



**JAI HIND COLLEGE  
BASANTSING INSTITUTE OF SCIENCE  
&  
J. T. LALVANI COLLEGE OF COMMERCE  
(AUTONOMOUS)**

**"A" Road, Churchgate, Mumbai-400020, India.**

**Affiliated to  
University of Mumbai**

**Program: B.Sc. Botany**

**Course: Bryophyta, Pteridophyta and Phanerogams**

**Semester II**

**Credit Based Semester and Grading System (CBSGS) with effect  
from the academic year 2021-22**

## F.Y. B.Sc. Botany Syllabus

Course Code	Course Title	Credits	Lectures/Week
SBOT201	Bryophyta, Pteridophyta and Phanerogams	2	3



## Semester II - Theory

<b>Course Code:</b> <b>SBOT 201</b>	<b>PAPER I Bryophyta, Pteridophyta, Gymnosperms and Angiosperms</b> <b>(Credits : 2 Lectures/Week: 3)</b>	
	<p><b>Learning Objectives:</b></p> <ul style="list-style-type: none"> <li>● Learn the classification, life-cycles and economic importance of individuals belonging to Bryophyta, Pteridophyta and Gymnosperms.</li> <li>● Learn the morphology, structure and functions of various parts of a flower in detail and explain the use of taxonomical terminology and understand the meaning of the same.</li> <li>● Understand detailed study of the classification of a few families prescribed in the syllabus.</li> </ul> <p><b>Learning Outcomes:</b></p> <ul style="list-style-type: none"> <li>● Students will be able to understand the morphological, anatomical and reproductional peculiarities and differences between all three groups of plants belonging to Bryophytes, Pteridophytes and Gymnosperm. Economic importance of each group will be understood to realize the potential use.</li> <li>● Basic study of parts of the flower and types variations in floral morphology along with study of few families as classified as per Bentham and Hooker's system will help to introduce students to the branch of taxonomy.</li> </ul>	
<b>Unit I</b>	<p><b>BRYOPHYTA AND PTERIDOPHYTA</b></p> <ul style="list-style-type: none"> <li>● General characters and economic importance of Hepaticae.</li> <li>● Structure, life cycle and systematic position of <i>Riccia</i> and <i>Marchantia</i></li> <li>● General characters and economic importance of Lycopsidea</li> <li>● Structure life cycle, systematic position and alternation of generations in <i>Selaginella</i>.</li> <li>● Stellar evolution.</li> </ul>	<b>15L</b>
<b>Unit II</b>	<p><b>GYMNOSPERMS</b></p> <ul style="list-style-type: none"> <li>● Outline of classification according to C. J. Chamberlin</li> <li>● General characters and economic importance of Coniferopsida</li> <li>● Structure life cycle systematic position and alternation of generations in <i>Thuja</i> and <i>Araucaria</i></li> </ul>	<b>15L</b>

