



**Janardan Bhagat Shikshan Prasarak Sanstha's**  
**CHANGU KANA THAKUR**  
**ARTS, COMMERCE & SCIENCE COLLEGE,**  
**NEW PANVEL (AUTONOMOUS)**

**Re-accredited 'A+' Grade by NAAC**  
**'College with Potential for Excellence' Status Awarded by UGC**  
**'Best College Award' by University of Mumbai**

**Program: B.Sc**

**Revised Syllabus of F.Y.B.Sc. Botany**  
**Choice Based Credit & Grading System (75:25)**  
**w.e.f. Academic Year 2019-20**

<b>Sr. No.</b>	<b>Heading</b>	<b>Particulars</b>
1	Title of Course	Botany
2	Eligibility for Admission	12 <sup>th</sup> Science of all recognised Board
3	Passing marks	40%
4	Ordinances/Regulations (if any)	
5	No. of Semesters	Two
6	Level	U.G.
7	Pattern	Semester (75:25)
8	Status	Revised
9	To be implemented from Academic year	2019-2020

## **Preamble of the syllabus**

Revised syllabus for F.Y.B.Sc. Botany has been prepared to enhance the existing syllabus so as to make it more contextual, relevant and commensurate with the learning capabilities of the learners of first year Botany.

Plant Sciences today are an amalgamation of traditional Botany and various applied aspects such as modern concepts in Phytochemistry, Molecular biology, Plant biotechnology, Environmental studies etc.

The well organized curriculum including basic as well as advanced concepts in plant sciences shall develop interest in the minds of the learners and inspire them to pursue higher studies in Botany. The curriculum would expose the learners to the entrepreneurial potential of plant sciences so as to become self-employed or obtain gainful employment in Plant Sciences based industries. knowledge are among such important aspects.

## **Objectives of the Course:**

1. To introduce the learners to various plant groups from simple to the most advanced.
2. To create awareness among the learners about the urgency of environmental conservation and sustainable use of plants
3. To make the students aware of applications of different plant systems, processes and products in various industries
4. To highlight the entrepreneurial potential of plant sciences to become self-employed in the future.
5. To equip the learners with skills of analytical and logical reasoning, keen observation, collection of scientific data, objective recording of results, drawing conclusions etc. and other such fundamental skills associated with the study of any science subject.
6. To create a sound foundation for further studies in Botany.
7. To facilitate career building in Botany.

**Course Outcome:** A student of F.Y.B.Sc. Botany upon completion of the course will be equipped with following skill sets:

1. Ability to identify basic plant groups, their specific role in the ecosystem with reference to food chains, recycling of nutrients etc.
2. Awareness and basic understanding of environmental balance and the necessity for conservation.
3. Ability to study internal structures of plant organs and its applications in various allied processes.
4. Knowledge about handling plant specimen, their preservation, sectioning etc.
5. Knowledge about plant physiology and its applications in various industrial processes.
6. Basic understanding of secondary metabolites and their role in health care.
7. Basic understanding about plant taxonomy and field studies.
8. Augmentation of analytical and logical reasoning, observational skills, objective recording of results etc. and other such fundamental skills associated with the study of any science subject.

### **F. Y. B. Sc. Botany**

For the subject of botany there shall be two papers for 45 lectures each comprising of three units of 15 L each.

#### **Semester-I**

##### **Paper I: Plant Diversity I**

1. Unit I : Algae
2. Unit II: Fungi
3. Unit III: Bryophytes

##### **Paper II: Form and Function I**

1. Unit I : Cell Biology
2. Unit II: Ecology
3. Unit III: Genetics

#### **Semester-II**

##### **Paper I: Plant Diversity I**

1. Unit I : Pteridophyta
2. Unit II: Gymnosperms
3. Unit III: Angiosperms

##### **Paper II: Form and Function I**

1. Unit I : Anatomy
2. Unit II: Physiology
3. Unit III: Medicinal Botany

**Scheme of Examination for Each Semester:**

Internal Evaluation: 25 (20 marks internal test and 05 marks for attendance)

Semester End Examination: 75 Marks will be as follows -:

