S. V. K. P. & Dr. K. S. RAJU ARTS & SCIENCE COLLEGE (A)
Penugonda-534320, W. G. Dt., A.P.

I Semester – BOTANY (19BOT1) SYLLABUS
(W.e.f. 2019-20 admitted batch)

PAPER I: MICROBIAL DIVERSITY, ALGAE AND FUNGI (19BOT1)

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.
3. Brief account of special groups of bacteria- Archaebacteria, Mycoplasma, Chlamydia, Actinomycetes and Cyanobacteria.

UNIT- II: VIRUSES (12hrs)

1. Viruses- Discovery, general account, structure& replication of –T4 Phage (Lytic, Lysogenic) and TMV, Viroids.
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.

UNIT III: BACTERIA (12hrs)

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 (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 V: FUNGI (12hrs)

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

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Phone : 08819 - 246126 / 246926
Website : www.svkpandksrajucollege.org.in

S.V.K.P. & Dr. K.S. RAJU ARTS & SCIENCE COLLEGE
(Autonomous)

Recognized by UGC as "College with Potential for Excellence"
Accredited by NAAC with "A" Grade
(Affiliated to ADIKAVI NANNAYA UNIVERSITY - Recognised by Govt. of Andhra Pradesh)
PENUGONDA-534 320, West Godavari District., (A.P.)

Semester	Paper Code	No.of hours per week		Credits	
		Theory	Practical/ Problem Solving	Theory	Practical/ Problem Solving
II	19BOT2	4	2	3	2

SEMESTER- II (w.e.f. 2019-20 Admitted Batch)
I B. Sc. BOTANY
Paper –II : Diversity of Archaegoniates &Plant Anatomy
Total hours of teaching 60hrs @ 4 hrs per week

UNIT – I: BRYOPHYTES **(12hrs)**

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

(12hrs)

UNIT - II: PTERIDOPHYTES

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

(12hrs)

UNIT – III: GYMNOSPERMS

1. General characters, classification (up to classes)
2. Morphology, anatomy, reproduction and life history of *Pinus and Gnetum*
3. Economic importance.

UNIT –I V: Tissues and Tissue systems
(12hrs)

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**
(12hrs)

1. Anomalous secondary growth in *Achyranthes, Boerhaavia* and *Dracaena.*
2. Study of local timbers of economic importance-Teak, Rosewood.

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III SEMESTER BOTANY SYLLABUS

PAER III: Plant Taxonomy and Embryology (19BOT3)

(w.e.f. 2019-20 Admitted Batch)

Unit I: Introduction to plant taxonomy

1. Fundamental components of taxonomy (identification, nomenclature, classification)
2. Taxonomic resources: Herbarium- functions & important herbaria. Botanical gardens.
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.

Unit III: Systematic Taxonomy- I

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

Unit IV: Systematic Taxonomy – II

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

Unit V: Embryology

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

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

Books for reference:

1. Porter. C.L.: Taxonomy of flowering plants, Eurasia Publishing House, New Delhi.
2. Lawrence. G.H.M.(1953): Taxonomy of vascular plants, Oxford & IBH Publishers, New Delhi, Calcutta.
3. Jefferey. C.(1968): An Introduction to plant Taxonomy, J.A.Churchill, London
4. Mathur. R.C.(1970): Systematic Botany (Angiosperms), Agra Book stores- Lucknow, Ajmer, Allahabad, Delhi.
5. Maheswari. P.(1963) : Recent Advances in the Embryology of Angiosperms(Ed.,) International Society of plant Morphologists- University of Delhi.

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SEMESTER- IV BOTANY SYLLABUS
(w.e.f. 2019-20 Admitted Batch)

II B. Sc. BOTANY

Paper –4 : PLANT PHYSIOLOGY AND METABOLISM

UNIT – I: Plant – Water relations

1. Physical properties of water, Importance of water to plant life.

2. Diffusion, imbibitions 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 stomara.

UNIT-II:Mineral nutrition & Enzymes

1. Mineral Nutrition: Essential elements (macro and micronutrients) and their role in plant metabolism, deficiency symptoms.

2. Nitrogen metabolism – biological nitrogen fixation in Rhizobium, outlines of protein synthesis (transcription and translation)

3. Enzymes: General characteristics, mechanism of enzyme action and factors regulating enzyme Action

UNIT-III: Photosynthesis

1. Photosynthesis: photosynthetic pigments, photosynthetic light reactions, photophosphorylation,

carbon assimilation pathways: C_3, C_4 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

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

Suggested Activity: Seminars, Quiz, Debate, Question and Answer sessions, observing animations of protein biosynthesis in you rube.

Books for reference

1. Steward. F.C.(1964) : Plants at work (A summary of plant physiology)

Addition- Wesley Publishing Co., Inc. Reading, Massachusetts, Palo alto, London.

