

SEMESTER – I

Paper – BOT-101

Algae & Fungi

Credit -4

MM-80+20

T: 3hrs

Objectives: To educate and train the students for professional and research careers in the field of Algology & Mycology.

Outcomes:

CO1 The students will be inspired to become aware and comprehend the broader aspects of algae and fungi.

CO2 The learning outcome will be aimed toward advanced academic education to broaden the knowledge of the biodiversity, ecological significance and economic importance of algae.

CO3 The students will be inspired to become well versed with the fungal world in terms of recent research.

CO4 Economic importance of Fungi with regards to its deleterious and beneficial aspects. Modern economic importance of Lichens. Working knowledge of biological laboratories and research centers in India.

CO-PO MAPPING MATRIX FOR PAPER BOT-101 (Algae & Fungi):

No.	PO1	PO2	PO3	PO 4	PO5	PO6
CO 1	2	1	2	2	2	3
CO 2	2	2	2	2	1	2
CO 3	2	1	2	2	1	1
CO 4	2	2	1	2	1	1
Average	2	1.5	1.75	2	1.25	1.75

CO-PSO MAPPING MATRIX FOR PAPER BOT-101 (Algae & Fungi):

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	1	2	1	2
CO2	2	2	1	2	1
CO3	1	1	2	1	2
CO4	2	2	2	2	2
Average	1.75	1.5	1.75	1.5	1.75

Note: Nine questions will be set in all. Question No.1 will be compulsory covering the entire syllabus. The remaining eight questions will be set with two questions from each Unit. The candidate will be required to attempt one question from each unit. All questions will be of equal marks.

Unit-I

1. Criteria for algal classification (pigments, reserve food, flagella, etc.) and their taxonomic importance.
2. Comparative account of important systems of classification and recent trends.
3. Thallus organization, reproduction and life cycles in algae.
4. Economic importance of algae as food, feed, uses in industries, etc and algal biofertilizers.

Unit-II

5. Biodiversity of algae in different habitats (terrestrial, freshwater, marine, thermal, psychrophilic, subaerial, symbiotic, parasitic, epiphytic, halophytic. etc),
6. Dynamics and consequences of algal blooms and red tides. Algae as major components of phytoplankton. Control of Algal nuisance
7. Morphological features, reproduction and life cycle patterns of the followings:
Cyanophyta: *Nostoc*, Nitrogen fixation, heterocyst, range of thallus
Chlorophyta: Range of thallus, *Vaucheria*, and *Chara*
Xanthophyta: *Botrydium*
Bacillariophyta: Thallus structure, and reproduction
Phaeophyta: *Ectocarpus*, and *Sargassum*
Rhodophyta: *Batrachospermum*, *Polysiphonia*

Unit- III

8. General characters of fungi: Thallus organization, nutrition, different kinds of spores and their dispersal and reproduction.
9. Classification of fungi by Ainsworth (1973), Alexopoulos *et al* (1996), Hawksworth *et al*. (1995).
10. General account and life cycle of the followings:
Dictyosteliomycota and Myxomycota: *Dictostellium* and *Physarum*
Chytridiomycota and Oomycota: *Synchytrium*, *Phytophthora* and downy mildews
Zygomycota: *Rhizopus*
Ascomycota: Ascocarp types, *Taphrina*, *Venturia*, powdery mildew
Basidiomycota: *Agrarius*, *Puccinia*, *Melampsora*, *Ustilago*, *Neovossia*
Deuteromycota: Sporulating structures, *Fusarium*, *Curvularia*, *Alternaria*, *Helminthosporium*
11. Concept of Homothallism, Heterothallism, and parasexual cycle.

Unit – IV

12. Economic importance of fungi in nutrient cycling, decomposition, humus formation, decay and deterioration of wood & timber.
13. Causal organisms, symptoms, and management of: Late and early blight of potato, downy mildew of grapes, powdery mildew of peas, green ear disease of Bajra, apple scab, wilt of pigeon pea, karnal bunt of wheat, loose smut of wheat, black, yellow and brown rust of wheat, tikka disease of groundnut
14. Lichens: structure, reproduction, and economic importance

Suggested Readings:

1. Ahluwalia, A.S. (Ed.). *Phycology: Principles, Processes and Applications*. Daya Publishing House, New Delhi. 2003.
2. Carr, N.G. & Whitton, B.A. (1982): *The biology of Cyanobacteria* Blackwell Scientific Publ., Oxford, U.K.
3. Fatma, T. (2005): *Cyanobacterial and Algal Metabolism and Environmental Biotechnology*, Narosa Publishers.
4. Alexopoulos.C.J. Mims, C.W. and Blackwell, M. 1995: *Introductory Mycology*, John Willey and Sons. Inc

