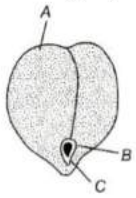
MORPHOLOGY OF FLOWERING PLANTS

1. Which of the following are not characteristic features of Fabaceae?
   a) Tap root system, compound leaves and receme inflorescence
   b) Flowers actinomorphic, twisted aestivation and gamopetalous
   c) Stamens ten, introrse, basifixed and dithecous
   d) Monocarpellary, ovary superior and bent stigma
2. When the floral appendages are in multiple of 3, 4, 5, they are respectively called
   a) Trimerous, tetramerous, pentamerous
   b) Penatmerous, tetramerous, trimerous
   c) Tripinnate, tetrapinnate, pentapinnate
   d) Tetrapinnate, tripnnate, pentapinnate
3. The type of leaf in *Daucus carota* is
   a) Simple
   b) Bipinnate
   c) Tripinnate
   d) Decompound
4. Most advanced fruit is
   a) Cypsela
   b) Caryopsis
   c) Pome
   d) Etaerio of drupe
5. Identify *A*, *B* and *C* in the given diagram



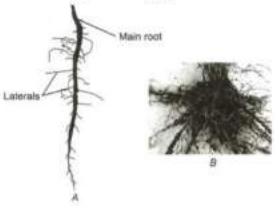
   a) A-Seed coat, B-Micropyle, C-Hilum
   b) A-Seed coat, B-Hilum, C-Micropyle
   c) A-Hilum, B-Seed coat, C-Micropyle
   d) A-Micropyle, B-Seed coat, C-Hilum
6. Pedicel of flower is called
   a) Thalamus
   b) Receptacle
   c) Both (a) and (b)
   d) Either (a) or (b)
7. A tree that has strong erect stem with hollow internodes and solid nodes, is known as
   a) Caudex
   b) Deliquescent
   c) Scape
   d) Culm
8. Identify the correct order (root) from base to root apex
   I. Mineral absorption zone
   II. Soil penetration zone
   III. Cell number increasement zone
   V. Cell elongation zone
   a) II, I, IV, III
   b) I, II, III, IV
   c) IV, III, II, I
   d) III, IV, I, II
9. Study the following statements and choose the correct option.
   I.Buds are present in the axil of leaflets of the compound leaf.
   II.Pulvinus leaf-base is present in some leguminous plants.
   III.In *Alstonia*, the petioles expand, become green and synthesize food.
   IV.Opposite phyllotaxy is seen in guava.
   a) II and IV are correct but I and III are wrong
   b) I and III are correct but II and IV are wrong
   c) I and IV are correct but II and III are wrong
   d) II, III and IV are correct but I is wrong
10. The number of stomata present per cm^2 of a leaf is
    a) 1000
    b) Less than 100
    c) One million
    d) None of these

11. Which one of the following series includes the orders Ranales, Parietals and Malvales?
a) Bicarpellatae b) Thalamiflorae c) Calyciflorae d) Disciflorae
12. Which pair of the following plants represents the condition of modification of stipules into spines?
a) *Euphorbia* and *Ziziphus* b) *Citrus* and *Euphorbia*
c) *Ziziphus* and *Bougainvillea* d) *Bougainvillea* and *Citrus*
13. Amla belongs to family
a) Labiatae b) Fabaceae c) Solanaceae d) Euphorbiaceae
14. The leaves are modified into tendrils, hook, pitcher and bladder in the following plants respectively
a) Sweet pea, cat's nail, *Nepenthes*, *Utricularia* b) Sweet pea, cat's nail, *Utricularia*,*Nepenthes*
c) *Nepenthes*, cat's nail, sweet pea, *Utricularia* d) *Nepenthes*, sweet pea, cat's nail, *Utricularia*
15. Fruits are formed in
a) *Brassica* b) *Fern* c) *Cycas* d) *Funaria*
16. Hypanthodium inflorescence is found in
a) *Ficus* b) Tulsi c) *Cedrus* d) *Calotropis*
17. I. Bear leaves and branches
II. Conduction of water and minerals
III. Storage of food
These are the functions of
a) Root b) Stem c) Leaves d) Root cap
18. Tulip belong to family
a) Asteraceae b) Liliaceae c) Brassicaceae d) Malvaceae
19. The floral formula is of $Br \bullet \oplus \male P_{(3+3)}\, A_{3+3}\, G\underline{(3)}$ belongs to plant
a) *Allium cepa* b) Sunflower c) *Cucurbita* d) *Brassica*
20. Which of the following is not a characteristic feature of Fabaceae?
a) Descendingly imbricate, ten stamens, diadelphous, ovary superior
b) Sepals five, gamosepalous, imbricate aestivation, placentation marginal
c) Monocarpellary, ovary superior, style long, slightly bent at the apex
d) Corolla, five petals, polypetalous, anterior one large and outermost
21. Wringed petioles are characteristic of
a) *Polygonum* b) *Citrus* c) Neem d) Banana
22. The triploid number of chromosomes of the first taxon in 10 times more than the haploid number of chromosomes of the second taxon, while the diploid number of the third taxon is six time more than the haploid number of the fourth taxon. Which one of the following shows the ascending order of the number of chromosomes in their respective endosperm?
a) Oryza-Allium-Saccharum-Nicotiana b) Allium-Oryza-Nicotiana-Saccharum
c) Nicotiana-Saccharum-Oryza-Allium d) Saccharum-Oryza-Nicotiana-Allium
23. The scutellum observed in a grain of wheat or maize is comparable to which part of the seed in other monocotyledons?
a) Cotyledon b) Endosperm c) Aleurone layer d) Plumule
24. *Colchicum autumnale* belongs to
a) Solanaceae b) Fabaceae c) Liliaceae d) Malvaceae
25. Clinging roots are found in
a) Orchids b) *Trapa* c) *Podostemon* d) *Screwpine*
26. Single-seeded winged fruits is called
a) Achene b) Cypsella c) Samara d) Caryopsis
27. The family containing mustard and its main characters are
a) Brassicaceae - Tetramerous flowers, six stamens, bicarpellary gynoecium, siliqua type fruit
b) Brassicaceae - Pentramerous flowers, many stamens, pentacarpellary gynoecium, capsule type fruit
c) Solanaceae – Pentamerous flowers, five stamens, bicarpellary gynoecium berry type fruit

d) Poaceae – Trimerous flowers, three stamens, monocarpellary gynoecium, caryopsis type of fruit

28. Which one of the following floral characters, is shared by *Ruscus* and ray florets of *Tridax*?
a) Nature of perianth b) Unisexuality c) Zygomorphy d) Number of stigmas

29. Identify the types of roots in the diagram *A* and *B*



a) A-Fibrous; B-Tap
b) A-Adventitious; B-Fibrous
c) A-Fibrous; B-Adventitious
d) A-Tap; B-Fibrous

30. In a flowering plant, archesporium gives rise to
a) Wall and the tapetum b) Only tapetum and sporogenous cells
c) Only the wall of the sporangium d) Both wall and the sporogenous cells

31. The fruit which develops from inflorescence is called
a) Achene b) Berry c) Etaerio d) Composite fruit

32. Caryopsis is found in
a) Sunflower b) Maize c) Pea d) Datura

33. The floral formula $\oplus \varphi \sigma K_{(5)} \overset{\curvearrowleft}{C_{(5)}} A_{(5)} \underline{G(2)}$ is that of
a) Tulip b) Soybean c) Sunnhemp d) Tobacco

34. If a primary root continues to grow, the type of root system will be known as
a) Secondary b) fibrous c) tap d) stilt

35. Largest flower is
a) *Rafflesia arnoldi* b) *Helianthus annuus*
c) *Welwitschia morabilis* d) *Nelumbo nucifera*

36. Pattern of arrangement of leaves on the stem or branches is called
a) Phyllotaxy b) Petiole c) Stipule d) Both (a) and (b)

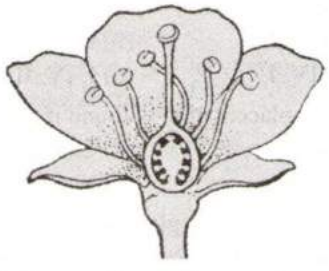
37. Arrangement of sepals or petals with respect to the other members of same whorl is known as
a) Gamopetalous b) Polypetalous c) Aestivation d) Vernation

38. The reproductive unit of angiosperms is
a) Inflorescence b) Floral buds c) Flower d) Flower meristem

39. The correct floral formula of chilli is
a) $\oplus \varphi \sigma K_{(5)} \overset{\curvearrowleft}{C_{(5)}} A_5 G_{(2)}$ b) $\oplus \varphi \sigma K_{(5)} C_{(5)} A_{(5)} G_2$ c) $\oplus \varphi \sigma K_5 \overset{\curvearrowleft}{C_5} A_{(5)} G_2$ d) $\oplus \varphi \sigma K_{(5)} C_5 A_5 G_{(2)}$

40. Velamen is found in
a) *Vanda* b) *Rosa* c) *Viscum* d) *Santalum*

41. The flower shown in the adjacent diagram is



a) Homochlamydous, unisexual and hypogynous b) Homochlamydous, bisexual epigynous

c) Dichlamydous, bisexual and hypogynous
d) Heterochlamydous, bisexual and epigynous

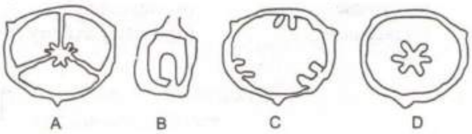
42. Sucking roots are present in the planet
a) Betel b) *Cuscuta* c) *Mangifera* d) *Solanum*

43. The root system growing near the base of the radical in monocots is
a) Haptera b) Anchoring roots c) Clinging roots d) Seminal roots

44. The hardest part of drupe is
a) Mesocarp b) Endocarp c) Pericarp d) Epicarp

45. Cyathium and Hypanthodium inflorescence are related in having
a) Nectar glands b) Unisexual flower c) Both (a) and (b) d) None of these

46. The plant mentioned in question number 174 belongs to which family?
a) Euphorbiaceae b) Musaceae c) Solanaceae d) Fabaceae

47. 

In the diagram of types of placentation given above 'A', 'B', 'C', and 'D' respectively represent
a) Basal, axile, parietal and free central
b) Free central, parietal, basal and axile
c) Axile, basal, parietal and free central
d) Parietal, axile, free central and basal

48. Geocarpic fruits are produced by
a) Carrot b) Onion c) Groundnut d) Watermelon

49. Tricarpellary, syncarpous, superior ovary is seen in
a) *Allium* b) *Oenothera* c) *Solanum* d) *Dolichus*

50. Ginger multiples vegetatively by
a) Bud b) Tuber c) Stem d) Rhizome

51. Opening of a flower and drooping of a bud are examples of
a) Nyctinasy
b) Hyponasty
c) Seismonasty
d) Epinasty

52. Pappus is present in Compositae for
a) Air pollination b) Insect pollination c) Water pollination d) Air dispersal

53. From the options given below, find out the correct floral formula for a flower having the following characters namely actinomorphic, bisexual, five united sepals, five united petals, stamens five and epipetalous, bicarpellary, syncarpous with superior ovary
a) $\oplus$ ⚥ $K_{(5)} \underline{C_{(5)} A_5} \underline{G}_{(2)}$
b) $\oplus$ ⚥ $K_{(5)} C_{(5)} A_{(5)} \underline{G}_{(2)}$
c) $\oplus$ ⚥ $K_{(5)} \underline{C_{(5)}}\, \underline{A}_{(5)} \underline{G}_{(2)}$
d) $\oplus$ ⚥ $K_{(5)} C_{(5)} A_{(5)} G_{(2)}$

54. Guttation occurs through
a) Lenticels b) Hydathodes c) Periderm d) Stomata

55. Root is distinguishable from stem in
a) Having root hairs b) Having root cap c) Absence of nodes and internodes d) All of the above

56. Monothecous anther is the characteristic of
a) Malvaceae b) Liliaceae c) Brassicaceae d) Solanaceae

57. Which of the following plants has haustorial roots?
a) Pea b) *Trapa* c) Lily d) *Cuscuta*

58. Type of aestivation shown by *Pisum* is
a) Imbricate b) Vexillary c) Twisted d) Quincuncial

59. Which of the following monocotyledonous seed is non-endospermic?
a) Maize b) Wheat c) Coconut d) Orchid

60. Perianth in the spikelet of jowar is represented by
a) Lodicules b) Sepals and petals c) Glumes d) Lemma and palea

61. Tulsi belongs to family
a) Asclepiadaceae b) Labiatae c) Umbelliferae d) Rubiaceae

62. Placentation is the arrangement of
a) Ovary in gynoecium
b) Ovules in ovary
c) Ovary in ovule
d) Fused carpels in gynoecium

63. Flower is always solitary when
a) Shoot bud transforms into flower b) Shoot tip transforms into flower
c) Lateral shoot transforms into flower d) Horizontal shoot transforms into flower

64. Region of root present just above the root cap is called the region of
a) Elongation b) Meristematic activity
c) Root hair d) Maturation

65. Pineapple (ananas) fruit develops from a
a) Unilocular polycarpellary flower
b) Multipistillate syncarpous flower
c) Cluster of compactly borne flowers on a common axis
d) Multilocular monocarpellary flower

66. The morphological nature of the organ, which helps in climbing in *Cardiospermum*, is
a) Inflorescence axis b) Leaf apex c) Terminal bud d) Axillary bud

67. Which of the following is/are not characteristic features of Asteraceae?
I.Cypsela type of fruit
II.Syngenesious stamens
III.Ovary bicarpellary and superior
IV.Placentation marginal
V.Head type of inflorescence
a) II, III and IV only b) III and V only c) III and IV only d) I and II only

68. When axillary buds or terminal buds of stem gets modified into woody straight and pointed structure, it is known as
a) Thorns b) Tendrils c) Nodes d) Internodes

69. Drupe contains
a) Stony endocarp b) Stony mesocarp c) Edible epicarp d) Edible endocarp

70. Which one of the following statements is correct?
a) Seeds of orchids have oil-rich endosperm b) Placentation in primrose is basal
c) Flower of tulip is a modified shoot d) In tomato, fruit is a capsule

71. A plant has an androecium with monadelphous stamens, monothecous and reniform anthers. They corolla exhibits contorted aestivation. The plant could be
a) *Rauwolfia* b) *Vinca* c) *Nerium* d) *Hibiscus*

72. Identify from the following plant parts, the major contributors to human food?
a) Stem b) Root c) Fruits d) Leaves

73. Scutellum in a caryopsis represents
a) Outermost layer of endosperm
b) A sheath that protects the radical
c) The place where the seed is attached to rephe
d) A cotyledon

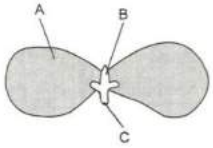
74. A monocarpic plant is one, which
a) Has only one carpel b) Flowers once in a lifetime
c) Produces only one seed d) Produces only one fruit

75. Pericarp may be or can be differentiated into
a) Epicarp b) Mesocarp c) Endocarp d) All of the above

76. Identify the type of inflorescence in the given diagram

a) Cyanthium b) Umbel c) Verticillaster d) Spikelet

77. Identify *A*, *B* and *C* in the given diagram



a) A-Plumule, B-Cotyledon, C-Radicle
b) A- Radicle, B-Cotyledon, C-Plumule
c) A-Cotyledon, B-Plumule, C-Radicle
d) A-Cotyledon, B-Radicle, C-Plumule

78. Fruit is
a) Mature ovary developed before fertilisation
b) Ripened ovary developed before fertilisation
c) Ripened ovary developed after fertilisation
d) Mature undeveloped ovary

79. Flowers are zygomorphic in
a) Gulmohur b) Tomato c) Datura d) Mustard

80. Pneumatophores are positively
a) Geotropic b) Phototropic c) Aerotropic d) Rheotropic

81. Leaf having completely divided lamina broken up into direct segment or leaflets is called
a) Petiole b) Phyllotaxy c) Compound leaf d) Simple leaf

82. The smallest Angiospermic flower is
a) *Wolffia* b) *Ranunculus* c) *Rafflesia* d) *Stellaria*

83. Fibrous root system originates from the base of
a) Root b) Stem c) Leaves d) Lamina

84. Stilt roots originate from the nodal part of
a) Stem b) Secondary root c) Leaf d) Primary root

85. The inflorescence in *Ocimum* is
a) Cyathium b) Verticillaster c) Hypanthodium d) Raceme

86. The leaves in *Utricularia* plant are modified into
a) Hooks b) Tendrils c) Bladders d) Pitchers

87. Inflorescence is the arrangement of
a) Leaves on the floral axis
b) Buds on the floral axis
c) Flowers on the floral axis
d) Petioles on the floral axis

88. In the flowers of a plant, the ovarian part is fused, but styles and stigmas are free. Its ovary becomes unilocular due to breakdown of partition wall and the ovules are attached to a central axis. Identify the plant.
a) *Dianthus* b) *Abutilon* c) *Nymphaea* d) *Michelia*

89. At the two ends of the embryonical axis
a) Radicle is present b) Plumule is present c) Both (a) and (b) d) None of these

90. Pneumatophores are present in
a) Mangroves b) Xerophytes c) Hydrophytes d) Lithophytes

91. Cuticle is absent in

a) Mesophytes b) young roots c) mature stems d) Leaves

92. Identify the mismatch among the following pairs of trees and families.
a) Psidium gujava - Myrtaceae b) Swietenia mahogni - Meliaceae
c) Pistacia vraa - Anacardiaceae d) Murraya koenigii - Meliacae

93. Tallest angiosperm is
a) *Eucalyptus* b) Red wood tree c) Oak tree d) *Pinus*

94. The underground stem that has contractile roots, is
a) Rhizome b) Corm c) Stem tuber d) Bulb

95. When gynoecium is present in the topmost position of thalamus, the flower is known as
a) Inferior b) Epigynous c) Perigynous d) Hypogynous

96. Which is odd one?
a) China rose b) Maize c) Mango d) Sunflower

97. Insectivore plants such as pitcher plant, venus fly trap have
a) Modified leaf b) Modified stem c) Modified root d) All of the above

98. Select the correct statements.
I. From the region of elongation, some of the epidermal cells from root hairs.
II. Pneumatophores are seen in *Rhizophora*.
III. Adventitious roots are seen in the banyan tree.
IV. Maize and sugarcane have prop roots.
a) I and IV b) I, III and IV c) III and IV d) II and III

99. Hesperidium of orange is a modification of
a) Berry b) Drupe c) Pome d) Aggregate fruit

100. Which of the following statements are correct?
I.When a fruit develops from the inflorescence, it is composite.
II.Mesocarp is the edible part in apple.
III.Gynobasic style is seen in *Ocimum*.
IV.Hypanthodium is a special type of inflorescence found in *Euphorbia* species.
a) I and IV are correct b) I and III are correct
c) I and II are correct d) II, III and IV are correct

101. $\underline{G}_{(2)}$ represents
a) Gynoecium, bicarpellary, apocarpous, superior
b) Gynoecium, bicarpellary, syncarpous, inferior
c) Gynoecium, bicarpellary, syncarpous, inferior
d) Gynoecium, bicarpellary, syncarpous, superior

102. Potato is a modification of
a) Stem b) Rhizome c) Root d) Leaf

103. Non-endospermic seeds are found in
a) Castor b) Rice c) Wheat d) Bean

104. Respiratory roots are found in
a) *Rhizopus* b) Orchids c) *Vallisneria* d) Mangrove plants

105. Parachute mechanism of seed dispersal occurs in
a) Sunflower b) *Antirrhinum* c) Mango d) Apple

106. I. Epicarp is thin
II. Mesocarp is fleshy and edible
III. Endocarp is strong hard
These are the probable features of
a) Coconut b) Brinjal c) Almond d) Mango

107. *Dahlia* and *Asparagus* posses
a) Stilt roots b) Fusiform roots c) Tuberous roots d) Fasciculated roots

108. Which one of the following is correctly matched pair of a certain plant family and its one example?

a) Malvaceae-Cotton
b) Leguminosae-Mango(or sunflower)
c) Cucurbitaceae-Orange
d) Brassicaceae-Wheat

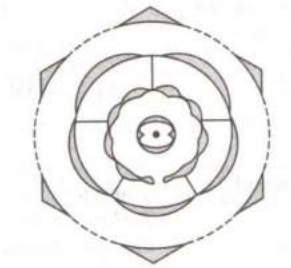
109. *Carthamus* belongs to family
a) Compositae
b) Gramineae
c) Liliaceae
d) Solanaceae

110. Aggregate fruit develops from
a) Multicarpellary, apocarpous ovary
b) Multicarpellary ovary
c) Multicarpellary, syncarpous ovary
d) Monocarpellary ovary

111. Bracts enclosing a cluster of flowers are known as
a) Bracteate
b) Involucre
c) Petaloid
d) Polysepalous

112. A fibrous root system is excellent for
a) food storage
b) nitrogen fixation
c) absorbing water from deeper layer of soil
d) providing good anchorage for the plant

113. The floral formula of the given floral diagram is



a) $\text{Br}\,\male\,\female\,K_{\text{pappus}}C_{(5)}A_0G_{(\bar{2})}$
b) $\text{Br}\,\male\,\female\,K_{\text{pappus}}\overline{C_{(5)}A_{(5)}}G_{(1)}$
c) $\text{Br}\,\male\,\female\,K_{\text{pappus}}\overline{C_{(5)}A_{(5)}},G_{(\bar{2})}$
d) $\text{Br}\,\male\,\female\,K_{\text{pappus}}\overline{C_{(5)}A_{(5)}},G_{(2)}$

114. Lateral branches with short internodes and each nodes bearing a rosette of leaves above and a tuft of roots below is found in aquatic plants like *Pistia* and *Eichhornia*. These lateral branches are called
a) Suckers
b) Offsets
c) Stolons
d) Rhizome

115. Cereals mostly belongs to the family
a) Cruciferaceae
b) Poaceae
c) Brassicaceae
d) Asteraceae

116. Edible part if mango is
a) Endocarp
b) Receptacle
c) Epicarp
d) Mesocarp

117. Edible part of tomato is
a) Epicarp
b) Pericarp and placenta
c) Mesocarp
d) Thalamus

118. In banana, which of the following part is edible?
a) Epicarp
b) Mesocarp
c) Endocarp
d) Both (a) and (c)

119. Sorosis is found in
a) Jack fruit
b) Mulberry
c) Fig
d) Both (a) and (b)

120. Ovary is half-inferior in the flowers of
a) Guava
b) Plum
c) Brinjal
d) Cucumber

121. In *Amorphophallus*, vegetative reproduction occurs through
a) Rhizome
b) Corm
c) Spores
d) Conidia

122. Flowers, in which only one set of essential organ is present are said to be
a) Bisexual
b) Monoecious
c) Dioecious
d) Unisexual

123. Which one of the following conditions is seen in the roots of a plant having submerged assimilatory roots and spongy petioles?
a) Triarch
b) Monarch
c) Tetrarch
d) Diarch

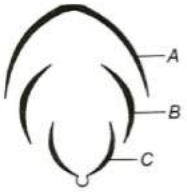
124. How many types of inflorescence are present in angiosperm depending on whether the apex gets converted into a flower or continuous to grow?
a) Three type
b) Four type
c) Five type
d) Two type

125. Which one of the following families shoes both freedom and fusion in four successive whorls of the flower from exterior in different members?
a) Malvaceae b) Solanaceae c) Asteraceae d) Liliaceae

126. Which of the following pairs is not correct?
a) Corymb-Candytuft b) Capitulum-Sunflower
c) Catkin-Mulberry d) Raceme-Wheat

127. Haustoria are found in
a) *Cuscuta* b) *Vanda* c) *Heritiera* d) *Dahlia*

128. Identify the type of petals in the given diagrams (A, B and C)



a) A-Wings, B-Keel, C-Standard
b) A-Keel, B-Wings, C-Standard
c) A-Standard, B-Wings, C-Keel
d) A-Standard, B-Keel, C-Wings

129. Regions of root from the root tip to base are
a) Region of maturation → Region of elongation → Region of meristematic activity
b) Region of elongation → Region of maturation → Region of meristematic activity
c) Region of meristematic → Region of elongation → Region of maturation
d) Region of dividing → Region of maturation → Region of elongation

130. Endosperm is consumed by developing embryo in the seed of
a) Coconut b) Castor c) Pea d) Maize

131. $\oplus \, ♂ \, ♀ \, P_{3+3}$ or $(3+3)A_{3+3}\,\underline{G_{(3)}}$ is the floral formula of
a) Malvaceae b) Solanaceae c) Cruciferae d) Liliaceae

132. Which of the following families has the floral formula $K_{(5)}C_{(5)}A_{(\infty)}\underline{G_{(5)}}$?
a) Compositae b) Cruciferae c) Leguminosae d) Malvaceae

133. Seedless banana is
a) Parthenocarpic fruit b) Multiple fruit c) Drupe fruit d) True fruit

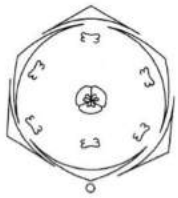
134. The bladder of *Utricularia* and pitchers of *Nepenthes* are modification of
a) Stems b) Leaves c) Roots d) Flowers

135. The main function (s) of root is
a) Absorption of water and minerals
b) To provide proper anchorage of plant
c) To store reserve food material and synthesis of plant growth regulators
d) All of the above

136. Examples of drupe fruit is/are
a) Mango b) Coconut c) Both (a) and (b) d) None of these

137. The plumule and radicle are enclosed in sheath which are called
a) Aleurone layer, scutellum b) Aleurone layer, coleoptile
c) Aleurone layer, coleorhiza d) Coleoptile, coleorhiza

138. Diagram belongs to



a) Coffee plant (Solanaceae) b) Vinea plant (Rutaceae)
c) Potato plant (Solanaceae) d) Onion plant (Liliaceae)

139. The reticulate venation is shown by
I. *Smilax* (monocot) II. *Colocasia* (monocot)
III. Gram (dicot)
Select the correct combination from the given options
a) I and II b) II and III c) III and I d) I, II and III

140. Nutrition is shown by
a) Root b) Stem c) Tendril d) None of these

141.

