THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS),
SIVAKASI – 626 123.
(Affiliated to Madurai Kamaraj University, Re-accredited with A+ Grade by NAAC,
College with Potential for Excellence by UGC and Mentor Institution under UGC PARAMARSH)

DEPARTMENT OF BOTANY

UG DEGREE PROGRAMME IN BOTANY

PROGRAMME EDUCATIONAL OBJECTIVES	
The Graduates will	
PEO1.	be a productive employee in herbal industries, botanical gardens, educational institutions or pursue higher studies.
PEO2.	create novel ideas to solve economic, social and environmental issues related to Botany with ethics.
PEO3.	be competent to handle a demanding situation and involve in the collection and preparation of specimens to aspire as a successful entrepreneur.

PROGRAMME LEARNING OUTCOMES	
By the Completion B.Sc programme, the learners will be able to	
PLO1.	Apply the knowledge of Arts, Science and Humanities to address fundamental and complex questions appropriate to their programmes.
PLO2.	Make use of appropriate knowledge and skills to identify, formulate, analyze and solve problems in order to reach substantiated conclusions.
PLO3.	Critically analyze research processes, products and practices with a view of strategic use of data in their field.
PLO4.	Demonstrate skills in oral and written communication and make use of ICT in various learning ambience.
PLO5.	Interact productively with people from diverse backgrounds as both leaders/mentors and team members with integrity and professionalism.
PLO6.	Defend the society against gender and environmental issues with moral and ethical awareness.
PLO7.	Formulate their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.

COURSE LEARNING OUTCOME

Core Course	
Course Code: 23GBC11	**Course Title:** PLANT DIVERSITY - I
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the classification, characters and significance of algae.
CLO2[K3]	find the benefits and cultivation methods of algae.
CLO3[K4]	analyze the algal architect and lifecycle.
CLO4[K5]	justify the thallus structure and reproduction of various groups of algae.
CLO5[K6]	explore the commercial potential of algal products and their uses.

Core Course	
Course Code: 23GLC1L	**Course Title:** Practical - I
On successful completion of the course, the learners should be able to	
CLO1[K2]	outline the skill of microscope handling and microslides preparation.
CLO2[K3]	identify the various algae from algal mixture with key character.
CLO3[K4]	examine the internal structure of algae.
CLO4[K5]	assess the fresh/marine algal diversity and their economic significance.
CLO5[K6]	prepare field trip report, collect and preserve algae from different habitats.

Generic Elective Course	
Course Code: 23GBEG11	**Course Title:** ANIMAL DIVERSITY
On successful completion of the course, the learners should be able to	
CLO1[K2]	Elucidate the diversity and organization of Protozoa and Porifera.
CLO2[K3]	categorize the diversity and organization of Coelenterata, Helminthes and Annelida.
CLO3[K4]	scrutinize the taxonomic position and diversity of Arthropoda, Mollusca and Echinodermata.
CLO4[K5]	validate the taxonomic position and diversity of Protochordata, Pisces and Amphibia.
CLO5[K6]	compile the structure and organization of Reptilia, Aves and Mammalia.

Non Major Elective	
Course Code: **23GBNE11**	**Course Title:** **NURSERY AND LANDSCAPING**
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the basic principles and components of gardening.
CLO2[K3]	make use of techniques for designing gardens and aesthetic art works.
CLO3[K4]	illustrate the working of cascading style sheets in web pages.
CLO4[K5]	assess the nursery structure and garden designing.
CLO5[K6]	plan and maintain gardens foroutdoor and indoor landscaping.

Foundation Course	
Course Code: 23GBFC11	**Course Title:** BASICS OF BOTANY
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the general characters and functioning of the Plant kingdom.
CLO2[K3]	identify the features of the cell and its physiology.
CLO3[K4]	analyze plant metabolic activities.
CLO4[K5]	defend the significance of plant morphology and genetics.
CLO5[K6]	explore the fundamental features and role of the plants.

Ability Enhancement Compulsory Course	
Course Code: 23GSS11	**Course Title:** ENGLISH FOR COMMUNICATION
On successful completion of the course, the learners should be able to	
CLO1	understand the prominent methods and models of communication
CLO2	identify the basic principles of communication
CLO3	analyze the various types of communication
CLO4	evaluate information critically to express opinions and engage in thoughtful discussions
CLO5	develop interpersonal communication skills and make use of the essential principles of communication in everyday usage

Core Course	
Course Code: 23GBC21	**Course Title:** PLANT DIVERSITY - II
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the classification, general characters and reproduction of lower forms.
CLO2[K3]	identify the role of microbes, fungi and lichens.
CLO3[K4]	analyze the features, multiplication and lifecycle of lower forms that affect plants.
CLO4[K5]	assess economic importance of microbes, fungi and lichens.
CLO5[K6]	propose the impact of microbes on economy.

