

Department of Botony

Diversity of Microbes (paper code - BOT 1.1)

B.Sc 1st Year (Sem. 1st)

Unit-I

Bacteria: Structure, nutrition, reproduction and economic importance

Cyanobacteria: General characters; life-history of *Nostoc*

Algae: General characters, classification (upto classes) and economic importance; General account of algal blooms

Unit-II

Important features and life-history (excluding development) of *Volvox*, *Oedogonium* (Chlorophyceae), *Vaucheria* (Xanthophyceae), *Ectocarpus* (Phaeophyceae) and *Polysiphonia* (Rhodophyceae)

Unit-III

Viruses: General account of Viruses including structure of TMV and Bacteriophages
Fungi: General characters, classification (upto classes) and economic importance; General account of Lichens

Unit-IV

Important features and life-history of *Phytophthora* (Mastigomycotina), *Mucor* (Zygomycotina), *Penicillium* (Ascomycotina), *Puccinia*, *Agaricus* (Basidiomycotina), *Colletotrichum* (Deuteromycotina)



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Bahal - 127 028 (Distt. Bhiwani) Haryana

Department of Botony

Cell Biology (paper code - BOT 1.2)

B.Sc 1st Year (Sem. 1st)

Unit-I

The Cell Envelopes: Structure and functions of Cell Wall, Plasma Membrane, Golgi Apparatus, Endoplasmic Reticulum, Lysosomes, Peroxisomes and Vacuoles

Unit-II

Ultra-structure and function: Chloroplast, Mitochondria, Nucleus and Nucleolus

Chromosome: Morphology, ultra-structure - kinetochore, centromere and telomere

Unit-III

Cell Cycle: General account

Cell Division: Mitosis and Meiosis - Stages and Significance

Unit-IV

Chromosomal aberrations: Structural and Numerical - deletions, duplications, translocations, inversions, aneuploidy, polyploidy Sex chromosomes and Sex determination in Plants



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Department of Botony

Divesity Of Archegoniates (paper code - BOT 2.1)

B.Sc 1st Year (Sem. 2nd)

Unit-I

Bryophyta- General characters, classification (upto classes), alternation of generations, evolution of sporophytes and economic importance

Unit-II

Bryophyta: Structure and reproduction (excluding development) of *Marchantia* (Hepaticopsida), *Anthoceros* (Anthocerotopsida) and *Funaria* (Bryopsida)

Unit-III

Pteridophyta- General characters, classification (upto classes), alternation of generations, heterospory, apospory, apogamy and economic importance; General account of stellar evolution

Unit-IV

Pteridophyta: Structure and reproduction (excluding development) of *Rhynia* (Psilopsida), *Selaginella* (Lycopsida), *Equisetum* (Sphenopsida) and *Pteris* (Pteropsida)



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Genetics (paper code - BOT 2.2)

B.Sc 1st Year (Sem. 2nd)

Unit-I

Genetic Material: DNA - the genetic material, DNA structure and replication, DNAProtein interaction, The Nucleosome Model, Genetic Code, Satellite and Repetitive DNA.

Unit-II

Genetic Inheritance: Mendelism: Laws of Segregation and Independent Assortment; Linkage Analysis; Allelic and non-allelic interactions.

Unit-III

Extra-nuclear Inheritance: Presence and function of Mitochondrial and Plastid DNA; Plasmids.

Genetic Variations: Mutations - spontaneous and induced; transposable genetic elements; DNA damage and repair.

Unit-IV

Gene Expression: Modern concept of gene; RNA; Ribosomes; Transfer of genetic information - transcription and translation; Structure of proteins; Regulation of gene expression in prokaryotes and eukaryotes



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Department of Botony

Biology & Diversity Of Seed Plants-I (paper code - BOT 3.1)

B.Sc 2nd Year (Sem. 3rd)

Unit-I

General characters, origin and evolution of Gymnosperms Geological Time Table; Evolution of Seed Habit. Pilger and Melchior's (1954) system of classification of Gymnosperms.

