

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED**

**B. Sc. GENERAL (SEMESTER PATTERN)**

**B. Sc. FIRST YEAR**

**BOTANY – CURRICULUM  
(MCQ Pattern)**

**w. e. f. JUNE, 2011**

## INTRODUCTION

Revising and updating of the curricula is the continuous process to provide an updated education to the students at large. Up till now there was wide diversity in the curricula of different Indian Universities which inhibited mobility of students in other universities or states. To ensure and have uniform curricula at UG and PG levels in different Indian Universities, the UGC developed a model curriculum and forwarded the same to all the universities in the country to serve as a base in updating their respective curricula.

For developing the final draft of curriculum, the BOS in Botany took into account total number of teaching days available in a year and the guidelines given by the faculty of science of the S.R.T.M.U Nanded. The BOS in Botany held a couple of meetings in which there were thorough and critical discussions.

S.R.T.M.U. Nanded is having B.Sc. (General) Botany course. The course content has been designed on semester pattern.

The course content of each theory paper is divided into units and subunits by giving appropriate titles and subtitles. For each unit, total number of periods required and weightage of maximum marks is mentioned. At the end of each theory paper the list of selected reading material is provided. A list of practical exercises to be completed in the academic year is also given. Paper wise skeleton question paper is provided as a guideline to teachers, students and paper setters.

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## **OBJECTIVES**

1. To evolve uniform curricula in all the universities of the country and to provide mobility to students from one university or state to other
2. To update curricula by introducing recent advances in the subject and enable the students to face NET, SET UPSC and other competitive examinations successfully.
3. To create awareness among the students about the botany and train them in the subject.
4. To improve the quality of laboratory and field work, for which study tours and excursions have been made compulsory so that the students can become familiar with the flora and ecosystems of that area.
5. To prepare such a dynamic curricula by incorporating innovative concepts and a multidisciplinary approach which can attract and develop interest among the students for selecting plant science as their career.

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## **CURRICULUM DESIGNING COMMITTEE**

1. **Dr. Bodke S.S.** Chairman  
Yeshwant Mahavidyalaya, Nanded
2. **Dr. Kadam A.S.** Member  
D.S.M. Mahavidyalaya, Jintur
3. **Dr. Mandge S.V.** Member  
Shri. SGM College, Loha
4. **Dr. Gawai D.U.** Member  
Science College, Nanded
5. **Dr. Dakore H.G.** Member  
P.N.College, Nanded
6. **Dr. Aithal S.V.** Member  
Vai. D.M.Mahavidyalaya, Degloor
7. **Dr. Biradar S.D.** Member  
D.S.M.College, Parbhani
8. **Dr. Bhadraiah B.** Member  
Osmania University, Hyderabad
9. **Dr. Patil D.A.** Member  
SSVP's Dr. Ghogre Science College, Dhule
10. **Dr. Mukadam D.S.** Member  
Green Gold seeds Ltd., Walunj
11. **Dr. Gacche R.N.** Member  
SRTM University, Nanded

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(MCQ Pattern)**

**An Outline:**

Semester	Paper No. & Title	Period /practical	Marks		
			MCQ Exam.	Internal Exam.	Total
Semester-I	<b>Theory Paper-I:</b> Diversity of Microbes	45	40	10	50
	<b>Theory Paper-II:</b> Histology and Anatomy	45	40	10	50
Semester-II	<b>Theory Paper-III:</b> Diversity of Cryptogams	45	40	10	50
	<b>Theory Paper-IV:</b> Embryology of angiosperms and Environmental biology	45	40	10	50
Annual pattern	<b>Practical Paper-V:</b> Practical based on theory papers of semester-I&II	24	-	-	100

**Workload:**

- 1. Theory:** Per paper per week three periods
- 2. Practical:** Per batch per week one practical (Three periods)

**SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED**

**B.Sc. First Year**

**Semester - I**

(MCQ Pattern)

**BOTANY**

**Theory Paper-I: Diversity of Microbes**  
(Viruses, Bacteria, Fungi and Lichens)

Periods – 45

Maximum Marks – 50

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**UNIT – I: VIRUSES** (10 periods)

1. General characters of viruses
2. Classification of viruses based on host.
3. Ultra structure of TMV
4. Symptoms of viral diseases of plants
5. Yellow vein mosaic of Bhendi
6. Bean mosaic
7. Transmission of viruses
8. Economic importance of viruses