<b>Unit III</b>	<p><b>ANGIOSPERMS : MORPHOLOGY</b></p> <ul style="list-style-type: none"> <li>● Morphology of Angiosperms <ul style="list-style-type: none"> <li>▪ Morphology of roots</li> <li>▪ Morphology of stem</li> <li>▪ Morphology of leaves</li> <li>▪ Morphology of inflorescence</li> <li>▪ Morphology of flower <ul style="list-style-type: none"> <li>▪ Calyx</li> <li>▪ Corolla</li> <li>▪ Androecium</li> <li>▪ Gynoecium</li> </ul> </li> <li>▪ Morphology of fruits</li> </ul> </li> <li>● Representation of floral characters in the form of a floral formula</li> <li>● Classification of families as per Bentham and Hooker's system of classification <ul style="list-style-type: none"> <li>▪ Malvaceae</li> <li>▪ Amaryllidaceae</li> </ul> </li> </ul> <p>(Economic importance of plants of above-mentioned families)</p>	<b>15L</b>
<p><b>References:</b></p> <ul style="list-style-type: none"> <li>● Vashishta B. R. &amp; Sinha A. K., Botany for degree students Bryophyta, S. Chand, 1<sup>st</sup> Edition, 2010</li> <li>● Vashishta B. R. &amp; Sinha A. K., Botany for degree students Pteridophyta S. Chand, 1<sup>st</sup> Edition, 2010</li> <li>● Vashishta B. R. &amp; Sinha A. K., S. Chand, Botany for degree students Gymnosperms, 1<sup>st</sup> Edition, 2010</li> <li>● Gangulee, Das and Dutta, College Botany –Volume II, New Central Book Agency, 2006</li> <li>● Chopra G. L., Angiosperms, S. Nagin &amp; Co., 1969</li> <li>● Sharma O. P., Plant Taxonomy, Tata Mc Graw – Hill Publishing Co. Ltd., 1993</li> <li>● Gurucharan S., Plant systematic, Oxford &amp; IBH publishing Co. Pvt. Ltd., 3<sup>rd</sup> edition, 2012</li> <li>● Davis P. H. &amp; Heywood V. H., Principles of Angiosperm Taxonomy, Scientific Publishers, 2011</li> </ul>		



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Program: B.Sc. Botany

Course: Anatomy, Physiology and Ethnobotany

Semester II

**Credit Based Semester and Grading System (CBSGS) with effect  
from the academic year 2021-22**

## F.Y. B.Sc. Botany Syllabus

Course Code	Course Title	Credits	Lectures/Week
SBOT202	Anatomy, Physiology and Ethnobotany	2	3





<b>Course Code:</b> <b>SBOT 202</b>	<b>PAPER II Anatomy, Physiology and Ethnobotany</b> <b>(Credits: 2 Lectures/Week: 3)</b>	
	<p><b>Learning Objectives:</b></p> <ul style="list-style-type: none"> <li>● The primary anatomical structure and functions of various tissue systems in plants.</li> <li>● Primary Structure of Dicot and Monocot Stem, leaf and root.</li> <li>● To study Carbohydrate structure, classification and its importance as a primary metabolite in plants.</li> <li>● To learn the basic physiological process of light harvesting mechanisms for the synthesis of carbohydrates in various groups of higher plants. Study the role of photorespiration in plants.</li> <li>● Study the use of plants for food, medicine, etc from past data in literature. Relate the same to present experimental evidence and future advances in the same.</li> </ul> <p><b>Learning Outcomes:</b></p> <ul style="list-style-type: none"> <li>● Students will understand anatomical structure and functions of various types of basic tissue systems present in plants.</li> <li>● Students will understand the basic concept of light harvest mechanism, pigments involved, photosynthesis as a process as well as variations seen in carbohydrate accumulation in higher plant species. They will understand the negative role played by photorespiration in reducing the crop yield.</li> <li>● Students will be able to understand the potential of plants from a medicinal and economical aspect.</li> </ul>	
<b>Unit I</b>	<p><b>ANATOMY</b></p> <ul style="list-style-type: none"> <li>● Simple and complex tissues, meristematic and permanent tissues.</li> <li>● Tissue systems in plants – Epidermal; Vascular and Ground tissue system.</li> <li>● Epidermal tissue system: types of hair/trichomes, stomata and types of stomata.</li> <li>● Adcrustation and incrustation, Ergastic substances and lithocysts</li> <li>● Primary structure of dicot and monocot root, stem and leaf</li> </ul>	<b>15L</b>