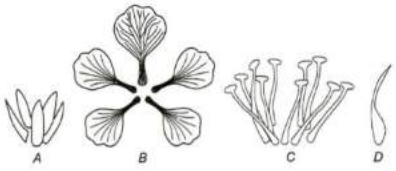

The above inflorescence is a/an
a) Cyathim b) Dichasial cyme c) Umbel d) Panicle

142. Perianth is the condition in which
a) Calyx and corolla are fused b) Calyx is present but corolla is absent
c) Corolla is present but calyx is absent d) Calyx and corolla are in distinct

143. Identify the correct order of the following four zones in the root from apex to base.
I. Mineral absorption zone
II.Meristematic zone
III.Maturation zone
IV.Water absorption zone
a) II, III, IV and I b) IV, III, II and I c) II, IV, I and III d) I, II, IV and III

144. Study of fruits is called
a) Palynology b) Pomology c) Embryology d) Morphology

145. Fleshy fruits with stony endocarp are called
a) Capsules b) Berries c) Pomes d) Drupes

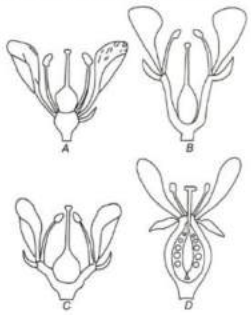
146. Identify flower parts *A* to *D* in the given diagrams correctly


a) A-Corolla, B-Calyx, C-Androecium, D-Gynoecium
b) A-Calyx, B-Corolla, C-Androecium, D-Gynoecium
c) A-Calyx, B-Corolla, C-Gynoecium, D-Androecium
d) A-Corolla, B-Calyx, C-Gynoecium, D-Androecium

147. Which of the following plants has the floral characters like zygomorphic flower, vexillary aestivation, diadelphous androecium and marginal placentation?
a) *Pisum* b) *Belladonna* c) *Brinjal* d) *Asparagus*

148. Leaf blade is spinous in case of
a) *Nerium* b) *Ziziphus* c) *Argemone* d) *Cannabis*

149. Identify the position of gynoecium in the given diagrams *A* to *D*



a) A-Perigynous, B-Perigynous, C-Hypogynous, D-Epigynous
b) A-Epigynous, B-Perigynous, C-Hypogynous, D-Perigynous
c) A-Hypogynous, B-Perigynous, C-Perigynous,D-Epigynous
d) A-Hypogynous, B-Epigynous, C-Perigynous, D-Perigynous

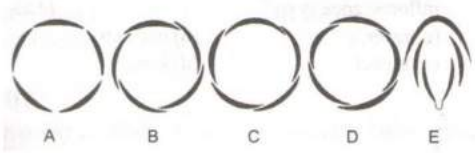
150. In floral formula, Br stands for
a) Bracteate b) Bracteolate c) Bearing flower d) Bud

151. *Viscum* is a
a) Total root parasite b) Total stem parasite
c) Partial root parasite d) Partial stem parasite

152. Generally, the parallel venation is found in
a) Gymnosperm b) Pteridophytes c) Monocotyledons d) Dicotyledons

153. Main axis continues to grow, the flowers are borne laterally in acropetal succession. This is a characteristic of which type of inflorescence?
a) Cymose b) Racemose c) Either (a) or (b) d) Both (a) and (b)

154. The following diagrams represent the types of aestivation in corolla. Identify the correct combination of labeling.



a) A-Valvate, B-Twisted, C-Vexillary, D-Imbricate
b) A-Valvate, B-Vexillary, C-Twisted, D-Imbricate
c) A-Vexillary, B-Imbricate C-Twisted, D-Valvate,
d) A-Valvate, B-Twisted, C-Imbricate D-Vexillary

155. I. Petals
II. Usually brightly coloured
III. May be free
IV. May be fused
Features given above represents
a) Calyx b) Corolla c) Sepals d) Androecium

156. Edible part of the apple is
a) Mesocarp b) Calyx c) Thalamus d) Pericarp

157. Tuberous roots are found in
a) *Beta vulgaris* b) *Daucus carota* c) *Ipomoea batatas* d) *Raphanus sativus*

158. Capitulum inflorescence is found in
a) Compositae (Asteraceae) b) Cruciferae (Brassicaceae)
c) Solanaceae d) Malvaceae

159. Floating roots are the characteristic feature of

a) *Viscum* b) *Cuscuta* c) *Vanda* d) *Jussiaea*

160. Which of the following are floral characters of Malvaceae?
a) Pedicellate, bracteates, hermaphrodite, tetramerous, actinomorphic complete and superior ovary
b) Compound spike, flowers bracteates, bracteolate, incomplete, bi or unisexual and hypogynous
c) Pedicellate, hermaphrodite, zygomorphic, complete and superior ovary
d) Jointed pedicel, bracteate, bracteolate, hermaphrodite, pentamerous, actinomorphic, complete and superior ovary

161. Inflorescence axis is called
a) Rachis b) Pedicel c) Petiole d) Peduncle

162. Tetradynamous condition is found in
a) *Hibiscus rosa-sinensis* b) *Petunia hybrid*
c) *Helianthus annuus* d) *Brassica campestris*

163. The photosynthetic or assimilatory roots are observed in
a) Banyan b) *Vanda* c) *Cuscuta* d) *Tinospora*

164. Which of the following represents the floral characters of Liliaceae?
a) Six tepals, zygomorphic, six stamens, bilocular ovary, axile placentation
b) Tetramerous, actinomorphic, polyphyllous, unilocular ovary, axile placentation
c) Trimerous, actinomorphic, polyandrous, superior ovary, axile placentation
d) Bisexual, zygomorphic, gomophyllous, inferior ovary, axile placentation

165. Gynobasic style is the characteristic features of
a) Malvaceae b) Lamiaceae c) Ranunculaceae d) Brassicaceae

166. Uniparous, biparous and multiparous systems of branching are found respectively in
a) *Mirabilis*, *Datura* and vine b) *Saraca*, *Mirabilis* and *Euphorbia*
c) Vine, *Polyalthia* and *Saraca* d) *Casuarina*, *Saraca* and *Croton*

167. Smallest region of the root is
a) Root cap b) Region of elongation
c) Region of meristematic activity d) Region of maturation

168. Prop roots are the modification for
a) Support b) Respiration c) Storage food d) Increasing mass

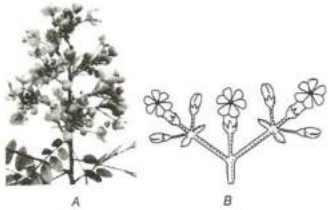
169. Which of the following has epiphytic features and aerial and flattened photosynthetic roots, without formal organization of stem and leaves?
a) *Tinospora* b) *Trapa* c) *Taeniophyllum* d) *Vanda*

170. Parts of the plants were observed. Structure-A develops aerially and produces roots when comes in contact with the soil. Structure-B develops from underground part of the stem, grow obliquely, becomes aerial and produces roots on its lower surface. Identify, respectively the structure of A and B.
a) Sucker, stolon b) Stolon, runner c) Stolon, sucker d) Runner, stolon

171. Trimerous flower, superior ovary and axile placentation is characteristics of
a) Liliaceae b) Cucurbitaceae c) Solanaceae d) Compositae

172. The capitulum type of inflorescence is found in
a) Marigold b) *Salvia* c) *Euphorbia* d) Jasmine

173. Identify the type of inflorescence in the given diagrams (A and B)



a) A-Racemose; B-Cymose b) A-Cymose; B-Racemose
c) A-Cymose; B-Cymose d) A-Racemose; B-Racemose

174. Roots are absent in

a) *Wolffia* b) *Podostemon* c) *Pistia* d) *Lemna*

175. Primary roots and its branches constitute the
a) Tap root system
b) Adventitious root system
c) Tertiary root system
d) Fibrous root system

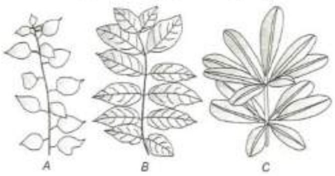
176. Two dry fruits (A & B) were observed. Both developed from unilocular ovaries of monocarpellary gynoecia. In fruit. A, pericarp and seed coat are free. It liberated the seeds only after the disintegration of the pericarp. Fruit 'B' dehisced dorsiventrally librating the seeds. In the following, the former in the pair represents 'A' and latter 'B'. to which types of fruits 'A' and 'B' respectively belong?
a) Achene and legume
b) Nut and follicle
c) Cypsella and siliqua
d) Pyxidium and septicidal capsule

177. In china rose, the inflorescence is
a) Cymose b) Capitulum c) Racemose d) Solitary axillary

178. In which of the following aestivation of sepal's/petals one margin covers the other and its margin is covered by previous one?
a) Valvate b) Twisted c) Imbricate d) Quincuncial

179. Which of the following two are the resultant of stipule modifications?
I.Spines in *Ziziphus*.
II.Tendrils in *Smilax*.
III.Tendrils in *Nepenthes*.
IV.Spines in *Argemone*.
V.Thorns in *Bougainvellea*.
a) I and III b) I and II c) II and V d) III and V

180. Identify the type of phyllotaxy in the given diagrams (A, B and C)



a) A-Whorled, B-Opposite, C-Alternate
b) A-Whorled, B-Alternate, C-Opposite
c) A-Alternate, B-Opposite, C-Whorled
d) A-Alternate, B-Whorled, C-Opposite

181. When stigma shows feathery appearance, it is
a) Plumose b) Cymose c) Globulose d) Racemose

182. The fruit developed from the single ovary is said to be
a) Composite type b) Simple type c) Aggregate type d) None of these

183. Which of the following is the modification of leaf?
a) Cladode b) Phyllode c) Corm d) Phylloclade

184. Arrangements of veins and the veinlets in the lamina of leaf is termed as
a) Phyllotaxy b) Inflorescence c) Venation d) Petioles

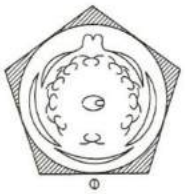
185. Aleurone layer is rich in
a) Lipid b) Starch c) Protein d) Fatty acid

186. Ebr $\text{Ebr}\ ⚥\ K_{(5)}C_{(5)}A_5\underline{G}_{(2)}$ is the floral formula of
a) Solanaceae b) Asteraceae c) Malvaceae d) Cruciferae

187. Cyathium inflorescence is found in
a) *Morus* b) *Dorstenia* c) *Ficus* d) *Euphorbia*

188. Cereals are mostly belong to family
a) Cruciferae b) Brassicaceae c) Poaceae d) Asteraceae

189. Given floral diagram represents



a) Compositae family b) Malvaceae family c) Cruciferae family d) Leguminosae family

190. Function of obturator on micropyle is to
a) Obstruct the path
b) Direct the growth of pollen tube
c) Help in fusion
d) Dissolve the wall of pollen tube

191. Perianth is represented by
a) Glumes b) Lemma c) Lodicules d) Palea

192. Radish is modified root and an example of
a) Napiform root b) Fusiform root c) Conical d) Tuberous root

193. I. In dicotyledonous seeds, cotyledons are often fleshy and full of reserve food
II. Generally, monocotyledonous seeds are endospermic
III. Generally, dicotyledonous seeds are non-endospermic
IV. Most of the monocotyledonous seeds have fleshy cotyledons
Select the correct statements
a) All except I b) All except II c) All except III d) All except IV

194. Potato family is called
a) Cruciferae b) Brassicaceae c) Solanaceae d) Poaceae

195. Epipetalous or epiphyllous condition is shown by
a) $\overset{\frown}{CA}$
b) $\overset{\frown}{PA}$
c) (a) or (b)
d) Both (a) and (b)

196. Rhizome, which grows vertically upwards are
a) Corms b) Stolon c) Bulbils d) Root stock

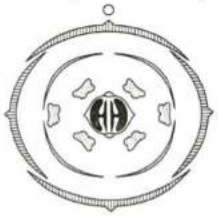
197. The existence of two types of leaves in the same plant, is called
a) Phyllody b) Phylloclade c) Heterophylly d) Heterosis

198. Most of the economically important fibre yielding plants belong to family
a) Malvaceae b) Solanaceae c) Cruciferae d) Poaceae

199. Spadix is an inflorescence found only in
a) Monocots b) Dicots c) Both (a) and (b) d) None of these

200. Phylloclades are
a) Green, photosynthetic, succulent stems of indefinite growth
b) One internode long stems
c) Leaf modifications
d) None of the above

201. Identify the family represented in given floral diagram



a) Brassicaceae b) Poaceae c) Asteraceae d) Fabaceae

202. Bright colour of petals is due to presence of
a) Chloroplast b) Anthocyanin c) Chromoplast d) Leucoplast

203. Gynandrous condition shows

a) Adhesion of stamens with petals
b) Adhesion of stamens with carpel
c) Stamens are united throughout their whole length
d) All anthers are united except filament

204. The direct elongation of radicle leads to the formation of
a) Stem b) Primary root c) Secondary root d) Tertiary root

205. I. Members of calyx are called ...A... .
II. United members of calyx are called ...B... .
III. Free members of calyx are called ...C... .
a) A-petals, B-gamosepalous, C-polyseptalous
b) A-sepals, B-gamosepalous, C-polysepalous
c) A-sepals, B-polysepalous, C-gamosepalous
d) A-petals, B-polysepalous, C-gamosepalous

206. Name the type of aestivation when sepals or petals in a whorl just touch one another at the margin without overlapping
a) Twisted aestivation b) Valvate aestivation
c) Imbricate aestivation d) Vexillary aestivation

207. Pome fruit is found in
a) Mango b) Apple c) Litchi d) Peach

208. What type of placentation is seen in sweet pea?
a) Basal b) Axile c) Free central d) Marginal

209. Vessels and companion cells are characteristic of
a) Angiosperm b) Gymnosperm c) Pteridophyta d) Fern

210. Which of the following is not a character of a monocot?
a) Presence of a single seed leaf b) Endosperm present in the mature seed
c) Leaves with parallel veins and smooth edges d) Floral parts as multiples of four or five

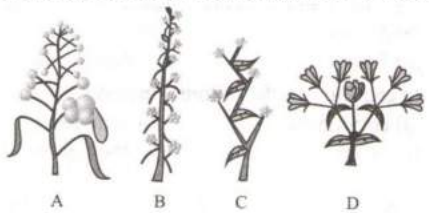
211. In floral formula, 'K' and 'C' stands for
a) K-Corolla, C-Calyx b) K-Calyx, C-Corolla c) K-Calyx, C-Calyx d) K-Corolla, C-Corolla

212. Drupes are called stony fruits because they have hard
a) Epicarp and mesocarp b) Mesocarp
c) Mesocarp and endocarp d) Endocarp

213. Study the following statements.
I.Food is stored in the leaf bases.
II.Buds develop from leaf apices.
III.Presence of tunicated bulb.
Identify the correct combination with reference to *Scilla*.
a) I, II and III are correct b) I and II are correct c) I and III are correct d) II and III are correct

214. Identify the wrong expression from the following statements.
a) A plant that bears male, female and bisexual flowers is polygamous
b) An actinomorphic flower can be dissected into two equal halves from any plane
c) Superior ovary is found in hypogynous flowers
d) That side of the flower towards the bract is called the posterior side

215. Find out the correct sequence of labeling of diagram given below.



a) A-Spike B-Raceme C-Dichasial cyme D-Monochasial cyme

b) A-Raceme B-Spike C-Monochasial cyme D-Dichasial cyme
c) A-Dichasial cyme B-Monochasial cyme C-Raceme D-Spike
d) A-Spike B-Dichasial cyme C-Monochasial cyme D-Raceme

216. 120° phyllotaxy is found in
a) Distichous condition
b) Tristichous condition
c) Monostichous condition
d) None of the above

217. The binomial of sunnhemp is
a) *Crotalaria juncea* b) *Erythrina indica* c) *Glycine max* d) *Arachis hypogeal*

218. In which of the following types of fruits, dorsiventral dehiscence takes place?
I. Legume
II. Follicle
III. Siliqua
IV. Capsule
a) I and III b) I and II c) II and III d) II and IV

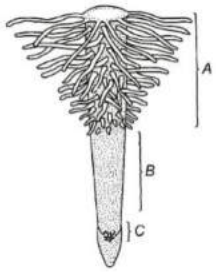
219. Green stems of unlimited growth, which have taken over the function of photosynthesis is called
a) Phylloclades b) Tendrils c) Modified shoot d) Inflorescence

220. Desert grasses often roll their leaves due to presence of
a) Oily surface b) Bulliform cells c) Spines d) None of these

221. Which of the following pairs of family's posses pollinia?
a) Orchidaceae and Apocynaceae
b) Orchidaceae and Asclepiadaceae
c) Asclepiadaceae and Mimosaceae
d) Asclepiadaceae and Apocynaceae

222. In Nepenthes (pitcher plant), pitcher is the modification of
a) Leaf petiole b) Leaf base c) Leaf lamina d) All of these

223. Identify *A*, *B* and *C* in the given diagram



a) A-Region of maturation, B-Region of elongation, C-Region of meristemastic activity
b) A-Region of elongation, B-Region of maturation, C-Region of meristematic activity
c) A-Region of meristematic, B-Region of maturation, C-Region of elongation activity
d) A-Region of meristematic, B-Region of elongation, C-Region of maturation

224. *Rauwolfia serpentina* belongs to family
a) Apocynaceae b) Solanaceae c) Liliaceae d) Fabaceae

225. Family-Podostemaceae is placed under the series
a) Multivulatae Aquaticae
b) Microembryeae
c) Daphnales
d) Unisexuales

226. The flower, in which the gynoecium occupies the highest position on the thalamus leaving other parts below is called
a) Hypogynous b) Perigynous c) Epigynous d) None of these

227. Stem is modified into cladode in
a) Casuarina b) Asparagus c) Opuntia d) Euphorbia

228. A root was described as adventitious root because it
a) Arose from plumule
b) Was used variously for storage of food
c) Was swollen
d) Was growing in marshy place

229. Commercial banana (Musa paradisica) is a
a) Haploid b) Diploid c) Triploid d) Tetraploid

230. The leaves of *Smilax* and *Colocasia* show
a) Parallel venation b) Reticulate venation c) Forward venation d) Lateral venation

231. Select the characters, which are not applicable to the family-Solanaceae?
I.Epipetalous and syngenesious anthers
II.Bicarpellary and syncarpous ovary
III.Oblique ovary with axile placentation
IV.Stamens six, arranged in two whorls
V.Bicarpellary, syncarpous and inferior ovary
a) II and III only b) I, IV and V only c) II, IV and V only d) I and III only

232. Percentage (%) sign is used for
a) Actinomorphic flower b) Zygomorphic flower c) Incomplete flower d) Epigynous flower

233. Dry indehiscent single-seeded fruit formed from bicarpellary syncarpous inferior ovary is
a) Caryopsis b) Cypsela c) Berry d) Cremocarp

234. Which of the following have succulent root?
a) *Opuntia* b) *Aloe* c) *Agave* d) *Asparagus*

235. Modified shoots wherein the shoot apical meristem changes to floral meristem is called
a) Flower b) Inflorescence c) Shoot buds d) Both (a) and (c)

236. The plant having monadelphous stamens and axile placentation is
a) Lemon b) Pea c) Tomato d) China rose

237. Consider the following statements.
I.In racemose inflorescence, the flowers are brone in a basipetal order.
II.Epigynous flowers are seen in rose plant.
III.In brinjal, the ovary is superior.
Of these statements
a) I and II are true but III is false b) I and III are true but II is false
c) I and II are false but III is true d) I and III are false but II is true

238. In hypogeal seed germination, the structure help to push the cotyledon inside the soil is
a) Epicotyl b) Hypocotyls c) Plumule d) Radical

239. Tendrils in plants are an example of
a) Convergent evolution b) Radiation
c) Divergent evolution d) Co-evolution

240. Parachute mechanism of seed dispersal is seen in
a) Poppy b) *Helianthus* c) *Plumbago* d) Lotus

241. In which of the following, petiolar leaf tendril is found?
a) *Clematis* b) *Citrus* c) *Parkinsonia* d) *Trapa*

242. Modified underground stem is called
a) Stolon b) Offset c) Sucker d) Corm

243. Why is vivipary an undesirable character for annul crop plants?
a) It reduces the vigour of plant
b) The seeds cannot be stored under normal conditions for the next season
c) The seeds exhibit long dormancy
d) It adversely affects the fertility of the plant

244. Leaves of dicotyledon plants generally exhibits
a) Oblique venation b) Lateral venation c) Reticulate venation d) Parallel venation

245. Multicostate parallel venation of leaf is found in
a) Gras, palm b) *Dalbergia* c) *Argemone* d) *Mangifera*

246. Simple, cluster of radial leaves, stipulate and parallel venation leaves and cyme or umbel inflorescence are the characteristics of
a) Poaceae b) Liliaceae c) Asteraceae d) Fabaceae

247. In some seeds, reminants of nucellus are also persistent.

This residual, persistent nucellus is the

a) Pericarp b) Perisperm c) Chalazosperm d) Mesosperm

248. In which of the following, parthenocarpy makes no sense?

a) Bnana b) Orange c) Lemon d) Pomegranate

249. In Duranta, the nature of vasculated defensive structures represent the modification of

a) Axillary bud as in *Bougainvillea* b) Terminal bud as in *Carissa*

c) Stipules as in *Acacia* d) Apical bud as in *Artabotrys*

250. In a flower, there are five unequal petals. The posterior petal is the largest. The two anterior petals are partially fused to form a boat-shaped structure. The two lateral petals are smaller than the posterior petal. Which one of the following characters is not associated with such a flower?

a) The aestivation of the petals is descendingly imbricate

b) The odd sepal is anterior

c) The pollination is by piston mechanism

d) The number of carpels is more

251. Water and minerals absorption from soil are the function of

a) Root hair b) Root cap c) Stilt root d) Prop roots

252. Gynoecium in the members of family-Leguminosae is composed of

a) Two carpels b) One carpel c) Five carpels d) Three carpels

253. Which one of the following represents the floral characters of Poaceae?

a) Pedicellate, bracteates, bisexual, tetramerous, actinomorphic, complete and superior ovary

b) Pedicellate, bracteates, bisexual, pentamerous, zygomorphic, complete and superior ovary

c) Sessile, bracteates, bracteolate, incomplete, uni or bisexual, perianth modified into lodicules, stamens three, syncarpous, superior ovary and feathery stigma

d) Bracteate, unisexual, actinomorphic, stamens five and inferior ovary

254. In a cereal grain, the single cotyledon of embryo is represented by

a) Coleorhiza b) Scutellum c) Prophyll d) Coleoptile

255. Anthesis is a phenomenon which refers to

a) Reception of pollen by stigma b) Formation of pollen

c) Development of anther d) Opening of flower bud

256. Which of the following have double fertilization?

a) Algae b) Bryophytes c) Pteridophytes d) Angiosperms

257. Identify a pair of the following plants, which show modification of axillary buds into tendrils and hooks respectively.

I.*Hugonia*

II.*Duranta*

III.*Passiflora*

IV.*Dioscorea*

a) I and II b) II and III c) III and I d) IV and I

258. Diadelphous stamens are the characteristic features of

a) Ranunculaceae b) Fabaceae c) Poaceae d) Malvaceae

259. The aerial, short and branched roots of an autotrophic plant that provide stability, are known as

a) Lateral roots b) Haustoria c) Velamen roots d) Clinging roots

260. The flower of Hibiscus is

a) Regular, bisexual, hypogynous and incomplete b) Regular, unisexual, hypogynous and complete

c) Regular, bisexual, epigynous and complete d) Regular, bisexual, hypogynous and complete

261. Gynoecium is the

a) Female reproductive part of flower made up of one carpel

b) Female reproductive part of flower made up of many carpel

c) Female reproductive part of flower made up of two carpel

d) All of the above

262. Exstipulate leaves are present in
a) *Althea rosea* b) *Tridax procumbens*
c) *Hibiscus rosa-sinensis* d) *Tephrosia purpurea*

263. Sunflower belongs to the family
a) Liliaceae b) Asteraceae c) Cruciferae d) Fabaceae

264. Ginger multiplies vegetatively by
a) Tuber b) Corm c) Sucker d) Rhizome

265. Non-endospermous seed is
a) Bean b) Gram c) Pea d) All of these

266. Which of the following groups of plants are propagated through underground roots?
a) *Bryophyllum* and *Kalanchoe* b) Ginger, potato, onion and zimikand
c) *Pistia*, *Chrysanthemum* and pineapple d) Sweet potato, *Asparagus*, *Tapioca* and *Dahlia*

267. Flowers and lateral branches arise from the
a) Lateral buds b) Lentices c) Stomata d) Cuticle

268. In cauliflower, the inflorescence is
a) Corymbose b) Cymose c) Raceme d) Capitulum

269. The botanical name of soybean is
a) *Cajanus cajan* b) *Glycine max* c) *Glycyrrhiza glabra* d) *Abrus precatorious*

270. Empty glumes are
a) Petals b) Bracts c) Anthers d) Carpels

271. When the filaments of stamens are attached to the petals, the condition is
a) Epiphyllous b) Epipetalous c) Adelphous d) Syngenesious

272. Root apex covered by thimble-like structure called
a) Region of elongation
b) Region of maturation
c) Region of dividing
d) Root cap

273. Fabaceae
a) Was earlier called Papilionoideae b) Was a sub family of Leguminosae
c) Is distributed all over the world d) All of the above

274. Stem develops from
a) Epicotyle b) Hypocotyle c) Plumule d) Radicle

275. Juicy hair-like structures observed in the lemon fruit develop from
a) Endocarp b) Exocarp c) Both (a) and (b) d) Mesocarp

276. Which of the following represents the male reproductive organ in a flower?
a) Androecium b) Stamen c) Both (a) and (b) d) None of these

277. Plants with single whorls of perianth are places under
a) Class-Monocot, Sub-class-Monochlamydeae b) Class-Dicot, Series-Monochlamydeae
c) Class- Dicot, Subclass- Monochlamydeae d) Class-Monocot, Subclass -Gamopetalae

278. Presence of persistent calyx is a feature of family
a) Solanaceae b) Gramineae c) Malvaceae d) Compositae

279. In cymose inflorescence
a) Main axis do not terminate in a flower b) Main axis terminate in a flower
c) Main axis do not exist d) Main axis modified into flower

280. Liliaceae
a) Is commonly called lily family
b) Is a representative of monocotyledonous plants
c) Is a representative of dicotyledonous plants
d) Both (a) and (b)

281. In China rose, five carpels are fused at base. This condition is called
a) Pentacarpellary, syncarpous and pentalocular
b) Pentacarpellary, apocarpous and pentalocular
c) Polycarpellary, syncarpous and pentalocular
d) Pentacarpellary, syncarpous and multilocular

282. Endosperm is the result of
a) Single fertilisation
b) Partial fertilisation
c) Double fertilisation
d) Triple fertilisation

283. Ginger is an underground stem. It is distinguished from root because it
a) Lacks chlorophyll
b) Stores food
c) Has nodes and internodes
d) Has xylem and vessels

284. In which plant underground stems spread to new niches and when older parts die new plants are formed?
a) *Grasses*
b) Strawberry
c) *Pistia*
d) Both (a) and (b)

285. Which of the following plants have long slender and coiled stem tendrils developed from axillary buds?
a) Grapevine and pumpkins
b) Australian *Acacia* and watermelon
c) *Bougainvillea* and cucumber
d) Strawberry and grapevine

286. A raceme inflorescence of *Tamarindus* bears 15 flowers. Each fertile anther lobe of its flower contains 215 pollen grains. What would be the total number of pollen grains produced by the inflorescence?
a) 64500
b) 32250
c) 19350
d) 16125

287. Triticale is a hybrid formed from the members belonging to the following families
a) Brassicaceae and Poaceae
b) Poaceae and Poaceae
c) Poaceae and Fabaceae
d) Alismaceae and Poaceae

288. The fleshy receptacle of syconous of fig encloses a number of
a) Achenes
b) Samaras
c) Berries
d) Mericarps

289. A student collected a hydrophyte with swollen petiole and with a single vascular bundle in the root. The plant which he collected., was
a) *Jussiaea*
b) *Trapa*
c) *Ceratophyllum*
d) *Potamogeton*

290. Scar on the seed coat through which seeds are attached to the fruit is called
a) Testa
b) Tegmen
c) Micropyle
d) Hilum

291. The condition where filaments and anthers are fused throughout entire length is
a) Synandrous
b) Gynandrous
c) Protandrous
d) Syngenesious

292. Which of these is an example for zygomorphic flower with imbricate aestivation?
a) *Calotropis*
b) Mustard
c) *Canna*
d) *Cassia*

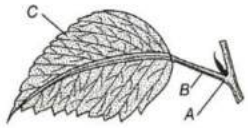
293. Select the correctly matched pair.
a) *Colchicum autumnale*- Solanaceae
b) *Petunia* – Solanaceae
c) *Gloriosa* – Fabaceae
d) *Trifolium* –Liliaceae

294. Leaves aries from which part of plant?
a) Rhizome
b) Stem
c) Internode
d) Node

295. What is the type of fruit that developed from the ovary of a monocarpellate gynoecium and breaks into several one seeded parts at maturity?
a) Cremocarp
b) Carcerulus
c) Regma
d) Lomentum

296. Whorl of small, green structures present around sunflower is
a) Involucre
b) Calyx
c) Epicalyx
d) Leaves

297. Identify *A*, *B* and *C* in the given diagram



a) A-Leaf base, B-Petiole, C-Lamina
b) A-Leaf base, B-Lamina, C-Petiole
c) A-Lamina, B-Petiole, C-Leaf base
d) A-Lamina, B-Leaf base, C-Petiole

298. In which plant, the pneumatophores are found?

a) *Tinospora* b) *Pinus* c) *Rhizophora* d) None of these

299. Two stamens as exception in Cruciferae are found in
a) *Nastrusium* b) *Senebirea* c) *Raphanus* d) *Brassica*

300. Vivipary is seen in
a) Mangroves b) Xerophytes c) Hydrophytes d) Mesophytes

301. Number of carpels is *Sida cordifolia* is always
a) Equal to the number of styles
b) Equal to the number of locules
c) Double the number of styles
d) Half the number of locules

302. Inflorescence of *Ficus* is
a) Raceme b) Spike c) Hypanthodium d) Verticillaster

303. Pineapple fruit develops from
a) Unilocular polycarpellary flower
b) Multipistillate syncarpous flower
c) Multilocular monocarpellary flower
d) A cluster of compactly born flowers on an axis

304. Mature seeds of some plant (such as gram pea and ground nut) and sperm is completely consumed by the embryo. Such seeds are called
a) Single b) Albuminous c) Endospermic d) Non-endospermic

305. Which of the following is a correct statement?
a) Orchid has palmate fleshy roots
b) *Pandanus* has stilt roots
c) Sweet potato has root tubers
d) All of the above

306. Bract is a modified
a) Petal b) Sepal c) Leaf d) Involucre

307. Leaf
a) Is a lateral generally flattened structure born on the stem
b) Is a vegetative organ for photosynthesis
c) Originates from shoot apical meristem
d) All of the above

308. Tobacco and Petunia belong to the family
a) Poaceae b) Fabaceae c) Solanaceae d) Brassicaceae

309. Which one of the following families has unicolour superior ovary?
a) Asteraceae b) Solanaceae c) Papaveraceae d) Cucurbitaceae

