

UNIVERSITY OF CALICUT
BSc Programme in Botany
QUESTION BANK

CORE COURSE: 1

**ANGIOSPERM ANATOMY, REPRODUCTIVE BOTANY AND
PALYNOLOGY**

QUESTION PAPER PATTERN & SUBJECT WISE DISTRIBUTION OF MARKS

Type of questions	Anatomy	Reproductive Botany & Palynology	Total marks
2 marks (total 12)	8	4	Ceiling 20
5 marks (total 7)	4	3	Ceiling 30
10 marks (total 2)	1	1	1x10 = 10
TOTAL			60

ANGIOSPERM ANATOMY

Short answer type (2 marks) questions

1. Name the following (a) Father of plant anatomy (b) Father of Indian plant anatomy.
2. What is lignin? What is its significance?
3. Explain the multinet theory of cell wall growth.
4. What would happen if plasmodesmata were absent in plant cells?
5. Explain the chemical composition of cell walls in angiosperms.
6. Give an account of growth of cell wall in angiosperms.
7. What is cellulose? Describe its orientation in an angiosperms cell wall.
8. What are pit pairs?
9. Give an account of bordered pits.
10. Describe the properties of cell wall.
11. Differentiate between symplast and apoplast.
12. What is middle lamella? Explain its significance.
13. What is hemicellulose? Explain its chemical nature.
14. Give an account of raphides.
15. Leaf blades of certain grasses appear to be rough. What would be the reason for this?
16. What is a cystolith? Describe its chemical nature, occurrence and function.
17. Name a water soluble fructosan found in plants. Add a note on its significance. Name two plants where you can see this polysaccharide.
18. Write short notes on various types of starch grains found in angiosperms.
19. Differentiate between concentric and eccentric starch grains. Give examples of plants where you can see these types of starch grains.
20. It is desirable not to peel off potato skin deeply while cooking. What may be the reason?
21. What is the significance of aleurone layer in maize grain?
22. What conclusions can you draw if a structure similar to a bunch of grapes is found in a cell?

23. What are druses? Where does it occur?
24. What are idioblasts? Mention their occurrence. Give two examples of plants where you can see this.
25. What are ergastic substances?
26. Why certain plants cause irritant contact dermatitis?
27. Write short notes on alkaloids in angiosperms.
28. What is gum? Where is it produced? Give two examples of gum producing plants.
29. What is tannin? Where is it produced? Give two examples of tannin producing plants.
30. What are alkaloids? What is its significance? Give two examples of alkaloid producing plants.
31. Give a brief account of nitrogenous waste products in plants.
32. Give a brief account of non-nitrogenous waste products in plants.
33. What is resin? Where is it produced? Give two examples of resin producing plants.
34. What is mucilage? Where is it produced? Give two examples of mucilage producing plants.
35. Give an account of mineral crystals in plants.
36. What are essential oils? Give two examples of essential oil producing plants. Mention its economic importance.
37. Give an account of silica crystals in plants. What is its significance?
38. Differentiate between prismatic crystals and sand crystals.
39. What is latex? Where is it produced? Give two examples of latex producing plants. Mention its economic importance.
40. What are the special features of meristematic cells?
41. What is intercalary meristem? Where does it occur? Give an example.
42. What is lateral meristem? Where does it occur? Give an example.
43. What is apical meristem? Where does it occur? What is its significance?
44. State the differences between mass meristem, rib meristem and plate meristem.
45. Differentiate between primary meristem and secondary meristem with example.
46. Give an account of root apex in dicots.
47. What are the differences between shoot apex and root apex?
48. Explain Histogen theory.
49. Explain the structure of the meristem from which axillary bud and terminal bud are derived.
50. What are the features of the cells of the quiescent centre?
51. Tunica corpus theory is connected with which part of a plant? Explain.
52. Which meristem helps in increasing girth? Explain how it helps in this process.
53. Why grasses make faster and excellent ground cover?
54. The lawn grass needs to be mowed frequently to prevent its overgrowth. Why?
55. Bamboos are the fastest growing plants. Substantiate
56. Internodal region of a fast elongating bamboo stem appear to be light green at its basal region. What may be reason for this?
57. What are the reasons based on which organization of stem apex into corpus and tunica is determined?
58. How do grasses roll their leaves during dry hot conditions?
59. Why the upper surface of bifacial leaves appear to be dark green in colour when compared to the lower surface?
60. What is cuticle? Where do you find it? What are its functions?

61. What are the salient features of parenchyma?
62. Describe different types of parenchyma.
63. Describe the structure of sclerenchyma.
64. Explain the types of collenchyma. What are their functions?
65. What are the salient features of collenchyma? Where do you find it?
66. Describe the functions of parenchyma.
67. Describe the functions of collenchyma.
68. Describe the functions of sclerenchyma.
69. Describe different types of sclereids.
70. What are companion cells? Mention their role.
71. What is xylem parenchyma? Mention their role.
72. What are the characteristics of sieve cells? Mention their functions.
73. What are the characteristics of transfer cells? Mention their functions.
74. What is gummosis? How does it occur in plants?
75. What are kino veins? Mention their occurrence and functions.
76. Differentiate amphivasal and amphicribal vascular bundles.
77. Write the difference between hadrocentric and leptocentric vascular bundles.
78. State the differences between centripetal and centrifugal xylem.
79. Death of protoplasm is a pre-requisite to perform certain vital functions in some types of tissues. Describe the types of such tissues and their functions.
80. Explain the structural adaptations in sieve tubes which are suited to their function of translocation of food?
81. What is protoxylem lacuna?
82. What are vascular rays?
83. Differentiate tracheids and trachea. Mention their functions.
84. Name an organized and well differentiated cell having cytoplasm but no nucleus. Explain how this feature facilitates its function.
85. Differentiate vascular cambium and cork cambium.
86. Which kind of simple tissue may be found predominantly in a floating hydrophyte? Justify your answer.
87. Write short notes on guard cells. Give examples.
88. What are sclereids? Where do you find it?
89. Give an account of economically important plant fibres.
90. Describe the structure of the longest plant cell.
91. Compare perforation plates and sieve plates.
92. What is a companion cell? Where can you find it?
93. What are transfer cells? Add a note on its occurrence and functions.
94. What is leptome? Mention the other terms used to represent this. What is its function?
95. Xylem vessels, cork cells, sieve tube cells etc. do not show totipotency. How would you justify this?
96. Elaborate on the reason why annual rings appear in woody plants.
97. Distinguish between protoxylem and metaxylem.
98. Distinguish between stele and vascular bundle.
99. Differentiate between exarch and endarch condition.

