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

2018-2019

DEPARTMENT OF BOTANY

SRR & CVR GOVERNMENT DEGREE COLLEGE
(AUTONOMOUS) Vijayawada 520004

Board of Studies Meeting
Dept. of Botany

B.Sc., II YEAR- Semester Pattern

w.e.f. 2018 - 2019

SRR & CVR GOVERNMENT DEGREE COLLEGE (AUTONOMOUS) Vijayawada 520004

Minutes of the meeting of the Board of Studies in the subject of

BOTANY

The meeting of the Board of Studies in the subject of **BOTANY** was held on **22 March2018** in staff room:Botany, SRR & CVR Govt. Degree College (Autonomous),Vijayawada520004

The following members attended the meeting:

1. **Miss. M. SRAVANA VALLI** **(In-charge of the Department & Chairman, BoS)**
   Lecturer in Botany
   SRR & CVR GDC, VIJAYAWADA
2. **Prof . M. VIJAY LAKSHMI** **(University Nominee)**
   Professor in Botany
   Department of Botany
   Acharya Nagarjuna University.
   Guntur.AP
3. **Dr. Ch. BHASKARA RAO** **(Subject Expert)**
   Lecturer in Botany
   Govt. Degree College for Women(A)
   Guntur
4. **Dr. M. BHUPATHI RAYULU** **(Subject Expert)**
   Lecturer in Botany
   GDC - Kaikaluru.AP
5. **Dr. M. LAKSHMI PRASAD** **(Special Member)**
   Suja Biotechs,
   Vijayawada.
6. **D. JYOTHI** **(Faculty Member)**
   Lecturer in Botany
   SRR & CVR GDC, VIJAYAWADA
7. **SK. Parveen Sulthana** **(Guest lecturer)**
   SRR&CVR GDC,VIJAYAWADA

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA-52004

An autonomous college in the jurisdiction of Krishna University, Machilipatnam. A.P.

I-BZC	BOTANY-I	SEM-I	Course code: BOT 1321	2018-2019	No. of Credits:4	No. of Hrs /Week:4

Microbial Diversity, Algae and Fungi

Objective: On successful completion of this course, the students will be able to know the diversity of Microbes, Algae and Fungi.

CO1: Students will be able to acquire, articulate, retain and apply specialized skills and knowledge relevant to Microbiology
CO2: Able to explore the diversity of microorganisms and microbial communities as well as their significance to humans and nature.
CO3: To Understand the classification, Structure , reproduction and Life History of Algae and Fungi
CO4: To understand history, relevance of microbiology and classification of Microorganisms and special groups of Bacteria
CO5: To understand bacterial cell structure, Nutrition, Reproduction and Economic importance, Virus structure, Replication , Viral diseases

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

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

UNIT- II: VIRUSES (12hrs)

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

UNIT III: BACTERIA (12hrs)

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

UNIT –IV Algae (12hrs)

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

UNIT V: FUNGI **(12hrs)**

General characteristics and outline classification (Ainsworth).

Structure, reproduction and life history of Rhizopus (Zygomycota),Penicillium (Ascomycota), and Puccinia (Basidiomycota).

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.

Additional inputs:

Penicillium life cycle

Mushroom cultivation

Outlines of Bacillariophyceae

Books for Reference:

1. Oladele Ogunseitan (2008) Microbial Diversity: Form and Function in Prokaryotes Wiley- Blackwell.

2. Pelczar, M.J. (2001) Microbiology, 5th edition, Tata Mc Graw-Hill Co, New Delhi.

3. Presscott, L. Harley, J. and Klein, D. (2005) Microbiology, 6th edition, Tata Mc Graw- Hill Co. New Delhi.

4. Fritsch F.E. (1935 The Structure & Reproduction of Algae 1945): Cambridge University Press Cambridge, U.K. Vol. I, Vol. II.

5. Smith, G.M (1955) :Cryptogamic Botany(Vol. I Algae, Fungi, & Lichens) McGraw-Hill Book Co., New York .

6. Ian Morris (1967): An Introduction to the Algae, Hutchinson, London.

7. Alexopoulos,C.J.., Mims, C.W. & Blackwell, M. (1996): Introductory Mycology John Wiley& Sons., Inc., N.Y., Chicester, Berisbane, Toronto, Singapore.

