phellogen
- (B) Phellogen, phellem and phelloderm
- (C) Phelloderm, phellogen and phellem
- (D) Phellogen, phelloderm and phellem

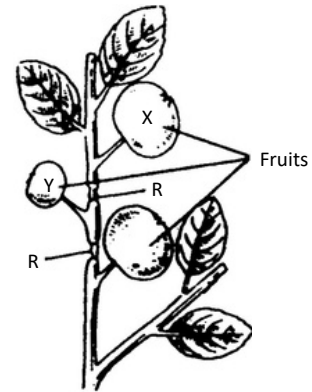
11. In woody dicotyledons, the arrangement of vessels is either diffuse porous or ring porous. Based on the these data, which one of the following statements is correct?

- (A) Ring porous vessels are specialised and are used for conducting more water for a shorter period only, when tyloses occur early in the vessels.
- (B) Although diffuse porous vessels are not so specialized as ring porous vessels, they conduct more water at all periods and through new xylem vessels added gradually during development.
- (C) Diffuse porous vessels carry more water and also faster because of a greater number of small vessels having greater capillary force.
- (D) Ring porous vessels conduct more water as they are formed early during development, when the need for water is great.

12. Which of the following statement is CORRECT regarding the promeristems?
- (A) They give rise to primary meristems.
 - (B) The cells produced by it differentiate into primary or secondary permanent tissues.
 - (C) They are formed at the later stage in the life cycle of a plant.
 - (D) They form cork cambium.
13. For a successful graft, the adhesion between stock and scion is a must. Which one of the following is the earliest event towards a good graft
- (A) Production of plasmodesmata in the cells at the interface of stock and scion.
 - (B) Coordinated differentiation of vascular tissue between the stock and scion.
 - (C) Regeneration of cortex and epidermis over the union of stock and scion.
 - (D) Production of callus tissue between the cells of stock and scion.
14. Which of the following region of plant have casparian strips?
- (A) Endodermis of root
 - (B) Pericycle of root
 - (C) Endodermis of stem
 - (D) Pericycle of stem

15. Grafting is not possible in monocots because they
- (A) Have scattered vascular bundles
 - (B) Have parallel venation
 - (C) Are herbaceous
 - (D) Lack cambium
16. When strong wind blows, the plants bend down and then again become erect. This flexibility in plants is due to
- (A) Sclerenchyma
 - (B) Parenchyma
 - (C) Collenchyma
 - (D) Chlorenchyma
17. Quiescent centre is a zone with:
- (A) Mother of columella cell
 - (B) Least mitotic activity in the root apex
 - (C) Maximum mitotic activity in the root apex
 - (D) shoot- promeristem of higher plants.
18. Which of the following statement is INCORRECT regarding heart-wood?
- (A) It is highly durable.
 - (B) It conducts water and minerals efficiently.
 - (C) It comprises dead elements with highly lignified walls.
 - (D) It is dark brown in colour.

19. The diagram below shows part of the shoot system of a fruit tree. At the two places marked *R*, all tissues external to the xylem were removed at the flowering stage



The diagram suggests that

- (A) Fruit *Y* had been developing for one year less than *X* and *Z*
- (B) Fruit *Y* received less light than *X* and *Z*
- (C) Fruit *Y* had received insufficient moisture since water was carried from the roots by the xylem vessels
- (D) Assimilated material is transported in phloem tubes regardless direction (upwards or downwards)

20. A particular type of plant cell undergoes all of the following changes during its development
 Enlargement of plasmodesmata.

Degeneration of the nucleus.

Modification (but not elimination) of endoplasmic reticulum.

Which one of the following cell types fits this description?

