

Syllabus

Botany

B.Sc. (Three year degree Course)



**DEPARTMENT OF BOTANY
UNIVERSITY OF ALLAHABAD**

B.Sc. Part -I

PAPER-I

FUNGI, LICHENS, BACTERIA & VIRUSES

UNIT -I

FUNGI: A general introduction to fungi including structure, reproduction Importance and classification. The life histories of following genera:

Lower Fungi: *Albugo, Phytophthora, Mucor*

Higher Fungi:

Ascomycetes: *Saccharomyces, Sphaerotheca, Peziza (Morchella for practical's only)*

Basidiomycetes: *Ustilago, Puccinia, Agaricus*

Fungi Imperfecti: *Cercospora, Aspergillus*

UNIT -II LICHENS BACTERIA AND PLANT VIRUSES

LICHENS: Occurrence general structure and reproduction with special reference to *Parmelia*. Economic Importance of Lichens in general;

BACTERIA: Structure reproduction and economic Importance;

VIRUSES: Nature, Structure transmission multiplication and economic importance

PAPER-II

ALGAE AND BRYOPHYTA

UNIT -I

ALGAE: A general Introduction to algae including their vegetative structure, reproduction ecology and economic importance; broad classification of algae; and study of reproduction and life cycle of the following genera:

Cyanophyceae: *Oscillatoria, Nostoc*

Chlorophyceae: *Chlamydomonas, Volvox Chlorella, Hydrodictyon, Oedogonium.*

Xanthophyceae: *Vaucheria*

Phaeophyceae: *Ectocarpus, Fucus, (Sargassum for Practical's Only)*

Rhodophyceae: *Batrachospermum, Polysiphonia*

UNIT II

Bryophyta: A general account of Bryophytes; the life histories of the following genera:

Hepaticopsida: *Riccia, Marchantia, Pellia, Porella*

Anthocerotopsida: *Anthoceros*

Bryopsida: *Sphagnum, Funaria*

PAPER -III

PTERIDOPHYTA AND GYMNOSPERMOPHYTA

UNIT -I

PTERIDOPHYTA: A general account of the pteridophytes with special reference to life histories of the following genera:

Psilophyta:	<i>Rhynia</i>
Lycophyta:	<i>Lycopodium, Selaginella</i>
Arthrophyta	<i>Equisetum</i>
Filicophyta	<i>Marsilea, Pteridium</i>

UNIT-II

GYMNOSPERMOPHYTA: Classification and general account of the gymnosperms with special reference to the life histories of the following genera:

Cycadales:	<i>Cycas</i>
Coniferales:	<i>Pinus</i>

Structure of Examination

THEORY:

Paper I:	Fungi, Lichens, Bacteria and Viruses	34 Marks
Paper II:	Algae and Bryophyta	33 Marks
Paper III:	Pteridophyta and Gymnospermophyta	33 Marks

PRACTICAL EXAMINATION: The practical examination will be based on the course work prescribed for Paper I, II and III. Preparation and study of suitable glycerine mounts and section of plant materials of cryptogams and gymnosperms to test their knowledge of these groups.

1. The dissection of plants and parts of plants prescribed, the preparation, staining, mounting and study of plants prescribed (permanent preparations are not required).
2. A practical study of plants prescribed in the syllabus. Notebooks containing a complete record of laboratory work must be produced at the practical examination. Marks will be allotted as follows:

Practical Examination	37 Marks
One test during the year	4 Marks
Viva-Voice	4 Marks
Class record	5 Marks
Total	50 Marks

B.Sc. Part –II

Paper I

Unit I

Taxonomy: History of plant taxonomy with special reference to India; brief account of Bentham & Hooker; Englar & Prantl and Hutchinson's system of classification; detailed account of the following families: Poaceae (Graminae); Liliaceae, Orchidaceae; Musaceae; Ranunculaceae; Brassicaceae (Cruciferae); Capparidaceae; Papaveraceae; Caryophyllaceae; Malvaceae; Leguminoceae; Rosaceae; Apiaceae (Umbelliferae); Myrtaceae; Amaranthaceae; Casuarinaceae; Euphorbiaceae; Asclepiadaceae; Cucurbitaceae; Acanthaceae; Solanaceae; Convolvulaceae; Lamiaceae (Labiatae); Asteraceae (Compositae); Rubiaceae.

Unit II

Morphology & Anatomy: Broad outline of morphology and anatomy of vegetative and reproductive organs of angiosperms; cell wall structure; tissue and tissue systems; morphology and anatomy of root and shoot; Root-stem transition regions; An account of normal primary structure and secondary growth in herbaceous and woody plants; anomalous secondary growth as exemplified by stems of *Boerhaavia*, *Chenopodium*, *Pyrostegia (Bignonia)* and *Dracena*; anatomy of leaf; Leaf abscission; general morphology of flower and floral parts.

Unit III

A brief history of anther and ovule; Male gametophytes, Polygonum type of embryo sac; fertilization, development of embryo sac as exemplified by *Capsella bursapastoris* and *Sagitaria* type; An elementary account of the development of endosperm ; apomixes and polyembryony

Paper II

Plant Physiology and Plant Ecology

Unit I

Plant Physiology: Cell constituents and their microchemical reactions; physiology of cell; Absorption of materials in general: ascent of sap; Transpiration; assimilation of Nitrogen; translocation of plant food materials; fermentation and respiration; elementary knowledge of growth including turgidity; movement in plants; Plant-water relations (water absorption, transpiration & translocation, salt uptake and translocation); Growth hormones; movement of hormones; dormancy and its regulation; vernalization and photoperiodism; phytochrome system; Enzymes: classification and mechanism of action; respiration & photorespiration; Photosynthesis; Nitrogen assimilation; and fixation of atmospheric nitrogen; synthesis of amino acids; Lipid carbohydrate metabolism

