

Dr. YSR Government Degree College, Vedurukuppam

BOTANY : II Semester

Course 3: Non-Vascular Plants (Algae, Fungi, Lichens and Bryophytes)

Credits -3

III. Syllabus of Theory:

Unit-1: Introduction to Algae

8Hrs.

1. General Characteristics of algae: Occurrence and distribution, cell structure, pigments, flagella and reserve food material.
2. Classification of algae: F.E.Fritsch (1935) and Lee (2008)
3. Thallus organization and life cycles in algae.
4. Ecological and economic importance of algae.

Unit-2: Biology of selected Algae

10Hrs.

1. Occurrence, structure, reproduction and life cycle of:
 - (a) Chlorophyceae: Spirogyra
 - (b) Phaeophyceae: Ectocarpus
 - (c) Xanthophyceae: Vaucheria
 - (d) Rhodophyceae: Polysiphonia
2. A brief account of Bacillariophyceae
3. Culture and cultivation of Chlorella

Unit-3: Introduction to Fungi

8Hrs.

1. General characteristics of fungi and Ainsworth (1973) classification.
2. Thallus organization and nutrition in fungi
3. Reproduction in fungi (asexual and sexual); Heterothallism and parasexuality.
4. Ecological and economic importance of fungi.

Unit-4: Biology of selected Fungi

10Hrs.

1. Occurrence, structure, reproduction and life cycle of:
 - (a) Mastigomycotina: Phytophthora
 - (b) Zygomycotina: Rhizopus
 - (c) Ascomycotina: Penicillium
 - (d) Basidiomycotina: Puccinia
2. Occurrence, structure and reproduction of lichens; ecological and economic importance of lichens.

Unit-5: Biology of Bryophytes

9Hrs.

1. General characteristics of Bryophytes; Rothmaler (1951) classification.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life cycle of
 - (a) Hepaticopsida: Marchantia
 - (b) Anthocerotopsida: Anthoceros
 - (c) Bryopsida: Funaria
3. General account on evolution of sporophytes in Bryophyta.

II. Laboratory/field exercises:

Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures

of the following using temporary or permanent slides/ specimens/ mounts:

1. **Algae:** *Spirogyra*, *Ectocarpus*, *Vaucheria* and *Polysiphonia*; a centric and a pennate diatom.
2. Demonstration of culture and cultivation of *Chlorella*
3. Identification of some algal products available in local market.
4. **Fungi:** *Phytophthora*, *Rhizopus*, *Penicillium* and *Puccinia*
5. Identification of some fungal products available in the local market.
6. **Lichens:** Crustose, foliose and fruticose
7. **Bryophyta:** *Marchantia*, *Anthoceros* and *Funaria*.

Course 4: Origin of Life and Diversity of Microbes

Credits -3

III. Syllabus of Theory:

Unit-1: Origin of life and Viruses

10 Hrs.

1. Origin of life, concept of primary Abiogenesis; Miller and Urey experiment.; discovery of microorganisms, Pasteur experiments, germ theory of diseases.
2. Five kingdom classification of R.H. Whittaker
3. Shape and symmetry of viruses; structure of TMV and Gemini virus.
4. Multiplication of TMV; A brief account of prions, viroids and virusoids; 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

7 Hrs.

1. General characteristics, outline classification and economic importance of following special groups of bacteria:
 - a) Archaeobacteria
 - b) Chlamydiae
 - c) Actinomycetes
 - d) Mycoplasma
 - e) Phytoplasma
 - f) Cyanobacteria
2. Culture and cultivation of *Spirulina*

Unit-3: Eubacteria

8 Hrs.

1. Occurrence, distribution and cell structure of eubacteria.
2. Classification of Eubacteria based on nutrition.
3. Reproduction- Asexual (Binary fission and endospores) and bacterial recombination (Conjugation, Transformation, Transduction).
4. Economic importance of Eu-bacteria with reference to their role in Agriculture and industry (fermentation and medicine).

Unit-4: Soil microbes – interactions

10Hrs.

1. Distribution of soil microorganisms in soil.
2. Factors influencing the soil microflora - Role of microorganisms in soil fertility.
3. Interactions among microorganisms, mutualism, comensalism, competition, amensalism, parasitism, predation.
4. Microorganisms of rhizosphere, phyllosphere and spermophere; microbial interactions and their effect on plant growth.

Unit-5: Microbes in agriculture

10 Hrs.

1. Mass production, mode of applications, advantages and limitations of bacterial inoculants (*Rhizobium*, *Azotobacter*, *Azospirillum*, *Cyanobacteria*).
2. Role of Frankia and VAM in soil fertility.
3. Microbial biopesticides: mode of action, factors influencing, target pests; microbial herbicides.

II. Laboratory/Field exercises:

1. Microbiology good laboratory practices and biosafety.
2. Study the principle and applications of important instruments (autoclave, hot air oven, incubator, Inoculation loop, Inoculation needle, membrane filter, laminar air flow system, colony counter, biological safety cabinets, BOD incubator, pH meter) used in the microbiology laboratory.
3. Study of Viruses (Gemini and TMV) using electron micrographs/ models.
4. Gram staining technique of Bacteria.
5. Microscopic study of Cyanobacteria using temporary/permanent slides.
6. Microscopic study of Eubacteria using temporary/permanent slides.
7. Study of Archaeobacteria and Actinomycetes using permanent slides/ electron micrographs/diagrams.