

**GOVERNMENT SCIENCE COLLEGE, GADCHIROLI
DEPARTMENT OF BOTANY**

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

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| Subject specific outcomes | <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. |
| Program specific outcomes | <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
PG IN M. S BOTANY (CBCS)

SEMESTER - I

| PAPER CODE | THEORY/PRACTICAL | TITLE OF THE PAPER | CREDIT |
|---------------------------|------------------|-------------------------------|--------|
| PSCBOTT01 | PAPER-I | MICROBIOLOGY, ALGAE AND FUNGI | 4 |
| PSCBOTT02 | PAPER-II | BRYOPHYTES AND PTERIDOPHYTES | 4 |
| PSCBOTT03 | PAPER-III | GYMNOSPERMS AND PALEOBOTANNY | 4 |
| PSCBOTT04 | PAPER-IV | CYTOLOY AND GENETICS | 4 |
| Practical I PSCBOTP01 | PRACTICAL-I | BASED ON THEORY PAPER 1 AND 2 | 4 |
| Practical II PSCBOTP02 | PRACTICAL –II | BASED ON THEORY PAPER 3 AND 4 | 4 |
| Seminar 1 | | SEMINAR 1 | 1 |

SEMESTER - II

| PAPER CODE | THEORY/PRACTICAL | TITLE OF THE PAPER | CREDIT |
|---------------------------|------------------|------------------------------------|--------|
| PSCBOTT05 | PAPER-V | PLANT PHYSIOLOGY AND BIOCHEMISTRY | 4 |
| PSCBOTT06 | PAPER-VI | PLANT DEVELOPMENT AND REPRODUCTION | 4 |
| PSCBOTT07 | PAPER-VII | CELL AND MOLECULAR BIOLOGY -I | 4 |
| PSCBOTT08 | PAPER-VIII | ANGIOSPERMS –I | 4 |
| Practical I PSCBOTP03 | PRACTICAL-III | BASED ON THEORY PAPER 5 AND 6 | 4 |
| Practical II PSCBOTP04 | PRACTICAL –IV | BASED ON THEORY PAPER 7 AND 8 | 4 |
| Seminar 2 | | SEMINAR 2 | 1 |

SEMESTER - III

| PAPER CODE | THEORY/PRACTICAL | TITLE OF THE PAPER | CREDIT |
|-----------------------|------------------|---|--------|
| PSCBOTT09 | PAPER-IX | PLANT ECOLOGY | 4 |
| PSCBOTT10 | PAPER-X | CELL AND MOLECULAR BIOLOGY- II | 4 |
| PSDBOTT11 | PAPER-XI | REPRODUCTIVE BIOLOGY OF ANGIOSPERM-I | 4 |
| PSDBOTT12 (SEC) | PAPER-XII | PLANT DIVERSITY AND HUMAN WELFARE-I | 4 |
| Pract-V PSCBOTP05 | PRACTICAL-V | BASED ON THEORY PAPER PSCBOTT09 & PSCBOTT10 | 4 |
| Pract-VI PSDBOTP06 | PRACTICAL –VI | BASED ON THEORY PAPER PSCBOTT11 & PSCBOTT12 | 4 |
| Seminar 3 | | SEMINAR 3 | 1 |

SEMESTER - IV

| PAPER CODE | THEORY/PRACTICAL | TITLE OF THE PAPER | CREDIT |
|-----------------|------------------|--|--------|
| PSCBOTT13 | PAPER-XIII | PLANT BIOTECHNOLOGY | 4 |
| PSCBOTT14 | PAPER-XIV | ANGIOSPERMS – II | 4 |
| PSCBOTT15 | PAPER-XV | REPRODUCTIVE BIOLOGY OF ANGIOSPERMS II | 4 |
| PSCBOTT16 (SEC) | PAPER-XVI | PLANT DIVERSITY AND HUMAN | 4 |

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| | | WELFARE-II | |
| Pract-VII PSCDBOTP07 | PRACTICAL-VII | BASED ON THEORY PAPER PSCBOTT13, PSCBOTT14 & PSCBOTT15 | 4 |
| Pract-VIII PSCDBOTP08 | PRACTICAL -VIII | PROJECT | 4 |
| Seminar 4 | | SEMINAR 4 | 1 |