**UNIT – II: BACTERIA** (10 periods)

1. General characters of bacteria
2. Ultra structure of bacterial cell
3. Asexual reproduction (By binary fission and endospore formation) in bacteria
4. Sexual reproduction (By conjugation) in bacteria
5. Salient features of cyanobacteria
6. Systematic position, habitat, distribution, structure and reproduction in *Nostoc*
7. Role of bacteria and cyanobacteria in agriculture
8. Archaeobacteria – Introduction and Forms

**UNIT – III: FUNGI** (12 periods)

1. General characters of Fungi
2. Classification of Fungi (as per Alexopolous and Mims, 1979)
3. Systematic position, occurrence, structure of mycelium, asexual reproduction, sexual reproduction and graphic life cycle of following fungal types
  - i. Mastigomycotina – *Albugo*
  - ii. Ascomycotina – *Eurotium*

**UNIT – IV: FUNGI AND LICHENS** (13 periods)

1. Systematic position, occurrence, structure of mycelium, asexual reproduction, sexual reproduction and graphic life cycle of following fungal types
  - iii. Basidiomycotina – *Agaricus*
  - iv. Deuteromycotina – *Cercospora* (Tikka disease of groundnut)
2. Role of fungi in fermentation industries (Bakery and Brewery)
3. General characters of lichens
4. Types of lichens
5. Economic importance of lichens

### **SELECTED READINGS (PAPER – I)**

1. Bodke S.S. and N.M. Dhekle (2007) Diversity of Microbes and Cryptogams Mansi prakashan, Nanded
2. Vashishta B.R. (1990) Botany for Degree Students Part-II Fungi S. Chand & Co. New Delhi.
3. Alexopolous C.J. & C.W. Mims (1979) Introductory Mycology Wiley Eastern Ltd., New Delhi
4. Smith G.M. (1971) Cryptogamic Botany Vol-I. Algae and Fungi Tata McGraw Hill Publishing Co. New Delhi.
5. Dubey H.C. (1990) An Introduction to Fungi Vikas Publishing House, New Delhi.
6. Sharma P.D. (1995) The Fungi Rastogi & Co., Meerut.
7. Sharma O.P. (1992) A Text Book of Thallophytes Tata McGraw Hill Publishing Co. New Delhi.
8. Mehrotra R.S. and K.R.Aneja (1990) Introduction to Mycology Wiley Eastern Ltd. New Delhi.
9. Pandey S.N.,P.S. Trivedi and S.P. Mishra A Text Book of Botany Vol-I & II Vikas Publishing House, New Delhi.
10. Pandey B.P. (2000) College Botany Vol-I (Algae, Fungi, Bryophytes) S. Chand & Co. New Delhi.
11. Clintion A (1958) Introduction to Bacteria McMillan, New York.
12. Dubey H.C. (1982) Text Book of Fungi, Bacteria and Viruses Vikas Publishing House, New Delhi.
13. Webster John (1980) Introduction to Fungi Cambridge University Press.
14. Bodke S.S. and N.M. Dhekle (2009) Cryptogamic Botany Sanket Prakashan, Nanded

**SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED**

**B.Sc. First Year**

**Semester - I**

(MCQ Pattern)

**BOTANY**

**Theory Paper-II: Histology and Anatomy**

Periods – 45

Maximum Marks – 50

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**UNIT – I: MERISTEM** (*10 periods*)

1. Meristem and its classification based on position and origin
2. Organization of root and shoot apices
  - i. Apical cell theory
  - ii. Histogen theory
  - iii. Tunica carpus theory
  - iv. Korper – Kappe theory

**UNIT – II: TISSUES** (*13 periods*)

**Sub-Unit – I: Simple Tissues**

1. Parenchyma (Arenchyma, Chlorenchyma)
2. Collenchyma
3. Sclerenchyma

**Sub-Unit – II: Complex Tissues**

1. Xylem
2. Phloem

**Sub-Unit – III: Secretory Tissues**

**A. Laticiferous Tissues**

1. Latex cells
2. Latex vessels

**B. Glandular Tissues**

**a. External glands**

1. Glandular hairs
2. Stinging hairs
3. Digestive glands

**4. Nectary glands**

**b. Internal glands**

1. Oil glands
2. Resin duct
3. Hydathode

**UNIT – III: PRIMARY STRUCTURES** (*12 periods*)

1. Root anatomy of dicotyledons and monocotyledons (Sunflower and Maize)



2. Stem anatomy of dicotyledons and monocotyledons (Sunflower and Maize)
3. Leaf anatomy of dicotyledons and monocotyledons (Sunflower and Maize)

