

Anatomy of Flowering Plants — NEET Biology PYQ (2007-2021)

Class 11 Biology · 41 real NEET & AIPMT questions, year-tagged · answers checked by RankUp

NEET 2021

1. Match List - I with List - II.

List - I | List - II

- (a) Cells with active cell division capacity | (i) Vascular tissues
(b) Tissue having all cells similar in structure and function | (ii) Meristematic tissue
(c) Tissue having different types of cells | (iii) Sclereids
(d) Dead cells with highly thickened walls and narrow lumen | (iv) Simple tissue

Select the correct answer from the options given below.

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

NEET 2020 · Q36

2. The transverse section of a plant shows following anatomical features:

- (a) Large number of scattered vascular bundles surrounded by bundle sheath.
(b) Large conspicuous parenchymatous ground tissue.
(c) Vascular bundles conjoint and closed.
(d) Phloem parenchyma absent.

Identify the category of plant and its part:

- (A) Monocotyledonous stem
(B) Monocotyledonous root
(C) Dicotyledonous stem
(D) Dicotyledonous root

NEET 2019 · Q93

3. Grass leaves curl inwards during very dry weather. Select the most appropriate reason from the following :

- (A) Closure of stomata
(B) Flaccidity of bulliform cells
(C) Shrinkage of air spaces in spongy mesophyll
(D) Tyloses in vessels

NEET 2019 · Q170

4. Phloem in gymnosperms lacks :

- (A) Albuminous cells and sieve cells
(B) Sieve tubes only
(C) Companion cells only
(D) Both sieve tubes and companion cells

NEET 2018 · Q124

5. Stomata in grass leaf are

- (A) Rectangular
(B) Kidney shaped
(C) Dumb-bell shaped
(D) Barrel shaped

NEET 2018 · Q125

6. Secondary xylem and phloem in dicot stem are produced by

- (A) Phellogen
(B) Vascular cambium
(C) Apical meristems
(D) Axillary meristems

NEET 2018 · Q127

7. Casparian strips occur in

- (A) Cortex
- (B) Pericycle
- (C) Epidermis
- (D) Endodermis

NEET 2018 · Q128

8. Plants having little or no secondary growth are

- (A) Conifers
- (B) Deciduous angiosperms
- (C) Grasses
- (D) Cycads

NEET 2017 · Q64

9. Identify the wrong statement in context of heartwood:

- (A) Organic compounds are deposited in it
- (B) It is highly durable
- (C) It conducts water and minerals efficiently
- (D) It comprises dead elements with highly lignified walls

NEET 2017 · Q94

10. Which of the following is made up of dead cells?

- (A) Xylem parenchyma
- (B) Collenchyma
- (C) Phellem
- (D) Phloem

NEET 2017 · Q127

11. The vascular cambium normally gives rise to:

- (A) Phelloderm
- (B) Primary phloem
- (C) Secondary xylem
- (D) Periderm

NEET 2017 (Gujarati paper) · Q97

12. The chief function of vessels in the plant body is to:

- (A) Transport food materials manufactured in the leaves to other parts of the plant.
- (B) Store food material in the form of starch or fat.
- (C) Conduct water and mineral salts.
- (D) Eliminate excess of water.

NEET 2017 (Gujarati paper) · Q113

13. Which of the following statements is true for phloem in plants?

- (A) Sieve tube elements are multicellular with wide lumen and rich cytoplasm.
- (B) Companion cells help in maintaining the pressure gradient in sieve tubes.
- (C) Phloem parenchyma is abundantly present in monocots.
- (D) Phloem fibres are made up of collenchymatous cells.