100. Give an account of external secretory tissues in plants.
101. Give an account of digestive glands in insectivorous plants.
102. What are hydathodes?
103. Differentiate between latex cells and latex vessels.
104. What may be the reason for occurrence of numerous embedded dots on the leaf of *Murraya*?
105. What are nectarines? Where can you find it?
106. Give a comparative account of schizogenous and lysigenous cavities.
107. What is latex? Explain the special structures which secrete latex in plants. Name a plant which secretes transparent latex.
108. Differentiate between articulated and non-articulated laticifers.
109. Write short notes on resin ducts in angiosperms.
110. What are trichomes? Explain their role in plants.
111. What is dendrochronology? What is its significance?
112. What are tyloses?
113. Differentiate between tyloses and tylosoids.
114. What is a slime plug? Explain its role in the functioning of a sieve tube.
115. What is meant by sieve area?
116. What is mycoplasma?
117. Differentiate between spring wood and autumn wood.
118. Enumerate common structural feature of vessel elements and sieve tube elements.
119. What structural adaptations can you find in angiosperm leaves to prevent water loss?
120. Describe the structure of an isobilateral leaf.
121. What are the major anatomical features that distinguish stems from roots?
122. What are the major anatomical features that distinguish dicot stem from monocot stem?
123. What are the major anatomical features that distinguish dicot root from monocot root?
124. While observing the anatomy of a particular portion of a plant, 3 exarch xylem groups with polygonal vessels were observed at the centre. What would be that portion? Explain its other anatomical features.
125. In the anatomy of a plant part, it is seen that 10 groups of exarch xylem are arranged in a ring around large pith. What would be this Part? Explain its whole anatomy.
126. What are bulliform cells? Write notes on its functions.
127. What are medullary bundles? Give examples.
128. What is the significance of root cap?
129. What is meant by bark? What are its constituent layers? Add a note on its function.
130. Describe different types of bark.
131. Differentiate between outer bark and inner bark.
132. Differentiate between ring bark and scaly bark.
133. Bark of many old trees shows rough surface with many cracks and openings. What may be the reason for this?
134. Why do some trees have smooth bark and others rough?
135. Describe the anatomical features of endodermis.
136. What is a conjunctive tissue?
137. Describe the structure of a monocot root.

138. Differentiate between storied and non-storied cambium.
139. What is the significance of pericycle of roots?
140. What is epiblema? What are its features and functions?
141. Differentiate epiblema and endoblema.
142. What would result if vascular cambium production has taken place in a plant?
143. What are the features of a bicollateral vascular bundle? Give examples of plants where you can see this type of vascular bundles.
144. In which part of a plant can you see Casparian strips? What is its significance?
145. In a woody dicotyledonous tree, which all parts will be mainly consisting of primary tissues? Justify your answer.
146. Distinguish between stem hair and root hair.
147. Distinguish between open and closed vascular bundles.
148. Write the precise function of interfascicular cambium.
149. Describe the features of vascular cambium.
150. Distinguish between fusiform initials and ray initials.
151. Explain how cambium is functioning in angiosperms.
152. Enumerate the functions of cambium.
153. What changes would you expect in the structure of a dicot stem when it undergoes secondary growth?
154. Which type of wood is commonly seen in plants growing in tropical areas? Why?
155. Which part of the wood will decay faster if a log of wood is immersed in water for a long time? Why?
156. What is the reason for high durability of heart wood?
157. Differentiate between spring wood and autumn wood.
158. Differentiate between sap wood and heart wood.
159. Differentiate between soft wood and hard wood.
160. What is meant by wood? What are its chemical constituents?
161. Compare duramen and alburnum.
162. What information would you use to support the view that the secondary phloem in *Boerhaavia* can be better called as 'false included phloem'?
163. Explain the anatomical adaptations developed in *Bignonia* stem to provide mechanical strength to the plant.
164. What is accessory cambium? What is its role? Name a plant that produces accessory cambium.
165. Explain the general deviations observed in dicot stems undergoing anomalous secondary growth.
166. What are the anatomical peculiarities observed in the primary structure of *Boerhaavia* stem?
167. Give an account of anomalous primary structures in the anatomy of angiosperms.
168. Enumerate any four reasons for anomalous secondary growth in dicot stems.
169. Give reason for the absence of secondary growth in monocots.
170. Differentiate between intra-fascicular and interfascicular cambia.
171. Define complementary cells. Where do you find it? What is its function?
172. How does the stem anatomy of *Dracaena* differ from other monocots?
173. Distinguish included phloem and false included phloem.
174. Describe the pattern of secondary growth in the third ring of vascular bundles in *Boerhaavia*.
175. What is a concentric vascular bundle? Explain its types with examples.

Paragraph type (5 marks) questions

1. In a longitudinal section of a root, describe the four zones starting from the tip upward.
2. While observing the stem anatomy of a plant, it is seen that pith and cortex are not well differentiated. What may be the type of plant? Describe the whole stem anatomy of this plant.
3. What are the differences between lenticel and hydathode? Explain with illustrations.
4. Critically analyse the structure and functions of plasmodesmata.
5. Describe different types of pits present in angiosperm cell walls.
6. Give an account of the ultrastructure of an angiosperm cell wall.
7. How the chemical composition of cell wall is related to its functions?
8. How would you categorize reserve food materials in plants?
9. Give an account of non-nitrogenous waste products in plants.
10. Give a detailed account of the structure, functions and types of parenchyma.
11. Give a detailed account of the structure, functions and types of collenchyma.
12. Give a detailed account of a nonliving simple mechanical tissue.
13. Describe different types of parenchyma. Mention their occurrence and functions.
14. Describe different types of collenchyma. Mention their occurrence and functions.
15. Describe different types of sclerenchyma. Mention their occurrence and functions.
16. Give an account of cell wall thickening in tracheary elements of angiosperms. Add a note on its phylogenetic significance.
17. Compare tracheids and vessels in angiosperms.
18. Describe the structure of sieve tube elements.
19. Give a detailed account of internal secretory structures in plants.
20. Give a detailed account of laticiferous tissues in plants.
21. Describe the types of vascular bundles with diagrams.
22. Explain the anomalous secondary growth in *Bignonia* stem.
23. What are the adaptations seen in *Bignonia* stem that supports its climbing nature?
24. Explain the anomalous secondary growth seen in *Dracaena* stem.
25. Give a detailed account of extrastelar secondary growth in angiosperms.
26. Explain how secondary growth is taking place in dicot root.
27. What is a bundle cap?
28. How does the formation of periderm occur in angiosperms?
29. Explain the structure of a dicot leaf with diagram.
30. Explain the structure of a monocot leaf with diagram.
31. Explain the primary structure of a typical monocot stem.
32. Explain the primary structure of a typical dicot stem.
33. Explain the primary structure of a typical dicot root.
34. Explain the primary structure of a typical monocot root.
35. Give a detailed account of conjoint vascular bundles with diagrams.
36. Give an account of the components of phloem.
37. Give an account of the components of xylem.
38. Give an account of extra cell wall materials.
39. Describe the types of reserve food materials in angiosperms.

