

BOTANY

B.Sc. I (Semester I)

THEORY

DIVERSITY Of MICROBES , PHYCOLOGY, MYCOLOGY AND PHYTOPATHOLOGY

Unit I: Introduction to Microbial World

1.1 Important groups of Microorganisms- Prion, Viroids ,Viruses, Mycoplasma, Eubacteria, Archaeobacteria and Cyanobacteria

1.2 Viruses – General characteristics and Morphological types of viruses , Structure of TMV and SARS-CoV-2 (Covid-19) , Replication of viruses-lytic & lysogenic , Economic importance of viruses with reference to vaccine production.

1.3 General characteristics and Economic importance of Archaeobacteria, General characteristics, cell structure, reproduction and economic importance of bacteria with reference to industry (Fermentation and Medicines)

Unit II: Cyanobacteria and Algae

2.1 General characteristics, structure and reproduction of cyanobacteria.

2.2 Introduction to cryptogams.

2.3 General characteristics of algae with reference to habitat, thallus organization, pigmentation, reserve food and reproduction.

2.4 Classification according to F.E. Fritsch up to the classes

2.5 Economic importance of algae as food and in industry.

2.5.1 Ecological importance of Cyanobacteria with reference with soil fertility.

Algae

Unit III: Gen. characteristics of following Classes and life cycle of respective genera.

3.1 Chlorophyceae - *Oedogonium*

3.2 Charophyceae - *Chara* (only Morphology and Sex organs)

3.3 Xanthophyceae - *Vaucharia*

3.4 Phaeophyceae - *Ectocarpus*

3.5 Rhodophyceae - *Batrachospermum*

Unit IV: Introduction to Fungi

4.1 General Characteristics of Fungi

4.2 Classification of fungi (Ainsworth-1973)

4.3 General characteristics of following Subdivisions and life cycle of respective

genera

4.3.1 Myxomycotina - *Stemonitis*

4.3.2 Mastigomycotina- *Albugo*

4.3.3 Zygomycotina -*Rhizopus*

4.3.4 Ascomycotina – *Aspergillus*

Unit V: Fungi and Applied Mycology

5.1 General characteristics of following Subdivisions and life cycle of respective genera

5.1.1 Basidiomycotina - *Puccinia graminis tritici*

5.1.2 Deuteromycotina - *Alternaria*

5.2 Lichen –Types and Economic importance

5.3 Applied mycology - Application of fungi in industry , medicines and agriculture

Unit VI: Phytopathology

6.1 General symptoms – Rust, smut , powdery mildew, downy mildew, blight, stem rot and root rot, anthracnose, leaf spot, etc.

6.2 Symptoms, Pathogen biology and disease management of Bacterial diseases-

6.2.1- *Citrus* canker

6.2.2- Angular leaf spot of cotton

6.3 Symptoms, pathogen biology and disease management of viral diseases-

6.3.1- Yellow vein mosaic of Bhindi

6.3.2-Curl leaf of papaya

6.4 Symptoms, pathogen biology and disease management of fungal diseases

6.4.1. Tikka disease of groundnut

6.4.2 Powdery mildew of *Tectona grandis* (Teak)

• Skill Enhancement Module (SEM)

Study of plant pathology of local crop plants

1.1 Symptomology

1.2 Fungal diseases of cotton and soybean

1.3 Chemical fungicides against diseases of cotton and soybean.

1.4 Biological control

Activities to be performed under SEM:

1. Collection of diseased plant parts of soybean and cotton from local fields.

2. Diagnosis of disease on the basis of symptoms and micro-examination or culturing of pathogen.

3. Suggestion of fungicide or biological control.

4. Report submission including photographs and microphotographs of host and pathogen.

B.Sc. I (Semester I)

PRACTICAL

List of Practical/Laboratory Experiments/Activities etc.

1. Study of types of bacteria from temporary / permanent slides / photographs.
2. Study of TMV and SARS CoV-2 Viruses from Models/ Photographs.
3. Algae - Preparation of temporary mount, identification with reasons of following algal materials: Nostoc, Oedogonium, Chara, Vaucheria, Ectocarpus, Batrachospermum
4. Fungi and Plant Pathology:
 - i. Study of following Genera - Stemonitis,, Albugo, Rhizopus, Aspergillus. Puccinia, Cercospora,
 - ii. Study of Crustose, Fruticose and Foliose lichen.
 - iii. Study of symptoms of fungal, viral, bacterial diseases.

Photographic herbarium of diseased plant parts from local region

Additional Activities:

1. Botanical Excursion (short/long)
2. Visit to any biodiversity rich area to study the plant diversity in natural habitat.

