

## Paper BOT.101. PHYCOLOGY, MYCOLOGY, MICROBIOLOGY

### Unit – 1. PHYCOLOGY

1. Classification of Algae, Thallus organization, Pigmentation, Reproduction, Cultivation, Economic importance of Algae, Algal Biotechnology
2. General account of Myxophyceae (Cyanobacteria) and their potential applications.
3. General account of Xanthophyceae and Bacillariophyceae
4. Vegetative and reproductive characters of Chlorophyceae with reference to Pandorina, Cladophora, Cosmarium, Zygnema and Nitella.
5. Phaeophyceae: General account with special reference to Ectocarpus, Saragassum and Laminaria
6. Rhodophyceae: General account with special reference to Batracospermum and Gracilaria

### Unit-II.MYCOLOGY

7. General Introduction: Fungi: Cell ultra structure, cell wall composition, nutrition, vegetative and reproductive structure. Heterothallism, Heterokaryosis and parasexuality. Recent trends in classification. Origin and Phylogeny of fungi.
8. Comparative study of vegetative and reproductive characters of
  - a. Myxomycota: A general account
  - b. Eumycota: Mastigomycotina: Phytophthora
  - c. Zygomycotina: Mucor
  - d. Ascomycotina: Pencillium and Peziza
  - e. Basidiomycotina: Ustilago, Agaricus
  - f. Deuteromycotina: Cercospora, Colletotrichum and Fusarium, Alternaria

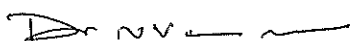
### Unit-III. LYCHNOLOGY AND MICROBIOLOGY

9. General account of Lichens and their types
10. Ecology and Economic importance of Lichens
11. Bacteria: general account, classification and economic importance
12. Viruses: general account, nomenclature, classification, Bacteriophages: viruses of eukaryotes.

### Unit-IV. PLANT PATHOLOGY

13. Plant pathology: General Introduction, Pathogenesis, dispersal of pathogens classification of pathogens
14. Plant diseases caused by and their management with reference to downy and powdery mildews, smuts and rusts
15. General account of bacterial diseases of plants and their control
16. (a). General characters and diseases caused by Mycoplasma, Rickettsia and Chlamydiae.  
(b). Diseases caused by viruses in plants their transmission and control.

Prof. B. Digamber Rao  
Chairperson, B.O.S. in Botany  
Satavahana University  
Karimnagar- 505 001





## Paper BOT.1.0.2. BRYOPHYTA, PTERIDOPHYTA AND GYMNOSPERMS

### Unit-1. BRYOPHYTA

1. Introduction origin distribution and classification of Bryophytes
2. General account of morphology, anatomy and reproduction in Hepaticopsida
3. Evolution of gametophyte and sporophyte in Bryophytes.
4. Ecology of Bryophytes.

### Unit – II. PTERIDOPHYTA

5. Origin and evolution of vascular cryptogams.
6. General account of morphology, anatomy and reproduction in Psilopsida, Lycopsida, Sphenopsida and Pteropsida.
7. Evolution of stele in Pteridophyta.
8. Heterospory and origin of seed habit.

### Unit – III. CYCADOPHYTA

9. Evolution and classification of Cycadophyta (Gynosperms)
10. Gymnosperms in India, reproductive biology and economic importance.
11. Structure and reproduction in Cycadales, Ginkgoales and Coniferales.
12. Structure and reproduction in Ephedrales, Wetwitschiales and Gnetales.

### Unit-IV. PALEOBOTANY

13. Paleobotany: Scope and objectives
14. Fossilization: Fossil type, techniques in paleobotany
15. Brief account of fossil gymnosperms.
16. Birbal Sahani Institute of Paleobotany and its contribution.