**UNIT – IV: SECONDARY AND ANOMALOUS SECONDARY GROWTH**

*(10 periods)*

1. Secondary growth in Sunflower root and stem
2. Anomalous secondary growth in Dracaena stem
3. Anomalous secondary growth in Achyranthus stem
4. Anomalous secondary growth in Beet root

**SELECTED READINGS**

- |     |   |  |  |
|-----|---|--|--|
| 1.  | Sundara Rajan (1998)                    | College Botany<br>Vol-1 and Vol-2        | Himalaya Publication<br>House, Nagpur. |
| 2.  | Dutta A.C. (1968)                       | A Botany for Degree<br>Students          | Oxford Press, London.                  |
| 3.  | Tayal M.S. (1983)                       | Plant Anatomy                            | Rastogi Publication, Meerut.           |
| 4.  | Ganguli, Das,<br>Dutta(1981)            | College Botany<br>Vol-1 and Vol-2        | New Cenral Book Agency,<br>Kolkatta.   |
| 5.  | Pandey B.P. (1993)                      | Plant Anatomy                            | S. Chand & Co. Pvt. Ltd.               |
| 6.  | Fahn A (1967)                           | Plant Anatomy                            |  |
| 7.  | Singh V, Pande P.C.<br>D.K. Jain (1994) | Anatomy of Seed Plants                   | Rastogi Publication, Meerut.           |
| 8.  | Esau K. (1977)                          | Anatomy of Seed Plants                   | John Wiley & sons,<br>New York.        |
| 9.  | Earnes A.J. &<br>L.H.MacDaniel (1947)   | Introduction to Plant<br>Anatomy         | Mc Graw Hill Book Co.<br>New York.     |
| 10. | Bodke S.S. and N.M.<br>Dhekle (2009)    | Plant Anatomy,<br>Embryology and Ecology | Sanket Prakashan, Nanded               |

SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

**B.Sc. First Year**

**Semester - II**

(MCQ Pattern)

**BOTANY**

**Theory Paper-I: Diversity of Cryptogams**  
(Algae, Bryophytes and Pteridophytes )

Periods – 45

Maximum Marks – 50

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**UNIT – I: ALGAE –I (10 periods)**

1. General characters of algae
2. Classification of algae(As per F.E.Fritsch,1935)
3. Systematic position, occurrence, thallus structure, vegetative reproduction, asexual reproduction, sexual reproduction and graphic life cycle with alternation of generation of the following algal types
  - i. Chlorophyceae – *Oedogonium*
  - ii. Xanthophyceae – *Botrydium*

**UNIT – II: ALGAE-II (10 periods)**

1. Systematic position, occurrence, thallus structure, vegetative reproduction, asexual reproduction, sexual reproduction and graphic life cycle with alternation of generation of the following algal types
  - i. Phaeophyceae – *Ectocarpus*
  - ii. Rhodophyceae - *Batrachospermum*
2. Economic importance of algae (Food and fodder)

**UNIT – III: BRYOPHYTES (12 periods)**

1. General characters of bryophytes
2. Classification of bryophytes (As per N.S.Parihar)
3. Systematic position, occurrence, thallus structure(external and internal), vegetative reproduction, asexual reproduction, sexual reproduction and graphic life cycle with alternation of generation of the following types (**Developmental stages not expected**)
  - i. Hepaticopsida – *Riccia*
  - ii. Anthocerotopsida – *Anthoceros*
  - iii. Bryopsida - *Funaria*

**UNIT – IV: PTERIDOPHYTES (13 periods)**

1. General characters of Pteridophytes
2. Classification of Pteridophytes (as per N.S.Parihar)

### 3. *LYCOPODIUM*

- i. Systematic position
- ii. Occurrence
- iii. External features of sporophyte
- iv. Internal structure of stem
- v. Structure of strobilus
- vi. Structure of sporangium
- vii. Structure of spore
- viii. Structure of prothallus (*L.complanatum* type)
- ix. Sexual reproduction
- x. Graphic life cycle with alternation of generation

**(Developmental stages not expected)**

### 4. *EQUISETUM*

- i. Systematic position
- ii. Occurrence
- iii. External features of sporophyte
- iv. Internal structure of aerial stem (T.S of internode)
- v. Structure of strobilus
- vi. Structure of sporangiophore
- vii. Structure of sporangium
- viii. Structure of spore
- ix. Structure of prothallus
- x. Sexual reproduction
- xi. Graphic life cycle with alternation of generations

