SUBJECT: BOTANY (UG)	***After completion of the course the learner will be able to:***
PROGRAMME OUTCOMES	Botany is the broad discipline encompassing various subjects involved with the study of plants. Graduates of B.Sc. Botany program gain comprehensive knowledge of plant biology, practical laboratory, field skills, critical thinking and communication abilities for careers in research, conservation and environment management. Upon completing a B.Sc in Botany, students will: PO1: Acquire a solid understanding of plant biology, including plant structure, function, and classification. PO2: Develop skills in plant identification, anatomy, physiology, and taxonomy. PO3: Gain practical experience in laboratory and field techniques for studying plants and their environments. PO4: Understand plant interactions within ecosystems and their roles in environmental processes. PO5:Be prepared for entry-level positions in research, education, agriculture, horticulture, and conservation, or for further academic study.
PROGRAMME SPECIFIC OUTCOMES **For Botany Honours**	PSO1: Explain understanding of plant classification systematic, evolution, ecology, developmental biology, physiology, biochemistry, plant interactions with microbes and insects, morphology, anatomy, reproduction, genetics and molecular biology of various life-forms. PSO2: Describe Understanding of various analytical techniques of plant sciences, use of plants as industrial resources or as human livelihood support system and is well versed with the use of transgenic technologies for basic and applied research in plants. PSO3:Explain various life forms of plants, morphology, anatomy, reproduction, genetics, microbiology, molecular biology, recombinant DNA technology, transgenic technology
COURSE OUTCOME	
Semester I	
CC-I Microbiology and Phycology	CO1:State theclassification, characteristic features, cell structure and growth and reproduction in viruses, bacteria,and variousgroup ofmarineandfreshwateralgaeandtheirecologicalandeconomici

	mportance
CC-II Biomolecules and Cell Biology	CO1: Explain the properties of macromolecules, their cellular activities and biological responses. CO2: Describe Cell metabolism, chemical composition, physiochemical and functional organization of organelle. CO3: Apply Contemporary approaches in modern cell and molecular biology.
GE 1A: **Biodiversity (Microbes, Algae, Fungi and Archegoniatae)**	CO1: Combination of Theoretical and Practical components will provide comprehensive information and insight into the fascinating world of Microbes and Plants. CO2: Hands on Training will help students learn use of microscope, mounting, section-cutting and staining techniques for the study of plant materials. CO3: Making Drawings in Practical Records will enhance understanding morphological and structural details and related functional aspects in diverse plant groups. CO4:Use of Illustrations, Photographs, Charts, Permanent Slides, Museum and Herbarium Specimens along with ICTMethodswillprovide an interesting insight into the beautiful world of microbes and plants. CO5: Scope of Biodiversity includes Medicinal field, Industry, Agriculture, Research and Study, Job Opportunities and Environmental Conservation.
SEMESTER-II	
CC-III Mycology and Phyto-pathology	CO1:Describe world of fungi, lichens and pathogensof plants CO2:State characteristics , ecological and economic significance of the fungi and lichens CO3:Describe applicationofmycologyinvariousfields of economic and ecological Significance CO4:Explaineconomicandpathologicalimportance of fungi, bacteria and viruses CO5:Identifycommonplantdiseasesandtheircontrolmeasures
CC-IV Archegoniate	CO1: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 seethese plants grow in nature and become familiar with the biodiversity. CO2:Create small digital reports of some rareStructure or phenomenon related to these plants.
GE 1B: **Plant Ecology and Taxonomy**	CO1: After successful completion of the course the student Shallhave ac CO2:Develop proficiency in identifying plant species using

	morphological characteristics and dichotomous keys.
Semester III	
CC-V Anatomy of Angiosperms	**CO1: Analyze** the fundamental structures and functions of plant tissues, including meristem tic, epidermal, and vascular tissues, to understand their roles in growth and development. **CO2:Compare and contrast** the growth and differentiation processes in various plant organs and tissues, explaining how these processes contribute to overall plant morphology and function. **CO3:Evaluate** the organization and structure of plant parts in angiosperms, correlating these with their morphology and functions to demonstrate a comprehensive understanding of plant biology.
CC-VI Economic Botany	**CO1:Identify** various plants used as food and describe the types of nutrients they provide, including proteins, fats, amino acids, vitamins, and minerals. **CO2:Perform** micro-chemical tests to detect and quantify essential components in plant materials, such as starch, reducing sugars, proteins, and lipids. **CO3:Evaluate** the uses of fiber plants, beverages, fruits, and vegetables in daily life, focusing on their nutritional benefits and applications. **CO4:Explore** the regional diversity in food crops and other plants, and their ethno-botanical importance as well.
CC-VII Genetics	CO1:Show interest in Genetics and peruse higher education and research in it. CO2:Describes modes of inheritance of traits/ phenotypes and Phenotype-genotype correlation are the basic learning.
GE 2A: **Plant Physiology and Metabolism**	CO1:The students are able to correlate morphology, anatomy, cell structure and biochemistry with plant functioning. CO2:The link between theory and practical syllabus is established, and the employability of youth would be enhanced.
SEMESTER IV	
CC-VIII Molecular Biology	CO1:Explain nucleic acid, organization of DNA in prokaryotes and Eukaryotes, DNA replication mechanism, genetic code and transcription process. CO2:Explain Processing and modification of RNA and translation process, function and regulation of expression.

