

SRI Y.N. COLLEGE (AUTONOMOUS) NARASAPUR – 534 275

Affiliated to Adikavi Nannayya University
Re-accredited by NAAC at 'A' Grade with a CGPA of 3.40
Recognized by UGC as "College with Potential for Excellence"



BOTANY

I B.Sc – I SEMESTER – PAPER I(A)

Microbial Diversity, Algae and Fungi

UNIT- I: MICROBIAL WORLD (Origin and Evolution of Life, Microbial diversity)

1. Discovery of microorganisms, origin of life, spontaneous, biogenesis, Pasteur experiments, germ theory of disease.
2. Classification of microorganisms –R.H. Whittaker's five kingdom, Carl concep Woese's-Domain system.
3. Brief account of special groups of bacteria- Archaeobacteria, Mycoplasma, Chlamydia, Actinomycetes, Rickettsias and Cyanobacteria.

UNIT- II: VIRUSES

1. Viruses- Discovery, general account, structure& replication of –T4 Phage (Lytic, Lysogenic) and TMV, Viroids, Prions.
2. Plant diseasescaused by viruses–Symptoms, transmission and control measures (Brief account only).
3. Study of Tobacco Mosaic, Bhendi Vein clearing and Papaya leaf curl diseases.

UNIT III: BACTERIA

1. Bacteria: Discovery, General characteristics, cell structure and nutrition.
2. Reproduction- Asexual and bacterial recombination (Conjugation, Transformation, Transduction).
3. Economic importance of Bacteria.

UNIT –IV Algae

1. General account - thallus organization and reproduction in Algae.
2. Fritsch classification of Algae (up to classes only) and economic importance.
3. Structure, reproduction and life history of *Oedogonium*, *Ectocarpus* and *Polysiphonia*.

UNIT V: FUNGI

1. General characteristics and outline classification (Ainsworth).
2. Structure, reproduction and life history of *Rhizopus* (Zygomycota), *Penicillium* (Ascomycota), and *Puccinia* (Basidiomycota).
3. Lichens-Structure and reproduction; ecological and economic importance.

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I B.Sc – II SEMESTER – PAPER I(B)

Diversity of Archaeogoniates & Plant Anatomy

UNIT –I: BRYOPHYTES

1. Bryophytes: General characters, Classification (up to classes)
2. Structure, reproduction and Life history of *Marchantia*, and *Funaria*.
3. Evolution of Sporophyte in Bryophytes.

UNIT - II: PTERIDOPHYTES

1. Pteridophytes: General characters, classification (up to Classes)
2. Structure, reproduction and life history of *Lycopodium*, and *Marsilea*.
3. Heterospory and seed habit.
4. Evolution of stele in Pteridophytes.

UNIT –III: GYMNOSPERMS

1. Gymnosperms: General characters, classification (up to classes)
2. Morphology, anatomy, reproduction and life history of *Pinus* and *Gnetum*
3. Economic importance with reference to wood, essential oils and drugs

UNIT –I V: TISSUES AND TISSUE SYSTEMS

1. Meristems - Root and Shoot apical meristems and their histological organization.
2. Tissues –Meristematic and permanent tissues (simple, complex, secretory)
3. Tissue systems–Epidermal, ground and vascular.

UNIT –V. SECONDARY GROWTH

1. Anomalous secondary growth in *Bignonia*, *Boerhaavia* and *Dracaena*.
2. Study of local timbers of economic importance-Teak, Rosewood, Red sanders and Arjun (Tella maddi).

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II B.Sc – III SEMESTER – PAPER II(A)

Plant Taxonomy and Embryology

UNIT –I: INTRODUCTION TO PLANT TAXONOMY & CLASSIFICATION

1. Fundamental components of taxonomy (identification, nomenclature, classification)
2. Taxonomic resources: Herbarium- functions & important herbaria, Botanical gardens, Flora, Keys- single access and multi-access.
3. Botanical Nomenclature- Principles and rules of ICBN (ranks and names; principle of priority, binomial system; type method, author citation, valid-publication).
4. Types of classification- Artificial, Natural and Phylogenetic.
5. Bentham & Hooker's system of classification- merits and demerits.

UNIT –II: SYSTEMATIC TAXONOMY-I

1. Engler & Prantle's system of classification- merits and demerits
2. Phylogeny –origin and evolution of Angiosperms
3. Systematic study and economic importance of the following families: Annonaceae, Brassicaceae, Rutaceae, Curcubitaceae, and Apiaceae.

