

# SYLLABUS UNDER AUTONOMY

## BOTANY

**SEMESTER 1**

**COURSE: S.BOT.1.01**

**PLANT DIVERSITY I**

**[45 Lectures]**

### LEARNING OBJECTIVES

The students will be able to:

1. Understand the morphology, structure and importance of the organisms
2. State the meaning of scientific terms
3. Differentiate between various groups of Bacteria, Algae, Fungi, Lichens and Bryophyte.

### **UNIT I – BACTERIA, VIRUSES AND ALGAE (15)**

Bacteria: (4)

- Size, shape, arrangement, cell structure
- Growth and reproduction
- Significance of bacteria

Viruses: (4)

- Size, shape, cell structure
- Significance

Algae: (7)

- General characters of Algae
- Pigments in Algae
- Classification of algae (up to order/s) into 4 major classes - Cyanophyta, Chlorophyta, Phaeophyta and Rhodophyta  
General characters of these classes
- Economic importance of Algae

### **UNITS II – FUNGI, LICHENS AND BRYOPHYTES (15)**

Fungi: (6)

- General characters of Fungi
- Classification (up to order)  
Phycomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes  
- General characters of these classes
- Mode of nutrition in Fungi
- Economic importance of Fungi

Lichens: (4)

- Classification
- Structure
- Method of reproduction
- Economic importance
- Ecological significance

Bryophytes: (5)

- General characters
- Classification–  
Hepataceae, Anthocerotaceae and Musci  
General characters of these classes
- Range of thallus(gametophytic) structure

**UNIT III – MORPHOLOGY (15)**

- Root
- Stem
- Leaf
- Inflorescence
- Flower

**CIA: Field trip Report / Quiz**

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**SEMESTER 1**

**COURSE: S.BOT.1.02**

**FORMS AND FUNCTION I**

**(45 LECTURES)**

**LEARNING OBJECTIVES**

The students will be able to:

1. State the meaning of various terms
2. Differentiate between the physiological processes and understand their importance.
3. Understand the external and internal structure and functions of cellular Organelles
4. Correlate the functions of tissues with reference to their structure.
5. Understand the phenomenon of inheritance.
6. To understand the interactions taking place in the ecosystem and flow of Energy.

**UNIT I – PLANT PHYSIOLOGY AND BIOCHEMISTRY (15)**

Plant physiology:

Plant –Water interaction (13)

- Structure, Properties and functions of water
- Diffusion and osmosis
- Water potential and its components and the relationship of the components with each other
- Transpiration
- Ascent of sap

Plant Biochemistry: (2)

- pH and Buffers

**UNIT II – CELL BIOLOGY AND ANATOMY (15)**

Cell Biology: (8)

- Structure and functions of the following:
  - Cell wall, Plasma membrane (unit membrane and fluid mosaic model)
  - Mitochondrion and Chloroplast
  - Nucleus
  - Chromosomes
  - Cell division – Cell Cycle, Mitosis

Anatomy: (7)

- Tissue systems in plants:
- Epidermal tissue system: Epidermal out growths, stomata (dicot and monocot)
- Mechanical tissue system: Collenchyma and Lignified tissues
- Vascular tissue system: Xylem and Phloem
- Types of vascular bundles

**UNIT III – GENETICS AND ECOLOGY (15)**

Genetics: (8)

- Mendel's Laws
- Allelic and non-allelic interaction
- Epistatic interactions
- Sex determination in plants

Ecology: (7)

- Concept of Ecosystem:
- Components and their interactions,
- Food Chains and food web
- Ecological pyramids

**CIA: Quiz / MCQ**

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**SEMESTER II**

**COURSE: S.BOT.2.01**

**PLANT DIVERSITY I**

**(45 LECTURES)**

**LEARNING OBJECTIVES**

1. Bioprospection : To understand the morphology, structure and importance of various plants groups
2. To comprehend the descriptive terminology with plants

**UNIT I – ALGAE AND FUNGI (15)**

Algae: (8)

- Type studies: Distribution, life cycle and systematic position of *Nostoc & Zygnema*

Fungi: (7)

- Type studies: Distribution, lifecycle and systematic position of *Rhizopus, Agaricus & Yeast*

**UNIT II - BRYOPHYTES AND PTERIDOPHYTES (15)**

Bryophyta: (8)

- Type studies: Distribution, life cycle and systematic position of *Riccia, Anthoceos*

Pteridophytes: (7)

- Classification and general characteristics
- Type studies: Distribution, life cycle and systematic position of *Nephrolepis*

**UNIT III – GYMNOSPERMS AND ANGIOSPERM (15)**

Gymnosperms: (5)

- General characters of Gymnosperms
- Life cycle and systematic position of *Cycas*

Angiosperms: (10)

- Introduction to Systems of Classification – Artificial, Natural and Phylogenetic (01)
- Bentham and Hooker’s system of classification (01)
- Study of following families  
*Malvaceae, Leguminosae, Asteraceae, Euphorbiaceae, Amaryllidaceae and Liliaceae.* (08)

**CIA: Field trip Report / Quiz**

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**SEMESTER II****COURSE: S.BOT.2.02****FORMS AND FUNCTIONS****(45 LECTURES)****LEARNING OBJECTIVES**

1. To understand transport mechanism in plants
2. To understand the mechanism of enzyme actions
3. To know the structure of DNA and plasmid vectors.
4. To be able to correlate the structural differences in plants with respect to their habitat.
5. To know the primary structure of root stem and leaf
6. To know the working and applications of the instruments in Biology.
7. To learn applications of statistical tools in plant science.

