SNDT Women's UNIVERSITY
B.Sc Botany Degree Syllabus

First Year

SEM I:

Paper I : Algae, Fungi, Lichens , Bacteria and Viruses,
Paper II:Morphology, Taxonomy and Anatomy,

SEM II:

Paper I : Bryophyta, Pteridophyta, Gymnosperms and Ecology
Paper II: Physiology, Biochemistry Biotechnology and Cyto-Genetics,

Second Year

SEM III:

Paper I : Algae, Fungi and Plant Pathology, and Microbiology
Paper II: Angiosperms Anatomy Economic Botany Biotechnology and Instrumentation

SEM IV:

Paper I: Bryophyta Pteridophyta, Paleobotany and Gymnosperms Horticulture. and Forestry
Paper II: Biochemistry, Pharmacognosy Cytogenetics Physiology and Ecology Biostatistics Bioinformatics

Third Year

SEM V :

Paper I : Cryptogams, Gymnosperms, Angiosperms, Palynology and Embryology
Paper II : Cryptogams Paleobotany Anatomy and Micro-technique
Paper III : Biochemistry, CytoGenetics, and Plant Breeding
Paper IV: Plant Physiology, Ecology Phytogeography

SEM VI :

Paper I : Plant Biotechnology Bioinformatics Biostatistics
Paper II : Economic Botany, Forestry Ethnobotany and Industrial Microbiology
Paper III: Horticulture and Gardening
Paper IV: Biotechnology and Instrumentation

FY BSc BOTANY SYLLABUS
SEMESTER I

Paper- I (104101): Algae, Fungi, Lichens , Bacteria, Viruses

Algae
General Characters of Algae
Structure, Life-Cycle and Systematic Position of *Nostoc* and *Zygnema*.
Economic Importance of Algae

Fungi
General Characters of Fungi
Structure, Life-cycle and Systematic position of *Rhizopus* and *Aspergillus*
Economic Importance of Fungi.

Lichens
Classification, Structure, Nature of Association, Forms of Thalli, Methods of Reproduction,
Economic Importance and Ecological Significance of Lichens.

Bacteria
Occurrence, Characteristics, Classification, Morphological Forms, Ultrastructure, Growth, Reproduction and
Economic Importance of Bacteria.

Viruses
Occurrence, Characteristics, Classification, Morphological Forms, Ultrastructure, Multiplication and Economic Importance of Viruses
TMV – Structure and Multiplication

Paper -II (104102) : Morphology, Taxonomy and Anatomy

Morphology
Typical Plant
Types of Inflorescence (Racemose, Cymose and Special Types)
Floral Morphology
Symmetry of Flower, Parts of Flower, Modifications of Calyx and Corolla, Aestivation, Placentation
Floral Formula

Angiosperms
Systems of Classifications: Artificial, Natural and Phylogenetic,
Binomial Nomenclature
Bentham and Hooker's System of classification up to orders[family] with respect to the following prescribed families:
Annonaceae, Crucifarae, Malvaceae, Leguminosae (All the Three Sub-Families)*, Asteraceae, Solanaceae, Acanthaceae, Euphorbiaceae, Liliaceae.*

Anatomy
Introduction of various Tissue Systems in Plants.
Epidermal Tissue System- Epidermal Outgrowth, Stomata(Typical Dicot and Monocot Stomata);
Study of the Primary Structure of Dicotyleddonous and Monocotyledonous Stem, Root and Leaf.

FY BSc BOTANY SYLLABUS
SEMESTER II

Paper- I (204101) : Bryophyta, Pteridophyta, Gymnosperms and Ecology

Bryophytes
General Characters
Structure, Life Cycle, Systematic Position and Alternation of Generation in *Riccia.*

Pteridophytes
General Characters
Structure, Life Cycle, Systematic Position and Alternation of Generation in *Nephrolepis.*

Gymnosperms
General Characters
Distinguishing Characters of Cycadophyta and Coniferophyta.
Structure Life Cycle, Systematic Position and Alternation of Generation in *Cycas.*
Economic Importance of Gymnosperms.

