Syllabus Completion Report

F. Y. B. Sc. - Botany: 2024-25

Plant Morphology (BOT-151-T)

(Semester – II)

Sr. No.	Month	Topics
1	**December**	**Introduction to Plant Morphology :**Introduction, Definition; Types of morphology – Descriptive and Interpretative, Importance of Morphology. **Root Morphology** : Definition, Parts / regions of root; Types – Tap root and fibrous / adventitious root. Modifications of roots – Aerial roots (Hanging roots) with velamen tissue in Epiphytes; Haustorial (sucking) roots in Parasites - Cuscuta, Respiratory roots / Pnuematophores in Mangrove; Fleshy / Storage roots - Conical, Fusiform, Napiform, and Tuberous roots; Roots modified for Mechanical supports – Stilt, Prop, Climbing, and Clinging roots with examples. Functions of roots. **Revision & Assignment**
2	**January**	**Stem Morphology**. Definition, Parts of stem – nodes, internodes, buds, types of buds (Apical, Axillary, Accessory Adventitious and Floral).. Types of stem – a) Erect – Strong, Weak (Creepers, Trailers and Climbers); b) Prostrate – Procumbent, Decumbent and Diffuse; Modifications of stem – a) Aerial – Phylloclade, Bulbil b) Sub-aerial – Runner, Sucker, Stolon, Offset; c) Underground – Rhizome, Corm, Tuber, Bulb (Tunicated and Scaly). Functions of stem. **Leaf Morphology :**. Definition, Parts of leaf; Stipule, Petiole, Leaf margins, Apices and Base, Surface, Venation, Phyllotaxy, Leaf duration (Caducous, Deciduous, Persistent-Evergreen). Types of leaves – Simple and Compound – Pinnately (Unipinnate – Paripinnate and Imparripinnate; Bipinnate, Tripinnate and Decompound) and Palmately (Uni-, Bi-, Tri-, Quadri- and Multifoliate); Leaf Modifications: Tendrils, Spines, Phyllode, Scaly, Reproductive, Trap leaves. Functions of leaves. **Revision & Assignment**
3	**February**	**Morphology of Inflorescence** Definition, Parts of Inflorescence. Types of Inflorescence – a) Racemose – i) Main Axis Elongated – Raceme, Spike, Catkin, Spadix; ii) Main Axis Shortened – Umbel and Corymb; iii) Main Axis Flattened – Capitate, Head / Capitulum; b) Cymose – Solitary, axillary, Terminal, Uniparous (Monochasial) – Helicoid and Scorpoid, Biparous (Dichasial), Multiparous (Polychasial) Cyme; c) Special Type – Verticilliaster, Cyathium, Hypanthodium. **Morphology of Flower**. Definition, typical structure of flower. Types of flowers based on Symmetry, Insertion of floral whorls on thalamus.
4	**March**	**Floral whorls –** I) Accessory whorls: a) Calyx: member - sepals, number, cohesion, types of calyx; Modifications of calyx – Petaloid, Pappus, Spurred; b) Corolla: member – petals: Claw and Limb; number, cohesion, types / forms of corolla – Polypetalous Regular – Cruciform, Caryophyllous, Rosaceous; Polypetalous irregular – Papillionaceous; Gamopetalous Regular – Tubular, Infundibuliform, Campanulate, Salvar shaped, Rotate; Gamopetalous Irregular – Bilabiate, Personate and Ligulate; **Perianth:** member – tepals, number, cohesion, modifications – sepaloid and petaloid tepals. Aestivation – Definition; aestivation in calyx, corolla and perianth; types of aestivation. II) Necessary / Essential whorls: **Revision & Assignment**

		Theory Internal Examination **Practical Internal Examination** **Practical External Examination**
5	**April**	**Androecium: member** – stamen, Structure of stamen; Cohesion and Adhesion; b) Gynoecium: member – Carpel / Pistil; structure of carpel; Types of gynoecium based on carpel number and fusion; Placentation- Definition; types – Marginal, Parietal, Axile, Free-central, Basal, superficial. Morphology of Fruit and Seed : Definition and parts of fruit. Seed: Definition, Parts of typical seed.