NEET 2016 Phase 2 · Q102

14. The balloon-shaped structures called tyloses

- (A) originate in the lumen of vessels
- (B) characterize the sapwood
- (C) are extensions of xylem parenchyma cells into vessels
- (D) are linked to the ascent of sap through xylem vessels

15. Specialised epidermal cells surrounding the guard cells are called:

- (A) Complementary cells
- (B) Subsidiary cells
- (C) Bulliform cells
- (D) Lenticels

AIPMT 2015

16. Vascular bundles in monocotyledons are considered closed because:

- (A) Xylem is surrounded all around by phloem
- (B) A bundle sheath surrounds each bundle
- (C) Cambium is absent
- (D) There are no vessels with perforations

AIPMT 2015

17. A major characteristic of the monocot root is the presence of:

- (A) Cambium sandwiched between phloem and xylem along the radius
- (B) Open vascular bundles
- (C) Scattered vascular bundles
- (D) Vasculature without cambium

AIPMT 2014

18. You are given a fairly old piece of dicot stem and a dicot root. Which of the following anatomical structures will you use to distinguish between the two?

- (A) Secondary phloem
- (B) Protoxylem
- (C) Cortical cells
- (D) Secondary xylem

AIPMT 2014

19. Tracheids differ from other tracheary elements in:

- (A) being imperforate
- (B) lacking nucleus
- (C) being lignified
- (D) having casparian strips

AIPMT 2012 Mains

20. As compared to a dicot root, a monocot root has :

- (A) More abundant secondary xylem
- (B) Many xylem bundles
- (C) Inconspicuous annual rings
- (D) Relatively thicker periderm

AIPMT 2012 Prelims

21. Water containing cavities in vascular bundles are found in

- (A) Pinus
- (B) Sunflower
- (C) Maize
- (D) Cycas

AIPMT 2012 Prelims

22. Closed vascular bundles lack

- (A) Pith
- (B) Ground tissue
- (C) Conjunctive tissue
- (D) Cambium

AIPMT 2012 Prelims

23. The common bottle cork is a product of

- (A) Vascular Cambium
- (B) Dermatogen
- (C) Phellogen
- (D) Xylem

AIPMT 2012 Prelims

24. Companion cells are closely associated with

- (A) Guard cells
- (B) Sieve elements
- (C) Vessel elements
- (D) Trichomes

AIPMT 2011 Mains

25. Some vascular bundles are described as open because these

- (A) Possess conjunctive tissue between xylem and phloem
- (B) Are not surrounded by pericycle
- (C) Are surrounded by pericycle but no endodermis
- (D) Are capable of producing secondary xylem and phloem

AIPMT 2011 Prelims

26. Ground tissue includes

- (A) All tissues internal to endodermis
- (B) All tissues external to endodermis
- (C) All tissues except epidermis and vascular bundles
- (D) Epidermis and cortex

AIPMT 2011 Prelims

27. In land plants the guard cells differ from other epidermal cells in having

- (A) Chloroplasts
- (B) Cytoskeleton
- (C) Mitochondria
- (D) Endoplasmic reticulum

AIPMT 2011 Prelims

28. The cork cambium, cork and secondary cortex are collectively called

- (A) Phellem
- (B) Phelloderm
- (C) Phellogen
- (D) Periderm

AIPMT 2010 Mains · Q34

29. Transport of food material in higher plants takes place through

- (A) Companion cells
- (B) Transfusion tissue
- (C) Tracheids
- (D) Sieve elements

AIPMT 2010 Prelims · Q132

30. Which one of the following is not a lateral meristem?

- (A) Intercalary meristem
- (B) Intrafascicular cambium
- (C) Interfascicular cambium
- (D) Phellogen

AIPMT 2010 Prelims · Q135

31. The chief water conducting elements of xylem in gymnosperms are

- (A) Tracheids
- (B) Vessels
- (C) Fibers
- (D) Transfusion tissue

AIPMT 2010 Prelims · Q138

32. Heartwood differs from sapwood in

- (A) Being susceptible to pests and pathogens
- (B) Presence of rays and fibres
- (C) Absence of vessels and parenchyma
- (D) Having dead and non-conducting elements

AIPMT 2009 Prelims · Q94

33. Anatomically fairly old dicotyledonous root is distinguished from the dicotyledonous stem by

- (A) Absence of secondary phloem
- (B) Presence of cortex
- (C) Position of protoxylem
- (D) Absence of secondary xylem