Prof. B. Digamber Rao  
Chairperson, B.O.S. in Botany  
Satavahana University  
Karimnagar-505 001

*D. N. V. R.*



## Paper.BOT.103. TAXONOMY AND ECONOMIC BOTANY

### Unit-I. TAXONOMY STRUCTURE AND EVIDENCE

#### a) Taxonomic Structure

1. Taxonomic hierarchy; Species, genus, family, order, class and division.
2. Evaluation of taxonomic categories.

#### b) Taxonomic Tools:

3. Herbaria, Flora, Botanic gardens and Arboreta, e-floras
4. Plant identification, Traditional keys and computer aids.

### Unit-II. CLASSIFICATION AND NOMENCLATURE

#### a) Taxonomic Evidence

5. Anatomy, Palynology and Embryology
6. Cytology, Phytochemistry and Molecular markers

#### b) Nomenclature – ICBN

7. History of nomenclature, de Candollean rules, IBC, Draft Bio-Code
8. Vienna Code: Salient features

### Unit-III. SYSTEMATIC BOTANY

#### a) Systematics of Classification

9. Parallelism vs. convergence, phenetic vs. phyletic systems; cladistics
10. Relative merits and demerits of systems of Takhtajan and Thorne, Angiosperm Phylogeny Group (APG).

#### b) Primitive and Problematic Taxa (A detailed account of the study of the families included under the following groups);

11. Ranalian complex and Amentiferae; Leguminosae
12. Centrospermae, Helobiae and Scitaminae

### Unit-IV. ETHNOBOTANY AND ECONOMIC BOTANY

#### a) Ethnobotany:

13. History, scope, objective and interdisciplinary nature of Ethnobotany
14. Ethnotribes and their dependence on ambient vegetation, podu cultivation.

#### b) Economic botany:

15. Economic Importance of Cucurbitaceae, Apiaceae, Solanaceae and Euphorbiaceae.
16. Cereals, pulses, leafy vegetables, oilseeds, spices and rubber.

Prof. B. Digamber Rao  
Chairperson, B.O.S. in Botany  
Satavahana University  
Karimnagar-505 001

*Dr. N. V. M.*

## Paper. BOT.1.0.4. ANATOMY, EMBRYOLOGY AND PALYNOLOGY

### Unit-I. PLANT STRUCTURE

1. Principles of plant fixation, sectioning and staining
2. Principles of scanning and transmission electron microscopy (SEM & TEM)
3. Primary structure of root, stem and leaf; nodal and floral anatomy.
4. Ultrastructure of phloem and xylem

### Unit-II. DEVELOPMENT ANATOMY

5. Shoot development, organization of shoot apical meristem, leaf differentiation, phyllotaxis.
6. Differentiation of epidermis (ontogeny of stomata, trichomes and idioblasts) and mesophyll.
7. Root development, Organization of root special meristem; cell fates and liaeages, lateral roots and root hairs.
8. Nature of cambium, Cambial activity –normal and abnormal (Anomalous Secondary Growth).

### Unit-III. EMBRYOLOGY

9. Male gametophyte: Anther wall, microsporogenesis and pollen development
10. Female gametophyte; Ovule development, types of megasporogenesis, development and ultrastructure of female gametophyte.
11. Fertilization, Endosperm development, nutrition of embryo. Embryology, Apamixis
12. Experimental Embryology, General principles, anther, pollen, ovary, ovule and endosperm culture.

### Unit-IV. PALYNOLOGY

13. Pollen morphology (incl. SEM and TEM), NPC system
14. Pollination: Abiotic and biotic systems.
15. Pollen storage, viability: pollen in air: pollen allergy.
16. Applications of palynology.

Prof. B. Digamber Rao  
Chairperson, B.O.S. in Botany  
Satavahana University  
Karimnagar- 505 001

*Dr N V Rao*

# M.Sc (BOTANY) – SEMISTER –II

## PAPER – I

### (Plant Biochemistry)

#### UNIT-I: Thermodynamics & Enzymes.

1. First law of thermodynamics (energy, enthalpy)
2. Second law of thermodynamics (entropy, free energy)
3. Properties of enzymes, classification and nomenclature
4. Enzyme kinetics & enzyme action, Isozymes, allosteric enzymes.

#### UNIT-II: Carbohydrates & Lipids

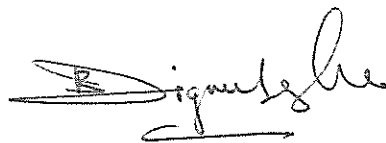
5. Classification, structure and function of carbohydrates
6. Storage polysaccharides, structural polysaccharides Glycoproteins.
7. Classification of lipids – simple lipids, compound lipids, sterols and terpenoids
8. Oxidation of fats,  $\alpha$ -oxidation,  $\beta$ -oxidation,

#### UNIT-III: Amino acids and proteins:

9. General properties Classification of amino acids
10. Biosynthesis of amino acids
11. Proteins classification, organization and specificity of proteins
12. glycoprotein and proteoglycans..