40. Compare the structures of dicot and monocot leaves.
41. Give an account of different types of woods in angiosperms.
42. What is meant by periderm? What are its constituents?
43. Give an account of various types of mineral crystals found in angiosperms.
44. Describe the organisation of angiosperm cell wall. How does growth of cell wall occur in angiosperms?

Essay type (10 marks) questions

1. Describe the chemical composition and structure of cell walls in higher plants.
2. What are the special features of meristematic cells? Classify meristems based on any three criteria. Give examples.
3. Give a detailed account of simple tissues in angiosperms specifying structure, occurrence and functions of each.
4. What are complex tissues? Classify them. Explain the structural adaptations found in complex tissues which enable them to function very effectively.
5. Describe the anomalous secondary thickening in *Boerhaavia*.
6. Give a detailed account of secretory tissues in plants.
7. Give a detailed account of secondary growth in dicot stem.
8. Give a detailed account of secondary growth in dicot root.
9. Explain the anomalous secondary growth in *Bignonia* stem with diagrams.
10. Give an account of nonliving cell inclusions in angiosperms.
11. Give a detailed account of the structure, organisation and growth of cell wall in angiosperms.
12. Describe various theories related with organisation of root and shoot apices.

REPRODUCTIVE BOTANY AND PALYNOLOGY

Short answer type (2 marks) questions

1. What are the major events during formation of the male gametophyte?
2. List the characteristics of a monosporic eight nucleated female gametophyte?
3. What is the importance of the orientation of ovule?
4. How are ovules distinguished on the basis of types of integuments?
5. What is porogamy?
6. When do free nuclear divisions take place in angiosperms?
7. What does perisperm indicate?
8. What is apospory?
9. Who discovered double fertilization and what are the major events, included?
10. What are integuments and its post-fertilization changes?
11. Explain the importance of various wall layers in an anther
12. State the difference between syncarpous and apocarpous ovaries.
13. What the practical importance of polyembryony?
14. Explain the term ditheous, and cite an example.
15. What does Syngamy indicate?

16. Explain the fate of the generative cell.
17. Define campylotropous ovule and cite an example
18. What are pollen allergens?
19. Define scutellum.
20. Name two Indian embryologists and their major contributions.
21. Write a short note on the dehiscence of an anther.
22. Define endothecium and state its importance.
23. What are fertilization barriers?
24. What is the importance of *Sagittaria* in embryology?
25. Define colpate pollen.
26. What are pollinia? Which family is characterized by its presence?
27. Mention two pollen viability test methods.
28. What is a tetrasporic embryo sac?
29. Define crassinucellate type of ovule.
30. What is meant by Adoxa type of embryo sac?
31. State the difference between 2-celled and 3-celled pollen.
32. Define a cellular endosperm and cite an example.
33. Mention the nucleus and cell status of an angiosperm embryo sac at maturity.
34. Mention the features of flowers that facilitate pollination by birds.
35. State the difference between geitonogamy and autogamy.

Paragraph type (5 marks) questions

1. Explain the different phases involved in Megasporogenesis
2. Describe the development of nuclear endosperm.
3. What is Anemophily, and elaborate the adaptations plants develop to favour anemophily?
4. Explain the pre and post fertilization changes in the formation of an endosperm
5. Explain the discovery and process of Double fertilization.
6. What are tetrads, explain in detail the formation of an Isobilateral microspore tetrad?
7. Explain fertilization in angiosperms with special reference to chalazogamy.
8. Describe the structural details of the exine.
9. What are the different fields of application of palynology?
10. Explain the different types of pollination and post fertilization changes in angiosperms
11. What is parthenocarpy? Discuss its applications.
12. Explain the structure of circinotropous ovule with suitable example.
13. Forensic application of palynology.
14. Describe the structure of a typical ovule.
15. Describe the types and functions of tapetum.
16. Explain the structure of orthotropous ovule.
17. Write a note on different types of Polyembryony.
18. What is apomixis? What is its significance in plants?
19. Describe the phenomenon of pollen-stigma interaction.
20. Write brief account on *in vitro* fertilization and its applications.

21. Write a note on the NPC system of classification of pollen grains.
22. Explain the structure of a monocot embryo.
23. Write a note on exine ornamentations.

Essay type (10 marks) questions

1. Give an account of the male gametophyte development, pollen grain morphology and the role of palynology in systematics of flowering plants.
2. Development of female gametophyte in angiosperms.
3. Elaborate the role of embryology in relation to taxonomy.
4. Describe the major types of embryos, with suitable examples.
5. What is double fertilization? In the light of recent studies discuss the mode of fertilization in angiosperms.
6. Enumerate various types of angiospermic embryo sacs in tabular form, and describe the development of monosporic type.
7. Describe the types, structure and morphological nature of endosperm in angiosperm.

CORE COURSE: 2**MICROBIOLOGY, MYCOLOGY, LICHENOLOGY AND
PLANT PATHOLOGY****QUESTION PAPER PATTERN & SUBJECT WISE DISTRIBUTION OF MARKS**

Type of questions	Microbiology	Mycology	Lichenology	Pathology	Total
2 marks (total 12)	3	4	2	3	Ceiling 20
5 marks (total 7)	3	2	1	1	Ceiling 30
10 marks (total 2)	2				1x10 = 10
TOTAL					60

MICROBIOLOGY**Short answer type (2 marks) questions**

1. Name the scientist known as father of Microbiology. Mention his contributions.
2. Explain Gram's staining.
3. Distinguish between virioids and prions.
4. Distinguish between rhizosphere and phyllosphere.
5. What is a prophage?
6. Draw and label a bacteriophage.
7. Mention the major features of TMV.
8. Retroviruses. Give an example.
9. What is the significance of a capsulated bacterium?
10. How fimbriae differ from flagella?
11. What are mesosomes? Mention their functions.
12. Distinguish between a plasmid and an episome.
13. What is a temperate phage?
14. Distinguish between a virulent phage and a temperate phage.
15. What is the difference between RNA virus and retrovirus?
16. What are photolithotrophs? Give one example.
17. Distinguish between lithotrophs and organotrophs.
18. Draw and label a bacterial endospore.
19. What is meant by Hfr strain of bacteria?
20. What is bacterial transformation?
21. Give the binomial of any two pathogenic bacteria.
22. What is nitrification? Name the microbes involved in the process.
23. What is a bacteroid? What is its significance?
24. Classify viruses based on their symmetry.
25. How will you classify viruses on the basis of their nucleic acid?
26. What is a capsule? Explain its role.
27. How bacteria effect the soil fertility?
28. What are merozygotes? How they are formed?
29. Explain competence. What are competent cells?
30. Infections from Gram-ve bacteria are more difficult to treat .Why?
31. What are Spirochaetes?

