

S.R.R. & C.V.R. Government Degree College (A)

An Autonomous & ISO 9001: 2015 Certified Institution:: Ranked by NIRF in 101-150 band at NIRF-2020 & 151-200 band in NIRF 2019 NAAC accredited Institution with grade B+ with C.G.P.A 2.6 during March, 2017

Machavaram, Vijayawada, Krishna District, AP-520 004

BOTANY SYLLABUS 2020-2021



DEPARTMENT OF BOTANY

**SRR & CVR GOVERNMENT DEGREE COLLEGE(AUTONOMOUS)
VIJAYAWADA, ANDHRA PRADESH, KRISHNA DISTRICT**

**I Semester /Botany Core Course - I
Fundamentals of Microbes and Non-vascular Plants
(Viruses, Bacteria, Fungi, Lichens, Algae and Bryophytes)
(Total hours of teaching – 60 @ 04 Hrs./Week)**

Theory: Learning Outcomes

On successful completion of this course, the students will be able to:

- Explain origin of life on the earth.
- Illustrate diversity among the viruses and prokaryotic organisms and can categorize them.
- Classify fungi, lichens, algae and bryophytes based on their structure, reproduction and life cycles.
- Analyze and ascertain the plant disease symptoms due to viruses, bacteria and fungi.
- Recall and explain the evolutionary trends among amphibians of plant kingdom for their shift to land habitat
- Evaluate the ecological and economic value of microbes, thallophytes and bryophytes.

Unit – 1: Origin of life and Viruses 12Hrs.

1. Origin of life, concept of primary Abiogenesis; Miller and Urey experiment. Five kingdom classification of R.H. Whittaker
2. Discovery of microorganisms, Pasteur experiments, germ theory of diseases
3. Shape and symmetry of viruses; structure of TMV and Gemini virus; multiplication of TMV; A brief account of Prions and Viroids
4. A general account on symptoms of plant diseases caused by Viruses. Transmission of plant viruses and their control.
5. Significance of viruses in vaccine production, bio-pesticides and as cloning vectors.

Unit – 2: Special groups of Bacteria and Eubacteria 12Hrs.

1. Brief account of Archaeobacteria, Actinomycetes and Cyanobacteria
2. Cell structure and nutrition of Eubacteria.
3. Reproduction- Asexual (Binary fission and endospores) and bacterial recombination (Conjugation, Transformation, Transduction).
4. Economic importance of Bacteria with reference to their role in Agriculture and industry (fermentation and medicine).
5. A general account on symptoms of plant diseases caused by Bacteria; Citrus canker

Unit – 3: Fungi & Lichens 12 Hrs.

1. General characteristics of fungi and Ainsworth classification (upto classes)
2. Structure, reproduction and life history of
(a) Rhizopus (Zygomycota) and (b) Puccinia (Basidiomycota).
3. Economic uses of fungi in food industry, pharmacy and agriculture.
4. A general account on symptoms of plant diseases caused by Fungi; Blast of Rice.
5. Lichens- structure and reproduction; ecological and economic importance

Unit – 4: Algae 12 Hrs.

1. General characteristics of Algae (pigments, flagella and reserve food material); Fritsch classification (upto classes).
2. Thallus organization and life cycles in Algae.
3. Occurrence, structure, reproduction and life cycle of (a) Spirogyra (Chlorophyceae) and (b) Polysiphonia (Rhodophyceae).
4. Economic importance of Algae.

Unit – 5: Bryophytes 12 Hrs.

1. General characteristics of Bryophytes; classification upto classes
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life cycle of
(a) Marchantia (Hepaticopsida) and (b) Funaria (Bryopsida).
3. General account on evolution of sporophytes in Bryophyta.