#### UNIT -IV: Vitamins & Nucleic acids

13. Classification- water and fat soluble vitamins,
14. Structure and biochemical properties of vitamins.
15. Structure of purine and pyrimidine bases
16. Types of RNA and DNA their structure.



Prof. B. Digamber Rao  
Chairperson, B.O.S. in Botany  
Satavahana University  
Karimnagar- 505 001

# M.Sc (BOTANY) - SEMISTER -II

## PAPER - II

### (Cytogenetics & Evolution)

#### UNIT-I: Cytology:

1. Physico-chemical nature of chromosomes of prokaryotes and eukaryotes.
2. Theories and models of chromosome morphology and structure.
3. Chromosome banding techniques.
4. Karyotype concept, construction and evolution.

#### UNIT-II: Genetics:

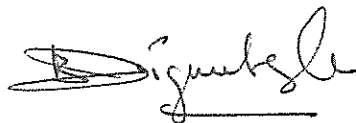
5. Chloroplast and mitochondrial genomes; cytoplasmic male sterility.
6. Genetic transformation, conjugation and transduction in bacteria.
7. Fine structure of gene.
8. Population genetics: Hardy Weinberg law.

#### UNIT-III: Cytogenetics:

9. Structural alterations in chromosomes.
10. Numerical changes in chromosomes.
11. Transposable elements, AC-DS System in maize.
12. DNA damage and repair mechanisms.

#### UNIT-IV: Evolution:

13. Origin of life; Theory of organic evolution.
14. Mechanisms of speciation, genetic polymorphism and selection.
15. Molecular evolution.
16. Origin and evolution of cultivated plants.



Prof. B. Digamber Rao  
Chairperson, B.O.S. in Botany  
Satevahana University  
Karimnagar- 505 004

# M.Sc (BOTANY) – SEMISTER –II

## PAPER – III

### (Ecology & Phytogeography)

#### UNIT-I: Ecosystem Organisation

1. Introduction & Structure of Ecosystem
2. Function & Primary production of Ecosystem (methods of measurement)
3. Energy Dynamics (trophic organization, energy flow, ecological efficiencies.
4. Global biogeochemical cycles of carbon, nitrogen, phosphorus and sulphur in terrestrial and aquatic ecosystems.

#### UNIT-II: Development & Evolution of Ecosystem

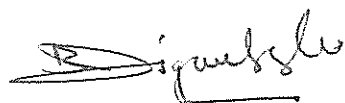
5. Mechanisms of ecological succession
6. Strategy of ecosystem development, migration, ecesis, aggregation and colonization.
7. Sub-climax and climax theories; stability of ecosystem
8. Hydrosere and Xerosere

#### UNIT-III: pollution Ecology

9. Kinds, sources, quality parameters; Effects of pollution on plants and ecosystems
10. Ozone depletion, acid rains, UV radiation and their effects
11. Global climate change, Green house effects
12. Eutrophication and biomagnifications; Bioremediation and activated sludge.

#### UNIT –IV: Phytogeography

13. Phytogeographical zones of India.
14. Phytogeography of Andhra Pradesh.
15. IUCN categories and hotspots.
16. Endemism.



Prof. B. Digamber Rao  
Chairperson, B.O.S. in Botany  
Satavahana University  
Karimnagar- 505 004

**UNIT-I. CELL BIOLOGY**

1. Ultrastructure of Prokaryotic and Eukaryotic cells
2. Cell cycle: Molecular events and model systems
3. Mitosis and Meiosis, Apoptosis
4. Biology of cancer cells, oncogenes and their expression

**UNIT-II. MOLECULAR BIOLOGY-I**

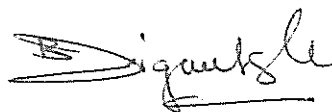
5. Introduction and scope of Molecular biology
6. Basic organization of nuclear genes: promoters and other regulatory sequences
7. Prokaryotic and Eukaryotic gene expression: Prokaryotic and Eukaryotic transcription  
RNA polymerase
8. Transcription factors, Mechanism of transcription, regulation