Paragraph type (5 marks) questions

1. Compare lytic and lysogenic cycles of bacterial multiplication.
2. Describe the structure of a typical bacteriophage with the help of a labelled sketch.
3. Give the structural details of TMV with the help of a labelled sketch.
4. Give a detailed account on bacterial conjugation.
5. With the help of labelled sketches describe binary fission in bacteria.
6. How bacteria can overcome unfavourable conditions? With the help of a labelled sketch give a detailed account.
7. Mention the different types of nutrition seen in bacteria. Give a detailed account of each type with suitable examples.
8. Distinguish between Gram+ve and Gram –ve bacteria.
9. Describe the ultrastructure of bacteria.
10. How bacteria reproduce asexually? Give a detailed account with the help of sketches.
11. Give a detailed account on sexual reproduction in bacteria. Mention its significance.
12. Classify bacteria on the basis of morphology. Give suitable examples.
13. What are flagella? Describe the structure of a flagellum. Classify bacteria on the basis of flagella.
14. Give a detailed account of alcohol production.
15. Mention the names of microbes and elaborate their role in the preparation of milk products.
16. Name two industrially important organic acids. Give a detailed account of their production.
17. Expand SCP. Give a detailed account on it.
18. Vaccination has greatly reduced the burden of infectious diseases. Define vaccine. Elaborate the importance and mechanism of vaccines.
19. How bacteria are beneficial in the field of agriculture?
20. With the help of a labelled sketch describe the structure of HIV.
21. With the help of labelled sketches describe the process of bacterial conjugation.
22. Compare the structure of TMV and bacteriophage.
23. What is an endospore? Name a bacterium which can form endospore. Explain the process of endospore formation.
24. Give a short note on the infectious agent causing ‘Mad cow disease’.
25. Why bacteria are placed under prokaryotes?
26. What are the surface appendages of bacterial cell?
27. Explain the beneficial activities of bacteria.
28. Write a short note on retroviruses.
29. Describe different types of bacterial plasmids.
30. How a bacterial cell different from a fungal cell.
31. Explain the cell wall nature of Gram +ve bacteria.

Essay type (10 marks) questions

1. Give an account on industrial importance of bacteria.
2. Briefly describe various methods of bacterial reproduction.
3. With the help of suitable diagrams describe viral multiplication cycles.

MYCOLOGY

Short answer type (2 marks) questions

1. Distinguish between anamorph and teleomorph.
2. List out the characteristic features of 'Mastigomycotina'. Mention the type coming under this group.
3. Distinguish between sporangiospores and conidiospores.
4. Name the ascocarp in *Xylaria*. Mention its features.
5. What is an ascocarp? Compare the ascocarps of *Xylaria* and *Aspergillus*
6. Name the common bread mould. Comment on its vegetative mycelial structure.
7. What is a heteroecious fungus? Give an example.
8. Name a macrocyclic rust fungus. Why is it called so?
9. Distinguish between a uredospore and a teleutospore.
10. *Puccinia graminis* is a macrocyclic heteroecious fungus. Justify the statement.
11. Distinguish between plasmogamy and karyogamy
12. Homothallic and heterothallic fungi.
13. What are aflatoxins? Name the fungus which produces it.
14. Name the stages of *Puccinia graminis* on wheat plant.
15. Name the stages of *Puccinia graminis* on Barberry plant.
16. Describe the structure of a pileus.
17. Comment on 'velum'.
18. What are the asexual reproductive methods in *Agaricus*?
19. Distinguish between autoecious and heteroecious fungi.
20. What are rhizomorphs?
21. Comment on annulus.
22. Draw and label a pycnidium.
23. What is spermatization?
24. What are perithecia? Name the perithecia bearing structure of *Xylaria*.
25. Comment on gametangial contact with an example.
26. What is a crozier?
27. Distinguish between homokaryotic and heterokaryotic hyphae.
28. Comment on sterigmata
29. Comment on economic importance of *Aspergillus*.
30. What is a columella? Where do you find it?
31. Give the binomial of two edible fungi.
32. What is 'Ergot'? Mention its use.
33. Give the binomial of two fungi used in cheese industry.
34. What is mycorrhiza? Mention their importance.
35. Give the binomial of two pathogenic fungi.
36. Which fungus is known as '*Drosophila*' of plant kingdom? Why is it called so?
37. Ascomycetes are often called as sac fungi. Why?
38. Differentiate between an obligate parasite and a facultative parasite.
39. What are the different types of ascocarps?

40. Assign the following fungi into respective groups.a) puffballs b) dead man's fingers c)yeast d) black bread mould.
41. Differentiate between an ascus and a basidium.
42. Point out any two economic importance of *Xylaria*.
43. Differentiate between uredospores and teleutospores.
44. Point out the methods of dikaryotisation in Basidiomycotina.
45. Name an edible Ascomycetes and Basidiomycetes.

Paragraph type (5 marks) questions

1. Give a note on the phylogeny of fungi.
2. Explain different asexual spores in fungi.
3. Fungi are economically important. Substantiate the statement.
4. Give an account of vegetative reproduction in fungi.
5. What are the salient features of Zygomycotina?
6. Point out how Ascomycetes are different from Basidiomycetes
7. Explain the structure of fruiting body in *Agaricus*
8. How is an ascocarp different from a basidiocarp?
9. Explain the characteristic features of Mastgomycotina.
10. Explain the sexual reproduction in *Pythium*.
11. What are the methods of sexual reproduction in Ascomycotina?
12. Explain the mycelial structure in Basidiomycotina.
13. Describe briefly the sexual reproduction in *Rhizopus*.
14. Describe the vegetative characteristics of *Aspergillus*. Give a short note on its economic importance.
15. Explain the structure of fruiting body n *Xylaria*.
16. Describe the different stages of *Puccinia* on wheat plant.

Essay type (10 marks) questions

1. Explain the life cycle of fungi causing wheat rust.
2. Explain the economic importance of fungi.
3. Give an account of thallus structure and reproduction of *Aspergillus*.
4. Describe the life cycle of *Rhizopus*.

LICHENOLOGY

Short answer type (2 marks) questions

1. Lichens are composite structures. Substantiate.
2. Explain various methods of Vegetative reproduction in Lichens.
3. Explain sexual reproduction of lichens.
4. Describe the fruiting bodies in lichens.
5. Differentiate between isidia and soredia.
6. Name the source of litmus. Describe the morphology of the thallus of this lichen.

