Q.141. Write a note on secondary xylem.

Ans: i. The cells which cut off towards pith (inner-side) mature into secondary xylem.

ii. In old trees, secondary xylem (wood) does not conduct water and becomes dark due to deposition of tannin, resins, oils, aromatic substances, etc.

iii. Due to deposition of these substances, the wood becomes hard and resistant to microbes and insects. Such wood is called heart wood.

iv. The peripheral region of the secondary xylem is lighter in colour and is known as sapwood.

v. Sap wood is involved in conduction of water and minerals.

Q.142. What is phellogen?

Ans: Certain cells in the cortex region regain the capacity to divide. This is called cork cambium or phellogen.

Q143. Which tissues are together called as periderm?

Ans: Cork, cork cambium and secondary cortex are together called as periderm.

Q.144. What are lenticels? How are they formed?

Ans: i. Lenticels are lens-shaped openings on epidermis, through which gaseous exchange takes place.

ii. Cork cells are with deposition of suberin in the cell wall which makes them impervious to air and water.

iii. Due to this, at certain regions, the cork cambium cuts off loosely arranged parenchymatous cells, which then rupture the epidermis and forms openings called lenticels.

Q.145. Why Gymnospermic wood is called as non-porous and soft wood?

Ans: Gymnosperrnic wood is called as non-porous because it does not have vessels, it is also called as soft wood because it lacks xylem fibres.

Q.146. With the help of a neat labelled diagram, describe the internal structure of dorsiventralleaf.

Ans: Structure of dorsiventral leaf: The mesophyll tissue is differentiated into pallisade and spongy parenchyma in a dorsiventral leaf. This type is very common in dicot leaf. The leaves show distinct upper" and lower surface. The upper surface which faces the sun is darker than the lower surface. These leaves are commonly horizontal in orientation. The different parts of this leaf are as follows:

i. Upper epidermis: It consists of a single layer of tightly packed barrel shaped parenchyma cells which are without chloroplast.
The outer walls are cutinized.
Stomata are generally absent.

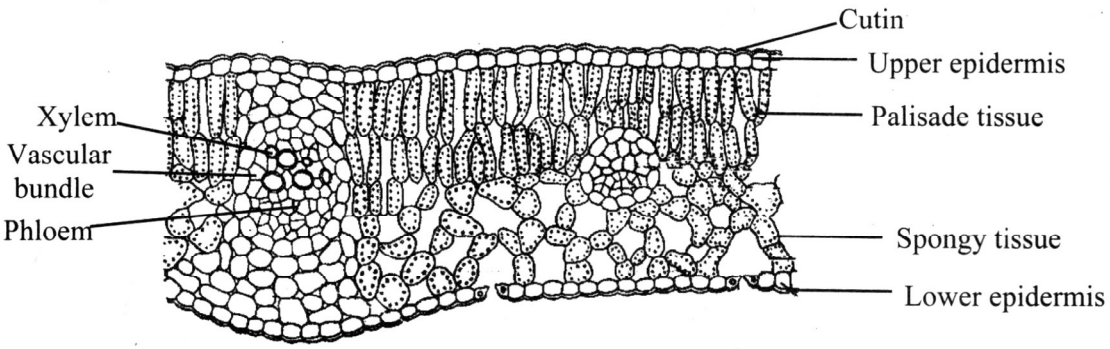
ii. Mesophyll: The tissue which is present in between upper and lower epidermis is called mesophyll.
It is a photosynthetic tissue.
It is divided into two parts:

a. Palisade parenchyma: It is present below upper epidermis and consists of closely packed elongated cells. Cells contain abundant chloroplast and help in photosynthesis.

b. Spongy parenchyma: It is present below palisade tissue and consists of loosely arranged irregular shaped cells. With large intercellular spaces, it is in contact with atmosphere through stomata.

iii. Vascular system: It consists of number of vascular bundles of varying size.
Each vascular bundle is surrounded by a thin layer of parenchymatous cells called as bundle sheath.
Vascular bundles are conjoint, collateral, endarch and each vascular bundle has xylem towards upper epidermis and phloem towards lower epidermis.
Cambium is absent.

iv. Lower epidermis: It consists of a single layer of compactly arranged rectangular parenchymatous cells.
Outer walls cutinized.
A distinct layer of cuticle is present both on lower and upper epidermis.
Lower epidermis contains numerous stomata.