Unit-II

Palaeobotany- Fossils and Fossilization (Process involved, types of fossils and importance of fossils);

Reconstruction of the following fossil plants:

Lyginopteris

Williamsonia

Cycadeoidea (= Bennettites)

Unit-III

Morphology and anatomy of root, stem, leaf/leaflet and reproductive parts including mode of reproduction, life-cycle and economic importance of following plants:

Cycas

Pinus

Unit-IV

Morphology and anatomy of root, stem, leaf/leaflet and reproductive parts including mode of reproduction, life-cycle and economic importance of *Ephedra*
Economic importance of Gymnosperms General characters, origin and evolution of Angiosperms



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Department of Botony

Plant Anatomy (paper code - BOT 3.2)

B.Sc 2nd Year (Sem. 3rd)

Unit-I

Tissues - meristematic and permanent (simple, complex and secretory) Tissue systems (Epidermal, ground and vascular) The Shoot system - shoot apical meristem and its histological organizations.

Unit-II

Cambium - structure and functions. Secondary growth in dicot stem; characteristics of growth rings; sap wood and heart wood, periderm; Anomalous secondary growth (*Dracaena*, *Boerhaavia* and *Achyranthes*)

Unit-III

Leaf: Types of leaves (simple and compound); phyllotaxy. Epidermis-uniseriate and ultiseriate, epidermal appendages and their morphological types. Anatomy of typical Monocot and Dicot leaf and cell inclusions in leaves, leaf abscission, Stomatal apparatus and their morphological types

Unit-IV

Root system: Root apical meristem; histological organization Secondary growth in dicot root. Structural modifications in roots: Storage (*Beta*), Respiratory (*Rhizophora*), Epiphytic (*Vanda*).



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Department of Botony

Biology & Diversity Of Seed Plants-II (paper code - BOT 4.1)

B.Sc 2nd Year (Sem. 4th)

Unit-I

Taxonomy and Systematics, fundamental components of taxonomy (identification, classification, description, nomenclature and phylogeny), Role of chemotaxonomy, cytotaxonomy and taxometrics in relation to taxonomy, Botanical Nomenclature, principles and rules, principle of priority, Keys to identification of plants.

Unit-II

Type concept, taxonomic ranks, Salient features of the systems of classification of angiosperms proposed by Bentham & Hooker and Engler & Prantl, Floral Terms and Types of Inflorescence

Unit-III

Diversity of Flowering Plants: Diagnostic features and economic importance of the following families: Ranunculaceae, Brassicaceae, Malvaceae, Euphorbiaceae, Rutaceae, Fabaceae, Cucurbitaceae

Unit-IV

Diversity of Flowering Plants: Diagnostic features and economic importance of the families: Apiaceae, Asclepiadaceae, Lamiaceae, Solanaceae, Asteraceae, Liliaceae and Poaceae



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Department of Botony

Plant Embryology (paper code - BOT 4.2)

B.Sc 2nd Year (Sem. 4th)

Unit-I

Flower-a modified shoot, Microsporangium, its wall and dehiscence mechanism. Microsporogenesis, pollen grains and its structure (pollen wall).

Unit-II

Pollen germination (microgametogenesis), Male gametophyte, Pollen-pistil interaction; self incompatibility, Pollination: types and agencies

Unit-III

Structure of Megasporangium (ovule), its curvatures; Megasporogenesis and Megagametogenesis, Female gametophyte (mono, bi and tetrasporic), Double fertilization, Endosperm types and its biological importance.

Unit-IV

Embryogenesis in Dicot and Monocot; Polyembryony, Structure of Dicot and Monocot seed, Fruit types; Dispersal mechanisms in fruits and seeds.



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Department of Botony

Plant Physiology (paper code - BOT 5.1)

B.Sc 3rd Year (Sem. 5th)

Unit-I

Plant-water relations: Importance of water to plant life; physical properties of water; imbibition, diffusion and osmosis; absorption and transport of water; transpiration; physiology of stomata. Mineral nutrition: Essential macro and micro elements and their role; mineral uptake; deficiency symptoms.

Unit-II

Transport of organic substances: Mechanism of phloem transport; source-sink relationship; factors affecting translocation.

