

**B.Sc. Part – I
BOTANY 2019**

Theory

Course	Nomenclature	Number of Papers	Number of Periods per week	Maximum marks	Minimum marks
Paper I	Algae, Lichens and Bryophytes	1	2	50	54
Paper II	Mycology, Microbiology and Phytopathology	1	2	50	
Paper III	Palaeobotany, Pteridophytes and Gymnosperms	1	2	50	
PRACTICAL COURSE			6	75	27

Duration of examination of each theory papers 3 hours

Duration of examination of practicals 5 hours

PAPER I: ALGAE, LICHENS AND BRYOPHYTES

Unit I: General characters, Classification (ICBN) and economic importance of Algae. Important features and life history of Chlorophyceae and Charophyceae. Structure and life cycle of *Volvox*, *Oedogonium*, *Coleochaete* and *Chara*.

Unit II: Important features and life history of Xanthophyceae and Phaeophyceae. Structure and life cycle of *Vaucheria*, *Ectocarpus* and *Sargassum*.

Unit III: Important Features and life history of Rhodophyceae. Structure and life cycle of *Polysiphonia*. Lichens: Morphology and structure of the two components; biological, ecological and economic importance. Vegetative multiplication methods with special reference to *Parmelia* and *Usnea*.

Unit IV: Bryophytes: General characters, alternation of generations and classification. Characters and Classification of Hepaticopsida. Morphology and life history of *Riccia*, *Marchantia* and *Plagiochasma*.

Unit V: Characters and classification of Anthocerotopsida and Bryopsida. Morphology and life history of *Anthoceros* and *Sphagnum*.

Suggested Laboratory Exercises

Algae: Microscopic preparation and study of following algal materials: *Volvox*, *Oedogonium*, *Coleochaete*, *Vaucheria*, *Chara*, *Ectocarpus*, *Sargassum* and *Polysiphonia*

Lichens: Study of Lichens

Bryophytes: Study of external morphology and microscopic preparations of following Bryophytes: *Riccia*, *Marchantia*, *Plagiochasma*, *Anthoceros* and *Sphagnum*

Suggested Readings

- Bold, H.C., Alexopoulos, C.J. and Delevoryas, T. Morphology of Plant and Fungi (4th Ed.) Harper & Foul Co., New York, 1980.
- Ghemawat, M.S., Kapoor, J.N. and Narayan, H.S. A text book of Algae, Ramesh Book Depot, Jaipur, 1976.
- Gilbert, M.S. Cryptogamic Botany, Vol. I & II (2nd Ed.), Tata McGraw Hill, Publishing Co. Ltd., New Delhi, 1985.
- Kumar, H.D. Introductory Phycology, Affiliated East–West Press, Ltd., New York, 1988.
- Pandey, S.N. and Trivedi, P.S.A Text Book of Botany 2000 Volume I, Vikas Pub. House Pvt. Ltd., New Delhi.
- Puri, P. Bryophytes, Atmaram & Sons, Delhi, Lucknow, 1985.
- Singh, V., Pande, P.C. and Jain, D.K. A Text Book of Botany, Rastogi & Co., Meerut, 2001.
- Vashista, B.R. Botany for Degree Students (Algae, Fungi Bryophyta), S. Chand & Co. Ltd., New Delhi, 2002.

PAPER II: MYCOLOGY, MICROBIOLOGY AND PHYTOPATHOLOGY

Unit I: General characters, Classification and economic importance of fungi. Important features and life history of Mastigomycotina–*Pythium* and *Albugo*; Zygomycotina–*Rhizopus*; Ascomycotina–*Saccharomyces*, *Aspergillus* and *Penicillium*.

Unit II: Important features and life history of Basidiomycotina– *Puccinia*, *Agaricus* and wild Mushroom and *Ustilago*; Deuteromycotina–*Collectotrichum* and *Alternaria*.

Unit III: Viruses: Chemical and physical nature; Structure, multiplication and transmission of plant viruses. Tobacco mosaic virus and yellow vein mosaic virus disease. General account of Viroids, AIDS and Prions.

Unit IV: Bacteria–Structure, nutrition, cell division, reproduction and economic importance. Biofilms and Quorum sensing in microbes. Cyanobacteria–Life history of *Nostoc* and *Oscillatoria*; Nitrogen fixation – by BGA (Blue green algae). General account and biology of Mycoplasma and Phytoplasma.

Unit V: Causes and symptoms of plant diseases with special reference to green ear disease of Bajra, smut of wheat, citrus canker, little leaf of brinjal and root knot disease. A brief account of principles of plant protection.

