

GOVERNMENT SCIENCE COLLEGE, GADCHIROLI
DEPARTMENT OF BOTANY

**Program outcomes, Program specific outcomes and
course outcomes of Botany**

<p style="text-align: center;">Subject specific outcomes</p>	<ul style="list-style-type: none"> • Students will gain knowledge and learn techniques in Plant sciences. • They will understand the difference between Prokaryotic and Eukaryotic cell, its functions in control and regulation of various metabolic pathways of organisms. • Analyze complex interactions among the Plants, Microbes and Animals, understands the evolutionary aspects of Plants. • Their distribution and relationship with the environment and interaction with other organisms. • Understands the Basic Life forms from Cryptogams to Phanerogams. • Understand the Physiological and Developmental processes of Plants • Gain knowledge of Agro Forestry/Pharmacognosy /Gardening/ Mushroom /biofertilizers etc to develop entrepreneur attitude. • Understands about various concepts of Genetics, Taxonomy, Ecology, Molecular biology, Tissue Culture and Its applied aspect.
<p style="text-align: center;">Program specific outcomes</p>	<ul style="list-style-type: none"> • Understand the nature and basic concepts of cell biology, genetics, molecular biology, taxonomy, physiology, ecology, diseases, disease spreading agents and applied Botany • Understand the relationships among Plants, plants and microbes • Perform experiments as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, molecular Biology, Plant biotechnology and Plant Tissue Culture. • Qualitative approach has been made to crack the different State and National level exam concern with Plant Sciences/Life sciences. • Gains knowledge about research methodologies, effective communication and skills of problem solving methods

GONDWANA UNIVERSITY, GADCHIROLI
CBCS COURSES IN B. SC. BOTANY

SEMESTER - I

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	CREDIT
	I	PLANT DIVERSITY I (MICRO-ORGANISMS, ALGAE, FUNGI AND PLANT PATHOLOGY)	02
	II	PLANT DIVERSITY II (BRYOPHYTA PTERIDOPHYTA, GYMNOSPERMS AND PALEOBOTANY)	02
	PRACTICAL	BASED ON THEORY PAPER I & II	02

SEMESTER - II

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	CREDIT
	III	MORPHOLOGY AND ANATOMY OF ANGIOSPERMS	02
	IV	TAXONOMY AND DIVERSITY OF ANGIOSPERMS	02
	PRACTICAL	BASED ON THEORY PAPER III & IV	02

SEMESTER- III

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	CREDIT	SEC
	V	REPRODUCTIVE BIOLOGY OF ANGIOSPERMS, PLANT GROWTH AND DEVELOPMENT	02	ENVIRONMENTAL STUDIES
	VI	PLANT BIOCHEMISTRY AND PHYSIOLOGY	02	
	PRACTICAL	BASED ON THEORY PAPER V & VI	02	

SEMESTER- IV

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	CREDIT	SEC
	VII	CELL BIOLOGY, GENETICS AND BIOTECHNOLOGY	02	ENVIRONMENTAL STUDIES
	VIII	PLANT ECOLOGY	02	
	PRACTICAL	BASED ON THEORY PAPER VII & VIII	02	

SEMESTER -V

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	CREDIT
--	IX DISCIPLINE SPECIFIC ELECTIVE (DSE)	MOLECULAR BIOLOGY –I	02
--	X DISCIPLINE SPECIFIC ELECTIVE (DSE)	MOLECULAR BIOLOGY –II	02
--	PRACTICAL	CORE COURSE IX & X	02
--	SKILL ENHANCEMENT COURSE (SEC)	GARDENER TRAINING –(BASIC)	02
		MUSHROOM CULTURE TECHNOLOGY	02
		HERBAL TECHNOLOGY	02
		HIGH DENSITY PLANTING	02
		FLORICULTURE	02

SEMESTER -VI

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	CREDIT
--	XI DISCIPLINE SPECIFIC ELECTIVE (DSE)	PLANT BIOTECHNOLOGY- I	02
--	XII DISCIPLINE SPECIFIC ELECTIVE (DSE)	PLANT BIOTECHNOLOGY- II	02
--	PRACTICAL	CORE COURSE XI & XII	02
--	SKILL ENHANCEMENT COURSE (SEC)	ETHNOBOTANY	02