<p><b>Unit II</b></p>	<p><b>PHYSIOLOGY</b></p> <ul style="list-style-type: none"> <li>● Carbohydrates: Basic Nomenclature, Classification, (Monosaccharides, Disaccharides, Oligosaccharides and Polysaccharides). Appropriate examples of class along with its use as Structural and storage Polysaccharides. Distribution of various types of carbohydrates classes in different plant species to understand their nutritional value.</li> <li>● Structure and function of chloroplast, pigments associated with photosynthesis and basic light trapping and energy transfer mechanisms.</li> <li>● Photosynthesis: Light reactions, photolysis of water photo phosphorylation (cyclic and non-cyclic), carbon fixation phase (C3, C4 and CAM pathways).</li> <li>● Photorespiration: Process and significance.</li> <li>● Case study - Melvin Calvin's experiment.</li> </ul>	<p><b>15L</b></p>
<p><b>Unit III</b></p>	<p><b>MEDICINAL BOTANY/ ETHNOBOTANY</b></p> <ul style="list-style-type: none"> <li>● Ethnobotany - Definition, history, sources of data and methods of study</li> <li>● Applications of Ethnobotany: <ul style="list-style-type: none"> <li>i) Ethnomedicines</li> <li>ii) Agriculture</li> <li>iii) Edible plants</li> <li>iv) Famine related plants,</li> <li>v) Toxic plants and Antidotes</li> </ul> </li> <li>● Traditional medicines as used by tribal in Maharashtra towards: <ul style="list-style-type: none"> <li>i) Skin ailments: <i>Rubia cordifolia</i>, Sandalwood</li> <li>ii) Liver ailments: <i>Phyllanthus</i>, <i>Andrographis</i></li> <li>iii) Wound healing and aging: <i>Centella</i>, <i>Typha</i>, <i>Terminalia</i>, <i>Tridax</i></li> <li>iv) Fever: <i>Vitex negundo</i>, <i>Tinospora cordifolia</i> leaves</li> <li>v) Diabetes: <i>Momordica charantia</i>, <i>Syzygiumcumini</i></li> </ul> </li> <li>● Role of ethnobotany in current scenario</li> </ul>	<p><b>15L</b></p>
<p><b>References:</b></p> <ul style="list-style-type: none"> <li>● Pandey B. P., Plant anatomy, S. Chand &amp; Co. Ltd., 2012</li> <li>● Fahn A., Plant anatomy, Pergamon Press, 1967</li> <li>● Esau K., Plant anatomy, John Wiley &amp; Sons, 1953</li> <li>● Roy P., Plant anatomy, New Central Book Agency, 2006</li> <li>● Taiz L. &amp; Zeiger E., Plant Physiology, Sinauer Associates Inc. Publishers, 5<sup>th</sup> edition, 2010</li> <li>● Lehninger, Principles of Biochemistry, D. Nelson &amp; M. Cox, W. H. Freeman &amp; Co., 4th edition, 2005</li> <li>● Jain S.K., Manual of Ethnobotany NBRI, Lucknow, 2nd edition</li> <li>● Jain A.K., Indian Ethnobotany Emerging trends, Scientific Publishers, 2016</li> <li>● Khandelwal K.R., Practical Pharmacognosy, Nirali Publication, 1998</li> </ul>		