310. Which one of the following floral formula represents the mustard plant?
a) $\oplus \, ♀♂ \, K_{2+2} \, C_4 \, A_{2+4} \, \overline{G} \, (2)$
b) $\oplus \, ♀♂ \, P_{3+3} \, C_4 \, A_{3+3} \, \underline{G} \, (3)$
c) $\oplus \, ♀♂ \, K_{(5)} \, C_{(5)} \, A_{(5)} \, \underline{G} \, (2)$
d) $\oplus \, ♀♂ \, K_{2+2} \, C_4 \, A_{2+4} \, \underline{G} \, (2)$

311. Inflorescence of family-Compositae is
a) Perianth b) Lodicules c) Capitulum d) Hypanthodium

312. Angiosperms have dominated the land flora primarily because of their
a) Power of adaptability in diverse habitat
b) Property of producing large number of seeds
c) Nature of some pollination
d) Domestication by man

313. Which one of the flowing is a monocarpic plant?
a) Pear b) *Citrus* c) Mango d) *Bambusa*

314. Stem tendrils are developed from the..... which are slender and spirally coiled
a) Terminal buds b) Auxillary buds c) Both (a) and (b) d) Shoot tip

315. The anthers in Solanaceae are
a) Monothecous, introrse
b) Dithecous, extrorse
c) Dithecous, introrse
d) Monothecous, extrorse

316. In Selaginella, the adaxial outgrowth, from the base of leaf, is called
a) Ligule b) Velum c) Rhizophore d) Glossopodium

317. The cloves, which are used in food preparation are
a) Seeds b) Leaves c) Flower buds d) Stem tips

318. Tetradynamous stamens are found in
a) *Chrysanthemum* b) *Zinnia* c) Poppy d) *Brassica*

319. The leaves are modified into spines in
a) *Nepenthes* b) *Opuntia* c) Australian *Acacia* d) *Utricularia*

320. Placenta is the cushion like structure on which the
a) Ovule attached b) Ovary attached c) Seed attached d) Stamen attached

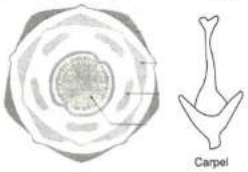
321. Arrange the following plants in the ascending order based on the number of leaflets in a leaf.
I. *Hardwickia*
II. *Gynandropsis*
III. *Marselia*
III. *Citrus*
a) I, III, II, IV b) IV, I, III, II c) IV, I, II, III d) II, IV, III, I

322. Bicarpellary, syncarpous ovary with axile placentation is seen in
a) Solanaceae b) Caesalpinaceae c) Asteraceae d) Malvaceae

323. The given formula belongs to
$Br \oplus ♀♂ \; Epi_3 \; K_{(5)}C_5 \; A_{(\infty)}G_{(5)}$
a) Solanaceae b) Malvaceae c) Gramineae d) Compositae

324. Which type of placentation is found in family-Fabaceae?
a) Axile b) Marginal c) Parietal d) Basal

325. Study the given diagram



a) *Colchicum* b) Onion c) *Solanum* d) Coffee

326. The multilocular fruit, splits in middle into two halves, is
a) Porocidal b) Septicidal c) Loculicidal d) Septifragal

327. Fibrous root system is mostly found in
a) Monocot plants b) Dicot plants c) Pteridophytes d) Bryophytes

328. Tetradynamous androecium is found in
a) Mustard b) Onion c) Tomato d) Sunflower

329. A student observed 34 inflorescences in Bougainvillea and 42 inflorescences in Poinsettia. Find out the number of flowers in Bougainvillea and the number of female flowers in Poinsettia respectively.
a) 34 and 126 b) 68 and ∞ c) 204 and 164 d) 102 and 42

330. Select the wrong statement.
a) Persistent calyx is seen in Solanaceae
b) Flowers are hypogynous in Asteraceae
c) Santonin is obtained from *Artemelsia*
d) In Poaceae, perianth is represented by membranous scales called Iodicules

331. Nodes are the region of stem where
a) Roots are born b) Leaves are born c) Stilt root are born d) Prop root are born

332. Structure of leaf which provide channels of transport for water, minerals and food materials is called
a) Midrib b) Margin c) Lamina d) Veins

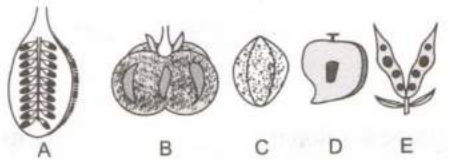
333. Identify the flower parts *A* to *E* in the given diagram

a) A-Androecium, B-Gynoecium, C-Corolla, D-Calyx, E-Pedicel
b) A-Androecium, B-Gynoecium, C-Corolla, D- Pedicel, E- Calyx
c) A-Androecium, B-Gynoecium, C-Pedicel, D-Corolla, E- Calyx
d) A-Androecium, B-Gynoecium, C-Calyx, D-Corolla, E-Pedicel

334. Whorled type of phyllotaxy is found in
a) Mustard b) China rose c) Guava d) *Alstonia*

335. Plants mentioned in previous question belongs to
a) Cruciferae b) Liliaceae c) Fabaceae d) Asteraceae

336. Which of the following correctly represents the types of fruits given?



a) A-Berry
B-Caryopsis
C-Drupe
D-Sorosis
E-Aggregate
b) B-Berry
C-Caryopsis
D-Drupe
A-Sorosis
E-Aggregate
c) B-Berry
C-Caryopsis
D-Drupe
E-Legume
A-Aggregate
d) B-Berry
C-Caryopsis
D-Drupe
A-Sorosis
E-Legume

337. Bicarpellary, syncarpous and with pseudoseptum fruit is
a) Siliqua b) Achene c) Capsule d) All of these

338. Root hairs are present on the
a) Root cap b) Region of elongation
c) Region of maturation d) Region of dividing cell

339. I. When carpels are free, they are called ...A... .
II. When the carpels fused, they are called ...B... .
Here, A and B refers to
a) A-syncarpous; B-apocarpous b) A-apocarpous; B-syncarpous
c) A-monocarpous; B-multicarpous d) A-multicarpous; B-monocarpous

340. Parthenocarpic tomato fruits can be produced by
a) Removing androecium of flowers before pollen grains are released
b) Treating the plants with low concentrations of gibberellic acid and auxins
c) Raising the plants from vernalised seeds
d) Treating the plants with phenylmercuric acetate

341. Petiole
a) Helps to hold the leaf blade b) Allows leaf blades to flutter wind

c) Helps in cooling the leaf
d) All of the above

342. Maize grain is
a) Seed
b) Embryo
c) Ovule
d) Fruit

343. Free central placentation is found in
a) Brassicaceae
b) Caryophyllaceae
c) Asteraceae
d) Malvaceae

344. In a tetradynamous androecium, one of the following is seen.
a) Outer whorl of four smaller stamens and inner whorl of two larger stamens
b) Outer whorl of two larger stamens and inner whorl of four smaller stamens
c) Outer whorl of four larger stamens and inner whorl of two smaller stamens
d) Outer whorl of two smaller stamens and inner whorl of four larger stamens

345. Multicarpellary, apocarpous, gynoecium with superior ovary is characteristic feature of the family
a) Papaveraceae
b) Mystaceae
c) Ranunculaceae
d) Rutaceae

346. The stem is the ...A... part of the axis bears branches, leaves, flowers and fruits. It develops from the ...B... part of embryo of germinating seeds. Complete the given statement by choosing appropriate options for A and B
a) A-descending; B-radicle
b) A-radicle; B-descending
c) A-ascending; B-plumule
d) A-plumule; B-ascending

347. Long filaments threads protruding at the end of a young cob of maize are
a) Anthers
b) Styles
c) Ovaries
d) Hairs

348. Angiosperms differ from gymnosperms in
a) Seeds
b) Fruits
c) Male gametophyte
d) Female gametophyte

349. Sub-aerial stem modification with long internode is
a) Tuber
b) Phyllode
c) Phylloclade
d) Runner

350. Flowers with bracts, (reduced leaf found at the base of pedicel) are called ...A... and those without bracts, are called ...B...
Complete the given statement by choosing appropriate options for A and B
a) A-bracteate; B-ebracteate
b) A-ebracteate; B-bracteate
c) A-pinnate; B-palmitate
d) A-palmitate; B-pinnate

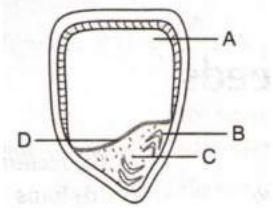
351. A drupe develop in
a) Wheat
b) Pea
c) Tomato
d) Mango

352. Which of the following represents the condition seen in the family-Compositae?
a) Superior ovary, Syngenesious and single basal ovule
b) Inferior ovary, monoadelphous and basal placentation
c) Inferior ovary, Syngenesious and axile placentation
d) Syngenesious, basal placentation and epigynous

353. A flower which can be divided into equal vertical halves by more than one plane of division is
a) Actinomorphic
b) Zygomorphic
c) Heteromorphic
d) Cyclic

354. An example of a seed with endosperm, perisperm and caruncle is
a) Cotton
b) Coffee
c) Lily
d) Castor

355. The diagram of the section of a maize gain is given blow. Identify the parts labeled A, B, C, and D.



	A	B	C	D
a)	Endosperm	Coleoptile	Scutellum	Aleurone layer
b)	Cotyledon	Coleoptile	Scutellum	Epithelium
c)	Endosperm	Coleoptile	Scutellum	Epithelium
d)	Endosperm	Coleoptile	Scutellum	Radicle

356. Lomentum is a kind of

a) Inflorescence b) Plant c) Fruit d) Insect

357. I. Standard petals

II. Wing petal

III. Keel petals

Above petals are found in

a) Valvate aestivation

b) Twisted aestivation

c) Imbricate aestivation

d) Vexillary aestivation

358. In the members of family-Malvaceae, anthers are described as

a) Diadelphous and dithecous b) Diadelphous and monothecous

c) Monodelphous and monothecous d) Monadelphous and dithecous

359. *Cinchona officinalis* belongs to family

a) Cruciferae b) Malvaceae c) Rubiaceae d) Leguminosae

360. Colchicine

I. is obtained from *Colchium autumnale*

II. is a cytokinesis inhibitor

III. induce polyploidy

IV. is obtained from Fabaceae family

V. Floral formula = $\oplus \overset{\text{♀}}{+} P_{3+3}A_{3+3}\underline{G}_3$

Which are correct statement?

a) I, II and III b) III, V and IV c) II, III and IV d) V, II and I

361. A phyllode is a modified

a) Leaf b) Stem c) Branch d) Root

362. Modification of petiole into leaf-like structure is called

a) Cladode b) Phylloclade c) Phyllode d) Pistillode

363. Some feature of plant leaves are

a) Hair on the lower surface and waxy cuticle b) Hair on the upper surface and no cuticle

c) Epidermis without stomata d) Presence of endodermis and casparian strips

364. Which of the following is a fatty oil yielding plant?

a) Sunflower b) *Acacia* c) *Butea* d) *Casuarina*

365. The order of opening of flower parts from the periphery towards the centre, is called

a) Acropetal b) Centripetal c) Centrifugal d) Basipetal

366. In which of the following fruits, the edible part is the aril?

a) Apple b) Pomegranate c) Orange d) Litchi

367. China rose have five fused carpals at the base. This condition is called

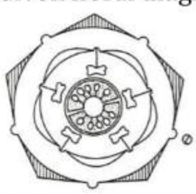
a) Pentacarpellary, syncarpous, monoadel pherus

b) Pentacarpellary, apocarpous, monoadel pherus

c) Polycarpellary, syncarpous, monoadel pherus

d) Pentacarpellary, syncarpous, monoadel pherus

368. Given floral diagram represents



a) Solanaceae b) Fabaceae c) Liliaceae d) Musaceae

369. Swollen leaf base is called

a) Lamina b) Petiole c) Pulvinus d) Leaf blade

370. The botanical name of cabbage is
a) *Brassica oleracea* var. *botrytis* b) *Brassica oleracea* var. *capitata*
c) *Brassica oleracea* var. *gongylodes* d) *Brassica compestris*

371. Jowar belongs to family
a) Glumaceae b) Gramineae/Poaceae
c) Asteraceae/Compositae d) Malvaceae

372. In plants like mint and jasmine, a selender lateral branch arises from the base of the main axis and after growing aerially for sometimes, arch downwards to touch the ground. This slender branch is called
a) Sucker b) Stolon c) Offset d) Scramblers

373. Expanded green stem of *Opuntia* is called
a) Phylloclade b) Tendril c) Bulbs d) Cladode

374. When leaflets are even in number they are called ...A... .
When leaflets are odd in number called they are ...B.. .
Here A and B refers to:
a) A-Paripinnate (tamarind); B-Imparipinnate (rose) b) A-Paripinnate (rose); B-Imparipinnate (tamarind)
c) A-Imparipinnate (tamarind); B-Paripinnate (rose) d) A-Imparipinnate (rose); A-Paripinnate (tamarind)

375. The difference in phloem of gymnosperms and angiosperms is due to
a) Parenchyma b) Sieve cell c) Companion cell d) Fibres

376. China rose is called shoeflower because
a) The flowers are showy b) The flowers produce black dye
c) The flowers are shoe shaped d) Petals are used for blackening the shoes

377. Tetradynamous condition is found in
a) Asteraceae b) Malvaceae c) Papilionatae d) Brassicaceae

378. Sunflower belongs to
a) Asteraceae b) Fabaceae c) Musaceae d) Euphorbiaceae

379. The fleshy fruits with hard and stony endocarp are called
a) Drupe b) Berry c) Pepo d) Pome

380. Ruminate endosperm is found in
a) Cruciferae b) Asteraceae c) Euphorbiaceae d) Annonaceae

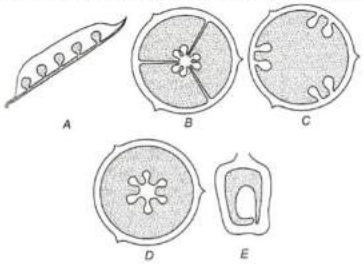
381. At root tip, number of divisions to produce 100 cells, is
a) 25 b) 50 c) 99 d) 100

382. Fruit formed without fertlisation of ovary is called
a) Cypsela fruit b) Parthenocarpic fruit
c) Drupe fruit d) Pome fruit

383. Leaf base expands into sheath covering the stem partially or wholly.
This is the characteristic of
a) Dicot b) Monocot c) Pteridophytes d) Gymnosperm

384. The most advanced family is
a) Cruciferae b) Cucurbitaceae c) Compositae d) Euphorbiaceae

385. Identify the types of placentation in the given diagrams (*A* to *E*)



a) A-Marginal, B-Axile, C-Parietal, D-Free central, E-Basal
b) A-Marginal, B- Basal, C-Parietal, D-Free central, E-Axile

c) A-Parietal, B-Basal, C-Marginal, D-Free central, E-Axile
d) A-Parietal, B-Axile, C-Marginal, D-Free central, E-Basal

386. The technical term used for the androecium in a flower of China rose (*Hibiscus rosa sinensis*), is
a) Monodelphous b) Diadelphous c) Polyandrous d) Polyadelphous

387. An inflorescence having a number of achlamydeous male flower surrounding a single achlamydeous female flower is
a) Verticillaster b) Cyathium c) Spadix d) Hypanthodium

388. $\underline{G}$ and $\overline{G}$, respectively stands for
a) Superior ovary, inferior ovary
b) Inferior ovary, superior ovary
c) Superior ovary, intermediate ovary
d) Intermediate ovary, inferior ovary

389. Root hairs are found
a) In the zone of elongation
b) Adventitious roots
c) On the root cap
d) In the zone of maturation

390. Pericarp and placenta are edible part of simple fleshy berry fruit
a) Jack fruit b) Banana c) Tomato d) Date palm

391. The given diagram belongs to

The diagram shown is the
a) Onion plant b) Garlic plant c) Potato plant d) Lily plant

392. Offset is a type of stem present in
a) *Pistia* b) *Colocasia* c) *Oxalis* d) Potato

393. Ginger is an example of underground modified stem called
a) Rhizome b) Corm c) Tuber d) Bulb

394. The *Orobanche* plant is
a) Partial stem parasite b) Total root parasite c) Symbiont d) Total stem parasite

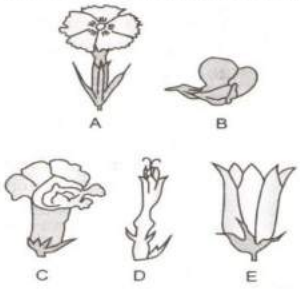
395. Which one of the following is an example for sub-aerial modification of stem?
a) *Agave* b) *Oxalis* c) *Asparagus* d) *Tridax*

396. In which plant, the fruit is a drupe, seed coat is thin, embryo is inconspicuous and endosperm is edible?
a) Groundnut b) Wheat c) Apple d) Coconut

397. Corolla aestivation showing two external, two internal and one partially external and internal sepals. The condition is
a) Valvate b) Twisted c) Quincuncial d) Vexillary

398. Staminode is
a) Sterile stamen b) Fertile stamen c) Redumentary stamen d) Developed stamen

399. The correct sequence of types of corolla in the figure given is



a) A-Caryophyllaceous

B-Papilionaceous
C-Personate
D-Tubular
E-Bell-shaped

b) A-Papilionaceous
B-Personate
C-Tubular
D-Bell-shaped
E-Caryophyllaceous

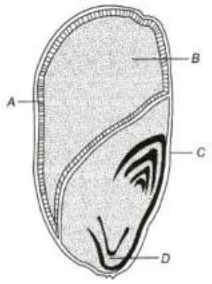
c) A-Personate
B-Papilionaceous
C-Caryophyllaceous
D-Bell-shaped
E-Tubular

d) A-Caryophyllaceous
B-Personate
C-Papilionaceous
D-Tubular
E-Bell-shaped

400. Epigynous flowers with numerous stamens are found in

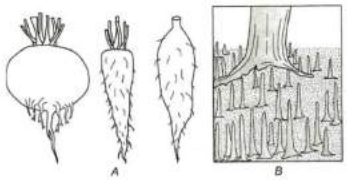
a) *Ranunculus muricatus*
b) *Fragaria indica*
c) *Croton roxburghii*
d) *Syzygium cuminis*

401. Identify *A*, *B*, *C* and *D* in the given diagram



a) A-Aleurone layer, B-Endosperm, C-Coleoptile, D-Coleorhiza
b) A- Aleurone layer, C-Coleoptile, C-Endosperm, D-Coleorhiza
c) A-Coleoptile, B-Aleurone layer, C-Endosperm, D-Coleorhiza
d) A-Coleoptie, B-Aleurone layer, C-Coleorhiza, D-Endosperm

402. Which of the following is incorrect about the diagram *A* and *B*?



a) Tap roots of carrot, turnip and adventitious root of sweet potato get swollen and store food
b) Pneumatophores help to get oxygen for respiration
c) Pneumatophores are found in the plants that grows in sandy soil
d) A is underground roots, but B grows vertically upwards

403. What is the botanical name of mulberry?

a) *Morus*
b) *Antherea*
c) *Attacus*
d) *Solanum*

404. Which one of the following is a pseudocarp?

a) Apple
b) Guava
c) Tomato
d) Banana

405. In unilocular ovary with a single ovule, the placentation is

a) Marginal b) Basal c) Free central d) Axile

406. A hyaline bisexual and self-fertilized flower that does not open at all, is
a) Chasmogamous b) Apogamous c) Cleistogamous d) Polygamous

407. A plant with actinomorphic and hypogynous flowers, heterochlamydeous perianth, dorsifixed and extrorse anthers dehiscing transversely belongs to
a) Coronariae b) Bicarpellatae c) Thalamiflorae d) Calyciflorae

408. Opium (poppy) is a plant belonging to the family
a) Apocynaceae b) Papaveraceae c) Solanaceae d) Liliaceae

409. Ladies finger (bhindi) belongs to
a) Malvaceae b) Cruciferae c) Solanaceae d) Liliaceaea

410. Name the condition given in statement I and II
I. When stamens attached to the petals
II. When stamens attached to perianth

I	II
a) Epiphyllous	Epipetalous
b) Epipetalous	Epiphyllous
c) Staminode	Epiphyllous
d) Epipetalous	Hypopetalous

411. Tracheophyta consists of
a) Bryophytes only b) Pteridophytes only
c) Gymnosperms and angiosperms d) Both (b) and (c)

412. Two plants 'A' and 'B' belonging to Solanaceae are observed. In plant 'A', the number of locules in the ovary of a flower is half of that of its carpel number. In plant B, the number of locules in the ovary of a flower is double the number of carpels. Identify the plants 'A' and 'B' respectively
a) *Capsicum, Datura* b) *Cestrum, Petunia*
c) *Withania, Solanum* d) *Lycopersicon, Nicotiana*

413. Double fertilization occurs among
a) Algae b) Bryophytes c) Angiosperms d) Gymnosperms

414. A flower which can be divided into two equal halves by only one plane is
a) Zygomorphic b) Actinomorphic c) Regular d) Perfect

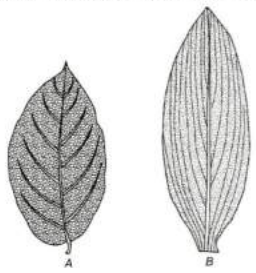
415. Cyathium inflorescence shows
a) Scorpioid cyme showing central female, many peripheral male flowers
b) Scorpioid cyme showing central male, many peripheral female flowers
c) Dichasial cyme showing two whorls of 3 to 9 flower
d) Dichasial cyme showing two whorls, one of male and another of female flowers

416. $\male\female K_{(5)}C_{1+2+(2)}A_{(9)+1}\underline{G}_1$ is the floral diagram of the family
a) Fabaceae b) Solanaceae c) Liliaceae d) Papaveraceae

417. A compound leaf, which appears as simple leaf due to the suppression of one or two leaflets is found in one of the following plants
a) *Hardwickia* b) *Parkinsonia* c) *Coriandrum* d) *Citrus*

418. Aggregate fruit is found in
a) *Ananas sativus* b) *Annona squamosa* c) *Artocarpus integrifolia* d) *Pyrus malus*

419. Identify the type of venation in the given diagram (*A* and *B*)



a) A-Reticulate (dicotyledons); B-Parallel (monocots)

b) A-Reticulate (monocots); B-Parallel (dicots)
c) A-Parallel (dicots); B-Reticulate (monocots)
d) A-Parallel (monocots); B-Reticulate (dicots)

420. In an inflorescence, two types of small, sessile flowers were observed. They are arranged in centripetal manner and have reduced hair-like sepals. Which pair of the following characters are not associated with such flowers?
I.Nectar glands at the base of the corolla
II.Axile placentation
III.Superior ovary
IV.Scaly bracts
a) II and III b) III and IV c) I and II d) I and IV

421. It is an example of amphibious plant
a) Lotus b) *Typha* c) *Vallisneria* d) *Trapa*

422. Keel is characteristic of the flowers of
a) Gulmohur b) *Cassia* c) *Calotropis* d) Bean

423. Tap roots of carrot, turnip and adventitious roots of sweet potato are the modification for the storage of
a) Water
b) Food
c) Secondary compound
d) Primary compound

424. Replum is found in family
a) Labiatae b) Malvaceae c) Compositae d) Brassicaceae

425. In a plant, the peduncle is elongated and it bears pedicillate flowers. The older flowers lie towards the base and the younger ones near the apex. The growth of the peduncle continues and more flowers are added. The inflorescence is
a) Raceme b) Corymb c) Umbel d) Head

426. Which one of the following statements are true?
I.If the stem is joined with solid nodes and hollow internodes, it is called caudex.
II.In *Tridax*, the stem is decumbent.
III.Corm is a condensed from of rhizome growing more or less in vertical direction.
IV.Sucker is an underground modification of stem.
V.Biparous type of cymose branching is seen in *Saraca*.
a) I, IV and V b) II and III c) II, III and V d) III and IV

427. The arrangement of the ovules on the placentae developed from the central axis of the ovary is called
a) Parietal placentation b) Axile placentation c) Basal placentation d) Marginal palcention

428. A simple one seeded fruit in which pericarp is fused with seed coat is
a) Achene b) Caryopsis c) Cypsela d) Nut

429. The endosperm is used by cotyledon, the cotyledon is
a) Single b) Albuminous c) Endospermic d) Non-endospermic

430. The leaf parts gets modified into spines in order to
a) Reduce transpiration b) Reduce surface area
c) Protect the plant from grazing animals d) All of the above

431. Plants mentioned in question number 167 and 168 belongs to which plant family?
a) Solanaceae b) Fabaceae c) Liliaceae d) Papaveraceae

432. Wearing isolated a dormancy inducing substance from the leaves of a plant. From which type of gynoecium does the fruit of that plant develop?
a) Bicarpellary, syncarpous gynoecium with inferior ovary
b) Bicarpellary, syncarpous gynoecium with superior ovary
c) Tricarpellary, syncarpous gynoecium with superior ovary
d) Monocarpellary gynoecium with half inferior ovary

433. A horizontal underground stem is a
a) Corm b) Phylloclade c) Rhizome d) Rhizoid

434. Treatment of seed at low temperature under moist conditions to break its dormancy is called
a) Scarification b) Vernalisation c) Chelation d) Stratification

435. The lateral roots originate from
a) Endodermal cells b) Pericycle cells
c) Epiblema d) Cortical cells below root hairs

436. Potato and sweet potato
a) Have edible parts, which are homologous organs
b) Have edible parts, which are analogous organs
c) Have been introduced in India from the same place
d) Are two species of the same genus

437. When flower has both and androecium and gynoecium, it is called ...A...
II. When flower has either stamens or only carpel, it is called ...B...
Complete the given statement by choosing appropriate options for A and B
a) A-unisexual; B-bisexual b) A-bisexual; B-unisexual
c) A-bisexual; B-hermaphrodite d) A-hermaphrodite; B-bisexual

438. One of the following is a dry indehiscent fruit
a) Caryopsis b) Pod c) Follicle d) Lomentum

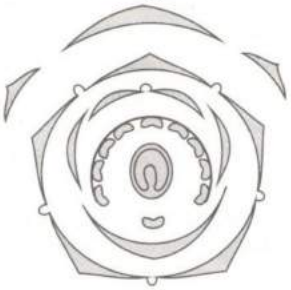
439. The characteristic type of placentation found in the members of Caryophyllaceae is
a) Parietal b) Marginal c) Basal d) Free central

440. Edible part of cauliflower is
a) Bud b) Inflorescence c) Flower d) Fruit

441. The circinate vernation is the characteristic feature of ferns. It refers to
a) Coiling of young leaves b) Arrangement of leaves on stem
c) Attachment of sori on leaves d) Heterophily

442. The fruit is chambered, developed from inferior ovary and has seeds with succulent testa in
a) Pomegranate b) Orange c) Guava d) Cucumber

443. Observe the given floral diagram and choose the suitable floral formula from the followings



a) $\%\,♀♂K_5C_5A_{10}\underline{G}_1$ b) $\%\,♀♂K_{(5)}C_5A_{10}\underline{G}_1$
c) $\%\,♀♂K_{(5)}C_{1+2+(2)}A_{(9)+1}\underline{G}_{10}$ d) $\%\,♀♂K_5C_{1+2+(2)}A_{(9)+1}\underline{G}_1$

444. Starch is insoluble in water, yet it is accumulated in large quantities in potato tuber because
a) It is useful for storage b) Tubers respire slowly
c) Starch is synthesized in tubers d) Translocated sucrose is polymerized here

445. Small branches produced from lower 2 to 3 nodes in jowar are called
a) Culm b) Prop roots c) Ligule d) Tillers

446. What is the fruit that develops from a tricarpellary, syncarpous, inferior ovary with parietal placentation?
a) Pepo b) Pome c) Cypsela d) Capsule

447. Three floral diagrams are given here. Their respective families are assigned in the answer key. Find out the families to which these diagrams belong to

A - ⚥ $K_{Pappus}\ \overset{\frown}{C_{(5)}\ A_5}\ G_{\overline{(2)}}$

B - ⚥ $K_{(5)}\ \overset{\frown}{C_{(5)}\ A_{(5)}}\ G_{\underline{(2)}}$

C - ⊕ ⚥ $K_{2+2}\ C_4\ A_{2+4}\ G_{(2)}$

a) A-Liliaceae B-Asteraceae C-Solanaceae
b) A-Asteraceae B-Solanaceae C-Brassicaceae
c) A-Asteraceae B-Solanaceae C-Poaceae
d) A-Poaceae B-Solanaceae C- Asteraceae