7. Give an account of economically important lichens.
8. What are crustose lichens? Give examples.
9. What is meant by arboreal lichen? Give examples.
10. What is saxicolous lichen? Give examples.
11. What is omnicolous lichen? Give examples.
12. Differentiate between crustose and foliose lichens.
13. Describe the morphology of fruticose lichen. Give examples.
14. What is scyphellae? How is it significant in the life cycle of lichens?
15. Give two examples each for lichen used for Food, medicine and fodder.

Paragraph type (5 marks) questions

1. Describe different thallus types of lichens.
2. Describe the internal structure of the thallus of *Usnea*.
3. Distinguish between crustose and foliose lichens with suitable examples.
4. Enumerate the ecological importance of lichens.
5. Describe the specialized structures of lichen thallus.
6. Describe various methods of reproduction in lichens.
7. List out the economic importance of lichens.
8. Classification of lichens based on fungal component and thallus with suitable examples.

Essay type (10 marks) questions

1. Describe the thallus structure of lichens. Add a note on vegetative and sexual reproduction in lichens.
2. Classify lichens. Explain the ecological and economic importance of lichens with examples.

PLANT PATHOLOGY

Short answer type (2 marks) questions

1. Define plant diseases. Describe various means of the spreading of diseases.
2. What is pathogenesis? What is its significance?
3. What is systemic disease? Give examples.
4. What is endemic disease? Give examples.
5. What is epidemic disease? Give examples.
6. What is non-infectious disease? Give examples.
7. What is meant by incubation period of diseases?
8. What is necrosis? Add a note on its significance.
9. Define the term damping-off. What is its significance?
10. What is die-back? What is its significance?
11. What is hypertrophy
12. What are sclerotia? What is the significance of this?
13. What are obligate saprotrophs? Give examples.
14. What is an obligate parasite? Give examples.
15. What are fungal toxins? Give examples.

16. What are the major constituents of Bordeaux mixture?
17. Give an account of biological methods of disease control.
18. What is the name of the pathogen that causes blast diseases of paddy?
19. What is the name of the pathogen that causes quick wilt of pepper?
20. What is the name of the pathogen that causes citrus cankers?
21. Distinguish between smut and rust.
22. What is chlorosis? What is its significance?
23. Enumerate the symptoms of quick wilt of pepper. Name the pathogen of this disease.
24. Outline the symptoms of blast of paddy. Name the pathogen of this disease.
25. Explain the symptoms of citrus canker. Name the pathogen of this disease.
26. Enumerate the symptoms of mahali disease of arecanut. Name the pathogen of this disease.
27. Give an account of the symptoms of grey leaf spot of coconut. Name the pathogen of this disease.
28. Enumerate the symptoms of mosaic disease of tapioca. Name the pathogen of this disease.
29. What are the symptoms of bunchy top of banana? Name the pathogen of this disease.
30. Describe the control measures of quick wilt of pepper.
31. Outline the control measures of blast of paddy.
32. Explain the control measures of Citrus canker.
33. Describe the control measures of mahali disease of arecanut.
34. Give an account of the control measures of grey leaf spot of coconut.
35. Enumerate the control measures of mosaic disease of tapioca.
36. What are the control measures of bunchy top of banana?
37. What is meant by quarantine? Outline the process.
38. Define Koch's postulates.
39. In an orchard, it is found that tip of some trees gradually get dries up and dies. What may be the reason? What would you do to control this?
40. Why is it that soil borne diseases tend to increase over time?
41. Why do most pathogens gain entrance to plants during rainstorms?
42. Why are some areas notorious for plant diseases and other areas relatively free of them?
43. How does crop rotation reduce pathogen population?
44. Describe fungal toxins. Give examples.

Paragraph type (5 marks) questions

1. Give an outline of Classification of plant diseases.
2. Describe the various stages of diseases development.
3. Explain the various symptoms of plant diseases.
4. Describe the mechanism of disease resistance.
5. Analyse host parasitic interactions.
6. Describe quarantine measures. Describe how it has helped in reducing disease outspread?
7. Identify five major chemical pesticides used for controlling plant diseases.
8. Describe various biological control methods of plant diseases with examples.
9. Outline genetic control of plant diseases.
10. Describe the pathogen, symptoms and control measures of Citrus canker.

11. Describe the pathogen, symptoms and control measures of gray leaf spot of coconut.
12. Describe the pathogen, symptoms and control measures of quick wilt of pepper.
13. Describe the pathogen, symptoms and control measures of mosaic disease of tapioca.
14. Describe the pathogen, symptoms and control measures of mahali disease of arecanut.
15. Describe the pathogen, symptoms and control measures of bunchy top of banana.
16. Describe the pathogen, symptoms and control measures of blast of paddy.

Essay type (10 marks) questions

1. Describe various symptoms and control measures of plant diseases.
2. Describe about pathogen, symptoms and control measures of Citrus Canker, Mahali disease of arecanut and Blast of paddy.
3. Describe about pathogen, symptoms and control measures of Quick wilt of pepper, Mosaic disease of tapioca and Bunchy top of banana.
4. Describe about pathogen, symptoms and control measures of any three plant diseases reported from South India.

COMPLEMENTARY COURSE: 1
ANGIOSPERM ANATOMY AND MICROTECHNIQUE

QUESTION PAPER PATTERN & SUBJECT WISE DISTRIBUTION OF MARKS

Type of questions	Angiosperm Anatomy	Microtechnique	Total
2 marks (total 12)	9	3	Ceiling 20
5 marks (total 7)	5	2	Ceiling 30
10 marks (total 2)	2		1x10 = 10
TOTAL			60

ANGIOSPERM ANATOMY

Short answer type (2 marks) questions

1. Define alburnum. What are its peculiarities?
2. What is duramen? Describe its features.
3. Enumerate any four reasons for anomalous secondary growth in dicot stems.
4. Compare the sap wood and heart wood.
5. How will you identify dicot roots by looking into the anatomy?
6. Write any four features of monocot leaf.
7. Write any four features of monocot stem.
8. Define tyloses. What is its importance?
9. What is the reason for high durability of heart wood?
10. Write special features of meristematic tissues.
11. Differentiate exarch and endarch xylem.
12. What is bark? How it is formed?
13. What are annual rings? How does it become useful?
14. Write short notes on laticiferous tissues.
15. Define concentric vascular bundles.
16. What is endodermis? Write its function.
17. Define medullary rays. What is its function?
18. What are difference between shoot apex and root apex?
19. Name the simple tissues. Explain its functions briefly.
20. What are the different elements of complex tissues? Write its function.
21. Define nectarines. Where does it occur?
22. Write the structure and functions of sclerenchyma.
23. Who put forward the Tunica Corpus theory? How shoot apex organized according to this theory?
24. Give reason for the monocot plant not possessing secondary growth.
25. What are the different types of cell wall thickening?
26. Name the different types of vascular bundles seen in plants.
27. State the differences between hydathodes and lenticells.