Text books:

- Botany – I (Vrukshasastram-I) : Telugu Akademi, Hyderabad.
- Pandey, B.P. (2013) College Botany, Volume-I, S. Chand Publishing, New Delhi
- Hait, G., K. Bhattacharya & A.K. Ghosh (2011) A Text Book of Botany, Volume-I, New Central Book Agency Pvt. Ltd., Kolkata .
- Bhattacharjee, R.N., (2017) Introduction to Microbiology and Microbial Diversity, Kalyani Publishers, New Delhi

Books for Reference:

- Dubey, R.C. & D.K. Maheswari (2013) A Text Book of Microbiology, S. Chand & Company Ltd., New Delhi
- Pelczar Jr., M.J., E.C.N. Chan & N.R. Krieg (2001) Microbiology, Tata Mc Graw Hill Co, New Delhi

Practical syllabus of Botany Core Course – 1/ Semester-I

Fundamentals of Microbes and Non-vascular Plants

(Viruses, Bacteria, Fungi, Lichens, Algae and Bryophytes)

Course Outcomes: On successful completion of this practical course, student shall be able to;

1. Demonstrate the techniques of use of lab equipment, preparing slides and identify the material and draw diagrams exactly as it appears.
2. Observe and identify microbes and lower groups of plants on their own.
3. Demonstrate the techniques of inoculation, preparation of media etc.
4. Identify the material in the permanent slides etc.

Practical Syllabus:

1. Knowledge of Microbiology laboratory practices and safety rules.
2. Knowledge of different equipment for Microbiology laboratory (Spirit lamp, Inoculation loop, Hot-air oven, Autoclave/Pressure cooker, Laminar air flow chamber and Incubator) and their working principles.

(In case of the nonavailability of the laboratory equipment the students can be taken to the local college/clinical lab. with required infrastructural facilities or they can enter a linkage with the college/lab for future developments and it will fetch credits during the accreditation by NAAC).

3. Demonstration of Gram's staining technique for Bacteria.
4. Study of Viruses (Corona, Gemini and TMV) using electron micrographs/ models.
5. Study of Archaeobacteria and Actinomycetes using permanent slides/ electron micrographs/diagrams.
6. Study of Anabaena and Oscillatoria using permanent/temporary slides.
7. Study of different bacteria (Cocci, Bacillus, Vibrio and Spirillum) using permanent or temporary slides/ electron micrographs/ diagrams.
8. Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/ specimens/ mounts :
 - a. Fungi : Rhizopus, Penicillium and Puccinia
 - b. Lichens: Crustose, foliose and fruticose
 - c. Algae : Volvox, Spirogyra, Ectocarpus and Polysiphonia
 - d. Bryophyta : Marchantia and Funaria
9. Study of specimens of Tobacco mosaic disease, Citrus canker and Blast of Rice.

SRR & CVR GOVT DEGREE COLLEGE (AUTONOMOUS)
VIJAYAWADA, KRISHNA DISTRICT
II Semester /Botany Core Course – 2
Basics of Vascular plants and Phytogeography
(Pteridophytes, Gymnosperms, Taxonomy of Angiosperms and Phytogeography)
(Total hours of teaching – 60 @ 02 Hrs./Week)

Learning Outcomes: On successful completion of this course, the students will be able to:

- Classify and compare Pteridophytes and Gymnosperms based on their morphology, anatomy, reproduction and life cycles.
- Justify evolutionary trends in tracheophytes to adapt for land habitat. Explain the process of fossilization and compare the characteristics of extinct and extant plants.
- Critically understand various taxonomical aids for identification of Angiosperms.
- Analyze the morphology of the most common Angiosperm plants of their localities and recognize their families.
- Evaluate the ecological, ethnic and economic value of different tracheophytes and summarize their goods and services for human welfare.
- Locate different phytogeographical regions of the world and India and can analyze their floristic wealth.

Unit – 1: Pteridophytes

12 Hrs.

1. General characteristics of Pteridophyta; classification of Smith (1955) upto divisions.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) Lycopodium (Lycopsidea) and (b) Marsilea (Filicopsida).
3. Stellar evolution in Pteridophytes;
4. Heterospory and seed habit.

Unit – 2: Gymnosperms

14 Hrs.

1. General characteristics of Gymnosperms; Sporne classification upto classes.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) Cycas (Cycadopsida) and (b) Gnetum (Gnetopsida).
3. Outlines of geological time scale.
4. A brief account on Cycadeoidea.

Unit – 3: Basic aspects of Taxonomy

13Hrs.

1. Aim and scope of taxonomy; Species concept: Taxonomic hierarchy, species, genus and family.
2. Plant nomenclature: Binomial system, ICBN- rules for nomenclature.
3. Herbarium and its techniques, BSI herbarium and Kew herbarium; concept of digital herbaria.

