

S.K.S.D. MAHILA KALASALA, UG & PG (AUTONOMOUS), TANUKU

(Affiliated to Adikavi Nannaya University, Rajamahendravaram)
Re-accredited by NAAC with 'B' Grade at 2.81 CGPA

I B.Sc., - BOTANY MODIFIED SYLLABUS

PAPER – IB, SEMESTER – I

Paper – IBT – **Microbial Diversity, Algae and Fungi**

UNIT- I: MICROBIAL WORLD (Origin and Evolution of Life, Microbial diversity (12hrs)

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 concept, Carl Woese's- Domain system.
3. Brief account of special groups of bacteria- Archaeobacteria, Mycoplasma, Chlamydia, Actinomycetes, Rickettsias and Cyanobacteria.

UNIT- II: VIRUSES (12hrs)

1. Viruses- Discovery, general account, structure & replication of -T4 Phage (Lytic, Lysogenic) and TMV, Viroids, Prions.
2. Plant diseases caused by viruses– Symptoms, transmission and control measures (Brief account only).
3. Study of Tobacco Mosaic, Bhendi Vein clearing and Papaya leaf curl diseases.
4. Bacteria: Discovery, General characteristics, cell structure and nutrition.
5. Reproduction- Asexual and bacterial recombination (Conjugation, Transformation, Transduction).
6. Economic importance of Bacteria.
7. Diseases of important crop plants caused by Bacteria and their control

UNIT -III Algae (12hrs)

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 IV: FUNGI (12hrs)

1. General characteristics and outline classification (Ainsworth).
2. Structure, reproduction and life history of *Rhizopus* (Zygomycota), *Penicillium* (Ascomycota), and *Puccinia* (Basidiomycota).
3. General account of plant diseases caused by fungal and their control
4. Lichens-Structure and reproduction; ecological and economic importance.

Suggested activity: Seminar, Quiz, debate, collection of diseased plant parts –studying symptoms and identification of pathogen, collection and study of fresh and marine Algae available in local area.

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I B.Sc – SEMESTER –I: BOTANY PRACTICAL SYLLABUS

Paper-I: Microbial Diversity, Algae and Fungi

Total hours of laboratory Exercises 30 hrs @ 2 per week

1. Knowledge of Equipment used in Microbiology: Spirit lamp, Inoculation loop, Hot-air oven, Autoclave/Pressure cooker, laminar air flow chamber and Incubator.
2. Preparation of liquid and solid media for culturing of microbes (Demonstration).
3. Study of viruses and bacteria using electron photo micrographs (TMV, Bacteriophage, HIV, Cocci, Bacillus, Spirillum bacteria).
4. Gram staining technique.
5. Study of Plant disease symptoms caused by Bacteria (Citrus canker, leaf blight of rice, Angular leaf spot of Cotton) and viruses (TMV, Bendi vein clearing and Leaf curl of Papaya), Fungi (Late blight of potato, Red rot of Sugarcane and Paddy blast).
6. Study of vegetative and reproductive structures of the following :
 - a) **Cyanobacteria:** *Nostoc and Scytonema.*
 - b) Algae: *Oedogonium, Ectocarpus, Polysiphonia,*
 - c) Fungi: *Rhizopus, Penicillium and Puccinia .*
7. Study of plant material infected by Fungi (Rot of tomatoes, blue and green moulds of Citrus fruits and wheat rust (Section cutting of diseased parts of Wheat and Barberry -identification of different spores).
8. Lichens: Morphology and anatomy of different thalli.
9. Field Visit.

I B. Sc - SEMESTER- II: BOTANY THEORY SYLLABUS

Paper –II : 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.
4. Anomalous secondary growth in *Achyranthes*, *Boerhaavia* and *Dracaena*.
5. Study of local timbers of economic importance-Teak, Rosewood, Red sanders and Arjun (Tella maddi).
6. Study of local timbers of economic importance – Teak, Rosewood, Red sanders and Arjun (Tella maddi)

Suggested activity:

Collection of *Marsilea* sporocarp, *Pinus* needles, male and female cones, study of *Pinus* pollen grains, collection of locally available economically useful timbers.