Ecology
Structure, Functions and Types of Ecosystem;
Food Chain, Food Web, Ecological Pyramids
Productivity in an Ecosystem (Terrestrial/ Pond), Energy Flow in an Ecosystem

Paper -II (204102): Physiology , Biochemistry, Biotechnology and CytoGenetics

Physiology
Plant-Water Interaction **:**Structure and Properties of Water, Polarity of Water
Osmosis, Plasmolysis and Imbibition, Water Potential.
Water Transport – Ascent of Sap, Transpiration
Enzymes
Nature of Enzymes, Classification, Mode of Action, Enzyme Specification and Inhibition.

Biocheistry
Classification, Structure and Functions of Carbohydrates, Proteins and Lipids
Biotechnology
DNA – Structure, Replication and Recombination
DNA Structure and Replication (Prokaryotic and Eukaryotic),Recombination
r-DNA Technology
Cloning Vectors
Cytogenetics
Prokaryotic and Eukaryotic Cell
Ultrastructure and Functions of the Cell Wall, Plasma Membrane
Ultrastructure and functions of the cell organelles: Mitochondrion and Chloroplast.
Ultrastructure of the Nucleus.and Chromosome
Cell Division-Mitosis
Mendalian Principles – Mendel's Laws
Intralocus (Allelic) Gene Interaction.
Intralocus (Non-Allelic) Gene Interaction- Non-Epistatic Interaction.
Epistatic Interaction- Recessive Epistasis, Duplicate Recessive Epistasis, Dominant Epistasis and Duplicate Dominant Epistasis.
Sex determination
Chromosomal Sex Determination:
Heterogametic Male- XX-XY(Man,Drosophila, Melandrium), XX-XO(Grass-hopper, Dioscorea and Vallisneria);
Heterogametic Female- ZW-ZZ(Fowl), ZO-ZZ(Butterflies);
Haplodiploidy in Hymenoptera, Gynandromorphs:

PRACTICALS FY BOTANY

Total of 20 Practicals / Semester

SEM – I (Paper No: 104201)

PRACTICAL I

Algae - Study of Stages in the Life Cycle of *Nostoc* and *Zygnema*.
Economic Importance of Algae
Fungi - Study of stages in the life cycle of *Rhizopus* and *Aspergillus*
Lichens – Study of Crustose, Foliose and Fruiticose Lichens
Bacteria - Study of Forms of Bacteria, Gram Staining of Bacteria,

PRACTICAL II

Morphology
Inflorescence – Racemose, Cymose and Special Type
Flowers – Typical Flower, Hypogynous, Epigynous and Perigynous, Aestivation, Types of Calyx and Corolla
Typical Stamen, Adhesion and Cohesion, Typical Carpel and Placentation
Angiosperms
Annonaceae, Crucifarae, Malvaceae, Leguminosae, Asteraceae, Solanaceae, Acanthaceae, Euphorbiaceae, Liliaceae.
Anatomy
Study of Meristematic and Permanent Tissues
Study of Epidermal Outgrowths
Study of typical Stomata
Study of Primary Structures in Roots, Stem and Leaf

SEM II (Paper No. 204201):

PRACTICAL I

Bryophytes - Study of stages in the life cycle of *Riccia.*
Pteridophytes - Study of stages in the life cycle of *Nephrolepis.*
Gymnosperms Study of stages in the life cycle of Cycas.
Ecology Study of any one natural ecosystem and preparation of a report on the same.

PRACTICAL II

Physiology
Immobilization of enzymes and Study of Activity of Enzyme Amylase
Effect of Substrate Concentration on Amylase activity.
Determination of solute potential by Plasmolytic Method.

Biochemistry
Qualitative Tests for Carbohydrates, Proteins and Lipids

Biotechnology
Photomicrographs of DNA, RNA and Plasmids

Cytology
Study of Micrograph of Cell, Cell Wall and Chloroplast and Mitochondria and Nucleus
Study of Mitosis

Genetics
Study of Human Karyotypes
Study of Gynandromorphs.