Photosynthesis : significance; historical aspects; photosynthetic pigments; action spectra and enhancement effects; concept of two photosystems; Z-scheme; photophosphorylation; Calvin cycle; C4 pathway; CAM plants; photorespiration.

Unit-III

Growth and development : Definitions; phases of growth and development; seed dormancy; plant movements; the concept of photoperiodism; physiology of flowering; florigen concept; physiology of senescence; fruit ripening;

Unit-IV

Plant hormones- auxins, gibberellins, cytokinins, abscissic acid and ethylene, history of their discovery, mechanism of action; photo-morphogenesis; Phytochromes and their discovery, physiological role and mechanism of action.



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Department of Botony

Ecology (paper code - BOT 5.2)

B.Sc 3rd Year (Sem. 5th)

Unit-I

Introduction to Ecology: Definition; scope and importance; levels of organization . Environment: Introduction; environmental factors- climatic (water, humidity, wind, light, temperature), edaphic (soil profile, physico-chemical properties), topographic and biotic factors (species interaction).

Unit-II

Adaptations of plants to water stress and salinity (morphological and anatomical features of hydrophytes, xerophytes and halophytes). Population ecology: Basic concept; characteristics; biotic potential, growth curves; ecotypes and ecads.

Unit-III

Community ecology: Concepts; characteristics (qualitative and quantitative-analytical and synthetic); methods of analysis; ecological succession. Ecosystem: Structure (components) and functions (trophic levels, food chains, food webs, ecological pyramids and energy flow) Biogeochemical cycles: Carbon, nitrogen, phosphorus and hydrological cycle.

Unit-IV

Phyto-geography: Phyto-geographical regions of India; vegetation types of India (forests). Environmental pollution: Sources, types and control of air and water pollution. Global change: Greenhouse effect and greenhouse gases; impacts of global warming; carbon trading; Ozone layer depletion; Biomagnification



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Biochemistry & Plant Biotechnology (paper code - BOT 6.1)

B.Sc 3rd Year (Sem. 6th)

Unit-I

Basics of Enzymology: Discovery and nomenclature; characteristics of enzymes; concept of holoenzyme, apoenzyme, coenzyme and co-factors; regulation of enzyme activity; mechanism of action.

Unit-II

Respiration: ATP – the biological energy currency; aerobic and anaerobic respiration; Krebs cycle; electron transport mechanism (chemiosmotic theory); redox - potential; oxidative phosphorylation; pentose phosphate pathway.

Unit-III

Lipid metabolism: Structure and functions of lipids; fatty acid biosynthesis; β -oxidation; saturated and unsaturated fatty acids; storage and mobilization of fatty acids. Nitrogen metabolism: Biology of nitrogen fixation; importance of nitrate reductase and its regulation; ammonium assimilation.

Unit-IV

Genetic engineering and Biotechnology: Tools and techniques of recombinant DNA technology; cloning vectors; genomic and cDNA library; transposable elements; aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis; biology of *Agrobacterium*; vectors for gene delivery and marker genes.



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Department of Botony

Economic Botony (paper code - BOT 6.2)

B.Sc 3rd Year (Sem. 6th)

Unit-I

Vavilov's centres of origin of crop plants, Origin, distribution, botanical description, brief idea of cultivation and economic uses of the following:

Food plants - cereals (rice, wheat and maize), pulses (gram, arhar and pea), vegetables (potato, tomato and onion).

Unit-II

Origin, distribution, botanical description, brief idea of cultivation and economic uses of the

following: Fibers- cotton, jute and flax.

Oils- groundnut, mustard, sunflower and coconut.

Unit-III

Morphological description, brief idea of cultivation and economic uses of the following: Spices- coriander, ferula, ginger, turmeric, cloves.

Medicinal plants- *Cinchona*, *Rauwolfia*, *Atropa*, *Opium*, *Cannabis*, *Azadirachta*, *Withania*.

Unit-IV

Botanical description, processing and uses of: Beverages- tea and coffee; Rubber - *Hevea*; Sugar- sugarcane General account and sources of timber; energy plantations and bio-fuels.



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