**DEPARTMENT OF BOTANY**
**UG PROGRAMME**
**B.Sc. BOTANY**

## PROGRAMME OUTCOMES (POs):

The three years (Six Semesters) UG Programme (B.Sc.) is designed to:

**PO 1:** Ready students for higher studies on a wide base of inter-related subjects

**PO 2:** Enable students to make informed choices regarding their future academic stream or endeavours

**PO 3:** Arm students with the necessary experience to correlate theory with practical aspects

## PROGRAMME SPECIFIC OUTCOMES (POs):

Upon completion of the UG programme, the student would be equipped with the following-

**PSO 1:** Knowledge necessary for identification of plants and microorganisms

**PSO 2:** Understanding of the importance of plants in human life

**PSO 3:** Skills related to laboratory as well as field work

**PSO 4:** Knowledge about the applications of plants in various industries

**PSO 5:** Awareness about environmental conservation and sustainable use of plants

**PSO 6:** Intellect to assess the socio-economic challenges related to plant sciences

**PSO 7:** Aptitude to comprehend the role of microbes and higher organisms in biotechnology

**PSO 8:** Necessary academic skills for a successful career in Botany and related spheres

**PSO 9:** Aptitude and creativity required to become a successful entrepreneur in related enterprises

## COURSE STRUCTURE:

| Year | Semester | Paper | Paper Title | MM |
|---|---|---|---|---|
| **I** | **I** | **I** | Diversity of Plant Viruses, Bacteria, & Fungi | 100 |
| | | **II** | Diversity of Algae, Lichens, and Bryophytes | 100 |
| | **II** | **III** | Diversity of Pteridophytes, Gymnosperms & Elementary Palaeobotany | 100 |
| | | **Practical** | Based on Papers I, II and III | 100 |
| | | | **Total** | **400** |

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|---|---|---|---|---|
| **II** | **III** | **IV** | Angiosperms: Taxonomy, Morphology, and Embryology | 100 |
| | | **Practical** | Based on Papers IV, V and VI | 100 |
| | **IV** | **V** | Cytology, Genetics | 100 |
| | | **VI** | Plant Physiology | 100 |
| | | | **Total** | **400** |
| **III** | **V** | **VII** | Plant Biochemistry | 100 |
| | | **VIII** | Plant Resource Utilization, Palynology and Biostatistics | 100 |
| | | **Practical** | Based on Papers VII, VIII, IX, X and XI | 100 |
| | **VI** | **IX** | Ecology, Soil Science and Evolution | 100 |
| | | **X** | Environmental Botany, Plant Pathology | 100 |
| | | **XI** | Plant Molecular Biology, Biotechnology | 100 |
| | | | **Total** | **600** |
| | | | **GRAND TOTAL** | **1400** |

## B.Sc. BOTANY SEMESTER I

## PAPER I: DIVERSITY OF PLANT VIRUSES, BACTERIA, & FUNGI [MM 100 (80+20)]

### COURSE OBJECTIVES:

The course content of this paper aims to apprise the students of the differences between prokaryotes and eukaryotes. The students will be taught about the criteria and methods of classifying viruses, bacteria and fungi, along with their diversity and their importance. They will get an overview of the importance of microbes in nature and in our lives.

### COURSE OUTCOMES (COs):

**CO 1:** The study of viruses, bacteria and fungi will enable the students to compare and understand the key concepts of the diverse microbial world.

**CO 2:** Students will learn how viruses and sub-viral pathogens serve as important model systems in the study of the various phenomena common to life, in addition to the techniques and tools related to the study of plant viruses.

**CO 3:** Students will understand the role played by bacteria in the colonization of land by higher forms, and comprehend their relevance in the fields of molecular biology and biotechnology, environmental and industrial microbiology.

**CO 4:** Students will understand pathogenicity of fungi and host responses, and the importance of fungi as saprobes.

## B.Sc. BOTANY SEMESTER I
## PAPER II: DIVERSITY OF ALGAE, LICHENS, AND BRYOPHYTES [MM 100 (80+20)]

**COURSE OBJECTIVES:**

The content of this paper has been designed to allow students to comprehend the diversity of Cryptogams – Algae, Lichens and Bryophytes. Type study should enable students to understand the morphological and reproductive variations within each major group and individually. They will also learn to appreciate the ethno-botanical aspect and the economic importance of these groups.