2. Devlin. R.M. (1969): Plant Physiology, Holt, Rinehart & Winston & Affiliated East West Press(P) Ltd. New Delhi

3.Noggle. R & Fritz (1989): Introductory Plant Physiology, Prentice Hall of India

4. Lawlor D.W. (1989): Photosynthesis , metabolism, Control & Physiology ELBS/ Longmans-London

5. Mayer- Anderson & Bonnings(1965): Introduction to plant physiology, D. Van Nostrand Publishing Co.N.Y.

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III B. Sc - SEMESTER- V: BOTANY SYLLABUS THEORY PAPER – V

Paper-5A: Cell Biology, Genetics and Plant Breeding(19BOT5A)

w.e.f. 2019-20 admitted batch

UNIT – I Cell Biology: **(12hrs)**

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: **(12hrs)**

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: **(12 hrs)**

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: **(12 hrs)**

1. Introduction and Objectives of plant breeding.
2. Methods of crop improvement: Procedure, advantages and limitations of Introduction, Selection, and Hybridization (outlines only).

UNIT – V Breeding, Crop Improvement and Biotechnology: **(12 hrs)**

1. Role of mutations in crop improvement.
2. Role of somaclonal variations in crop improvement.
3. Molecular breeding – use of DNA markers in plant breeding and crop improvement (RAPD, RFLP).

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III B. Sc - SEMESTER- V: BOTANY THEORY

SYLLABUS

PAPER-5B: PLANT ECOLOGY& PHYTOGEOGRAPHY (19BOT5B)

w.e.f. 2019-20 admitted batch

UNIT – I. Elements of Ecology **(12 hrs)**

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 **(12 hrs)**

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 **(12 hrs)**

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 **(12 hrs)**

1. Principles of Phytogeography, Distribution (wides, endemic, discontinuous species)
2. Phytogeographic regions of India.
3. Phytogeographic regions of World.
4. Endemism – types and causes

UNIT- V: Plant Biodiversity and its importance **(12 hrs)**

1. Definition, levels of biodiversity-genetic, species and ecosystem.
2. Biodiversity hotspots- Criteria, Biodiversity hotspots of India.
3. Loss of biodiversity – causes and conservation (*In-situ* and *ex-situ* methods).
4. Seed banks - conservation of genetic resources and their importance

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III B. Sc - BOTANY SIXTH SEMESTER SYLLABUS

SIXTH SEMESTER- PAPER – VIIB

Elective Paper: Nursery, Gardening and Floriculture.(19BOT6EB)

w.e.f. 2019-20 admitted batch

Unit I: Nursery: **(12 hrs.)**

1. Definition, objectives, scope and building up of infrastructure for nursery.
2. Planning and seasonal activities - Planting - direct seeding and transplants.
3. Nursery Management and Routine Garden Operations.

Unit III: Gardening **(12 hrs.)**

1. Definition, objectives and scope - different types of gardening.
2. Landscape and home gardening - parks and its components, plant materials and design .
3. Computer applications in landscaping.
4. Gardening operations: soil laying, manuring, watering.
5. Landscaping Places of Public Importance: Landscaping highways and Educational Institutions)
6. Some Famous gardens of India.

Unit III: Propagation methods (12 **hrs.)**

1. Sowing/raising of seeds and seedlings, transplanting of seedlings.
2. Air-layering, cutting, selection of cutting, propagule collecting season, treatment of cutting rooting medium and planting of cuttings - Hardening of plants.
3. Propagation of ornamental plants by rhizomes, corms tubers, bulbs and bulbils.
4. .Green house - mist chamber, shade house and glass house for propagation.

Unit IV: Floriculture: **(12 hrs.)**

1. Ornamental Plants: Flowering annuals; herbaceous, perennials; Shade and ornamental trees.
2. Ornamental bulbous and foliage plants; Cacti and succulents.
3. Ornamentals-palms.
4. Cultivation of plants in pots; Indoor gardening; Bonsai.

Unit V: Commercial Floriculture (12 hrs.)

1. Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life of flowers
2. Cultivation of Important cut flowers (Aster, Dahlia, Gerbera, Anthuriams, Marigold, Rose, Lilium)
3. Management of pests, diseases and harvesting.
4. Methods of harvesting.

Books for Reference:

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil. institution)
4. Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers.

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III B.Sc., BZC BOTANY VI SEMESTER SYLLABUS

CLUSTER 1: PLANT DIVERSITY AND HUMAN WELFARE(19BOT6CA1)

Unit- I: Plant diversity and its scope: **(12hrs)**

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: **(12hrs)**

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: **(12hrs)**

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 **(12hrs)**

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 **(12hrs)**

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.

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III B.Sc., BZC BOTANY VI SEMESTER SYLLABUS

CLUSTER 2: ETHNOBOTANY AND MEDICINAL BOTANY(19BOT6CA2)

Unit –I: Ethnobotany **(12hrs)**

i. Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethno botany 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: **(12hrs)**

i. Role of ethnobotany in modern medicine with special example *Rauvolfia sepentina, Trichopus zeylanicus, Artemisia annua, Withaniasomnifera.*

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 **(12hrs)**

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 **(12hrs)**

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: **(12hrs)**

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.

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III B.Sc., BZC BOTANY VI SEMESTER SYLLABUS

CLUSTER 3: PHARMACOGNOSY AND PHYTOCHEMISTRY(19BOT6CA3)

Unit-I: Pharmacognosy **(12hrs)**

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

Unit –II: Organoleptic and microscopic studies: **(12hrs)**

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

Unit-III: Secondary Metabolites: **(12hrs)**

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: **(12hrs)**

Biosynthesis and sources of drugs:

(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.

(iv) Volatile oils, aromatherapy.

Unit-V: Enzymes, proteins and amino acids as drugs: **(12hrs)**

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.