Core Course	
Course Code: 23GBC2L	**Course Title:** PRACTICAL - II
On successful completion of the course, the learners should be able to	
CLO1[K2]	demonstrate the preparation of microslides.
CLO2[K3]	find out the internal and external structural organization of various plants.
CLO3[K4]	evaluate the characteristics of microbes, fungi and plant pathogens.
CLO4[K5]	explore the economic products of fungi and microbes.
CLO5[K6]	prepare field trip report, collect and preserve algae from different habitats.

Generic Elective Course	
Course Code: 23GBEG21	**Course Title:** ANIMAL PHYSIOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	reveal the concepts of respiratory, circulatory, excretory, nervous and sensory physiology.
CLO2[K3]	comprehend the processes involved during development of chick.
CLO3[K4]	relate immunological components, immune response and to familiarize them with the recommended vaccination schedule for human beings.
CLO4[K5]	unravel the information contained by the human chromosome, human genetics and the inheritance pattern.
CLO5[K6]	recognize environmental factors and their cycling patterns.

GENERIC ELECTIVE COURSE	
Course Code: 23GBEG2L	**Course Title:** ZOOLOGY PRACTICAL
On successful completion of the course, the learners should be able to	
CLO1[K2]	demonstrate the structure and label the various parts of dissected organisms using virtual dissections, charts and web resources
CLO2[K3]	illustrate the mouthparts of causatives of certain zoonotic diseases
CLO3[K4]	examine the organisms by adopting staining technique and to ensure the presence of certain nutrients / excretory products
CLO4[K5]	authenticate different invertebrate and chordate forms using lab manuals and to criticize various types of syndromes in man
CLO5[K6]	visualize and classify the various fauna in their surrounding environment.

NON MAJOR ELECTIVE	
Course Code: 23GBNE21	**Course Title: CULTIVATION OF MUSHROOM**
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the types, structure and uses of mushrooms.
CLO2[K3]	make use of different substrate for the cultivation of mushrooms.
CLO3[K4]	Analyze the cultivation of mushrooms
CLO4[K5]	measure the environmental factors and economic value associated with mushroom cultivation.
CLO5[K6]	prepare nutritious mushroom dishes.

Core Course	
Course Code: 23GBC31	**Course Title: PLANT DIVERSITY - III**
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarise the morphological and anatomical diversity of Bryophytes and Pteridophytes.
CLO2[K3]	Identify the variations in gametophyte and sporophyte of Bryophytes and Pteridophyte.
CLO3[K4]	Analyse the structure and reproduction of Bryophytes and Pteridophytes.
CLO4[K5]	Assess the role of steles and stellar evolution in Pteridophytes.
CLO5[K6]	Predict the importance of Bryophytes and Pteridophytes.

Core Course	
Course Code: 23GBC3L	**Course Title:** PRACTICAL- III
On successful completion of the course, the learners should be able to	
CLO1[K2]	explain the preparation of microslides.
CLO2[K3]	find out the internal and external structural organization of Bryophytes and Pteridophytes.
CLO3[K4]	examine the anatomy of plant materials.
CLO4[K5]	choose suitable technique for the study of internal structure of a plant part.
CLO5[K6]	explore the presence of Bryophytes and Pteridophytes in the field.

Generic Elective Course	
Course Code: 23GBEG31	**Course Title:** FUNDAMENTALS OF BOTANY -I
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the general characters and economic importance of lower and higher plants.
CLO2[K3]	identify the structure, reproduction and anatomy of vascular and non-vascular plants.
CLO3[K4]	examine the components of cell, cell organelles and the process of inheritance.
CLO4[K5]	assess the economic utility of plants and the functions of cell organelles.
CLO5[K6]	compile the characteristic features of various groups of plants.

SKILL ENHANCMENT COURSE	
Course Code: 23GBES31	**Course Title:** CAREER OPPORTUNITIES INBOTANY
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the ways to establish various ventures to become an entrepreneur
CLO2[K3]	make use of the botanical knowledge to produce plant products for commercial exploitation.
CLO3[K4]	analyze the preparation of various plant based products.
CLO4[K5]	assess the entrepreneurial opportunities in Botany.
CLO5[K6]	propose new ideas to start own companies of their interest and set marketing strategies.

SKILL ENHANCEMENT COURSE	
Course Code: 23GBDS31	**Course Title**: HERBAL TECHNOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the medicinal system and utilization of medicinal plants.
CLO2[K3]	identify the potent herbs, their botanical name and chemical constituents.
CLO3[K4]	examine the various medicinal plants through analytical testing.
CLO4[K5]	conclude the significance of various methods of harvesting, drying and storage of medicinal herbs.
CLO5[K6]	prepare a report on the cultivation and usage of medicinal plants.