Scheme of Marks of Theory and Practical

| Semester | Paper code | Theory/ practical | Title | Marks | | Total |
|----------|----------------------------|----------------------------------|---|--------------------|------------------------|-------|
| | | | | University Exam | Internal Assessment | |
| I | PSCBOTT01 | PAPER-I | MICROBIOLOGY, ALGAE AND FUNGI | 80 | 20 | 100 |
| | PSCBOTT02 | PAPER-II | BRYOPHYTES AND PTERIDOPHYTES | 80 | 20 | 100 |
| | PSCBOTT03 | PAPER-III | GYMNOSPERMS AND PALEOBOTANNY | 80 | 20 | 100 |
| | PSCBOTT04 | PAPER-IV | CYTOLOY AND GENETICS | 80 | 20 | 100 |
| | Practical I PSCBOTP01 | PRACTICAL-I | BASED ON THEORY PAPER 1 AND 2 | 80 | 20 | 100 |
| | Practical II PSCBOTP02 | PRACTICAL – II | BASED ON THEORY PAPER 3 AND 4 | 80 | 20 | 100 |
| | Seminar 1 | | SEMINAR 1 | 25 | - | 25 |
| II | PSCBOTT05 | PAPER-V | PLANT PHYSIOLOGY AND BIOCHEMISTRY | 80 | 20 | 100 |
| | PSCBOTT06 | PAPER-VI | PLANT DEVELOPMENT AND REPRODUCTION | 80 | 20 | 100 |
| | PSCBOTT07 | PAPER-VII | CELL AND MOLECULAR BIOLOGY –I | 80 | 20 | 100 |
| | PSCBOTT08 | PAPER-VIII | ANGIOSPERMS –I | 80 | 20 | 100 |
| | Practical III PSCBOTP03 | PRACTICAL- III | BASED ON THEORY PAPER 5 AND 6 | 80 | 20 | 100 |
| | Practical IV PSCBOTP04 | PRACTICAL – IV | BASED ON THEORY PAPER 7 AND 8 | 80 | 20 | 100 |
| | Seminar 2 | | SEMINAR 2 | 25 | - | 25 |
| III | PSCBOTT09 | PAPER-IX | PLANT ECOLOGY | 80 | 20 | 100 |
| | PSCBOTT10 | PAPER-X | CELL AND MOLECULAR BIOLOGY-II | 80 | 20 | 100 |
| | PSDBOTT11 | PAPER-XI SPECIAL- 1(DSE-I) | REPRODUCTIVE BIOLOGY OF ANGIOSPERMS-I | 80 | 20 | 100 |
| | PSSBOTT12 | Foundation 1 (SEC-I) | PLANT DIVERSITY AND HUMAN WELFARE-I | 80 | 20 | 100 |
| | Pract-V PSCBOTP05 | PRACTICAL – V | BASED ON THEORY PAPER PSCBOTT09 & PSCBOTT10 | 80 | 20 | 100 |
| | Pract-VI PSDBOTP06 | PRACTICAL – VI | BASED ON THEORY PAPER PSCBOTT11 & PSCBOTT12 | 80 | 20 | 100 |
| | Seminar 3 | | SEMINAR 3 | 25 | - | 25 |
| IV | PSCBOTT13 | PAPER-XIII | PLANT BIOTECHNOLOGY | 80 | 20 | 100 |
| | PSCBOTT14 | PAPER-XIV | ANGIOSPERMS – II | 80 | 20 | 100 |

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| | PSDBOTT15 | PAPER-XV SPECIAL- 2(DSE-II) | REPRODUCTIVE BIOLOGY OF ANGIOSPERMS II | 80 | 20 | 100 |
| | PSSBOTT16 | Foundation 2 (SEC-II) | PLANT DIVERSITY AND HUMAN WELFARE-II | 80 | 20 | 100 |
| | PRACT-VII PSCDBOTP07 | PRACTICAL- VII | BASED ON THEORY PAPER PSCBOTT13, PSCBOTT14 & PSCBOTT15 | 80 | 20 | 100 |
| | PRACT-VIII PSCDBOTP08 | PRACTICAL- VIII | PROJECT | 80 | 20 | 100 |
| | Seminar 4 | | SEMINAR 4 | 25 | - | 25 |