SY BSc BOTANY SYLLABUS

SEMESTER III

Paper- I (304101): Algae, Fungi and Plant Pathology, and Microbiology

Algae

Range of Thallus Structure and Pigmentation in Algae
Structure, Life-Cycle and Systematic Position of *Sargassum and Batrachospermum*.

Fungi

General Characters of Fungi
Structure, Life-cycle and Systematic position of *Erysiphe*, *Agaricus* and *Ustilago*
Economic Importance of Fungi.

Plant Pathology

Classification of Plant Diseases on the basis of Causative Organisms and Symptoms
Host- Parasite Interaction.
Study of the following diseases with emphasis on Symptoms, Disease Cycle and Control Measures of Rust, Early Blight and Powdery Milldew
Brief account Fungicides- Bordeaux Mixture, Lime Sulphur,Tobacco Decoction, Neem Cake & Oil

Microbiology

Microbial Techniques
Principles of Staining
Culture Media, Pure Culture Methods
Bacterial Classification: Morphological Classification, Classification based on Staining Reaction
Mycoplasma & Actinomycetes –General Account.
General Characteristics, Nomenclature, Classification, Structure, Chemical
Composition, Properties and Reproduction of Bacteriophages and T. M. V.
Transmission of Viruses and Role of Vectors.
Soil Microbiology –Biogeochemical Activityof Microorganisms in Soil - N2 cycle, Carbon Cycle, Sulphur Cycle, Phosphorous Cycle, Iron Cycle. Decomposition of organic matter, Microbial Degradation of Cellulose, Lignin & Starch, Biofertilizers and Biogas Production
Aquatic Microbiology - Water Contamination, Standards of Water, Methods of Waste Water
Treatment.

Paper -II (304102): Angiosperms Anatomy Economic Botany Biotechnology and Instrumentation

Angiosperms

Herbarium, Herbarium Techniques and Botanical Gardens
A brief account of modem trends in Taxonomy; Chemotaxonomy, Numerical Taxonomy, Cytotaxonomy and Molecular Taxonomy
Bentham and Hooker's System of classification up to orders[family] with respect to the following prescribed families:
Rubiaceae, Apocynaceae, Convolvulaceae, Acanthaceae, Urticaceae, Euphorbiaceae, Commelinaceae, Scitaminae

Anatomy

Normal Secondary Growth in Roots and Stem
Mechanical Tissue System and Stelar Evolution

Economic Botany

A brief account on the utility of the following plants, specifying the Binomial, family and morphology of the useful parts.
Cereals and millets - Wheat and Ragi
Pulses - Black gram and Bengal gram
Sugar yielding Plants –Sugar cane and Beet
Spices - Pepper and Cardamom
Beverages –Tea and Coffee

Biotechnology

DNA – Structure, Replication and Recombination
Recombinant DNA Technology and Manipulation of DNA,
Selectable Markers, Reporter Genes, Promoters used in Plant Vectors,
Transgenic Plants used for improving quality of Seeds, Edible vaccines

Instrumentation

pH Meter and its application. Buffers - Use of buffers in biological research,
Principles and applications of Colorimeter, Spectrophotometer and Centrifuge.

SEMESTER IV

Paper- I (404101): Bryophyta Pteridophyta, Paleobotany Gymnosperms Horticulture. and Forestry

Bryophytes
General Characters
Structure, Life Cycle, Systematic Position and Alternation of Generation in Anthoceros

Pteridophytes
General Characters
Structure, Life Cycle, Systematic Position and Alternation of Generation in *Sellaginella* and *Equisetum*
Evolution of Heterospory and Seed Habit in Pteridophyta

Gymnosperms
General Characters
Distinguishing Characters of Cycadophyta and Coniferophyta
Structure Life Cycle, Systematic Position and Alternation of Generation in *Pinus.*
Structure Life Cycle, Systematic Position and Alternation of Generation in *Cycas.*
Economic Importance of Gymnosperms.