- (A) Companion cell
- (B) Cork cell
- (C) Sclereid
- (D) Sieve tube element

21. The epiblema or the piliferous layer is the outermost layer of cells of a young root. It is

- (A) Cuticularized and not provided with stomata
- (B) Non-cuticularized and provided with stomata
- (C) Cuticularized and provided with stomata
- (D) Non-cuticularized and not provided with stomata

22. The soft and weak stems of hydrophytic plants are due to the poor development of:

- (A) Cortex and supporting parenchyma
- (B) Phloem and cortex
- (C) Xylem and supporting tissue
- (D) Pith and endodermis

23. A concentric amphivasal (leptocentric) vascular bundle is one in which

- (A) Centrally located phloem is surrounded by the xylem or xylem surrounds phloem.
- (B) Centrally located xylem is surrounded by phloem.
- (C) Xylem is flanked by phloem on the interior and exterior side only.
- (D) Phloem is flanked by the xylem on interior side only.

24. A collateral vascular bundle is that
- (A) In which both xylem and phloem are present with the xylem towards the centre
 - (B) In which both xylem and phloem are present with the xylem on both the sides
 - (C) Which has either phloem or xylem
 - (D) In which both xylem and phloem are present with the xylem towards periphery
25. In a centripetal xylem
- (A) The protoxylem develops towards the periphery and metaxylem towards the centre.
 - (B) The protoxylem develops towards the centre and metaxylem towards the periphery.
 - (C) Both protoxylem and metaxylem develop towards the centre.
 - (D) Both protoxylem and metaxylem develop towards the periphery.
26. In a dicotyledonous stem, the sequence of tissues from the outside to the inside is
- (A) Phellem – Pericycle – Endodermis - Phloem
 - (B) Phellem – Phloem - Endodermis - Pericycle
 - (C) Phellem - Endodermis - Pericycle - Phloem
 - (D) Pericycle – Phellem - Endodermis - Phloem

27. Monocotyledons have closed vascular bundles which means that they lack:
- (A) Cambium
 - (B) Pith
 - (C) Ground tissue
 - (D) Conjunctive tissues
28. After preparing a transverse section out of a cut piece of a plant axis, it was seen that it has a C shaped open arch of endarch collateral vascular bundles with secondary growth. This indicates that it is a transverse section of
- (A) A dicotyledonous petiole
 - (B) A dicot stem at the node
 - (C) A dicot root at the point where a root branch is coming out.
 - (D) A phylloclade
29. Annual rings are the bands of
- (A) Secondary cortex and cork
 - (B) Secondary vascular tissues
 - (C) Secondary xylem and medullary rays
 - (D) Secondary phloem and medullary rays
30. If you cut the old trunk of a tree transversely, you will observe that the outer region of secondary wood is lighter in colour. This region of wood is known as
- (A) Autumn wood
 - (B) Sap wood

(C) Heart wood

(D) Spring wood

31. Which of the following is true for the origin of epidermis and hypodermis

(A) Epidermis from corpus and hypodermis from tunica

(B) Epidermis from tunica and hypodermis from corpus

(C) Both from tunica

(D) Both from corpus

32. After the secondary growth, the oldest layer of secondary phloem in a dicot stem is located

(A) Just outside the vascular cambium

(B) Just inside the vascular cambium

(C) Just inside the vascular primary phloem

(D) Just outside the secondary xylem

33. A leaf showing stomata and cuticle on upper epidermis, raphides in the mesophyll and diaphragm cells, came from a plant that probably is a

(A) Mesophyte

(B) Floating hydrophyte

(C) Submerged hydrophyte

(D) Succulent xerophyte

34. Pericycle in roots is responsible for

(A) Formation of lateral roots

(B) Providing mechanical support

(C) Formation of vascular bundle from cortex

(D) Formation of vascular bundle from endodermis

35. The bicollateral vascular bundle is the characteristic feature of plants belonging to the family

(A) Cruciferae

(B) Liliaceae

(C) Cucurbitaceae

(D) Malvaceae

36. Which of the following constitute the hypodermis of the monocot stem?

(A) Xylem

(B) Sclerenchyma

(C) Parenchyma

(D) Collenchyma

37. Sieve tubes are devoid of nuclei, how then its life is sustained. It is sustained by the nucleus of

(A) Phloem parenchyma (B) Companion cells (C)