4. Bentham and Hooker system of classification;
5. Systematic description and economic importance of the following families: (a) Annonaceae (b) Curcubitaceae

Unit – 4: Systematic Taxonomy

13 Hrs.

1. Systematic description and economic importance of the following families: (a) Asteraceae (b) Asclepiadaceae (c) Amaranthaceae (d) Euphorbiaceae (e) Arecaceae and (f) Poaceae
2. Outlines of Angiosperm Phylogeny Group (APG IV).

Unit – 5: Phytogeography

08 Hrs.

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

Text books:

Botany – I (Vrukshasastram-I) : Telugu Akademi, Hyderabad

Botany – II (Vrukshasastram-II) : Telugu Akademi, Hyderabad

Acharya, B.C., (2019) Archchegoniates, Kalyani Publishers, New Delhi

• Bhattacharya, K., G. Hait & Ghosh, A. K., (2011) A Text Book of Botany, Volume II, New Central Book Agency Pvt. Ltd., Kolkata

• Hait, G., K. Bhattacharya & A. K. Ghosh (2011) A Text Book of Botany, Volume-I, New Central Book Agency Pvt. Ltd., Kolkata

• Pandey, B.P. (2013) College Botany, Volume-I, S. Chand Publishing, New Delhi

• Pandey, B.P. (2013) College Botany, Volume-II, S. Chand Publishing, New Delhi Books for Reference:

• Smith, G.M. (1971) Cryptogamic Botany Vol. II., Tata McGraw Hill, New Delhi

• Sharma, O.P. (2012) Pteridophyta. Tata McGraw-Hill, New Delhi

• Kramer, K.U. & P. S. Green (1990) The Families and Genera of Vascular Plants, Volume –I: Pteridophytes and Gymnosperms (Ed. K. Kubitzki) Springer-Verlag, New York

• Bhatnagar, S.P. & Alok Moitra (1996) Gymnosperms. New Age International, New Delhi

• Coulter, J.M. & C.J. Chamberlain (1910) Morphology of Gymnosperms, The University of Chicago Press, Chicago, Illinois

• Govil, C.M. (2007) Gymnosperms : Extinct and Extant. KRISHNA Prakashan Media (P) Ltd. Meerut & Delhi

• Sporne, K.R. (1971) The Morphology of Gymnosperms. Hutchinsons Co. Ltd., London

• Arnold, C.A., (1947) An introduction to Paleobotany McGraw – Hill Book Company, INC, New York

• Stewart, W.N., and G.W. Rothwell (2005) Paleobotany and the evolution of plants Cambridge University Press, New York

• Lawrence, George H.M. (1951) Taxonomy of Vascular Plants. The McMillan Co., New York

**SRR & CVR GOVT DEGREE COLLEGE (AUTONOMOUS)
VIJAYAWADA , KRISHNA DISTRICT**

**Practical syllabus of BotanyCore Course – 2/ Semester – II
Basics of Vascular plants and Phytogeography (Pteridophytes,
Gymnosperms, Taxonomy of Angiosperms and Phytogeography)**

(Total hours of laboratory exercises 30 Hrs. @ 02 Hrs. /Week)

Course Outcomes:

On successful completion of this course students shall be able to:

1. Demonstrate the techniques of section cutting, preparing slides, identifying of the material and drawing exact figures.
2. Compare and contrast the morphological, anatomical and reproductive features of vascular plants.
3. Identify the local angiosperms of the families prescribed to their genus and species level and prepare herbarium.
4. Exhibit skills of preparing slides, identifying the given twigs in the lab and drawing figures of plant twigs, flowers and floral diagrams as they are.
5. Prepare and preserve specimens of local wild plants using herbarium techniques.

Practical Syllabus:

1. Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/ specimens/ mounts : a. Pteridophyta : Lycopodium and Marselia b. Gymnosperms : Cycas and Gnetum
2. Study of fossil specimens of Cycadeoidea and Pentoxylon (photographs /diagrams can be shown if specimens are not available).
3. Demonstration of herbarium techniques.
4. Systematic / taxonomic study of locally available plants belonging to the families prescribed in theory syllabus. (Submission of 30 number of Herbarium sheets of wild plants with the standard system is mandatory).
5. Mapping of phytogeographical regions of the globe and India.