Paleobotany
Geological Time Scale. Evolutionary Trends Fossil Formation
Primitive Land Plants - Precambrian Flora - Algae, Fungi and Bryophyta

Horticulture
Importance and scope of horticulture.
Components of Garden
Lawns and Landscaping
Trees, shrubs and shrubberies, climbers and creepers
Flower beds and borders
Drives, roads, walks and paths
Carpet beds
Conservatory or green houses
Indoor garden, Roof garden
Bonsai
Flower Arrangement
Containers and requirements for flower arrangements
Free style, Shallow and Mass arrangement
Japanese – Ikebana
Bouquet and garland making
Dry flower arrangement

Forestry
Forests- Natural and Man Made Forests
Tropical, Temperate, Evergreen Semi-Evergreen, Deciduous; Monoculture, Multipurpose, Social and Industrial. Forest and Gene Conservation.
Social and Agro Forestry
Silviculture

Paper -II (404102): Biochemistry, Pharmacognosy Cytogenetics Physiology and Ecology Biostatistics Bioinformatics

Biochemistry
Chemistry of Nucleic Acids
Amino Acids, Classification, Structure and Metabolism

Pharmacognosy
Definition and scope of Pharmacognosy
Sources of Crude Drugs –
Roots, Rhizome, Bulb, Corm, Leaves, Stems, Flowers, Fruits and Seeds

Cytogenetics
Chromosomes- Chromosome Morphology- Eukaryotic Chromosomes and its Molecular Organization.
Chromatin - Composition and Structure; Hetero-Chromatin and Euchromatin;
Special Types of Chromosomes- Salivary Gland, Lamp Brush and B Chromosomes
Multiple Alleles-General account. ABO Blood Groups in Man. *Rh* factor.
Quantitative Characters- General characters of Quantitative Inheritance,
Polygenic Inheritance; Skin Color in Man, Ear size in Maize.
Linkage and Crossing Over- Linkage and its Importance, Linkage and independent assortment.
Complete and Incomplete Linkage.
Crossing Over –Two point and Three point Test Cross.
Determination of Gene Sequence. Interference and Coincidence. Mapping of Chromosomes

Physiology
Photosynthesis: Photosynthetic Apparatus, Structure and Function of Chloroplast,
Quantasomes - Solar Spectrum and its importance
Fluorescence and Phosphorescence
Pigment Systems
Mechanism of Photosynthesis- Light Reaction - Cyclic and Non Cyclic Photophosphorylation. Hill Reaction –
Dark Reaction: Calvin Cycle. Comparative Study of C3, C4, and CAM Plants.
Photorespiration –
Bacterial Photosynthesis and Chemosynthesis -
Factors affecting Photosynthesis - Law of Limiting Factors.
Respiration: Introduction, Respiratory Substances, Types of Respiration- Aerobic and Anaerobic.
Aerobic Respiration - Glycolysis, Krebs's Cycle,
Anaerobic Respiration –Fermentation: Alcoholic and Lactic Acid Fermentation.
Energy Relation of Respiration and Factors affecting respiration.

Ecology
Concept of Environmental Factors, Soil as an Edaphic Factor, Soil Composition, Types of Soil, Soil Formation, Soil Profile
Plant Succession, Concept of Hydrosere and Xerosere

Biostatistics
General Introduction.
Sample and Sampling. Methods of Sampling. Collection and Representation of Data.
Measures of Central Tendency –Mean, Mode, Median
Measures of Dispersion –Range, Quartile Deviation, Mean Deviation, Standard
Deviation, Standard Error, Variance.

Bioinformatics
Introduction to Bioinformatics – www, Internet and its uses,
Tools used in Bioinformatics related to Biotechnology,
NCBI Data Models and other Data Bases,
Services offered by NCBI and EBI

PRACTICALS SY BSc BOTANY

Total of 30 Practicals / Semester

SEM – III

Paper No: 304201

PRACTICAL I

Algae - Study of Stages in the Life Cycle of *Sargassum and Batrachospermum*
Study of Algal Pigments and Chromatographic Seperation of Pigments
Study the range of thallus structure in Algae

Fungi - Study of stages in the life cycle of *Erysiphe*, *Agaricus* and *Ustilago*

Plant Pathology- Study the Symptom of fungal diseases Rust, Early Blight and Powdery Milldew

Microbiology
Sterilization Techniques
Preparation of Culture Media in slants and plates
Isolation of Soil Bacteria

PRACTICAL II

Angiosperms
Rubiaceae, Apocynaceae, Convolvulaceae, Acanthaceae, Urticaceae, Euphorbiaceae, Commelinaceae, Scitaminae.