Dorsiventral leaf

Q.147. With the help of a neat labelled diagram, describe the anatomy of isobilateralleaf.

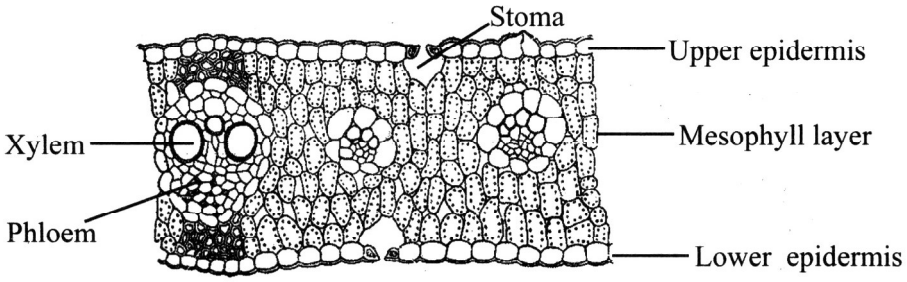
Ans: In isobilateralleaf, both the surfaces have similar structure and are equally illuminated, so they are green in colour.

The parts of isobilateralleaf are as follows:

i. **Epidermis:** It is single layered, present on both sides of the leaf.
It consists of compactly arranged rectangular transparent parenchymatous cells.
Both the surfaces contain stomata.
Both the surfaces have a distinct layer of cuticle.

ii. **Mesophyll:** Mesophyll is not differentiated into pallisade and spongy layer; but is composed of compactly arranged isodiametric cells.
These cells contain chloroplasts and are responsible for photosynthesis ..

iii. **Vascular bundle:** Vascular bundles are conjoint and closed.
Some vascular bundles are small but fairly large vascular bundles also occur at regular intervals.
Xylem is towards upper side and phloem is on the lower side.
They are encircled by bundle sheath.



Isobilateral leaf

Q.148. What is the difference between dorsiventral and isobilateralleaf?

Ans: In dorsiventral leaf, mesophyll tissue is differentiated into palisade parenchyma and spongy parenchyma, whereas in isobilateral leaf, mesophyll tissue is not differentiated. Dorsiventral leaf is the characteristic of most of the dicots, while isobilateralleaf is found in most of the monocots. Stomata are restricted to lower epidermis in dorsiventral leaf. Stomata occur on both epidermis in isobilateralleaf.

Q.149. What is dorsiventralleaf?

Ans: The leaf in-which mesophyll tissue is differentiated into palisade parenchyma and spongy parenchyma is called dorsiventralleaf.

Additional Theory Questions :

Q.1. Write a short note on 'stilt roots'. Refer Q.19.(ii)

Q.2. Describe different modifications of root with suitable examples. Refer Q.16,17,18,19, 21 and 23.

Q.3. Describe the modifications of stem with suitable examples. Refer Q.31, 32, 33, 34.

Q.4. Write a short note on phylloclade and bulbil. Refer Q.34.(iii) and (v)

Q.5. What is phyllotaxy? Give its significance. Refer Q.51.

Q.6. Explain with suitable examples of different types ofphyllotaxy. Refer Q.51.

Q.7. Define the term inflorescence. Explain the basis for the different types of inflorescence in flowering plants. Refer Q. 54,55 and 56.

Q.8. Sketch and label V.S. of mango fruit. Refer Q.83.

Q.9. Give a brief account of various types of fruits. Refer Q.83, 84 and 85

Q.10. Draw a labelled diagram of gram seed. Refer Q.87.

Q.11. Draw the labelled diagram bfV.S of maize grain. Refer Q.88.

Q.12. Give the vegatative and floralcharacters (two each) of family Fabaceae. Refer Q.94.

Q.13. State the location and function of different types ofmeristems. Refer Q.105.

Q.14. Describe Sclerenchyma fibres. Refer Q.116.