Course specific outcomes M.Sc.Botany

| Semester | Title | Course specific outcomes |
|-----------------|--------------------------------------|---|
| I | MICROBIOLOGY, ALGAE AND FUNGI | <ul style="list-style-type: none"> • Students will understand the history and contribution of various microbiologists for mankind. • General characteristic and reproduction , economic importance of Archaeobacteria and eubacteria. • Criteria for classification of algae and fungi. • Students will learn the comparative study, classification and evolutionary trends in the various classes of fungi. • Detailed study of diseases by Plant pathogens with symptoms, causal organisms and their control. |
| | BRYOPHYTES AND PTERIDOPHYTES | <ul style="list-style-type: none"> • General characters, distribution, classification and ecology of Bryophytes and Pteridophytes. • Learn more about the series of Evolution in stele, heterospory and seed habit. |
| | GYMNOSPERMS AND PALEOBOTANY | <ul style="list-style-type: none"> • Students will learn the evolution of Gymnosperms and Angiosperms with various fossil records; process of fossilization and geological time scale. • General account, distribution, origin, systems of classification and economic importance of Gymnosperms. • Comparative study of vegetative and reproductive parts of some selected genus of Gymnosperms. |
| | CYTOLOGY AND GENETICS | <ul style="list-style-type: none"> • General understanding of chromosomal inheritance, linkage, deviation from Mendal's findings. • Sex determination and dosage compensation in plants. • Chromosome structure and packaging of DNA. Function of rRNA genes, karyotypes analysis and evolution. Specialized types of chromosomes. • Will understand the causes and effects of structural changes in chromosome. Inversion and translocation in heterozygotes. • Causes and consequences of mutation in plants. The types of mutation and use of different mutagenic agent in crop |

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| | | <p>improvement.</p> <ul style="list-style-type: none"> • Concept of Epigenetics and how it causes the change in phenotype without changing genotype and its role in various human diseases. |
| I | BASED ON THEORY PAPER 1 AND 2 | <ul style="list-style-type: none"> • Practical based on paper 1 and 2 |
| | BASED ON THEORY PAPER 3 AND 4 | <ul style="list-style-type: none"> • Practical based on paper 3 and 4 |
| | SEMINAR 1 | <ul style="list-style-type: none"> • Improve the presentation skill, handling of ICT based tools. • Use of educational videos for making topic very clear and comprehensive. |
| II | PLANT PHYSIOLOGY AND BIOCHEMISTRY | <ul style="list-style-type: none"> • Will emphasis the importance of plant physiology and biochemistry. • Role of photosynthesis, evolution of photosynthetic apparatus and various pathways involved in photosynthesis. • Will understand the concept of respiration and various pathways involved in energy release. • Will learn the biosynthetic pathways of primary metabolites and also how they are broken down and the enzymes involved in the process. • Understand the process of amino acid metabolism; assimilation of sulfur, phosphate and nitrogen; biological nitrogen fixation and role of nif gene. • Solute transport and photo-assimilated translocation in plants. |
| | PLANT DEVELOPMENT AND REPRODUCTION | <ul style="list-style-type: none"> • Students will understand the kinetics of growth and growth patterns. • Theory of shoot and root apical meristem- SAM and RAM • Application of plant growth regulators in plant morphogenesis. • Physiology and genetics in flowering and mechanism of pollination. • Developmental process in male and female gametophytes and gene expression in pollen pistil interaction. • Biochemical and hormonal control of seed development and germination. • Learn the concept of senescence and programmed cell death (PCD); metabolic |

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| | | changes associated with PCD, senescence and its regulation. |
| | CELL AND MOLECULAR BIOLOGY-I | <ul style="list-style-type: none"> • It will give an insight on the process of biogenesis. • Structure and function of cell wall, plasma membrane, plasmodesmata and cellular organelles. • In detail study of cell division, DNA structure, forms and replication in prokaryote and eukaryote. • Molecular biology of stress responses in plants. Defense mechanism and modulation of metabolism, induction of genes in response to different stresses. |
| | ANGIOSPERMS-I | <ul style="list-style-type: none"> • Learn the origin and evolution of Angiospermic characters their floral adaptations to different pollinators. • Understand the scope, aims, principles and historic development of plant taxonomy. • Relative merits and demerits of major systems of classification. • Role of various taxonomic tools including biochemical as well as molecular tools in plant identification. Use of computer and GIS. • Study the biosystematics, numerical taxonomy in plant characterization. • Nomenclature of plants, salient features and role of ICBN. |
| | BASED ON THEORY PAPER 5 AND 6 | <ul style="list-style-type: none"> • Practical based on paper 5 and 6 |
| | BASED ON THEORY PAPER 7 AND 8 | <ul style="list-style-type: none"> • Practical based on paper 7 and 8 |
| | SEMINAR 2 | <ul style="list-style-type: none"> • Improve the presentation skill, handling of ICT based tools. • Use of educational videos for making topic very clear and comprehensive. |
| III | PLANT ECOLOGY | <ul style="list-style-type: none"> • Course provides them comprehensive understanding about vegetation organization & its development • Ecosystem organization & Global biogeochemical cycles • Air, Water and Soil pollution & Climate change • Ecosystem stability & Ecological management |