Anatomy
Study of Normal Secondary Growth in root and stem
Study of mechanical tissue system in aerial and underground organs

Economic Botany
Study of Two plants each yielding Cereals and millets, Pulses, Sugar yielding Plants, Spices, Beverages

Biotechnology
Design protocol to identify Transgenic Plant

Instrumentation
Study Principle, Structure and Function of
pH Meter, Colorimeter, Spectrophotometer

SEM – IV

Paper no. 404201

PRACTICAL I

Bryophytes - Study of stages in the life cycle of *Anthoceros*
Pteridophytes - Study of stages in the life cycle of *Sellaginella and Equisetum.*

Paleobotany Study of Fossils Types
Gymnosperms Study of stages in the life cycle of Cycus and Pinus.
Horticulture
Prepare a Typical Garden Plan for House, School and Public Garden
Study Two Plants each to be used at following locations Drives, roads, walks and paths, Carpet, Indoor garden, and Roof garden
Forestry
Visit to Sylviculture Farm

PRACTICAL II

Biochemistry Study the Photomicrographs of DNA and RNA

Pharmacognosy
Study Root Stem and Leaf as a source of Herbal Medicine
Tests for Alkaloids from *Strychnos* (seeds) & *Holarrhena* (Bark)
Tests for Glycosides from *Glycyrrhza* / *Aloe* / *Senna*
Tests for Tannins from *Clove buds / Arjuna (bark) / Catechu*
Cytogenetics
Quantitative Estimation of DNA and RNA
Study of Giant Chromosome
Physiology
Study of Hill's
Reaction Quantitative estimation of photosynthetic pigments
Study of absorption spectrum pattern of Chlorophyll / Carotenoids
Ecology Mechanical analysis of soil by sieve method
Visit nearby Aquatic Ecosystem and record the observations

Biostatistics
Design an Experiment to measure Mean Mode Median
Design an Experiment to Measure Variance
Bioinformatics
Operate the Computer and Log on to a Bioinformatics site

Third Year BSc Botany Syllabus

SEMESTER V

Paper I (504101): Cryptogams, Gymnosperms, Angiosperms, Palynology and Embryology

Algae
Classification based on F .E Fritsch
Phylogenic Trends in Algae
Structure, Life-Cycle and Systematic Position of *Chara, Vaucheria* and *Polysiphonia*
Role of Algae in Soil Fertility - Fertilizer – Nitrogen Fixation- Symbiosis
Commercial Products of Algae
Medicinal Aspects of Algae, Algal Blooms and Red Tides

Fungi
Classification of Fungi based on Ainsworth; Alexopoulos
Modern Trends of Fungal Classification
Distinguishing Characters of Different Classes of Fungi representing the following genera
Saccharomyces, Penicillium, Puccinia and Agaricus

Gymnosperms
General Characters
Structure Life Cycle, Systematic Position and Alternation of Generation in *Gnetum.*
Affinities of Gymnosperms

Angiosperms
Historical development of Systems of classification:
1. Artificial- Linnaeus System
2. Natural - Bentham and Hooker System
3 Phylogenetic- Engler and Prantle System
Study of the following families with emphasis on the Morphological Peculiarities and Economic Importance
(based on Bentham & Hooker's system)
Annonaceae, Rutaceae Anacardiaceae Cucurbitaceae Sapotaceae Asclepiadiaceae Scrophulariaceae Acanthaceae Amaranthaceae Arecaceae Poaceae

Palynology
Pollen Structure, Pollen Morphology, Pollen Allergy - Viability Test for Pollen Grains,
Economic Importance and its Importance in taxonomy
Study of Pollen Morphology of the following plants –
Hibiscus, *Vinca*, *Balsm, Ixora, Crotalaria, Bougainvillea*