Dr. K.M. Nitnaware

Syllabus Completion Report
S. Y. B. Sc. [Botany]: 2024-25
CBCS
BO: 241; Plant Anatomy and Embryology
(Semester IV, Paper I)

Month	Topics
December	**Credit – I; Plant anatomy** **Introduction –** Definition and scope of plant anatomy
January	**Epidermal tissue system** Structure, types and function of epidermis, Structure, types and function of stomata, Epidermal outgrowths - glandular and non-glandular, Motor cells **Mechanical tissue system** Principles involved in distribution of mechanical tissues with one example each – inflexibility, incompressibility, inextensibility and shearing stress, Vascular tissue system - Structure and function of xylem, phloem and cambium Structure and function of cambium. **Revision & Assignment, Class test** **Normal secondary growth** Introduction, Normal secondary Growth in Dicotyledonous stem
February	Development of annual rings, periderm, bark, tyloses and lenticels. **Anomalous secondary growth** Introduction, Causes, anomalous secondary growth Anomalous secondary growth in: Dicot stem (*Bignonia*), Dicot root (*Raphanus*) and monocot stem (*Dracaena*). **Seminar and Class test** **Introduction to plant embryology** Definition and scope of plant embryology **Microsporangium and male gametophyte** Structure of tetrasporangiate anther
March	Types of tapetum, Sporogenous tissue, Microsporogenesis: process and its types, Types of microspore tetrad, Male gametophyte: structure and development of male gametophyte. **Megasporangium and female gametophyte** Structure and Types of ovules, Types of megaspore tetrads Female gametophyte: structure of typical embryo sac; Types of embryo sacs – monosporic, bisporic and tetrasporic **Revision & Assignment** **Pollination and Fertilization** Introduction and definition; Types of pollination; Germination of pollen grain Entry of pollen tube- porogamy, mesogamy and chalazogamy; Double fertilization and its significance. **Endosperm and embryo** Endosperm: Types
April	**Endosperm and embryo (cont.)** nuclear, helobial and cellular; Structure of Dicotyledonous and Monocotyledonous embryo **Revision & Assignment, Previous Year Question paper discussion.** Theory Internal Examination Practical Internal Examination Practical External Examination

Dr. Sangeetha J.S.

Syllabus Completion Report

S.Y.B.Sc. Botany (CBCS): 2024-25 Term II

BO 242: Plant Biotechnology

(Semester IV, Paper II)

Sr. No.	Month	Topics
1	January	**Chapter 1 Introduction to Plant Biotechnology** History and definition, Scope and importance of plant biotechnology, Current status of biotechnology in India. **Chapter 2 Plant Tissue Culture** Concept of plant tissue culture and cellular totipotency; Basic techniques: Types of culture, Media preparation, sterilization, inoculation, incubation, hardening;Applications with reference to: Micropropagation, Somaclonal variation,
2	Februry	Haploid production, Protoplast fusion & Somatic hybrids, Embryo rescue, Production of secondary metabolites; Commercial Plant Tissue culture laboratories in Maharashtra and India. **Chapter 3 Single Cell Protein** (SCP) Concept and definition ; Importance of proteins in diet ; Production of SCP from *Spirulina* and Yeast; Importance & acceptability of SCP
3	March	**Internal Examination** **Chapter 4 Plant Genetic Engineering** Introduction, concept ; Tools of genetic engineering (restriction enzymes, ligases, plasmid vectors); Gene cloning Technique; Applications of plant genetic engineering: insect pest resistance, abiotic stress tolerance, herbicide resistance **Revision & Assignment** **Theory Internal Examination** **Practical Internal Examination**
4	April	**Chapter 5 Genomics, Proteomics and Bioinformatics** Genomics- concept, types, methods used for whole genome sequencing; Proteomics-concept, types, methods used in proteome analysis; Bioinformatics-concept, database and its classification, data retrieval tools. **Chapter 6 Bioremediation** Introduction and concept; Microbial remediation ; Phytoremediation **Chapter 7 Biofuel technology** Definition, Concept and types of Renewable and nonrenewable energy sources Definition and concept of Biogas, Bioethanol, Biobutanol, Biodiesel & Biohydrogen **Practical External Examination**

Dr. K.M. Nitnaware

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2024-25

BO. 341: PLANT PHYSIOLOGY AND METABOLISM

(Semester– VI; Paper – I)