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I B.Sc SEMESTER -II
BOTANY PRACTICAL SYLLABUS

Paper-II: Diversity of Archaeogniates & Plant Anatomy

Total hours of laboratory Exercises 30 hrs @ 2 per week

1. Morphology (vegetative and reproductive structures) , anatomy of the following :
Marchantia, Funaria, Lycopodium and Pinus.
2. Anatomy:
 - a) Demonstration of double staining technique.
 - b) Tissue organization in root and shoot apices using permanent slides
 - c) Preparation of double staining slides
 - d) Anomalous secondary structure of *Achyranthes, Boerhavia* and *Dracaena.*
 - e) Anatomical study of wood in T.S., T.L.S. and R.L.S.
3. Field visits to local timber depots.

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II B. Sc - SEMESTER –III: BOTANY THEORY PAPER –III

Paper-III : Plant Taxonomy and Embryology)

Total hours of teaching 60hrs @ 4 hrs per week

UNIT – I: INTRODUCTION TO PLANT TAXONOMY

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).

UNIT – II: CLASSIFICATION

1. Types of classification- Artificial, Natural and Phylogenetic.
2. Bentham & Hooker's system of classification- merits and demerits.
3. Engler & Prantle's system of classification- merits and demerits
4. Phylogeny – origin and evolution of Angiosperms

UNIT –III: SYSTEMATIC TAXONOMY-I

1. Systematic study and economic importance of the following families: Annonaceae, Brassicaceae, Rutaceae, Curcubitaceae, and Apiaceae.

UNIT –IV: SYSTEMATIC TAXONOMY-II

1. Systematic study and economic importance of plants belonging to the following families: Asteraceae, Asclepiadaceae, Lamiaceae, Euphorbiaceae, Araceae, and Poaceae.
2. Anther structure, microsporogenesis and development of male gametophyte.
3. Ovule structure and types; Megasporogenesis, development of Monosporic, Bisporic and Tetrasporic types (*Peperomia*, *Drusa*, *Adoxa*) of embryo sacs.
4. Pollination and Fertilization (out lines) Endosperm development and types.
5. Development of Dicot and Monocot embryos, Polyembryony.

Suggested activity: Collection of locally available plants of medicinal importance, observing pollen grains in honey, Aero palynology-collection of pollen from air using glycerin strips in different seasons.

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II B.Sc BOTANY - SEMESTER-III

Paper-III: PRACTICAL

Plant Taxonomy and Embryology

Suggested Laboratory Exercises:

1. Systematic study of locally available plants belonging to the families prescribed in theory syllabus.
2. Demonstration of herbarium techniques.
3. Structure of pollen grains using whole mounts (*Catharanthus*, *Hibiscus*, *Acacia*, Grass).
4. Demonstration of Pollen viability test using *in-vitro* germination (*Catharanthus*).
5. Study of ovule types and developmental stages of embryo sac using permanent slides / Photographs.
6. Structure of endosperm (nuclear and cellular); Developmental stages of dicot and monocot Embryos using permanent slides / Photographs
7. Isolation and mounting of embryo (using *Symopsis* / *Senna* / *Crotalaria*)
8. Field visits .
9. Study of local flora and submission of Field Note Book.

II B.Sc. BOTANY, SEMESTER- IV, Paper-IV: THEORY SYLLABUS
PAPER –IV: 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.
5. Mineral Nutrition: Essential elements (macro and micronutrients) and their role in plant metabolism, deficiency symptoms.
6. Mineral ion uptake (active and passive transport).
7. Enzymes: General characteristics, mechanism of enzyme action and factors regulating enzyme action.