**COURSE OUTCOMES (COs):**

**CO 1:** Recognize the Algal diversity, morphological and reproductive features of various genera, and classification of algae and lichens

**CO 2:** Understand the economic importance of algae and significance of lichens in relation to pollution.

**CO 3:** Knowledge of features, classification and affinities of Bryophytes, and diversity in gametophytic and sporophytic organization of Moss and Hornwort

**CO 4:** Recognize the diversity in the gametophytic and sporophytic organization of Liverworts.

## B.Sc. BOTANY SEMESTER II
## PAPER III: DIVERSITY OF PTERIDOPHYTES, GYMNOSPERMS, AND ELEMENTARY PALAEOBOTANY [MM 100 (80+20)]

**COURSE OBJECTIVES:**

The contents of the syllabus of this paper target at making the students aware of the existing diversity and economic significance of Pteridophytes and Gymnosperms. It aims at educating the students about morphological, anatomical and reproductive features based on type forms. Besides, evolution of stele in Pteridophytes and basic aspects of Palaeobotany have been included to prepare the students for higher studies.

**COURSE OUTCOMES (COs):**

**CO 1:** Knowledge of different classes of Pteridophytes along with their stelar details and seed habit

**CO 2:** Complete insight of the morphological, anatomical and reproductive diversity within the Pteridophytes

**CO 3:** Knowledge of morphological, anatomical and reproductive diversity within Gymnosperms

**CO 4:** Understanding of the economic importance of Gymnosperms and basic knowledge of fossils

## B.Sc. BOTANY SEMESTER III
## PAPER IV: ANGIOSPERMS: TAXONOMY, MORPHOLOGY AND EMBRYOLOGY
## [MM 100 (80+20)]

**COURSE OBJECTIVES:**

The framing of the syllabus has been done to apprise the students of the large taxonomical and reproductive diversity amongst seed plants. They would also be made aware of the different classifications, assisted by systematic study of representative families. It is also aimed to impart knowledge about meristems, growth, differentiation and development along with the reproductive behavior.

**COURSE OUTCOMES (COs):**

**CO 1:** Knowledge of Angiosperm systematics through classifications, herbaria, botanical gardens and hotspots

**CO 2:** Complete insight of the taxonomic & phylogenetic diversity and economic importance of representative families

**CO 3:** Clear concept of meristems, tissues, their growth and differentiation, and development of organs

**CO 4:** Understanding of the reproductive system in Angiosperms

## B.Sc. BOTANY SEMESTER IV
## PAPER V: CYTOLOGY, GENETICS [MM 100 (80+20)]

**COURSE OBJECTIVES:**

Course content of this paper has been formulated to introduce the concept of cell, cell organelles and chromosomes to the students. They will be educated about the hereditary nature of the chromosomes and patterns of inheritance followed for different characters. It is also aimed to make the students aware of the possible changes in existing germplasm through aberrations, ploidy changes and mutation.

**COURSE OUTCOMES (COs):**

**CO 1:** Knowledge of structure and function of cell and its organelles

**CO 2:** Understanding of the chromosome organization and cell division

**CO 3:** Understanding of the phenomenon of inheritance along with deviations and sex determination

**CO 4:** Knowledge of type, occurrence and mechanism of genomic alterations and their evolutionary significance

## B.Sc. BOTANY SEMESTER IV
## PAPER VI: PLANT PHYSIOLOGY [MM 100 (80+20)]

**COURSE OBJECTIVES:**

The content of the syllabus for this paper targets at making the students aware of the various physiological processes taking place in the plants. They will be taught phenomenon of ascent of sap, transpiration, mineral nutrient uptake and requirement, photosynthesis, respiration, nitrogen metabolism, growth and movement in a simple and systematic manner so that they can comprehend the complex topics. Besides, it is aimed to communicate the roles of enzymes and phytohormones to the students.

**COURSE OUTCOMES (COs):**

**CO 1:** Knowledge of different aspects of plant water relations, culture methods and mineral nutrients.

**CO 2:** Complete insight of plant enzymes and various perspectives of photosynthesis.

**CO 3:** Knowledge of major macromolecules, respiratory pathways and fatty acid metabolism.

**CO 4:** Understanding of general aspects of nitrogen metabolism, growth, phytohormones and movement in plants.

## B.Sc. BOTANY SEMESTER V
## PAPER VII: PLANT BIOCHEMISTRY [MM 100 (80+20)]

**COURSE OBJECTIVES:**

The contents of the syllabus for this paper have been designed with the objective of introducing the principles and fundamentals of plant biochemistry. It aims at apprising the students about the diversity of bio-molecules, their structure, properties and biological roles with plants.