Month	Topics
December	Syllabus Discussion; **Mineral nutrition**- Classification of mineral elements, macro and micronutrients; Role of essential elements; Transport of ions across cell membrane, Ionophores, Carriers and Channels. **Translocation in phloem** - Composition of phloem sap, girdling experiment; Pressure flow model. **Class test** **Plant growth regulators** - Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene. **Revision & Assignment**
January	**Stomatal Biology - L**ight-dependent Stomatal Opening, Mediation of Blue light Photoreception in Guard Cells by Zeaxanthin, Reversal of Blue Light–Stimulated Opening by Green Light, The Resolving Power of Photophysiology. **Photomorphogenesis**- Red and far-red light responses on photomorphogenesis, Phytochrome- discovery and mode of action. **Revision & Assignment, Class test** **Photosynthesis -** Mechanism of photosynthesis- Electromagnetic spectrum, Organization of Light-Absorbing Antenna Systems, Structure of chloroplast, Light Reaction - Cyclic photophosphorylation
Ferbruary	**Photosynthesis (cont.)** - Light Reaction – Non- cyclic photophosphorylation Dark Reaction: Calvin–Benson Cycle
March	**Photosynthesis (cont.)** - Photorespiration, C4 cycle and CAM pathway. **Respiration -** Types of respiration (Aerobic and anaerobic), Mechanism of aerobic respiration (Glycolysis, TCA cycle, Terminal oxidation and phosphorylation in respiratory chain); Pentose Phosphate Pathway. **Revision & Assignment, Class test** Theory Internal Examination Practical Internal Examination
April	Revision, Previous Year Question Paper Discussion, Model exam Practical External Examination Theory External Examination

Dr. Sangeetha J.S.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2024-25

BO.362: Biochemistry

(Semester– VI; Paper – II)

December	**Water: The solvent of life:** Physical properties of water, structure of water molecule, polarity of water molecule, weak interactions in aqueous solutions. **Amino acids and proteins:** Structure, classification, properties and functions of amino acids. Structure (primary, secondary, tertiary and quaternary), properties and functions of proteins Biological disorders of amino acid metabolism. Commercial applications.
January	**Enzymes:** Definition, nature of enzymes and co-factors, classification and properties of enzymes, active site. Mechanism of enzyme action: free energy, activation energy, binding energy, transition state, lock and key hypothesis, induced fit theory. Factors affecting enzyme activity: pH, temperature, substrate concentration, enzyme concentration. Enzyme inhibition: Competitive, uncompetitive, non-competitive.Reversible and irreversible inhibition, feedback inhibition **Carbohydrates:** Definition, classification of carbohydrates- Monosaccharides: aldoses and ketoses, configurations, linear to ring structure; Oligosaccharides: glycosidic bond, reducing and non-reducing sugars; Polysaccharides: homopolysaccharides, heteropolysaccharides, examples, their structures, locations and role. Properties and functions of carbohydrates. Commercial applications. **Revision, assignment**
February	**Lipids:** Definition, classification of lipids: simple, conjugate and derived lipids, properties and functions of lipids. Biological disorders of lipid metabolism. Commercial applications. **Vitamins:** Definition, classification of vitamins. source and functions of vitamins.
March	**Foundation of Biochemistry:** From molecules to the first cell (origin of a cell), Miller and Urey experiment. Biomolecules of a cell, functional groups in biomolecules, conformations and configurations of biomolecules. **Theory internal examination**
April	**Practical external and internal examination**

Prof. P. D. Kad

Syllabus Completion Report
T. Y. B. Sc. - Botany: 2024-25
BO.363: Plant Pathology
(Semester– VI; Paper – III)