AIPMT 2009 Prelims · Q109

34. The annular and spirally thickened conducting elements generally develop in the protoxylem when the root or stem is:

- (A) elongating
- (B) widening
- (C) differentiating
- (D) maturing

AIPMT 2009 Prelims · Q119

35. Guard cells help in:

- (A) Transpiration
- (B) Guttation
- (C) Fighting against infection
- (D) Protection against grazing

AIPMT 2009 Prelims · Q131

36. Palisade parenchyma is absent in leaves of:

- (A) Mustard
- (B) Soybean
- (C) Gram
- (D) Sorghum

AIPMT 2009 Prelims · Q132

37. In barley stem vascular bundles are:

- (A) closed and scattered
- (B) open and in a ring
- (C) closed and radial
- (D) open and scattered

AIPMT 2008 Prelims · Q135

38. Vascular tissues in flowering plants develop from

- (A) Dermatogen
- (B) Phellogen
- (C) Plerome
- (D) Periblem

39. The length of different internodes in a culm of sugarcane is variable because of

- (A) Intercalary meristem
- (B) Shoot apical meristem
- (C) Position of axillary buds
- (D) Size of leaf lamina at the node below each internode

40. For a critical study of secondary growth in plants, which one of the following pairs is suitable?

- (A) teak and pine
- (B) deodar and fern
- (C) wheat and maiden hair fern
- (D) sugarcane and sunflower

41. Passage cells are thin walled cells found in

- (A) phloem elements that serve as entry points for substance for transport to other plant parts
- (B) testa of seeds to enable emergence of growing embryonic axis during seed germination
- (C) central region of style through which the pollen tube grows towards the ovary
- (D) endodermis of roots facilitating rapid transport of water from cortex to pericycle

Answer key and explanations

1. Answer: (A) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

Actively dividing cells make up meristematic tissue, a tissue of one cell type is a simple tissue, a tissue made of different cell types (xylem, phloem) is complex vascular tissue, and dead cells with very thick walls and a narrow lumen are sclereids. Hence (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii).

2. Answer: (A) Monocotyledonous stem

Many scattered, conjoint and closed vascular bundles with bundle sheaths in a large parenchymatous ground tissue, and no phloem parenchyma, are the features of a monocot stem. A dicot stem has bundles in a ring, and roots have radial, not conjoint, vascular bundles.

3. Answer: (B) Flaccidity of bulliform cells

Bulliform (motor) cells in the upper epidermis of grass leaves lose water and become flaccid during water stress, so the leaf rolls inwards to cut water loss. Closing stomata reduces transpiration but does not by itself roll the leaf.

4. Answer: (D) Both sieve tubes and companion cells

Gymnosperm phloem has sieve cells and albuminous cells but lacks both sieve tubes and companion cells. Saying it lacks only one of these leaves out the other.

5. Answer: (C) Dumb-bell shaped

In grasses (monocots) the guard cells are dumb-bell shaped. Kidney (bean) shaped guard cells are typical of dicot leaves, which is the main trap.

6. Answer: (B) Vascular cambium

The vascular cambium is a lateral meristem that cuts off secondary xylem towards the inside and secondary phloem towards the outside. Phellogen (cork cambium) forms cork and secondary cortex, while apical and axillary meristems produce primary tissues.

7. Answer: (D) Endodermis

The tangential and radial walls of root endodermal cells carry a band of suberin called the Casparian strip, which blocks the apoplastic movement of water. The pericycle lies just inside the endodermis but has no such strips.

8. Answer: (C) Grasses

Grasses are monocots with closed vascular bundles that lack cambium, so they show little or no secondary growth. Conifers and deciduous dicot trees have an active vascular cambium and form wood; cycads also show secondary growth.

9. Answer: (C) It conducts water and minerals efficiently

Heartwood is the dark central wood whose dead, highly lignified elements are filled with tannins, resins, oils and gums, which make it durable but non-conducting. Water and minerals are conducted by the outer sapwood, so that statement is wrong.