UNIT –II: 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 – III: PLANT METABOLISM

1. Respiration: Glycolysis, anaerobic respiration, TCA cycle, electron transport system. Mechanism of oxidative phosphorylation.
2. Lipid Metabolism: Types of lipids, Beta-oxidation. Nitrogen metabolism- biological nitrogen fixation in *Rhizobium*, outlines of protein synthesis (transcription and translation).

UNIT –IV: 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.
5. Role of plant growth regulators in horticulture.

Suggested activity: Seminars, Quiz, Debate, Question and Answer

sessions, observing animations of
protein biosynthesis in you tube.

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II B. Sc BOTANY SEMESTRE- IV, Paper-IV: PRACTICAL SYLLABUS PAPER-IV: Plant Physiology and Metabolism

Suggested Laboratory Exercises:

1. Osmosis – by potato osmoscope experiment
2. Determination of osmotic potential of plant cell sap by plasmolytic method using leaves of *Rhoeo* / *Tradescantia*.
3. Structure of stomata (dicot & monocot)
4. Determination of rate of transpiration using cobalt chloride method.
5. Demonstration of transpiration by Ganong's photometer
6. Demonstration of ascent of sap/Transpiration pull.
6. Effect of Temperature on membrane permeability by colorimetric method.
7. Study of mineral deficiency symptoms using plant Material photographs.
8. Separation of chloroplast pigments using paper chromatography technique.
9. Rate of photosynthesis under varying CO₂ concentrations.
10. Effect of light intensity on oxygen evolution in photosynthesis using Wilmott's bubbler.

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III B. Sc - SEMESTER- V: BOTANY SYLLABUS

THEORY PAPER – V (w.e.f.2017-18)

Paper-V: Cell Biology, Genetics and Plant Breeding

UNIT – I Cell Biology:

1. Cell, the unit of life- Cell theory, Prokaryotic and eukaryotic cells; Eukaryotic cell components.
2. Ultra structure and functions of cell wall and cell membranes.
3. Chromosomes: morphology, organization of DNA in a chromosome (nucleosome model), Euchromatin and heterochromatin.

UNIT – II Genetic Material:

- 1 DNA structure (Watson & Crick model) and replication of DNA (semi-conservative)
- 2 Types of RNA (mRNA, tRNA, rRNA), their structure and function.

UNIT – III Mendelian Inheritance:

1. Mendel's laws of Inheritance (Mono- and Di- hybrid crosses); backcross and test cross.
2. Chromosomal mapping – 2-point & 3-point test cross.
3. Linkage: concept, complete and incomplete linkage, coupling and repulsion
4. Crossing Over: concept & significance.

UNIT – IV Plant Breeding & Breeding, Crop improvement and Biotechnology:

1. Introduction and Objectives of plant breeding.
2. Methods of crop improvement: Procedure, advantages and limitations of Introduction, Selection, and Hybridization (outlines only).
Role of mutations in crop improvement.
Role of somaclonal variations in crop improvement.
Molecular breeding – use of DNA markers in plant breeding and crop improvement (RAPD, RFLP).

Suggested activity: Seminar, Debate, Quiz, observation of live cells and nucleus in Onion peels, observation of Meiotic nuclei in Maize pollen. Solving Genetics problems.

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III B. Sc - SEMESTER- V: BOTANY PRACTICAL SYLLABUS
THEORY PAPER – V (w.e.f.2017-18)
Paper-V: Cell Biology, Genetics and Plant Breeding

Suggested Laboratory Exercises:

1. Study of the structure of cell organelles through photomicrographs.
2. Study of structure of plant cell through temporary mounts.
3. Study of various stages of mitosis using cytological preparation of Onion root tips.
4. Study of effect of organic solvent on permeability of cell membrane.
5. Numerical problems solving Mendel's Laws of inheritance
6. Chromosome mapping using 3 point test cross data.
7. Hybridization techniques – emasculation, bagging (for demonstration only).
8. Field visit to a plant breeding research station.