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| | CELL AND MOLECULAR BIOLOGY-II | <ul style="list-style-type: none"> • Course provides them comprehensive understanding about Central Dogma of Biology • Gene structure and expression & protein sorting • Genome organization in prokaryotes and eukaryotic organelles • Genetic recombination and genetic mapping • Cell cycle and apoptosis • Signal transduction & Techniques in cell biology |
| | REPRODUCTIVE BIOLOGY OF ANGIOSPERM-I (DSE-I) | <ul style="list-style-type: none"> • Course provides them comprehensive & detail understanding about reproductive system in Angiosperm • Anther –structure,microsporogenesis and its molecular developmental aspect • Male gametophyte development and pollen with Physiological and biochemical aspect • Pistill & Megasporogenesis, cytoskeleton of the embryo sac • Pollination in detail, biochemistry of Pollen-pistil interaction & Incompatibility |
| | PLANT DIVERSITY AND HUMAN WELFARE-I (SEC-I) | <ul style="list-style-type: none"> • Course provides them comprehensive understanding about Plant diversity and its scope • Students gain knowledge of Values and uses of Biodiversity • Understanding of Loss of Biodiversity at various levels • Management of Plant Biodiversity, Methodology for execution & legislation |
| | PRACTICAL –V | <ul style="list-style-type: none"> • Practical based on paper 9 & 10 |
| | PRACTICAL –VI | <ul style="list-style-type: none"> • Practical based on paper 11 and 12 |
| | SEMINAR | <ul style="list-style-type: none"> • Improve the presentation skill, handling of ICT based tools. • Use of educational videos for making topic very clear and comprehensive. |
| IV | PLANT BIOTECHNOLOGY | <ul style="list-style-type: none"> • Students gain knowledge about various tools & techniques used in Recombinant DNA technology & Genetic engineering of plants • Microbial genetic manipulation & |

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| | | <p>Genomics and proteomics</p> <ul style="list-style-type: none"> • Students gains knowledge about Plant tissue culture, Transgenic production • Bioinformatics, Learns various aspects of Database. • Data analysis, prediction and submission tools and their uses. |
| | ANGIOSPERM-II | <ul style="list-style-type: none"> • Course provides students comprehensive understanding about distinguished characters, floral variation and evolution, affinities of primitive , modern monocot & dicot families • primitive living angiosperms, speciation and extinction & global pattern of biodiversity • Biological diversity concept and levels |
| | REPRODUCTIVE BIOLOGY OF ANGIOSPERMS II (DSE II) | <ul style="list-style-type: none"> • Understanding of Angiospermic Fertilization & endosperm in detail • Embryogenesis & Polyembryony • Phenomenon of apomixis, parthenocarpy & Mellitopalynology • Concept and scope of biotechnology in angiosperm • Biotransformation and production of useful compounds |
| | PLANT DIVERSITY AND HUMAN WELFARE-II (SEC II) | <ul style="list-style-type: none"> • Conservation of Biodiversity • Social approaches & awareness programmes • Understand the Role of plants in relation to Human Welfare at different aspects |
| | PRACTICAL VII | <ul style="list-style-type: none"> • BASED ON THEORY PAPER XIII, XVI & XV |
| | PRACTICAL VIII PROJECT | <ul style="list-style-type: none"> • Get acquainted with Research • Make research proposal • data collection & fieldwork • Basic or Experimental work • Understand the process of data analysis |
| | SEMINAR 4 | <ul style="list-style-type: none"> • Improve the presentation skill, handling of ICT based tools. • Use of educational videos for making topic very clear and comprehensive. |