**COURSE OUTCOMES (COs):**

**CO 1:** Knowledge of carbohydrates and the diversity of polysaccharides

**CO 2:** A clear understanding of fatty acids and lipids with respect to their structure and properties.

**CO 3:** Classification and organization of proteins and their biological roles

**CO 4:** An insight into the catalytic function of enzymes

## B.Sc. BOTANY SEMESTER V
## PAPER VIII: PLANT RESOURCE UTILIZATION, PALYNOLOGY AND BIOSTATISTICS [MM 100 (80+20)]

**COURSE OBJECTIVES:**

The contents of this paper aim at making the students aware of the large amount of plant resources that are used by them on a daily basis. It is aimed at imparting knowledge about the centres of crop origin and diversity, breeding practices, conservation methods and the uses of various crop plants. The other major objective is to introduce palynology and various biostatistical methods.

**COURSE OUTCOMES (COs):**

**CO 1:** Knowledge of centres of crop diversity and origin, domestication and uses of crop plants

**CO 2:** Complete insight into economically important plants

**CO 3:** Understanding of methods of conservation of plant resources

**CO 4:** Basic knowledge of pollen structure and utility of biostatistical methods

## B.Sc. BOTANY SEMESTER VI
## PAPER IX: ECOLOGY, SOIL SCIENCE AND EVOLUTION [MM 100 (80+20)]

**COURSE OBJECTIVES:**

The syllabus is designed to help students to gain an understanding of ecological diversity, plant succession and ecosystem. Additionally it has been designed to introduce the fundamentals of soil science, and theories of evolution

**COURSE OUTCOMES (COs):**

**CO 1:** Knowledge about the ecological groups of plants and their adaptations to diverse habitats

**CO 2:** Gain an insight into the diverse ecosystems and related food webs and ecological pyramids

**CO 3:** Information on soil types and their properties, and an understanding about problem soils

**CO 4:** Understand the concept of origin of life, and comprehend evolution based on theories and evidences

## B.Sc. BOTANY SEMESTER VI
## PAPER X: ENVIRONMENTAL BOTANY AND PLANT PATHOLOGY [MM 100 (80+20)]

**COURSE OBJECTIVES:**

The syllabus of this paper aims to make students aware of the available mineral resources, soil types, water and energy resources and forest wealth. They will also be apprised of the existing problem of pollution and management along with information about geographical distribution of plants, biotic communities, population dynamics and natural vegetation of India. The students will also be taught the etiology of various viral, bacterial and fungal diseases and the concept of integrated disease and pest management.

**COURSE OUTCOMES (COs):**

**CO 1:** Knowledge of different aspects of mineral resources, soil types, water and energy resources and forest wealth

**CO 2:** Complete insight of different types of pollution and their management

**CO 3:** Knowledge of geographical distribution of plants, biotic communities, population dynamics and natural vegetation of India

**CO 4:** Information and practical knowledge of etiology of viral, bacterial, fungal and insect-pest diseases and IPM

## B.Sc. BOTANY SEMESTER VI
## PAPER – XI: PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY

**COURSE OBJECTIVES:**

The course content of this Paper aims at introducing biochemical and molecular events taking place within cells to the students. They will be made aware of the structure, function and replication of nucleic acids, structure and properties of polysaccharides, proteins, vitamins and enzymes. Knowledge about genetic code, expression of genes and also regulation will be imparted to the students. They will also be apprised with various aspects of biotechnology, with emphasis on recombinant DNA technology, transgenics and plant tissue culture.

**COURSE OUTCOMES (COs):**

**CO 1:** Understand the biochemical nature of nucleic acids, their replication, and role in living systems

**CO 2:** Complete insight into the structure and function of carbohydrates, proteins, vitamins, enzymes and energy rich compounds

**CO 3:** Knowledge of genetic code, gene expression and regulation

**CO 4:** Understand the general aspects of biotechnology, recombinant DNA technology and tissue culture