Embryology
Introduction to Embryology
Microsporogenesis - Structure and Functions of Wall Layers.
Development of Male Gametophyte - Dehiscence of Anther.
Megasporogenesis - Development of Female Gametophyte –
Embryo Sac -Development and Types - Monosporic – *Polygonum* type, Bisporic - *Allium* type, Tetrasporic – *Adoxa* type.
Pollination - Fertilization - Barriers of Fertilization - Germination of Pollen Grains –Double Fertilization.
Structure of Embryo- Dicot [*Capsella*], Monocot [*Sagittaria*] Endosperm Types

Paper II (504102): Cryptogams Paleobotany Anatomy and Micro-technique

Bryophyta
General Characters
Structure, Life Cycle, Systematic Position and Alternation of Generation in *Polytrichum*
Evolution of Gametophyte and Saprophyte in Bryophyta

Pteridophyta
General Characters
Structure, Life Cycle, Systematic Position and Alternation of Generation in *Lycopodium*,and *Marsilia*
Stelar Evolution in Pteridophyta

Paleobotany
Fossil Pteridophytes – *Rhynia* , *Lepidodendron*, *Lepidocarpon* .
Fossil Gymnosperm -*Lygenopteris*.
Applied Aspects of Palaeobotany - Exploration of Fossils – Exploration of Fuels.

Anatomy
Anamolous Secondary Growth in Roots and Stems
Secretary and Glandular Tissues
Defense Mechanisms in Plants

Micro-technique
Introduction - Microscopy - Simple and Compound – Phase Contrast; Dark Field Illumination and Electron Microscopes
Micrometry, Camera Lucida Technique
Microtome – Rotary and Sledge
Killing and Fixation Agents – Carnoy's Formula, Farmers formula, F .A. A
Dehydration - Reagents
Sectioning - Hand and Microtome
Stains and Staining Techniques - Double Staining. General Sccount; Stains: Saffranin, Hematoxylin, Acetocarmine.
Mounting Media: D. P. X and Canada Balsam
Whole Mounts - Cytological Methods: Maceration, Smear and Squash Preparation.
Preservation Methods-Lyophilisation, Cryopreservation, Herbarium Technique

Paper III (504103): Biochemistry, CytoGenetics, and Plant Breeding

Biochemistry
Metabolism,:Energy Metabolism, Metabolic Pathways and Regulation of Metabolism
Secondary Metabolites, Classification and Functions

Cytolgenetics
Variation in Chromosome Number (Numerical Aberrations)- Anueploidy and Euploidy- Haploidy, Polyploidy
Variation in Chromosome Structure (Structural Aberrations) - Deletion, Duplication, Inversion and Translocation
Extra Nuclear Inheritance-
Maternal Influence. Plastid Inheritance in *Mirabilis*. Shell Coiling in Snails, Kappa Particles in *Paramecium*.

Plant Breeding
Objectives in Plant Breeding
Selection - Mass Selection, Pure Line Selection and Clonal Selection.
Hybridization: Procedure of Hybridisation, Inter Generic, Inter Specific, Inter-Varietal Hybridisation
Mutation Breeding – Method – Achievements in India.

Paper IV(504104): Plant Physiology, Ecology Phytogeography

Physiology
Translocation of Solutes: Pathway of Movement, Phloem Transport, Mechanism of Transport –
Munch Hypothesis, Protoplasmic Streaming Theory - Activated Diffusion Hypothesis, Electro Osmotic Theory.
Nitrogen Metabolism: Source of Nitrogen - Biological Nitrogen Fixation – Symbiotic and Asymbiotic. Nitrogen Fixation by blue Green Algae - Rotation of Crops.
Reduction of Nitrate - Reductive Amination and Transamination. *Nif* genes - Leghaemoglobin.
Growth: Phases of Growth - Vegetative and Reproductive Growth - Growth Curve -
Plant Growth Regulators - Auxins, Gibberellins, Cytokinins, Ethylene, Abscissic acid Synthetic Plant Hormones
Practical Applications.
Senescence and Abscission. Photoperiodism and Vernalization – Phytochrome and its Significance.
Physiology of Bud and Seed Dormancy, Germination.
Plant Movements: Tropic and Nastic movements. Circadian Rhythm and Biological Clock.
Stress Physiology: Water Stress, Salt Stress.