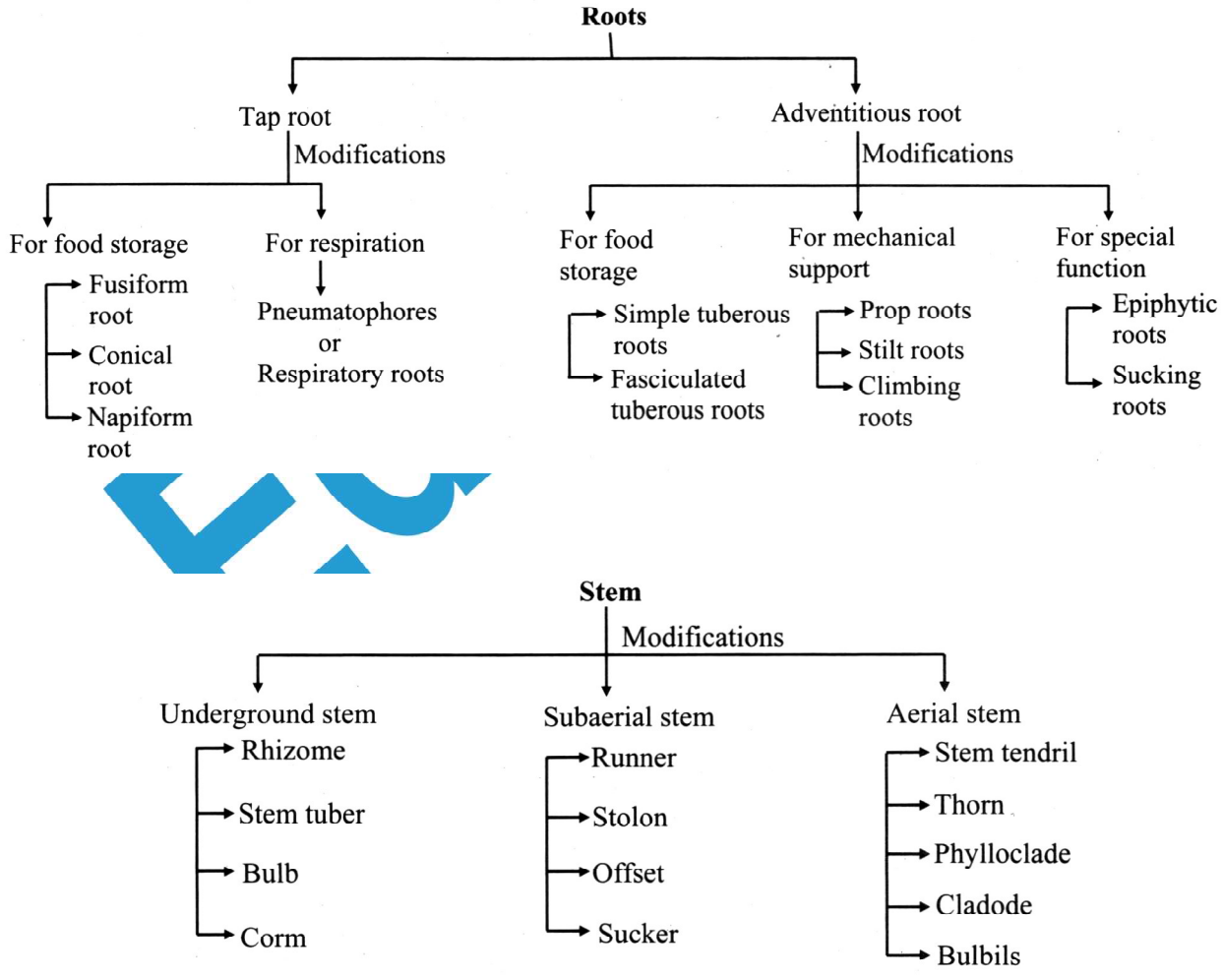
Q.15. Sketch and label T.S. of phloem tissue. Refer Q.121 ..