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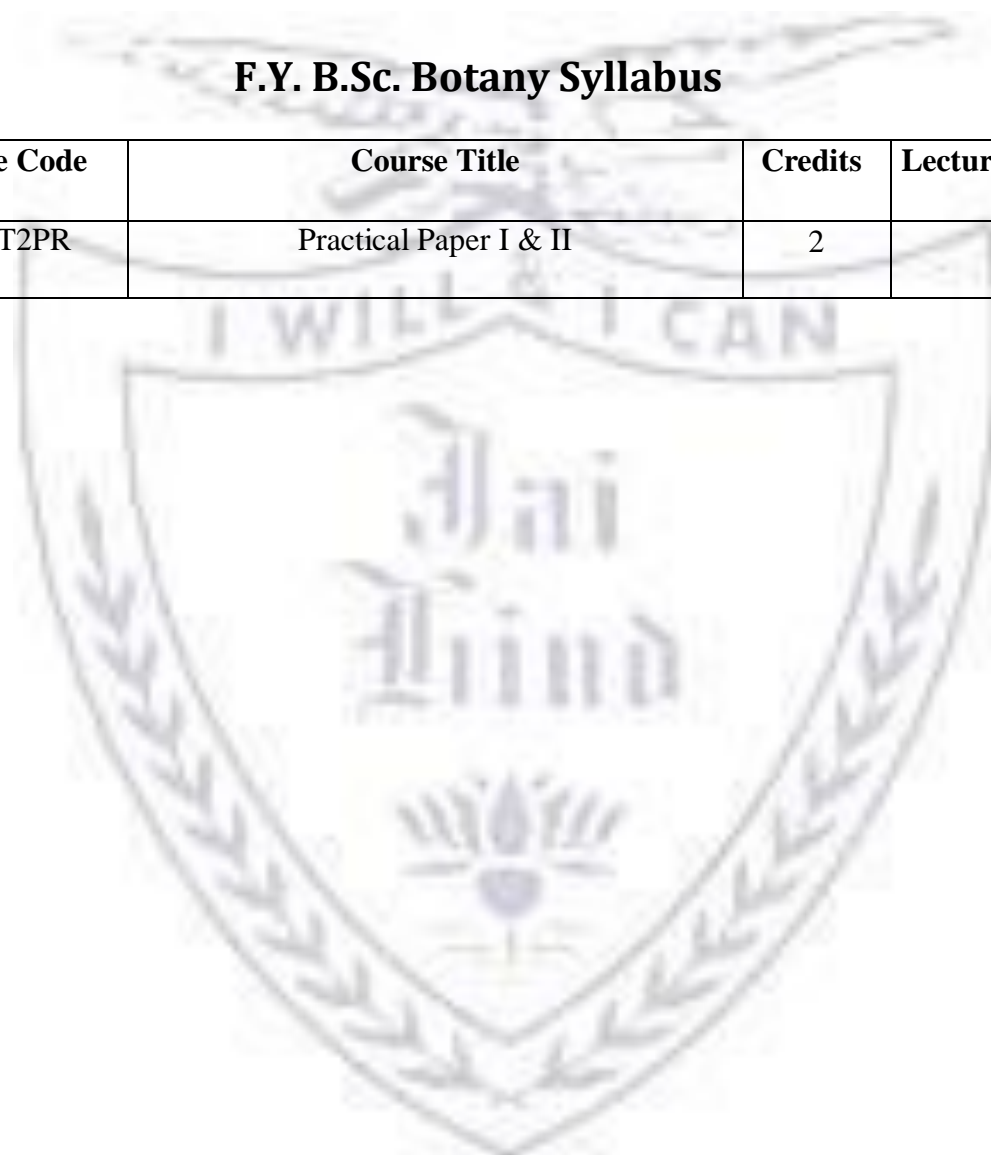
Program: B.Sc. Botany  
Course: Practical Paper I & II

Semester II

**Credit Based Semester and Grading System (CBSGS) with effect  
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## F.Y. B.Sc. Botany Syllabus

Course Code	Course Title	Credits	Lectures/Week
SBOT2PR	Practical Paper I & II	2	2



