

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

(Affiliated to Adikavi Nannaya University, Rajamahendravaram)

Re-accredited by NAAC with 'B++' Grade at 2.82 CGPA

I B.Sc., - BOTANY SYLLABUS

SEMESTER - I

Paper - Microbial Diversity, Algae and Fungi

(w.e.f.2020-2021)

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 concept.
3. Brief account of special groups of bacteria- Archaeobacteria, Mycoplasma, Chlamydia, Actinomycetes.

Additional Input: Biofertilizers

UNIT- II: VIRUSES

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, Bendi 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

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* and *Ectocarpus*, *Polysiphonia*.

UNIT IV: FUNGI

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

Additional Input:- Identification of Locally popular diseases selected

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

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.

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

Paper-III : Plant Taxonomy and Embryology)

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 and Prantle system of Classification.
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, Apiceae.

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.

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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 Phyto geography & Plant Biodiversity and its importance

1. Principles of Phyto geography, Distribution (wides, endemic, discontinuous species)
2. Phyto geographic regions of India.
3. Phyto geographic 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

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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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Foundation Course - 2

ENVIRONMENTAL STUDIES

Common for BA/BCom/BSc Programmes

(w.e.f.2020-2021)

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 humanhealth

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.