Suggested Laboratory Exercises

Microscopic preparation and study of following fungal materials: *Albugo*, *Rhizopus*, *Saccharomyces*, *Aspergillus*, *Penicillium*, *Ustilago*, *Agaricus*, local Mushroom, *Collectotrichum* and *Alternaria*. Viruses: Study of disease symptoms caused by Tobacco mosaic virus and yellow vein mosaic virus.

Bacteria: Gram staining of bacteria. *Nostoc*, *Oscillatoria* and study of bacteriological specimens. Study of symptoms of following diseases: (specimen or photographs)

Green ear disease of bajra

Smut of wheat

Citrus canker

Rust of wheat

Little leaf of brinjal

Root knot nematode.

Suggested Readings

- Alexopoulos, C.J. and Mims. Introductory Mycology, John Wiley and Sons, New York, 2000.
- Bilgrami, K.S. and Dube, H.C. A Text Book of Modern Plant Pathology, Vikas Publ. House, New Delhi, 1976.
- Biswas, S.B. and Biswas, A. An Introduction to Viruses, Vikas Publ. House, New Delhi, 2000.
- Clifton, A. Introduction to Bacteria, McGraw Hill Co., New York, 1985.
- Dube, H.C. Fungi, Rastogi Publication, Meerut, 1989.
- Kaushik, P. Microbiology, Emkay Publication, 2001.
- Madahar, C.L. Introduction to plant viruses, S. Chand & Co. Ltd., New Delhi, 1978.
- Palezer, Chan and King. Microbiology, McGraw Hill Book Co., London, 1995.
- Pathak, V.N. Fundamentals of Plant Pathology, Agro Botanica. 2000.
- Purohit, S.S. Microbiology, Agro. Bot. Publication, Jodhpur, 2002.
- Sharma, O.P. Fungi, Today and tomorrow Publication, 2000.
- Sharma, P.D. Microbiology and Plant Pathology, Rastogi Publ. Meerut, 2003.
- Singh, V. and Srivastava, V. Introduction to Bacteria, Vikas Publication, 1998.
- Vashista, B.R. Botany for Degree Student Fungi, S. Chand & Co., New Delhi, 2001.

PAPER III: PALAEOBOTANY, PTERIDOPHYTES AND GYMNOSPERMS

Unit I: Geological time scale, Fossilization. General characters and classification and Pteridophytes. Important characteristics of Psilopsida, Lycopsidea, Sphenopsida and Pteropsida. Stellar systems in Pteridophyta. Structure and reproduction in *Rhynia* and *Psilotum*.

Unit II: Occurrence, Structure and life history of *Lycopodium*, *Selaginella* and *Equisetum*.

Unit III: Occurrence, structure and life history of *Adiantum*, *Marsilea* and *Azolla*. Heterospory in Pteridophyta.

Unit IV: Characteristics of seed plants, evolution of the seed habit. General features of gymnosperms and their classification; evolution, diversity and economic importance of Gymnosperms. *Cycas*: Morphology of vegetative and reproductive parts, anatomy of root, stem and leaf; Reproduction and life cycle.

Unit V: *Pinus* and *Ephedra*: Morphology of vegetative and reproductive parts, anatomy of root, stem and leaf, reproduction and life cycle.

Suggested Laboratory Exercises

Palaeobotany: Microscopic examination of slides of *Rhynia*.

Pteridophytes: Study of external morphology of *Lycopodium*, *Selaginella*, *Equisetum*, *Adiantum*, *Marsilea*, and *Azolla*. Microscopic study of temporary double stained preparations of stem/rhizome of *Lycopodium*, *Selaginella*, *Equisetum* and *Marsilea*.

Study of temporary single stained microscopic preparations of cone of *Selaginella* and T.S. of Sporophyll of *Adiantum* and sections of sporocarp of *Marsilea*.

Gymnosperms: Study of external morphology of plant parts of *Cycas*: young and old foliage leaf, scale leaf, bulbils, male cone, microsporophyll, megasporophyll and mature seed (if material is not available show photographs).

Microscopic temporary double stained preparations of rachis and leaflet of *Cycas*. Study of T.S. normal and Corolloid root by permanent slides.

Study of external morphology of plant parts of *Pinus* habit, long and dwarf shoot, male cone; female cone; winged seeds.