Phloem parenchyma and companion cells both (D)

Either companion cells or phloem parenchyma

38. Which of the following elements exert a greater resistance to the flow of water by virtue of the pits present on their contiguous walls

(A) Vessels

(B) Tracheids

(C) Fibres

(D) Sieve tubes

39. Secondary meristems are set apart from primary meristems in that they

- (A) Are responsible for secondary growth
- (B) Increase the size of state
- (C) Form the cork and secondary vascular tissue
- (D) Always arise in permanent tissue

40. Xylem parenchyma occurring in association with vessels is known as

- (A) Paratracheal xylem parenchyma
- (B) Apotracheal xylem parenchyma
- (C) Syntracheal xylem parenchyma
- (D) Associated xylem parenchyma

41. Match column I and column II

Organs	vascular bundle
(p) Maize stem	(1) Bicollateral and open
(q) Cucurbita stem	(2) Radial
(r) Sunflower stem	(3)
(s) Maize root	(4) Conjoint and open

- (A) (p-1) (q-4) (r-3) (s-2)
- (B) (p-2) (q-3) (r-1) (s-4)
- (C) (p-3) (q-1) (r-4) (s-2)
- (D) (p-3) (q-4) (r-2) (s-1)

42. Match column I with column II

Tissue	Function
(p) Aerenchyma	(A) Increase in length of plants
(q) Lateral meristem	(B) Increase in nodal region

(r) Apical meristem	(C) support, protection, storage
(s) Intercalary meristem	(D) Increase in diameter of trunk

(A) (p-d) (q-c) (r-b) (s-a)

(B) (p-c) (q-d) (r-a) (s-b)

(C) (p-a) (q-b) (r-d) (s-c)

(D) (p-c) (q-a) (r-d) (s-b)

43.

Tissue	Deposition
(p) Tracheae	(A)
(q) parenchyma	callose
(r) sieve cell	(B) pectin
(s) collenchyma	(C) lignin
	(D)
	cellulose

(A) (p-1) (q-2) (r-3) (s-4)

(B) (p-3) (q-1) (r-4) (s-2)

(C) (p-3) (q-4) (r-1) (s-2)

(D) (p-2) (q-3) (r-1) (s-2)

44.

Tissue	Function
(p) Chlorenchyma	(A) Strength, Support
(q) sclerenchyma	(B) Bouyancy, Support
(r) Aerenchyma	(C) Growth
(s) Meristem	(D) Photosynthesis

(A) (p-(iii)) , (q-(i)) , (r-(ii)) , (s-(iv))

(B) (p-(ii)) , (q-(iv)) , (r-(i)) , (s-(iii))

- (C) (p-(iv)) , (q-(i)) , (r-(ii)) , (s-(iii))
 (D) (p-(i)) , (q-(iii)) , (r-(ii)) , (s-(iv))

45. Match column I with column II

Specific Structure	Location
(p) Resin duct	(A) Maize stem Vascular bundle
(q) Lysigenous cavity	(B) Maize leaf-upper epidermis
(r) Passage cell	(C) sunflower stem cortex
(s) Motor cells	(D) Sunflower root endodermis

- (A) (p-(i)) , (q-(iv)) , (r-(ii)) , (s-(iii))
 (B) (p-(iii)) , (q-(i)) , (r-(iv)) , (s-(ii))
 (C) (p-(ii)) , (q-(iii)) , (r-(i)) , (s-(iv))
 (D) (p-(iii)) , (q-(ii)) , (r-(iv)) , (s-(i))

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
B	B	B	C	A	C	C	C	D	C	D	A	D	A	D	
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
C	B	B	D	D	D	C	A	A	A	C	A	A	B	B	
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	

B	C	B	A	C	B	B	B	D	A	C	B	D	C	B
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SOLUTIONS

