

Syllabus Completion Report

F. Y. B. Sc. - Botany: 2022-23

Plant life and utilization I (BO 111)

(Semester – I; Paper – I)

Sr. No.	Month	Topics
1	August	INTRODUCTION - General outline of plant kingdom (Lower Cryptogams: Thallophytes- Algae, Fungi & Lichens; Higher Cryptogams: Bryophytes and Pteridophytes; Phanerogams: Gymnosperms and Angiosperms- Dicotyledons and Monocotyledons). Distinguishing characters of these groups and mention few common examples from each. ALGAE – Introduction, General Characters, Classification (Bold and Wynne 1978) up to classes with reasons. Life Cycle of <i>Spirogyra</i> w.r.t. Habit, Habitat, Structure of thallus, structure of typical cell, Reproduction- Vegetative, Asexual and Sexual, systematic position with reasons. Revision and Assignment Class test
2	September	Utilization of Algae in Biofuel Industry, Agriculture, Pharmaceuticals, Food and Fodder LICHENS – Introduction, General Characters, Nature of Association, forms- Crustose, Foliose and Fruticose. Utilization of lichens. FUNGI – Introduction, General Characters, Classification (Ainsworth, 1973). Revision and Assignment Class test, Seminar
3	October	Life Cycle of Mushroom- <i>Agaricus bisporus</i> w.r.t. Habit, Habitat, Structure of thallus, Structure of Sporocarp Structure of Gill, Reproduction- Asexual and sexual, Systematic position. Utilization of Fungi in Industry, Agriculture, Food and Pharmaceuticals. Revision and Assignment Seminar
4	November	BRYOPHYTES – Introduction, General Characters, Classification (G.M. Smith 1955) Life Cycle of <i>Riccia</i> w.r.t. Habit, habitat, external and internal structure of thallus, Reproduction- vegetative, asexual and sexual- Structure of sex organs, fertilization, BRYOPHYTES Structure of mature sporophyte, structure of spore, systematic position with reasons. Utilization: Bryophytes as ecological indicators, agriculture, fuel, industry and medicine Revision and Assignment Theory Internal Exam
5	December	Revision and Assignment, Question paper discussion

Total lectures conducted: 50 lectures

Student strength: 65

Dr. K. M. Nitnaware

Syllabus Completion Report

F. Y. B. Sc. - Botany: 2022 -23

Plant Morphology and Anatomy (BO 112)

(Semester – I; Paper – II)

Sr. No	Month	Topics
2	September	<p>MORPHOLOGY Introduction, definition, descriptive and interpretative morphology. Importance in identification, nomenclature, classification, phylogeny and Plant breeding.</p> <p>Revision and Assignment, Tutorial</p> <p>MORPHOLOGY OF REPRODUCTIVE PARTS:</p> <p>Inflorescence Introduction and definition, Types: a) Racemose -Raceme, Spike, Spadix, Corymb, Umbel, Catkin and Capitulum. b) Cymose -Solitary, Monochasial- Helicoid and scorpioid; Dichasial and Polychasial. c) Special types -Verticillaster, Cyathium and Hypanthodium; Significance.</p> <p>Revision and Assignment, Tutorial</p> <p>Flower Introduction and definition, Parts of a typical flower: Bract, Pedicel, Thalamus- forms, Perianth-Calyx and Corolla, Androecium and Gynoecium. Symmetry: Actinomorphic and zygomorphic, Sexuality- Unisexual and bisexual, Insertion of floral whorls on thalamus- Hypogyny, Epigyny and perigyny, Merous condition-Trimerous, tetramerous and pentamerous. Floral whorls: a) Calyx: Nature- Polysepalous, Gamosepalous; Aestivation- types, Modifications of Calyx- Pappus, Petaloid and Spurred. identification.</p>
3	October	<p>b) Corolla: Forms of Corolla- i) Polypetalous- Cruciform and Papilionaceous. ii) Gamopetalous- Infundibuliform, Bilabiate, Tubular and Campanulate. iii) Aestivation- types and significance. c) Perianth: Nature- Polytepalous, Gamotepalous.d) Androecium: Structure of typical stamen, Variations- cohesion and adhesion. e) Gynoecium: Structure of typical carpel, number, position, cohesion and adhesion; placentation- types and significance.</p>
4	November	<p>Fruits Introduction and definition. Types of fruits: a) Simple: Dry- Indehiscent - Achene, Cypsela, Nut and Caryopsis; Dehiscent - Legume, Follicle and Capsule, Fleshy: Drupe, Berry, Hesperidium and Pepo. b) Aggregate: Etaerio of Berries and Etaerio of Follicles. c) Multiple fruits: Syconus and Sorosis.</p> <p>Revision</p> <p>ANATOMY Introduction and definition Importance in Taxonomy, Physiology, Ecological interpretations, Pharmacongny and Wood</p>

		<p>identification. Revision</p> <p>Types of Tissues</p> <p>Meristmatic tissues: Meristem, characters and types based on origin, position and plane of division, functions.</p> <p>Permanent tissues</p> <p>Complex/Vascular tissues: Components of xylem and phloem, types of vascular bundles and functions: Simple tissues - parenchyma, collenchymas, chlorenchyma and sclerenchyma.</p> <p>Theory Internal Examination</p>
5	December	<p>Types of Tissues (cont.)</p> <p>Epidermal tissues: Epidermis, structure of typical stomata, trichomes, motor cells; functions.</p> <p>Internal Organization of Primary Plant body</p> <p>Internal structure of dicotyledon and monocotyledon root.</p> <p>Internal structure of dicotyledon and monocotyledon stem.</p> <p>Internal structure of dicotyledon and monocotyledon leaf.</p> <p>Seminar and revision</p> <p>Revision and Assignment</p> <p>Question paper discussion</p>

Total lectures conducted: 37 Lectures

Student strength: 65

Dr. Sangeetha J.S.