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III B. Sc - SEMESTER- V: BOTANY THEORY SYLLABUS
PAPER-VI: PLANT ECOLOGY & PHYTOGEOGRAPHY w.e.f.2017-18)

UNIT – I. Elements of Ecology

1. Ecology: definition, branches and significance of ecology.
2. Climatic Factors: Light, Temperature.
3. Edaphic Factor: Origin, formation, composition and soil profile.
4. Biotic Factor: Interactions between plants and animals.

UNIT- II. Ecosystem Ecology

1. Ecosystem: Concept and components, energy flow, Food chain, Food web, Ecological pyramids.
2. Productivity of ecosystem-Primary, Secondary and Net productivity.
3. Biogeochemical cycles- Carbon, Nitrogen and Phosphorous.

UNIT – II Population & Community Ecology

1. Population -definition, characteristics and importance, outlines –ecotypes.
2. Plant communities- characters of a community, outlines – Frequency, density, cover, life forms, competition.
3. Interaction between plants growing in a community.

UNIT – IV Phytogeography & Plant Biodiversity and its importance

1. Principles of Phytogeography, Distribution (wides, endemic, discontinuous species)
2. Phytogeographic regions of India.
3. Phytogeographic regions of World.
4. Endemism – types and cause
5. Definition, levels of biodiversity-genetic, species and ecosystem.
6. Biodiversity hotspots- Criteria, Biodiversity hotspots of India.
7. Loss of biodiversity – causes and conservation (*In-situ* and *ex-situ* methods).
8. Seed banks - conservation of genetic resources and their importance

Suggested activity :Collection of different soils, studying their texture, observing polluted water bodies, student study projects, debates on man's activity on ecosystem and biodiversity conservation methods, visiting a nearest natural vegetation area. Visit to NGO, working in the field of biodiversity and report writing; to study Honey Bees and plants yielding honey.

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III B. Sc - SEMESTER- V: BOTANY PRACTICAL PRACTICAL PAPER-VI:

(w.e.f.2017-18) PLANT ECOLOGY & PHYTOGEOGRAPHY

1. Determination of soil pH
2. Study of morphological and anatomical adaptations of hydrophytes and xerophytes (4 each)
3. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method
4. Study of Phytoplankton and macrophytes from water bodies.
5. To study field vegetation with respect to stratification, canopy cover and composition.
6. Study of plants included in agro forestry and social forestry.
7. To locate the hotspots, phyto geographical regions and distribution of endemic plants in the map of India.
8. The following Practical should be conducted in the Field/lab with the help of photo- graphs, herbarium, Floras, Red data book- Study of endangered plants species, critically endangered plants species, vulnerable plant species and monotypic endemic genera of India

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III B. Sc - BOTANY SYLLABUS SEMESTER- VI

PAPER – VII – ELECTIVE

(w.e.f.2017-18)

Paper VII-(C): Plant tissue culture and its biotechnological applications

Unit I: PLANT TISSUE CULTURE – 1

1. History of plant tissue culture research - basic principles of plant tissue callus culture, meristem culture, organ culture, Totipotency of cells, differentiation and dedifferentiation.
2. Methodology - sterilization (physical and chemical methods), culture media, Murashige and Skoog's (MS medium), phytohormones, medium for micro-propagation/clonal propagation of ornamental and horticulturally important plants.
3. Callus subculture maintenance, growth measurements, morphogenesis in callus culture – organogenesis, somatic embryogenesis.

UNIT-II: Plant Tissue culture -2

1. Endosperm culture – Embryo culture -culture requirements – applications, embryo rescue technique.
2. Production of secondary metabolites.
3. Cryopreservation; Germplasm conservation.

Unit III: Recombinant DNA technology

1. Restriction Endonucleases (history, types I-IV, biological role and application); concepts of restriction mapping.
2. Cloning Vectors: Prokaryotic (pUC 18, pBR322, Ti plasmid and Lambda phage, Eukaryotic Vectors (YAC and briefly PAC)
3. Gene cloning (Bacterial Transformation and selection of recombinant clones, PCR mediated gene cloning)
4. Construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by complementation technique, colony hybridization.