Scheme of Marks of Theory and Practical

Semester	Paper	Title	Marks		Total
			Theory	Internal Assessment	
I	I	PLANT DIVERSITY I (MICRO-ORGANISMS, ALGAE, FUNGI AND PLANT PATHOLOGY)	50	10	150
	II	PLANT DIVERSITY II (BRYOPHYTA PTERIDOPHYTA, GYMNOSPERMS AND PALEOBOTANY)	50	10	
	PRACTICAL	BASED ON THEORY PAPER I & II	30	-	
II	I	MORPHOLOGY AND ANATOMY OF ANGIOSPERMS	50	10	150
	II	TAXONOMY AND DIVERSITY OF ANGIOSPERMS	50	10	
	PRACTICAL	BASED ON THEORY PAPER I & II	30	-	
III	I	REPRODUCTIVE BIOLOGY OF ANGIOSPERMS, PLANT GROWTH AND DEVELOPMENT	50	10	150
	II	PLANT BIOCHEMISTRY AND PHYSIOLOGY	50	10	
	PRACTICAL	BASED ON THEORY PAPER I & II	30	-	
IV	I	CELL BIOLOGY, GENETICS AND BIOTECHNOLOGY	50	10	150
	II	PLANT ECOLOGY	50	10	
	PRACTICAL	BASED ON THEORY PAPER I & II	30	-	
V	I	MOLECULAR BIOLOGY-I	50	10	150
	II	MOLECULAR BIOLOGY-I	50	10	
	PRACTICAL	PRACTICALS BASED	30	-	

		ON PAPER IX AND PAPER X			
VI	I	PLANT BIOTECHNOLOGY-I	50	10	150
	II	PLANT BIOTECHNOLOGY-II	50	10	
	PRACTICAL	PRACTICALS BASED ON PAPER XI AND PAPER XII	30	-	

COURSE SPECIFIC OUT COMES

B.SC. I

SEMESTER – I

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	COURSE SPECIFIC OUTCOMES
	I	PLANT DIVERSITY I (MICRO-ORGANISMS, ALGAE, FUNGI AND PLANT PATHOLOGY)	<ul style="list-style-type: none">• Describes general characteristics of life-viz, Virus, Bacteria, Mycoplasma, Cyanobacteria.• Understand the Concept of Cryptogams and Phanerogams• General characteristics, classification and economic importance of Algae, Fungi and Lichens.• Understand the representative forms in Algae, Fungi and Lichens.• Application of Botany in agriculture through study of plant pathology.
	II	PLANT DIVERSITY II (BRYOPHYTA PTERIDOPHYTA, GYMNOSPERMS AND PALEOBOTANY)	<ul style="list-style-type: none">• Understand the diversity of plants from Bryophytes to Gymnosperms.• General characteristics, classification and economic importance of Bryophyta, Pteridophyta and Gymnosperms.• Understand the life history from representative forms of Bryophyta, Pteridophyta and Gymnosperms.• Concept of Heterospory and seed habit• Understand the geological time scale.• The process of fossilization and types of fossils.
	PRACTICAL	BASED ON THEORY PAPER I & II	<ul style="list-style-type: none">• Practical on handling the compound microscope, Differentiate the various groups of bacteria.• Study various life stages of representatives of Cryptogams to Gymnosperms.• Different plant diseases and causal organisms.• Types of fossil.• Study of fossil Gymnosperms