**UNIT-III. MOLECULAR BIOLOGY-II**

9. Post-transcriptional modification, modifications in RNA: 5' cap formation, transcription, termination, 3' end processing and polyadenylation, slicing, editing, nuclear export of mRNA stability
10. Translation, Prokaryotic & Eukaryotic translation, the translational machinery
11. Mechanism of initiation, elongation and termination, regulation translation, post translation modification of proteins
12. Restriction enzymes: discovery, types, nomenclature and role of genetic engineering

**UNIT-IV. APPLIED MOLECULAR BIOLOGY**

13. Cloning vectors: Plasmids, Cosmids, Phagemids and other viral vectors
14. Process of cloning, selection of recombinant DNA molecule, blotting techniques
15. Synthesis of cDNA, construction of genomic and cDNA, YAC, BAC Libraries
16. Molecular markers in genome analysis: RFLP, RAPD and AFLP analysis and its applications



**Prof. B. Digamber Rao**  
Chairperson, B.O.S. in Botany  
Satavahana University  
Karimnagar- 505 001



M.Sc (BOTANY) - SEMISTER -II

Practical Model Paper

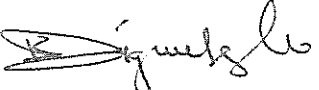
PAPER- I

(Plant Biochemistry & Cytogenetics, Evolution)

Time: 4 hours

Max. Marks: 100

- 
- |  |               |
|--|---------------|
| 1. Plant Biochemistry Major Experiment (A)         | 20 marks      |
| 2. Plant Minor Biochemistry Experiment (B)         | 15 marks      |
| 3. Cytological preparation (Mitosis & Meiosis) (C) | 20 marks      |
| 4. Cytogenetics problem (D)                        | 15 marks      |
| 5. Spotters  | 5 X4=20 marks |
| (E)  |               |
| (F)  |               |
| (G)  |               |
| (H)  |               |
| (I)  |               |
| 6. Assignment/ Viva-voce                           | 05 marks      |
| 7. Record.   | 05 marks      |

  
Prof. B. Digamber Rao  
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Satavahana University  
Karimnagar- 505 001

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**Practical Model Paper**

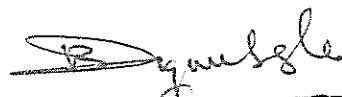
**PAPER- II**

**(Ecology, Phytogeography & Molecular Biology)**

**Time: 4 hours**

**Max. Marks: 100**

- |   |               |
|---|---------------|
| 1. Ecology Major Experiment (A)           | 20 marks      |
| 2. Ecology Minor Experiment (B)           | 15 marks      |
| 3. Molecular Biology Major Experiment (C) | 20 marks      |
| 4. Molecular Biology Minor Experiment (D) | 15 marks      |
| 5. Spotters                               | 5 X4=20 marks |
| (E)                                       |               |
| (F)                                       |               |
| (G)                                       |               |
| (H)                                       |               |
| (I)                                       |               |
| 6. Assignment/ Viva-voce                  | 05 marks      |
| 7. Record.                                | 05 marks      |

  
**Prof. B. Digamber Rao**  
Chairperson, B.O.S. in Botany  
Satavahana University  
Karimnagar- 505 001

**M.Sc (BOTANY) – SEMISTER –II**

**Practical Syllabus**

**PAPER- I**

**(Plant Biochemistry & Cytogenetics, Evolution)**

**I. Plant Biochemistry Major Experiment (A)**

1. Estimation of fructose by resorcinol method
2. Estimation of protein by Biuret method
3. Estimation of soluble nitrogen by Ninhydrin method.