448. The edible part in hesperidium fruit is
a) Pericarp b) Mesocarp c) Juicy hair d) Endocarp

449. Water stomata are found in
a) Plants lacking normal stomata b) Plants inhibiting idry regions
c) Plants inhibiting humid region d) All plants

450. Which one of the following is wrongly matched?

Column I	Column II

a) Caesalpiniaceae Catechu b) Palmae Date palm
c) Euphorbiaceae *Coccinia* d) Musaceae Banana

451. Fruit of custard apple is etaerio of
a) Berries b) Follicles c) Achenes d) Drupes

452. Which is correct to saprophytic angiosperm?
a) They secrets enzyme outside the body and absorb nutrients
b) They have mycorrhiza with fungi
c) They takes food and then digested it
d) They are photosynthetic

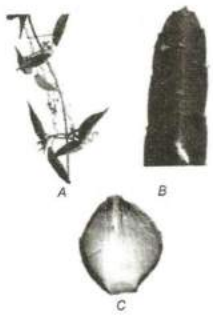
453. In cryopsis type of fruit
a) Seed is absent b) Three layers of pericarp are distinct
c) Seed coat and pericarp are fused d) Autochory occurs

454. Arrange the following plants in the ascending order based on the number of carpels they possess
I.*Oenothera*
II.*Acacia melanoxylon*
III.Squill
IV.Lettuce
a) IV, III, I, II b) II, IV, III, I c) II, III, IV, I d) I, IV, III, II

455. Rarely among angiosperms, the pollen grains influenced the endosperm. This is called as
a) Metaxenia b) Nemec phenomenon c) Xenia d) Mesogamy

456. Colchicines producing plant belongs to family
a) Liliaceae b) Rubiaceae c) Malvaceae d) Solanaceae

457. Identify the type of leaf modification in the given diagram (*A* to *C*)

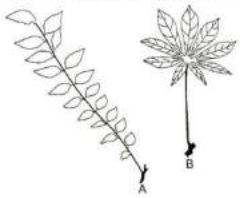


a) A-Support (spines), B-Protection (tendril), C-Storage (freshy leaves)
b) A-Support (dendril), B-Protection (spine), C-Storage (freshy leaves)
c) A-Protection (dendril), B-Support (spine), C-Storage (freshy leaves)
d) A-Protection (spine), B-Support (dendril), C-Storage (freshy leaves)

458. Study the following and choose the correct statements.
I.Bulb of *Allium cepa* is a modified stem.
II.Cloves of *Allium sativum* are fleshy scale leaves.
III.Corm of *Colocasia* is a modified root.
IV.Tendril in *Vitis vinifera* is a modified axillary bud.
a) I and II b) II and IV c) II and III d) I and IV

459. Stems are
a) Positively phototropic
b) Negatively geotropic
c) Negatively hydrotropic
d) All of the above

460. Identify the types of leaves given in the diagram *A* and *B*



a) A-Pinnately compound leaf (neem); B-Palmately compound leaf (silk cotton)
b) A-Pinnately compound leaf (silk cotton); B-Palmately compound leaf (neem)
c) A-Palmately compound leaf (silk cotton); B-Pinnately compound leaf (neem)
d) A-Palmately compound leaf (neem); B-Pinnately compound leaf (silk cotton)

461. The anthers in Solanaceae are
a) Monothecous, introrse
b) Dithecous, extrorse
c) Dithecous, introrse
d) Monothecovs, extrorse

462. Male reproductive organ (flower) consists of
a) Stalk b) Thalamus c) Anther d) Both (a) and (c)

463. A fruit developed from Hypanthodium inflorescence is called
a) Hesperidium b) Sorosis c) Syconous d) Caryopsis

464. I. Usually bilobed
II. Each lobe has two chambers (pollen sacs)
III. The chamber (pollen sacs) contains pollen grain
Above are the features of
a) Pistil b) Anther c) Stamen d) Petals

465. Which one of the following is an endospermic seeds?
a) Pea b) Bean c) Gram d) Castor

466. Identify the monocarpic palm.
a) *Areca* b) *Borassus* c) *Calamus* d) *Corypha*

467. Seed coat has ...A... layers
I. Outer covering is called ...B.... .

II. Inner covering is called ...C... .

Complete the given set of statements (I to III) by choosing appropriate options for A to C

a) A-3, B-testa, C-tegmen
b) A-2, B-testa, C-tegmen
c) A-2, B-tegmen, C-testa
d) A-3, B-tegmen, C-testa

468. Number of female flowers in a Cyathium inflorescence is

a) One b) Two c) Three d) Several

469. Identify the characters of gynoecium found in members of Asteraceae, Fabaceae, Liliaceae and Solanaceae, respectively

I.Tricarpelly syncarpous, ovary superior and trilocular.
II.Bicarpellary syncarpous, ovary superior and usually bilocular
III.Bicarpellary syncarpous, ovary inferior and unilocular.
IV.Monocarpellary, ovary half-inferior and unilocular.

a) II, I, III, IV b) III, IV, I, II c) IV, III, II, I d) I, II, IV, III

470. Which one among the following is the true nut?

a) Walnut b) Ground nut c) Cashew nut d) Areca nut

471. Thalamus of hypogynous ovary is

a) Concave b) Convex c) Biconcave d) Biconvex

472. Which of the following plant parts can respire even in the absence of oxygen?

a) Seeds b) Roots c) Stems d) Leaves

473. A_{∞} represents

a) Indefinite stamens b) Numerous stamens c) Either (a) or (b) d) Both (a) and (b)

474. Aggregate fruit formed from

a) Multicarpellary apocarpous ovary
b) Multicarpellarey syncarpous ovary
c) Monocarpellary apocarpous ovary
d) Monocarpellary syncarpous ovary

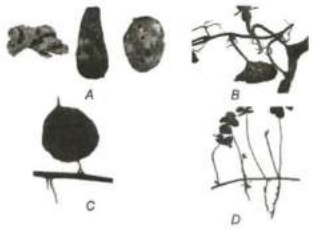
475. When the other floral parts are arranged at the base of the gynoecium, the flower is called

a) Hypogynous flower b) Perigynous flower c) Epigynous flower d) Agynous flower

476. Green leaf-like modified aerial stems/branches with a single internode are called

a) Phylloclades b) Phyllodes c) Bulbils d) Cladodes

477. Identify the stem modification for (*A* to *D*)



a) A-Support, B-Storage, C-Vegetative propagation, D-Protection
b) A-Storage, B-Support, C-Vegetative propagation, D-Protection
c) A-Storage, B-Support, C-Protection, D-Vegetative reproduction
d) A-Support, B-Storage, C-Protection, D-Vegetative reproduction

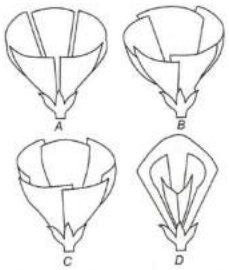
478. Which one of the following is a stem vegetable?

a) Sweet potato b) Potato c) Turnip d) Carrot

479. Which one of the following inhibits seed germination for a particular period?

a) Light b) Water c) Caron dioxide d) Dormancy

480. Identify types of aestivation in the given diagrams *A* to *D*



a) A-Valvate, B-Imbricate, C-Twisted, D-Vexillary
b) A-Valvate, B-Twisted, C-Imbricate, D-Vexillary
c) A-Vexillary, B- Twisted, C-Imbricate, D-Valvate
d) A-Vexillary, B-Imbricate, C-Twisted, D-Valvate

481. Jowar grain is
a) Caryopsis b) Pome c) Berry d) Nut

482. Vascular bundles are arranged in a ring in the members of family
a) Orchidaceae b) Iridaceae c) Euphorbiaceae d) Liliaceae

483. Floral formula $\oplus ♀♂ K_5C_5A_7 + {}_3\underline{G1}$ is of family
a) Papilionaceae b) Mimosoideae c) Caesalpinoidae d) Malvaceae

484. Legume plants are important for atmosphere because they
a) Help in N_2- fixation
b) Do not help in N_2-fixation
c) Increase soil fertility
d) All of the above

485. The example for trimerous, unisexual flower is
a) *Cocos nucifera* b) Hibiscus c) Tamarind d) Pea

486. *Cannabis sativa* is the source of
a) Opium b) LSD c) Marijuana d) Cocaine

487. In the following, succulent stem is found in
a) *Saccharum* b) *Musa* c) *Euphorbia* d) *Dryopteris*

488. Study the following table and choose the correct pair.

V.	False whorls-like inflorescence	Many sessile bisexual flowers *Leonotis*
VI.	Single flower-like inflorescence	Many stalked staminate and pistillate flowers *Poinsettia*
VII.	Fruit-like inflorescence	Many sessile staminate flowers on the top and pistillate flowers at the base and sterile flowers in between *Ficus*
VIII.	Fleshy axis of Inflorescence	Many stalked staminate *Colocacia* flowers at the Base and pistillate flowers on the top and sterile flowers in between

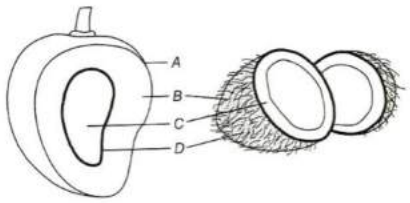
a) I and III b) I and IV c) II and III d) II and IV

489. Scorpioid cyme is seen in
a) *Hamelia* b) *Heliotropium* c) *Clerodendron* d) *Nerium*

490. Arrange the following fruits in descending order based on the number of locules in the ovary from which it develops.
IX. Carcerulus
X. Schizocarp
XI. Cremocarp
XII. Regma
a) II, I, IV, III b) I, IV, III, II c) II, IV, III, I d) II, III, I, IV

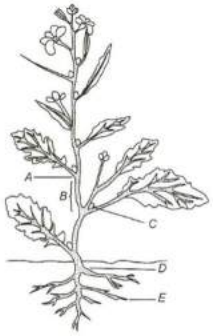
491. Juicy hair-like structures observed in the lemon fruit develop from
a) Endocarp
b) Mesocarp and endocarp
c) Exocarp
d) Mesocarp

492. Identify *A* to *D* in the given diagram



a) A-Epicarp, B-Mesocarp, C-Seed, D-Endocarp
b) A-Mesocarp, B-Epicarp, C-Seed, D-Endocarp
c) A-Mesocarp, B-Epicarp, C-Endocarp, D-Seed
d) A-Epicarp, B-Mesocarp, C-Endocarp, D-Seed

493. Identify *A* to *E* in the given diagram



a) A-Node, B-Internode, C-Accessory bud, D-Primary root, E-Secondary root
b) A-Node, B-Internode, C-Bud, D-Primary root, E-Secondary root
c) A-Internode, B-Node, C-Bud, D-Primary root, E-Secondary root
d) A-Internode, B-Node, C-Callus, D-Primary root, E-Secondary root

494. In pea, castor and maize the number of cotyledons are
a) 2, 2 and 1 respectively
b) 1, 2 and 2 respectively
c) 2, 1 and 2 respectively
d) 1, 2 and 1 respectively

495. ⚥ stands for (in plants)
a) Perfect flower
b) Bisexual flower
c) Either (a) or (b)
d) Imperfect flower

496. The most common type of ovule in angiosperms is
a) Amphitropous
b) Atropous
c) Anatropous
d) Circinotropous

497. Underground stems of potato, ginger, turmeric, Zaminkand, *Colocasia* are the examples of modified stem for
a) Conduction of minerals
b) Conduction of water
c) Both (a) and (b)
d) Storage of food

498. Which of the following is a wheat fruit?
a) Achene
b) Cypsella
c) Caryopis
d) Endosperm

499. Multicostate parallel type of venation is found in the leaves of
a) Grass and palms
b) Banana and Canna
c) Castor and China rose
d) Mango and peepal

500. The edible part of the sweet potato is a modified
a) Stem
b) Root
c) Leaf
d) Flower

501. $\underline{G}_{\infty}$ stands for
a) Gynoecium, polycarpellary, apocarpous, inferior
b) Gynoecium, polycarpellary, syncarpous, superior
c) Gynoecium, polycarpellary, apocarpous, superior
d) Gynoecium, polycarpellary, inferior, apocarpous inferior

502. The fruit of Solanaceae is
a) Berry of capsule
b) Pome
c) Legume of pod
d) Drupe

503. An example of axile placentation is
a) *Argemopne*
b) *Dianthus*
c) Lemon
d) Marigold

504. Scaly bulb stem modification is seen in
a) *Allium* b) *Lilium* c) *Scilla* d) *Ginger*

505. The monocotyledon seeds consist of one large and shield-shaped cotyledon known as
a) Aleurone layer b) Scutellum c) Coleoptiles d) Hilum

506. An Angiospermic plant has 24 chromosomes in 'microspore mother cells'. The number of chromosome in its endosperm will be
a) 12 b) 24 c) 36 d) 48

507. K_{2+2} represents
a) Four petals in two groups
b) Four petals in whorls of two each
c) Both (a) and (b)
d) Either (a) or (b)

508. In angiosperms, male gametes are formed from
a) Antipodals b) Prothallial cell c) Tube cell d) Generative cell

509. Which one of the following statements is correct with reference to *Amentum*?
a) The peduncle is fleshy and bears unisexual flowers and the flowers open in basipetal manner
b) The peduncle is condensed and bears bisexual flowers and the flowers open in a centripetal manner
c) The peduncle is weak, drooping and bear unisexual flowers and the flowers open in an acropetal manner
d) The peduncle grows indefinitely and bears bisexual flowers and flowers open in basipetal manner

510. In banana, pineapple and *Chrysanthemum*, the lateral branches originate from the basal and underground portion of main stem and then come obliquely upward giving rise to leafy shoots These branches are called
a) Runner b) Corm c) Bulb d) Sucker

511. Thorn is a modified branch because
a) It is hard, straight and pointed
b) It is a part of the plant
c) It arises in the axil of a leaf
d) It is a defensive organ

512. Lateral roots arise from
a) pericycle b) cortex c) endodermis d) stele

513. Which of the following promotes softening of fruits?
a) Polygalacturonase b) Colchicine c) Polyethylene glycol d) Cellulose

514. The economically important plant of Malvaceae is
a) *Gossypium hirsutum*
b) *Hibiscus cannabis*
c) *Abelmoschus esculentum*
d) All the above

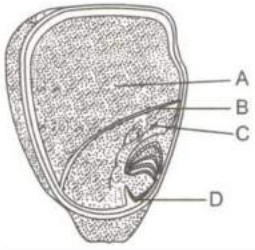
515. Tetradynamous stmens are found in family
a) Malvaceae b) Solanaceae c) Cruciferae d) Liliaceae

516. Diadelphous condition is found in
a) Rosaceae b) Papilionaceae c) Leguminosae d) Cucurbitaceae

517. The ovary is half inferior in flowers of
a) Cucumber b) Cotton c) Guava d) Peach

518. The reticulate venation is commonly found in the leaves of
a) Monocot plants b) Dicot plants c) Bryophytes d) Thallophytes

519. The diagram represents the LS of monocot seed. Choose the correct combination of labeling.



Column I	Column II
Coleorhizae	Radicle

Food storing tissue	Endosperm
Parthenocarpic fruit	Grapes
Single seeded fruit developing from monocarpellary superior ovary	Mango
Membranous seed coat	Maize

	A	B	C	D
a)	Aleurone layer	Scutellum	Colepotile	Coleorhiza
b)	Seed coat	Scutellum	Coleptile	Coleorhiza
c)	Epithelium	Scutellum	Plumule	Coleorhiza
d)	Endosperm	Scutellum	Coleoptile	Coleorhiza

520. Pneumatophores are the roots for
a) Storing water
b) Asexual reproduction
c) Respiration
d) Sexual reproduction

521. A fruit in which seed coat and fruit wall is fused known as caryopsis present in
a) Wheat b) Sunflower c) Mango d) Tomato

522. Pneumatophores are usually present in
a) *Murraya* b) *Eichhornia* c) *Avicinnea* d) None of these

523. Perigynous type of ovary is found in
a) Plum b) Rose c) Pearch d) All of these

524. Umbel inflorescence is found in
a) *Musa* b) *Colocasia* c) *Coriandrum* d) *Helianthus*

525. In drumstick, the seeds are dispersed by
a) Water
b) Animals
c) Wind
d) Explosive mechanism

526. A characteristic feature of ovary of *Brassica campestris* is
a) Presence of replum
b) Axile placentation
c) Epigynous
d) Multilocular nature

527. Vivipary is observed in
a) Banyan b) Bryophyllum c) Ipomoea d) Rhizophora

528. Find out the wrongly matched pair.
a) Tuber- Potato
b) Rhizome-Ginger
c) Bulbil-*Agave*
d) Leaf buds-Banana

529. In a longitudinal section of a root, starting from the tip upward the four zones occur in the following order :
a) Root cap, cell division, cell enlargement, cell maturation
b) Root cap, cell division, cell maturation, cell enlargement
c) Cell division, cell enlargement, cell maturation, root cap
d) Cell division, cell maturation, cell enlargement, root cap

530. Scientific name of sunflower is
a) *Hibiscus rosa-sinensis*
b) *Solanum nigrum*
c) *Oryza sativa*
d) *Helianthus annuus*

531. Seeds posses spongy aril in
a) *Eichhornia* b) *Potamogeton* c) *Sagittaria* d) *Nymphaea*

532. Which of the following statements is correct?
a) Replum is found in the ovary of *Pisum*
b) The anthers are introrse in *Hibiscus*
c) The ovules are pendulous in *Nelumbo*
d) Lateral style is found in *Ocimum*

533. Inflorescence in jowar is
a) Corymb b) Spike c) Panicle d) Head

534. United sepals are called ...A... .
Free sepals are called ...B... .

Here, A and B refers to

a) A-polysepalous; B-gamosepalous
b) A-gamosepalous; B-polysepalous
c) A-gamopetalous; B-polypetalous
d) A-polypetalouos; B-gamopetalus

535. Spadix inflorescence occurs in

a) Mulberry
b) Banana
c) *Delonix*
d) Coriander

536. The modified stem of *Opuntia* is

a) Phyllode
b) Phylloclade
c) Cladode
d) Staminode

537. The outer covering of endosperm separates the embryo by a proteinous layer called

a) Plumule
b) Radicle
c) Aleurone layer
d) Scutelium

538. Swollen and spongy petioles are characteristic of

a) *Trapa*
b) *Wolffia*
c) *Ceratophyllum*
d) *Limnophila*

539. Which one of the following is a monocarpic tree?

a) *Borassus flabellifer*
b) *Corypha umbraculifera*
c) *Phoenix dactylifera*
d) *Elaeis guineensis*

540. ♂ stands for ...A...
⊕ stands for ...B...
% stands for ...C...
Here, A to C refers to

a) A-bisexual plant, B-actinomorphic, C-zygomorphic
b) A-unisexual, B-actinomorphic, C-zygomorphic
c) A-unisexual, B-zygomorphic, C-actinomorphic
d) A-bisexual plant, B-zygomorphic, C-actinomorphic

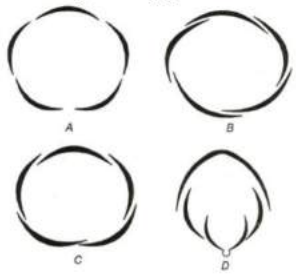
541. A plant is considered to possess all advanced morphological characters based on the evolutionary significance. Which one of the following sets of characters does the plant denote the same?

a) Dioecious condition, gamopetalous corolla and multiple fruit
b) Actinomorphic flowers, free stamens and endospermic seeds
c) Perennial life span, dichlamydous flower and simple fruit
d) Simple leaves, monoecious condition and apocarpous pistil

542. Leaf having single or undivided lamina is called

a) Compound leaf
b) Simple leaf
c) Either (a) or (b)
d) General leaf

543. Identify the type of aestivation in the given diagram (*A* to *D*)



a) A-Twisted, B-Valvate, C-Vexillary, D-Imbricate
b) A-Valvate, B-Twisted, C-Imbricate, D-Vexillary
c) A-Valvate, B-Twisted, D-Vexillary, D-Imbricate
d) A-Valvate, B-Vexillary, C-Twisted, D-Imbricate

544. Identify the order of plants showing alternate, opposite and whorled phyllotaxy.

a) China rose, *Calotropis* and *Nerium*
b) China rose, *Nerium* and *Calotropis*
c) *Nerium*, China rose and *Calotropis*
d) *Nerium*, *Calotropis* and China rose

545. Main difference between creepers and trailers is

a) Creepers are rooted at node while trailers don't
b) Creepers and not rooted at node while trailers do
c) Creepers have internodes while trailers don't

d) Creepers have node while trailers don't

546. Which one of the following is an example of cleistogamy?
a) Sunflower b) *Vallisneria* c) *Commelina* d) *Calotropis*

547. In the monocotyledon seeds, the endosperm is separated from the embryo by a distinct layer known as
a) Testa b) Aleurone c) Tegmen d) Epithelium

548. Arrangement of petal and sepal with respect to each other is
a) Placentation b) Phyllotaxy c) Aestivation d) Anthotaxy

549. Which of the following members of family-Solanaceae is rich in source of vitamin-C?
a) Tomato b) Guava c) Gooseberry d) Strawberry

550. Match the following pairs.

XIII.	Polysiphonous Pollen	– Floral bectaries	-Simple sieve plate
XIV.	Angular collocyte	-Monosiphonous Pollen	-Synandry
XV.	Inserted stamens	-Simple leaves	-Spines
XVI.	Exerted stamens	-Reticulate divergent venation	-Pepo

select the correct pair of answers, in which the former in the pair shows the set of characters presents in *Cucurbita* and the latter in the pair shows the set of character absent in Acacia.
a) I and III b) I and II c) II and III d) III and IV

551. Which of the following statements are true/false?
I.Trimerous condition of floral whorl is characteristic of dicotyledons.
II.*Adiantum* is also called walking fern.
III.In gymnosperms, the vascular system consists of xylem without vessels and phloem with companion cells.
IV.*Riccia* and *Marchantia* are liverworts.
a) I and II are true and III and IV are false
b) I and III and true and II and IV are false
c) I and IV are true and II and III are false
d) II and IV are true and I and III are false

552. Most of the petrocrops belong to family
a) Malvaceae b) Rutaceae c) Leguminosae d) Euphorbiaceae

553. Seeds are
a) Ovules after fertilisation b) Ovules before fertilisation
c) Ovary before fertilisation d) Ovary after fertlisation

554. Roots arising from the part of plant other than the radicle are called
a) Adventitious root b) Stilt root c) Nodal root d) Intermodal root

MORPHOLOGY OF FLOWERING PLANTS

: ANSWER KEY :

1)	b	2)	a	3)	d	4)	d	165)	b	166)	b	167)	c	168)	a
5)	b	6)	d	7)	d	8)	a	169)	c	170)	c	171)	a	172)	a
9)	a	10)	a	11)	b	12)	a	173)	a	174)	a	175)	a	176)	a
13)	d	14)	a	15)	a	16)	a	177)	d	178)	b	179)	b	180)	b
17)	b	18)	b	19)	a	20)	d	181)	a	182)	b	183)	b	184)	c
21)	b	22)	b	23)	a	24)	a	185)	c	186)	a	187)	d	188)	c
25)	a	26)	c	27)	a	28)	b	189)	d	190)	b	191)	c	192)	b
29)	d	30)	d	31)	d	32)	b	193)	d	194)	c	195)	c	196)	d
33)	d	34)	c	35)	a	36)	a	197)	c	198)	a	199)	a	200)	a
37)	c	38)	c	39)	a	40)	a	201)	a	202)	b	203)	b	204)	b
41)	c	42)	b	43)	d	44)	b	205)	b	206)	b	207)	b	208)	d
45)	c	46)	c	47)	c	48)	c	209)	a	210)	d	211)	b	212)	d
49)	a	50)	d	51)	d	52)	d	213)	a	214)	d	215)	b	216)	b
53)	b	54)	b	55)	d	56)	c	217)	a	218)	a	219)	a	220)	b
57)	d	58)	b	59)	d	60)	a	221)	b	222)	c	223)	a	224)	a
61)	b	62)	b	63)	b	64)	b	225)	a	226)	a	227)	b	228)	a
65)	c	66)	a	67)	c	68)	a	229)	b	230)	b	231)	b	232)	b
69)	a	70)	c	71)	d	72)	c	233)	b	234)	d	235)	a	236)	d
73)	d	74)	b	75)	d	76)	a	237)	c	238)	a	239)	c	240)	b
77)	c	78)	c	79)	a	80)	c	241)	a	242)	d	243)	b	244)	c
81)	c	82)	a	83)	b	84)	a	245)	a	246)	b	247)	b	248)	d
85)	b	86)	c	87)	c	88)	a	249)	a	250)	d	251)	a	252)	b
89)	c	90)	a	91)	d	92)	d	253)	c	254)	b	255)	d	256)	d
93)	a	94)	b	95)	d	96)	b	257)	c	258)	b	259)	d	260)	d
97)	a	98)	d	99)	a	100)	b	261)	d	262)	b	263)	b	264)	d
101)	d	102)	a	103)	d	104)	d	265)	d	266)	d	267)	a	268)	a
105)	a	106)	d	107)	d	108)	a	269)	b	270)	b	271)	b	272)	d
109)	a	110)	a	111)	b	112)	d	273)	d	274)	c	275)	a	276)	b
113)	c	114)	b	115)	b	116)	d	277)	c	278)	a	279)	b	280)	d
117)	b	118)	d	119)	d	120)	b	281)	a	282)	c	283)	c	284)	d
121)	b	122)	d	123)	b	124)	d	285)	a	286)	c	287)	b	288)	a
125)	d	126)	d	127)	a	128)	c	289)	b	290)	d	291)	a	292)	d
129)	c	130)	c	131)	d	132)	d	293)	b	294)	d	295)	d	296)	a
133)	a	134)	b	135)	d	136)	c	297)	a	298)	c	299)	b	300)	a
137)	d	138)	d	139)	d	140)	a	301)	b	302)	c	303)	d	304)	d
141)	a	142)	d	143)	a	144)	b	305)	d	306)	c	307)	d	308)	c
145)	d	146)	b	147)	a	148)	c	309)	c	310)	d	311)	c	312)	a
149)	c	150)	b	151)	d	152)	c	313)	d	314)	b	315)	c	316)	a
153)	b	154)	d	155)	b	156)	c	317)	c	318)	d	319)	b	320)	a
157)	c	158)	a	159)	d	160)	d	321)	b	322)	a	323)	b	324)	b
161)	d	162)	d	163)	d	164)	c	325)	c	326)	c	327)	a	328)	a

329) d	330) b	331) b	332) d	445) d	446) a	447) b	448) c
333) a	334) d	335) b	336) d	449) c	450) a	451) a	452) a
337) a	338) c	339) b	340) b	453) c	454) b	455) c	456) a
341) d	342) d	343) b	344) d	457) b	458) b	459) d	460) a
345) c	346) c	347) b	348) b	461) a	462) d	463) c	464) b
349) d	350) a	351) d	352) b	465) d	466) d	467) b	468) a
353) a	354) d	355) d	356) c	469) b	470) c	471) b	472) b
357) d	358) c	359) c	360) a	473) c	474) a	475) a	476) d
361) a	362) c	363) a	364) a	477) c	478) b	479) d	480) b
365) b	366) d	367) a	368) a	481) a	482) c	483) c	484) a
369) c	370) b	371) b	372) b	485) a	486) c	487) c	488) a
373) a	374) a	375) c	376) d	489) b	490) a	491) a	492) a
377) d	378) a	379) a	380) d	493) b	494) a	495) b	496) c
381) c	382) b	383) b	384) c	497) d	498) c	499) a	500) b
385) a	386) a	387) b	388) a	501) c	502) a	503) c	504) b
389) d	390) c	391) a	392) a	505) b	506) c	507) d	508) d
393) a	394) b	395) b	396) d	509) c	510) d	511) c	512) a
397) c	398) a	399) a	400) d	513) a	514) b	515) c	516) b
401) a	402) c	403) a	404) a	517) d	518) b	519) d	520) c
405) b	406) c	407) c	408) b	521) a	522) c	523) d	524) c
409) a	410) b	411) d	412) a	525) c	526) a	527) d	528) d
413) c	414) a	415) a	416) a	529) a	530) d	531) d	532) c
417) d	418) b	419) a	420) a	533) c	534) b	535) b	536) b
421) b	422) d	423) b	424) d	537) c	538) a	539) a	540) a
425) a	426) b	427) b	428) b	541) a	542) b	543) b	544) a
429) d	430) d	431) b	432) b	545) a	546) c	547) d	548) c
433) c	434) d	435) b	436) b	549) a	550) a	551) d	552) d
437) b	438) a	439) d	440) b	553) b	554) a		
441) a	442) a	443) d	444) a				

NEET BIOLOGY

MORPHOLOGY OF FLOWERING PLANTS

: HINTS AND SOLUTIONS :

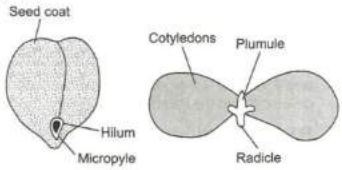
1 **(b)**
In Fabaceae, flowers are zygomorphic, imbricate aestivation, and polypetalous.