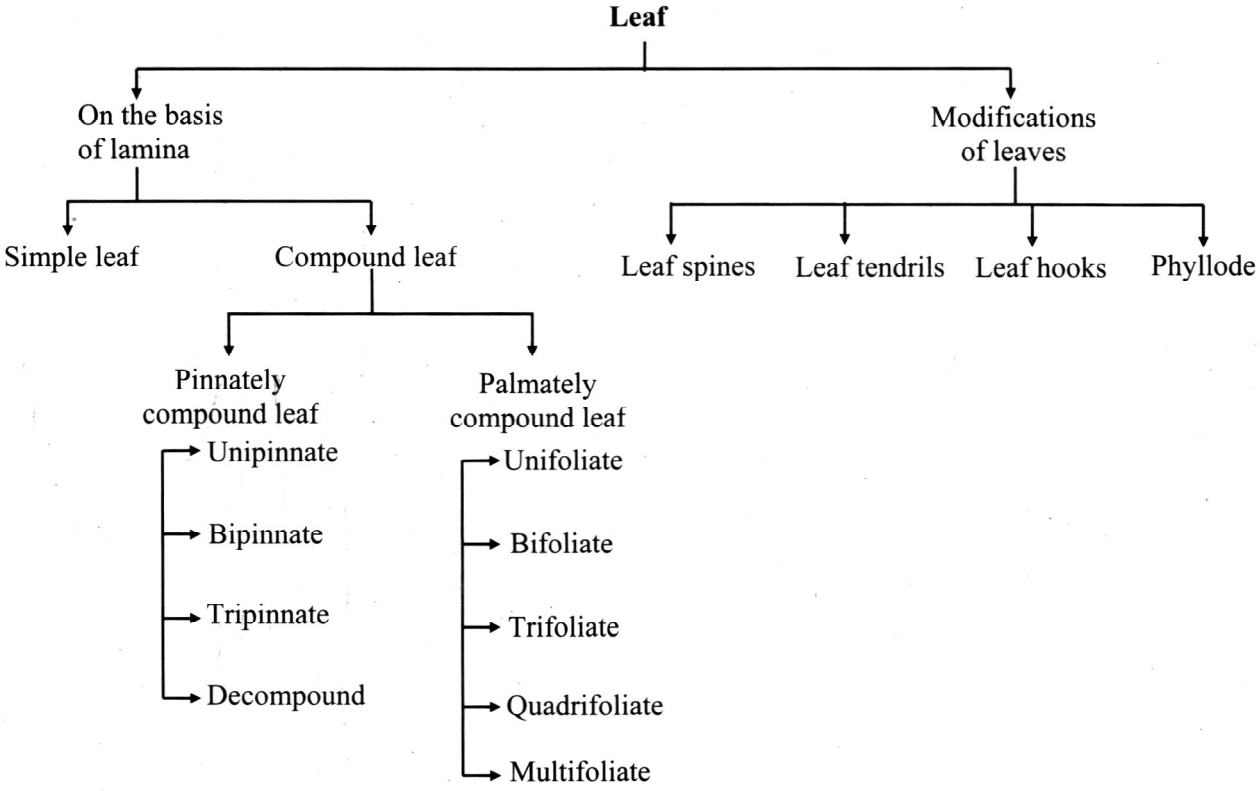
Q.16. Draw illustrations to bring out the anatomical difference between:

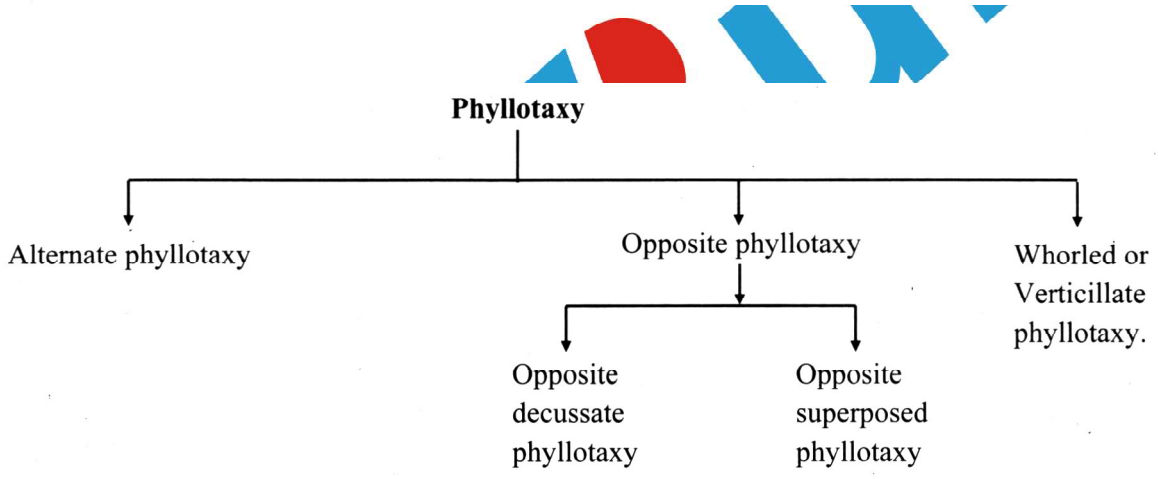
i. Monocot root and dicot root (For Diagram Refer.Q. 131 and 133)