Core Course	
Course Code: 23GBC4L	**Course Title:** PRACTICAL - IV
On successful completion of the course, the learners should be able to	
CLO1[K2]	trace the fossil members with the aid of microslides.
CLO2[K3]	identify Gymnosperms based on morphology and anatomical variations.
CLO3[K4]	dissect out the anatomy of various plant parts.
CLO4[K5]	interpret the living and fossil forms of Gymnosperms.
CLO5[K6]	prepare an album of Gymnosperms and evolution scientists.

Core Course	
Course Code: 23GBC41	**Course Title:** PLANT DIVERSITY - IV
On successful completion of the course, the learners should be able to	
CLO1[K2]	rephrase the living and fossil Gymnosperms and concepts of evolution.
CLO2[K3]	identify the Gymnosperms based on the characteristics and economical utility.
CLO3[K4]	analyze the anatomical and reproductive pattern of Gymnosperms and fossils
CLO4[K5]	criticize the existence of life on earth with an aid of fossils.
CLO5[K6]	compile the process of fossilization and various theories of evolution.

Generic Elective Course	
Course Code: 23GBEG41	**Course Title FUNDAMENTALS OF BOTANY - II**
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the taxonomical and physiological aspects of plants.
CLO2[K3]	make use of the anatomical and embryological study of plants.
CLO3[K4]	analyze the importance of tissue system and metabolism.
CLO4[K5]	justify the plant metabolic pathways.
CLO5[K6]	generalize the anatomical and physiological concepts.

Generic Elective Course	
Course Code: 23GBEG4L	**Course Title FUNDAMENTALS OFBOTANY PRACTICAL**
On successful completion of the course, the learners should be able to	
CLO1[K2]	demonstrate the preparation of whole mount and sectioning.
CLO2[K3]	find out the solution for genetic problems.
CLO3[K4]	examine the floral parts technically.
CLO4[K5]	assess the process of photosynthesis.
CLO5[K6]	present the report of micro and macro flora from their habitats.

SKILL ENHANCEMENT COURSES	
Course Code: 23GSE45	**Course Title:** HERBAL HEALTH CARE
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the knowledge of herbs for health care.
CLO2[K3]	make use of techniques for designing gardens and aesthetic art works.
CLO3[K4]	analyze the importance of herbs for maintenance of health
CLO4[K5]	defend the effect of nutrients and active principles of herbs on body health.
CLO5[K6]	propose the marketing strategies of herbal products.

SKILL ENHANCEMENT COURSE	
Course Code: 23GSE45L	**Course Title:** HERBAL HEALTH CARE PRACTICAL
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the basic knowledge on natural products.
CLO2[K3]	identify the suitable medicinal plants for curing the diseases.
CLO3[K4]	discuss the potent of medicinal herbs with scientific knowledge.
CLO4[K5]	assess and produce herbal cosmetics on their own.
CLO5[K6]	inspect the ways to market their own herbal products.

CORE COURSE	
Course Code: 23GBC51	**Course Title:** ANGIOSPERM TAXONOMY & ECONOMIC BOTANY
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the morphology, nomenclature, characters of angiosperms and its importance.
CLO2[K3]	identify the morphology of flowering plants and families with key characters.
CLO3[K4]	analyze and compare the vegetative and floral characters of angiospermic families.
CLO4[K5]	conclude the economic importance of angiospermic families and economic produces.
CLO5[K6]	discuss the significance of plant taxonomy with the rules and recommendations behind it.

CORE COURSE	
Course Code: 23GBC52	**Course Title:** PLANT ANATOMY AND EMBRYOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize about various tissues and reproductive systems in plants.
CLO2[K3]	identify the stages of plant through anatomical key characters.
CLO3[K4]	analyze the process of normal and anomalous secondary growth in plants.
CLO4[K5]	assess the role of various tissue systems and the process of fertilization.
CLO5[K6]	explore the various anatomical adaptations and the process of fertilization.

CORE COURSE	
Course Code: 23GBC53	**Course Title:** CELL BIOLOGY AND GENETICS
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the tasks of cellular organelles, basis of genetics and plant breeding.
CLO2[K3]	find the pattern of cell cycle, population genetics, genic and sex linked inheritance.
CLO3[K4]	inspect the effect of linkage, crossing over, extra nuclear inheritance and plant breeding techniques.
CLO4[K5]	interpret about cell organelles, cell division, mutation and its application.
CLO5[K6]	explore plant breeding techniques and interaction of genes.

CORE COURSE	
Course Code: 23GBC5L1	**Course Title:** PRACTICAL - V
On successful completion of the course, the learners should be able to	
CLO1[K2]	explain the morphological features of an angiosperm in technical terms.
CLO2[K3]	identify the family of an angiosperm and prepare herbarium
CLO3[K4]	analyze the features of a plant through observation and dissection.
CLO4[K5]	justify the importance of economic produces.
CLO5[K6]	present the report of the flora of an area.

