

BOTANY

I. Bacteria and Viruses:

1. General Account of viruses. Definition, Characterisation, Chemistry, Ultrastructure, Composition, replication, Bacteriophages, transmission of plant viruses, Importance.
2. General account of bacteria – Characteristics, shape, ultrastructure of the cell, nutrition, reproduction, classification and importance.

II. Plant Pathology:

1. Disease symptoms produced by Bacteria, Fungi, and Viruses.
2. A general account of important diseases of crop plants and their control:

a) Late blight of potato	f) Leaf spot of rice.
b) Smuts (Wheat, Jowar)	g) Citrus cancer
c) Rust of wheat	h) Bacterial blight of paddy.
d) Leaf spot of groundnut.	i) Angular leaf spot of cotton.
e) Paddy blast.	j) Mosaic of Tobacco.
3. Mycoplasma.
4. Control of plant diseases (A general account)

III. Algae (Phycology)

1. Introduction and general classification of Algae.
2. Criteria for the classification.
3. Thallus organization in Algae.
4. Economic importance of Algae.
5. General characters, structure, Reproduction, pigments, phylogeny, life cycles etc., of main groups in Algae with reference to Genera Given:
 - (a) Cyanophyceae (Nostoc, Scytonema, Oscillatoria).
 - (b) Chlorophyceae (Chlamydomonas, Volvox, Cladophora, Oedogonium, Coleochaete, Chara).
 - (c) Bacillariophyceae – General Account.
 - (d) Xanthophyceae – [Vautheria]
 - (e) Phaeophyceae (Ectocarpus, Laminaria)
 - (f) Rhodophyceae (Polysiphonia, Gracillaria)

IV. Fungi (Mycology):

1. General Characters of fungi. Occurrence and thallus structure of fungi. Nutritional aspects of Fungi (Saprophytism, parasitism, Symbiosis). Modes of reproduction (Sexual and Asexual). Life cycle in fungi. Criteria for classification of fungi. Classificatory systems.
2. General characters, morphology, reproduction, phylogeny, affinities etc., of the following : main groups with special reference to Genera given below:
 - a) Myxomycetes (slime molds).
 - b) Plasmodiophoromycetes (Plasmodiophora).
 - c) Mastigomycotina (Saprolegnia, Phytophthora).
 - d) Zygomycotina (Mucor).
 - e) Ascomycotina (Taphrina, Eurotium, Erysiphe, Pleospora, Neurospora).
 - f) Basidiomycotina (Puccinia, Agaricus).
 - g) Deuteromycotina (Cercospora, Colletotrichum, Phoma).
3. Economic importance of Fungi.

V. Bryophyta:

1. General characters of Bryophyta.
2. Sporophyte evolution in Bryophytes.
3. Classification of Bryophytes.
4. General account of the following main groups.
 - a) Hepaticopsida, (b) Anthocerotopsida, (c) Bryopsida.
5. Structure, reproduction and systematics of the following genera:
 - a) Marchantia, (b) Anthoceros, (c) Sphagnum (d) Funaria.

VI. Pteridophyta:

1. General characters of pteridophytes.
2. Classification of pteridophytes.
3. General characters of the following main groups:
 - a) Psilopsida; b) Lycopsidea; c) Sphenopsida (Eusporangiate and Leptosporangiate):
4. Morphology, anatomy, reproduction and affinities of the following genera:
 - a) Psilotum; b) Lycopodium; c) Selaginella; d) Ophioglossum; e) Marsilea; f) Pteris.

VII. Palaeobotany:

1. Fossil pteridophytes .
2. Origin and evolution of land plants.
3. Homospory, Heterospory and Origin of Seed.
4. Telome theory and origin of sporophyte.
5. General account of the following fossil Gymnosperms.
 - a) Pteridosperms; b) Bennittitales; c) Cordaitales; d) Pentoxylales.

VIII. Gymnosperms:

1. Gymnosperms.
2. Comparative account of morphology, life history, Affinities etc. of the following:
 - a) Cycadophyta – Cycas, Zarnia,
 - b) Coniferophyta – Pinus.
 - c) Ginkgophyta – Gintgo.
 - d) Chlamydospermatophyta : Ephedra, Welwetschia, Gnetum.
3. Classification of Gymnosperms.