Ecology
Concept of Community
Qualitative Characters of Community – Physiognomy, Growth Forms (Raunkair's Classification), Biological Spectrum, Stratification, Species Diversity and Abundance
Quantitative Characters of Community – Frequency, Density, Cover and Biomass, Species Abundance
Awareness of the Following
Plant Indicators, Environmental Impact Assessment (EIA), Protected Area Network (PAN), Environment Legislation, Ecotourism

Phytogeography
Principles and Vegetation Types of India-Tropical Rain Forest, Sholas and Deciduous Forest-Sand Dunes
Mangroves, and Scrub Jungle,
Phytogeographical Regions of India.

SEMESTER VI

Paper I (604101): Plant Biotechnology, Bioinformatics, Biostatistics

Plant Biotechnology
Plant Tissue Culture – Totipotency-
Culture Media, Composition, Preparation and Sterilization.
Callus and Suspension Culture, Meristem Culture- Somaclonal Variation- Somatic Embryogenesis and Organogenesis.
Synthetic Seeds – Anther Culture and Production of Haploids –
Protoplast Culture – Somatic Hybrids – Cybrids.

Bioinformatics
Bioinformatics in relation to Bimolecular Structure
• Protein Structure Databank- PDB
• Molecular Visualization- use of Rasmol
• Molecular Modeling
• Molecular Docking and Computer Aided Drug Design
Basics of Genomics and Proteomics,
Comparative Genomics and Pharmacogenomics
Sequence analysis and Alignment
• Pair Wise Sequence Alignment
• Multiple Sequence Alignment
Molecular Phylogeny and PhylogeneticTrees

Biostatistics
Distribution Patterns-Normal Distribution, Binomial Distribution.
Chi-square Test

Correlation- Coefficient of Correlation
Regression Analysis

Paper II (604102): Economic Botany, Forestry Ethnobotany and Industrial Microbiology

Economic Botany
A brief account on the utility of the following plants, specifying the Binomial, family and morphology of the useful parts.
Fibre Yielding Plant – Cotton and Jute
Dye Yielding Plants - Henna and *Bixa orellana*
Resins - Asafoetida
Tuber Crops - Tapioca
Oil Yielding Plants - Sesame and Coconut
Medicinal Plants - *Zingiber officinalis, Aloe vera and Vinca rosea*
Insecticides - Neem

Forestry
Forest Resources and Utilization.
Forest Products- Timber, Pulp Wood, and Non Timber Forest Products (NTFPs).
Forest Laws

Ethnobotany
Study of various methods to collect Ethno Botanical Data
Plant parts used by Tribes in their daily life as Food, Clothing, Shelter, Agriculture and Medicine.

Industrial Microbiology
Industrial microbiology: Production of
Alcohol, Vinegar, Antibiotics, Vitamins, Vaccines, Insulin, Organic Acids, Bread, Diary Products & Single Cell Protein.

Paper III (604103): Horticulture and Gardening

Horticulture and Gardening

Principles of Gardening
Types of pots and containers
Potting mixture and potting media
Soil preparation
Irrigation methods
Hydroponics

Propagation Methods
Cuttings, Layering, Budding and Grafting grafting.
Garden tools and Implements

Manures and Fertilizers
Farmyard Manure, Compost, Vermicompost and Biofertilizers.
Chemical Fertilizers

Growth Regulators in Horticulture
Rooting hormones
Growth promoters
Flower induction
Parthenocarpy

Plant Protection
Common Diseases of Fruits and Vegetable Crops
Use of Weedicides**,** Fungicides**,** Pesticides

Paper IV (604104) : Biotechnology and Instrumentation

Biotechnology

Recombinant DNA Technology
General account of Cloning Vehicles
Cutting and joining of DNA molecules – Restriction Endonucleases,Ligases
Gene library.
Gene Transfer Techniques – Direct DNA uptake by Protoplast
Vector Method, Agrobacterium Mediated, Electroporation, Shot Gun Method and Microinjection.
Methods in Biotechnology

- Isolation and Purification of DNA from plant cells.
- Agarose Gel Electrophoresis
- PCR, RFLP, DNA sequencing, Southern blotting, ELISA.