Unit IV: Methods of gene transfer & Applications of Biotechnology

1. Methods of gene transfer- Agrobacterium-mediated, direct gene transfer by Electroporation, Microinjection, Micro projectile bombardment.
2. Selection of transgenics– selectable marker and reporter genes (Luciferase, GUS, GFP).

3. Application of Plant Genetic Engineering – crop improvement, herbicide

resistance, insect resistance, virus resistance.

4. Genetic modification – transgenic plants for pest resistant (Bt-cotton);

herbicide resistance (Round Up Ready soybean); improved agronomic traits -
flavrSavr tomato,

Golden rice); Improved horticultural varieties Moon dust carnations)

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III B. Sc., - BOTANY SYLLABUS

SEMESTER-

VI PAPER

(w.e.f.2017-18)

Practical Paper VII-(C): Plant Tissue Culture & Plant Biotechnology

Total hours of teaching 30hrs @ 2hrs per week

1. (a) Preparation of MS medium.

a. Demonstration of in vitro sterilization methods and inoculation methods using leaf and nodal explants of Tobacco/ Datura/ Brassica etc.

2. Study of embryo and culture, micro propagation of Banana, somatic embryogenesis, artificial seeds through photographs.

3. Construction of restriction map of circular and linear DNA from the data provided.

4. Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, and micro projectile bombardment.

5. Different steps involved in genetic engineering for production of Bt. cotton, Goldenrice, Flavr Savr Tomato through photographs.

7. Isolation of plasmid DNA.

8. Restriction digestion and gel electrophoresis of plasmid DNA (optional)

9. Field visit to a lab involved in tissue culture

10. Study project under supervision of lecturer – tissue culture/ genetic engineering

Expected domain skills to be achieved: Ability to prepare artificial nutrient media, preparing independently, applying various sterilization procedures for media, glassware and biological materials, in vitro propagation of Banana callus, morphogenesis--s, clonal propagation methods, isolation of plasmid DNA individually and as a group.

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III B.Sc.: BOTANY SYLLABUS SEMESTER- VI
Paper VIII, CLUSTER ELECTIVE, Cluster-A,
Paper VIII-A-1 : PLANT DIVERSITY AND HUMAN WELFARE

Unit- I: Plant diversity and its scope:

- i. Genetic diversity, Species diversity, Plant diversity at the ecosystem level, Agro biodiversity and cultivated plant taxa, wild taxa.
- ii. Values and uses of biodiversity: Ethical and aesthetic values, iii. Methodologies for valuation, Uses of plants.

Unit -II: Loss of biodiversity:

- i. Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agro biodiversity, projected scenario for biodiversity loss
- ii. Management of plant biodiversity: Organizations associated with biodiversity management-Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations, Biodiversity information management and communication.

Unit-III: Contemporary practices in resource management:

- i. Environmental Impact Assessment (EIA), Geographical Information System GIS, Participatory resource appraisal, Ecological footprint with emphasis on carbon footprint, Resource accounting;
- ii. Solid and liquid waste management

Unit -IV: Conservation of biodiversity

- i. Conservation of genetic diversity, species diversity and ecosystem diversity, *In situ* and *ex situ* conservation,
- ii. Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.

Unit- V: Role of plants in relation to Human Welfare

- i. Importance of forestry, their utilization and commercial aspects-
 - a) Avenue trees, b) ornamental plants of India. c) Alcoholic beverages through ages.
- ii. Fruits and nuts: Important fruit crops their commercial importance. Wood, fiber and their uses.

Suggested Readings:

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi.
2. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications, New Delhi.
3. Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.

Suggested activities: Study of flora and its diversity in the college campus or local area, enumerating wild and exotic species (*Parthenium*, Water hyacinth etc.)