## Semester II – Practical

<p><b>Course Code:</b> <b>SBOT2PR</b></p>	<p style="text-align: center;"><b>Practical Paper I &amp; II</b> <b>(Credits:2 Practical/Week: 2)</b></p> <p><b>Learning Objectives:</b></p> <ul style="list-style-type: none"> <li>● The students will perform sectioning of fresh and preserved specimens of Bryophytes, Pteridophytes and Gymnosperms and observe microscopic details to understand their structural variations.</li> <li>● The students will observe specimens to study floral morphology.</li> <li>● The students will section specimens to study and compare anatomical differences in dicotyledonous and monocotyledonous plants.</li> <li>● Students will study differences in epidermal outgrowths as a taxonomic character and they will also classify different adaptations to defense and storage.</li> <li>● The students will understand the principle of working of a colorimeter based on Beer Lambert’s law and will apply it for analyzing plant pigments.</li> </ul> <p><b>Learning Outcomes:</b></p> <ul style="list-style-type: none"> <li>● Study of morphological characters will help them to easily identify the field plants.</li> <li>● Students will understand the use of anatomical variations to classify plants.</li> <li>● Students will learn the importance of Ethno-medicinal plants for various ailments.</li> </ul>
	<ol style="list-style-type: none"> <li>1. Study of stages in the life cycle of <i>Riccia</i> from fresh/ preserved material and permanent slide</li> <li>2. Study of stages in the life cycle of <i>Marchantia</i> from fresh/ preserved material and permanent slide</li> <li>3. Study of stages in the life cycle of <i>Selaginella</i> from fresh/ preserved material and permanent slide</li> <li>4. Study of Stellar evolution from permanent slide.</li> <li>5. Study of stages in the life cycle of <i>Thuja</i> from fresh/ preserved material and permanent Slides</li> <li>6. Study of stages in the life cycle of <i>Araucaria</i> from fresh/ preserved material and permanent Slides</li> <li>7. Morphology of:             <ul style="list-style-type: none"> <li>▪ Root</li> <li>▪ Stem</li> <li>▪ Leaves (Morphometry)</li> <li>▪ Inflorescence</li> <li>▪ Flower</li> <li>▪ Fruit</li> </ul> </li> <li>8. Study of the family:             <ul style="list-style-type: none"> <li>Malvaceae.</li> <li>Amaryllidaceae.</li> </ul> </li> </ol>

**9.** Study of simple and complex tissues (Identification with permanent slides)

**10.** Epidermal outgrowths with the help of mountings

- Unicellular: *Gossypium*/ Radish.
- Multicellular: *Lantana* /Sunflower
- Glandular: *Drosera* (Identification with permanent slides)
- Stinging: *Urtica* (Identification with permanent slides)
- Peltate: *Thespesia*
- Stellate: *Sida acuta*
- T-shaped: *Avicennia*

**11.** Study of dicot and monocot stomata.

**12.** Identification of starch grains from potato and rice.

**13.** Study of ergastic substances, incrustations, adcrustations, lithocysts.

**14.** Primary structure of:

- Dicot and monocot root
- Dicot and monocot stem
- Dicot and monocot leaf

**15.** Study of Beer Lambert's Law

**16.** Study of absorption spectrum of plant pigments.

**17.** Identification of plants used in:

- Skin ailments
- Wound healing and aging
- Liver ailments
- Fever
- Diabetes

# Evaluation Scheme

## [A] Evaluation scheme for Theory Courses

### I. Continuous Assessment (C.A.) - 40 Marks

- (i) C.A. - I: Test – 20 Marks
- (ii) C.A. - II: Assignment/Project/on the spot surprise class test - 20 Marks

### II. Semester End Examination (SEE)- 60 Marks

## [B] Evaluation scheme for Practical courses (SEE – 60 Marks)

- **Internal Assessment -40 Marks: Journal/Viva/Experiment**

### **NOTE:**

1. A minimum of TWO field excursions (with at least one beyond the limits of Mumbai) for habitat studies are compulsory. Field work of not less than eight hours duration is equivalent to one period per week for a batch of fifteen students.
2. A candidate will be allowed to appear for the practical examinations only if he/she submits a certified journal of F.Y.B.Sc. Botany and the Field Report or a certificate from the Head of the Department/Institute to the effect that the candidate has completed the practical course of F.Y.B.Sc. Botany as per the minimum requirements. In case of loss of journal, a candidate must produce a certificate from the Head of the Department/ Institute that the practical for the academic year were completed by the student. However, such a candidate will be allowed to appear for the practical examination but the marks allotted for the journal will not be granted.