SEMESTER –II

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	COURSE SPECIFIC OUTCOMES AT THE END OF COURSE STUDENTS WILL ABLE TO UNDERSTAND
	III	MORPHOLOGY AND ANATOMY OF ANGIOSPERMS	<ul style="list-style-type: none">• Morphological modification of root, stem, leaves and floral parts and its taxonomic relevance in plant identification.• Allow the students to understand the anatomical features of angiosperms and function of various tissues in plants life.• Differentiation of tissue system in Monocot and Dicot root, stem and leaf. Anomalous secondary growth in root and stem.
	IV	TAXONOMY AND DIVERSITY OF ANGIOSPERMS	<ul style="list-style-type: none">• Help to understand Diversity of Angiosperms and concept of Taxonomy.• Origin of Angiosperms with Bennettitalian theory• Principles and rules of Botanical nomenclature.• Classification of Angiosperms and detailed study of Bentham and Hookers system classification.• Imparts to the importance of Herbarium in Taxonomy.• Diversity of Angiosperm plants by studying the families from Dicot and monocot and economic importance of plants.
	PRACTICAL	BASED ON THEORY PAPER I & II	<ul style="list-style-type: none">• Morphological modification of Angiosperms plants in relation to adaptation; types of tissue system; their function and role in plant life.• Study of Bentham and Hookers classification system for dicot and monocot plant.• Technique of classical and digital Herbarium preparation.

B. Sc. II**Semester III**

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	COURSE SPECIFIC OUTCOMES AT THE END OF COURSE STUDENTS WILL ABLE TO UNDERSTAND
	V	REPRODUCTIVE BIOLOGY OF ANGIOSPERMS, PLANT GROWTH AND DEVELOPMENT	<ul style="list-style-type: none">• Importance of pollination and their types in reproduction of plants; developmental process of male and female gametophyte.• Stages involved in Seed development; causes of seed dormancy and its importance.• Phases of plant growth and development and how growth hormones play an important role?• Tropic and Nastic movements.• Understand the concept of photoperiodism, vernalization, circadian rhythm, senescence and abscission.
	VI	PLANT BIOCHEMISTRY AND PHYSIOLOGY	<ul style="list-style-type: none">• Understanding the concept of biomolecules- includes the carbohydrates, proteins, lipids, amino acids and enzymes and their importance, mechanism and role in physiological and biochemical processes of plants.• Importance of nitrogen in plant growth, sources of nitrogen. The process of biological nitrogen fixation and role of nitrate reductase in nitrogen metabolism. Commercial application of PGPR.• Role of mineral nutrition in plant growth and development and deficiency symptoms.• Understand the concept of Ascent of sap, Transpiration, phloem transport and theories of absorption of solutes.• Process of Photosynthesis and Respiration.
	PRAC TICAL	BASED ON THEORY PAPER I & II	<ul style="list-style-type: none">• Understand the concept of Enzyme substrate complex.• structure and development of seed• phenomenon of nastic and tropic movement• Learn the methods of breaking seed

			<p>dormancy.</p> <ul style="list-style-type: none"> • Impart the knowledge of fermentation, imbibition, transpiration and photosynthesis.
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Semester IV

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	COURSE SPECIFIC OUTCOMES AT THE END OF COURSE STUDENTS WILL BE ABLE TO UNDERSTAND
	VII	CELL BIOLOGY, GENETICS AND BIOTECHNOLOGY	<ul style="list-style-type: none"> • Ultrastructure and function of plant cell. • Cell division to learn how cells divide by equational and reduction division. Structure of DNA and its replication. • Concept of totipotency, steps in micropropagation. • Understand the Mendelian genetics and interaction of genes. • Structure and function of Extra nuclear genome. • Knowing the effect of chromosomal aberrations. Variation in chromosome number, sex linkage and sex determination. • Application in genetic counseling and R-DNA technology.
	VIII	PLANT ECOLOGY	<ul style="list-style-type: none"> • Importance of ecology in relation to understand the plant and environment interaction. • Understand the concept of ecosystem; biotic and abiotic factors. • Biogeochemical cycle, community ecology and assessment of environmental pollution. • Plant succession and climax concept and phytogeographical regions of India. •
	PRAC TICAL	BASED ON THEORY PAPER I & II	<ul style="list-style-type: none"> • Understand the ultra structure of cell. • Learn different stages of mitosis and meiosis and staining technique. Working out of law of inheritance. • Get acquainted with laboratory organization, tools of genetic engineering. • Use of various instruments. • Techniques of Plant Tissue Culture.