December	**Fundamentals of Plant Pathology**: Introduction, Important terminology-Incitants, Host, Symptoms, Parasite, Pathogen, Inoculum, Penetration, Infection, Incubation, Disease. Economic importance of plant diseases, History of plant pathology, Introduction to Indian Agriculture Research Institute (IARI),International Crop Research Institute for Semi-Arid Tropics (ICRISAT), Contribution of Anton De Bary and Prof. B.B. Mundkur **Disease Development:** Concept of disease cycle, Inoculation, Prepenetration, Penetration, Infection, Dissemination.
January	Epidemics-Forms, Decline, Exponential model. **Defense Mechanisms**: Concept and Definition, Types-Preexisting- Structural and chemical, Induced- Structural and Biochemical. **Methods of Studying Plant Diseases.** Macroscopic study, Microscopic study, Koch"s postulates. Types of culture Media, Pure culture methods- Streak plate, Pour plate, Spread plate. **Fungal Plant Diseases:** Introduction to fungi as plant pathogens. Study of Diseases- Downy mildew of Grapes, Head smut of Jowar, Tikka diseases of Groundnut with reference to causal organism, symptoms and disease management. **Bacterial Plant Diseases.** Introduction to bacteria as plant pathogens, Study of Diseases- Citrus Canker, Black arm of Cotton with reference to causal organism, symptoms and disease management. **Revision, assignment**
February	**Mycoplasma Plant Diseases:** Introduction to Mycoplasma as plant pathogens, Study of Diseases- Grassy shoot disease of sugarcane, Little leaf of brinjal with reference to causal organism,symptoms and disease management. **Viral Plant Diseases**: Introduction of Virus as plant pathogens. Study of Diseases- Papaya Mosaic Disease, Bunchy top of Banana with reference to causal organism, symptoms and causal organism **Nematodal Plant Diseases:** Introduction to Nematodes as plant pathogens. Study of Diseases- Root knot diseases of vegetables, Soyabean cyst Nematodes with reference to causal organism,symptoms, Integrated management of Nematodal diseases **Non-Parasitic Diseases.** The impact and abiotic causes- Temperature, Soil moisture and relative humidity, Poor oxygen, Poor light, Air pollutants, mineral deficiencies. Herbicidal injury, Study of Mango necrosis, Black Heart of Potato. **Principles of plant diseases control:** General account, Quarantine, Eradication, cultural control practices, Biological control. Curative measures, chemical control, Use of Effective Microorganism solution (EMS), Microbial Pesticides. **Revision, assignment**
March	**Theory internal examination**
April	**Practical external and internal examination**

Prof. P. D. Kad

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2024-25

BO 3610: Nursery and Gardening Management

(Semester– VI; Paper – X)

January	**Nursery:** definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants. **Seed:** Structure and types - Seed dormancy; causes and methods of breaking dormancy.
February	**Seed (cont.)**- Seed storage: Seed banks, factors affecting seed viability, genetic erosion –Seed production technology - seed testing and certification. **Revision, assignment.** **Vegetative propagation**: Cutting, Selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings; Hardening of plants
March	**Vegetative propagation** (**cont**.) Air-layering, Greenhouse - mist chamber, shed root, shade house and glass house. **Revision, assignment.** Theory internal examination.
April	Previous Year Question Paper Discussion. Practical external examination Theory External Examination

Dr. Sangeetha J.S.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2024-25

BO 3610: Nursery and Gardening Management

(Semester– VI; Paper – X)

February	**Gardening:** definition, objectives and scope, importance
March	different types of gardening -landscape and home gardening - parks and its components - plant materials and design -computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting. **Sowing/raising of seeds and seedlings -** Transplanting of seedlings – Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots - Storage and marketing procedures. **Revision, assignment** **Theory internal examination**
April	**Practical internal and external examination**

Prof. P. D. Kad

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2024-25

BO 3611: BIOFERTILIZERS

(Semester– VI; Paper – XI)

March	**Fungal Biofertilizers** Introduction, Occurrence and Distribution of Mycorrhizal association. Types of Mycorrhizal association, growth and yield – colonization of VAM - Vesicular Arbuscular Mycorrhiza. Mycorrhizal applications in agriculture. **Revision, Assignment** Theory Internal Examination
April	**Compost and Manure** Organic Farming, green manuring, organic manures and their uses. Recycling by composting method of biodegradable, municipal, agricultural and industrial wastes, Biocompost making methods, Types and methods of vermicomposting. Benefits of vermicompost, field applications. **Revision, Previous Year Question Paper Discussion.** Practical External Examination Theory External Examination

Dr. Sangeetha J.S.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2024-25

BO 3611: Biofertilizers

(Semester– VI; Paper – XI)

January	**Introduction**: Introduction, Scope and importance of Biofertilizers,General account of the microbes used as Biofertilizers **Bacterial Biofertilizers** Isolation of Rhizobium, Identification, Mass multiplication, Carrier based inoculants. Azospirillum isolation and mass multiplication, carrier based inoculants and associative effect of different organisms Azotobacter, classification and characteristics, Crop response to Azotobacter inoculums, Mass multiplication of Azotobacter, Applications of Azospirillum, Phosphate solubilizing Bacteria
February	**Algal Biofertilizers** Cyanobacteria (Blue Green Algae): Isolation of Anabaena from Azolla, Mass Multiplication of Anabaena, Azolla - Anabaena relationship, Biological Nitrogen fixation Blue Green algae in a rice cultivation.Applications of BGA **Revision, assignment**
March	**Theory internal examination**
April	**Practical internal and practical external examination**

Prof. P. D. Kad