**UNIT I – PLANT BIOCHEMISTRY AND MOLECULAR BIOLOGY (15)**

Plant Physiology: (4)

- Transport of solutes- passive transport

Enzymes: (6)

- Properties, Nomenclature, Classification, Mode of action, Km, Specificity and inhibition

Molecular Biology: (5)

- DNA- structure and replication
- Cloning vectors : Plasmids – pBR322 and pUC 19

**UNIT II – ECOLOGY AND ANATOMY (15)**

Ecology: (8)

- Ecological adaptations of plants belonging to following ecological groups: Hydrophytes, Xerophytes and Halophytes

Anatomy: (7)

- Study of Primary structures: Dicot and monocot root, stem and leaf

**UNIT III – INSTRUMENTATION AND BIOSTATISTICS (15)**

Instrumentation: (8)

- Principle working and applications of: Light Microscope, pH meter, Colorimeter, Paper Chromatography

Biostatistics: (7)

- Mean, Median Mode
- Frequency distribution
- Standard deviation

**CIA: Quiz / MCQ**

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## **PRACTICALS**

### **SEMESTER I**

**COURSE : S.BOT.1.PR**

#### **I**

1. Gram staining of Bacteria
2. Study of Economically important Algae and Fungi.
3. Study of Crustose, Foliose and Fruticose Lichens, their internal structure, reproductive structures and economic importance of Lichens
4. Study of morphological characters of root, stem, leaf, inflorescence and flower

#### **II**

1. Preparation of buffers
2. Determination of solute potential by plasmolytic method
3. Determination of Stomatal Frequency.
4. Examining various stages of mitosis in root tip cells
5. Study of epidermal outgrowths and stomata
6. Primary structure of typical dicot and monocot root, stem and leaf

### **SEMESTER I**

**COURSE : S.BOT.2.PR**

#### **I**

1. Study of stages in the life cycle of *Nostoc* & *Zygnema*
2. Study of stages in the life cycle of *Rhizopus*, *Agaricus* & Yeast
3. Study of life cycle of *Riccia* and *Anthoceros*
4. Study of life cycle of *Nephrolepis*
5. Study of various types of steles met within the Pteridophytes and types of vascular bundles in higher plants
6. Stages of life cycle of *Cycas*
7. Study of one plant from each family prescribed for theory, morphological peculiarities and economic importance of the members of these families

#### **II**

1. Frequency distribution, graphical representation of data- frequency polygon, histogram, pie-chart
2. Calculation of mean, median, mode and standard deviation
3. Study of external and internal structures of *Hydrilla*, *Eichhornia* / *Pistia*, *Nerium*, *Opuntia* and *Avicennia*
4. Study of activity of enzyme Amylase
5. Determination of Chloride uptake
6. Principle, working and applications of light microscope, pH-meter and colorimeter
7. Paper chromatography- principles and technique - separation of leaf pigments

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## Reference Books:

### Course 1.01 - Plant Diversity I

1. Pelzer and Reid, Microbiology
2. Smith, G.M., Cryptogamic Botany Vol. 1
3. Vashishtha B.R – Botany for Degree Students Part I - Algae and Part II – Fungi.
4. Alexopoulos C.J. & Mims, Introductory Mycology
5. Parihar, N.S. Bryophyta
6. Sharma, O.P. Plant Taxonomy
7. Dutta, A.C., Class Book of Botany
8. Lawrence G.M. , Vascular Taxonomy

### Course 1.02 – Forms and Functions I

1. Verma S.K., Plant Physiology and Biochemistry
2. Devlin R., Plant Physiology
3. Gupta, P.K., Cell Biology
4. Fahn A., Plant Anatomy
5. Gardner, Principles of Genetics
6. Odum E.P., Fundamentals of Ecology

### Course 2.01 – Plant Diversity II

1. Kumar R. D. & N.H. Singh, Text Book of Algae
2. Gangulee and Kar, College Botany Vol II
3. Vashishta B.R., Botany for degree students – Part IV – Pteridophyta
4. Subramanian N., Plant Taxonomy
5. Parihar, N.S., Bryophyta

### Course 2.02 – Forms and Functions II

1. Noggle and Fritz, Introductory plant physiology
2. Devlin, R., Plant Physiology
3. Sharma, P.D., Ecology and Environment
4. Subramanian and Sambhamurthy, Principles of Ecology
5. Eames A.J., McDaniels – An introduction to plant Anatomy.
6. Esau K. – Plant Anatomy
7. Mishra and Mishra – Introductory Practical Biostatistics
8. Mahajan & Mahajan – Biostatistics
9. Upadhyaya and Upadhyaya – Biophysical Chemistry
10. Wilson and Walker – Principles of Biochemistry
11. Giese, Cell Physiology
12. Taiz L. and Zeiger – Plant Physiology

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