

## CERTIFICATE COURSE IN MICROBIAL TECHNOLOGY & CLASSICAL BOTANY / B.Sc.-I

Programme: *Certificate Course in Microbial Technology & Classical Botany*

Year: I

Semester:  
I/Paper-I

Subject: Botany

Course Code:  
B040101T

Course Title: Microbiology & Plant Pathology

**Course outcomes:** After the completion of the course the students will be able to:

1. Develop understanding about the classification and diversity of different microbes including viruses, Algae, Fungi & Lichens & their economic importance.
2. Develop conceptual skill about identifying microbes, pathogens, biofertilizers & lichens.
3. Gain knowledge about developing commercial enterprise of microbial products.
4. Learn host –pathogen relationship and disease management.
5. Learn Presentation skills (oral & writing) in life sciences by usage of computer & multimedia.
6. Gain Knowledge about uses of microbes in various fields.
7. Understand the structure and reproduction of certain selected bacteria algae, fungi and lichens
8. Gain Knowledge about the economic values of this lower group of plant community.

Credits: 4

Core Compulsory

**CERTIFICATE COURSE IN MICROBIAL TECHNOLOGY & CLASSICAL BOTANY / B.Sc.-I**

Programme: *Certificate Course In Microbial Technology & Classical Botany*

Year: I

Semester: I/Paper-II

Subject: **Botany**

Course Code: B040102P

Course Title: **Techniques in Microbiology & Plant Pathology**

**Course outcomes:** After the completion of the course the students will be able:

1. Understand the instruments, techniques, lab etiquettes and good lab practices for working in a microbiology laboratory.
2. Develop skills for identifying microbes and using them for Industrial, Agriculture and Environment purposes.
3. Practical skills in the field and laboratory experiments in Microbiology & Pathology.
4. learn to identify Algae, Lichens and plant pathogens along with their Symbiotic and Parasitic associations.
5. Can initiate his own Plant & Seed Diagnostic Clinic
6. Can start own enterprise on microbial products

<b>Programme /Class: B.Sc.-I/ Certificate Course In Microbial Technology &amp; Classical Botany</b>	<b>Year: I</b>	<b>Semester: III Paper-I</b>
<b>Subject: Botany</b>		
<b>Course Code: B040201T</b>	<b>Course Title: Archegoniates and Plant Architecture</b>	
<b>Course outcomes:</b> After the completion of the course the students will be able to: <ol style="list-style-type: none"> <li>1. Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms</li> <li>2. Understanding of plant evolution and their transition to land habitat.</li> <li>3. Understand morphology, anatomy, reproduction and developmental changes therein through typological study and create a knowledge base in understanding the basis of plant diversity, economic values &amp; taxonomy of plants</li> <li>4. Understand the details of external and internal structures of flowering plants.</li> </ol>		
<b>Credits: 4</b>	<b>Core Course</b>	

<b>Programme /Class: B.Sc.-I/ Certificate Course In Microbial Technology &amp; Classical Botany</b>	<b>Year: I</b>	<b>Semester: III Paper-I</b>
<b>Subject: Botany</b>		
<b>Course Code: B040201T</b>	<b>Course Title: Archegoniates and Plant Architecture</b>	
<p><b>Course outcomes:</b> After the completion of the course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms</li> <li>2. Understanding of plant evolution and their transition to land habitat.</li> <li>3. Understand morphology, anatomy, reproduction and developmental changes therein through typological study and create a knowledge base in understanding the basis of plant diversity, economic values &amp; taxonomy of plants</li> <li>4. Understand the details of external and internal structures of flowering plants.</li> </ol> <p style="text-align: right;"><b>Core Compulsory</b></p>		

Programme/Class: <b><i>Certificate Course In Microbial Technology &amp; Classical Botany</i></b>	Year: <b>I</b>	Semester: <b>II</b> <b>Paper-II (Practical)</b>
Subject: <b>Botany</b>		
Course Code: <b>B040202P</b>	Course Title: <b>Land Plants Architecture</b>	
<p><b>Course outcomes:</b></p> <ol style="list-style-type: none"> <li>1. The students will be made aware of the group of plants that have given rise to land habit and the flowering plants. Through field study they will be able to see these plants grow in nature and become familiar with the biodiversity.</li> <li>2. Students would learn to create their small digital reports where they can capture the zoomed in and zoomed out pictures as well as videos in case they are able to find some rare structure or phenomenon related to these plants.</li> <li>3. Develop an understanding by observation and table study of representative members of phylogenetically important groups to learn the process of evolution in a broad sense.</li> <li>4. Understand morphology, anatomy, reproduction and developmental changes therein through typological study and create a knowledge base in understanding plant diversity, economic values &amp; taxonomy of lower group of plants</li> <li>5. Understand the composition, modifications, internal structure &amp; architecture of flowering plants for becoming a Botanist.</li> </ol>		
Credits: <b>2</b>	Core Compulsory	

## ***Diploma in Plant Identification, Utilization & Ethnomedicine***

Programme /Class: ***Diploma in Plant Identification, Utilization & Ethnomedicine***