10. Answer: (C) Phellem

Phellem (cork) cells are dead at maturity, with suberin deposited in their walls. Xylem parenchyma, collenchyma and the sieve tubes and companion cells of phloem are living (phloem fibres are the only dead part of phloem).

11. Answer: (C) Secondary xylem

The vascular cambium cuts off secondary xylem towards the inside and secondary phloem towards the outside. Phelloderm and the rest of the periderm come from the cork cambium, and primary phloem comes from procambium.

12. Answer: (C) Conduct water and mineral salts.

Vessels are long tubes of dead lignified cells in the xylem whose main role is conducting water and minerals from roots to the aerial parts. Transporting food made in leaves is the function of phloem sieve tubes, not vessels.

13. Answer: (B) Companion cells help in maintaining the pressure gradient in sieve tubes.

Companion cells are connected to sieve tube elements by pit fields and help maintain the pressure gradient in the sieve tubes. Each sieve tube element is a single cell that loses its nucleus, phloem parenchyma is absent in most monocots, and phloem fibres are sclerenchymatous.

14. Answer: (C) are extensions of xylem parenchyma cells into vessels

Tyloses are balloon-like outgrowths of neighbouring xylem parenchyma cells that push into the vessel lumen through pits. They block the vessels and are typical of heartwood, not sapwood, so they stop rather than aid the conduction of sap.

15. Answer: (B) Subsidiary cells

Specialised epidermal cells next to the guard cells are subsidiary cells, and together they form the stomatal apparatus. Bulliform cells are large cells on grass leaves that help leaf rolling, and lenticels are pores in bark.

16. Answer: (C) Cambium is absent

A vascular bundle is closed when there is no cambium between xylem and phloem, so it cannot form secondary tissues. Monocot bundles lack this cambium; having a bundle sheath does not make a bundle closed.

17. Answer: (D) Vasculature without cambium

Monocot roots have no cambium, so they do not undergo secondary growth. Scattered vascular bundles are a feature of the monocot stem, not the root, where xylem and phloem are arranged radially.

18. Answer: (B) Protoxylem

Even after secondary growth the primary xylem persists: protoxylem is endarch (towards the pith) in a dicot stem but exarch (towards the periphery) in a dicot root, so it distinguishes the two. Secondary xylem, secondary phloem and cortex are formed or arranged similarly in both old organs and do not reliably separate them.

19. Answer: (A) being imperforate

Tracheids are elongated cells with tapering ends and no perforations in their end walls (imperforate), whereas vessel members have perforation plates. Both tracheids and vessels are lignified and dead without a nucleus at maturity, and Casparian strips belong to the endodermis, not tracheary elements.

20. Answer: (B) Many xylem bundles

Monocot roots are polyarch, with many xylem bundles, whereas dicot roots usually have two to six. Monocot roots show no secondary growth, so they have no secondary xylem, annual rings or periderm to compare.

21. Answer: (C) Maize

In monocot stems such as maize, the protoxylem breaks down to leave water-containing cavities (lysigenous cavities) in each vascular bundle. Sunflower is a dicot, and Pinus and Cycas are gymnosperms that do not show this feature.

22. Answer: (D) Cambium

A closed vascular bundle has no cambium between xylem and phloem, so it cannot form secondary tissue (as in monocots). Pith, ground tissue and conjunctive tissue are not parts of the bundle itself.

23. Answer: (C) Phellogen

Commercial bottle cork is phellem (cork) produced by the phellogen (cork cambium) of the cork oak, *Quercus suber*. Vascular cambium produces secondary xylem and phloem, and dermatogen forms the epidermis.

24. Answer: (B) Sieve elements

Companion cells are connected to sieve tube elements by pit fields and help maintain their pressure gradient. Guard cells surround stomata, and vessel elements belong to xylem.

25. Answer: (D) Are capable of producing secondary xylem and phloem

A vascular bundle is open when cambium is present between xylem and phloem, so it can produce secondary xylem and phloem. Conjunctive tissue lies between separate xylem and phloem patches in roots and does not make a bundle open.