**II. Plant Biochemistry Minor Experiment (B)**

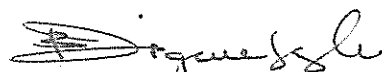
4. Determination of catalase activity
5. Determination of amylase activity
6. Determination of nitrate reductase activity

**III. Cytological preparation (Mitosis & Meiosis) (C)**

7. Mitosis stages
8. Meiosis stages

**IV. Cytogenetics problem (D)**

9. The European raspberry (*Rubus idaeus*) has 14 chromosomes. The dewberry (*Rubus caesius*) is a tetraploid with 28 chromosomes. Hybrids between these two species are sterile  $F_1$  individuals. Some unreduced gametes of the  $F_1$  are functional in backcrosses. Determine the chromosome number and level ploidy for each of the following: (a)  $F_1$ , (b)  $F_1$  backcrossed to *R. idaeus*, (c)  $F_1$  backcrossed to *R. caesius*, (d) chromosome doubling of  $F_1$  (*R. maximus*).
10. The diploid number of the garden pea is  $2n=14$ . (a) How many different trisomics could be formed? (b) How many different double trisomics could be formed?
11. The diploid number of an organism is 12. How many chromosomes would be expected in (a) a monosomic (b) a trisomic (c) a tetrasomic (d) a double trisomic (e) a nullisomic (f) a monoploid (g) a triploid and (h) an autotetraploid.



Prof. B. Digamber Rao  
Chairperson, B.O.S. in Botany  
Satavahana University  
505 001

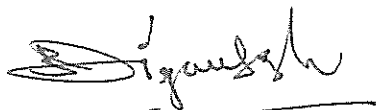
12. The MN blood group has three phenotypes M, MN and N with the genotypes  $L^M L^M$ ,  $L^M L^N$  and  $L^N L^N$  respectively. In sample of 100 individuals the following members in the M, MN and N blood groups were obtained.

Phenotype (Blood group)	M	MN	N	Total
Genotype	$L^M L^M$	$L^M L^N$	$L^N L^N$	
No. of individuals	60	30	10	100

Estimate the frequencies of  $L^M$  and  $L^N$  alleles of the gene producing MN blood group in man.

#### V. Spotters

13. Cellulose
14. Isozymes
15. Lock & Key model
16. Structure of Cholesterol
17. Tertiary structure of protein
18. Chromosomal bridges
19. Laggards and fragments
20. Cp-DNA
21. Mt-DNA
22. Karyo-typing
23. Ac/Ds system
24. Chromosome models
25. Conjugation
26. Molecular evolution
27. Polyploids



Prof. B. Digamber Rao  
 Chairperson, B.O.S. in Botany  
 Satavahana University  
 Karimnagar- 505 001

## M.Sc (BOTANY) – SEMISTER –II

### Practical Syllabus

### PAPER- II

#### (Ecology, Phytogeography & Molecular Biology)

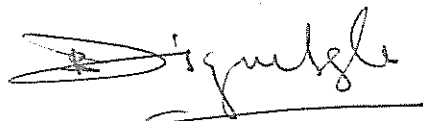
- I. **Ecology Major Experiment (A)**
  1. Determination of Biochemical oxygen demand (BOD) in sewage water.
  2. Determination of chemical oxygen demand (COD) in industrial effluents.
  3. Study of plant community by determining the frequency, density and abundance of different species. Based on the collected data construct frequency diagram and compare it with normal frequency diagram.
- II. **Ecology Minor Experiment (B)**
  4. Determination of accumulated soil enzymes (protease and urease) and soil fertility.
  5. Estimation of organic matter in agriculture soils.
  6. Estimation of phosphates and sulphates in degraded and fertile soils.
- III. **Molecular Biology Major Experiment (C)**
  7. Estimation of DNA
  8. Estimation of RNA
  9. Isolation of plasmid DNA
- IV. **Molecular Biology Minor Experiment (D)**
  10. Isolation of plant DNA
  11. Electrophoretic separation of DNA (Agarose gel electrophoresis- AGE)
  12. Restriction digestion of plasmid DNA



Prof. B. Digamber Rao  
Chairperson, B.O.S. in Botany  
Satavahana University  
Karimnagar- 505 004

V. **Spotters**

13. Plasmid (Pbr 322)
14. Cosmid
15. Phagemid
16. C-DNA libraries
17. YAC/BAC library
18. RFLP analysis
19. RAPD analysis
20. Southern blotting
21. Northern blotting
22. Western blotting
23. Petrol or coal (Non-renewable energy)
24. Alcohol (bioenergy)
25. Hydrophytes
26. Xerophytes
27. Epiphytes



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Chairperson, B.O.S. in Botany  
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Karimnagar- 505 001