SRR & CVR GOVT. DEGREE COLLEGE (A)

VIJAYAWADA-520004::KRISHNA DISTRICT::ANDHRAPRADESH

DEPARTMENT OF BOTANY

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

(Paper-DSC IIA : Plant Taxonomy and Embryology)

Total hours of teaching 60 hrs @ 4 hrs per week

w.e.f.2018-19

UNIT – I: INTRODUCTION TO PLANT TAXONOMY (12 hrs)

- 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 (12 hrs)

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

UNIT –III: SYSTEMATIC TAXONOMY-I (12 hrs)

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

UNIT –IV: SYSTEMATIC TAXONOMY-II (12 hrs)

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

UNIT – V: EMBRYOLOGY

(12 hrs)

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 (outlines) Endosperm development and types.
4. 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. 13

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
5. Maheswari, P (1963) : Recent Advances in the Embryology of Angiosperms (Ed.,) International Society of Plant Morphologists- University of Delhi.
6. Swamy, B.G.L. and Krishnamoorthy. K.V. (1980): From flower to fruit
7. Maheswari, P.(1985): An Introduction to the Embryology of Angiosperms Tata McGraw Hill Publishing Co., Ltd., New Delhi.
8. Bhojwani, S.S. and Bhatnagar, S.P. (2000) : The Embryology of Angiosperms (4th Edition) Vikas Publishing House(P) Ltd., UBS Publisher's Distributors, New Delhi. 14

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II B.Sc - SEMESTER-III BOTANY PRACTICAL – DSC IIA

Plant Taxonomy and Embryology

Total hours of laboratory Exercises 30 hrs @ 2 per week

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 (Typha)].
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. Demonstration of polyembryony in Citrus.
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. Preparation and submission of 30 herbarium specimens for evaluation during practical Examination.

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3. Ch. Bhavani S. K. Pannu
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SRR & CVR GOVT. DEGREE COLLEGE (A)

VIJAYAWADA-520004::KRISHNA DISTRICT::ANDHRAPRADESH

DEPARTMENT OF BOTANY

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

PAPER – DSC IIB: Plant Physiology and Metabolism

Total hours of teaching 60 hrs @ 4 hrs per week

w.e.f.2018-19

UNIT – I: Plant – Water relations

(12 hrs)

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 mechanism of opening and closing mechanism of stomata.

UNIT –II: Mineral nutrition & Enzymes

(12hrs)

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

UNIT –III: PHOTOSYNTHESIS

(12 hrs)

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

UNIT – IV: PLANT METABOLISM

(12 hrs) 1.

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

(12hrs)

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.

Suggested activity: Seminars, Quiz, Debate, Question and answer sessions, Observing animations of protein biosynthesis in You-Tube.

Books for Reference

1. Steward. F.C (1964): Plants at Work (A summary of Plant Physiology) AddisonWesley Publishing Co., Inc. Reading, Massachusetts, Palo Alto, London.

2. Devlin, R.M. (1969) : Plant Physiology, Holt, Rinehart & Winston and Affiliated East West Press (P) Ltd., New Delhi. 3. Noggle, R. and Fritz (1989): Introductory Plant Physiology Prentice Hall of India.

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

5. Mayer, Anderson and Bonning (1965): Introduction to Plant Physiology D. Van Nostrand Publishing Co., N.Y.

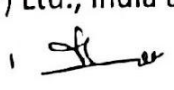



6. Mukherjee, S. A.K. Ghosh (1998): Plant Physiology, Tata McGraw Hill Publishers (P) Ltd., New Delhi.

7. Salisbury, F.B and C.W. Ross (1999): Plant Physiology CBS Publishers and Printers, New Delhi.

8. Plummer, D.(1989): Biochemistry–the Chemistry of life, McGraw Hill Book Co., London, N.Y., New Delhi, Paris, Singapore, Tokyo.

9. Day, P.M. and Harborne, J.B. (Eds.,) (2000): Plant Biochemistry. .

Harcourt Asia (P) Ltd., India and Academic Press, Singapore

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2. Mr. Vijayabharathi 6. 

II B. Sc SEMESTRE- IV. – BOTANY PRACTICAL SYLLABUS

PAPER- DSC IIB - Plant Physiology and Metabolism)

Total hours of laboratory Exercises 30 hrs @ 2 per week

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 and monocot)
4. Determination of rate of transpiration using cobalt chloride method.
5. Demonstration of transpiration by Ganongs' 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' bubbler.

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