2 **(a)**
A flower may be trimerous, tetramerous or pentamerous when the floral appendages are in multiples of 3, 4 or 5 respectively. Flowers with bracts, reduced leaf found at the base of the pedicel, are called **bracteates** and those without bracts are called **ebracteate**

3 **(d)**
Daucus carota contains decompounds type of leaves, in which leaf rachis divided more than three times and gives rise to small axis on which leaflets are arranged.

4 **(d)**
According to Hutchinson's general principles adopted for classification of flowering plants, aggregate fruits (etaerio of drupe) are more recent than single fruits.

5 **(b)**



Structure of dicotyledonous seed

Seed coat The seed is covered by two coverings (layers). The outer layer is thick and tough called testa. The inner one is thin and whitish called tegmen.
Hilum The concave side of seed is darker with a whitish elongated oval scar called hilum.
Micropyle It is the small pore present at the end of hilum. It takes part in absorbing the water during seed germination.
Cotyledons They are also called seed leaves. The two cotyledons are attached to embryo axis in between the plumule and radicle. Cotyledons are large, white, kidney-shaped. They store food

6 **(d)**
Thalamus or receptacle.
The flower is a reproductive unit in the angiosperms. It is meant for sexual reproduction. A typical flower has four different kinds of whorls arranged successively on the swollen end of the stalk or pedicel called thalamus or receptacle

7 **(d)**
A stem with hollow internodes and solid nodes is called culm *e.g.*, bamboo, sugarcane, etc.

8 **(a)**
Below the root cap the area of new cell formation is called meristematic zone. Behind meristematic zone is the area of cell enlargement. Below this zone, the absorption of water and then mineral takes place. This water and mineral absorption comes under the zone of maturation

9 **(a)**
In some legumes the leaf base may become swollen, which is called the pulvinions.
In opposite phyllotaxy, a pair of leaves arises at each mode and lie opposite to each other as in *Calotropic* (akon/madar) and guava (*Psidium*) plants.

10 **(a)**
The number of stomata present per cm^2 of a leaf is known as stomatal frequency. Normally, it ranges from 1000-60000 per cm^2 or 10-600 mm^2 in different plant species.

11 **(b)**
Thalamiflorae is a series that contains orders Ranales, Parietales, Malvales, etc.

12 **(a)**
In *Euphorbia* of family-Euphorbiaceae and *Ziziphus* of family-Rhamnaceae, the stipules are modified into spines.

13 **(d)**
Emblica officinalis is the botanical name of amla and it belongs to family-Euphorbiaceae.

14 **(a)**

Leaf tendrils Modified thread/spring-like sensitive structures of leaf or leaf parts, e.g., in sweet pea (*Lathyrus odortus*).

Leaflet hooks In unguis-cati (cat's nail), the terminal leaflet are modified into cured hooks (as of cat) for climbing.

Pitcher Lamina in *Nepenthes* is modified into pitcher, which functions in catching and digesting microorganisms or storing water.

Bladder In *Utricularia* (an aquatic insectivore), a few leaf segments are modified into bladder (balloon-like structures) for trapping small aquatic organisms.

15 **(a)**

Fruit is the mature ripened ovary of the flower, enclosing the seeds. It is the characteristic feature of Angiospermic plants, *e.g.*, *Brassica*.

16 **(a)**

Ficus has hypanthodium inflorescence.

17 **(b)**

Characteristics of stem

(i) Stem develops from plumule of embryo

(ii) Stem is ascending part of the plant axis

(iii) It bears terminal bud growth

(iv) The stem differentiated into nodes and internodes

(v) The young stem is capable of performing photosynthesis

(vi) Stem are usually positively phototropic, negatively geotropic and negatively hydrotropic

18 **(b)**

Tulipa, *Allium*, *Lilium*, *Aloe*, *Dracaena*, etc, belong to family-Liliaceae.

19 **(a)**

Allium cepa (onion) belongs to family-Amaryllidaceae. The floral formula of *Allium cepa* is

$$Br \bullet \oplus ⚥ P_{(3+3)} A_{3+3} G_{\underline{3}}$$

20 **(d)**

The corolla of Fabaceae family has five petals, polypetalous, Papilionaceous, descending imbricate aestivation, one posterior long standard, two lateral short wings, two anterior petals joined to each other forming keel.

21 **(b)**

A petiole or leaf stalk is a cylindrical or sub-cylindrical structure of a leaf which joins the lamina to the base. Green, flattened petioles may be called winged petioles, e.g., *Citrus* and *Dionaea*.

22 **(b)**

Allium, 2*n*=16 then endosperm has 24 chromosomes.

Oryza, 2*n*=24 then endosperm has 36 chromosomes.

Nicotiana, 2*n*=48 then endosperm has 72 chromosomes.

Saccharum 2*n*=82-124 (Indian cane) then endosperm has 123-186 chromosomes.

23 **(a)**

In wheat or maize (family-Poaceae), the Scutellum is through to be a modified cotyledon or seed leaf.

24 **(a)**

Colchicum autumnale belongs to Liliaceae family *Colchine* is obtained from colchicum, which is used to induce polyploidy in tissue culture

25 **(a)**

Epiphytic roots are also called hygroscopic roots. Epiphyte bear three types of roots clinging, absorbing and hygroscopic aerial. These roots develop in some orchids, which grow as epiphytes upon the trunks or branches of trees. They hang freely in the air and absorb atmospheric moisture with the help of a special spong like tissue called velamen. Velamen is modification of epidemis, e.g., *Vanda, Dendrobium,* etc.

26 **(c)**

Samara is a single seeded fruit developing from a superior bi or tricarpellary ovary. Pericarp becomes flat like wing, *e.g.*, *Holoptera*.

27 **(a)**

Mustard (*Brassica campestris*) belongs to family-Brassicaceae (Cruciferae). Mustard is characterised by tetramerous flower, six stamens with tetradynamous condition (i.e., two stamens of outer whorl are smaller than the four stamens of inner whorl), bicarpellary gynoecium and siliqua type of fruit.

28 **(b)**

Ruscus belongs to family-Liliaceae (monocot). It produces unisexual flowers.

29 **(d)**

Primary roots and its branches constitutes the tap root system as seen in mustard plants (figure *A*). Roots originate from the base of the stem and constitutes the fibrous root system as seen in wheat plant (figure *B*)

30 **(d)**

The archesporial cells divide periclinally, cutting off primary parietal layer (forming wall later on)

towards the outer side and primary sporogenous cells towards the inner side.

31 **(d)**
The multiple or composite fruit develops from entire inflorescence. These are known as infructescence.

32 **(b)**
Caryopsis is an indehiscent dry simple fruit which develops from monocarpellary, unilocular and superior ovary. It is one-seeded fruit in which seed coat is fused with pericarp. Such fruit is also called grain, *e.g.*, members of family-Poaceae.

33 **(d)**
Tobacco belongs to family-Solanaceae. Its floral formula is
$Br \oplus ⚥ K_{(5)} C_{(5)} A_5 \underline{G(2)}$

34 **(c)**
When the primary root, which develops from the radicle of the embryo remains as the main root throughout the life of the plant and grows straight downwardly in the soil, it is called tap root, *e.g.*, roots in dicot plants.

35 **(a)**
Rafflesia arnoldi is the largest flower.

36 **(a)**
Phyllotaxy is the pattern of arrangement of leaves on the stem or branch. This is usually three types

37 **(c)**
Aestivation The mode of arrangement of sepals or petals in floral buds with respect to other members of the same whorl is known as aestivation
Main types of aestivation are
(i) **Valvate** When sepals or petals in a whorl just touch one another at margin without overlapping *e. g., Calotropis*
(ii) **Twisted** If one margin of the appendages ovarlaps that of the next one and so on. *e. g.,* China rose, cotton, lady's finger
(ii) **Imbricate** If the margins of sepals or petals overlap one another but not in any particular direction, *e. g., Cassia* and gulmohar
(iv) **Vexillary** In pea and bean flowers, there are five petals, the largest (standard) overlaps the two lateral petals (wings) which in turn overlap the two smallest anterior petals (keel) this type of aestivation is known as vexillary or papilionaceous

38 **(c)**
The flower is a reproductive unit in the angiosperms. It is meant for sexual reproduction. A typical flower has four different kinds of whorls arranged successively on the swollen end of the stalk or pedicel called thalamus or receptacle

40 **(a)**
Velamen tissue is found in the aerial roots of certain epiphytic orchids (*e.g., Vanda*). Epiphytic plants are the group of plants, which grow on other plants for attachment purpose.

41 **(c)**
The flower shown in the diagram has two whorls of perianth hence, it is dichlamydeous. It is bisexual becomes both sex organs (stamens and ovary) are present together and hypogynous because ovary is superior.

42 **(b)**
Parasite plants develop roots which penetrate into the tissue of the host plant to absorb nutrition. Thus, these roots function as haustoria. Such roots are known as sucking roots, *e.g.,Cuscuta.*

43 **(d)**
In monocots, the primary root denigrates early. Now, seminal roots arise from base of radicle. Fibrous root arise from base of radicle. Fibrous root system also arises from base of plumule and lower nodes.

44 **(b)**
The fruit wall of drupe fruit is called pericarp. It is consisted of an outermost Epicarp, middle mesocarp and an innermost layer, endocarp which a hard and stony layer.

45 **(c)**
Both Cyathium and Hypanthodium inflorescence have nector glands and unisexual flower.

46 **(c)**
Solanaceae.
Solanaceae is large family containing 90 genera over 20000 species. It is also called 'potato family'. It is widely distributed in tropics, subtropics and even in temperate zones

47 **(c)**
A-Axile
B-Basal
C-Parietal
D-Free central

48 **(c)**
Geocarpy refers to ripening of fruits underground. In the case of groundnut, the young fruit are

pushed into the soil as a result of post-fertilization curvature of the stalk.

49 **(a)**
The genus-*Allium* belongs to family-Amaryllidaceae. In members of this family, the gynoecium consists of three carpels, which are syncarpous. The ovary is superior (in *Allium*) or inferior. The placentation is axile.

50 **(d)**
Ginger (*zingiber officinale*) is a straggling sympodial rhizome, which is a perennial, fleshy, dorsiventral, horizontal, usually branched, underground stem growing beneath the surface of soil. It possesses nodes and internodes, scaly leaves, axillary buds and roots at their nodes.

51 **(d)**
Opening of a flower and drooping of a bud are examples of epinasty.

52 **(d)**
In several members of Compositae (*i.e.*, *Taraxacum*, *Tragopogon*), Dipsacaceae, Vallerianaceae, the calyx is modified into hairy pappus. It helps the fruit to float in air by parachute mechanism.

54 **(b)**
Removal of water particularly from tips of leaves of the plant is known as guttation. This process takes place through the special structures known as hydathodes, which are found at the vein ending of leaves.

55 **(d)**
Morphology of Root
(i) They normally constitutes the descending part of plant axis
(ii) They are non-green
(iii) Each functional root is covered by root cap
(iv) Root hairs are present
(v) They are positively hydrotropic
(vi) They don't have nodes and internodes

56 **(c)**
Family-Malvaceae have characteristic, monadelphous, a stamina tube around style, monothecous and extrorse androecium.

57 **(d)**
Cuscuta is a total stem parasite that grows on a number of plants like *Duranta*, *Ziziphus*, etc. *Cuscuta* sends a number of haustoria into the host. Each haustorium digests its way to reach vascular strand of the host.

58 **(b)**
In pea (*Pisum sativum*), been (*Dolichos lablab*), etc, there are five petals, the largest (standard or Vexillum) overlaps the two lateral petals (wings or alae) which in turns overlap the two smallest, anterior but united petals (keel or carina). This type of aestivation is known as vexillary or papillionaceous.

59 **(d)**
Generally in the monocotyledons, the food is commonly stored inside the endosperm. But in the orchid, the seeds are non-endospermic

60 **(a)**
Lodicules are two scale-like structures that lie at the base of the ovary of a grass flower including jowar.

61 **(b)**
In family-Labiatae, inflorescence is verticillaster, stamens are four didynamous (2+2) and style is gynobasic. The plants are aromatic due to volatile oils, e.g., Leucas (medicinal plant), Ocimum or Tulsi (medicinal), Coleus (ornamental).

62 **(b)**
Ovules arranged differently in a ovary according to the type of fruit or flower. The arrangement of ovule in the ovary is called placentation

63 **(b)**
When shoot tip transforms into flower, it is always solitary

64 **(b)**
Meristematic activity.
A typical root possess the four parts or regions
(i) **Root Cap** The root is covered at the apex by thimble like structure called root cap. It protects the tender apex of root as it makes its way through soil
(ii) **Region of Meristematic Activity** Few millimeters above the root cap. The cells of this region are very small, thin walled and dense protoplasm. They divide repeatedly
(iii) **Region of Elongation** The cells proximal to the meristematic zone undergoes the rapid elongation and enlargement and are responsible for growth of root in length
(iv) **Region of Maturation** The cells of elongation zone gradually differentiate and mature. This zone lies just proximal to the region of elongation

65 **(c)**
The fruit of Ananas sativus (pineapple or ananas) is sorosis (a type of multiple fruits), developing from spike, spadix or catkin. In this type, the

flowers associate by their succulent petals, the axis bearing them grows and becomes fleshy or woody, thus, the whole inflorescence turns into a compact fruit.

66 **(a)**
Cardiospermum (balloon vine) belongs to family-Sapindaceae. In them, tendrils are found, which are formed from the apices of inflorescence axis.

67 **(c)**
Family-Asteraceae (Compositae) is characterized by head or capitulum inflorescence, bicarpellary, syncarpous, inferior ovary with basal placentation. The fruit is cypsella.

68 **(a)**
Axillary buds of stem may also get modified into woody, straight and pointed thorns. Thorns are found in many plants such as *Citrus, Bougainvillea*. They protect the plant from browsing animals

69 **(a)**
In drupe fruit (stone fruit), pericarp is divided into three layers, *i.e.*, Epicarp, mesocarp and endocarp. Endocarp is stony in these fruits. These fruits generally contain one seed rarely two (*Zizyphus*) or these (*Borassus*).

70 **(c)**
Flower is highly condensed and modified shoot meant for sexual reproduction (**Dr. Goethe**; 1790). During the course of evolution, the nodes of the axis of shoot came in contact so, that internodes got reduced, and leaves got modified and specialized to form floral leaves.

71 **(d)**
The androecium of *Hibiscus*, family-Malvaceae possesses stamens indefinite, monoadelphous, stamens form a stamina tube around the style, epipetalous, anthers monothecous, reniform, basifixed. The corolla exhibits inferior twisted aestivation.

72 **(c)**
The major food crops of the world are wheat, rice and maize. All belongs to family-Poaceae. The edible part of these crops is caryopsis fruit.

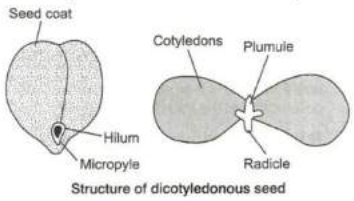
73 **(d)**
The monocotyledonous embryo of grasses is strikingly different from that of other monocotyledons. The mature embryo has a single cotyledon called **scutellum**. The portion of embryonal exis below scutellum is redicle while the portion of embryonal axis above the level of Scutellum is epicotyl.

74 **(b)**
On the basis of the frequency of flowering or fruiting in the lifetime, plants may be either monocarpic or polycarpic. Monocarpic plants are those, in which flowering and fruiting occurs only once in their life, *e.g.*, all annual and biennial plants and some perennial plants like bamboo and *Agave*. In contrast, polycarpic plants bear flowers and fruit repeatedly contrast, polycarpic plants bear flowers and fruits repeatedly after attaining maturity, *e.g.*, mango, *Acacia*, *Eucalyptus*, etc.

75 **(d)**
Generally, the fruit consists of a wall or pericarp and seed. The pericarp may be dry or fleshy. When pericarp is thick and fleshy, it is differentiated into outer epicarp, the middle mesocarp and the inner endocarp

76 **(a)**
Cyanthium is the characteristic inflorescence of the genus ***Euphorbia*** (but not the family-Euphorbiaceae).
In cyanthium, five involucre becomes fused and form a cup-shaped structure, which bears a large single female flower surrounded by numerous free male flowers

77 **(c)**
A-Cotyledon B-Plumrule, C-Radicle.



Structure of dicotyledonous seed

Seed coat The seed is covered by two coverings (layers). The outer layer is thick and tough called testa. The inner one is thin and whitish called tegmen.
Hilum The concave side of seed is darker with a whitish elongated oval scar called hilum.
Micropyle It is the small pore present at the end of hilum. It takes part in absorbing the water during seed germination.
Cotyledons They are also called seed leaves. The two cotyledons are attached to embryo axis in between the plumule and radicle. Cotyledons are large, white, kidney-shaped. They store food

78 **(c)**

The fruit is a characteristic feature of the flowering plant. It is a mature or ripened ovary developed after the fertilisation.

Simple Fruit A simple fruit is that fruit which is derived from the ovary a single flower. Depending upon the state of pericarp in the ripe fruit, a simple fruit can be dry or succulent

79 **(a)**
When a flower can be divided into two similar halves only in one particular vertical plane, it is called zygomorphic, *e.g.*, bean, pea, gulmohur, *Cassia* etc.

80 **(c)**
The growth movement in response to air is called aerotropism. Pneumatophores are positively aerotropic.

81 **(c)**
When the incisions of the lamina reaches up to the midrib, breaking it into a number of leaflets, the leaf is called compound. A bud is present in the axil of petiole in both simple and compound leaves, but not in the axil of leaflets of the compound leaf

82 **(a)**
Wolffia sp. (duck weed) is a floating, aquatic Angiospermic plant. It has the smallest flowers of about 1 mm diameter, while *Rafflesia arnoldi* (total root parasite) has the largest flowers of about 1 metre diameter.

83 **(b)**
In monocotyledonous plant, the primary root is short lived and is replaced by large number of roots. Those roots originate from the base of the stem and constitutes the fibrous root system, as seen in the wheat or rice plant

84 **(a)**
Stilt Root These are also called brace roots. They are short but thick supporting roots, which develop obliquely from the basal nodes of stem. In sugarcane, maize, pennisetum and sorghum, the stilt roots grow in whorls. After penetrating the soil, they provide support to plants

85 **(b)**
Verticillaster consists of biparous cymes ending in uniparous scorpioid cymes on either side, *e.g.*, *Ocimum* or several members of family-Labiatae.

86 **(c)**
In *Utricularia* (a submerged hydrophyte), the floating stem bears highly dissected leaves. Some of the leaf segments get modified into tiny bladders. They have a single opening guarded by valve.

87 **(c)**
Flower on floral aris.
Flower is a modified shoot, which performs the function of reproduction. The arrangement and distribution of flower over a plant is called inflorescence. Inflorescence is the name of modified shoot that is specialised to bear flower. The axis of inflorescence is called peduncle. A flattened peduncle is called receptacle

88 **(a)**
In the flower of Dianthus, the ovarian part is fused but styles and stigma are free. Its ovary becomes unilocular due to breakdown of partition wall and the ovules are attached to a central axis, *i.e.*, the ovary is syncarpous, superior, unilocular, with many ovules and free central placentation.

89 **(c)**
The embryo consists of an axis to which are attached one cotyledon (monocotyledonous seed) or two (dicotyledonous seeds) seed leaves or cotyledons. The place of attachment of cotyledons on the embryo axis bears radicle or embryonic root. The other end contains plumule or embryonic bud

90 **(a)**
Pneumatophores or respiratory roots are short, vertical and negatively geotropic, which occur in mangrove plants. The upper ends of pneumatophores bear lenticels for exchange of gases. Mangrove plants grow in marshy areas along sea shores, *e.g.*, *Rhizophora*, *Avicennia*, *Sonneria*, *etc.*

91 **(d)**
Cuticle is the superficial, non-cellular, waxy layer or covering secreted by the epidermis of nature plant parts, which protects these parts from water loss and mechanical injury. It is absent in young roots.

92 **(d)**
Murraya koenigii-Meliaceae is the incorrect match, *Murraya koenigii* belongs to family-Meringaceae.

93 **(a)**
Eucalyptus ragnans (375 ft.) is the tallest angiosperm.

94 **(b)**
Corm is a modification of stem because it bears node and internodes as stem bears. From the base

of corm, arises the adventitious roots, some of which are contractile and pull new corm, down into the soil.

95 **(d)**
In **hypogynous** conditions of flowers, gynoecium (female reproductive organ) is occupied the topmost (superior) position at the thalamus and other parts of flower arise from below the gynoecium, *e.g.*, *Hibiscus rosa sinensis* (gurhal).

96 **(b)**
Maize is a monocotyledonous plant, whereas China rose, mango and sunflower are dicotyledonous plants.

97 **(a)**
Modified leaf.
Leaves are often modified to perform functions other than photosynthesis. They are converted into tendrils for climbing as in peas or into spines for defence as in cacti. The fleshy leaves of onion and garlic store food. In some plants such as Australian *Acacia*, the leaves are small and short-lived. The petioles in these plants expand, become green and synthesise food. Leaves of certain insectivorous plants such as pitcher plant and venus-fly trap are also modified

98 **(d)**
In some plants such as *Rhizophora* growing in swampy areas, many roots come out of the ground and grow vertically upwards. Such roots, called pneumatophore, help to get oxygen for respiration.
In banyan tree, adventitious roots are hanging structure arising from nodes of horizontally growing branches. Such roots are called prop roots.

99 **(a)**
Hesperidium is a modification of berry.

100 **(b)**
A composite or multiple fruit constitutes a geoup of fruitlets developed from different flowers of an inflorescence.
Ocimum is a member of family-Labiatae and is characterised by verticillaster inflorescence and gynobasic style.
Apple (*Pyrus malus*) is a pome (false fruit0, in which fleshy thalamus is edible.
Cyathium is the special type of inflorescence, which is the characteristic of genus-*Euphorbia*.
Hence, statement (I) and (III) are correct but statement (II) and (IV) are wrong.

101 **(d)**
$\underline{G}_{(2)}$ Represents gynoecium, bicarpellary, syncarpous and superior

102 **(a)**
Potato is a stem tuber, which is a swollen, underground stem modification developed at the growing tip of a branch. It possesses number of spirally arranged depressions called eyes, which represent the nodes and contain buds.

103 **(d)**
Non-endospermic (example, albuminous) seeds do not possess endosperm and store trheir food material in cotyledons, *e.g.*, bean (*Dolichos lablab*), Pea (*Pisum sativum*), etc.

104 **(d)**
Respiratory roots or **pneumatophores** are special, negatively geotropic root branches meant for gaseous exchange or respiration. These are found in some vascular plants growing in the water of tidal swamps, *e.g.*, **mangrove** plants (*Rhizophora*) or halophytic plants.

105 **(a)**
Appendages of some fruits and seed act as a parachute, due to which fruits and seeds remain in the air for a longer period and disperse at a good distance.

106 **(d)**
In mango and coconut, the fruit is known as a drupe. In mango the pericarp is well differentiated into an outer thin pericarp, a middle fleshy edible mesocarp and an inner stony hard endocarp. In coconut which is also a drupe, the mesocarp is fibrous

107 **(d)**
In both *Dahlia* and *Asparagus*, fasciculated roots are present. The swollen tuberous roots occur in clusters are called **fasciculated roots**.

108 **(a)**
Mango belongs to family-Anacardiaceae, sunflower to Asteraceae (Compositae), orange to Rutaceae, wheat to Poaceae (Gramineae), while cotton (*Gossypium*) belongs to Malvaceae.

109 **(a)**
Carthamus tinctorius (kasum) belongs to Family-Compositae. This is a shrub. It's flowers are used as dye for dying food and cloth.

110 **(a)**
Aggregate fruit is formed from a single flower, in which gynoecium is apocarpous.

111 **(b)**

The term involucres is used for any leaf-like structure (including a ring of bracts) protecting the reproductive structures.

112 **(d)**
Fibrous root system (surface feeder tap root system) represents the tap root, which does not elongate deep into the soil and its fibrous secondary roots mostly horizontally to a greater extent near to the soil surface. This fibrous root system is excellent for providing good anchorage for the plant.

113 **(c)**
The given floral diagram belongs to **Asteraceae** (Compositae) family. The floral formula of this floral diagram is the following

$$\text{Br}, \oplus, \male\female K_{\text{pappus}}\, C_{(5)}\, A_{(5)}, G_{\bar{(2)}}$$

114 **(b)**
They are one internode long small runners, which are found in rosette plants at the ground or water land, *e. g.*, *Pistia* (water lettuce), *Eichhornia* (water hyacinth)

115 **(b)**
Most of the cereals belongs to family-Poaceae (gramineae). It is most widely distributed family containing nearly 600 genera and 10,000 species

116 **(d)**
Mango is a drupe fruit and its edible part is mesocarp.

117 **(b)**
The pericarp, placenta and seed of the tomato fruit are edible.

118 **(d)**
Banana is a parthenocarpic berry (seedless berry) formed due to fusion of Epicarp with thalamus to form skin (exocarp) which is not edible and both mesocarp and endocarp are edible.

119 **(d)**
Sorosis is a multiple fruit developing from spike or spadix, flowers fuse together by their succulent calyx and the axis bearing them grows and becomes fleshy or woody and the whole inflorescence becomes a compact mass, *e.g.*, pineapple, jackfruit, mulberry.

120 **(b)**
If gynoecium is situated in the centre and other parts of the flower are located on the rim of the thalamus almost at the same level, it is called perigynous flower, the ovary here is said to be half inferior, *e.g.*, plum, rose, peach.

121 **(b)**
In *Amorphophallus* (element foot), buds present on corm give rise to new aerial shoots and new corm.

122 **(d)**
Flowers, in which only one set of essential organ (male or female) is present are called unisexual.

123 **(b)**
Trapa natans is a hydrophyte. It has **monarch** (one xylem strand) condition in slender root and spongy petioles.

124 **(d)**
Inflorescence.
Depending on whether the apex gets converted into flower or continues to grow

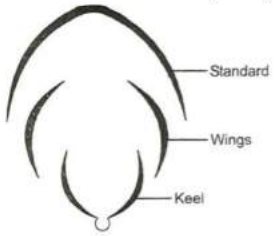
Racemose	Cymose
Main axis continues to grow flower grow laterally, *e. g.*, radish, mustard	The main axis terminates in flower hence limited growth, *e. g.*, jasmine, *Calotropis*

125 **(d)**
Perianth is of six tepals in two whorls of three each (3+3). They are free or united (*e.g.*, *Allium*). The perianth segments are usually petaloid and the two whorls are generally undifferentiated into calyx and corolla.

126 **(d)**
Wheat has the inflorescence called compound spikelet.

127 **(a)**
Haustoria or parasitic roots are adventitious roots, which penetrate the host to suck nutrition, *e.g.*, *Cuscuta*, a total stem parasite.

128 **(c)**
In pea and bean flowers, there are five petals, the largest (standard) ovarlaps the two lateral petals (wings) which in turn overlap the two smallest anterior petals (keel); this type of aestivation is known as vexillary or papilionaceous



129 **(c)**
A typical root possess the four parts or regions
(i) **Root Cap** The root is covered at the apex by thimble like structure called root cap. It protects

the tender apex of root as it makes its way through soil

(ii) **Region of Meristematic Activity** Few millimeters above the root cap. The cells of this region are very small, thin walled and dense protoplasm. They divide repeatedly

(iii) **Region of Elongation** The cells proximal to the meristematic zone undergoes the rapid elongation and enlargement and are responsible for growth of root in length

(iv) **Region of Maturation** The cells of elongation zone gradually differentiate and mature. This zone lies just proximal to the region of elongation

130 **(c)**
In pea seed, endosperm is consumed by developing embryo.

131 **(d)**
Floral characters of lily family
Inflorescence Solitary/cymose; often umbellate clusters
Flower Bisexual; actinomorphic
Perianth Tepal six (3+3), often united into tube, valvate aestivation
Androecium Stamen six (3+3)
Gynoecium Tricarpellary, syncarpous, ovary superior, trilocular with many ovules; axile placentation
Fruit Capsule, rarely berry
Seed Endospermous
Floral formula $\oplus\ \male\ \female\ P_{3+3}A_{3+3}\ \underline{G}_{(3)}$
Or (3+3)

132 **(d)**
Malvaceae shows pentamerous flower, superior ovary, and numerous stamens and monoadelphous androecium. All stamens form a single group.