Year: **II**

Semester: **III**  
**Paper-I**

Subject: **Botany**

Course Code: **B040301T**

Course Title: **Flowering Plants Identification & Aesthetic Characteristics**

### **Course outcomes:**

After the completion of the course the students will be able to:

1. To gain an understanding of the history and concepts underlying various approaches to plant taxonomy and classification.
2. To learn the major patterns of diversity among plants, and the characters and types of data used to classify plants.
3. To compare the different approaches to classification with regard to the analysis of data.
4. To become familiar with major taxa and their identifying characteristics, and to develop in depth knowledge of the current taxonomy of a major plant family.
5. To discover and use diverse taxonomic resources, reference materials, herbarium collections, publications.
6. For the entrepreneur career in plants, one can establish a nursery, Start a landscaping business, Set up a farm Or Run a plantation consultancy firm

Programme/Class: : <i>Diploma in Plant Identification, Utilization &amp; Ethnomedicine</i>	Year: <b>II</b>	Semester: <b>III</b> <b>Paper-II (Practical)</b>
Subject: <b>Botany</b>		
Course Code: B040302P	Course Title: <b>Plant Identification technology</b>	
<p><b>Course outcomes:</b> After the completion of the course the students will be able:</p> <ol style="list-style-type: none"> <li>1. To learn how plant specimens are collected, documented, and curated for a permanent record.</li> <li>2. To observe, record, and employ plant morphological variation and the accompanying descriptive terminology.</li> <li>3. To gain experience with the various tools and means available to identify plants.</li> <li>4. To develop observational skills and field experience.</li> <li>5. To identify a taxonomically diverse array of native plants.</li> <li>6. To recognize common and major plant families.</li> <li>7. To Understand aesthetic characters of flowering plants by making-landscapes,gardens,bonsai,miniatures</li> <li>8. Comprehend the concepts of plant taxonomy and classification of Angiosperms.</li> </ol>		
Credits: 2	Core Compulsory	

Programme /Class: <i>Diploma in Plant Identification, Utilization &amp; Ethnomedicine</i>	Year: <b>II</b>	Semester: <b>IV</b> <b>Paper-I</b>
<b>Subject: Botany</b>		
Course Code: B040401T	Course Title: <b>Economic Botany, Ethnomedicine and Phytochemistry</b>	
<p><b>Course outcomes:</b></p> <p>After the completion of the course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand about the uses of plants –will know one plant-one employment</li> <li>2. Understand phytochemical analysis related to medicinally important plants and economic products produced by the plants</li> <li>3. know about the importance of Medicinal plants and its useful parts, economically important plants in our daily life and also about the traditional medicines and herbs, and its relevance in modern times.</li> </ol>		



Programme: *Diploma in Plant Identification, Utilization & Ethnomedicine* | Year: **II** | Semester: **IV Paper-II**

Subject: **Botany**

Course Code: B040402P

Course Title: **Commercial Botany & Phytochemical Analysis**

**Course outcomes:** After the completion of the course the students will be able to:

1. Know about the commercial products produced from plants.
2. Gain the knowledge about cultivation practices of some economic crops.
3. Understand about the ethnobotanical details of plants.
4. Learn about the chemistry of plants & herbal preparations
5. Can become a protected cultivator, aromatic oil producer, Pharmacologist or quality analyst in drug company.

Programme: <i>Diploma in Plant Identification, Utilization &amp; Ethnomedicine</i>	Year: II	Semester: IV Paper-II
Subject: <b>Botany</b>		
Course Code: B040402P	Course Title: <b>Commercial Botany &amp; Phytochemical Analysis</b>	
<p><b>Course outcomes:</b> After the completion of the course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Know about the commercial products produced from plants.</li> <li>2. Gain the knowledge about cultivation practices of some economic crops.</li> <li>3. Understand about the ethnobotanical details of plants.</li> <li>4. Learn about the chemistry of plants &amp;herbal preparations</li> <li>5. Can become a protected cultivator, aromatic oil producer, Pharmacologist or quality analyst in drug company.</li> </ol>		

## BACHELOR OF SCIENCE (BOTANY)

Programme/Class: *Bachelor of Science*

Year: III

Semester: V  
Paper-I

Subject: BOTANY

Course Code: B040501T

Course Title: **Plant Physiology, Metabolism & Biochemistry**

### **Course outcomes:**

After the completion of the course the students will be able to:

1. Understand the role of Physiological and metabolic processes for plant growth and development.
2. Learn the symptoms of Mineral Deficiency in crops and their management.
3. Assimilate Knowledge about Biochemical constitution of plant diversity.
4. Know the role of plants in development of natural products, nutraceuticals, dietary supplements, antioxidants

Programme/Class: <b>Bachelor of Science</b>	Year: <b>III</b>	Semester: <b>V</b> <b>Paper-II</b>
Subject: <b>BOTANY</b>		
Course Code: <b>B040502T</b>	Course Title: <b>Molecular Biology &amp; Bioinformatics</b>	
<p><b>Course outcomes:</b>  After the completion of the course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand nucleic acids, organization of DNA in prokaryotes and Eukaryotes, DNA replication mechanism, genetic code and transcription process.</li> <li>2. Know about Processing and modification of RNA and translation process, function and regulation of expression.</li> <li>3. Gain working knowledge of the practical and theoretical concepts of bioinformatics</li> </ol>		
Credits: <b>4</b>	<b>CC / Elective</b>	