Microscopic temporary preparation of pollen grains (W.M.) of *Pinus*. Study through permanent slides T.S. stem: young and old; male/female cone of *Pinus*.
Study of habit and structure of whole male and female cone of *Ephedra*.
Microscopic preparation of male and female flowers of *Ephedra*.

Suggested Readings

- Bold, H.C., Alexopolous, C.J. and Delevoryas, T. Morphology of plant and fungi (4th ed.), Harper and Foul, Co., New York, 1980.
- Gifford, E.M. and Foster, A.S. Morphology and Evolution of Vascular Plants, W.H. Freeman and Company, New York, 1988.
- Pandey, S.N., Mishra, S.P., Trivedi, P.S. A Text Book of Botany Vol. II, VikasPub.House Pvt. Ltd., New Delhi 2000.
- Raven, P.H. Evert, R.F. and Eichhom, S.C. Biology of plants, (5th ed.), W.H. Reema and Co., Worth Publication, New York, U.S.A., 1999.
- Sharma, O.P. Pteridophytes, Today and tomorrow Publication, 2000.
- Sporne, K.R. The Morphology of Gymnosperms, B.I. Publ. Pvt., Bombay, Calcutta, Delhi, 1991.
- Vashista, P.C. Gymnosperm, S. Chand & Co. Ltd., New Delhi, 2002.
- Vashista, P.C. Pteridophyta, S. Chand & Co. Ltd., New Delhi, 2002.
- Wilson, N.S. and Rothewall, G.W. Palaeobotany and evolution of Plants, (2nd ed.), Cambridge University Press, U.K., 1993.

Suggested Laboratory Exercises

Part -I: Algae, Fungi, Lichens, Microbiology and Plant Pathology

Part-II: Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany

Part-I

Algae: *Volvox*, *Oedogonium*, *Coleochaete*, *Chara*, *Ectocarpus*, *Sargassum* and *Polysiphonia*

Fungi: *Albugo*, *Rhizopus*, *Saccharomyces*, *Penicillium* (specimen/slides), *Aspergillus*, *Ustilago*, *Puccinia* (Wheat), *Agaricus*, *Alternaria* and *Colletotrichum* (Specimen/slides).

Lichen: External morphology of different types. Crustose (*Rhizocarpon*), Foliose (*Parmelia*) and Fruticose (*Usnea*)

Microbiology:

- Gram's staining of bacteria
- Nostoc*
- Oscillatoria*
- Rhizobia (Root nodules)
- Phytoplasma (Photograph)
- Tobacco mosaic virus
- Yellow vein mosaic virus of Bhindi

Plant Pathology: Symptoms of the following diseases:

- Green ear disease of bajra
- Smut of wheat (Loose)
- Black rust of wheat
- Citrus canker
- Little leaf of brinjal
- Root knot nematodes

Part-II

Bryophytes: External morphology and microscopic preparation of following genera:

Riccia, *Marchantia*, *Plagiochasma*, *Anthoceros* and *Sphagnum*

Pteridophytes:

Lycopodium: External morphology, stem and cone (slide only)

Selaginella: External morphology, stem and cone.

Equisetum: External morphology, stem (internodes) and cone (slide only)

Marsilea: External morphology, rhizome, petiole and sporocarp (H.L.S.)

Adiantum: External morphology and sporophyll(T.S.)

Azolla: External morphology

Gymnosperms:

Cycas: External morphology, (normal root, coralloid root and rachis- slides only),

Leaflet (T.S.), male cone and female Megasporophyll (specimen)

Pinus: External morphology, needle (T.S.), stem (slide only) pollen grains, male and female cones

Ephedra: External morphology, stem (T.S.), male and female reproductive parts.

Palaeobotany: *Rhynia* (specimen)

**Practical Examination Scheme
B.Sc. Botany Part I****Time: 5 hours****Max. Marks 75****Min. Pass Marks 27**

	Regular	Ex- student
1. Cut a T.S of the given material "A" and make double stained temporary mount of the same. Draw labeled diagram. Identify the material and giving reasons.	13	15
2. Make suitable preparation of the reproductive parts of the given material "B". Draw labeled diagram. Identify and comments upon the features of interest	06	07
3. Make suitable preparation of the given materials "C", "D", "E" and "F". Identify and comments upon your preparation (NO description is required for the Material "F").		
Material "C"	06	07
Material "D"	06	07
Material "E"	06	07
Material "F"	04	06
4. (A) Identify and comments upon the given spots 1 to 7	21	21
(B) Microbiological Experiment	04	05
5. Practical record	09	00
Total	75	75