	CO3:Describe Application in biotechnology
CC-IX Plant Ecology & Phyotogeography	CO1:Describe complex interrelationship between organisms and environment; make them understand methods to studying vegetation, community patterns and processes, ecosystem functions, and principles of phytogeography. CO2:Evolve strategies for sustainable natural resource management and biodiversityconservation.
CC-X Plant Systematics	CO1:Explain the principles and practices of plant taxonomy, including the identification, classification, and of naming of plants. CO2:State plant diversity, including the major plant families and their distinguishing characteristics. CO3:Explain role of plant systematic in conservation biology and ecosystem management.
GE 2B: **Plant Anatomy and Embryology**	CO1:Knowledge regarding anatomy equipped the students to identify different types of tissues and make them able to correlate their physiology in a better away. CO2:This will also help them to understand how different plant tissue evolve and modify their structure and functions with respect to their environment. CO3:Knowledge regarding embryology will make them understand how reproduction play significant role in definingpopulations structure,naturaldiversityandSustainabilityof ecosystem mina betterway.
SEMESTER-V	
CC-XI **Reproductive Biology of Angiosperms**	CO1: Explain flower structure, pollination, fertilization, seed and fruit development, genetic mechanisms, and application in agriculture. CO2:Analyze the ecological and evolutionary significance of angiosperm reproductive strategies CO3:Assess the impact of environmental factors on reproductive success
CC-XII **Plant Physiology**	CO1: Explain the fundamental processes of plant growth, development, and metabolism. CO2: Explain how plants acquire, transport, and utilize water, nutrients, and gases. CO3: Analyse the responses of plants to environmental stresses and stimuli. CO4:Use physiological principles in agricultural, ecological and

	biotechnological contexts
DSE 1: **Analytical Techniques in Plant Sciences**	CO1: Use spectroscopy, chromatography, microscopy, and molecular techniques in plant research. CO2: Demonstrate proficiency in data interpretation and experimental design relevant to plant science research. CO3: Apply analytical techniques to investigate physiological, biochemical, and molecular aspects of plants. CO4:Critically assess and integrate analytical data to address research questions in plant biology and agriculture
DSE 2: **Natural Resource Management**	CO1:Explain the principles and frameworks of natural resource management, including sustainable development and conservation. CO2:Analyze the interactions between human activities andnatural ecosystems. CO3:Evaluate strategies for the sustainable use and conservation of natural resources. CO4:Apply interdisciplinary approaches to address environmental challenges and promote ecosystem resilience.
SEMESTER-VI	
CC-XIII **Plant Metabolism**	CO1:Explain the biochemical pathways and regulatory mechanisms involved in plant metabolism. CO2:Integrate of metabolism with growth, development, and environmental responses in plants. CO3:Analyze metabolic adaptations of plants to diverse ecological niches and stresses. CO4:Apply metabolic engineering and biotechnology in agriculture and industry
CC-XIV **Plant Biotechnology**	CO1:Explain the principles and techniques used in plant genetic engineering and molecular biology. CO2:Apply biotechnology in crop improvement, including genetic modification and genome editing. CO3:Evaluate ethical, environmental, and regulatory issues related to plant biotechnology. CO4:Apply biotechnological approaches to solve agricultural challenges and enhance crop productivity.
DSE 3: **Horticulture practices &post-Harvest**	CO1:Explain horticultural crop production techniques, including propagation, cultivation, and management practices. CO2:Explain post-harvest handling, storage, and processing technologies to maintain crop quality and extend shelf life.

technology	CO3: Analyze factors influencing crop post-harvest losses and implement strategies for their reduction. CO4: Apply knowledge to enhance efficiency, sustainability, and profitability in horticultural production and post-harvest management.
DSE 4: **Project work**	CO1: Students develop research skills, critical thinking, and problem-solving abilities, and gain technical proficiency in relevant tools and methods. CO2: Effective communication through written reports and presentations is emphasized, along with project management skills, including planning and resource allocation. CO3: The course fosters ethical standards, professionalism, and self-directed learning, preparing students for careers or further academic pursuits. CO4: Through independent research and practical application, students enhance their knowledge and readiness for future challenges.