133 **(a)**
Parthenocarpy is the phenomenon of formation of fruit without fertilization. Usually, these Parthenocarpic fruits are seedless, *e.g.*, seedless banana, seedless grapes, seedless oranges.

134 **(b)**
In insectivorous plant Nepenthes, the lamina forms the pitcher, the lid represents the apex, and the petiole is tendrilar, whereas leaf base is flattened. In *Utricularia*, which is submerged floating hydrophyte, the leaves are dissected and some of the leaf segments get modified into tiny bladders.

135 **(d)**
The main functions of the root system are absorption of water and mineral from soil, providing a proper anchorage to plant parts, storing reserve food material and synthesis of plant growth regulators

136 **(c)**
Drupe The pericarp is differentiated into epicarp, mesocarp and endocarp. Endocarp is stony. Hence, the drupes are also called stone fruits. Drupe develops from monocarpellary superior ovaries and are one seeded

137 **(d)**
In monocotyledonous seeds, the embryo is small and situated in a groove at one end of the endosperm. Embryo consists of one large and shield shaped cotyledon known as scutellum and a short axis with a plumule and a radicle. The plumule and radicle are enclosed in sheaths which are called coleoptile and coleorhiza, respectively

138 **(d)**
Perianth Onion flower have 6 tepals in two alternate whorld of three each, polyphyllous
Androecium Six, stamens in two whorls of three each opposite the tepals; antipetalous
Gynoecium Tricarpellary, syncarpous ovary, trilocular with 2 ovules in each locules.
So, from the description it is clear that the given floral diagram is of onion plant

139 **(d)**
Generally, parallel venation are found in the monocots but *Smilax* and *Colocasia* are two exception in which reticulate venation are found. Gram is dicot and venation found in gram is reticulate

140 **(a)**
Nutation movements are shown by tendrils, which get spirally coiled due to more growth on outer side.

141 **(a)**
Cyathium is the characteristic inflorescence of genus-*Euphorbia* (but not of the family-Euphorbiaceae). In cyathium, five involucre becomes fused and form a cup-shaped structure, which bears a large single female flower surrounded by numerous, free male flowers.

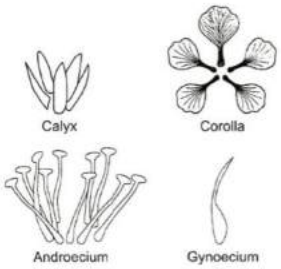
142 **(d)**
Sometimes calyx and corolla of the flower are not distinct. The condition is called parianth

143 **(a)**
Below root cap, the area of new cell formation is called **meristematic zone**. Behind meristematic zone is the area of cell enlargement.
Below this zone, the absorption of water and then mineral takes place. This water and mineral absorption come under the **zone of maturation**.

144 **(b)**
Pomology deals with the study of fruits.

145 **(d)**
Drupe is fleshy, single seeded, indehiscent fruit with the seed enclosed in a stony endocarp, e.g., peach, plum, mango, coconut, etc.

146 **(b)**
Parts of flower

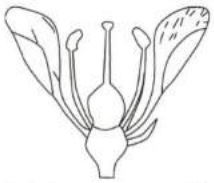


Calyx Outer part of flower which is generally used for the protection of flower. It is sometime fused with the corolla and used for special functions.
Corolla It is the brightly coloured (generally) which is used for the attraction of insect for pollination.
Androecium Male reproductive part containing stamen. In stamen, three are pollen sac which contain pollens.
Gynoecium Female reproductive part which contains stigma, style and ovary

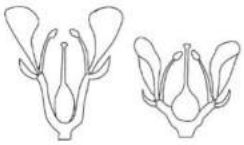
147 **(a)**
Pisum belongs to family-Fabaceae. In this family, flower is bisexual and zygomorphic; corolla is polypetalous papilionaceous and zygomorphic; corolla is polypetalous papilionaceous and with vexillary aestivation; andriecium is papilionaceous and with vexillary aestivation; androecium is diadelophous with dithecous anther; and gynoecium has monocarpellary, unilocular and superior ovary with marginal placentation having many ovules.

148 **(c)**
The leaf blades become spinous in *Argemone* (*Papaver*).

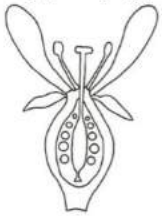
149 **(c)**
(i) **Hypogynous flower** Gynoecium occupies its highest position. This is called the superior ovary *e. g.*, mustard, China rose, brinjal



(ii) **Perigynous flower** Gynoecium is situated in the centre and other parts are situated at the same level. This condition is called half inferior ovary. *e. g.*, plum, rose, peach



(iii) **Epigynous flower** The other part lies above the ovary. This condition is called the inferior ovary
e. g., of epigynous ovary cucumber, sunflower



150 **(b)**
Symbols used for floral formula

Br- Bracteate	EBr - Ebracteate
Brl- Bracteolate	EBrl – Ebracteolate
⊕ - Actinomorphic	% - Zygomorphic
♀ - Perfect or bisexual	N- Necter
♂ – Female	C- Corolla, petals
O - Male	A- Androecium, stamens
K – Calyx, sepal	Std – Staminodes
P – Parianth, tepal	
G – Gynoecium, Carpel	

151 **(d)**
Viscum (mistletoe) is a partial stem parasite that grows on silverfer, popular, apple, walnut, oak, etc.

152 **(c)**
Monocotyledons.
Venation The arrangement of veins and the veinlets in the lamina of leaf is termed as venation. When the veinlets form a network, the venation is termed as reticulate.
When the veins run parallel to each other within a lamina the venation is termed as parallel. Leaves

of dicotyledonous plants generally possess reticulate venation, while parallel venation is the characteristic of most monocotyledons in reticulate venation vein form network

153 **(b)**

Racemose.

Inflorescence

Depending on whether the apex gets converted into flower or continues to grow

Racemose	Cymose
Main axis continues to grow flower grow laterally, *e. g.*, radish, mustard	The main axis terminates in flower hence limited growth, *e. g.*, jasmine, *Calotropis*

154 **(d)**

The mode of arrangement of sepals or petals in floral bud with respect to the other members of the same whorl is known as aestivation. The main types of aestivation are valvate, twisted, imbricate and vexillary.

In valvate, sepals or petals just touch one another at the margin, without overlapping, *e.g.*, *Calotropis*.

In twisted, one margin of sepal or petal overlaps that of the next one and so on, e.g., China rose, lady's finger, cottons, etc.

In imbricate, The margins of sepal or petals overlap one another but not in any particular direction, *e.g.*, *Cassia*, Goldmohur.

In vexillary, the largest posterior petal (vexillum or standard) overlaps two lateral petals (alae or wings) which in turn overlaps the two smallest, anterior but united petals (keel or carina), *e.g.*, pea, bean etc.

155 **(b)**

Corolla is composed of petals. Petals are usually brightly coloured to attract insects for pollination. Like calyx, corolla may be free (Polypetalous) or united (gamopetalous). The shape and colour of corolla vary greatly in plants. Corolla may be tubular, bell-shaped, funnel-shaped or wheel-shaped

156 **(c)**

The fruit of apple is known as **pome**. It is a false fruit because it is developed by fleshy thalamus, which is also its edible part.

157 **(c)**

Tuberous roots are food storing adventitious roots. These arise from germinating seed other then radical. Structurally, these are thick and fleshy without any definite shape, (*i.e.*, irregularly swollen), *e.g.*, *Ipomoea batatas*.

158 **(a)**

In family-Compositae or Asteraceae, inflorescence is head or **capitulum**.

159 **(d)**

The floating roots are swollen spongy and have large aerenchyma. They provide buoyancy to the plant and are also respiratory in function. These are found in *Jussiaea*, *Utricularia*, etc.

160 **(d)**

Floral characters of Malvaceae family; bracteate or ebracteate, pedicellate, hermaphrodite, complete, hypogynous, actinomorphic, pentamerous.

161 **(d)**

Inflorescence is the mode of arrangement of flowers in group on a specialised branch called peduncle (inflorescence axis). Pedicel is the stalk of individual flower.

162 **(d)**

Tetradynamous condition is the characteristic feature of *Brassica campestris* (mustard), in which out of six stamens four are long and two are short.

163 **(d)**

Adventitious roots of certain plants become green and carry out photosynthesis, such roots are called assimilatory or photosynthetic roots, *e.g.*, *Tinospora, Trapa, Taeniophyllm*.

In *Tinospora*, these are like green, hanging threads developing from the nodes during the rainy seasons and shrivel during the rainy seasons and shrivel during drought.

In banyan, prop roots or pillar roots are found, while Cusuta is a total root parasite.

In Vanda, epiphytic or hygroscopic roots are found these may also photosynthesize with the help of chloroplast contents present below the velamen coating.

164 **(c)**

The flower in family-Liliaceae I complete, actinomorphic, trimerous, hypogynous and the gynoecium is tricarpellary, syncarpous having superior ovary with axile placentation.

165 **(b)**

The members of family-Lamiaceae possess gynobasic style.

166 **(b)**

Uniparous/Monochasial : At each point, only one lateral branch is produced. It may be **scorpioid** (*e.g.*, *Canna*, *Terminalia*)
Biparous : Two lateral branches develop at a time, *e.g.*, *Carissa*, *Datura*, *Mirabilis*.
Multiparous : More than two lateral branches develop below the modified terminal bud from the axils of whorled leaves, *e.g.*, *Nerium*, *Euphorbia*.

167 **(c)**
Smallest region of root is meristematic or growing point. In this, the cells are very small and actively dividing, having dense cytoplasm

168 **(a)**
Prop or Pillar Roots They are thick pillar-like adventitious root, which grow from and support heavy horizontal branches of banyan tree.
Initially, these roots are areal and hygroscopic. As the root reaches to the soil, they become thick and pillar-like

169 **(c)**
Taeniophyllum is an epiphytic orchid with thick, flattened, photosynthetic roots. These roots are green aerial, adventitious, which prepare food materials by photosynthesis. The stem and leaves are absent.

170 **(c)**
Stolons are special kind of runners, which initially grow upwards like ordinary branches and then arch down to develop new daughter plants on coming in contact with the soil.
Sucker is a sub-aerial branch, that arise from the main stem. Initially, it grows horizontally below soil surface and later grows obliquely upward.

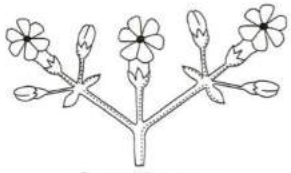
171 **(a)**
Trimerous flower, tricarpellary, syncarpous, superior ovary and axile placentation are the characteristics of family-Liliaceae.

172 **(a)**
Head or capitulum inflorescence consists of mono or dimorphic florets borne on a condensed axis, the receptacle. The florets are borne in acropetal manner but appear centripetal due to much condensation of the axis, *e.g.*, *Launea*, *Ageratum*, *Vernonia*, *Dahlia*, *Helianthus*, *marigold*, *etc.*

173 **(a)**
In the given diagram, there is no flower at the tip of shoot. So, it have indefinitely growth. The flower borne laterally


Racemose Inflorescence

In cymose, the shoot tip ends with a terminal flower so it have limited growth


Cymose inflorescence

174 **(a)**
In *Wolffia* and *Utricularia* roots are generally absent.

175 **(a)**
Taproot system The first root produced from seed is called radicle. In dicotyledonous plant this root became more prominent and is known as tap root and many small branch Isee root arise from this by forming tap root system

176 **(a)**
Achene develops from monocarpellary unilocular ovary but the fruit wall (pericarp) is not fused with seed coat, *e.g.*, rose, *Mirabilis*, *Clematis*.
Legume developed from monocarpellary, unilocular superior ovary with marginal placentation, *e.g.*, family-Leguminosae.

177 **(d)**
China rose or gurhal (*Hibiscus rosa-sinensis*) belongs to family-Malvaceae. It has solitary axillary inflorescence.

178 **(b)**
In twisted aestivation, sepal/petals edges are overlapping each other (*i.e.*, on margin cover the other and its margin is covered by previous one), whereas in valvate the margins of sepals and petal's only touch to each other.

179 **(b)**
In smilax, stipules become elongated and function as tendril. Spines of *Ziziphus* and *Acacia* are modified stipules.

180 **(b)**
Types of phyllotaxy
Alternate Single leaf arises at each node in alternate manner, *e. g.*, China rose

Opposite Pair of leaves arises at each node, *e. g.*, *Calotropis*

Whorled More than two leaves at each interval, *e. g.*, *Alstonia*

181 **(a)**
The feathery stigma is called plumose. It is found in grasses, family-Gramineae Poaceae. These plants are wind pollinated, because feathery stigma easily trap air-borne pollen grains.

182 **(b)**
Simple fruit is developed from an unicarpellary or multicarpellary and syncarpous ovary.

183 **(b)**
Phyllode is the modification of leaf. It is an expanded petiole resembling and having the function of a leaf, *e.g.*, *Parkinsonia*.

184 **(c)**
Venation The arrangement of veins and the veinlets in the lamina of leaf is termed as venation. When the veinlets form a network, the venation is termed as reticulate.
When the veins run parallel to each other within a lamina the venation is termed as parallel. Leaves of dicotyledonous plants generally possess reticulate venation, while parallel venation is the characteristic of most monocotyledons in reticulate venation vein form network

185 **(c)**
Protein.
The outer covering of endosperm separates the embryo by a proteinous layer called the aleurone layer. The cells of aleurone layer have thick walls and dense cytoplasm filled with aleurone or protein grains. The latter produce enzymes during the process of grain germination

186 **(a)**
Member of Solanaceae are usually herbs or shrubs. Flowers are hypogynous with five petals and gamopetalous. Androecium has five stamens and is polyandrous epipetalous.

187 **(d)**
Euphorbia - Cyathium
Ficus – Hypanthodium
Dorstenia - Coenanthium

188 **(c)**
Most of the cereales belong to family-Poaceae (Gramineae). It is most widly distributed family containing nearly 600 genera and 10,000 species.

189 **(d)**
Leguminosae family is also called Fabaceae family. The floral formula is
$\% \, ♀♂ K_{(5)} C_{1+2+(2)} A_{(9+1)} \underline{G}_1$

190 **(b)**
The function of obturator on micropyle is to direct the growth of pollen tube.

191 **(c)**
In family-Gramineae (or Poaceae), the perianth is represented by membranous scales called Iodicules. The Iodicules are situated above and apposite the superior palea.

192 **(b)**
Radish (*Raphanus sativus*) is a modified tap root. For storage of food, it becomes Fusiform with swollen portion in the middle and gradually tapering towards the two ends.

193 **(d)**
Most of the dicots have fleshy cotyledons from which the embryo takes food

194 **(c)**
Solanaceae is large family containing 90 genera over 20000 species. It is also called 'potato family'. It is widely distributed in tropics, subtropics and even in temperate zones

195 **(c)**
The epipetalous or epiphyllous condition of a gynoecium is represented by an arc which joins androecium with the corolla or perianth as in the case of $\overset{\frown}{CA}$ or PA $\overset{\frown}{PA}$

196 **(d)**
Rhizomes are mostly horizontal or straggling, e.g., ginger, turmeric, lotus, etc, or may be vertical as in *Canna*, sugarcane, *Alocasia*, vertical rhizome is also called **root-stock**.

197 **(c)**
Heterophylly is the phenomenon in which morphologically dissimilar leaves are produced on the same plant body. Many aquatic plants, *e.g.*, *Ranunculusscleretus* produce very much dissected submerged leaves with simple and entire floating leaves at the same time on the same plant body.

198 **(a)**
Most of the economically important fibre yielding plants belongs to family-Malvaceae (*e.g.*, *Gossypium*, *Hibiscus*, *Cannabinus*, *Abutilon theophrasti*, *Abelmoschus esculentus*, *Hibiscus subdariffa*, *Urena lobata*, etc).

199 **(a)**

Spadix is a spike with thick and fleshy axis covered by one or more large bracts, *e.g.*, maize, banana, *Colocasia*. It is found in monocots only.

200 **(a)**
When the stem I flattened and function as leaf, it is called phylloclade, i.e., it is green, photosynthetic succulent stem of indefinite growth, *e.g.*, *Opuntia*, *Ruscus*, *Lemna*, etc.

201 **(a)**
Brassica – Ebr $\oplus$ $\male\!\!\female$ K_{2+2} C_4 A_{2+4} $\underline{G_{(2)}}$

202 **(b)**
Anthocyanin pigment present in vacuole is responsible for the bright colour of petal.

203 **(b)**
In gynandrous, stamens are fused with the carpel (unit of gynoecium) throughout their whole length or by their anthers only, *e.g.*, Asclepiadaceae family.

204 **(b)**
In majority of the dicotyledonous plants, the direct elongation of the radicle leads to the formation of primary roots, which grows inside the soil. It bears lateral roots of several orders that are referred to as secondary, tertiary root etc. The primary roots and its branches constitute the tap root system as seen in mustard plant

205 **(b)**
Calyx is composed of sepals if sepals are free (polysepalous) or united (gamosepalous)

206 **(b)**
Valvate aestivation.
Aestivation The mode of arrangement of sepals or petals in floral buds with respect to other members of the same whorl is known as aestivation
Main types of aestivation are
(i) **Valvate** When sepals or petals in a whorl just touch one another at margin without overlapping *e. g.*, *Calotropis*
(ii) **Twisted** If one margin of the appendages ovarlaps that of the next one and so on. *e. g.*, China rose, cotton, lady's finger
(ii) **Imbricate** If the margins of sepals or petals overlap one another but not in any particular direction, *e. g.*, *Cassia* and gulmohar
(iv) **Vexillary** In pea and bean flowers, there are five petals, the largest (standard) overlaps the two lateral petals (wings) which in turn overlap the two smallest anterior petals (keel) this type of aestivation is known as vexillary or papilionaceous

207 **(b)**
Pome is two or more seeded fleshy syncarpous fruit surrounded by thalamus, *e.g.*, Apple, pear, mango, peach-Drupe.

208 **(d)**
In sweet pea (*Pisum sativum*), the placentation is marginal. In which, the placenta develops along the junction of two carpels, in a unilocular ovary. In **basal placentation**, the ovules are few or reduced to one are borne at the base of ovary, *e.g.*, Compositae.

209 **(a)**
The presence of xylem vessels, companion cells and double fertilization are the characteristic features of angiosperms.

210 **(d)**
Monocots possess floral parts in multiple of four or five.

211 **(b)**
K-Calyx, C-Corolla.
Symbols used for floral formula

Br- Bracteate	EBr - Ebracteate
Brl- Bracteolate	EBrl – Ebracteolate
$\oplus$ - Actinomorphic	% - Zygomorphic
$\male\!\!\female$ - Perfect or bisexual	N- Necter
$\male\!\!\female$ – Female	C- Corolla, petals
O - Male	A- Androecium, stamens
K – Calyx, sepal	Std – Staminodes
P – Parianth, tepal	
G – Gynoecium, Carpel	

212 **(d)**
Drupe is a fleshy, one or more chambered and one or more seeded fruit developing from a monocarpellary or syncarpous pistil, with pericarp differentiate into mesocarp (fleshy) and the endocarp (stony and hard). So, called as stone-fruit, *e.g.*, mango, peach, coconut, etc.

213 **(a)**
Scilla is a photosynthetic plant. Prepared food in *Scilla*, is stored in leaf bares. Buds, generally develop from leaf bases and this plant contains tunicates bulb.

214 **(d)**
Bract is considered a modified leaf. It bears a peduncle or petiole in its axile. Bract occurs towards the anterior side of a flower, while

mother axis or floral axis of a flower occurs towards the posterior side.

215 **(b)**
Option (b) is correct.

216 **(b)**
The arrangement of leaves on a stem or branch is called phyllotaxy. The number of vertical rows in which leaves are arranged is called as orthostichies. 120°phyllatoxy is found in tristichous condition.

217 **(a)**
Sunnhemp is a fibre yielding plant belongs to family-Fabaceae. Its scientific name according to binomial nomenclature is *Crotalaria juncea*.

218 **(a)**
Legume or pod fruits and siliqua fruits can be dehisced through dorsal and ventral sutures. Legume is developed from a monocarpellary, one chambered and superior ovary, *eg.* pea, while siliqua develops from a bicarpellary, syncarpous and superior ovary, *e.g.*, mustard.

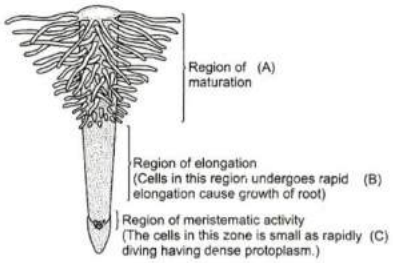
219 **(a)**
Some plants of arid region modify their stem into flattend (*Opuntia*) or fleshy cylindrical (*Eurphorbia*) structures are called phylloclades. They contain chlorophyll and carryout photosynthesis

220 **(b)**
Desert grasses often roll their leaves due to presence of bulliform cells. These are big-sized, thin-walled and large vacuolated cells frequently occurring towards the lower epidermis.

221 **(b)**
The member of family-Orchidaceae and Asclepiadaceae possess pollinia.

222 **(c)**
Nepenthes (pitcher plant) is an insectivous climber plant of tropical region. Leaves are alternate and modified with a foliaceous leaf base. Upper part of petiole is elongated and tendrillar, whereas leaf blade (lamina) is modified into pitcher, which collects small amount of water containing digestive enzyme. Pitcher is provided with a lid at its mouth. Insects that slips into water are not allowed coming out by the hair near the rim, which are pointed downward.

223 **(a)**
The cells of the elongation zone gradually differentiate and mature. Hence, this zone, proximal to the region of elongation, is called the region of maturation. From this region, some of the epidermal cells form very fine and delicate, thread-like structures called root hairs. These root hairs absorb water and minerals from the soil



224 **(a)**
Rauwolfia serpentina belongs to family-Apocynaceae. It is the important source of an alkaloid reserpine and other alkaloids like serpentine, serpentinine, rauwolfine, etc.

225 **(a)**
Bentham and **Hooker** have placed the family-Podostemaceae in Monochlamydeae or incomplete and series-2 multivulate Aquaticae.

226 **(a)**
In hypogynous flower, the calyx, corolla and androecium arise from below the ovary (gynoecium), *i.e.*, the ovary becomes superior, *e.g.*, Cruciferae, Liliaceae.

227 **(b)**
Cladode or cladophyll is typical phylloclade only one internode long. It develops by the modification of stem branches of limited growth and is green (photosynthetic).
The tree leaves of the plant are reduced to scales in spines. In *Asparagus*, the cladodes are needle-like, slightly flattened, fleshy green structures developing in clusters in the axils of scale leaves. The main stem bears leaf spines at its nodes and the scale leaf occurs just above the spine.

228 **(a)**
Roots developing from any part of the plant, expect radicle, are called adventituous roots.

229 **(b)**
The commercial banana (*Musa paradisica*) is a **diploid** plant.

230 **(b)**
Smilax and *Colocasia* are monocots but their leaves exceptionally possess reticulate venation.

231 **(b)**
In family-Solanaceae, the androecium consists of five stamens which are epipetalous, polyandrous, and alternate to petals, filaments inserted deep in

the corolla tube, anthers dithecous, ususlly basifixed or dorsifixed, introrse.

232 **(b)**
When the flower is bilaterally symmetrical, *i.e.*, divisible into only two equal halves by a single vertical plane, it is termed as zygomorphic, *e.g.*, *Adhatoda*, pea, *Larkspur*, *Ocimum*, etc, the zygomorphic condition of flower is represented by the sign %.

233 **(b)**
Cypsela is dry, indehiscent, single seeded fruit develops from an unilocular, single ovulate inferior ovary of bicarpellary, syncarpous, gynoecium possessing basal placentation.

234 **(d)**
Asparagus is a root succulent, *Aloe* and *Agave* are leaf succulent and *Opuntia* is a stem succulent.

235 **(a)**
Flower is a modified shoot, which performs the function of reproduction. The arrangement and distribution of flower over a plant is called inflorescence. Inflorescence is the name of modified shoot that is specialised to bear flower. The axis of inflorescence is called peduncle. A flattened peduncle is called receptacle

236 **(d)**
In monodelphous stamens , fliments units to form one bundle, e.g., Malvaceae. In axile placentation, placentae are axial and the ovules are attached to it multilocular ovary, as in China rose, tomato and lemon.

237 **(c)**
In racemose inflorescence, the flowers borne in acropetal manner (younger flowers towards the apex and older ones towards the base).
Perigynous flowers are seen in rose plants.

238 **(a)**
In hypogeal seed germination, the epicotyls elongates instead of hypocotyls. This keeps cotyledons inside soil surface or may bring them just above the soil surface but there they remain non-green, dry up gradually and fall off, *eg*, some seeds of dicots *Pisum*, *Cicer*, *Cocos*, *Mangifera* and most of monocot seeds—*Zea mays*, *Oryza sativa*.

239 **(c)**
Leaves modified as thorns (*Bougainvillea*), tendril (*Cucurbita*) are homologous structure. The homologous organs show divergent evolution
Analogous organs show convergent evolution.
Coevolution involves evolutionary changes in one or more species in response to changes in other species of the same community.

240 **(b)**
Parachute mechanism is method of dispersal of seeds by the parchute like pappus (calyx) which is the characteristic of family-Co0mpositae, 'Pappus' are the persistent sepals modified into hairy structures. In *Helianthus* (sunflower), *Tagetes* (marigold), *Taraxacum*, etc.

241 **(a)**
In *Clematis*, petiolar leaf tendril is found. In this, petiole becomes thin (tendril-like), sensitive and helps in climbing.

242 **(d)**
Corm is an underground, modified main stem. It grows vertically at a particular depth in the soil. It stores food materials and becomes tuberour. It is cylindrical flattened in shape

243 **(b)**
Due to vivipary the seeds cannot be stored under normal condition for the next season.

244 **(c)**
Reticulate venation.
Venation The arrangement of veins and the veinlets in the lamina of leaf is termed as venation. When the veinlets form a network, the venation is termed as reticulate.
When the veins run parallel to each other within a lamina the venation is termed as parallel. Leaves of dicotyledonous plants generally possess reticulate venation, while parallel venation is the characteristic of most monocotyledons in reticulate venation vein form network

246 **(b)**
In family-Liliaceae, the leaves are simple, in the form of a cluster of radial leaves, cauline and ramal, exstipulate (but stipulate in *Smilax*), have parallel venation (but reticulate in Smilax) sessile or petiolate with sheathing leaf base. The inflorescense may be racemose or sometimes solitary (*e.g.*, Tulip, *Gloriosa*) or umbellate condensed cymes (umbel cyme) *e.g.*, onion.

247 **(b)**
Perisperm is the nutritive tissue outside the sac containing the embryo in some seeds.

248 **(d)**
Parthenocarpy (Gr. *parthenos*= *virgin* (false); *karpos*=fruit) is the production and development of seedless fruits without fertilization of an egg in the ovary. Presently, a number of fruit varieties

have been altered genetically to undergo parthenocarpic development besides, hormonal treatment has been also found to induce parthenocarpy in certain plants. In banana, orange, lemon, guava, etc, seedless fruits are useful as there is no use of seeds in eating them. But in pomegranate, it is the seed coat of the seed, which is fleshy and edible. So, fruit is useless without the seeds in it and thus, parthenocarpy makes no sense in pomegranate.

249 **(a)**
Thorns are deep-seated outgrowths present as modified stem structures, possessing vascular cylinder surrounded by dark. In *Duranta* and *Bougainvillea*, thorns are the modification of axillary buds.

250 **(d)**
The given description is the characteristic feature of corolla of the family-Papilionaceae. The number of carpel in this family is one, *i.e.*, gynoecium consists of only one carpel, which is superior and unilocular.

251 **(a)**
The root hairs increases the exposed surface of the roots of absorption of minerals and water from the soil. From the surface, the root hairs appear as white cottony fibres

252 **(b)**
The gynoecium of family-Leguminosae is monocarpellary (*i.e.*, single carpel), unilocular, marginal placentation with superior ovary.

253 **(c)**
In family-Poaceae, the inflorescence is compound spike. Flowers are sessile, bracteates and bracteolate, incomplete, hermaphrodite or unisexual irregular, zygomorphic, hypogynous, and cyclic. Perianth is represented by membraneous lodicules, stamens usually three or rarely six, ovary superior, unilocular with single ovule and basal placentation style is short or absent and two feathery stigma are present.

254 **(b)**
In a cereal grain (*e.g.* wheat), the single cotyledon of embryo is represented by the Scutellum. Scutellum is specialised for nutrient absorption from the endosperm.

255 **(d)**
Anthesis is the opening of floral buds. Reception of pollen y sigma is called micro-sporogensis.