28. What is abulliform cell? What is its function?
29. What is the difference between ray initials and fusiform initials?
30. What is extra stelar secondary growth?
31. How will you calculate the age of a teak wood?
32. Compare heart wood and sap wood.
33. What is Bark? How its formation takes place?
34. Death of protoplasm is a pre-requisite to perform certain vital functions in some types of tissues. Describe the types of such tissues and their functions.
35. Explain the structural adaptations in sieve tubes which are suited to their function of translocation of food?
36. What is the significance of pericycle of roots?
37. What would result if vascular cambium production has taken place in a plant?
38. What are the features of a bicollateral vascular bundle? Give examples of plants where you can see this type of vascular bundles.
39. Xylem vessels, cork cells, sieve tube cells etc. do not show totipotency. How would you justify this?
40. In which part of a plant can you see Casparian strips? What is its significance?
41. Elaborate on the reason why annual rings appear in woody plants.
42. Which part of the wood will decay faster if a log of wood is immersed in water for a long time? Why?
43. Enumerate common structural features of vessel elements and sieve tube elements.
44. The lawn grass needs to be mowed frequently to prevent its overgrowth. Why?
45. Distinguish between stem hair and root hair.
46. Distinguish between open and closed vascular bundles.
47. Distinguish between protoxylem and metaxylem.
48. Distinguish between stele and vascular bundle.
49. Distinguish between exarch and endarch condition.
50. Write the precise function of interfascicular cambium.
51. What information would you use to support the view that the secondary phloem in *Boerhaavia* can be better called as 'false included phloem'?
52. Give an account of root apices in dicots.
53. Explain Histogen theory.
54. Which kind of simple tissue may be found predominantly in a floating hydrophyte? Justify your answer.
55. What are sclereids? Where do you find it?
56. Give an account of economically important plant fibres.
57. Compare perforation plates and sieve plates.
58. What are the functions of xylem parenchyma?
59. What is a companion cell? Where can you find it?
60. What are transfer cells? Add a note on its occurrence and functions.
61. Give an account of external secretory tissues in plants.
62. Give an account of digestive glands in *Nepenthes*.
63. What are hydathodes?

64. How do grasses roll their leaves during dry hot conditions?
65. What structural adaptations can you find in angiosperm leaves to prevent water loss?
66. What are the major anatomical features that distinguish stems from roots?
67. What are the major anatomical features that distinguish dicot stem from monocot stem?
68. What are the major anatomical features that distinguish dicot root from monocot root?
69. What is protoxylem lacuna?
70. Describe the anatomical features of endodermis.
71. What is a conjunctive tissue?
72. Describe the structure of a monocot root.
73. Differentiate between storied and non-storied cambium.
74. Describe the features of vascular cambium.
75. Distinguish between fusiform initials and ray initials.
76. Explain how cambium is functioning in angiosperms.
77. Enumerate the functions of cambium.
78. What are the anatomical peculiarities observed in the primary structure of *Boerhaavia* stem?
79. What is dendrochronology? What is its significance?
80. What are tyloses?
81. Differentiate between spring wood and autumn wood.
82. Differentiate between sap wood and heart wood.
83. Differentiate between soft wood and hard wood.
84. While observing the anatomy of a particular portion of a plant, 3 exarch xylem groups with polygonal vessels were observed at the centre. What would be that portion? Explain its other anatomical features.
85. In the anatomy of a plant part, it is seen that 10 groups of exarch xylem are arranged in a ring around large pith. What would be this Part? Explain its whole anatomy.
86. What are bulliform cells? Write notes on its functions.
87. Differentiate between latex cells and latex vessels.
88. Distinguish between ring porous and diffuse porous wood.
89. What are the salient features of parenchyma?
90. Describe the functions of sclerenchyma.
91. Describe the structure of sclerenchyma.
92. Explain the types of collenchyma. What are their functions?
93. Give reason for the absence of secondary growth in monocots.
94. Write the difference between hadrocentric and leptocentric vascular bundles.
95. Differentiate between intra-fascicular and interfascicular cambia.
96. Define complementary cells. Where do you find it? What is its function?
97. Describe the structure and functions of parenchyma.
98. Describe the structure and functions of collenchyma.
99. Describe the structure and functions of sclerenchyma.
100. Describe the types of parenchyma.

Paragraph type (5 marks) questions

1. How will you classify meristem based on position and origin?
2. Explain how the structure of xylem is suitable for conduction?
3. Write a note on phloem conduction, emphasizing the structural peculiarities of phloem.
4. Compare the anatomy of dicot and monocot stems.
5. Compare the anatomy of dicot and monocot roots
6. What is periderm? Describe its formation.
7. How the structure of dicot leaf is suitable for photosynthesis?
8. Explain how the root structure is suitable for absorption of minerals and water.
9. Explain the stelar secondary growth in dicot root.
10. How dicot plants increase its stem girth? Explain with suitable diagrams.
11. Write an account on Laticiferous tissues present in plants.
12. Why xylem and phloem are called complex tissues? How are these tissues suitable for conduction?
13. Give a detailed account of various vascular bundles seen in plants with examples.
14. Draw the internal structure of a dicot leaf and label the parts.
15. Draw the internal structure of a monocot leaf and label the parts.
16. Explain the typical anatomy of stem of Cucurbitaceae.
17. Explain the theories regarding shoot apex.
18. Explain normal secondary growth taking place in dicot stem.
19. What type of secondary growth occurs in *Berberis*? Explain with help of diagram.
20. Give an account of various secretory tissues seen in angiosperms.
21. Comment on various laticiferous tissues seen in angiosperms.
22. Compare the anatomy of dicot root and monocot roots.
23. Compare the anatomy of dicot and monocot stems.
24. Give an account of the components of phloem.
25. Give an account of the components of xylem.
26. How does the formation of periderm occur in angiosperms?
27. Explain the structure of a dicot leaf with diagram.
28. Explain the structure of a monocot leaf with diagram.
29. Explain the primary structure of a typical monocot stem.
30. Explain the primary structure of a typical dicot stem.
31. Explain the primary structure of a typical dicot root.
32. Explain the primary structure of a typical monocot root.
33. Give a detailed account of conjoint vascular bundles with diagrams.
34. What is a cambium? Describe its types and functions.
35. Describe the structure, types and functions of parenchyma.
36. Describe the structure, types and functions of collenchyma.
37. Describe the structure, types and functions of sclerenchyma.
38. Bamboos are the fastest growing plants. Substantiate
39. Give a detailed account of different types of wood.
40. Explain the theories of organisation of root apex.
41. Explain the theories of organisation of shoot apex.