			<ul style="list-style-type: none"> • Ecological adaptation of plants • Method of determining the plant biomass, • Learn the water holding capacity of soil.
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B. Sc. III

Semester V

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	COURSE SPECIFIC OUTCOMES AT THE END OF COURSE STUDENTS WILL ABLE TO UNDERSTAND
--	DSE (ANY ONE)	MOLECULAR BIOLOGY	<ul style="list-style-type: none"> • The basic life processes in Biology • To Study the reaction at molecular level • Differentiate between Prokaryotic and Eukaryotic process • Different forms of Genetic Material • Students will understand Central dogma of Biology and Genetic code
		GENETICS AND PLANT BREEDING	<ul style="list-style-type: none"> • To understand the Mendel's Law of Heredity • Non-Mendelian Inheritance. • Plant Breeding: Introduction and its objectives • Plant genetic resources & Hybridization • Gene organization & genetic code • Special types of chromosome • Role of biotechnology in crop improvement
		ECONOMIC BOTANY	<ul style="list-style-type: none"> • To understand the Importance and scope of Economic Botany • Cultivation and uses of Cereals & Pulses • Vegetables, Sugars and fruits • Information of oil & Wild edible fruit plants • Information of Fibre & forage plants • Spices, condiments and beverages plants • Rubber and dye yielding plants • Timber yielding plants and Bamboo:
	SEC (ANY ONE)	GARDENER TRAINING –(BASIC)	<ul style="list-style-type: none"> • To understand the Gardening, its types • Ornamental Plants • Design and layout of gardens at various places • Green house & making of bonsai
		MUSHROOM	<ul style="list-style-type: none"> • Gives all knowledge of Mushroom

		CULTURE TECHNOLOGY	Industry <ul style="list-style-type: none"> • Edible Mushroom & its Cultivation Technology • Storage and nutrition • Research Centers & Cost benefit ratio
		HERBAL TECHNOLOGY	<ul style="list-style-type: none"> • Gives knowledge of herbal medicine ,Herbal drug & its formulations • Processing of herbal raw material • Herbal Nutraceuticals & Herbal cosmetics • Herbal excipients & Herbal Industry • Evaluation of Drugs
		HIGH DENSITY PLANTING	<ul style="list-style-type: none"> • To understand Traditional farming and Forestation • High Density Planting and its applications • HDP in Forestation & Miyawaki concept
		FLORICULTURE	<ul style="list-style-type: none"> • Gives knowledge related to floriculture and landscape gardening • To understand the Nursery Management & Ornamental Plants • Principles of Garden Designs & Commercial Floriculture

B.Sc. III Semester VI

PAPER CODE	CORE PAPER	TITLE OF THE PAPER	COURSE SPECIFIC OUTCOMES AT THE END OF COURSE STUDENTS WILL ABLE TO UNDERSTAND
	DSE (ANY ONE)	PLANT BIOTECHNOLOGY	<ul style="list-style-type: none"> • To understand the Basics and techniques in Plant Tissue Culture (PTC) • Micropropagation & Secondary metabolite production in Plants • To get aware with modern Tissue Culture Techniques • Methods of gene transfer & Transgenic Crop Production • Applications of Plant Biotechnology & Transgenic plants
		PLANT DIVERSITY AND CONSERVATION	<ul style="list-style-type: none"> • To understand the Concept of Biodiversity • Its applications at various levels • Biodiversity in Terrestrial & Aquatic Environment • Biodiversity distribution

			<ul style="list-style-type: none"> • Biogeographically & Phytogeographical classification of India • Biodiversity- Threats , loss and its causes • Listing of Threatened biodiversity • Conservation and Prevention Acts • In situ & Ex situ conservation • Conservation through tissue Culture
	SEC (ANY ONE)	ETHNOBOTANY	<ul style="list-style-type: none"> • To understand the concept, scope and objectives of Ethnobotany • Methodology of Ethnobotanical studies • Role of Ethnobotany in modern Medicine • Ethnobotany and legal aspects