256 **(d)**
The characteristic feature of angiosperms is double fertilization.

257 **(c)**
Tendrils are green, thread-like sensitive structure, which can coil around the support and help the weak stem or shoot to climb up. Axillary buds are modified into tendrils in *Passiflora* and into hooks in *Hugonia*.

258 **(b)**
Diadelphous condition of stamen is characteristic feature of **Papillionaceae** or **Fabaceae**. In this, two separate bundles of united filaments are formed, while anthers remain free.

259 **(d)**
Clinging roots are the aerial, short and branched roots of an autotrophic plant that provide stability to the plant.

260 **(d)**
The flower of gurhal or China rose (Hibiscus rosa-sinensis) is pedicellate, complete, bracteates, 6 to 7 bracteoles, hermaphrodite, actinomorphic and hypogynous.

261 **(d)**
Gynoecium is the female reproductive part of the flower and is made up of one or more carpets. A carpel consists of the three parts namely stigma, style and ovary.
Stigma It is usually the tip of style and is the receptive surface for pollen grains.
Style Tube-like structure connects the stigma and ovary.
Ovary Enlarged base part contain ovules

262 **(b)**
In *Tridax*, the stem shows bending in one direction and it contains exstipulate leaves.

263 **(b)**
Sunflower (Helianthus annuus) belongs to family-Asteraceae (=Compositae). It possesses involucrate head or capitulum inflorescence with ray florets and disc florets.

264 **(d)**
Regeneration of new plants from vegetative organs like roots, stem and leaves is called vegetative propagation. In ginger, vegetative reproduction occurs by rhizomes.

265 **(d)**
Bean, gram, pea. In dicot plant during embryo development endosperm is completely used such seed are called non-endospermic seed

266 **(d)**

There are different natural modes of vegetative reproduction in plants.

Underground roots, *e.g.*, sweet potato, *Asparagus*, *Tapioca* and *Dahlia* have fleshy, adventitious, tuberous roots, which help in propagation.

267 **(a)**

The flower and lateral branches usually develop as a branch from a bud growing in the axil of a small leaf-like structure known as bract; such buds are known as lateral buds.

268 **(a)**

In cauliflower the inflorescence id typically corymbose at the apex.

269 **(b)**

The botanical name of soybean is *Glycine max*.

270 **(b)**

Bracts are empty glumes.

271 **(b)**

When the filaments of anthers are attached to the petals, the condition is called epipetalous, *e.g.*, Solanaceae.

272 **(d)**

Root cap.

A typical root possess the four parts or regions

(i) **Root Cap** The root is covered at the apex by thimble like structure called root cap. It protects the tender apex of root as it makes its way through soil

(ii) **Region of Meristematic Activity** Few millimeters above the root cap. The cells of this region are very small, thin walled and dense protoplasm. They divide repeatedly

(iii) **Region of Elongation** The cells proximal to the meristematic zone undergoes the rapid elongation and enlargement and are responsible for growth of root in length

(iv) **Region of Maturation** The cells of elongation zone gradually differentiate and mature. This zone lies just proximal to the region of elongation

273 **(d)**

This is the third largest family of the flowering plants. Earlier it was called Papilionoideaes a sub-family of family Laguminosae. It is distributed all over the world

274 **(c)**

Stem develops from the plumule part of embryo. Root develops from the radicle part of embryo

275 **(a)**

Lemon is a hesperidium type of fruit. Epicarp of this fruit contains many oil glands. Below epicarp is present a fibrous part, which fuses with Epicarp, this is known as mesocarp, while endocarp projects inwards and forms distinct chamber. Many unicellular juicy hairs are present on the inner side of endocarp which are edible part of this fruit.

276 **(b)**

Androecium is composed of stamens. Each stamen which represents the male reproductive organ consists of stalk or a filament and an anther

277 **(c)**

When there is no distinction of sepals and petals, the non-essential floral organs are collectively called **perianth**.

Plant with single whorl of perianth is placed under class-Dicot and sub-class-Monochlamydeae.

278 **(a)**

The calyx of family-Solanaceae is gamosepalous, persistant and after much enlarged in fruit.

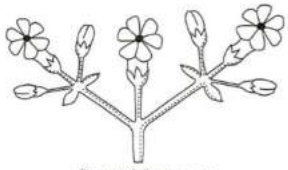
279 **(b)**

Main axis terminate in a flower.

In the given diagram, there is no flower at the tip of shoot. So, it have indefinitely growth. The flower borne laterally

Racemose inflorescence

In cymose, the shoot tip ends with a terminal flower so it have limited growth



Cymose inflorescence

280 **(d)**

Liliaceae is a large family of about 254 genera and 4075 species widely distributed all over the world. It is commonly called lily family and is a characteristic of monocotyledonous family

281 **(a)**

In china rose (Hibiscus rosa sinensis), gynoecium is pentacarpellary, syncarpous, pentalocular, ovary superior, axile placentation, two ovules in each locule, style passes through staminal tube

branching into five branches, each ending into a prominent scarlet red knob-like stigma.

282 **(c)**
Endosperm is formed as a result of double-fertilisation. Endosperm nourishes the developing embryo during seed development. In plants such as bean, gram and pea, the endosperm is not present in the mature seed because the endosperm is completely consumed during development of seed. Such seeds are called nonendospermic or exalbumious.
In monocots and caster bean (dicot) embryo do not consume all endosperm during seed development. So it persists in the mature seeds. Such seeds are called endospermic or albuminous seed

283 **(c)**
Underground stems can be differentiated from roots by (i) absence of root cap (ii) absence of root hair (iii) presence of terminal bud (iv) presence of nodes and internodes (v) occurrence of foliage or scale leaves on the nodes.

284 **(d)**
Runners are special narrow, green, above ground horizontal or prostate branches which develop at the bases of erect shoot called crowns. They replace the old parts, *e. g.*, grass, strawberry

285 **(a)**
Long, slender and spirally coiled stem tendrils developing from axillary buds and helping plants to climb up are found in gourds (cucumber, pumpkins, watermelon) and grapevines.

286 **(c)**
Inflorescence will produce total 19350 pollen grains.

287 **(b)**
Triticale is the first man made cereal. It is produced by artificial allopolyploidy between wheat (*Triticum* sp.) and rye (*Secale cerele*). Both belong to family-Poaceae.

288 **(a)**
Syconous is a composite fruit develops from Hypanthodium inflorescence, *e.g.*, *Ficus carica*, *Ficus benghalensis*. The flask-shaped receptacle encloses female flowers that give rise to achene-like fruitlets.

289 **(b)**
Hydrophytes grow in water or very wet places. They may be submerged or partly submerged. The vascular bundles in hydrophytes show greatest reduction, *e.g.*, *Trapa* (with a single vascular bundle in the root.)

290 **(d)**
Hilum.
The outermost covering of a seed is the seed coat. The seed coat has two layers, the outer testa and inner tagmen. The hilum is a scar in the seed coat through which the developing seeds gets attached to the fruit. Above the hilum, there is the small pore called micropyle

291 **(a)**
In **synandrous** condition of androecium, the anthers and their filaments are fused and form a group.
In **gynandrous** condition, the stamens are fused with gynoecium.
In **protandrous** condition, male flowers become mature before female in a bisexual flower.
In **syngenesious** condition, anthers become fused but filaments remain free.

292 **(d)**
Cassia belongs to family-Fabaceae. The flower is bracteates, pedicellate, hermapharodite, complete, zygomorphic and hypogynous. Descending imbricate aestivation is found.

293 **(b)**
Petunia is an ornamental plant of family-Solanaceae.

294 **(d)**
The leaf is a green, flat, thin, lateral appendage of stem having chlorophyll. Leaves arise from the nodes of stem and produce organic food for plant by the process of photosynthesis.

295 **(d)**
Lomentum fruits are developed from the monocarpellary ovary and are broken into several one seeded parts at maturity, *e.g.*, *Acacia*, Cremocarp and carcerulus develop from bicarpellary ovary.

296 **(a)**
Involucre is present around sunflower

298 **(c)**
Pneumatophores are respiratory roots common in halophytes (mangroves). The halophytes grow in muddy saline soil near sea shore, *e.g.*, *Rhizophora*.

299 **(b)**
Usually in Cruciferae family, six stamens are found in tetradynamous condition but in case of *Senebiera* sp, there are only two stamens.

300 **(a)**
Vivipary (germination of seed inside the fruit) is an important character of mangrove plants.

301 **(b)**
In *Sida cordifolia*, the number of carpels is equal to the number of locules.

302 **(c)**
Inflorescence of *Ficus* is Hypanthodium. It is modified head and cyme inflorescence for myrmicophily, here the male flowers are situated on the top near the opening (ostiole) and the female fertile flowers are situated at the bottom, whereas sterile gall flowers are present in between the two.

303 **(d)**
Pineapple (*Ananas sativus*) is a multiple fruit (sorosis), which develops from a complete inflorescence, i.e., a cluster of compactly borne flowers on an axis.

304 **(d)**
In non-endospermic seed such as *Pisum, Arachis, Cucurbita*, etc., endosperm is consumed up by growing embryo and is no longer seen in mature seed. Such seeds are also called ex-albuminous seed

305 **(d)**
The orchids have epiphytic roots, which are covered by a hygroscopic velamen tissue. The rootlets of sweet potato are irregularly swollen they are described as tuberous. The stilt roots are adventitious roots arising from the nodes of the mina stem to provide more support to the plant, *e.g., Pandanus, Rhizophora*.

306 **(c)**
The bract is a modified leaf with a flower or inflorescence in its axil. The bracts are usually brightly coloured and often mistaken for the petals of a flower, *e.g., Bougainvillea*.

307 **(d)**
The leaf is a lateral, generally flattened structure borne on the stem. It develops at the node and bears a bud in its axil. The axillary bud later develops into a branch. Leaves originate from shoot apical meristems and are arranged in an acropetal order. They are the most important vegetative organs for photosynthesis

308 **(c)**
Tobacco plant (*Nicotiana tabacum*) yields tobacco, while *Petunia violacea* is an ornamental plant. Both the plants are the member of family-Solanaceae.

309 **(c)**
The unilocular superior ovary is found in **Papaveraceae** family.

310 **(d)**
Flower formula of mustard plant is
$\oplus ♀♂ K_{2+2} C_4 A_{2+4} \underline{G(2)}$

311 **(c)**
The characteristic inflorescence found in family-Asteraceae or Compositae is capitulum. In this, peduncle becomes flattened and called receptacle. It bears sessile, bisexual florets called disc florets at the centre and one or two whorls of sessile unisexual (pistillate) florets called ray florets towards the periphery.

312 **(a)**
Angiosperms are well adapted to terrestrial life and occur in diverse habitats like cold tundra to hot tropical and even desert areas. They also thrive well in aquatic habitat. Hence, they being the most successful to have dominated the land flora.

313 **(d)**
Monocarpic plants are those, which flower only once during their life time, *e.g., Bambusa*.

314 **(b)**
Sem tendrils which develops from axillary buds are slender and spirally coiled and helps the plant to climb such as in gourds (cucumber, pumpkins, watermelon) and grapevines

315 **(c)**
In Solanaceae, androecium has five stamens, and is polyandrous, epipetalous anthers are touching each other and are dithecus, basifixed and introrse.

316 **(a)**
The leaves of *Selaginella* are *microphillus*. Each leaf is transversed by a single unbranched midrib. A ligule arises from the base of each leaf (ligulate) as an adaxial outgrowth. They are delicate, green with entire or serrate margin and acute apex.

317 **(c)**
Cloves (laung) are the unopened **dried floral buds** of *Syzygium aromaticum* used as species and condiments.

318 **(d)**
Tetradynamous condition is a condition of stamens, where four stamens are long, while the other two are short. This is the characteristic

feature or family-Brassicaceae or Cruciferae, *e.g.*, mustard or *Brassica campestris*.

319 **(b)**
Opuntia is a xerophytic plant, in which, normal leaves are not well developed and fall off very soon and small leaves of axillary buds are transformed into spines. These modified spines are protective and are also helpful in reducing the rate of transpiration.

320 **(a)**
Placentation The arrangement of ovules within the ovary is known as placentation. The placentation are of different types namely marginal, axile, parietal, basal, central and free central.
Each ovary bears one or more ovules attached to flattened, cushion like structure, called placenta

321 **(b)**
The ascending order of the given plants based on the number of leaflets in a leaf is
Citrus→*Hardwickia*→*Marselia*→*Gynandropsis*

322 **(a)**
In **Solanaceae**, gynoecium is bicarpellary, syncarpous, ovary superior, bilocular, unilocular in Henoonia, axile placentation, placentae swollen, many ovules in each locule, ovary obliquely placed, posterior carpel to the high about 45° from median and the anterior to the left. In some cases, nectariferous disc is present, style simple, stigma bifid or capitate.

323 **(b)**
The family-Malvaceae includes 75 genera and 1000 species they are chiefly distributed in tropical and subtropical region of the world. The given floral formula is of *Malva* plant.

324 **(b)**
Marginal placentation is found in monocarpellary ovary having placenta born at the margin, *e.g.*, Fabaceae.

325 **(c)**
The given diagram is of *Solanum* nigrum (*Solanaceae*). Because in the floral diagram the placenta sum to be swallen that is the characteristics of family-Solanaceae and in the option only *Solanum* belongs to Solanaccae family. Ovary is bicarpellary syncarpous with axile placentation

326 **(c)**
Capsular fruits are multilocular and multiseeded fruits developed from polycarpellary, syncarpous and superior (sometimes inferior) ovary. Loculicidal capsule dehisces by lonhitudinal slits appearing along the doesal suture, *e.g.*, *Gossypium* (cotton), *Abelmoschus* (Lady's finger).

327 **(a)**
The root system that develops from any part of the plant body other than the radicle is called the adventitious root system or fibrous root system. It is mostly seen in **monocotyledonous** plants.

328 **(a)**
Tetradynamous androecium is found in *Brassica* (mustard), which has six stamens. Out of these, four are long and two are short in size.

329 **(d)**
In Bougainvillea, inflorescence is dichasial cyme, where medianly situated peduncle itself finishes in a flower and bears two lateral floral branches at the base of its origin hence, in 34 inflorescences, the number of flowers is 102.
In Poinsettia, inflorescences is cyathium, in which a single central female flower remains surrounded by numerous male flowers in a cup formed by the fusion of involucres, so, in 42 inflorescence, the number of female flowers is 42.

330 **(b)**
Flowers are **epigynous** usually Pentamerous, hermaphrodite or unisexual complete or incomplete, tubular (actinomorphic) or ligulate (zygomorphic), bracteates or ebracteate in **Asteraceae** family.

331 **(b)**
The stem bears nodes and internodes. The region of the stem where leaves are borne are called nodes while internodes are the portions between two nodes. The stem bears buds, which may be terminal or axillary. Stem is generally green when young and later often become woody and dark brown

332 **(d)**
The lamina or the leaf blade is the green expanded part of the leaf with veins and veinlets. There is usually, a middle prominent vein, which is known as the midrib. Veins provide rigidity to the leaf blade and acts as channels of transport for water, minerals and food materials, the shape, margin, apex, surface and extent of incision of lamina varies in different leaves

334 **(d)**
In whorled or verticillate phyllotaxy, three (*e.g.*, *Nerium*) or more than three (*e.g.*, *Alstonia*) leaves

are borne on a single node in a whorl or circle. The leaves of the whorl of one node generally alternate with the leaves of the whorl of adjacent nodes in order to provide maximum exposure.

335 **(b)**
Tulip, Gloriosa, Aloe, Asparagus, belongs to family- Solanceae

336 **(d)**
Option (e) is correct.

337 **(a)**
Bicarpellary, syncarpous and with pseudoseptum (*i.e.*, false septum) fruit is called siliqua, *e.g.*, *Brassica*.

338 **(c)**
From the region of maturation, some of the epidermal cells form very fine and delicate, thread-like structures called root hairs. These root hairs absorb water and minerals from the soil

339 **(b)**
A-apocarpous, B-syncarpous.
Placentation The arrangement of ovules within the ovary is known as placentation. The placentation are of different types namely marginal, axile, parietal, basal, central and free central.
Each ovary bears one or more ovules attached to flattened, cushion like structure, called placenta

340 **(b)**
Parthenocarpic tomato fruit can be produced by treating the palnts with low concentration of gibberellic acid (promotes fruit set) and auxin (completes the development process).

341 **(d)**
Petiole is a cylindrical stalk of the leaf which fits into lamina above the level of stem so as to provide it with maximum exposure. Petiole helps to hold the blade to light. Long thin flexible petioles allow leaf blades to flutter in wind, thereby cooling the leaf and bringing fresh air to the leaf surface

342 **(d)**
Fruit is defined as fertilized ovary, which consists of fruit wall (pericarp) developing from ovary wall and seed, which develops from ovule. Maize grain is a caryopsis fruit, in which fruit wall is fused with seed coat (*i.e.*, one seeded fruit).

343 **(b)**
Free central placentation is the character of the members of the family-Caryophyllaceae, in this type, the central placental column are devoid of septa.

344 **(d)**
In a tetradynamous androecium, outer whorl of two smaller stamens and inner whorl of four larger stamens are present.

345 **(c)**
The Multicarpellary apocarpous gynoecium with superior ovary is the characteristics feature of the family-**Ranunculaceae**.

346 **(c)**
A-Ascending, B-Plumule
During seed germination the radical of embryo develops into root, while the plumule develops into stem

347 **(b)**
In a cob of maize, each ovary has a long silky (hairy) style, called as corn silk. Collectively these styles protrude at the end of a young cob. The grains are formed on the cob, which remain covered by the leafy bracts.

348 **(b)**
Fruit formation is the characteristic feature of angiosperms. There is no fruit formation in gymnosperms because there is no ovary.

349 **(d)**
In sub-aerial modification the stems are delicated, thin weak and unable to stand erect. Runners grow prostrate in all directions above the soil level. It has a creeping stem with long internodes. On the lower side nodes bear adventitious roots.

350 **(a)**
A-bracteate, B-ebracteate.
A flower may be trimerous, tetramerous or pentamerous when the floral appendages are in multiples of 3, 4 or 5 respectively. Flowers with bracts, reduced leaf found at the base of the pedicel, are called **bracteates** and those without bracts are called **ebracteate**

351 **(d)**
In mango, coconut, plum, etc., the fruit is known as drupe (stony fruit). They develop from monocarpellary, superior ovaries and are one seeded. In mango, the pericarp is well differentiated into an outer thin Epicarp, a middle fleshy edible mesocarp and an inner stony hard endocarp.

352 **(b)**
Family-Compositae contains inferior ovary, *i.e.*, stamens, corolla and calyx are placed above the

level of ovary, Syngenesious androecium; *ie*, all anthers are united but filaments are free and basal placentation, *ie*, ovules seem to arise from the base of locus.

353 **(a)**
When the flowers are divisible into two equal halves by any radial plane, they are called **actinomorphic**.

354 **(d)**
The seeds of castor (Ricinus communis, family-Euphorbiaceae) are endospermic dicot seeds. They poses, endosperm which acts as the food storage tissue of seed. They also possess perisperm and cruncle.

355 **(d)**
For the given figure, option (d) is correct.
1. Endosperm B- Coleoptile
C- Scutellum D- Radicle

356 **(c)**
Lomentum is a dry, many seeded fruit develops from monocarpellary, superior, unilocular ovary with marginal placentation.

357 **(d)**
Vexillary aestivation has unique type of aestivation in which the largest petals is called standard, which overlaps the two lateral petal, called wings. Wings overlaps the two smallest anterior petal called keel. *e. g.*, pea and bean

358 **(c)**
The androecium of family-Malvaceae consists of indefinite stamens. The stamens are monodelphous, *i.e.*, united into one bundle by filaments and monothecous, *i.e.*, single celled anther. The anther dehisce transversely.

359 **(c)**
The bark of *Cinchona officinalis*, tree yields the drug 'quinine' used for the malarial fever. It belongs to the family-Rubiaceae.

360 **(a)**
Colchicine is obtained from the *Colchicum autumnale* which belongs to the family – Liliaceae or commonly called 'Lily Family'. This chemical induces polyploidy by inhibiting cytokinesis

361 **(a)**
Phyllode is modified leaf petiole.

362 **(c)**
The lamina in compound leaf of some plants (*e.g.*, *Acacia* sp, *Parkinsonia*) falls off soon and petiole gets modified into sickle shaped leafy structure, which performs photosynthesis. Such a modified petiole is called phyllode (phyllodia).

363 **(a)**
Leaves are food manufacturing organs of the plant. A typical foliage leaf consists of leaf stalk or petiole, expanded portion called blade or lamina and leaf base. A leaf has hair and waxy cuticle stomata in epidermis and lacks endodermis and casparian strips.

364 **(a)**
Sunflower oil is a semi-drying oil obtained from Helianthus *annuus* which belongs to the family-Asteraceae. It's seed contains 40-50% oil contents. On hydration it yields vegetable 'ghee'. Sunflower oil is used in cooking and in manufacturing of paints and soaps.

365 **(b)**
The order of opening of floral parts from the periphery towards the centre is called centripetal, while from centre towards the periphery is called centrifugal.

366 **(d)**
Aril is the edible part in the fruit litchi. The aril is an accessory seed covering often formed from an outgrowth at the base of the ovule.

367 **(a)**
In China rose (*Hibiscus rose sinesis*), gynoecium is pentacarpellary, syncarpous, pentalocular, ovary superior, axile placentation, two ovules in each locule, style passes through the staminal tube branching into five branches, each ending into a prominent scarlet red knob-like stigma

368 **(a)**
In Solanaceae, gynoecium is bicarpellary, syncarpous, ovary is superior, bilocular and axile placentation is found. In some cases, nectariferous disc is present, style is simple is stigma bifid or capitate

369 **(c)**
Pulvinus.
In monocotyledons, the leaf base expands into a sheath covering the stem totally or partially. In some leguminous plants, the leaf base may become swollen which is called pulvinus

370 **(b)**
Brassica oleracea var. capitata is the botanical name of cabbage (band gobhi) which belongs to family—Brassicaceae.

371 **(b)**

Jowar, maize, sugarcane, wheat and rice belong to family-Gramineae or Poaceae.

372 **(b)**
They are elongated horizontal or arched runners, which can cross over small obstacles. Each stolon has one or more nodes possessing scale leaves and axillary buds

373 **(a)**
Phylloclade is a modified stem or branch of unlimited growth. It consists several nodes and internodes and may be flat or circular, fleshy, photosynthetic like green leaf, *e.g.*, *Opuntia*.

374 **(a)**
When leaflet of a leaf are even in number called pari pinnate (tamarind) and when odd in number called imparipinnate

375 **(c)**
The **companion cells** are found in angiosperms only, in gymnosperms no companion cells present but some special parenchyma cells associated to sieve cells, which are known as 'albuminous cells'.

376 **(d)**
China rose or gurhal (*Hibiscus rosa-sinensis*) is called shoeflower because petals of this flower are used for blackening the shoes.

377 **(d)**
In tetradynamous condition out of six stamens, four are long and two are short, *e.g.*, Brassicaceae (Cruciferae).

378 **(a)**
Sunflower (*Helianthus annus*) belongs to the family Asteraceae (Compositae). It possesses involucrate head or capitulum inflorescence with ray florets and disc florets

379 **(a)**
The drupe is single seeded fruits characterised by thin Epicarp fleshy mesocarp and stony endocarp. They are called stone fruits, *e.g.*, mango, coconut.

380 **(d)**
Mature endosperm with any degree of irregularity and unevenness in its surface contour is called ruminate **endosperm**. Rumination stats at a late stage of endosperm development. Ruminate endosperm is known to occur in some families of angiosperms like Annonaceae and Aristolochiaceae.

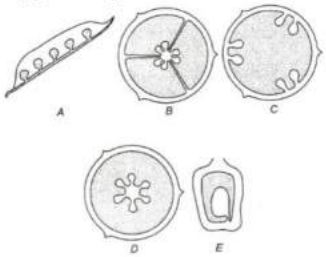
381 **(c)**
Mitotic division takes place in root tip to produce new cell. 99 mitotic divisions will be required to produce 100 cells.
Because, as result of mitotic division, number of cells becomes durable. Thus, at 99th division 50 cells will produce 100 cells.

382 **(b)**
Fruit formed without fertilisation of ovary is called parthenocarpic fruit. Parthenocarpic tomato fruit can be produced by treating the plants with low concentration of gibberallic acid and auxin

383 **(b)**
In monocotyledons, the leaf base expands into a sheath covering the stem totally or partially. In some leguminous plants, the leaf base may become swollen which is called pulvinus

384 **(c)**
Some taxonomists believed that Compositae is most advanced family.

385 **(a)**
Types of placentation



A-Marginal
B-Axile
C-Parietal
D-Free central
E-Basal

386 **(a)**
In **monoadelphous** condition, all filaments become fused and form a group, while anthers remain free, *e.g.*, China rose, *Achyranthes*, etc.

387 **(b)**
Cyathium inflorescence has a large, achlamydeous, pedicellate female flower with tricarpellary and syncarpous ovary and many achlamydeous, pedicellate, centrifugally arranged and Scorpioid male flowers.

388 **(a)**
$\underline{G}$ = Superior ovary (hypogynous flower)
$\overline{G}$ = Inferior ovary (epigynous flower)

389 **(d)**
Root hairs are found in the zone of maturation.

390 **(c)**
Berry is generally many seeded fleshy fruit develops from polycarpellary, syncarpous, superior ovary. It consists of epicarp, mesocarp

and endocarp. Mesocarp and endocarp are fused together to form the pulp of the fruit, *e.g.*, tomato, brinjal, etc. Thus, placentae and endocarp are edible part of tomato.

391 **(a)**
Inflorescence of onion is cymose, *i.e.*, is inflorescence axis terminated into flower. Each individual flower is made up of six stamens, three carpels and six perianth segment so the given figure is of onion

392 **(a)**
Offsets are only one internode long, thicker, small runners bearing a cluster of leaves in rosette manner above the water or ground level and adventitious roots below the water or ground level arising from all nodes, *e.g.*, *Pistia* (water lettuce), *Eichhornia crassipes* (water hyacinth), etc.

393 **(a)**
Rhizome is an underground modification of stem. It grows horizontally forward under soil surface. It has distinct nodes and internodes with scaly leaves arising at the nodes. There are well marked apical and axillary buds also, *e.g.*, *Canna*, *Zingiber* (ginger), *Curcuma*, etc.

394 **(b)**
Total root parasites have no chlorophyll. These are common on the roots of Cruciferae and Solanaceae, *e.g.*, *Balanophora* and *Orobanche*, etc.

395 **(b)**
Oxalis (wood sorrel) is an example of runners, which are the sub-aerial weak stem modification. Runners are those creepers that grow horizontal or prostrate in all directions above the ground, possess long internodes and nodes bearing scale leaves and adventitious roots on the lower side.

396 **(d)**
The fruit of coconut is an indehiscent drupe with a single seed. The single seed remains enclosed by stony endocarp and posses thin seed coat, brown testa, small inconspicuous embryo and white oily edible endosperm.

397 **(c)**
In **quincuncial**, there are five sepals, in which two are completely out, two are completely in and one is partially out and partially in, *e.g.*, *Cucurbita* (Cucurbitaceae).

398 **(a)**
Sterile stamen.
Each anther is usually bilobed and each lobe has two chamber, the pollen-sacs.
The pollen grains are produced in pollen-sacs. A sterile stamen (incapable of producing fertile pollen) is called staminode

399 **(a)**
A-**Caryophyllaceous** (5 petals each with long claw and limb placed at right angle to claw, *e.g.*, Dianthus).
B-**Papilionaceous** (5 petals arranged asymmetrically, the largest posterior one vexillum, two lateral wings or alae and two anterior keels, *e.g.*, pea)
C-**Personate** (corolla also biliped but corolla mouth is closed due to closed placed *e.g.*, Antirhinnum).
D-**Tubular** (*e.g.*, sunflower).
E-**Bell-shaped** (*e.g.*, Physalis).

400 **(d)**
Syzygium cuminis have epigynous flowers with numerous stamens.

402 **(c)**
Pneumatophores are found in the plant inhabitants of the marshy area, *e. g.*, *Rhizophora*. These type of roots performs the function of respiration

403 **(a)**
Botanical name of mulberry is *Morus alba*, it belongs to family-Moraceae.

404 **(a)**
In pseudocarpic fruits (false fruits), the edible part is formed from ovary along with outside part of the ovary (*i.e.*, other floral parts like bracts, perianth, thalamus, etc), *e.g.*, in apple and pear thalamus forms major part in fruit formation.

405 **(b)**
In **basal placentation**, ovary is bicarpellary syncarpous and unilocular, and a single ovule is borne at t5he base of ovary, *e.g.*, marigold.