Essay type (10 marks) questions

1. With suitable labeled diagrams, explain the anomalous secondary growth in *Boerhaavia* stem.
2. Define conductive tissues? Explain the various elements of each conductive tissue. Draw diagrams wherever necessary.
3. Describe the normal secondary growth in dicot stem with suitable diagrams.
4. Classify simple tissues. Explain the structure and functions of each.
5. Explain the different types of laticiferous and secretory tissues present in plants.
6. With help of diagrams, explain the secondary growth in dicot root.
7. What is a cambium? Describe its types, structure and function. Add a note on accessory cambium and its significance.
8. Explain the theories put forth to describe the organisation of root and shoot apices.

MICROTECHNIQUE

Short answer type (2 marks) questions

1. Differentiate compound and electron microscopes.
2. Differentiate killing and fixing.
3. List killing and fixing fluids used in preparation of material for sectioning.
4. What are stains? Give examples
5. What is embedding? What is its significance?
6. What is the significance of serial sectioning?
7. What is FAA? What is its role?
8. Give the composition of Farmer's fluid? What is its role?
9. What is the functional difference of an eye piece lens and objective lens
10. What is diaphragm? What is its role?
11. What is meant by clearing? Give an example for clearing agents. .
12. What is the significance of dehydration in micro-preparation? Give an example for a dehydrating agent.
13. Differentiate acidic and basic stains. Give example.
14. What is safranin? What is its function?
15. What is the role of acetocarmine?
16. What is a condenser? What is its function?
17. Write the optical parts of microscope and their functions.
18. How will you kill the plant parts? Write two killing agents.
19. How will you prepare acetocarmine in the laboratory?
20. What is meant by dehydration and clearing?
21. Compare the dissection microscope with compound microscope.
22. How will you prepare acidic stains? Write two examples. .
23. What are fixatives? Name two fixatives used in laboratory.
24. What is a rotary microtome? How it become useful in sectioning?

Paragraph type (5 marks) questions

1. What is the principle of Microscopy? Explain different types of microscopes used for observation of samples.
2. What is microtomy? Give a note on different types of microtomes used in Microtechnique.
3. Enumerate different categories of stains used in micropreparations. Explain with suitable examples.
4. Give an account of killing and fixing fluids. Explain the composition of Farmer's fluid and FAA.
5. How safranin and acetocarmine are prepared for staining sections of plant materials? What is its significance?
6. How scanning and transmission electron microscopes work during observations of micropreparations?
7. Explain different types of stains used in microscopy.
8. How will you prepare a permanent slide using serial sectioning? Explain.
9. Explain the structural components of a binocular compound microscope.
10. Write the preparation of FAA, safranin, and acetocarmine.
11. What is killing and fixing? What is its significance? Write the composition of a killing agent and a fixative.
12. Briefly describe the working principle of Electron microscope.

Essay type (10 marks) questions

1. Explain the structural components of a binocular compound microscope emphasizing the function of each component.
2. How will you prepare a permanent slide using serial sectioning? Explain
3. What is staining? Explain different types of stains used in microscopy? Give examples.

COMPLEMENTARY COURSE: 2
CRYPTOGAMS, GYMNOSPERMS AND PLANT PATHOLOGY

QUESTION PAPER PATTERN & SUBJECT WISE DISTRIBUTION OF MARKS

Type of questions	Mod I	Mod II	Mod III	Mod IV (Pathology)	Total marks
2 marks (total 12)	2	4	4	2	Ceiling 20
5 marks (total 7)	2	2	2	1	Ceiling 30
10 marks (total 2)	2				1x10 = 10
TOTAL					60

MODULE I – VIRUS, BACTERIA, CYANOBACTERIA

Short answer type (2 marks) questions

1. Differentiate generalized and specialized transduction.
2. Identify the gene transfer mechanisms in bacteria.
3. Discuss the role bacteria in nitrogen cycle.
4. Actinomycetes are considered as transitional forms between bacteria and fungi. Analyse the statement.
5. The infections of gram negative bacteria are more difficult to treat. Justify.
6. What are structures seen in bacteria for protection, respiration, movement and attachment ?
7. Differentiate between true bacterium and archaebacterium.
8. Classify the bacteria based on flagellation.
9. Bacterial endospores are highly resistant structures. Justify.
10. Identify different nutritional types in bacteria.
11. Differentiate between gram positive and gram negative bacteria.
12. Outline the classification of viruses.
13. Analyze the prokaryotic features of bacteria.
14. Distinguish the living and nonliving characters of viruses.
15. Enumerate the structural and functional peculiarities of heterocysts.
16. Analyse the biological importance of blue green algae.

Paragraph type (5 marks) questions

1. Summarise different steps for virus multiplication.
2. Explain the mode of infection and multiplication of bacteriophages.
3. Can you group the characteristics of archaebacteria that make it as living fossils.
4. Explain the mode of reproduction in *Nostoc*.
5. Judge the role of bacteria in agriculture and medicine.
6. Explain the salient features of viruses.
7. Summarise the cellular peculiarities of *Nostoc*.
8. Explain the replication and transcription of nucleic acids in viruses.
9. Differentiate the cell wall structure in gram positive and gram negative bacteria.

10. Explain different surface appendages in bacteria.
11. Compare generalized and specialized transduction.
12. Bacteria are quite useful to mankind in several aspects. Justify.
13. Bacteria can use various sources of energy. Justify.
14. Explain the structure of TMV.
15. Compare lytic and lysogenic cycle in bacteriophages.
16. Explain the salient features of BGA.

Essay type (10 marks) questions

1. Identify how the structural characteristics of bacteria helped it to become most successful prokaryotic organism.
2. Explain different methods for bacterial reproduction.
3. Explain the cell structure and reproduction in *Nostoc*.
4. Virus multiplication is different from the reproduction of other organisms. Justify.

MODULE I – PHYCOLOGY, MYCOLOGY, LICHENOLOGY

Short answer type (2 marks) questions

1. What are phycobilins? Give examples.
2. What are imperfect fungi? Give examples.
3. Discuss different nutritional types in fungi.
4. Differentiate asci and basidia.
5. Give an account of thallus structure of *Polysiphonia*.
6. The life cycle of *Polysiphonia* is triphasic. Discuss.
7. Differentiate carposporophyte and tetrasporophyte.
8. What are heterocystous fungi? Give example.
9. Differentiate holocarpic and eucarpic fungi.
10. Describe the salient features of basidiomycetes.
11. Differentiate zoospores and chlamydo-spore.
12. Describe the structure of apothecium in *Usnea*.
13. Summarise different reserve food and pigments seen in algae.
14. Examine different types of individual plants seen in the life cycle of *Polysiphonia*.
15. Give an account of fungal cell wall.
16. Explain scalariform conjugation in *Spirogyra*.
17. Explain the haploid phase of Puccinia.
18. What is a coenobia? Give example.
19. Outline the classification of algae by Fritch.
20. Differentiate isidia and soredia.
21. What are fruticose lichens? Give example.
22. What is cyphellae? What is its function?
23. What are pyrenoids. ? Give its function.
24. Describe the structure of a *Spirogyra* cell with suitable diagram.
25. Describe the thallus structure of *Usnea*.
26. Distinguish between self-conjugation and lateral conjugation.