**(Developmental stages not expected)**

### 5. *MARSILEA*

- i. Systematic position
- ii. Occurrence
- iii. External features of sporophyte
- iv. Internal structure of petiole
- v. External structure of sporocarp
- vi. Structure of sorus (VLS)
- vii. Structure of microsporangium
- viii. Structure of megasporangium
- ix. Structure of microspore
- x. Structure of megaspore
- xi. Germination of microspore (formation of male gametophyte)
- xii. Germination megaspore (formation of female gametophyte)
- xiii. Graphic life cycle with alternation of generations

**(Developmental stages not expected)**

### **SELECTED READINGS (PAPER – I)**

1. Vashishta B.R. (1990) Botany for Degree Students Part-I Algae S. Chand & Co. New Delhi.
2. Smith G.M. (1971) Cryptogamic Botany Vol-I. Algae and Fungi Tata McGraw Hill Publishing Co. New Delhi.
3. Smith G.M. (1971) Cryptogamic Botany Vol-II Bryophytes and Pteridophytes Tata McGraw Hill Publishing Co. New Delhi.
4. Sharma O.P. (1992) A Text Book of Thallophytes Tata McGraw Hill Publishing Co. New Delhi.
5. Vashishta B.R. (1990) Botany for Degree Students Part-III Bryophyta S. Chand & Co. New Delhi.
6. Puri P. (1980) Bryophyta Atmaram & Sons. New Delhi.
7. Parihar N.S. (1965) An Introduction to Embryophyta Vol-I Bryophyta Central Book Depot, Allahabad.
8. Vashishta P.C. (1991) Botany for Degree Students Part-V Vascular Cryptogams (Pteridophyta) S. Chand & Co. New Delhi.
9. Parihar N.S. (1965) An Introduction to Embryophyta Vol-II Pteridophyta Central Book Depot, Allahabad.
10. Sharma O.P. (1992) A Text Book of Pteridophytes McMillan (India) Ltd.
11. Fritsch F.E.(1945) The Structure and Reproduction of Algae Vol-I & II. Cambridge University Press.
12. Chapman V.J. and D.J. Chapman (1962) The Algae, English Language Book Society McMillan, London.
13. Bodke S.S. and N.M. Dhekle (2009) Cryptogamic Botany Sanket Prakashan, Nanded
14. Pandey S.N.,P.S. Trivedi and S.P. Mishra A Text Book of Botany Vol-I & II Vikas Publishing House, New Delhi.

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|-----|---------------------------------------|---|---|
| 15. | Pandey B.P. (2000)                    | College Botany Vol-I<br>(Algae, Fungi, Bryophytes)                      | S. Chand & Co. New Delhi.                         |
| 16. | Pandey B.P. (2000)                    | College Botany Vol-II<br>(Pteridophyta,<br>Gymnosperms,<br>Paleobotany) | S. Chand & Co. New Delhi.                         |
| 17. | Clinton A (1958)                      | Introduction to Bacteria  | McMillan, New York.                               |
| 18. | Bower F.O. (1988)                     | Primitive Land Plants<br>Vol-I & II                                     | Arihant Publishers, Jaipur.                       |
| 19. | Gangule H.C. & Kar<br>A.K. (1995)     | College Botany Vol-II   | New Central Book Agency,<br>Calcutta.             |
| 20. | Rajan S. Sundra (1995)                | College Botany Vol-I & II   | Himalaya Publication<br>House.                    |
| 21. | Rajan S. Sundra (1995)                | College Botany Vol-I & II   | Himalaya Publication<br>House.                    |
| 22. | Saxena A.K.& Sarabhai<br>R.P. (1968)  | Text Book of Botany Vol-I   | Ratan Prakashan Mandir,<br>Agra.                  |
| 23. | Saxena A.K. & Sarabhai<br>R.P. (1968) | Text Book of Botany Vol-II  | Ratan Prakashan Mandir,<br>Agra.                  |
| 24. | Rashid A (1976)                       | An Introduction to<br>Pteridophyta                                      | Vikas Publishing House,<br>New Delhi.             |
| 25. | Rajan S. Sundra (1995)                | College Botany Vol-I & II   | Himalaya Publication<br>House.                    |
| 26. | Gupta J.S. (1987)                     | Text Book of Algae  | Oxford & IBH Publ.<br>New Delhi.                  |
| 27. | Kumar H.D. &<br>Singh H.N.(1990)      | Text Book of Algae  | Affiliated East & West<br>Publication, New Delhi. |
| 28. | Bodke S.S. and N.M.<br>Dhekle (2007)  | Diversity of Microbes and<br>Cryptogams                                 | Mansi prakashan, Nanded                           |
| 29. | Sporne K.R. (1976)                    | The Morphology of<br>Pteridophytes                                      | B.I. Publication, Bombay.                         |
| 30. | Vashishta P.C. (1988)                 | Botany for Degree Students  | S. Chand & Co. New Delhi.                         |