Project work on any one of the International organizations striving for preservation of biodiversity, study of conservation efforts of local people, and civic bodies, study of locally available fruits in different seasons, enumerating the avenue plantations and their diversity in your town/city

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III B.Sc.: BOTANY SYLLABUS SEMESTER- VI
Paper VIII, CLUSTER ELECTIVE, Cluster-A,
Paper VIII-A-1 : PLANT DIVERSITY AND HUMAN WELFARE PRACTICAL

- 1) Study of plant diversity (flowering plants).
- 2) Study of exotic species- Identification and morphological characteristics.
- 3) Identification of forest trees through bark, wood, flowers, leaves and fruits.
- 4) Maceration, Study of wood (Tracheary elements, fibres).
- 5) Methods of preservation and canning of fruits.
- 6) Visit to the local ecosystem to study the plants.
- 7) Write up on the conservation efforts of International organizations.
- 8) Study of Solid and Liquid waste management systems in rural/urban areas.

Domain skills expected to achieve: Identification of exotic plant species, identification of forest trees based on the characteristics of bark, flowers and fruits, understanding the preservation methods of fresh and dry fruits, understanding the methods of safe disposal of biodegradable and non-biodegradable wastes

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III B. Sc - BOTANY SYLLABUS

SEMESTER- VIII : CLUSTER ELECTIVE -A

Paper VIII-A-2 : ETHNOBOTANY AND MEDICINAL BOTANY

Unit -I: Ethnobotany

- i. Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethnobotany in the present context
- ii. Major and minor ethnic groups or Tribals of India, and their life styles.
- iii. Plants used by the tribal populations: a) Food plants, b) intoxicants and beverages, c) Resins and oils and miscellaneous uses.

Unit -II: Role of ethnobotany in modern Medicine:

- i. Role of ethnobotany in modern medicine with special example *Rauwolfia serpentina*, *Trichopus zeylanicus*, *Artemisia annua*, *Withania somnifera*.
- ii. Medico-ethnobotanical sources in India
- iii. Significance of the following plants in ethno botanical practices (along with their habitat and morphology)
 - a) *Azadirachta indica*, b) *Ocimum sanctum*, c) *Vitex negundo*, d) *Gloriosa superba*, e) *Tribulus terrestris*, f) *Phyllanthus niruri*, g) *Cassia auriculata*, h) *Indigofera tinctoria*, i) *Senna auriculata* j). *Curcuma longa*.
- iv. Role of ethnic groups in the conservation of plant genetic resources.

Unit-III: Ethnobotany as a tool to protect interests of ethnic groups

- i. Sharing of wealth concept with few examples from India.
- ii. Biopiracy, Intellectual Property Rights and Traditional Knowledge.

Unit -IV: History, Scope and Importance of Medicinal Plants. indigenous Medicinal Sciences

- i. Definition and Scope-**Ayurveda**: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments.
- ii. **Siddha**: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine.
- iii. **Unani**: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations (in brief).

Unit -V: Conservation of endangered and endemic medicinal plants:

- i. Definition: endemic and endangered medicinal plants,
- ii. Red list criteria
- iii. *In situ* conservation: Biosphere reserves, sacred groves, National Parks
- iv. *Ex situ* conservation: Botanical Gardens.

Suggested Activities: Studying plant utilization methods by tribal/rural/migrant populations for their beverages, food, medicinal and uses, seminars on role of ethnic groups in conservation of plant genetic resources, project work on traditional knowledge about plant medicines, study of indigenous medicinal sciences and their efficacy.

Suggested Readings:

- 1) S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.
- 2) Glimpses of Indian. Ethnobotny, Oxford and I B H, New Delhi – 1981.
- 3) S.K. Jain (ed.) 1989. Methods and approaches in ethnobotany. Society of ethnobotanists, Lucknow, India.
- 4) S.K. Jain, 1990. Contributions of Indian ethnobotny. Scientific publishers, Jodhpur.
- 5) Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons – Chichester
- 6) Rama Ro, N and A.N. Henry (1996). The Ethnobotany of Eastern Ghats in Andhra Pradesh, India. Botanical Survey of India. Howrah.
7. Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
8. Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn. Agrobios, India.
9. Pal, D.C. & Jain, S.K., 1998. Tribal Medicine. Naya Prakash Publishers, Calcutta
10. Raychudhuri, S.P., 1991. (Ed.) Recent advances in Medicinal aromatic and spice crops. Vol.1, Today& Tomorrow's printers and publishers, New Delhi