CORE COURSE	
Course Code: 23GBC5L2	**Course Title:** PRACTICAL - VI
On successful completion of the course, the learners should be able to	
CLO1[K2]	explain the sectioning of plant materials and plant breeding techniques.
CLO2[K3]	identify the structure of cell organelles and stages of cells.
CLO3[K4]	differentiate the normal and anomalous secondary growth in angiosperms.
CLO4[K5]	justify the presence of various ergastic substances in plant tissues.
CLO5[K6]	compile the given genetic data and prepare genetic crosses.

CORE COURSE	
Course Code: 23GBC5P	**Course Title:** PROJECT WITH VIVA-VOCE
On successful completion of the course, the learners should be able to	
CLO1[K2]	describe the area of research technically.
CLO2[K3]	identify and apply appropriate techniques to solve research problem.
CLO3[K4]	scrutinize the results and draw conclusions.
CLO4[K5]	validate the findings with scientific background.
CLO5[K6]	conclude and present their work precisely.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: BDGBDE51	**Course Title:** BIOANALYTICAL TECHNIQUES
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the various biological techniques and its importance.
CLO2[K3]	make use of bioanalytical instruments to identify biomolecules.
CLO3[K4]	infer the principle and working mechanism of various instruments.
CLO4[K5]	assess the efficiency of various types of microscopes and centrifuges.
CLO5[K6]	adapt methodologies for extraction and analysis of biochemical compounds.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23GBDE52	**Course Title:** ENTREPRENEURIAL BOTANY
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate about entrepreneurial values, opportunities and bioventure.
CLO2[K3]	make use of entrepreneurial opportunities and agencies produce products.
CLO3[K4]	analyze significance of entrepreneurial botany.
CLO4[K5]	assess the role of government agencies in entrepreneurship development.
CLO5[K6]	propose new ideas to start own business of their interest.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23GBDE53	**Course Title:** SEED BIOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the morphology, structural details of economically important seeds.
CLO2[K3]	identify the chemical composition and seed germination techniques.
CLO3[K4]	examine the germination and viability of seed.
CLO4[K5]	asses the importance of seeds and its testing.
CLO5[K6]	propose the ways to store and use seeds effectively.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23GBDE54	**Course Title** : POMOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize tropical fruit cultivation and management techniques.
CLO2[K3]	find out the overall strategies and techniques to grow different commercial fruits.
CLO3[K4]	analyze the fundamentals of pomology.
CLO4[K5]	evaluate the cultivation and harvesting methods of tropical and subtropical fruits.
CLO5[K6]	explore the cultivation methods and marketing of fruits.

CORE COURSE	
Course Code: 23GBIN51	**Course Title : INTERNSHIP**
On successful completion of the course, the learners should be able to	
CLO1[K2]	associate the class room theory with work place practice.
CLO2[K3]	apply the practices / procedures observed in real time working environment.
CLO3[K4]	analysetheworkflowandcommunicationflowprevailingintheInstitution /Industry.
CLO4[K5]	assess interests and abilities in their field of study
CLO5[K6]	propose strategies, policies and guidelines for enhancing efficiency of industrial/institutional operations.

CORE COURSE	
Course Code: 23GBC61	**Course Title : PLANT ECOLOGY AND PHYTOGEOGRAPHY**
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the basics of ecology and phytogeography.
CLO2[K3]	identify the environmental issues and different groups of plants.
CLO3[K4]	analyze biodiversity and its conservation.
CLO4[K5]	justify the importance of conservation of environment.
CLO5[K6]	suggest ideas for major environmental pollutions.

CORE COURSE	
Course Code: 23GBC62	**Course Title: PLANT BIOTECHNOLOGY & MOLECULAR BIOLOGY**
On successful completion of the course, the learners should be able to	
CLO1[K2]	explain the fundamentals concepts of plant biotechnology and tissue culture
CLO2[K3]	utilize the techniques of plant tissue culture and genetic engineering
CLO3[K4]	analyze the significance and importance of genetic materials
CLO4[K5]	evaluate the mechanism of gene action.
CLO5[K6]	propose the techniques and applications of transgenic plants

CORE COURSE	
Course Code: 23GBC63	**Course Title PLANT PHYSIOLOGY AND BIOCHEMISTRY**
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the various physiological and biochemical phenomena of plants.
CLO2[K3]	identify the response of plants to various stress and light.
CLO3[K4]	elucidate the properties and role of biomolecules.
CLO4[K5]	assess the importance of physiological processes and phytohormones.
CLO5[K6]	compile the various physiological process prevalent in green plants.