Programme/Class: <i>Bachelor of Science</i>	Year: III	Semester: V Paper-III
Subject: <b>Botany</b>		
Course Code: B040503P	Course Title: <i>Experiments in physiology, Biochemistry &amp; molecular biology</i>	
<p><b>Course outcomes:</b></p> <p>After the completion of the course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Know and authentic the physiological processes undergoing in plants along with their metabolism</li> <li>2. Identify Mineral deficiencies based on visual symptoms</li> <li>3. Understand and develop skill for conducting molecular experiments for genetic engineering</li> </ol>		

Programme/Class: <b>Bachelor of Science</b>	Year: <b>III</b>	Semester: <b>V</b> Paper- <b>IV</b>
Subject: <b>BOTANY</b>		
Course Code: - <b>B040504R</b>	Course Title: <b>Project in Botany for Pre-graduation</b>	
<p><b>Course outcomes:</b></p> <ul style="list-style-type: none"> <li>● Project work will supplement field experimental learning and deviations from classroom and laboratory transactions.</li> <li>● project work will enhance the capability to apply gained knowledge and understanding for selecting, solving and decision-making processes.</li> <li>● It will promote creativity and the spirit of enquiry in learners.</li> <li>● They will learn to consult Scientists, libraries, laboratories and herbariums and learn importance of discussions, Botanical &amp; field trips, print and electronic media, internet etc. along with data documentation, compilation, analysis &amp; representation in form of dissertation writing.</li> <li>● It will enhance their abilities, enthusiasm, and interest.</li> </ul>		
Credits: <b>03</b>		

Programme/Class: <i>Bachelor of Science</i>	Year: <b>III</b>	Semester: <b>VI</b> <b>Paper-I</b>
Subject: <b>Botany</b>		
Course Code: <b>B040601T</b>	Course Title: <b>Cytogenetics, Plant Breeding &amp; Nanotechnology</b>	
<p><b>Course outcomes:</b> After the completion of the course the students will be able:</p> <ol style="list-style-type: none"> <li>1. Acquire knowledge on cell ultrastructure.</li> <li>2. Understand the structure and chemical composition of chromatin and concept of cell division.</li> <li>3. Interpret the Mendel's principles, acquire knowledge on cytoplasmic inheritance and sex-linked inheritance.</li> <li>4. Understand the concept of 'one gene one enzyme hypothesis' along with the molecular mechanism of mutation.</li> </ol>		
Credits: <b>4</b>	Course Coordinator: _____	

Programme/Class: <i>Bachelor of Science</i>	Year: III	Semester: VI Paper-II
Subject: <b>Botany</b>		
Course Code: B040602T	Course Title: <b>Ecology &amp; Environment</b>	
<p><b>Course outcomes:</b></p> <ol style="list-style-type: none"> <li>1. acquaint the students with complex interrelationship between organisms and environment;</li> <li>2. make them understand methods for studying vegetation, community patterns and processes, ecosystem functions, and principles of phytogeography.</li> <li>3. This knowledge is critical in evolving strategies for sustainable natural resource management and biodiversity conservation.</li> </ol>		
Credits: 4		



Programme/Class: <i>Bachelor of Science</i>	Year: <b>III</b>	Semester: <b>VI</b> <b>Paper-III</b>
<b>Subject: Botany</b>		
Course Code: <b>B040603P</b>	<b>Course Title: Lab on Cytogenetics, Conservation &amp; Environment management</b>	
<b>Course outcomes:</b> After the completion of the course the students will be able:		
<ol style="list-style-type: none"> <li>1. To perform all experiments related to the semester-i.e. Plant tissue cultured plants, conducting breeding on field, conserving and depolluting the environment.</li> <li>2. Can be employed in environment impact assessment companies &amp; start his own venture</li> </ol>		

Programme/Class: <b>Bachelor of Science</b>	Year: <b>III</b>	Semester: <b>VI /Project-II/ Paper-IV</b>
Subject: <b>BOTANY</b>		
Course Code: - <b>B040604R</b>	Course Title: <b>Project in Botany for Graduation</b>	
<p><b>Course outcomes:</b> After completing this course a student will have:</p> <ul style="list-style-type: none"> <li>● Project work will supplement field experimental learning and deviations from classroom and laboratory transactions.</li> <li>● project work will enhance the capability to apply gained knowledge and understanding for selecting, solving and decision-making processes</li> <li>● It will promote creativity and the spirit of enquiry in learners.</li> <li>● They will learn to consult Scientists, libraries, laboratories and herbariums and learn importance of discussions, Botanical &amp; field trips, print and electronic media, internet etc. along with data documentation, compilation, analysis &amp; representation in form of dissertation writing</li> <li>● It will enhance their abilities, enthusiasm, and interest.</li> </ul>		