IX. Taxonomy of Angiosperms:

1. Systems of classification: - Hutchinson, Takhtajan, Bessey, Engler and Prantl, Bentham and Hooker.
2. Principles of taxonomy:- Criteria of classification, categories of classification, Diversity of Phyletic concepts.
3. International code of Botanical nomenclature, principles, Typification, Citation and authority.
4. Recent trends in Taxonomy:
 - a) Biosystematics; b) Chemataxonomy; c) Serodiagnostic test and classification,
 - d) Numerical taxonomy.
5. Study of the following families with reference to their characteristics, economic importance, attributes etc.,

a) Ranunculaceae,	e) Malvaceae,	i) Apocynaceae,	m) Solanaceae,
b) Caryophyllaceae,	f) Tiliaceae,	j) Asclepiadaceae,	n) Euphorbiaceae,
c) Sterculiaceae,	g) Rubiaceae,	k) Boraginaceae,	o) Poaceae.
d) Sapotaceae,	h) Compositae,	l) Convolvulaceae,	

X. Anatomy and Cell Biology:

1. Ultra structure of the cell and cell organelles along with their functions.
2. Cell wall structure.
3. Tissue and Tissue systems.
4. Meristems – Shoot and root apices.
5. Normal and anomalous Secondary growth.

XI. Embryology:

1. Concept of primitive flower.
2. Development of anther and ovule.
3. General account of Embryosac and types of Embryo.
4. Fertilization.
5. Endosperm morphology and types.
6. Polyembryony and apomixis.

XII. Cytology, Genetics and Evolution:

1. Mitosis and Meiosis.
2. Chromosome (Morphology, Structures importance etc.).
3. Concept of gene, laws of inheritance gene action.
4. Genetic code.
5. Linkage and crossing over.
6. Parasexuality.
7. General account of Mutations
8. Polyploidy and its role in crop improvement.
9. Origin of life.

XII. Ecology and Phytogeography :

1. Ecosystem: - Concept, biotic and abiotic components, ecological pyramids, productivity.
2. Geo-chemical cycles.

(Carbon, Nitrogen, Sulphur, Phosphorous cycles).
3. Plant succession – Xerosere and Hydrosere.
4. Floristic regions of the world.
5. Floristic zones of India.

XIV. Physiology:

1. Absorption and translocation of water.
2. Transpiration and stomatal behaviour.
3. Absorption and uptake of Ions, Donnan's equilibrium.
4. Role of micronutrients in plant growth.
5. Translocation of solutes.
6. Respiration (Glycolysis, pentose phosphate shunt, structure and role of mitochondria, Krebs cycle, Oxidative phosphorylation, Photorespiration, Respiratory quotient, Fermentation, Pasteur effect Factors affecting).
7. Photosynthesis: - light and dark reaction, Red drop, Emerson effect, Two pigment systems, Mechanism of Hydrogen transfer, Calvin cycle, Enzymes of CO₂ reduction, Hatch a slack cycle C₄ cycle, CAM Pathway, Factors affecting photosynthesis, Pigments.
8. The enzymes: Nomenclature and classification, structure and composition, Mode of enzyme action, Factors affecting.
9. Nitroge, Metabolism and bio, synthesis of proteins Nitrogen fixation, Nitrogen cycle, (Physical and biological) Nitrogen assimilation Amino acid, metabolism, Biosynthesis of proteins.
10. Plant hormones Auxins, Gibberellins, Cytokinins, Abscissic acid (General account).

XV. Economic Botany:

1. Cultivation, economic importance, systematic position and morphology of the following plants.

(a) Rice	(e) Sugarcane	(l) Coffee	(m) Rauwolfia
(b) Wheat	(f) Groundnut	(j) Tea	(n) Pigeon pea
(c) Jowar	(g) Sun flower	(k) Jute	(o) Pearl millet.
(d) Cotton	(h) Castor	(l) Cardamom	

XVI. Recent Aspects of Botany:

1. Modern techniques

a) Electron microscopy,	e) Electrophoresis
b) Phase contrast microscopy	f) The tracer technique
c) Spectro photometry	g) Auto radiography
d) Chromatography	h) Sero-diagnostic methods.
2. Genetic engineering.
3. Plant tissue culture.
4. Alternative sources of Energy.
5. Social forestry.
6. Microorganisms as tools in understanding biological systems.
7. Environmental pollution (Water, soil, air) health hazards and control.