UNIT –III: SYSTEMATIC TAXONOMY-II

1. Systematic study and economic importance of plants belonging to the following families: Asteraceae, Asclepiadaceae, Lamiaceae, Ephorbiaceae, Arecaceae, and Poaceae.

UNIT –IV: EMBRYOLOGY-I

1. Anther structure, microsporogenesis and development of male gametophyte.
2. Ovule structure and types; Megasporogenesis, development of Monosporic, Bisporic and Tetrasporic types (*Peperomia*, *Drusa*, *Adoxa*) of embryo sacs.

UNIT –V: EMBRYOLOGY-II

1. Pollination and Fertilization (out lines) Endosperm development and types.
2. Development of Dicot and Monocot embryos, Polyembryony.

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II B.Sc – IV SEMESTER – PAPER II(B)

Plant Physiology and Metabolism

UNIT –I: PLANT –WATER RELATIONS

1. Physical properties of water, Importance of water to plant life.
2. Diffusion, imbibition and osmosis; concept & components of Water potential.
3. Absorption and transport of water and ascent of sap.
4. Transpiration –Definition, types of transpiration, structure and opening and closing mechanism of stomata.

UNIT –II: MINERAL NUTRITION & ENZYMES

1. Mineral Nutrition: Essential elements (macro and micronutrients) and their role in plant metabolism, deficiency symptoms.
2. Mineral ion uptake (active and passive transport).
3. Nitrogen metabolism- biological nitrogen fixation in *Rhizobium*, outlines of protein synthesis (transcription and translation).
4. Enzymes: General characteristics, mechanism of enzyme action and factors regulating enzyme action.

UNIT –III: PHOTOSYNTHESIS

1. Photosynthesis: Photosynthetic pigments, photosynthetic light reactions, photo-phosphorylation, carbon assimilation pathways: C₃, C₄, and CAM (brief account)
2. Photorespiration and its significance.
3. Translocation of organic solutes: mechanism of phloem transport, source-sink relationships.

UNIT –IV: PLANT METABOLISM

1. Respiration: Glycolysis, anaerobic respiration, TCA cycle, electron transport system. Mechanism of oxidative phosphorylation.
2. Lipid Metabolism: Types of lipids, Beta-oxidation.

UNIT –V: GROWTH AND DEVELOPMENT

1. Growth and development: definition, phases and kinetics of growth.
2. Physiological effects of phytohormones - Auxins, Gibberellins, Cytokinins, ABA, Ethylene and Brassinosteroids.
3. Physiology of flowering -photoperiodism, role of phytochrome in flowering; Vernalization.
4. Physiology of Senescence and Ageing.



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III B.Sc - V SEMESTER – PAPER III(A)

(TAXONOMY & MEDICINAL BOTANY)

TAXONOMY

UNIT – I

- Historical account – Artificial, Natural and Phylogenetic systems of classification.
- Principles of classification.
- Bentham and Hooker's system – classification in brief, merits and demerits.
- Engler and Prantle's system – classification in brief; merits and demerits.
- Comparison between Bentham and Hooker's system and Engler and Prantle's system of classifications.
- Omega taxonomy- Chemotaxonomy, Cytotaxonomy.
- A brief account of International Code of Botanical Nomenclature(ICBN)

UNIT – II

- Important plants, description, distinguishing characters and economic importance of the following.
1. Annonaceae 2. Rutaceae 3. Malvaceae 4. Fabaceae 5. Caesalpinaceae
6. Mimosaceae 7. Cucurbitaceae 8. Apiaceae 9. Asteraceae
10. Asclepiadaceae 11. Lamiaceae. 12. Euphorbiaceae 13. Orchidaceae 14. Poaceae

Medicinal Botany

UNIT-III

- **Plants in Primary Health Care:** Common Medicinal plants –Tulasi (Ocimum sanctum),Turmeric(Curcuma longa), Karaka (Terminalia chebula), Vepa(Azadiracta indica), Kalabanda (Aloe vera), Tippa Teega(Tinospora cordifolia).
- **Traditional medicina Vs. Modern medicine:** Study of select plant examples used in Traditional medicine as resource. (Active principles, structure, usage and Pharmacological action) of modern medicine: Aswagandha (Withania somnifera), Sarpagandha (Rauvolfia serpentina), Amla (Emblca officinalis), Nelavemu (Andrographis paniculata).

UNIT-IV

- Ethnomedicine, Outlines of Ayurveda, Siddha, Unani and Homeopathic systems of traditional medicine.
- Indian Pharmacopoeia, AYUSH, NMPB, CIMAP and CDRI.