27. Explain the salient feature of zoosporic fungi.
28. Differentiate between ascocarp and a basidiocarp.
29. Classify the lichens based thallus structure.
30. Explain dolipore septa in basidiomycetes.
31. Explain the nutritional symbiotic association in lichens.
32. Outline the evolutionary trends in fungi.

Paragraph type (5 marks) questions

1. Outline the fungal classification by Alexopoulose.
2. Summarise the ecological and economic importance of fungi.
3. Analyse the evolutionary trends in algae.
4. Describe the salient features of ascomycetes.
5. Explain the sexual reproduction in *Sargassum*.
6. Outline the thallus organization in algae.
7. Discuss about different vegetative structures seen in lichens.
8. Recognize similarities between green algae and higher plants.
9. Explain the dikaryotic phase in the life cycle of *Puccinia*.
10. Outline the general characters of Rhodophyceae.
11. Explain the post fertilization changes in the life cycle of *Polysiphonia*.
12. Outline the general characters of Pheophyceae.
13. Explain the sexual reproduction in spirogyra with suitable diagrams.
14. Explain different type of asexual reproduction methods in algae.
15. Explain the general characters of fungi.
16. Distinguish between ascomycetes and basidiomycetes.

Essay type (10 marks) questions

1. Explain the life cycle of *Sargassum* with diagrams.
2. Elaborate the life cycle of *Polysiphonia* with suitable diagrams.
3. *Puccinia* is known as macrocyclic heteroecious fungi. Justify with diagrams.

MODULE III – BRYOLOGY, PTERIDOLOGY, GYMNOSPERMS

Short answer type (2 marks) questions

1. Why Bryophytes are called amphibians of the plant kingdom?
2. What are rhizoids? What is its function?
3. Differentiate a gametophyte and a sporophyte.
4. Differentiate tuberculate and smooth rhizoids.
5. List the vegetative propagation methods in bryophytes.
6. Explain the morphological features of *Riccia*.
7. What is the method of gaseous exchange in *Riccia*?
8. Give the structure of sporophyte in *Riccia*.
9. How nutrient uptake in *Riccia* take place?
10. List the sex organs in *Riccia*.
11. What are nurse cells? What is its function?

12. Name an aquatic species of *Riccia*. What are the adaptations seen in *Riccia* for an aquatic habitat?
13. How *Riccia* tide over unfavorable conditions?
14. Explain the structure of dominant phase in pteridophytes
15. Explain the meaning of pteridophytes.
16. What is apospory?
17. What is apogamy?
18. List the methods of reproduction in pteridophytes.
19. What is a prothallus? What is its significance?
20. Why *Selaginella* is called a resurrection plant?
21. Differentiate protostele and plectostele?
22. What is rhizophore? What is its function?
23. What is heterospory? Name a heterosporous fern.
24. What is meant by strobilus?
25. Differentiate megaspore and microspore.
26. What is a transfusion tissue? Give example.
27. What are coralloid roots? Give example.
28. Explain the branching pattern in *Cycas*.
29. Differentiate micro and mega sporophylls.
30. What is a manoxylic wood? Give example.
31. Explain the nature of stomata in *Cycas*.
32. Differentiate ring porous and diffuse porous woods.
33. What is alternation of generation? Give example.
34. What are bulbils? What is its significance?

Paragraph type (5 marks) questions

1. Explain the thallus structure of *Riccia*. Draw a labeled diagram.
2. Outline the life cycle of *Riccia*.
3. Enumerate the methods of reproduction in *Riccia*.
4. Explain the structure of sporophyte in *Riccia*.
5. Give an account of different types of steles in Pteridophytes?
6. Explain the methods of reproduction in *Selaginella*.
7. Explain the structure of stem in *Selaginella*. Draw a labeled diagram.
8. Enumerate the structure of rhizophore in *Selaginella*. Draw a labeled diagram.
9. Outline the life cycle of *Selaginella* enumerating the structure of strobilus.
10. Explain the structure of *Cycas* leaflet. Draw a neatly labeled diagram.
11. Differentiate the structure of a normal and coralloid roots in *Cycas*.
12. Explain the life cycle in *Cycas*.
13. Draw the structure of ovule in *Cycas*.
14. Enumerate the structural differences in male and female reproductive structures in *Cycas*.
15. Explain the structure of petiole in *Cycas*.
16. Critically evaluate the secondary growth in *Cycas*. Explain how annual rings are useful for an assessment of the age of Cycads?

Essay type (10 marks) questions

1. Explain the thallus structure and the methods of reproduction in *Riccia*. Give a schematic sketch of the life cycle of *Riccia*.
2. Explain the life cycle of *Selaginella*. Discuss how heterospory in *Selaginella* foreshadows seed habit in plants?
3. Outline the life cycle in *Cycas* giving emphasis on the structure of reproductive structures.
4. Why Gymnosperms are considered advanced over Pteridophytes and Bryophytes? Substantiate with a critical comparison of the salient features.

MODULE IV – PLANT PATHOLOGY

Short answer type (2 marks) questions

1. Describe the symptoms of the disease leaf mosaic of tapioca
2. Explain the symptoms of Citrus canker
3. List out the symptoms of blast of paddy
4. Describe the control measures of leaf mosaic of tapioca
5. Describe the control measures of Citrus canker
6. Describe the control measures of blast of paddy
7. What is a pathogen? Describe different types of pathogens.
8. Define plant diseases. What are the major causes of plant diseases?
9. Give an account of symptoms of plant diseases.
10. What is pathogenesis? How does it occur?
11. What is a systemic disease? Explain.
12. What is an endemic disease? Explain.
13. What is meant by an epidemic disease? Add a note on its significance.
14. What is a non-infectious disease?

Paragraph type (5 marks) questions

1. Describe the pathogen, symptoms and control measures of blast of paddy
2. Describe the pathogen, symptoms and control measures of Citrus canker
3. Describe the pathogen, symptoms and control measures of Leaf mosaic of tapioca
4. Write about the control measures of plant diseases
5. Give an account of the general symptoms of plant diseases.
6. Discuss the methods of spreading of plant diseases.
7. What are the general symptoms of bacterial diseases?
8. Give a detailed account of various plant pathogens.

Essay type (10 marks) questions

1. Describe about pathogen, symptoms and control measures of blast of paddy, Citrus canker and leaf mosaic of tapioca.
2. Give an account of the general symptoms of bacterial, fungal and viral diseases in plants.
3. Explain the general symptoms, methods of spreading and control measures of various plant diseases.