CORE COURSE	
Course Code: 23GBC6L1	**Course Title PRACTICAL VII**
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the anatomy of various groups of plants and its importance.
CLO2[K3]	demonstrate the process of *in vitro* regeneration of plants.
CLO3[K4]	analyse the role of DNA in molecular biology.
CLO4[K5]	justify the anatomical adaptations of plants based on the habitat.
CLO5[K6]	Prepare the report of industrial visit.

CORE COURSE	
Course Code: 23GBC6L2	**Course Title PRACTICAL - VIII**
On successful completion of the course, the learners should be able to	
CLO1[K2]	paraphrase the biochemical and physiological aspects.
CLO2[K3]	find the basic principles involved in plant physiology and biochemistry experiments.
CLO3[K4]	infer the experimental results of biochemical and physiological experiments.
CLO4[K5]	interpret the rate of photosynthesis by various experiments.
CLO5[K6]	integrate the photosynthesis and transpiration process

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23GBDE61	**Course Title:** HORTICULTURE
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the concepts of horticulture and nursery management.
CLO2[K3]	demonstrate the planning of garden and management practices.
CLO3[K4]	analyze the importance of various horticultural techniques.
CLO4[K5]	discuss the different methods of crop production and protection practices.
CLO5[K6]	propose a plan to execute horticultural practices and marketing.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23GBDE62	**Course Title:** FORESTRY
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the basic concepts of forest distribution, degradation, protection, management and utilization of resources.
CLO2[K3]	find the complex interactions of humans and forest ecosystems in a global context.
CLO3[K4]	infer the skills for ecological measurements and interpretation of forest ecology management.
CLO4[K5]	interpret the factors influencing forest vegetation, degradation and wood preservation methods.
CLO5[K6]	develop new strategies in the conservation and management of forests.

DISCIPLINE SPECIFIC COURSE	
Course Code: 23GBDE63	**Course Title:** COMPUTER APPLICATIONS IN BOTANY
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the concepts and uses of computer and bioinformatics.
CLO2[K3]	apply various software resources with advanced functions to carry out analysis of biological databases.
CLO3[K4]	analyze the various bioinformatics applications and uses.
CLO4[K5]	asses the effective utilization of advanced software in botany.
CLO5[K6]	Propose a design for experiments and data interpretation.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23GBDE64	**Course Title:** FORENSIC BOTANY
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the application of Botany to Forensic investigations and legal disputes.
CLO2[K3]	apply techniques for the collection and preservation of botanical evidence of the crime.
CLO3[K4]	analyze the morphological and anatomical features of plants for forensic investigations.
CLO4[K5]	interpret the significance of classic and DNA-based forensic cases.
CLO5[K6]	propose ideas for the detection of crimes with the help of plants.

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College with Potential for Excellence by UGC and Mentor Institution under UGC PARAMARSH)

DEPARTMENT OF BOTANY

PG DEGREE PROGRAMME IN BOTANY

PROGRAMME EDUCATIONAL OBJECTIVES	
The Graduates will	
PEO1.	exhibit a mastery of skills and knowledge with ethics at a level required for plant based industry or to be an eminent research scholar.
PEO2.	pursue research of significance in Botany or an interdisciplinary to solve the problems in thrust areas to preserve nature.
PEO3.	enhance the productivity of several economically important products/botanicals and thereby become a successful entrepreneur.

PROGRAMME LEARNING OUTCOMES	
By the Completion M.Sc programme, the learners will be able to	
PLO1.	Apply the knowledge of Arts, Science and Humanities to address fundamental and complex questions appropriate to their programmes.
PLO2.	Make use of appropriate knowledge and skills to identify, formulate, analyze and solve problems in order to reach substantiated conclusions.
PLO3.	Critically analyze research processes, products and practices with a view of strategic use of data in their field.
PLO4.	Demonstrate skills in oral and written communication and make use of ICT in various learning ambience.
PLO5.	Interact productively with people from diverse backgrounds as both leaders/mentors and team members with integrity and professionalism.
PLO6.	Defend the society against gender and environmental issues with moral and ethical awareness.
PLO7.	Formulate their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.

COURSE LEARNING OUTCOME

Core Course	
Course Code: 23PBC11	**Course Title: PLANT DIVERSITY - I**
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the classification, structure, reproduction and life history cryptogams.
CLO2[K3]	identify the life cycle pattern of lower plants.
CLO3[K4]	compare the features and mode of reproduction in different kinds of plants.
CLO4[K5]	justify the importance of plants in day- to - day life.
CLO5[K6]	predict the features of various classes/divisions of plant kingdom.