The botanical excursion is compulsory for all students and the report of excursion should be submitted at the time of practical examination

Submission:

1. Photographic herbarium of diseased plant plants.
2. Tour reports or field visit report

B.Sc. I (Semester II)

THEORY

Bryophytes, Pteridophytes, Gymnosperms and Morphology of Angiosperms

Unit I: Bryophytes

1.1 General characteristics, affinities with algae and pteridophytes and Classification of Bryophytes by G.M.Smith

1.2 Morphology, Anatomy and Reproduction of

i) Marchantiales : Marchantia

ii) Anthocerotales : Anthoceros

iii) Briales : Funaria

1.3 Ecological and Economical Importance of Bryophytes

Unit II: Pteridophytes

2. 1 General characteristics of Pteridophytes

2. 2 Types of Stele in Pteridophytes

2. 3 Classification of Pteridophytes by G.M.Smith

2. 4 Morphology, Anatomy and Reproduction of

i) Sphenopsida : Equisetum

ii) Lycopsida : Selaginella

iii) Filicopsida : Marsilea

Unit III: Gymnosperms and Palaeobotany

3.1 General characteristics and affinities of Gymnosperms with Angiosperm

3.2 Classification of Gymnosperms by D.D. Pant

3.3 Morphology, Anatomy and Reproduction of

i) Coniferopsida : Pinus

ii) Gnetopsida : Gnetum

3.4 Economic importance of Gymnosperms.

3.5 Process of plant fossilization and types of fossils.

Unit IV: Morphology of Angiosperms

4.1 Life cycle pattern : Annual, Biennial and Perennial

4.2 Angiosperm plant body : Morphology and Modification of Root and Stem

4.3 Leaf : Types, Modifications , Phyllotaxy, Venation and Stipules

4.4 Inflorescence : Racemose , Cymose and Special Types

4.5 Flowers: Structure of Flower- Calyx, Corolla, Androecium, Gynoecium and Placentation

Unit V: Utilization of Plant Wealth

5.1 Fruits : Morphology and Type

5.2 Morphology, variety and economic importance of

5.2.1 Food plant: Cereal- Wheat (*Triticum aestivum*) ;

Pulses- Pigeon pea (*Cajanus cajan*),

5.2.2 Spices : Cardamom (*Ellataria cardamomum*),

5.2.3 Oil yielding plants : Sunflower (*Helianthus annus*)

5.2.4 Fiber Plants: Cotton (*Gossypium sp.*),

5.2.5 Essential oils- Plant Description and Uses – Rose (*Rosa sp.*), Nilgiri oil (*Eucalyptus sp.*)

Unit VI : Traditional Knowledge of Medicinal Plants

Morphology, Phytochemistry and medicinal uses of

6.1. *Aloe vera*

6.2. *Adhatoda vasica*

6.3. *Asparagus racemosus*

6.4. *Azadirachta indica*

6.5. *Catharanthus roseus*

6.6. *Chlorophytum borivillianum*

6.7. *Embllica officinalis*

6.8. *Ocimum sanctum*

6.9. *Rauwolfia serpentina*

6.10. *Vitex negundo*

6.11. *Withania somnifera*

6.12 *Tinospora cordifolia*

• Skill Enhancement Modul

Herbal Technology

1. Definition and Scope of Herbal Technology

2. Overview of “Ayush”

3. Cultivation, harvesting, processing and storage of herbal plant parts and product

4. Morphology and Microscopic Examination. And Preliminary Phytochemistry of

i) *Catharanthus roseus*

- ii) *Ocimum sanctum*
- iii) *Azadirachta indica*
- iv) *Achyranthes aspera*
- v) *Aloe vera*

Activities to be performed under SEM:

1. Photographic collection and preparation of e-herbarium of medicinal plants
2. Cultivation of herbal medicinal plants in college garden, home kitchen garden.
3. Preliminary phytochemical analysis of Mentioned medicinal plants
4. Microscopic preparation of herbal medicinal plants and its microphotography.
5. Project on local herbal plants to be submitted at the end of session.

B.Sc. I (Semester II)

PRACTICAL

1. Bryophytes: Study of morphology and anatomy of vegetative and reproductive parts of following genera – *Marchantia, Anthoceros, Funaria*
2. Pteridophyta: Study of morphology and anatomy of vegetative and reproductive parts of following genera – *Selaginella, Equisetum, Marsilea*
3. Gymnosperms: Study of morphology and anatomy of vegetative and reproductive parts of following genera – *Pinus, Gnetum*
4. Study of types of fossil.
5. Morphology: Detail morphological study of following types of plant parts: Root, Stem, Leaves, Stipule, Inflorescence, Flower, Placentation, Fruits
6. Utilization of plants: Morphology varieties and economic importance of following plants
 - i) Food plants-Wheat
 - ii) Pulses – Pigeonpea
 - iii) Spices- Cardamom
 - iv) Oil yielding plants- Sunflower
 - v) Fiber yielding- Cotton
7. vi) *Mentha piperata* (only uses)
8. vii) *Eucalyptus* (only uses)

9. Medicinal plants- *Aloe vera*, *Adhatoda vasica*, *Asparagus racemosus*, *Azadirachta indica*, *Catharanthus roseus*, *Chlorophytum borivillianum*, *Embllica officinalis*, *Ocimum sanctum*, *Rauwolfia serpentina*, *Vitex negundo*, *Withania somnifera*, *Tinospora cordifolia*.

Additional Activities:

1. Botanical Excursion (short/long)
2. Visit to any biodiversity rich area to study the plant diversity in natural habitat.
3. The botanical excursion is compulsory for all students and the report of excursion should be submitted at the time of practical examination.
4. Photographic collection of bryophytic, pteridophytic and gymnospermic plants specimens

Submission:

1. Photographic herbarium of Bryophytes, Pteridophytes, Gymnosperms etc.
2. Botanical excursion report