26. Answer: (C) All tissues except epidermis and vascular bundles

The ground tissue system comprises all tissues except the epidermis and the vascular bundles, so it includes cortex, pericycle, pith and medullary rays in a dicot stem, and mesophyll in leaves. It is not limited to tissues on one side of the endodermis.

27. Answer: (A) Chloroplasts

Guard cells contain chloroplasts, whereas ordinary epidermal cells generally lack them. Mitochondria, ER and the cytoskeleton are present in all living epidermal cells, so they do not distinguish guard cells.

28. Answer: (D) Periderm

During secondary growth the phellogen (cork cambium), phellem (cork) and phelloderm (secondary cortex) together make up the periderm. Phellem, phelloderm and phellogen are each just one component of it.

29. Answer: (D) Sieve elements

Food is carried in phloem, through the sieve tube elements (sieve cells in gymnosperms) joined end to end by sieve plates. Companion cells only support the sieve tubes, tracheids conduct water, and transfusion tissue is a gymnosperm leaf tissue.

30. Answer: (A) Intercalary meristem

Intercalary meristem lies between mature tissues at the bases of internodes (as in grasses) and is a primary meristem, not a lateral one. Fascicular and interfascicular cambium and cork cambium (phellogen) are lateral meristems that cause growth in thickness.

31. Answer: (A) Tracheids

Gymnosperms lack vessels in their xylem, so tracheids are their main water-conducting elements. Vessels are characteristic of angiosperms, and fibres provide support, not conduction.

32. Answer: (D) Having dead and non-conducting elements

Heartwood is the dark central secondary xylem. Its elements are dead and filled with tannins, resins, gums and similar deposits, so it no longer conducts water. These deposits make it more resistant to microbes and insects, not more susceptible.

33. Answer: (C) Position of protoxylem

Even after secondary growth, a dicot root keeps exarch protoxylem (towards the periphery), whereas the stem has endarch protoxylem (towards the centre). Both old root and stem have secondary xylem and phloem, so their presence or absence cannot distinguish them.

34. Answer: (A) elongating

Protoxylem forms in regions that are still elongating, and its annular and spiral wall thickenings allow the vessels to stretch with the growing organ without breaking. Metaxylem, with reticulate and pitted thickenings, forms later when the organ has stopped elongating and is maturing.

35. Answer: (A) Transpiration

Guard cells open and close the stomatal pore and so regulate transpiration and gaseous exchange. Guttation happens through hydathodes, not stomata.

36. Answer: (D) Sorghum

Sorghum is a monocot with an isobilateral leaf whose mesophyll is not differentiated into palisade and spongy layers. Mustard, soybean and gram are dicots with dorsiventral leaves that have palisade parenchyma.

37. Answer: (A) closed and scattered

Barley is a monocot, and monocot stems have many conjoint, closed (no cambium) vascular bundles scattered in the ground tissue. Open bundles arranged in a ring are typical of dicot stems.

38. Answer: (C) Plerome

In Hanstein's histogen theory the plerome, the central histogen of the apex, gives rise to the stele including the vascular tissues. Dermatogen forms the epidermis, periblem forms the cortex, and phellogen is the cork cambium of secondary growth.

39. Answer: (A) Intercalary meristem

In grasses like sugarcane, intercalary meristems at the base of internodes cause each internode to elongate on its own, so internodes end up with different lengths. The shoot apical meristem adds new nodes and internodes but does not set their individual lengths.

40. Answer: (A) teak and pine

Teak (a dicot tree) and pine (a gymnosperm) both have an active vascular cambium and cork cambium, so they show clear secondary growth. Ferns, wheat and sugarcane lack cambial activity, so every other pair contains a plant without secondary growth.

41. Answer: (D) endodermis of roots facilitating rapid transport of water from cortex to pericycle

In older roots most endodermal cells become thickened with suberin, but some opposite the protoxylem stay thin-walled; these passage cells let water pass from the cortex into the pericycle and xylem. They are not part of phloem, seed coat or style.

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