406 **(c)**
A hyaline, bisexual and self-fertilized flower that never opens is called cleistogamous flower, while chasmogamous flowers expose their mature stigma and anthers to the pollinating agents.

407 **(c)**
The given floral characteristics belong to family-Papaveraceae, order-Parietales, series-Thalamiflorae. (According to Bentham and Hooker's classification).

408 **(b)**

Opium (poppy) belongs to family—Papaveraceae.

409 **(a)**
Abelmoschus esculentus (syn. Hibiscus esculentus) is a member of family-Malvaceae and is commonly known as lady finger (bhindi) or gumbo. Its fresh and green tender fruits are used as a vegetable.

410 **(b)**
Stamens of flower may be united with other members such as petals or among themselves. When stamens are attached to the petals, they are **epipetalous** as in brinjal or **epiphyllous** when attached to the perianth as in the flowers of lily

411 **(d)**
Tracheophytes are the plants which have vascular bundles. It includes pteridophytes, gymnosperms and angiosperms. Atrachenophytes are the plants which have no vascular bundles.

412 **(a)**
In Datura stramonium, gynoecium is bicarpellary syncarpous, ovary superior, bilocular, becoming tetralocular due to formation of a false septa. Therefore, plant B is *Datura*. In *Capsicum*, gynoecium is bicarpellary, syncarpous, ovary superior. The cross wall ovary is unilocular in the upper part.

413 **(c)**
Double fertilization is the characteristic features of angiosperms. Double fertilization was discovered by **Nawaschin** (1898) in *Lilium* and *Fritilaria*.

414 **(a)**
Those flowers which can be divided into equal parts in one vertical plane are called zygomorphc flowers, *e.g.*, *Dolichos*, *lablan*, *Crotalaria*.

415 **(a)**
In Cyathium inflorescence, five involucres become fused and form a cup-shaped structure, which surrounds a large, achlamydeous (sepals and petals are absent), pedicellate, tricarpellary and syncarpous female flowers. Numerous, achlamydeous pedicellate, centrifugally arranged and Scorpioid male flowers surround this flower. It is the characteristic. Inflorescence of genus-Euphorbia or family-Euphorbiaceae.

416 **(a)**
Floral characters of family-Fabaceae
Inflorescence Racemose
Flower Bisexual, zygomorphic
Calyx Sepals five, gamosepalous, imbricate, aestivation
Corolla Petals five, polypetalous, papilionaceous, consisting of a posterior standard, two lateral wings, two anterior ones forming a keel (enclosing stamens and pistil), vexillary aestivation
Androecium Ten, diadelphous, anther dithecous
Gynoecium Ovary superior, monocarpellary, unilocular with many ovules, style single
Fruit Legume, seed, one to many, non-endospermic

417 **(d)**
A composed leaf has a blade which is divided into small, leaf like leaflet. Citrus plant contains compound leaves, which look like simple leaves due to fall or suppression of its one or two leaflets.

418 **(b)**
Aggregate fruits are formed from polycarpellary apocarpous ovary. Each carpel develops into a fruitlet and all fruitlet together form an aggregate fruit. An etaerio of berries (aggregate fruit) is found in *Annona squamosa* (caustard apple), *Polyalthia*, etc.

419 **(a)**
Reticulate venation are found in dicotyledonous. Parallel venation are found in monocotyledonous

420 **(a)**
Capitulum or head inflorescence is characterized by sessile flowers arranged centripetaly on receptacle. The gynoecium has inferior ovary with basal placentation.

421 **(b)**
Amphibious plants are those plants that can grow both in aquatic and land conditions. Here only *Typha* is such example, while others are purely aquatic plants.

422 **(d)**
The bean or legume family is one of the most common plant families. Bean-family flowers typically have their two bottom petals grown together along one side forming a structure a bit like a narrow but deep scoop. This special Bean-family kind of two-in-one petal is called the keel, like the keel of a boat. Bean blossoms with this configuration are said to be papilionaceous.

423 **(b)**
Roots in some plants change their shape and structure and become modified to perform

functions other than absorption and conduction of water and minerals. They are modified for support, storage of food, respiration, etc.
The tap roots of carrot, turnip and adventitious roots of sweet potato get swollen and store food

424 **(d)**
Replum is a false septum, present in family-Brassicaceae. In family-Brassicaceae, ovary unilocular in initial stage, this becomes bilocular later on due to development of replum.

425 **(a)**
Raceme is a type of racemose inflorescence, in which pedicellate or stalked bisexual flowers are found acropetaly on an unbranched, continuously growing peduncle, *e.g.*, mustard, radish, etc.

426 **(b)**
In caudex, only the terminal bud functions and lateral buds remain dormant. The plant thus, has only terminal crown of leaves, *e.g.*, palms
Decumbent stems have branches which after growing horizontally for some length, grow vertically upward, *e.g.*, *Tridax*, *Portulaca*.
Sucker is the sub-aerial modification of stem. They grow obliquely upward from the main stem producing roots from the under ground nodes, *e.g.*, *Mentha*.
Saraca shows helicoids type of uniparous cymose branching.

427 **(b)**
Axile placentation occurs in Multicarpellary and syncarpous ovary. Inward growth of margins of carpel from a Multicarpellary condition, which contain an axis in centre. Placentae are arised from this central axis, which bear ovules, *e.g.*, Malvaceae, Liliaceae.

428 **(b)**
Caryopsis fruits develop from unilocular, single-ovuled, superior ovary of Multicarpellary gynoecium. They are small and single-seeded. Their pericarp is completely fused with the seed-coat or testa.

429 **(d)**
In non-endospermic seeds such as *Pisum*, *Arachis*, *Cucurbita*, etc, endosperm is used up by the growing embryo and is no longer seen in the mature seed. Such seeds are also called ex-albuminous seeds.

430 **(d)**
When there is less surface area, there is thule leaf or leaf parts less transpiration. Hence, the xerophytic plant gets changed into the spines in order to reduce the gets transpiration

431 **(b)**
Fabaceae (Hsuminosae)

432 **(b)**
Option (b) is correct.

433 **(c)**
Rhizome is perennial, fleshy dorsiventral and horizontal underground stem growing beneath the surface of soil. These may be root stock rhizome, *e.g.*, banana or straggling rhizome, *e.g.*, lotus, ginger, etc.

434 **(d)**
Stratification involves the treatment of seed at low temperature (5-10°C) under sufficiently moist conditions to break its dormancy and to induce germination.

435 **(b)**
Lateral roots arise endogenously, i.e., from the sells inside the endodermis. They arise from Pericycle cells. In dicot roots, Pericycle gives rise to secondary roots and lateral meristem and in monocot root. It gives rise to lateral roots only.

436 **(b)**
Analogous organs have different embryonic origin but perform similar functions. Potato (stem-tuber) and sweet potato (roots) have edible parts, which are analogous organs.

437 **(b)**
A-bisexual, B-unisexual
Flower generally has four whorls

Accessory part	Reproductive part
Calyx	Androecium
Corolla	Gynoecium

When a flower has both androecium and gynoecium, it is bisexual. A flower having either only stamens or only carpels is unisexual

438 **(a)**
Caryopsis is a dry, indehiscent fruit. It is simple and small containing only one seed and the testa (seed coat) become fused to the fruit wall during maturation, *e.g.*, wheat, corn, oats, etc.

439 **(d)**
In the family-Caryophyllaceae, the type of placentation is free-central. Here, ovary contains only one chamber, *i.e.*, unilocular (without any septa) and the placenta bearing the ovules arised from the central axis.

440 **(b)**

Edible part of cauliflower is fleshy inflorescence (compound corymb).

441 **(a)**
In pteridophytes, the young leaves are coiled or tightly rolled but uncoil like a watch spring as these leaves grow. This condition of leaves is called **circinate vernation**.

442 **(a)**
The seeds possess bright red juicy testa that forms edible part of fruit, *e.g.*, pomegranate.

443 **(d)**
$\% \, ♀♂ K_{(5)} C_{1+2+(2)} A_{(9)+1} | \underline{G}_{(1)}$
% – Zygomorphic
♀♂ – Bisexual
$K_{(5)}$–5 sepals, fused.
$C_{1+2+(2)}$–5 petals arranged freely as one larger, posterior petal called vexillum overlapping two smaller lateral petals called wings, the latter overlap a boat shaped structure called kell or carina, formed by two anterior petals fused lightly on anterior side.
Aestivation is called as vexillary imbricate, papilonaceous (butterfly shaped).
$A_{(9)+1}$ – 10, diadelphous anthers dehiscing longitudinally.
$\underline{G}_{(1)}$ Monocarpellary, superior ovary, unilocular, marginal placentation.

444 **(a)**
Starch is insoluble in water but it is useful for storage. During night, it is stored in various storage organs but it is mainly found in underground stems (or tubers), in the seeds of cereals (*e.g.*, wheat, maize, rice, etc) and in fleshy roots.

445 **(d)**
Tiller is a grass stem rising from a lateral bud at a basal node, whereas tillering is the process of tiller formation.

446 **(a)**
Pepo, a berry developing from tricarpellary, syncarpous, inferior ovary with partial placentation, *e.g.*, *Cucurbita*.

448 **(c)**
Juicy hair are edible part in hesperidium fruit.

449 **(c)**
The plants of humid region have water stomata or hydathodes. These perform the function of guttation.

450 **(a)**
catechu belongs to family-Araceae

451 **(a)**
Fruits of custard apple (*Annona squamosa* vern-sharifa) are etaerio of berries, in which the berries are fused but the edible part represents the mesocarp of individual berries.

452 **(a)**
Saprophytic organism (Saprophytes Gre; *Sapro*=putid and *troph*=feeder) break down dead organic matters by secreting digestive enzymes and then they absorbing the nutrient molecules.

453 **(c)**
Caryopsis type of fruit is found in family-Gramineae or Poaceae (*e.g.*, maize, rice, wheat, etc). In all these plants pericarp and testa are fused and the grains of these plants are actually fruits.

454 **(b)**
Acacia (family-Mimosaceae) has single carpel in ovary.
Lettuce (Lactuca sativa, family-Asteraceae) has two carpels in ovary.
Red squill (family-Liliaceae) has three carpels.

455 **(c)**
The direct or indirect effect of pollen in seed or fruit has been termed by **Foke** (1881) as xenia. This phenomenon is seen in *Zea mays* alone and is limited to the endosperm part only.

456 **(a)**
The members of family—Liliaceae produce colchicine.

457 **(b)**
Figure A represent leaf tendrillar, which help the plant in supporting around other plant for climbing.
Figure B represent leaves modified into spines, which protect the plant and C is fleshy leaves, which store the sood

458 **(b)**
Statement I and II are correct.

459 **(d)**
Positively phototropic, negatively geotropic, negatively hydrotropic are fundamental characters of stem

461 **(a)**
In Solanaceae, androecium has five stamens and is polyandrous, epipetalous, anthers are touching each other and are dithecus, basifixed and introrse.

462 **(d)**

Male reproductive organ stamin is consisted of stalk and anther.
Androecium is composed of stamens. Each stamen which represents the male reproductive organ consists of stalk or a filament and an anther

463 **(c)**
Syconous fruit develop from Hypanthodium inflorescence, *e.g.*, *Ficus carica*, *F. religiosa*, *F. benghalensis*. The flask shaped receptacle encloses female flowers that give rise to achene-like fruitlets. This fruit possess a small pore protected by swcaly leaves. The receptacle that becomes fleshy is edible.

464 **(b)**
Each anther is usually bilobed and each lobe has two chamber, the pollen-sacs.
The pollen grains are produced in pollen-sacs. A sterile stamen (incapable of producing fertile pollen) is called staminode

465 **(d)**
Castor seed is a conical, oblong, mottled, dark brown shining and smooth surfaced endospermic seed, which develops in a spiny regma. It has outer testa, then perisperm and then there is a white oily mass called **endosperm**. In the centre of endosperm is present, the embryo.

466 **(d)**
Corypha is a monocarpic palm.

467 **(b)**
The outermost covering of a seed is the seed coat. The seed coat has two layers, the outer testa and inner tagmen. The hilum is a scar in the seed coat through which the developing seeds gets attached to the fruit. Above the hilum, there is the small pore called micropyle

468 **(a)**
In Cyathium inflorescence, one female flower remains surrounded by many male flowers within involucres like structure.

469 **(b)**
In the members of family :
Compositae (**Asteraceae**), gynoecium is bicarpellary, syncarpous, ovary inferiors unilocular, basal placentation.
Leguminous (**Fabaceae**) gynoecium is monocarpellary, ovary superior, unilocular with marginal placentation.
Liliaceae, gynoecium is tricarpellary, syncarpous, ovary superior, trilocular with axile placentation.
Solanaceae, gynoecium is bicarpellary, syncarpous ovary superior, carpels placed obliquely, generally bilocular with axile placentation.

470 **(c)**
Nut is a dry, indehiscent, single-seeded fruit, somewhat similar to an achene but it is the product of more than one carpel and usually larger with a hard, woody pericarp. *Anacardium* (cashewnut), litchi, *Quercus* (oak), *Trapa* (water chestnut), *Casuarina*, etc, are the example of nuts.

471 **(b)**
In hypogynous ovary thalamus is convex, the gynoecium is situated at the apex and the other whorls arise below it. The ovary is superior. *e.g.*, mustard, *Datura*, *Ranunculus*.

472 **(b)**
The breakdown of organic compound even in absence of O_2 is called anaerobic respiration. It occurs in the roots of some water logged plants, certain parasitic worms, animal muscles and some microorganisms.

473 **(c)**
A_∞ = Indefinite or numerous stamens or plants having many stamens which is not countable

474 **(a)**
Aggregate fruit is a cluster of several to many ripened ovaries formed from polycarpellary, apocarpous flower (ovary). Each carpel forms a fruitlet.

475 **(a)**
When the other floral whorls are arranged at the base of the gynoecium, the later being at the superior position, such a flower is called hypogynous flower. In this condition, the ovary position is termed as superior.

476 **(d)**
Only one internode long typical phylloclade (*i.e.*, green leaf-like modified stem) is called as cladode, *e.g.*, *Asparagus*.

477 **(c)**
A – Storage B- Support
C – Protection D- Reproduction
From the given diagram C represent those, which helps in protection for plant

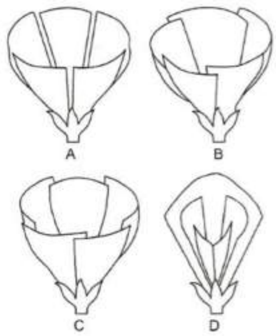
478 **(b)**
Turnip, sweet potato and carrot are modified roots, which stores the reserve food material, potato is the modified stem which stores starch as a reserve food material

479 **(d)**

Seed dormancy is the internal inhibition of germination of a normal or viable seed even if it is placed under most favourable conditions required for its germination. These dormant seeds remain under non-germination condition only for a specific period of time (*i.e.*, dormancy period) which may vary from days to years.

480 **(b)**

Types of aestivation in corolla



A-Valvate B-Twisted C-Imbricate D-Vexillary

481 **(a)**

Jowar grain is caryopsis.

482 **(c)**

In dicotyledons or dicotyledone—vascular bundles are arranged in ring, *e.g.*, Euphorbiaceea, Ranunculanceae, etc.

483 **(c)**

Family-**Caesalpinoidae** (Caesalpiniaceae) has floral formula—

$\oplus$ or % ⚥ $K_5\, C_5\, A_{7+3}\, \underline{G1}$

e.g., *Cassia*, *Bauhinia*, *Tamarindus*, *Caesalphinia*, etc.

484 **(a)**

The bacteria (*Rhizobium* sp) associated with the root nodules of legumes fix atmospheric nitrogen.

485 **(a)**

Cocos nucifera (coconut) belongs to a monocotyledon family-Palmae or Arecaceae. It is characterised by trimerous, actinomorphic, incomplete, hypogynous and unisexual flowers.

486 **(c)**

The flower tops, leaves and the resin of the plant Cannabis sativa are used in various combinations to produce marijuana, hashish, charas and ganja. Generally taken by inhalation and oral ingestion, these are known for their effect on cardiovascular system of the body. A group of chemicals cannabinoids interact with cannbinoid receptors present pricipally in the brain.

487 **(c)**

Succulent plants also known as succulents or fat plants, they are water-retaining plants adapted to arid climate or soil conditions. Succulent plants store water in their leaves, stems and also in roots. Many species of *Euphorbia* are more or less succulent, thorny or unarmed. The main stem and mostly the side arms of the succulent species are thick and fleshy.

488 **(a)**

I and III are correct pairs.

489 **(b)**

In scorpioid cyme, the flowers are formed on both the sides, alternatively like a zig-zag manner, *e.g.*, *Ranunculus*, *Bulbosus*, *Tecona*, *Freesia*, *Heliotropium*.

490 **(a)**

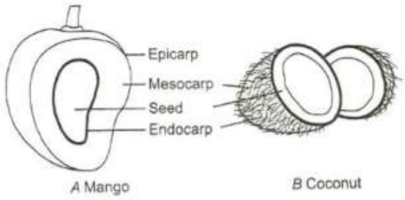
Column I	Column II
Cremocarp	Bilocular
Regma	Trilocular
Schizocarp	Tetralocular
Carcerulus	Tetralocular

491 **(a)**

In lemon, juicy hair-like structures develop from endcarp.

492 **(a)**

Parts of fruit



494 **(a)**

Pea and castor contain two cotyledons each, whereas maize has only one cotyledon.

495 **(b)**

Bisexual flower.

Symbols used for floral formula

Br- Bracteate	EBr - Ebracteate
Brl- Bracteolate	EBrl – Ebracteolate
$\oplus$ - Actinomorphic	% - Zygomorphic
⚥ - Perfect or bisexual	N- Necter
⚥ – Female	C- Corolla, petals
O - Male	A- Androecium, stamens
K – Calyx, sepal	Std – Staminodes
P – Parianth, tepal	
G – Gynoecium, Carpel	

496 **(c)**

The most common type of ovule in angiosperms is anatropous. In this type, the body of the ovule

has rotated by 180° and micropyle and hilum come to lie very close to each other. This type of ovule is present in more than 80% of angiosperms.

497 **(d)**
The stem may not always to be typically like what they are expected to be. They are modified to perform different functions. Underground stem of potato, ginger, turmeric, zaminkand, *Colocasia* are modified for storing food in them. They also acts as organs of penetration to tide over the conditions unfavaourable for growth

498 **(c)**
Caryopsis is a fruit of family-Gramineae, *e.g.*, wheat. Caryopsis fruit is characterized by fused fruit and seed wall.

499 **(a)**
Palmate or multicostate venation is the type of venation where leaf lamina consists of a number of main veins (midribs) or costae arising from its base. It may be convergent (main veins running parallel converge or unite towards apex), *e.g.*, bamboo and grasses or divergent (main veins diverge towards the margins of the lamina), *e.g.*, fan palm.
In banana and *Canna* pinnate or unicostate parallel venation is found.

501 **(c)**
$\underline{G}\ \infty$ Represents gynoecium, polycarpellary, apocarpous and superior
Polycarpellary condition is found in the *Ranunculus*

502 **(a)**
In family-Solanaceae, the fruits are berry or bacca. They have a thin Epicarp, fleshy mesocarp and a thin endocarp. They usually develop from a superior ovary and their seeds get detached from the palcenta at maturity.

503 **(c)**
Lemon (Citrus sp.) belongs to family-Rutaceae, contains axile placetation.
Argemone belongs to family-Papaveraceae, contains parietal placentation. *Dianthus* belongs to family-Caryophyllaceae, contains free-central placentation. Marigold belongs to family-Asteraceae, contains basal placentation.

504 **(b)**
In scaly bulb stem modification, the fleshy scales (scale leaves) are not concentric. They are narrow, small, separated, loosely arranged and overlap each other at their margins. Covering sheath or tunic is absent, *e.g.*, lily (*Lilium bulbifera*).

506 **(c)**
In question, the number of chromosomes in microspore mother cell ($2n$) is 24 ($n = 12$). Thus, the number of chromosomes in endosperm tissue ($2n + n = 3n$) would be $24 + 12 = 36$ chromosomes.

507 **(d)**
$K_5 = 5$ sepals
$K_{2+2} = 4$ sepals in two groups or two group of 2 whorl having two sepal each
K_∞ = Indefinate or numerous stamens

508 **(d)**
In angiosperms, male gametes are formed from generative cell.

509 **(c)**
Amentum is a dicotyledonous plant. It contains unisexual flowers and the flowers are opened in acropetal manner. It also contains a weak peduncle.

510 **(d)**
Suckers It is a special non-green slender stem branch which arises from the underground base of an erect shoot or crown. It grows horizontally in the soil and ultimately comes out to form a new aerial shoot or crown

511 **(c)**
Thorn is a modified branch because it arises in the axil of a leaf.

512 **(a)**
Lateral roots originate from the **pericycle**. Pericycle is usually uniseriate and composed of thin-walled parenchymatous cells.

513 **(a)**
The enzyme polygalacturonase promotes softening of fruits. Flavr savr is genetically modified tomatos, which remains fresh and retain their flavor much longer than normal tomato due to blocking of synthesis of the fruit softening enzyme polygalacturonase.

514 **(b)**
Gossypium hirsutum (cotton), *Hibiscus cannabis* (kenaf, patsan) and *Abelmoschus esculentus* (lady finger, okra, 'bhindi') all are the economically useful plants of 'Malvaceae'.

515 **(c)**
The members of family-Cruciferae possess tetradynamous stamens, *i.e.*, out of six stamens,

four of the inner side has long filaments than the two stamens of outer side.

516 **(b)**
Diadelphous condition is found in family—Papilionaceae.

517 **(d)**
If gynoecium is situated in the centre and other parts of the flowers are located on the rim of the thalamus almost at the same level, it is called perigynous. The ovary here is said to be half inferior, *i.e.*, plum rose, peach, etc.

518 **(b)**
In reticulate venation, the veins are arranged in a net-like manner, *e.g.*, most of the dicots. Some dicot plants like *Calophullum*, *Corymbium* and *Eryngium* show parallel venation.

519 **(d)**
LS of monocot seed (*Zea mays*) show a broader and falttened end (lower side) and a pointed (upper side) end.
Endosperm, present towards broader end contains stored food as starch with some protein and fat.
Embryo, present towards pointed and upper side has an embryo axis. It bears radicle towards lower end. It is covered by root cap and an outer sheath called coleorhiza.
Plumule is present opposite to radicle. It has few rudimentary leaves and is covered by protective outer sheath called as coleoptile.
Scutellum is the large cotyledon which arises from middle of the embryonal axis.

520 **(c)**
In some plants such as *Rhizophora* (growing in swampy areas) many roots came out of the ground and grow vertically upwards. Such roots are called pneumatophores, which helps to get oxygen for respiration

521 **(a)**
Caryopsis is very small, dry and one-seeded fruit, which develops from a superior monocarpellary ovary. Here, the pericarp is closely fused with seed coat. It is characteristic of family-Gramineae, *e.g.*, wheat, rice, maize.

522 **(c)**
Pneumatophores are specialized negatively geotropic roots produced by halophytic mangrove plants, *e.g.*, *Avicinnea*.

523 **(d)**
In perigynous ovary, the gynoecium is situated in the centre and other part are located on the rim of thalamus having same level. This type of ovary is called half inferior. *e. g.*, plum, rose and peach

524 **(c)**
Umbel inflorescence is found in the members of family-Umbelliferae example of which are *Coriandrum* (dhania), carrot, *Allium*, etc.

525 **(c)**
In drumstick, seeds are dispersed by **wind**.

526 **(a)**
Gynoecium in *Brassica campestris* is bicarpellary, syncarpous, superior and bilocular due to presence of a false septum called 'replum'.

527 **(d)**
Germination of seeds inside the fruit, which is still attached to the parent tree is called vivipary. It is a special type of seed germination occurring in plants growing in sea coast and salt lakes (mangroves) *eg, Rhizophora, Cereops*.

528 **(d)**
Banana is root stock rhizome. It is vertical or oblique with the tip almost reachin the soil surface and is usually unbranched.

529 **(a)**
In a longitudinal section of a root, starting from the tip upward the four zones occur in the following order :
Root cap→Zone of cell division →Zone of cell enlargement → Zone of cell maturation

530 **(d)**
Scientific name of sunflower is *Helianthus annuus*. It is a member of family-Asteraceae or Compositae.

531 **(d)**
The fruit of *Nymphaea* is spongy berry, which dehisces by the swelling of mucilage surrounding the seeds. The seeds thus set free float as spongy aril entangles air bubbles. They settle down to the bottom of pond as aril decays.

532 **(c)**
Nelumbo belongs to the family-Nymphaceae (waterlily). It has monocarpellary ovary with ovules hanging from the apex of carpel.

533 **(c)**
In jowar (*Sorghum vulgare*), inflorescence is usually compact panicle, sometime loose and spreading panicle.

534 **(b)**

The calyx is the outermost whorl of the flower and the members are called sepals. Generally, sepals are green, leaf like and protect the flower in the bud stage.
The calyx may be gamosepalous (sepals united) or polysepalous (sepals free)

535 **(b)**
Banana has spadix inflorescence.

536 **(b)**
The modified stem of *Opuntia* is phylloclade.

537 **(c)**
The outer covering of endosperm separates the embryo by a proteinous layer called the aleurone layer. The cells of aleurone layer have thick walls and dense cytoplasm filled with aleurone or protein grains. The latter produce enzymes during the process of grain germination

538 **(a)**
On the basis of floral characters, **Roy** (1949) proposed the removal of *Trapa* from Onagraceae and its inclusion in a separate family-**Trapaceae**. It contains swollen spongy petioles and its root also contains chlorophyll for photosynthesis.

539 **(a)**
A monocarpic tree is one, which flowers only once during its life cycle, *e.g.*, *Borassus flabellifer*.

540 **(a)**
A-Bisexual, B-Actinomorphic C-Zygomorphic
Symbols used for floral formula

Br- Bracteate	EBr - Ebracteate
Brl- Bracteolate	EBrl – Ebracteolate
⊕ - Actinomorphic	% - Zygomorphic
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O - Male	A- Androecium, stamens
K – Calyx, sepal	Std – Staminodes
P – Parianth, tepal	
G – Gynoecium, Carpel	

541 **(a)**
Advanced characters of plants are dioecious flower, *i.e.*, unisexuyal flower, gamopetalous corolla, *i.e.*, petals (parts of corolla) is fused and multiple fruits, *i.e.*, compound fruit.

542 **(b)**
Simple leaf When lamina is entire or incised, the incision don't touch the midrib. We can say that the leaf which has single lamina

543 **(b)**
Aestivation
A – Valvate, *e. g.*, *Calotropis procera*
B – Twisted, *e. g.*, lady's finger and cotton
C – Imbricate, *e. g.*, *Cassia* and gulmohar
D – Vexillary, *e. g.*, bean and pea

544 **(a)**
Phyllotaxy is the arrangement of leaves on the stem or its branches, *e.g.* spiral or alternate in China rose, opposite decussate in *Calotropis* and whorled in *Nerium*.

545 **(a)**
Prostate or Sub-ariel Weak Stems The weak stem take the support of ground for spreading and proper exposure of leaves and reproductive organs. They are of two categories-trailers and creepers. Creepers root at intervals while trailers do not do so. Breaking of the different rooted part help in vegetative reproduction in creepers

546 **(c)**
In cleistogamy, bisexual flowers never open; therefore, the pollen grains may only pollinate the stigma of the same flower, *e.g.*, *Commelina benghalensis*.

547 **(d)**
The outermost layer of endosperm monocotyledonous seeds is called aleurone layer, which is rich in protein. The endosperm is separated from the embryo by a distinct layer called **epithelium**.

548 **(c)**
Aestivation is the mode of arrangement of petals (or sepals) in a flower bud with respect to members of the same whorl.

549 **(a)**
Tomato (*Lycopersicon esculentum*) belongs to family-Solanaceae. The tomato fruit have large quantities of vitamin-C; compared with oranges, tomatoes contain over two-thirds of vitamin-C.

550 **(a)**
Option (a) is correct.

551 **(d)**
Option (d) is correct.

552 **(d)**
Most of the petrocrops belong to family-Euphorbiaceae, Apocyanaceae and Asclepiadaceae. The plants of these families convert a substancial amount of the photosynthetic products into latex.

553 **(b)**
The ovule after fertilisation develops into seed. Seed is made up of seed coat and embryo. Embryo

is made up of plumule, embryonal axis, radicle and cotyledon. If one cotyledon is present, plants are called monocot and if two cotyledons are present, plants are called dicot

554 **(a)**

In some plants like grass, *Monstera* and the banyan tree, roots arise from parts of the plant other than the radicle are called adventitious roots