

BOT-159
GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM
I B.Sc., SEMESTER- I: Botany Core Course – 1 Theory Syllabus
(w.e.f 2020-2021 admitted batch)

Paper-I: Fundamentals of Microbes and Non-vascular Plants
(Viruses, Bacteria, Fungi, Lichens, Algae and Bryophytes)

Total hours of Teaching 60 hrs@ 4 hours per a week

Course objectives:

- ❖ Explain origin of life on the earth.
- ❖ Illustrate diversity among the viruses and prokaryotic organisms and can categorize them.
- ❖ Classify fungi, lichens, algae and bryophytes based on their structure, reproduction and life cycles.
- ❖ Analyze and ascertain the plant disease symptoms due to viruses, bacteria and fungi.
- ❖ Recall and explain the evolutionary trends among amphibians of plant kingdom for their shift to land habitat.
- ❖ Evaluate the ecological and economic value of microbes, thallophytes and bryophytes.

Unit – 1: Origin of life and Viruses

12Hrs.

1. Origin of life, concept of primary Abiogenesis; Miller and Urey experiment. Five kingdom classification of R.H. Whittaker
2. Discovery of microorganisms, Pasteur experiments, germ theory of diseases.
3. Shape and symmetry of viruses; structure of Bacteriophage TMV and Gemini virus; replication of Bacteriophage.; A brief account of Prions and Viroids.
4. A general account on symptoms of plant diseases caused by Viruses. Transmission of plant viruses and their control.
5. Types of Vaccines.

Unit – 2: Special groups of Bacteria and Eubacteria

12Hrs.

1. Brief account of Archaeobacteria, Actinomycetes and Cyanobacteria.
2. Cell structure and Gram staining of Bacteria.
3. Reproduction- Asexual (Binary fission and endospores) and bacterial recombination (Conjugation, Transformation, Transduction).
4. Economic importance of Bacteria with reference to their role in Agriculture and industry (fermentation and medicine). A general account on plant diseases caused by Bacteria; Citrus canker.

Unit – 3: Fungi & Lichens

12 Hrs.

1. General characteristics of fungi and Ainsworth classification (upto classes).
2. Structure, reproduction and life history of (a) Rhizopus (Zygomycota) and (b) Puccinia (Basidiomycota).
3. Mushroom Cultivation (Paddy straw)
4. Economic uses of fungi in food industry, pharmacy and agriculture.
5. Lichens-Types, structure and reproduction; ecological and economic importance.

Unit – 4: Algae

12 Hrs.

1. General characteristics of Algae (pigments, flagella and reserve food material); Fritsch classification (upto classes).
2. Thallus organization in Algae.
3. Occurrence, structure, reproduction and life cycle of (a) Nostoc (b) Spirogyra (Chlorophyceae) and (c) Polysiphonia (Rhodophyceae).
4. Economic importance of Algae.

Unit – 5: Bryophytes

12 Hrs.

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

Deviation of the Syllabus

Sl. No	Unit No.	Addition	Deletion
1	1	a. Structure of Bacteriophage, b. Replication of Bacteriophage. c. Types of Vaccines	a. Multiplication of TMV
2	2	Gram staining of Bacteria	a.Nutrition in Bacteria. b.General account on symptoms of plant diseases caused by bacteria.
3	3	a.Mushroom cultivation (Paddy Straw Mushroom) b.Lichen Types	General account on symptoms of plant diseases caused by fungi, Blast of rice
4	4	Nostoc	Life cycles in Algae.

Learning Outcomes

On completion of this course, the students will be able to: Develop understanding on the concept of microbial nutrition

- Study of Viral Characteristics and their disease symptoms.
- Develop critical understanding of plant diseases and their remediation.
- Examine the general characteristics of bacteria and their cell reproduction
- Algae and their economic importance.
- Conduct experiments using skills appropriate to subdivision.
- Identify true fungi and demonstrate the principles and application of plant pathology in the control of plant disease.
- Develop an understanding of microbes, fungi and lichens and appreciate their adaptive strategies.
- Mushroom cultivation is one of the entrepreneurship and create self employability.
- Identify the common plant diseases caused by microorganisms and their control.

Text books:

- ➔ Botany – I (Vrukshasastram-I) : Telugu Akademi, Hyderabad.
- ➔ Pandey, B.P. (2013) College Botany, Volume-I, S. Chand Publishing, New Delhi—
- ➔ Hait,G., K.Bhattacharya—&A.K.Ghosh (2011) A Text Book of Botany, Volume-I, New Central Book Agency Pvt. Ltd., Kolkata.
- ➔ Bhattacharjee, R.N., (2017) Introduction to Microbiology and Microbial— Diversity, Kalyani Publishers, New Delhi.

Books for Reference:

- ➔ Dubey, R.C. &D.K.Maheswari (2013) A Text Book of Microbiology,S.Chand& Company Ltd., New Delhi.
- ➔ Pelczar Jr., M.J., E.C.N. Chan— &N.R.Krieg (2001)Microbiology, Tata McGrawHill Co, New Delhi.
- ➔ Presscott, L. Harley, J. and Klein, D. (2005)Microbiology, 6th edition, Tata McGraw –Hill Co. New Delhi.
- ➔ Alexopoulos, C.J., C.W.Mims—&M.Blackwell (2007) Introductory Mycology,Wiley& Sons, Inc., New York.
- ➔ Mehrotra, R.S.— & K. R. Aneja (1990) An Introduction to Mycology. New Age International Publishers, New Delhi.
- ➔ Kevin Kavanagh (2005) Fungi ; Biology and Applications John Wiley— & Sons, Ltd.,West Sussex, England.
- ➔ John Webster— & R. W. S. Weber (2007) Introduction to Fungi,Cambridge University Press, New York.