1. Collenchyma cells are mechanical tissue, they possess thickening of corners of cells.
2. Cystoliths are crystals of calcium carbonate found as epidermal outgrowth in the leaves of *Ficus bengalensis*.
5. When xylem and phloem occur along different radii, altering with each other, the vascular bundle is called the radial bundle.
6. A vascular bundle having the phloem strands on both outer and inner sides of xylem is called bicollateral.
7. At some places, the cambium forms a narrow band of parenchyma, which passes through the secondary xylem and the secondary phloem in the radial directions and thus gives rise to the secondary medullary rays.
12. The promeristems are the group of meristematic cells in the embryo or seedlings that give rise to primary meristems. Hence, option A is the correct statement regarding the promeristems.
13. New cells form a mass of parenchymatous cells known as callus.
14. The innermost layer of the cortex of dicotyledonous root is called endodermis which consists of a single layer of barrel-shaped cells without any intercellular spaces. The

tangential as well as radial walls of the endodermal cells have a deposition of water impermeable, waxy material, suberin-in the form of casparian strips.

15. A new variety is produced by joining parts of two different plants (with the help of cambium) is called grafting. In monocots cambium is absent hence the parts of two different plants are unable to joint each other.
16. Collenchyma tissue is elastic, extensible and have capacity to expand.
17. Quiescent centre is a zone of slowly dividing cells in the root apical meristem. Hence, it is a zone with least mitotic activity in the root apex.
18. Heartwood does not conduct water and minerals as it has lignin deposits and other organic compounds. However, it provides mechanical support to the plant. Hence, option B is the correct option.
20. During differentiation or development in to sieve element it undergoes the following changes
 - (1) The nucleus starts degenerating and completely disappears at maturity.
 - (2) The mitochondria degenerate losing cristae.
 - (3) Endoplasmic reticulum is replaced by vesicles which occupy parietal position.
 - (4) Distinct slime bodies of proteinacious nature appear in the cytoplasm.

(5) The pores are lined with callose surrounding the plasmodesmata. The stems of hydrophytic plants are soft, weak and spongy as there is no mechanical tissue present in the stem to provide support to the plant and moreover, the vascular tissues are poorly developed and hence, does not show marked differentiation of phloem and xylem. Monocotyledons have closed vascular bundles, that is, they do not have cambium present in them. Hence, option A is the correct option. Spring wood + Autumn wood of a year constitute annual ring. Spring and Autumn wood is the part of secondary xylem formed during spring and autumn. The amount of wood is affected by the activity of cambium. The outer young and functional part of xylem is called sap wood. The functions of conduction of water and dissolved mineral from roots is now performed by outer younger rings of secondary xylem which constitute the sapwood. According to the tunica – corpus theory epidermis is derived from outer layer of tunica and the remaining tissues are derived from remaining layer of tunica and entire corpus. Floating Hydrophytes: They live in abundance of water. They adapt some anatomical adaptations for floating on the surface of water. Like cuticle absent or poorly developed, stomata on upper surface etc. *e.g. Wolfia, Azolla.*

34. Pericycle gives rise to secondary roots and lateral meristem in dicot roots but it gives rise only lateral roots in monocot roots.
35. Cucurbitaceae (*e.g., Cucurbita*). Bicollateral : In such vascular bundles there are two patches of phloem one on each side of xylem. In such a vascular bundles there are two strips of cambium one on each side of xylem.
36. Hypodermis is present just below the epidermis in the monocot stem. It consists of two or three layers of sclerenchyma cells.
37. Companion cells serves to control and direct the activities of the sieve-tube.
38. These are elongated cells with tapering ends and are dead because of deposition of lignin and thickenings in wall may be scalariform or annular or reticulate or pitted. Main function of tracheids is conduction of water but due to their hard and lignified walls they also provide mechanical strength.
39. The meristematic cells that originate from promeristem are primary meristem and the secondary meristems developed from primary permanent tissue.