Application of Biotechnology in Medicine, Agriculture and Industry
Biosafety and Ethical issues
Intellectual Property Rights (IPR)

Instrumentation

Basic knowledge of the separation methods: - Chromatography and Electrophoresis.
Cryobiology and its applications.

PRACTICALS BSc TY BOTANY
Total of 40 Practicals / Semester

SEM – V
Paper No 504201
PRACTICAL I

Algae - Study of Stages in the Life Cycle of *Chara, Vaucheria* and *Polysiphonia*
Fungi - Study of stages in the life cycle of *Saccharomyces, Penicillium, Puccinia and Agaricus*
Bryophyta - Study of stages in the life cycle of *Polytrichum*
Pteridophyta - Study of stages in the life cycle of *Lycopodium*,and *Marsilia*
Gymnosperms - Study of Stages in the Life Cycle of *Gnetum*
Paleobotany - Fossil Pteridophytes – *Rhynia* , *Lepidodendron*, *Lepidocarpon,* Fossil Gymnosperm -*Lygenopteris*.
Cytolgenetics – Photo-micrographic study of Variation in Chromosome Number and Structure
Plant Breeding –Demonstration of Hybridization Techniques

SEM – V
Paper No 504202
PRACTICAL II

Angiosperms - Study of the following families
Annonaceae, Rutaceae Anacardiaceae Cucurbitaceae Sapotaceae Asclepiadiaceae Scrophulariaceae Acanthaceae Amaranthaceae Arecaceae Poaceae
Anatomy - Anamolous Secondary Growth in Roots and Stems
Micortechnique – Preparation of Micorotomy Slides
Palynology- Study of Pollen Morphology of the following
Hibiscus, *Vinca*, *Balsm, Ixora, Crotalaria, Bougainvillea*
Embryology - Endosperm Types
Structure of Embryo- Dicot [*Capsella*], Monocot [*Sagittaria*]
Physiology – Demonstrate the Process of Translocation in Plants
Study the process of Germination
Study of the Plant Movements
Study of Geotropism using Clinostat.
Measurement of growth using Arc Auxanometer
Ecology - Study of plant community by quadrat method

SEM – VI
Paper No. 604201
PRACTICAL I

Plant Biotechnology –
Culture Media, Composition, Preparation and Sterilization.
Micropropagation Technique
Bioinformatics - Sequence analysis and Alignment
Molecular Visualization- use of Rasmol
Biostatistics - Chi-square Test
Economic Botany - A brief account on the utility of the following plants
Fibre Yielding Plant – Cotton and Jute
Dye Yielding Plants - Henna and *Bixa orellana*
Resins - Asafoetida
Tuber Crops - Tapioca
Oil Yielding Plants - Sesame and Coconut
Medicinal Plants - *Zingiber officinalis, Aloe vera and Vinca rosea*
Insecticides – Neem
Forestry
Forest Products- Timber, Pulp Wood, and Non Timber Forest Products (NTFPs).
Identification of Wood

SEM – VI
Paper No. 604202
PRACTICAL II

Horticulture and Gardening -

- Study of Potting mixture and potting media
- Demonstration of Hydroponics
- Demonstration of Cuttings, Layering, Budding and Grafting
- Study of Garden tools and Implements

Biotechnology -

Study of Restriction Endonucleases,Ligases
Methods in Biotechnology

- Isolation and Purification of DNA from plant cells.
- Agarose Gel Electrophoresis

Instrumentation -

- Study of Chromatography and Electrophoresis
- Demonstration of Paper and Thin Layer Chromatography
- Separation of Monosaccharides by Circular Paper Chromatography
- Study Principle, Structure and Function of Electrophoresis Apparatus
- Separation of DNA by Electrophoresis

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