PROGRAMME: *B.Sc. (Botany)*

PROGRAMME SPECIFIC OUTCOMES (PSO):

PSO1 **Knowledge and understanding of**: 1. The range of plant diversity in terms of structure, function and environmental relationships. 2. The evaluation of plant diversity. 3. Plant classification. 4. The role of plants in the functioning of the global ecosystem. 5. Statistics as applied to biological data.

PSO2 **Practical skills**: Students learn to carry out practical work, in the field and in the laboratory, with minimal risk. They gain introductory experience in applying each of the following skills and gain greater proficiency in a selection of them depending on their choice of optional modules. 1. Interpreting plant morphology and anatomy. 2. Plant identification. 3. Vegetation analysis techniques. 4. A range of physiochemical analyses ofplant materials in the context of plant physiology and biochemistry. 5. Analyze data using appropriate statistical methods and computer packages. 6. Plant pathology to be added for sharing of field and lab data obtained.

PSO3 **Scientific Knowledge**: Apply the knowledge of basic science, life sciences and fundamental process of plants to study and analyze any plant form.

PSO4 **Intellectual skills** – able to: 1. Think logically and organize tasks into a structured form. 2. Assimilate knowledge and ideas based on wide reading and through the internet. 3. Transfer of appropriate knowledge and methods from one topic to another within the subject. 4. Understand the evolving state of knowledge in a rapidly developing field. 5. Construct and test hypothesis. 6. Plan, conduct and write a report on an independent term project.

PSO5 **Transferable skills**: 1. Use of IT (word-processing, use of internet, statistical packages and databases). 2. Communication of scientific ideas in writing and orally. 3. Ability to work as part of a team. 4. Ability to use library resources. 5. Time management. 6. Career planning.

PSO6 **Problem analysis**: Identify the taxonomic position of plants, formulate the research literature, and analyze non-reported plants with substantiated conclusions using first principles and methods of nomenclature and classification in Botany.

PSO7 **Design/development of solutions**: From medicinally important plants, health problems, disorders and disease of human beings and estimate the phytochemical content of plants which meet the specified needs to appropriate consideration for the public health.

PSO8 **Conduct investigations of complex problems**: Use research-based knowledgeand research methods including design of experiments, analysis and interpretation of data, and development of the information to provide valid conclusions.

PSO9 **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern instruments and equipments for Biochemical estimation, Molecular Biology, Biotechnology,

Plant Tissue culture experiments, cellular and physiological activities of plants with an understanding of the application and limitations.

PSO10 **The Botanist and society**: Apply reasoning informed by the contextual knowledge to assess plant diversity, its importance for society, health, safety, legaland environmental issues and the consequent responsibilities relevant to the biodiversity conservation practice.

PSO11 **Environment and sustainability**: Understand the impact of the plant diversity in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PSO12 **Ethics**: Apply ethical principles and commit to environmental ethics and responsibilities and norms of the biodiversity conservation.

PSO13 **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PSO14 **Communication Skill**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

COURSE OUTCOMES (COS): B.Sc. (Botany)

SEMESTER – I

BOTHCC1: Microbiology & Phycology

Course Outcomes:

Microbiology:

CO1 Student will know about the preparation of different media and staining techniques.
CO2 They will understand the importance of isolation and identification methods in bacteriology.
CO3 Develop knowledge about history and expansion of the subject in present day.
CO4 Acquire an idea about the vast world of microbes.
CO5 They can determine their own blood group by using kit.

Phycology:

CO6 Student will know the diversity of fresh water and marine algae in various fields – Economic and ecological aspects aloing with origin and adaptation of pioneer colonizer organism.
CO7 They can assess the effectiveness of algae for mankind.
CO8 Student will know the technique of sampling of algae and became familiar with local flora.