Core Course	
Course Code: 23PBC12	**Course Title: PLANT DIVERSITY – II**
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate about the vascular cryptogams, gymnosperms and fossils.
CLO2[K3]	identify the structural features and life cycle of pteridophytes and gymnosperms.
CLO3[K4]	analyze the characteristic features of pteridophytes and gymnosperms.
CLO4[K5]	justify the economic importance and life cycle of plants.
CLO5[K6]	integrate the process of fossilization and fossil flora.

CORE COURSE	
Course Code: 23PBC1L	**Course Title:** PRACTICAL - I
On successful completion of the course, the learners should be able to	
CLO1[K2]	demonstrate the preparation of whole mount and sectioning of plant materials.
CLO2[K3]	identify various groups of plants based on their morphology and anatomical variations.
CLO3[K4]	dissect out the anatomy of various plant parts.
CLO4[K5]	assess suitable technique for the study of internal structure of a plant part.
CLO5[K6]	collect and preserve the lower form of plants

Discipline Specific Elective Course	
Course Code: 23PBDE11	**Course Title:** MICROBIOLOGY AND PLANT PATHOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	explain the biology of microbes and diseases caused by them
CLO2[K3]	identify the disease development in plants and humans.
CLO3[K4]	analyze the impact of microflora in soil, air and water.
CLO4[K5]	judge the role of microbes in health and environment.
CLO5[K6]	integrate the detection of pathogens and their adaptive strategies.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23PBDE12	**Course Title:** CONSERVATION OF NATURAL RESOURCES
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the concept of different natural resources and their utilization.
CLO2[K3]	make use of land, water, forest and energy resources conserve our earth.
CLO3[K4]	analyze the importance of natural resources and policies.
CLO4[K5]	evaluate the management strategies of different natural resources.
CLO5[K6]	integrate the various environmental policies to conserve the natural resources.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23PBDE13	**Course Title:** ALGAL TECHNOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate about various cultivation techniques of algae.
CLO2[K3]	make use of fertilizers and enhance the production of algal products.
CLO3[K4]	analyze therapeutic importance of algal products and their uses.
CLO4[K5]	justify the commercial potential of algal products
CLO5[K6]	integrate various algal technologies for the benefit of the ecosystem.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23PBDE14	**Course Title:** HERBAL TECHNOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the salient features of crude drugs from various botanical sources.
CLO2[K3]	make use of suitable methodology for the cultivation and analysis of medical plants.
CLO3[K4]	analyze the pharmacological techniques involved in processing of herbal drugs and adulteration
CLO4[K5]	assess the secondary metabolites of market and commercial value.
CLO5[K6]	design and develop herbal products of their own.

CORE COURSE	
Course Code: 23PBC21	**Course Title:** TAXONOMY OF ANGIOSPERMS
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the basic concepts, characteristics of angiosperms and its importance.
CLO2[K3]	identify the role of taxonomical organizations and family of plants with its key characters.
CLO3[K4]	analyze and compare the vegetative and floral characters of angiosperm families and its classification
CLO4[K5]	conclude the economic importance of angiosperm families and economic produces.
CLO5[K6]	discourse the significance of plant taxonomy with the rules and recommendations behind it.

CORE COURSE	
Course Code: 23PBC22	**Course Title:** PLANT ANATOMY AND EMBRYOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the internal structure and functions of angiosperms
CLO2[K3]	identify various stages of plant development.
CLO3[K4]	differentiate the organization and functions of normal and anomalous secondary growth.
CLO4[K5]	defend the various concepts of plant development and reproduction.
CLO5[K6]	propose the process of reproduction in economic aspects.

CORE COURSE	
Course Code: 23PBC23	**Course Title:** ECOLOGY AND CONSERVATION BIOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	illustrate the concepts of ecology and biodiversity.
CLO2[K3]	find solutions to the alarming environmental issues.
CLO3[K4]	correlate the fundamental ideas of protective and conservative areas of ecology.
CLO4[K5]	defend the role of ecological organizations and IPR.
CLO5[K6]	propose suggestions for environmental issues and its solutions.

CORE COURSE	
Course Code: 23PBC2L	**Course Title:** PRACTICAL - II
On successful completion of the course, the learners should be able to	
CLO1[K2]	demonstrate the preparation of sectioning of plant materials.
CLO2[K3]	solve taxonomical problems using the rules and recommendations of ICN.
CLO3[K4]	estimate and determine the community and molecules from the environment.
CLO4[K5]	assess the dissection and sectioning of angiospermic plants.
CLO5[K6]	prepare the field trip report, collect and preserve herbaria.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23PBDE21	**Course Title:** BIOSTATISTICS
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize fundamental knowledge on statistics.
CLO2[K3]	solve problems using various statistical tools.
CLO3[K4]	infer the results using appropriate methods.
CLO4[K5]	interpret the data’s statistically
CLO5[K6]	generalize the hypothesis and probability distribution.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23PBDE22	**Course Title:** NANOBIOTECHNOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the essential features of nanotechnology.
CLO2[K3]	find the role of nanotechnology in life sciences.
CLO3[K4]	analyze the synthesis and applications of nanoparticles.
CLO4[K5]	interpret about biosensors, biochips and microarrays.
CLO5[K6]	formulate the procedure for the synthesis of nanoparticles and its applications.