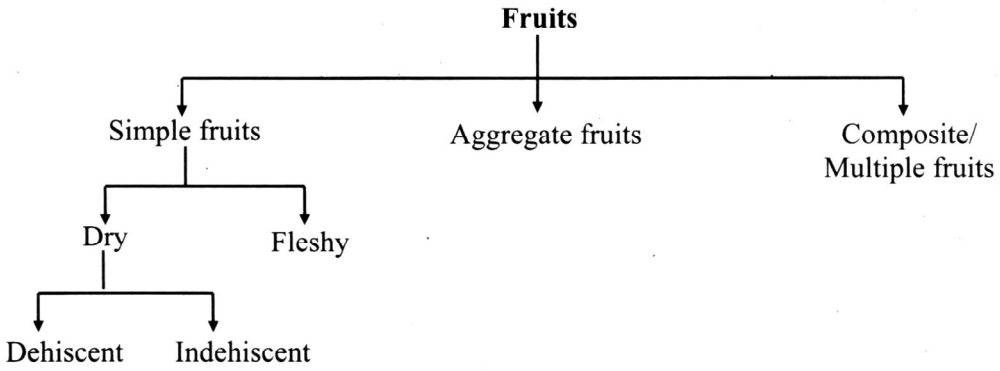
ii. Monocot stem and dicot stem (For Diagram Refer.Q. 137 and 138)

Quick Review :




Leaf
On the basis of lamina
Modifications of leaves
Simple leaf
Compound leaf
Leaf spines
Leaf tendrils
Leaf hooks
Phyllode
Pinnately compound leaf
Palmately compound leaf
Unipinnate
Bipinnate
Tripinnate
Decompound
Unifoliate
Bifoliate
Trifoliate
Quadrifoliate
Multifoliate


Phyllotaxy
Alternate phyllotaxy
Opposite phyllotaxy
Whorled or Verticillate phyllotaxy.
Opposite decussate phyllotaxy
Opposite superposed phyllotaxy


Fruits
Simple fruits
Aggregate fruits
Composite/ Multiple fruits
Dry
Fleshy
Dehiscent
Indehiscent

Multipal Choice Question's

1. There are about _____ species of flowering plants.
   a) 1,00,000 b) 2,00,000
   c) 3,00,000 d) 4,00,000
2. The study of external structure of an organism or an organ is called with
   a) external morphology
   b) internal morphology
   c) taxonomy
   d) physiology
3. _____ is the study of internal structure of an organism.
   a) External morphology
   b) Internal morphology
   c) Anatomy
   d) both (b) and c)
4. Descending part of the plant axis is due to the storage of food material.
   a) stem b) root
   c) leaf d) branches
5. The tender apex of the root is protected with
   a) root hair b) root cap
   c) rootlet d) none of these
6. In many hydrophytes like ____, root cap is replaced by root pocket.
   a) Brassica b) Mentha
   c) Pistia d) Oxalis
7. Roots, stem and leaves are the _____ parts of a plant.
   a) vegetative b) floral
   c) reproductive d) nutritional
8. _____ system of a plant is positively geotropic.
   a) Shoot
   b) Root
   c) Leaves
   d) Both (a) and (b)
9. Root system develops from
   a) coleoptile b) plumule
   c) radicle d) cotyledon
10. ____ helps in longitudinal growth of root.
    a) Meristematic region
    b) Region of elongation
    c) Region of maturation
    d) Both a) and b)
11. Which region of the root lies close to the stem?
    a) Region of growth
    b) Region of elongation
    c) Region of absorption
    d) Region of maturation
12. Lateral root also develop from the region of
    a) cell division b) elongation
    c) absorption d) maturation
13. Zone of elongation in a plant root is concened with
    a) absorption
    b) growth in length
    c) addition of new cells
    d) fmaturation
14. A root can be differentiated from the stem because of the absence of
    a) hair
    b) green colour
    c) nodes and inter-nodes
    d) branches
15. Root of ____ become fleshy or swotten due to the storage of food material.
    a) Lotus b) Asparagus
    c) Cuscuta d) Orchid
16. After becoming green, roots of _____ manufacture food by photosynthesis.
    a) Trapa b) Asparagus
    c) Cuscuta d) Rhizophora
17. Roots that grow from any part of the plant body other than the radicle are called
    a) tap roots b) aerial roots
    c) epiphytic roots d) adventitious roots
18. Pneumatophores are the characteristic of
    a) aquatic plants b) halophytes
    c) epiphytes d) orchids
19. Pneumatophores are
    a) climbing roots b) parasitic roots
    c) breathing roots d) stem-tuber
20. In Sunflower, the roots system is
    a) fibrous roots
    b) adventitious roots
    c) tap roots
    d) all of these
21. Epiphytes depend upon other plants for
    a) support only
    b) water only
    c) nourishment
    d) water and minerals
22. Additional roots given out by maize plants are
    a) prop roots b) stilt roots
    c) epiphytic roots d) parasitic roots
23. Wheat shows the presence of _____root system.
    a) tap b) adventitious
    c) napiform d) fusiform