8. Webster, J (1999) : Introduction to Fungi(2nd edition) Cambridge University Press.

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA-52004

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I-BZC	BOTANY-I	SEM-I	Course code: BOT 1321P	2018-19	No. of Credits:1	No. of Hrs /Week:2

MICROBILA 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, Bhendi 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 materialinfected by Fungi (Rot of tomatoes,blue and greenmoulds of Ciitrus fruits and wheat rust(Section cutting of diseased parts of Wheat and Barberry -identification of different spores).
8. Lichens: Morphology and of anatomy of different thalli.
9. Field Visit.

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA-52004

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I-BZC	BOTANY-II	SEM-II	Course code: BOT 2321	2018-2019	No. of Credits:4	No. of Hrs /Week:4

DIVERSITY OF ARCHEGONIATES AND PLANT ANATOMY

Objective: On successful completion of this course, the students will be able to know the diversity, life cycle of Pteridophytes and Gymnosperms and tissues, tissue systems and anomalous secondary growth.

CO1: Able to explore the diversity of Bryophytes and their life cycles
CO2: Able to understand the life cycle of Pteridophytes
CO3: To understand evolution and life cycles of Gymnosperms
CO4: To understand the tissues and tissue systems in Angiosperms.
CO5: Able to know the process of secondary and anomalous secondary growth.

UNIT – I: BRYOPHYTES 12 Hrs

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 12 Hrs

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 12 Hrs

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-IV: 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. Anomolous secondary growth in Achyranthes, Boerhaavia and Dracaena
2. Study of local timber of economic importance-Teak, Rose wood, Red sanders and Arjun (Tella maddi)

Additional Inputs:

Study of Rhynia

Structure of Anthoceros sporophyte

Study of fossil Gymnosperms

General process of secondary growth

Books for Reference:

1. Cavers, Frank ( ): The inter-relationships of the Bryophytes New Phytologist, Indian Reprint.

2. Smith, G.M. (1955): Cryptogamic Botany Vol. II. (2nd Edition) (Bryophytes & Pteridophytes) Tata McGraw Hill Publishing Co., New Delhi.

3. Parihar, N.S. ( ): An Introduction to embryophyta – Vol.II. Bryophyta Central Book Depot, Allahabad.

4. Watson, E.V. (1968): British Mosses & Liverworts Cambridge University Press, U.K

5. Eames, A.J. (1936) : Morphology of Vascular Plants (Lower Groups) McGraw Hill, N.Y.

6. Parihar, N.S. (19) : An Introduction to Embryophyta Vol.II Pteridophyta Central Book Depot., Allahabad.

7. Smith, G.M. (1955) :Cryptogamic Botany Vol.II (2nd Edn.,) (Bryophytes & Pteridophytes) Tata McGraw Hill Publishing Co., New Delhi.

8. Sporne, K.R. (1970) : The Morphology of Pteridophytes (The Structure of Ferns and Allied Plants) Hutchinson University Library, London

9.Bierhorst, D.W. (1971) : Morphology of Vascular Plants, The MacMillan Co., N.Y. & Collier- MacMillan Ltd., London.

10. Coulter, J.M.& C.J. Chamberlain (1964) : Morphology of Gymnosperms Central Book Depot, Allahabad.

11. Sporne, K.R. (1971): The Morphology of Gymnosperms (The Structure and Evolution of Primitive seed Plants) Hutchinson University Library, London.

12. Esau, K. (1965) : Vascular Differentiation in Plants. Holt, Rinehart & Winston, N.Y., Chicago, San Fransisco, Toronto, London.

13. Eames, A.J., & Mc Daniels, L.H.(1979) : An Introduction to Plant anatomy Tata- McGraw-Hill Publishing Co., (P) Ltd. Bombay, New Delhi.

14. Esau. K.(1980) : Plant Anatomy, (2nd Edition) Wiley Eastern Ltd., New Delhi

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA-52004

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I-BZC	BOTANY-II	SEM-II	Course code: BOT 2321P	2018-2019	No. of Credits:1	No. of Hrs /Week:2

DIVERSITY OF ARCHEGONIATES AND ANATOMY

Practical syllabus

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

Inclusions in Practicals:

Anthoceros (Vegetative and Reproductive structures)

Selaginella Reproductive structures

Gnetum Leaf , Male and Female cone study

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, Curcurbitaceae, 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.Demonistration of pollen viability test using in in-vitro germination(catharanthus).

5. Study of ovule types and developmental stages of embryo sac using permanentslides /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.

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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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 CO_2 concentrations.
10. Effect of light intensity on oxygen evolution in photosynthesis using Wilmott' bubbler.

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