SKILL ENHANCEMENT COURSE	
Course Code: 23PBSE21	**Course Title:** AGRICULTURE AND FOOD MICROBIOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	relate the role of microbes in agriculture and food industry.
CLO2[K3]	make use of suitable microbes to increase the fertility of soil.
CLO3[K4]	analyze the impact of microbes in agriculture and food industry.
CLO4[K5]	defend the role of microbes in food preservation and as biocontrol.
CLO5[K6]	integrate the beneficial aspects of microbial interactions with plant and food.

CORE COURSE	
Course Code: 23PBC31	**Course Title:** CELL BIOLOGY AND GENETICS
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize about the role of cell organelles, genetics and gene regulation.
CLO2[K3]	find the role of plant breeding and mutation in crop improvement.
CLO3[K4]	analyze about cell cycle, cell division and regulation of gene action.
CLO4[K5]	interpret about mutation and recombination of genes.
CLO5[K6]	predict the role of genes in determining the characters.

CORE COURSE	
Course Code: 23PBC32	**Course Title:** MOLECULAR BIOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	describe the principals involved in genetic engineering and its uses.
CLO2[K3]	make use of the recent technologies for the welfare of human.
CLO3[K4]	comment on blotting techniques and hybridoma technology.
CLO4[K5]	prove the importance of innovative technologies.
CLO5[K6]	propose ideas to remediate the polluted environment.

CORE COURSE	
Course Code: 23PBC3L	**Course Title:** PRACTICAL - III
On successful completion of the course, the learners should be able to	
CLO1[K2]	find the cell organelles and various stages of cell division.
CLO2[K3]	solve genetic problems.
CLO3[K4]	infer about isolation of DNA and bioremediation using bioadsorbents.
CLO4[K5]	criticize about structure of cell organelles and vectors.
CLO5[K6]	propose a novel idea to remediate the polluted environment

CORE INDUSTRIAL MODULE	
Course Code: 23PBCI31	**Course Title:** INDUSTRIAL BOTANY
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the industrial applications of lower organisms.
CLO2[K3]	make use of microbes in producing various industrial products.
CLO3[K4]	evaluate the role of microbes and plant source in various industries and its products.
CLO4[K5]	recommend the organic and ecofriendly production techniques.
CLO5[K6]	develop skills for working in industries specialized in biomolecules.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23PBDE31	**Course Title:** ENTREPRENEURIAL BOTANY
On successful completion of the course, the learners should be able to	
CLO1[K2]	acquire knowledge about organic farming and their advantages.
CLO2[K3]	apply theoretical and practical knowledge in various horticultural techniques.
CLO3[K4]	examine the cultivation/preparation of economically important plant based products.
CLO4[K5]	defend the significance of plants in farming and industry.
CLO5[K6]	propose ideas to startup a career as entrepreneur.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23PBDE32	**Course Title:** APPLIED PLANT CELL & TISSUE CULTURE
On successful completion of the course, the learners should be able to	
CLO1[K2]	explain the techniques used in plant regeneration and its application.
CLO2[K3]	write the role of micro propagation in plant propagation.
CLO3[K4]	analyze the conditions suitable for plant regeneration and hybridization.
CLO4[K5]	asses the applications of metabolic engineering in cell culture and germplasm storage.
CLO5[K6]	propose ideas to develop plantlets through *in vitro* techniques.

CORE COURSE		
Course Code: 23PBIN31		**Course Title:** INTERNSHIP
On successful completion of the course, the learners should be able to		
CLO1[K2]	associate the class room theory with work place practice.	
CLO2[K3]	apply the practices / procedures observed in real time working environment.	
CLO3[K4]	analyze the work flow and communication flow prevailing in the Institution / Industry.	
CLO4[K5]	assess interests and abilities in their field of study.	
CLO5[K6]	propose strategies, policies and guidelines for enhancing efficiency of industrial/institutional operations.	

PROFESSIONAL COMMUNICATION SKILL ENHANCEMENT COURSE		
Course Code: 23PBSE31		**Course Title:** RESEARCH DESIGN
On successful completion of the course, the learners should be able to		
CLO1[K2]	summarize the knowledge on computers and bioinformatics.	
CLO2[K3]	identify the role of search engines in biological research.	
CLO3[K4]	analyze the application of biological databases in research.	
CLO4[K5]	defend about biological tools.	
CLO5[K6]	prepare and present their research work.	