Cluster Elective VIII-A-2: Practical:

ETHNOBOTANY AND MEDICINAL BOTANY

1. Ethnobotanical specimens as prescribed in theory syllabus

2. Detailed morphological and anatomical study of medicinally important part(s) of locally available plants (Minimum 8 plants) used in traditional medicine.

3. Field visits to identify and collect ethno medicinal plants used by local tribes/folklore.

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SEMESTER- VIII : CLUSTER ELECTIVE -A

Paper VIII-A-2 : ETHNOBOTANY AND MEDICINAL BOTANY PRACTICAL

I. Identify the specimen A- Give reasons (morphological and anatomical) and draw labeled sketches 15marks

II. Identify and write about the medicinal uses of B-and C- $2 \times 5 = 10$ marks.

III. Comment on D and E. $2 \times 4 = 8$ marks

IV. Report on Field visit: 7 marks

List to be prepared mentioning special features of plants used by tribal populations as Medicinal Plants & Spices. Write their botanical and common names, parts used and diseases/disorders for which they are prescribed.

V. Viva-voce 5 marks

VI. Record 5 marks

Total = 50 marks

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CLUSTER ELECTIVE, Paper VIII-A-3
Paper VIII-A-3: Pharmacognosy and Phytochemistry

Unit-I: Pharmacognosy

Definition, Importance, Classification of drugs - Chemical and Pharmacological, Drug evaluation methods

Unit -II: Organoleptic and microscopic studies:

Organoleptic and microscopic studies with reference to nature of active principles and common adulterants of *Alstonia scholaris* (bark), *Adhatoda vasica*(leaf), *Strychnos nuxvomica* (seed), *Rauwolfia serpentina*(root) and *Zinziber officinalis Catharanthus roseus*.

Unit-III: Secondary Metabolites:

- i. Definition of primary and secondary metabolites and their differences, major types - terpenes, phenolics, alkaloids, terpenoids, steroids.
- ii. A brief idea about extraction of alkaloids. Origin of secondary metabolites – detailed account of acetate pathway, mevalonate pathway, shikimate pathway.

UNIT-IV: Phytochemistry:

Biosynthesis and sources of drugs:

- i (i) Phenols and phenolic glycosides : structural types, biosynthesis, importance of simple phenolic compounds, tannins, anthraquinones, coumarins and furanocoumarins, flavones and related flavonoid glycosides, anthocyanins, betacyanins, stilbenes, lignins and lignans).

- (ii) Steroids, sterols, saponins, withanolides, ecdysones, cucurbitacins:

Biosynthesis, commercial importance.

- (iii) Alkaloids: Different groups, biosynthesis, bioactivity.

- (v) Volatile oils, aromatherapy.

UNIT-V: Enzymes, proteins and amino acids as drugs:

- i. Vaccines, toxins and toxoids, antitoxins, immune globulins, antiserums,
- ii. Vitamins, Antibiotics – chemical nature, mode of action.
- iii. Pharmacological action of plant drugs – tumor inhibitors, PAF antagonists, antioxidants, phytoestrogens and others.
- iv. Role of different enzyme inhibitors.

Suggested Activities: Isolation techniques of active principles from various parts of popular medicinal plants, debates on the efficacy of plant medicines and palliative cure, volatile oils from plants-extraction methods, project work on crude drugs

BOOKS FOR REFERENCE:

1. Wallis, T. E. 1946. Text book of Pharmacognosy, J & A Churchill Ltd. 2. Roseline, A. 2011. Pharmacognosy. MJP Publishers, Chennai.
2. Gurdeep Chatwal, 1980. Organic chemistry of natural productis. Vol.I.Himalaya Publishing house.