24. Roots arising from horizontal branches of a tree is called
a) stilt roots b) climbing roots
c) prop roots d) epiphytic roots

25. Pneumatophores occur in the plants of
a) marshy soil
b) water
c) marshy saline soil
d) sandy soil

26. Tap root is a direct prolongation of
a) plumule b) radicle
c) stem d) cotyledon

27. Pneumatophores help the plant in
a) absorption of food
b) exchange of gases
c) storage of food
d) absorption of moisture

28. Rhizophora shows the presence of
a) climbing roots b) prop roots
c) pneumatophores d) stilt roots

29. _____ are negatively geotropic.
a) Pneumatophores
b) Prop roots
c) Tap roots
d) Napiform roots

30. ____ possess lenticels for gaseous exchange.
a) Avicennia b) Rhizophora
c) Sonneratia d) All of these

31. In which habitat is Heritiera found?
a) Aquatic habitats b) Saline swamps
c) Deserts d) Clay condition

32. Dahlia and Asparagus have _____ roots.
a) napiform
b) fasciculated tuberous
c) conical
d) prop

33. In the Indian botanical garden, ____ tree is 200 years old.
a) banyan b) neem
c) mango d) orange

34. Banyan tree present in the Indian Botanical Garden, Howrah (Kolkata) has nearly _____ prop roots.
a) 170 b) 1700
c) 700 d) 7000

35. In plants like ____ roots grow in whorls from lower nodes.
a) Money plant b) Banyan tree
c) Dendrobium d) Maize

36. Which of the following pair of plants possess stilt roots?
a) Vanda, Dendrobium
b) Sugarcane, Bajara
c) Pothos, Piper betel
d) Avicennia, Sonneratia

37. Climbing roots occur in
a) Vanda b) Pothos
c) Pandanus d) Potato

38. Epiphytic root is also called ____ root.
a) respiratory b) climbing
c) assimilatory d) parasitic

39. Which of the following plants possess parasitic root?
a) Dodder b) Vanda
c) Kali mirch d) Beet

40. The region of a root which is responsible for absorption of mineral salts is
a) meristematic region
b) region of elongation
c) region of root hairs
d) region of differentiation

41. The roots which do the function of photosynthesis
a) Tinospora b) Trapa
c) Orchid d) All of these

42. The root which is broad at the middle due to storage of food and tapers gradually towards the apex is called
a) fasiculated root
b) conical root
c) napiform root
d) fusiform root

43. Fasciculated tuberous roots are present in
a) Dahlia b) Sweet potato
c) Potato d) Carrot

44. Banyan tree shows roots.
a) clinging b) prop
c) epiphytic d) stilt

45. Epiphytic roots are spongy due to the presence of
a) water storage tissue
b) velamen tissue
c) mucilage like substances
d) all of these

46. Viscum album is a
a) total parasite b) saprophyte
c) partial parasite d) autotroph

47. The function of velamen is
a) absorption of water from soil

b) absorption of moisture from air
c) to help in transpiration
d) to conduct food material

48. Haustoria or sucking roots are observed in
a) Tinospora b) Cuscuta
c) betel d) Orchid

49. Napiform roots are
a) swollen in the centre and tapers at base
b) swollen at the apex only
c) swollen at the base and almost spherical
d) swollen from the apex to the base

50. In which of the following roots food is stored?
a) Fusiform b) Napiform
c) Conical d) All of these

51. Fibrous roots develop in maize from the
a) base of stem
b) nodes of the stem
c) internodes of the stem
d) both (b) and c)

52. In Pandanus (Screw pine), stilt roots anse·
a) basal nodes the soil
b) upper surface of oblique stem
c) lower side of oblique stem
d) anywhere