Unit II

An elementary knowledge of ecology; ecological factors: climatic, edhaphic, phytogeographic and biotic factors; plant succession; and plant communities: hydrophytes, mesophytes, xerophytes, mangroves , epiphytes and parasites; food chains; ecosystem; pollution; forest types in India

Paper III

Cytology and Genetics

Unit I

Cytology: General study of cell and its organelles; chromosomes; cell divisions

Genetics: Mendelism; linkage & crossing-over; gene concept; sex-determination in plants; cytoplasmic inheritance, mutation (Chromosomal & genic); chromosomal aberrations & polyploidy

Unit II

Molecular Biology: Structure of DNA, RNA and Proteins; Role of nucleic acids in protein synthesis; Genetic code; mechanism of protein synthesis;

Unit III

Evolution: Origin of life and organic evolution: evidences, mechanism and theories.

PRACTICAL EXAMINATION: The practical examination will be based on the course work prescribed for Paper I, II and III. Marks will be allotted as follows:

Practical Examination	35 Marks
One test during the year	5 Marks
Viva-Voice	5 Marks
Class record	5 Marks
Total	50 Marks

B.Sc. Part III

Paper I

Unit I

Biotechnology (Applied microbiology & Genetic engineering)

Microbiology and Applied microbiology: Definition and scope: An elementary knowledge of soil, water, sewage, milk, food, air, and industrial microbiology; importance and application of *Penicillium*, *Bacillus*, *Chlorella*, *Streptococcus*, *Lactobacillus*, *Leuconostoc*, *Saccharomyces*, *Aspergillus*, *Clostridium*, and *Claviceps*; symbiotic and non-symbiotic nitrogen-fixing bacteria; and blue-green algae; Mycorrhiza

Genetic Engineering: Concept & scope: gene transplant, role of restriction enzymes, endonucleases; plasmids in transferring gene; application of genetic engineering in medicine, agriculture, industry and environment

Unit II

Plant Pathology: Definition and scope: disease and disease-causing organisms; symptoms of plant diseases; dissemination of pathogens; introductory knowledge of epidemiology and forecasting of plant diseases; host-parasite interaction; effect of environment on plant diseases; principles of defence mechanisms and control

Paper II

Economic Botany, Applied Plant anatomy, Marine Biology, Limnology and Plant Breeding

Unit I

Economic Botany: knowledge of use of plants for human welfare;

- A. use of plants or plant products belonging to the groups: algae, fungi, bryophytes and gymnosperms
- B. use of plants or plant products belonging to Angiosperms with special reference to the following:
 - a) Food plants: cereals (wheat, rice maize); legumes (Pigeon pea, ground nut, gram); sugarcane and fruits
 - b) Food Adjuncts: Beverages (Tea and coffee); Spices (*Piper nigrum*, *Capsicum*, *Curcuma*, *Zinziber*, *Crocus sativus*, *coriander sativum*, *syzygium aromaticum*)
 - c) Masticatories and fumicatories (*Piper betel*, *Areca catechu*, *Acacia catechu*, *Nicotiana tabaccum*)
 - d) Drug-yielding plants: Drug narcotics (*Cinchona*, *Aconitum*, *Atropa*, *Artemissia*, *Rauwolfia*, *Cannabis sativa*, *Paper sominiferum*)
 - e) Timber: Teak, Sal, Shesham
 - f) Fibre: Cotton, Jute, Sun-hemp, Coir
 - g) Edible oil: Peanut oil, Coconut, Mustard
 - h) Rubber: *Havea*, *Ficus*
 - i) Tannins: *Acacia*
 - j) Gum: *Acacia*, *Sterculia*

- k) Weeds and weed control: An introduction and definition of weeds; methods of weed control, a basic knowledge of herbicides, their transformation and persistence in soil; some prominent weeds of crop plants and their control

Unit II

Applied Plant Anatomy and Plant Breeding

Applied plant anatomy: Economic aspect of applied plant anatomy in taxonomy, horticulture, food adulteration, medicinal plants; wood in present day archaeology, forensic application

Plant Breeding: An elementary knowledge of plant breeding, methods of breeding of self-pollinated crops, cross-pollinated crops, and asexually propagated crops, parasexuality, techniques of plant breeding: emasculation, pollination etc.

Unit III

Marine Biology and Limnology: An elementary knowledge of marine biology and limnology; a general study of morphological and reproductive features of micro and macrophytes growing in sea water with special reference to their adaptations; a preliminary knowledge of abiotic (Physicochemical properties of water) and biotic (planktons, periphytons, macrophytes, benthos and decomposes) factors influencing growth of fresh water and marine water flora

Paper III

PALAEOBOTANY, PALYNOLOGY, PLANT DIVERSIFICATION, MORPHOGENESIS AND TISSUE CULTURE

Unit I

PALAEOBOTANY: An elementary knowledge of Palaeobotany; geological era; process of fossilization; types of fossils; methods of fossil study; form genera and reconstruction of fossil plants

PALYNOLOGY: An introductory knowledge of palynology

Unit II

PLANT DIVERSIFICATION: Evolutionary trends; origin and evolution of different plant groups

Unit III

Morphogenesis and Tissue Culture: Phenomenon of morphogenesis;; an elementary knowledge of polarity, symmetry; cellular and tissue differentiation; protoplast fusion, methodology and application of tissue culture

PRACTICAL EXAMINATION: The practical examination will be based on the course work prescribed for Paper I, II and III. Marks will be allotted as follows:

Practical Examination	60 Marks
One test during the year	5 Marks
Viva-Voice	5 Marks
Class record	5 Marks
Total	75 Marks