-Pteridophyta

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|-------------------------|---|---------------------------------------|
| 31. Parihar N.S. (1965) | An Introduction to Embryophyta<br>Vol-I Bryophyta | Central Book Depot,<br>Allahabad.     |
| 32. Watson E.V. (1974)  | The Structure & Life of Bryophyta                 | B.I. Publication, Bombay.             |
| 33. Dubey H.C. (1982)   | Text Book of Fungi,<br>Bacteria and Viruses       | Vikas Publishing House,<br>New Delhi. |
| 34. Webster John (1980) | Introduction to Fungi                             | Cambridge University<br>Press.        |

**SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED**

**B.Sc. First Year**

**Semester - II**

(MCQ Pattern)

**BOTANY**

**Theory Paper-I: Embryology of Angiosperms and Environmental Biology**

Periods – 45

Maximum Marks – 50

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**UNIT – I: EMBRYOLOGY –I (10 periods)**

1. Introduction
2. Structure of a Microsporangium(T.S. of anther)
3. Structure of a pollen grain
4. Development of male gametophyte (Microgametogenesis)
5. Types of ovule
6. Structure of anatropous ovule (L.S.)

**UNIT – II: EMBRYOLOGY –II (10 periods)**

1. Development of female gametophyte (Megagametogenesis)– Monosporic (Polygonum), Bisporic (Allium) and Tetrasporic (Adoxa)
2. Double fertilization and its significance
3. Development and maturation of seed (Post fertilization changes)
4. Endosperm and its types
5. Development of dicotyledonous embryo (Crucifer type)

**UNIT – III: ECOLOGY (13 periods)**

1. Ecology – Definition and Scope
2. Structure of ecosystem (Abiotic and Biotic)
3. Types of ecosystem (Pond ecosystem and Grassland ecosystem)
4. Ecological pyramids and energy flow
5. Food chain and Food web
6. Morphological and anatomical adaptations of plants to water stress conditions
  - iii. Hydrophytes – Hydrilla stem and Nymphaea (Lotus) petiole
  - iv. Xerophytes – Nerium leaf and Casuarina stem

**UNIT – IV: ENVIRONMENTAL BIOLOGY (12 periods)**

1. Pollution: Causes and effects of water, soil and air pollution and their control measures
2. Aforestation and deforestation
3. Chipko movement

## **SELECTED READINGS (PAPER – II)**

1. Trivedi R.K. et al (1987) Practical methods in Ecology & Environmental Science Enviro Media Publishers Karad.
2. Rao K.S. (1993) Practical Ecology Anmol Publication, Jodhpur.
3. Odum E.P. (1971) Fundamentals of Ecology W.B. Saunders Co. Philadelphia.
4. Shukla R.S. & Chandel P.S. (2000) Plant Ecology S. Chand & Co. Pvt. Ltd. New Delhi
5. Pandey B.P. (2003) Embryology of Angiosperms S. Chand & Co. Pvt. Ltd. New Delhi
6. Saxena A.K. & R.P. Sarabhai (1975) A Text Book of Botany Vol-2 Embryophyta Kitab Ghar, Gwalior Pergamon Press, Oxford.
7. Pande O.N., A. Chanda (1993) A Text Book of Botany Vol-3 Vikas Publication House Pvt. Ltd., New Delhi
8. Nebel B.J. (1990) Environmental Science Printice Hall ind. Pvt. Ltd. New Delhi.
9. Ravan P.H., L.R. Berg, H.B. Johnson (1993) Environment Saunder's College Publi. New York.
10. Andrew Goudie (1984) The Nature of the Environment Basil Blackwell Cambridge, U.S.A.
11. Maheshwari P. (1972) An Introduction to Embryology of Angiosperms Tata Mc Graw Hill Book Pub. Co. Ltd. New York.
12. Bhojwani S.S. Bhatnager S.P. (1974) Embryology of Angiosperms Vikas Publication House Pvt. Ltd., New Delhi.
13. Dwivedi J.N. (2000) Embryology of Angiosperms
14. Agarwal K.C. (1993) Environmental Biology Agro botanical Publishers, Jodhpur.
15. Mishra K.C. (1992) Manual of Plant Ecology Oxford & IBH Publi. Co.