53. The rhizome differs from root in respect of
a) scale leaves at nodes and buds in axil
b) its thickness
c) green colour
b) simple tunicated bulb

54. Stem develops from
a) plumule b) radicle
c) pen carp d) embryo

55. Stem grows towards
a) water b) light
c) soil d) all of these

56. Stem is
a) positively phototropic
b) negatively phototropic
c) negatively geotropic
d) both (a) and c)

57. A bud which develops at any place other than
a) apical bud b) axillary bud
c) floral bud d) adventitious bud

58. Bulbil is a modified bud meant for
a) storage b) propagation
c) protection d) climbing

59. Amorphophallus is an example of
a) bulb b) corm
c) tuber d) rhizome

60. A condensed, disc-like underground stem is called
a) tuber b) bulb
c) rhizome d) corm

61. Food present in bulbs occur in
a) stem b) root
c) leaf bases d) leaf lamina

62. ____ is a scaly bulb.
a) Garlic b) Oxalis
c) Onion d) Amorphophallus

63. The primary function of stem is
a) to bear and expose leaves to sunlight
b) to anchor the plant in soil
c) to absorb water and mineral salts from the soil
d) to help in vegetative propagation

64. Thorn in Bougainvillea is a modified
a) stem b) leaf
c) root d) flower

65. Colocasia is the example of
a) rhizome
b) simple tunicated bulb
c) compound tunicated bulb
d) stolon

66. Runner is alan
a) aerial modification of stem
b) sub-aerial modification of stem
c) underground modification of stem
d) none of these

67. Rhizome differs from roots as it
a) is thicker than roots
b) is thinner than roots
c) has scale, leaves and buds
d) is green in colour

68. The stem modified to perform the function of a leaf and having many internodes is called
a) phylloc1ade b) offset
c) c1adode d) phyllode

69. Phylloc1ade is the modification of for photosynthesis.
a) root b) stem
c) leaf d) flower

70. Stem developing below the soil is called
a) aerial b) sub-aerial
c) underground d) runner

71. Cynodon dactylon is an example of
a) offset b) runner
c) sucker d) bulb

72. In Vitis, is modified into tendril.
a) apical bud

b) axillary bud
c) extra axillary bud
d) adventitious bud

73. In Cucurbita _____ bud is modified into tendril.
a) apical b) axillary
c) extra axillary d) adventitious

74. Which one of the following is a xerophytic plant in which the stem is modified into flat green and succulent structure?
a) Opuntia b) Casuarina
c) Hydrilla d) Acacia

75. Phylloc1ade is cylindrical in
a) Opuntia
b) Casuarina
c) Muehlenbeckia
d) Asparagus

76. In Asparagus,
a) stem is modified into leaf like structure
b) axillary bud is modified into tendril
c) leaves are reduced to spines
d) axillary bud become fleshy and rounded

77. In Dioscorea,
a) stem is modified into leaf like structure
b) axillary bud is modified into tendril
c) leaves are reduced to spines
d) axillary bud become fleshy and rounded

78. Potatoes are cultivated by
a) seeds b) cuttings of root
c) foliar buds d) buds on tuber

79. Zingiber officinale is a which is a modification of underground stem.
a) rhizome b) stem tuber
c) bulb d) both (a) and (b)

80. Bud is alan
a) immature flower
b) condensed stem
c) overlapping leaves
d) condensed stem, overlapped by young, immature leaves

Answer Keys

1. c)	2. a)	3. d)	4. b)	5. b)	6. c)	7. a)	8. b)	9. c)	10. d)
11. d)	12. d)	13. b)	14. c)	15. b)	16. a)	17. d)	18. b)	19. c)	20. c)
21. a)	22. b)	23. b)	24. c)	25. c)	26. b)	27. b)	28. c)	29. a)	30. d)
31. b)	32. b)	33. a)	34. b)	35. d)	36. b)	37. b)	38. c)	39. a)	40. b)
41. d)	42. b)	43. a)	44. b)	45. b)	46. c)	47. b)	48. b)	49. c)	50. d)
51. a)	52. c)	53. a)	54. a)	55. b)	56. d)	57. d)	58. b)	59. b)	60. b)
61. c)	62. a)	63. a)	64. a)	65. d)	66. b)	67. c)	68. a)	69. b)	70. c)
71. b)	72. a)	73. c)	74. a)	75. b)	76. c)	77. d)	78. d)	79. a)	80. d)