BOTHCC 2 : (Biomolecules and Cell biology)

Course Outcomes:

At the end of the course, the student will be able to:

CO1 The relationship between the properties of macromolecules, their cellular activities and biological responses
CO2 Understand the structure and function of proteins, protein folding, charge, acid/base properties, and protein-protein interactions.
CO3 Understand the principles of enzyme catalysis and how enzyme activity can be altered by drugs that act as competitive, non-competitive, or irreversible inhibitors.
CO4 Discuss chromatin structure and how it can be modified.
CO5 Analyze and interpret data and graphs that demonstrate application of cytogenetic assays and techniques used to identify and manipulate DNA and measure RNA expression to the understanding and diagnosis of disease.
CO6 Demonstrate an understanding of cell structure and the functions of organelles.
CO7 Discuss the mechanisms of cell to cell signaling, including intracellular second-messenger pathways.
CO8 Explain the cell cycle and its regulation, including the mechanism of mitosis.

SEMESTER – II

BOTHCC 3 : Mycology & Phyto Pathology

Course Outcomes:
Mycology

CO1 Students will know the characteristic feature, identification and nomenclature of different fungi.
CO2 Knowledge about the importance of fungi in agriculture, medicine and environment.
CO3 General knowledge of the different types of culture media and sub-culturing techniques.
CO4 Experience of mushroom culture and spawn production will be achieved.

Phytopathology

CO5 Student will know about concept of causal agents, identification methods and management of crop diseases.
CO6 Student will know the importance of sign and symptoms for detection of pathogens and diseases, integrated methods of disease management, biological and chemicals methods in disease management.
CO7 Detailed knowledge of cultivation practices, Soil, fertilizers, livestock"s insect pest, economic associated with farming enterprises.
CO8 Students will know various laboratory methods of detection of plant pathogens.

BOTHCC 4: Archigoniatae

Course Outcomes:
CO1 Impart quality education to meet the demands of higher education and Research in Bryology and Pteridology.
CO2 Student will know medicinal and environmental importance of moss and ferns.
CO3 To get an idea of extinct Bryophyte and Pteridophytes with evolutionary trends.
CO4 The outcome will be used for the advancement of knowledge in Gymnosperms
CO5 Students will know the economic importance of this seed-bearing plant in the field of medicine, ornamental plants, commercial purpose, etc

SEMESTER – III

BOTH CC 5 : Anatomy of Angiosperm

Course Outcomes:
CO1 Knowledge gathering on primary and secondary structure of plants.
CO2 Knowledge of various cells and tissues, meristem, epidermal and vascular tissue system in plants.
CO3 Various aspects of growth, development of the tissues and differentiation of various plant organs. Knowledge of basic structure and organization of plant parts in angiosperms.

CO4 Correlation of structure with morphology and functions. Idea about polarity development on plants

BOTH CC 6: Economic Botany

Course Outcomes:

CO1 After studying Economic Botany, students would have first-hand information of plants used as food, the various kinds of nutrients available in the plants.
CO2 The dietary requirements of proteins, fats, amino-acids, vitamins etc that can be met by plants.
CO3 The students will learn to perform the micro-chemical tests to demonstrate various components.
CO4 The students will learn about the use of fibre plants, beverages, fruits and vegetables that are integral to day to day life of plants.
CO5 Students will learn to explore the regional diversity in food crops and other plants and their ethno-botanical importance as well.

BOTH CC 7: Genetics

Course Outcomes:

CO1 To generate interest among the students in Genetics and make them aware about the importance and opportunities in higher education and research, the first unit should be Introductory dealing with how this area has revolutionized all aspects of our life from its growth from Mendel to Genetic Engineering.
CO2 Modes of inheritance of traits/ phenotypes and Phenotype-genotype correlation are the basic learning.

SEMESTER – IV

BOTH CC8: Molecular Biology

Course Outcomes:

CO1 Understanding of nucleic acid, organization of DNA in prokaryotes and Eukaryotes, DNA replication mechanism, genetic code and transcription process.
CO2 Processing and modification of RNA and translation process, function and regulation of expression.
CO3 Application in biotechnology.