3. Kalsi, P. S. and Jagtap, S., 2012. Pharmaceutical medicinal and natural product chemistry N.K. Mehra . Narosa Publishing House Pvt. Ltd. New Delhi.
4. Agarwal, O. P. 2002. Organic chemistry–Chemistry of organic natural products. Vol. II. Goel publishing house , Meerut.
5. Harborne, J. B. 1998. Phytochemical methods –a guide to modern techniques of plant analysis 3 rd edition, Chapman and Hall

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CLUSTER ELECTIVE, Paper VIII-A-3
Paper VIII-A-3: Pharmacognosy and Phytochemistry Practical

1. Physical and chemical tests for evaluation of unorganized drugs- Asaphoetida. Honey, Castor oil. Acacia
2. Identification of bark drugs – cinchona, cinnamom
3. Identification of fruit drugs – Cardamom, Coriander
4. Identification of root and rhizome drugs- Ginger, Garlic, Turmeric
5. Identification of whole plant – Aloes, Vinca, Punarnava 20
6. Herbarium of medicinal plants (minimum of 20 plants)
7. Collection of locally available crude drugs from local vendors (minimum of 20)

Domain skills expected to achieve: Identification of various plant parts used as medicines, extraction of active principles from them, isolation by chromatographic techniques, learning callus culture techniques for secondary metabolite enrichment and understanding ethno-pharmacological principles

S.K.S.D. MAHILA KALASALA, UG & PG (AUTONOMOUS), TANUKU

(Affiliated to Adikavi Nannaya University, Rajamahendravaram)
Re-accredited by NAAC with 'B' Grade at 2.81 CGPA

Foundation Course - 2

ENVIRONMENTAL STUDIES

Common for BA/BCom/BSc Programmes

Semester - I

Unit-I : Natural Resources:

Definition, scope and importance. Need for public awareness.

Brief description of;

- Forest resources: Use and over-exploitation. Deforestation; timber extraction, mining, dams. Effect of deforestation environment and tribal people
- Water resources: Use and over-utilization. Effects of over utilisation of surface and ground water. Floods, drought.
- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.
- Food resources: World food problems, Effects of modern agriculture; fertilizer- pesticide, salinity problems.
- Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.
- Land resources: Land as resources, land degradation, man induced landslides, soil erosion and desertification

Unit-II : Ecosystems, Biodiversity and its conservation

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Food chains, food webs and ecological pyramids
- Characteristic features of the following ecosystems:- Forest ecosystem, Desert ecosystem, Aquatic ecosystem.
- Value of biodiversity: Consumptive use, productive use. Biodiversity in India.
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity

Unit-III : Environmental Pollution

- Definition
- Causes, effects and control measures of :-
 - a. Air pollution
 - b. Water pollution
 - c. Soil pollution
 - d. Noise pollution
- Solid waste management; Measures for safe urban and industrial waste disposal
- Role of individual in prevention of pollution
- Disaster management: Drought, floods and cyclones

Unit-IV : Social Issues and the Environment

- From Unsustainable to Sustainable development
- Water conservation, rain water harvesting, watershed management.
- Climate change, global warming, ozone layer depletion,
- Environment protection Act
- Wildlife Protection Act, Forest Conservation Act

Unit-V : Human Population and the Environment

- Population explosion, impact on environment.
- Family welfare Programme
- Environment and human health
- Women and Child Welfare
- Value Education
- Role of Information Technology in Environment and human health

Reference Books :

1. Environmental Studies by Dr.M.Satyanarayana, Dr.M.V.R.K.Narasimhacharyulu, Dr.G. Rambabu and Dr.V.VivekaVardhani, Published by Telugu Academy, Hyderabad.
2. Environmental Studies by R.C.Sharma, Gurbir Sangha, published by Kalyani Publishers.
3. Environmental Studies by Purnima Smarath, published by Kalyani Publishers.