I	<b>Theory:</b>	
	Each theory paper shall be of two and half hour duration.	
	All questions are compulsory and will have internal options.	
	Q-1	From Unit – I (having internal options.) 20 M
	Q-2	From Unit – II (having internal options.) 20M
	Q-3	From Unit – III (having internal options.) 20M
	Q-4	Questions from all the THREE Units with equal weightage of marks Allotted to each Unit. 15 M
II	Practical	The External examination per practical course will be conducted as per the Following scheme.
<b>Sr. No.</b>	<b>Particulars of External Practical Examination</b>	<b>Marks%</b>
1	Laboratory Work	35+35 =70
2	Journal	5+5 = 10
3	Viva	5+5 = 10
4	Field Report	5+5 = 10
	<b>TOTAL</b>	<b>100</b>

**Choice Based Credit Grading and Semester System (CBCGS)  
To be implemented from the Academic year 2019-2020**

<b>F.Y.B.Sc. Botany Semester I</b>		<b>L</b>	<b>CR</b>
<b>USC1BO1 Paper I Plant Diversity I</b>		<b>45</b>	<b>2</b>
<b>Unit I</b>		<b>15</b>	
<b>Algae</b>			
1.	General Characters of Cyanophyceae with reference to thallus structure, pigments, reserve food, reproduction and life cycle patterns		
2.	General Characters of Chlorophyceae with reference to thallus structure, pigments, reserve food, reproduction and life cycle patterns		
3.	Structure, Life cycle and systematic position of <i>Spirogyra</i> and <i>Nostoc</i>		
4.	Economic importance of Algae		
<b>Unit II</b>		<b>15</b>	
<b>Fungi</b>			
1.	General Characters of Phycomycetae with reference to thallus structure, nutrition, reproduction and life cycle patterns		
2.	Structure, Life cycle and systematic position of <i>Rhizopus</i> and <i>Saprolegnia</i>		
3.	Economic importance of Fungi		
4.	Modes of nutrition in Fungi (Saprophytism and Parasitism)		
<b>Unit III</b>		<b>15</b>	
<b>Bryophyta</b>			
1.	General Characters of Hepaticae		
2.	Structure, Life cycle and systematic position of <i>Riccia</i>		

<b>F.Y.B.Sc. Botany Semester I</b>		<b>L</b>	<b>CR</b>
<b>USC1BO2 Paper II Form and Function I</b>		<b>45</b>	<b>2</b>
<b>Unit I</b>		<b>15</b>	
<b>Cell Biology</b>			
1.	General Structure of Plant Cell: Cell Wall, Plasma Membrane (bilayer lipid structure, fluid mosaic model)		
2.	Ultrastructure and functions of following cell organelles: Endoplasmic reticulum, Mitochondrion and Chloroplast		
<b>Unit II</b>		<b>15</b>	
<b>Ecology</b>			
1	Concept of Ecosystem, Components of Ecosystem, Biotic interactions		
2	Energy Pyramids, Energy Flow in an Ecosystem		
3	Types of Ecosystems: Aquatic and Terrestrial		
<b>Unit III</b>		<b>15</b>	
<b>Genetics</b>			
1.	Phenotype/Genotype, Mendelian Genetics; monohybrid; dihybrid; test cross; back cross ratios		
2.	Epistatic and non-epistatic interactions, multiple alleles		

<b>F.Y.B.Sc. Botany Semester I</b>		<b>L</b>	<b>CR</b>
<b>USC1BOP PRACTICAL Paper I – Plant Diversity I</b>		<b>30</b>	<b>1</b>
1.	Study of stages in the life cycle of <i>Nostoc</i> from fresh/ preserved material and permanent slides.		
2.	Study of stages in the life cycle of <i>Spirogyra</i> from fresh/ preserved material and permanent slides.		
3.	Economic importance of algae: <i>Ulva</i> (Biofuel), <i>Spirulina</i> (Neutraceutical), <i>Gelidium</i> (Agar), <i>Nostoc</i> (Bio-fertilizer and agent for Phytoremediation)		
4.	Study of stages in the life cycle of <i>Saprolegnia</i> from fresh/ preserved material and permanent slides.		
5.	Study of stages in the life cycle of <i>Rhizopus</i> from fresh/ preserved material and permanent slides.		
6.	Economic importance of Fungi: Mushroom, Yeast, wood rotting fungi (any bracket fungus).		
7.	Study of stages in the life cycle of <i>Riccia</i> from fresh/ preserved material.		
8.	Study of stages in the life cycle of <i>Riccia</i> with the help of permanent slides.		