ADDITIONAL SKILL SUPPORTIVE COURSE SOFT SKILL III	
Course Code: 23PBSS31	**Course Title:** BIOANALYTICAL SKILLS
On successful completion of the course, the learners should be able to	
CLO1[K2]	paraphrase the various biological techniques.
CLO2[K3]	make use of chromatographic techniques to separate the compounds.
CLO3[K4]	analyze the working mechanism of electrophoresis.
CLO4[K5]	access the efficiency of various types of microscopes and centrifuges.
CLO5[K6]	prepare permanent slides.

CORE COURSE	
Course Code: 23PBC41	**Course Title:** PLANT PHYSIOLOGY AND METABOLISM
On successful completion of the course, the learners should be able to	
CLO1[K2]	generalize the various physiological processes in plants.
CLO2[K3]	identify the ways to overcome environmental stress by plants.
CLO3[K4]	analyze the plant metabolic pathways.
CLO4[K5]	justify the role of plant growth regulators.
CLO5[K6]	integrate the importance of physiological processes and phytohormones.

CORE COURSE	
Course Code: 23PBC42	**Course Title:** BIOCHEMISTRY & APPLIED BIOTECHNOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	explain the fundamentals and significance of biomolecules.
CLO2[K3]	identify the structure and properties of biomolecules and enzymes.
CLO3[K4]	examine the role of biomolecules.
CLO4[K5]	asses the methods of production of transgenic plants and their applications.
CLO5[K6]	integrate the effective utilization of biomolecules and technologies.

CORE COURSE	
Course Code: 23PBC4L	**Course Title:** PRACTICAL - IV
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the biochemical and physiological concepts through experiments
CLO2[K3]	estimate the quantity of biomolecules and pigments.
CLO3[K4]	analyze the structure and properties of various biomolecules.
CLO4[K5]	asses the significance of plant biomolecules through biotechnology.
CLO5[K6]	create experimental set ups to explain biological process.

CORE COURSE	
Course Code: 23PBC4P	**Course Title: PROJECT WITH VIVA-VOCE**
On successful completion of the course, the learners should be able to	
CLO1[K2]	describe the area of research technically.
CLO2[K3]	make use of laboratory skills and master in advanced techniques to solve research problem.
CLO3[K4]	discuss the results and give valuable solutions for the betterment of society.
CLO4[K5]	justify the findings ethically with scientific background.
CLO5[K6]	conclude and present their research scientifically.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23PBDE41	**Course Title: ORGANIC FARMING**
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the various aspects of organic farming and its advantages.
CLO2[K3]	make use of organic farming techniques to produce agro-products and improve soil fertility.
CLO3[K4]	analyze the significance of organic farming in development and disease management.
CLO4[K5]	asses the quality of organic products.
CLO5[K6]	plan to practice organic farming and set marketing strategies.

DISCIPLINE SPECIFIC ELECTIVE COURSE	
Course Code: 23PBDE42	**Course Title:** FORESTRY AND WOOD TECHNOLOGY
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the various aspects of forestry.
CLO2[K3]	apply the techniques used to find a wood nature.
CLO3[K4]	analyze the ecological significance of forests
CLO4[K5]	assess the dynamics of the forest.
CLO5[K6]	present the significance of Indian forests laws and acts.

PROFESSIONAL COMPETENCY SKILL ENHANCEMENT COURSE	
Course Code: 23PBSE41	**Course Title:** TRAINING FOR COMPETITIVE EXAMS
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the structure of atoms, molecules, and chemical bonds.
CLO2[K3]	apply cognitive abilities to solve quantitative and qualitative problems.
CLO3[K4]	infer the role of genes regulation in prokaryotes and eukaryotes.
CLO4[K5]	interpret the physiological functions and metabolism of living system.
CLO5[K6]	compile the significance of cell communication and signaling.

SKILL ENHANCEMENT COURSE SOFT SKILL IV	
Course Code: 23PBSS41	**Course Title: SCIENTIFIC COMMUNICATION**
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the knowledge on data collection and analysis.
CLO2[K3]	identify the role of search engines and its applications.
CLO3[K4]	analyze the role of communication in research.
CLO4[K5]	defend about the statistical data.
CLO5[K6]	prepare and present their research work.

GENERIC ELECTIVE COURSE	
Course Code: 23PBEG21	**Course Title: MEDICINAL BOTANY**
On successful completion of the course, the learners should be able to	
CLO1[K2]	summarize the uses and effects of medicinal plants and its herbal supplements.
CLO2[K3]	make use of the techniques for conservation and propagation of medicinal plants.
CLO3[K4]	analyze the phytochemistry and pharmacognosy of herbs.
CLO4[K5]	assess the importance of herbs.
CLO5[K6]	plan for repository of ethnobotanical data.