- Pvt. Ltd. New Delhi.
16. Khochar P.L. (1980) Plant Ecology S. Nagin & Co. Jallundhar.
  17. Kormandi E.J. (1984) Concepts of Ecology Printice Hall ind. New Delhi.
  18. Asthana R.K. (1998) Environmental Problems and Solutions S. Chand & Co. Pvt. Ltd. New Delhi.
  19. Verma P.S., V.K. Agarwal (1983) Environmental Biology S. Chand & Co. Pvt. Ltd. New Delhi
  20. Subramanyam N.S. A.V.S.S. Sambmurthy (2000) Ecology Narosa Publishing House, New Delhi.
  21. Sharma O.P. (1993) Ecology & Environmental Biology Rastogi Publication, Meerut.
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21. Bodke S.S. and N.M. Dhekle (2009) Plant Anatomy, Embryology and Ecology Sanket Prakashan, Nanded

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**B. Sc. FIRST YEAR**

**BOTANY**

**Practical Paper-V:** Practical based on theory papers of Semester-I  
& Semester-II)

Practicals: 24

Marks: 100

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- Practical 1:** Preparation of culture media- PDA/NA
- Practical 2:** Study of yellow vein mosaic of bhendi and bean mosaic disease
- Practical 3:** Study of morphology of bacteria by Grams staining method
- Practical 4:** Study of external features of *Nostoc* (Cyanobacterium)
- Practical 5:** Study of external features of *Albugo* and *Eurotium* with classification
- Practical 6:** Study of external and internal characters of *Agaricus* and *Cercospora*
- Practical 7:** Study of types of **Lichens (Crustose, Foliose and Fructicose)**
- Practical 8:** Study of external features of *Oedogonium* and *Botrydium* with classification
- Practical 9:** Study of external features of *Ectocarpus* and *Batrachospermum* with classification
- Practical 10:** Study of external and internal features of *Riccia* and *Anthoceros*
- Practical 11:** Study of external and internal features adult gametophyte of *Funaria*
- Practical 12:** Study of external features of adult sporophyte and internal structure (T.S.) of stem of *Lycopodium* and *Equisetum*
- Practical 13:** Study of external features of adult sporophyte and internal structure (T.S.) of stem and petiole of *Marsilea*
- Practical 14:** Study of meristematic and permanent tissues with the help of permanent slides/models/ charts/photocopies
- Practical 15:** Study of secretory tissues with the help of permanent slides/models/ charts/photocopies
- Practical 16:** Preparation of double stained permanent slides of Maize and Sunflower stem
- Practical 17:** Preparation of double stained permanent slides of *Dracaena* stem and *Beet root*
- Practical 18:** Study of T.S. of Anther and L.S. of Ovule
- Practical 19:** Study of types of ovule with the help of permanent slides/models/ charts/photocopies
- Practical 20:** Study of morphological and anatomical structures in Hydrophytes (Hydrilla stem and Nymphaea petiole)
- Practical 21:** Study of morphological and anatomical structures in Xerophytes (Nerium leaf and Casuarina stem)
- Practical 22 – 24:** Botanical excursions (two short and one long)

## SKELETON OF QUESTION PAPER

### B. Sc. FIRST YEAR

#### BOTANY

#### Practical Paper-V: Practical based on theory papers of Semester-I & Semester-II)

Time: 4 Hours

Marks: 100

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Date:

Session:

Batch No.:

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**Note:** 1. Draw neat and well labeled diagram wherever necessary  
2. Show your preparation to the examiner

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- Q1.** Identify, classify and describe the given specimen **A (Fungi)** on the basis of external and internal characters 10
- Q2.** Identify, classify and describe the **any two algae from the given mixture** on the basis of external and internal characters 10
- Q3.** Identify, classify and describe the given specimen **B (Bryophytes / Pteridophytes)** on the basis of external and internal characters 15
- Q4.** Make double stained permanent preparation of Maize stem/Sunflower stem/Dracaena stem/Achyranthus stem/Beet root 15
- Q5.** Make temporary preparation of given specimen. Identify and describe ecological adaptations on the basis of anatomical peculiarities 15
- Q6.** Spotting (Five) 15  
(Viruses / Bacteria / Lichens-1, Bryophyta / Pteridopyta- 1, Histology- 1, Anatomy -1 and Embryology -1)
- Q7.** i. Record book 10  
ii. Submission 10