Paper 1a ALGOLOGY AND MYCOLOGY

B. Sc. va (Candidates admitted from the academic year 2021-2022)

Course Code 211BO1M01 Total Hours 90 Credits 5

CORE THEORY

Learning Objective	To gain knowledge on distinguishing Algae & Fungi based on various characters and its inevitable role in mankind.

CO No.	Course Outcome Upon the completion of this course, students will be able to	PSO Addressed	CL
CO - 1	Gain knowledge about the diversity of algae in India.	PSO-1	U
CO - 2	Classify algae based on the morphological structures.	PSO-1	U
CO - 3	Discuss on various divisions of algae and different types of life cycles in algae.	PSO-1	An
CO - 4	Distinguish the characteristic features of fungi and classify them. To know about the symbiotic relationships and its benefits.	PSO-1	An
CO - 5	To enlist the economic importance of algae and fungi.	PSO-1	Ap

UNIT I **ALGAE** **HOURS 18**

Introduction to Algae: Definition, Distribution, Ecology of Algae; Classification of Algae (Robert Edward Lee, 2008); Major criteria for algal classification and distinguishing features of the classes of Algae: Cyanophyceae, Chlorophyceae, Phaeophyceae, Bacillariophyceae and Rhodophyceae. Thallus organization: Unicellular (*Chlorella*, *Closterium* and *Chlamydomonas*), colonial (*Volvox* and *Pediastrum*), filamentous (*Oedogonium*, *Hincksia*), siphonous (*Caulerpa*) and parenchymatous (*Dictyota*, *Sargassum*, *Gracilaria*) thallus organization.

UNIT II **HOURS 18**

Vegetative reproduction (Bulbils, tubers, propagules, hormogone, fragmentation and adventitious branches) and Asexual reproduction (exospores, endospores, zoospores, aplanospores, hypnospores and zygospores) in algae. Sexual reproduction in algae (Isogamous, anisogamous and oogamous); Life cycles in algae: Zygotic (*Oedogonium*, *Chara*), gametic (*Sargassum*), sporic (Biphasic-*Dictyota*), (triphasic-*Gracilaria*) and somatic (*Batrachospermum*) life cycles.

UNIT III **FUNGI** **HOURS 20**

Brief outline on Bacteria and Virus. Distribution and position of fungi in Whittaker's classification. Characteristic features of Zygomycotina, Ascomycotina, Basidomycotina and Deuteromycotina each with an example. Bread fungi (*Mucor*), *Peziza, Polyporus* and *Cercospora*.

UNIT IV **HOURS 16**

Biology of lichen: Structure, function and symbiosis of mycobiont and phycobiont. Local examples and case study in *Parmelia*. Role of Lichens in the environment and others. Mycorrhizae: endomycorrhizae and ectomycorrhizae. Use of mycorrhizae in agriculture.

UNIT V **HOURS 18**

Algae: Economic importance of algae: Source of single cell protein, pigments and biofertilizers; Diatomite; Source of agar-agar, carrageenan and alginic acid; Toxic algae. **Fungi:** Economic importance of Fungi: nutrient recycling, antibiotic production, fermentation technology (Yeast). Fungi as pathogens of plant plants - brown rust of wheat, red rot of sugarcane, white rust of crucifers. outline on medical mycology.

TEXT BOOKS

BARSANTI, LAURA AND PAOLO GUALTIERI. 2005. Algae-Anatomy, Biochemistry and Biotechnology. Taylor & Francis, London, New York.

DINABANDHU SAHOO AND JOSEPH SECKBACH. 2016. The algae World. Springer, London.

FRITSCH, F.E. 1935. Structure and Reproduction of Algae, Vol. I, Cambridge University Press, Cambridge.

FRITSCH, F.E. 1945. Structure and Reproduction of Algae, Vol. II, Cambridge University Press, Cambridge.

SOUTH, G.R. AND A. WHITTICK. 1987. *Introduction to Phycology*. Blackwell Scientific Publications, Oxford.

JOHN WEBSTER and ROLAND W.S. WEBER. 2007. Introduction to Fungi. Cambridge University Press.

MEHROTRA, R.S. 1980. Plant Pathology. Tata McGraw Hill Publishing Company Ltd, New Delhi.

SHARMA P. D. 2005. Fungi and Allied Organisms. Narosa Publishing House Pvt. Ltd.

SHARMA OP. 2006. Text book of fungi. Tata McGraw – Hill publishing company ltd, New Delhi.

SINGH, R.S. 2006. Principles of Plant Pathology. Oxford & IBH Publishing co. Pvt. Ltd.