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III B.Sc - VI SEMESTER – PAPER III(B)

(PLANT GENETICS, ECOLOGY & BIODIVERSITY)

GENETICS

UNIT -I

- **Mendelism:** Laws of inheritance. Genetic interactions - Epistasis, complementary supplementary and inhibitory genes
- **Linkage and crossing over:** A brief account, construction of genetic maps – 2 point and 3 point test cross data.

UNIT -II

- **Mutations:** Chromosomal aberrations - structural and numerical changes; Gene mutations, transposable elements.
- **Gene Expression:** Organisation of gene, mechanism and regulation of gene expression in prokaryotes (Lac. Operon).
- **Extra nuclear genome:** Mitochondrial and plastid DNA, plasmids.

UNIT –III

ECOLOGY

- **Concept and components of Ecosystem.** Energy flow, food chains, food webs, ecological pyramids, biogeochemical cycles - Carbon, Nitrogen.
- **Plants and environment:** Ecological factors - Climatic (light and temperature), edaphic and biotic. Ecological adaptations of plants, ecological succession (Hydrosere, Xerosere).
- **Production ecology:** Concepts of productivity, GPP, NPP, CR (Community Respiration) and secondary production, P/R ratio and Ecosystems.

UNIT –IV

BIODIVERSITY

- **Biodiversity:** Concepts, Convention on Biodiversity - Earth Summit. Types of Biodiversity, Levels, threats and value of Biodiversity.
- **Hot spots of India :** Endemism, North Eastern Himalayas, Western Ghats.
- Vavilov centres of crop plants.
- **Principles of conservation:** IUCN threat-categories, RED data book - threatened & endangered plants of India. Role of organisations in the conservation of Biodiversity - IUCN, UNEP, WWF, NBPGR, NBD.

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III B.Sc - V SEMESTER – PAPER IV(A)

(Physiology, Tissue Culture & Biotechnology)

PHYSIOLOGY (Part A)

UNIT -I

- **Water Relations:** Diffusion, imbibition, osmosis; water, osmotic and pressure potentials; absorption, transport of water, ascent of sap; transpiration; Stomatal structure and movements.
- **Enzymes:** Nomenclature, characteristics, mechanism and regulation of enzyme action, factors regulating enzyme action.

UNIT -II

- **Photosynthesis:** Photosynthetic pigments, Red drop and Emerson enhancement effect; concept of two photosystems, mechanism of photosynthetic electron transport and evolution of oxygen; photophosphorylation;
- **Carbon assimilation pathways:** C₃, C₄ and CAM; photorespiration.

TISSUE CULTURE & BIOTECHNOLOGY

UNIT -III

- **Tissue culture:** Introduction, sterilization procedures, culture media - composition and preparation; explants.
- Callus culture; cell and protoplast culture, Somatic hybrids and cybrids.
- **Applications of tissue culture:** Production of pathogen free plants and somaclonal variants, production of stress resistance plants, secondary metabolites and synthetic seeds.

UNIT -IV

- **Biotechnology:** Introduction, history and scope.
- **r-DNA technology:** Vectors and gene cloning and transgenic plants.



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III B.Sc –VI Semester ; Paper – IV (B)

(Physiology, Seed Technology & Horticulture)

PHYSIOLOGY (Part B)

UNIT -I

- **Respiration:** Aerobic and Anaerobic; Glycolysis, Krebs cycle; electron transport system, mechanism of oxidative phosphorylation.
- **Nitrogen Metabolism:** Biological nitrogen fixation, nitrate reduction, protein synthesis.

UNIT -II

- **Phytohormones** - Auxins, Gibberellins, Cytokinins, ABA, Ethylene.
- Physiology of flowering and photoperiodism, role of phytochrome in flowering.

SEED TECHNOLOGY

UNIT -III

- **Seed:** Structure and types. Seed dormancy; causes and methods of breaking dormancy.
- **Seed storage:** Seed banks, factors affecting seed viability, genetic erosion. Seed production technology; seed testing and certification.

HORTICULTURE

UNIT -IV

- **Horticulture techniques:** Introduction, Cultivation of ornamental and vegetable crops, Bonsai and landscaping.
- **Floriculture:** Introduction. Importance of green house, Polyhouse, mist chamber, shade nets; Micro irrigation systems. Floriculture potential and its trade in India
- **Vegetative Propagation of plants:** Stem, root and leaf cuttings. Layering and grafting.