BOTHCC 9: (Plant Ecology & Phytogeography)

Course Outcomes:

CO1 It acquaints the students with complex interrelationship between organisms and environment; make them understand methods to studying vegetation, community patterns and processes, ecosystem functions, and principles of phytogeography. This knowledge is

critical in evolving strategies for sustainable natural resource management and biodiversity conservation

BOTHCC 10: Plant Systematics

Course Outcomes:

CO1 Understanding of systematics its importance in bioresource utilization and biodiversity management. Nomenclature pattern, Phylogeny, Classification systems of the plants.Basic knowledge to identify wild plants for various purpose.

CO2 Students will acquire a practical knowledge outside the class room through field excursion, seminar, workshop and exhibition programme.

SEMESTER – V

BOTH CC11: (Reproductive Biology of Angiosperms)

Course Outcomes: Student would have an understanding of

CO1 Induction of flowering and molecular and genetic aspects of flower development.

CO2 Pollen development, dispersal and pollination

CO3 Ovule development and fertilization,

CO4 Endosperm development and its importance

CO5 alternation pathways of reproduction

CO6 Student would be able to apply this knowledge for conservation of pollinators and fruit development

BOTH CC 12: (Plant Physiology)

Course Outcomes:

CO1 Students will be able to explain how terrestrial vascular plants acquire and use the energy and material resources needed to complete their life cycle, highlighting relationships between structure and function, and coordination of development, resource acquisition and environmental responses within and across cells, tissues and organs.

CO2 An understanding of the biology of plants has implications for our ability to address applied questions and issues facing our world today such as agricultural concerns, handling threatened species and habitats, and global changes and increased appreciation for plants as fascinating and important components of our living world.

BOTH DSE 1 (Analytical Techniques in Plant Sciences)

Course Outcomes:

CO1 Understanding of principles and use of light, confocal transmission and electron microscopy, centrifugation, spectrophotometry, chromatography, x-ray diffraction technique and chromatography techniques

BOTH DSE 2 (Biostatistics)

Course Outcomes:

CO1 Understanding of interpreting the scientific data that is generated during scientific experiments. It is the responsibility of biostatisticians and other experts to consider the variables in subjects to understand them, and to make sense of different sources of variation. In essence, the goal of biostatistics is to disentangle the data received and make valid inferences that can be used to solve problems in public health. Biostatistics uses the application of statistical methods to conduct research in the areas of biology, public health, and medicine. Many times, experts in biostatistics collaborate with other scientists and researchers.

SEMESTER – VI

BOTH CC 13: (Plant metabolism)

Course Outcomes:

CO1 Concept and significance of metabolic redundancy in plants. Students will also be able to learn the similarity and differences in metabolic pathways in animals and plants.

CO2 To have understanding of water and nutrient uptake and movement in plants, role of minerl elements, translocation of sugars, Role of various plant growth regulatoras, phytochrome cytochromes and phototropins, and flowering stimulus.

BOTH CC 14: (Plant Biotechnology)

Course Outcomes:

CO1 The successful students will be able to: Learn the basic concepts, principles and processes in plant biotechnology.

CO2 Have the ability of explanation of concepts, principles and usage of the acquired knowledge in biotechnological, pharmaceutical, medical, ecological and agricultural applications.

CO3 Use basic biotechnological techniques to explore molecular biology of plants

CO4 Explain how biotechnology is used to for plant improvement and discuss the biosefty concern and ethical issue of that use.

BOTH DS 3 (Bioinformatics)

Course Outcomes:

CO1 With a working knowledge of the practical and theoretical concepts of bioinformatics, you will be well qualified to progress onto advanced graduate study. The portfolio of skills developed on the programme is also suited to academic research or work within the bioinformatics industry as well as range of commercial settings.

BOTHDS4 (Plant Breeding)

Course Outcomes:

CO1 Student would be able to understand the experimental steps and methods involved in generating new varieties using classical and contemporary breeding practices.