SUGGESTED READING

BELLINGER E. G. AND D. C. SIGEE. 2010. Freshwater algae: identification and use as bioindicators. John Wiley & Sons, Ltd, Chichester, UK.

Gupta, R. K. and D. P. Vidya. 2007. Advances in Applied Phycology. Daya Publishing House, Delhi, India.

BURNETT, J.H. 1976. Fundamentals of mycology. Edward Arnold Publishers, London. Commonwealth Mycological Institute, Kew. U.K.

MARGULIS, L., AND K.V. SCHWARTZ. 1988. Five Kingdoms. W.H. Freeman and Co. New York.

SINGH. R.S. 1980. Introduction to Principles of Plant Pathology. III - Edition. Oxford. IBM. Publishing Co. Pvt. Ltd, New Delhi.

REFERENCES

LOBBAN, C.S. AND M.J. WYNNE (1981) *The Biology of Seaweeds*. Blackwell Scientific Publications, Oxford.

LEE, R. E. 2008. *Phycology*. Cambridge University Press, Cambridge.

AINSWORTH, G.C. 1971. Ainsworth and Bibsy's dictionary of fungi. 6th Edition.

AINSWORTH, G.C., F.K. SPARROW, AND A.S. SUSSMAN (Eds.). 1965 - 1975. The fungi and advanced treatise. Vol. I - IV. G.L. Academic press, New York and London.

ALEXOPOULOS, C.J and C.W. MISRA. 1972. Introductory mycology. John Wiley and Sons, New York.

ONLINE RESOURCES

Australian Biological Resources Study: Fungi

Sydney Fungal Studies Group http://www.sydneyfungalstudies.org.au/Intro.html

University of Adelaide: Mycology Online http://www.mycology.adelaide.edu.au/

Paper 2a ALGOLOGY AND MYCOLOGY

B. Sc. va (Candidates admitted from the academic year 2021-2022)

Course Code 211BO1M02 Total Hours 60 Credits 3

CORE PRACTICAL

Learning Objective	To gain knowledge on distinguishing Algae & fungi based on various characters and its inevitable role in mankind.

CO No.	Course Outcome Upon the completion of this course, students will be able to	PSO Addressed	CL
CO - 1	Prepare the algal specimen for microscopic observation and illustrate cellular and morphological drawings of algae.	PSO-1	U
CO - 2	Learn the vegetative and reproductive structures of various group of algae and and their uses.	PSO-1	U
CO - 3	Demonstrate the vegetative and reproductive structures of various groups of fungi.	PSO-1	An
CO - 4	Know different diseases in plants and causes for them.	PSO-1	U
CO - 5	Acquaint with the techniques in culturing various fungi.	PSO-1	An

ALGAE **HOURS 30**

Examination of algae mentioned in the theory to observe different types of thallus organization as given below:

Closterium – Unicellular thallus; *Volvox, Pediastrum* – Colonial thallus; *Spirogyra*, *Hincksia* – Filamentous thalli; *Caulerpa* – Siphonous thallus; *Dictyota*, *Sargassum*, *Gracilaria* - Parenchymatous thallus.

Examination of the following algae to observe the structures listed against them:

Oscillatoria – Hormogones, *Planococcus*; *Sphacelaria*, *Hypnea* - Propagules; *Dictyota*, *Grateloupia* – adventitious branches; *Oedogonium*, *Hincksia* – zoospores; *Chlorella* – autospores; *Dermocarpa* – Endospore; *Chamaesiphon* - Exospore.

Examination of different stages of the following algae to study their life cycle:

Caulerpa – Isogamous, monophasic, diplontic/gametic life cycle

Hincksia – Anisogamous, biphasic, diplohaplontic/sporic life cycle

Chara – Oogamous, monophasic, haplontic/zygotic life cycle

Batrachospermum-Oogamous, triphasic, haplobiontic/somatic life cycle.

Gracilaria – Oogamous, triphasic, diplobiontic/sporic life cycle

Observation of spotters prepared with photographs/photomicrographs of algae to show the ultrastructural features, thallus organization, algal habitats, asexual and sexual reproductive structures.

Observation of agarophytes, carragenophytes and alginophytes, their products and uses.

MYCOLOGY **HOURS 30**

Examination of various thallus and reproductive structures of fungi and lichens.

Study on types and structure & reproduction of Bacteria and Virus.

Detailed study of structure of *Mucor*, *Polyporus*, *Peziza*, *Cercospora* and *Parmelia*.

Collection and observation of infected sugarcane plant by *Colletotrichum* and wheat plant by *Puccinia.*

Culture and observation fungi: Media Preparation, slants and plating techniques, isolation of fungal culture.

Cultivation of Mushrooms using isolated fungal cultures.