<b>F.Y.B.Sc. Botany Semester I</b>		<b>L</b>	<b>CR</b>
<b>USC1BOP PRACTICAL Paper II – Form and Function I</b>		<b>30</b>	<b>1</b>
1.	Gram Staining of Bacteria and Yeast		
2.	Cell inclusions: Starch grains (Potato and Rice, Euphorbia latex); Aleurone Layer (Maize)		
3.	Cystolith ( <i>Ficus</i> ); Raphides ( <i>Pistia</i> ); Sphaeraphides ( <i>Opuntia</i> ).		
4.	Staining and observation of mitochondria from <i>Allium cepa</i> bulb Identification of cell organelles with the help of photomicrograph: Plastids: Chloroplast, Amyloplast, Endoplasmic Reticulum, Nucleus and Mitochondrion		
5.	Identification of plants adapted to different environmental conditions: Hydrophytes: Floating: Free floating ( <i>Pistia/Eichornia</i> ); Rooted floating ( <i>Nymphaea</i> ); Submerged ( <i>Hydrilla</i> )		
6.	Mesophytes (any common plant); Hygrophytes ( <i>Typha/Cyperus</i> )		
7.	Xerophytes : Succulent ( <i>Opuntia</i> ); Woody Xerophyte ( <i>Nerium</i> ); Halophyte ( <i>Avicennia</i> pneumatophore) No sections in ecology, only identification and description of specimens. Morphological adaptations only.		
8.	Biotic Interactions: 1.Mutualism example; Root nodules in Leguminous plants, Lichens and Coralloid roots in <i>Cycas</i> 2. Parasitism example; <i>Cuscuta</i> and any parasitic fungus.		

9.	Calculation of mean, median, mode and standard deviation.		
10.	Frequency distribution, graphical representation of data- frequency polygon, histogram, pie chart.		
11.	Study of Karyotypes: Human: Normal male and female.		

<b>F.Y.B.Sc. Botany Semester II</b>		<b>L</b>	<b>CR</b>
<b>USC2BO1 Paper I Plant Diversity I</b>		<b>45</b>	<b>2</b>
<b>Unit I</b>		<b>15</b>	
<b>Pteridophytes</b>			
1.	Structure, Life cycle, Systematic Position and Alternation of Generations in <i>Nephrolepis</i>		
2.	Stelar Evolution		
<b>Unit II</b>		<b>15</b>	
<b>Gymnosperms</b>			
1.	Structure, Life cycle, Systematic Position and Alternation of Generations in <i>Cycas</i>		
2.	Economic importance of Gymnosperms		
<b>Unit III</b>		<b>15</b>	
<b>Angiosperms</b>			
1.	Leaf Morphology of the prescribed Angiosperm families with respect to: Incisions of leaf, venation, phyllotaxy, types of stipules, leaf apex, leaf margin, leaf base, leaf shapes.		
2.	Inflorescence: Racemose: simple raceme, spike, catkin, spadix, and panicle. Cymose: monochasial, dichasial, polychasial. Compound: corymb, umbel, cyathium, capitulum, verticillaster, hypanthodium.		
3.	Study of following families: Cruciferae (Brassicaceae), Apocynaceae, Euphorbiaceae and Amaryllidaceae.		

<b>F.Y.B.Sc. Botany Semester II</b>		<b>L</b>	<b>CR</b>
<b>USC2BO2 Paper II Form and Function I</b>		<b>45</b>	<b>2</b>
<b>Unit I</b>		<b>15</b>	
<b>Anatomy</b>			
1.	Simple Tissues, Complex Tissues		
2.	Primary Structure of Dicot and Monocot Root, Stem and Leaf		
3.	Epidermal Tissue System, Types of Hair, monocot and Dicot Stomata		
<b>Unit II</b>		<b>15</b>	
<b>Physiology</b>			
1.	Water relations in Plants: Water Potential, Pressure Potential, Solute Potential		
2.	Enzymes: Classification, Mechanism of Action, Kinetics and Inhibition		
<b>Unit III</b>		<b>15</b>	
<b>Medicinal Botany</b>			
1.	Concept of primary and secondary metabolites, difference between primary and secondary metabolites.		