5. Mehrotra, R.S. and Aneja, K.R. 1990 An Introduction of Mycology, New Age International Press, New Delhi.
6. Sumbali, G. 2005. The Fungi, Narosa Publ. House, New Delhi
7. Fay, P & C van Baalen (1987): The cyanobacteria, Elsevier Science Publishers, B.V. Amsterdam, Netherlands.
8. Gupta, R.K. & Pandey, V.D. 2007: Advances in Applied Phycology, Daya Publishing House, Daryaganj, New Delhi.
9. Hoek, C. Van Den, Mann, D.G. & Jahns, H.M. 1995: Algae: An Introduction to Phycology, Cambridge University Press, U.K.
10. Morris, I. 1967: An Introduction to the Algae. Hutchinson & Co (Publ) Ltd. London

Objectives The Course has been conceived to equip the students with the knowledge of various microbial pathogens and their effect on humans affairs. In addition, the course also deals with the growth, collection and maintenance of microbes, their interactions and control of different therapeutic methods.

Outcomes:

CO1 To acquaint the students with the knowledge of various microbes (viruses, bacteriophages, and Cyanobacteria their impacts on Biological Importance.

CO2 The Course has been conceived to equip the students with the knowledge of various laboratory conditions for their culture and maintenance of microorganisms in terms of their control through physical and chemical methods.

CO3 It is aimed to impart knowledge about microbial interactions in the wider context of Environmental Microbiology biological laboratories and research centers in India.

CO4 Working knowledge of biostatistics and their importance in the plant sciences while discussing the results & findings in terms of correlations, regressions and other details.

CO-PO MAPPING MATRIX FOR PAPER BOT-201 (Microbiology and Biostatistics):

	PO 1	PO 2	PO3	PO 4	PO5	PO6
CO1	2	1	1	2	2	2
CO2	1	2	1	2	2	2
CO3	2	2	1	1	1	1
CO4	1	1	2	2	2	1
Average	1.5	1.5	1.25	1.75	1.75	1.5

CO-PSO MAPPING MATRIX FOR PAPER BOT-201 (Microbiology and Biostatistics):

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	1	1	1
CO2	1	1	2	2	1
CO3	2	1	1	2	1
CO4	1	2	1	2	2
Average	1.25	1.5	1.25	1.75	1.25

Note: Nine questions will be set in all. Question No.1 will be compulsory covering the entire syllabus. The remaining eight questions will be set with two questions from each unit. The candidate will be required to attempt one question from each unit. All questions will be of equal marks.

Unit-I

1. Structure & replication of viruses and bacteriophage; transmission & control of viruses; Isolation & purification of Plant Viruses.

- Diseases caused by Viruses: TMV, Tristeza of citrus
2. Structure, nutrition, reproduction, and economic importance of bacteria.
Diseases caused by bacteria: Bacterial blight of paddy, Crown gall of stone fruits
A brief account of Cyanobacteria, and phytoplasmas

Unit-II

3. Growth, culture and maintenance of microorganisms
Microbial growth and measurement, environmental factors influencing growth.
Maintenance and preservation of cultures: Subculturing, Storage under mineral oil, Water storage, soil storage, deep freezing, Lyophilization, and Cryogenic storage.
Culture collection centers
4. Control of microorganisms: Physical methods(High temperature, dry hot or hot-air sterilization, moist air sterilization, low temperature, filtration, lyophilization, Radiation), Chemical methods (Disinfectants and antiseptics)

Unit-III

5. Microbial interaction: Functions of symbiotic relationships, types of symbiosis, commensalism, synergism, mutualism-(Lichens, Bacterial endosymbionts of protozoa, Nitrogen-fixing symbiosis, mycorrhizae), parasitism.
6. Environmental Microbiology: Microbiology of fresh, marine and extreme environment, Biofilms, Bioremediation of polluted environment, Bioleaching.

Unit-IV

7. Biostatistics: Brief description and tabulation of data and its graphical representation.
8. Measures of central tendency and dispersion.
9. Mean, mode, median, range standard deviation, variance idea of two types of errors and level of significance, tests of significance (F & t test); chi-square test.
10. Simple Linear Regression and Correlation.

Suggested Readings:

1. Gupta R & Mukherji K G (2001). Microbial technology, APH Publ. co., New Delhi.
2. Pelezar, MJ, Chaing, ECS & Krieg, NR (1993). Microbiology, Tata McGraw-Hill Publ. New Delhi.
3. Prescott, LM., Harley, JP & Klein, DA (1996). Microbiology Wm. C. Brown Publ. USA.
4. Ronald, M Atlas (1995). Principles of microbiology. Mosby-Year Book, Inc. St. Louis, Missouri, USA.
5. Singh R.P. (1990): Introductory Biotechnology, Central Book Depot, Allahabad, India.
6. Sumbali, G. 2005: The Fungi, Narosa Publ. House, New Delhi.
7. Statistics for Biologists (1974) Campbell R.C. Cambridge University Press, Cambridge.
8. Statistics in Biology, Vol. 1 (1967) Bliss, C.I.K, McGraw Hill, New York