2.	Grandma's pouch: Following plants have to be studied with respect to botanical source, part of the plant used, and active constituents' present and medicinal uses: <i>Ocimum sanctum</i> , <i>Adathoda vasica</i> , <i>Zinziber officinale</i> , <i>Curcuma longa</i> , <i>Santalum album</i> , <i>Aloe vera</i> .		
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<b>F.Y.B.Sc. Botany Semester II</b>		<b>L</b>	<b>CR</b>
<b>USC2BOP PRACTICAL Paper I – Plant Diversity I</b>		<b>30</b>	<b>1</b>
1.	Study of stages in the life cycle of <i>Nephrolepis</i> : Mounting of ramentum, hydathode, T.S. of rachis.		
2.	T.S. of pinna of <i>Nephrolepis</i> passing through sorus.		
3.	Stelar evolution with the help of permanent slides: Protostele: haplostele, actinostele, plectostele, mixed protostele, siphonostele: ectophloic, amphiphloic, dictyostele, eustele and atactostele.		
4.	<i>Cycas</i> : T.S of leaflet ( <i>Cycas</i> pinna)		
5.	Megasporophyll, microsporophyll, coralloid root, microspore, L.S. of ovule of <i>Cycas</i> – all specimens to be shown.		
6.	Economic importance of Gymnosperms: <i>Pinus</i> ( turpentine, wood, seeds)		
7.	Leaf morphology : as per theory		
8.	Types of inflorescence: as per theory		
9.	Cruciferae (Brassicaceae), Apocynaceae		
10.	Euphorbiaceae, Amaryllidaceae		

<b>F.Y.B.Sc. Botany Semester II</b>		<b>L</b>	<b>CR</b>
<b>USC2BOP PRACTICAL Paper II – Form and Function I</b>		<b>30</b>	<b>1</b>
1.	Primary structure of dicot and monocot root.		
2.	Primary structure of dicot and monocot stem.		
3.	Study of Dicot and Graminaceous Stomata Epidermal outgrowths: with the help of mountings Unicellular: <i>Gossypium</i> /Radish Multicellular: <i>Lantana</i> /Sunflower Glandular: <i>Drosera</i> and Stinging: <i>Urtica</i> – only identification with the help of permanent slides. Peltate: <i>Thespesia</i> Stellate: <i>Erythrina</i> / <i>Sida acuta</i> / <i>Solanum</i> / <i>Helecteris</i> T-shaped: <i>Avicennia</i>		
4.	Determination of Solute Potential of suitable plant Material by Plasmolytic Method		
5.	Study of Effect of pH and Temperature on Amylase Activity		
6.	Study of Activity of Enzyme Lipase		

7	Change in colour because of change in pH: Anthocyanin: Black grapes/Purple cabbage/ <i>Clitoria</i> flowers		
8	Test for tannins, alkaloids and terpenoids from suitable plant material		
9	Identification of plants or plant parts for grandma's pouch as per theory.		

**References:**

**Paper I: Semester I**

**Unit I: Algae**

1. College Botany Volume I and II Gangulee, Das and Dutta latest edition. Central Education enterprises
2. Cryptogamic Botany Volume I and II by G M Smith McGraw Hill.
3. Botany for Degree Students, Algae by B.R.Vasishtha S. Chand Publications

**Unit II: Fungi**

4. Botany for Degree Students, Fungi by B.R.Vasishtha S. Chand Publications

**Unit III: Bryophytes**

5. Botany for Degree Students, Bryophyta by B.R.Vasishtha S. Chand Publications

**Paper II: Semester I**

**Unit I: Cell Biology**

1. Cell Biology by De Robertis, Wolters, Kluver
2. Cell Biology by Channarayappa, Universities Press

**Unit II: Ecology**

3. Fundamentals of Ecology by E P Odum and G W Barrett. Thompson Asia Pvt Ltd. Singapore.

**Unit III: Genetics**

4. Genetics by Russel. Wesley Longman inc. publishers. ( 5<sup>th</sup> edition)

**Paper I: Semester II**

**Unit I: Pteridophyta**

1. Botany for Degree Students, Pteridophyta by B.R.Vasishtha S. Chand Publications

**Unit II: Gymnosperms**

2. Botany for Degree Students, Gymnosperms by P.C.Vasishtha S. Chand Publications

**Unit III: Angiosperms**

3. Taxonomy of Angiosperms by B.P. Pandey S. Chand Publications

**Paper II: Semester II**

**Unit I: Anatomy**

4. Plant Anatomy by B. P. Pandey, S. Chand Publications

**Unit II: Physiology**

5. Plant Physiology by V. Verma, Athena Academics
6. Plant Physiology by Taiz and Zeiger Sinauer Associates inc. publishers

**Unit III: Medicinal botany**

7. Pharmacognosy by Kokate, Purohit, Nirali Prakashan

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