Syllabus Completion Report

S.Y.B.Sc. Botany (CBCS): 2022 - 23

BO-231. Taxonomy of Angiosperms and Plant Ecology
(Semester III, Paper I)

Sl. No	Month	Topic
1	September	1. Introduction to Angiosperm Taxonomy Definition, Scope, objectives and importance of taxonomy, Exploration, Description, Identification, Nomenclature and Classification Concept of Systematics with brief historical background.
2	October	2. System of classification: Comparative account of various system of classification, Artificial system-Carl Linnaeus System of classification– Natural System- Bentham and Hooker, Phylogenetic system -Engler and Prantl, APG system -A brief review
3	November	3. Study of plant families Study of following families with reference to systematic position (As per Betham and Hooker's System of classification), Salient features, floral formula, floral diagram and any five examples with their economic importance- Annonaceae, Myrtaceae, Rubiaceae Study of Plant Families Solanaceae, Apocynaceae, Nyctaginaceae and Amaryllidaceae Introduction to Ecology: Definition, concept, scope and interdisciplinary approach, autecology and synecology Species diversity: definition, concept, scope and types: Alpha, Beta, and Gamma diversity. Methods of vegetation sampling: quadrat method, transect method, plot less method Theory Internal Exam
4	December	Ecological grouping of plants with reference to their significance of adaptive external and internal features: a) Hydrophytes, b) Mesophytes c) Xerophytes d) Halophytes with examples. Botanical Nomenclature Concept of nomenclature, brief history, Binomial nomenclature, International code of nomenclature of Algae, Fungi and Plants (ICN), Principles, Rules and Recommendation, Type specimen and its types (Holotype, Paratype, Isotype, Lectotype, Neotype). Concept of Typification, Ranks and endings of taxa names, Coining of Genus names and species names Single, double and multiple authority citation. Revision and Assignment Question paper discussion

Total lectures conducted: 30 lectures

Student strength: 53

Dr. Sangeetha J.S.

Syllabus Completion Report

S. Y. B. Sc. Botany; CBCS 2022 -23

BO: 232; Plant Physiology

(Semester III, Paper II)

Sr. No.	Month	Topic
1	22 September	Introduction to Plant Physiology Brief history, Scope and applications of plant physiology
2	October	Absorption of water Role of water in plants Mechanisms of water absorption with respect to crop plants Factors affecting rate of water absorption Revision, Assignment Ascent of sap Introduction and definition. Transpiration pull or cohesion-tension theory; evidences and objections Factors affecting ascent of sap Transpiration Definition Types of transpiration – cuticular, lenticular and stomatal Structure of stomata Mechanism of opening and closing of stomata
3	November	Steward's hypothesis, Active K ⁺ transport mechanism Factors affecting the rate of transpiration Significance of transpiration Antitranspirants Guttation Exudation Nitrogen metabolism Introduction, Biological nitrogen fixation, Symbiotic nitrogen fixation, nitrogenase enzyme- structure and function , Non-symbiotic nitrogen fixation ,Denitrification, ammonification and nitrification, Reductive amination and transamination Role of nitrogen in plants, Theory Internal Examination
4	December	Seed dormancy and germination Definition, types of seed dormancy and germination Methods to break seed dormancy Metabolic changes during seed germination Role of phytohormones to improve seed germination Vigor Index Physiology of flowering

		<p>Photoperiodism – Concept, definition, short day plants, long day plants and day neutral plants, Photoperiodic induction, phytochrome and flowering , Phytohormones and initiation of flowering , Applications of photoperiodism; Vernalisation – concept and definition, mechanism of vernalisation, applications of vernalisation, devernalization</p> <p>Revision, Assignment</p> <p>Question paper discussion</p> <p>Practical Internal Examination</p> <p>Revision and Assignment, Question paper discussion</p>
--	--	---

Total lectures conducted:32 lectures

Student strength: 53

Dr. K.M.Nitnaware

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022 - 23

BO: 351 Cryptogamic Botany

(Semester– V; Paper – I)

Sr. No	Month	Topics
1	October	<p>Introduction: Cryptogams- meaning. Types- Lower Cryptogams, brief Review with examples</p> <p>Algae: General characters, distribution, Thallus organization, habit and Habitat reproduction and Classification (G.M.Smith 1955) up to classes.</p> <p>Study of life cycle of algae with reference to taxonomic position, Occurrence, Thallus structure, and reproduction of <i>Nostoc</i>, <i>Oedogonium Chara</i>, <i>Sargassum</i> and <i>Batrachospermum</i>.</p> <p>Economic importance of algae- Role in industry, agriculture, fodder and medicine.</p>
2	November	<p>Fungi: General characters, Habit and habitats, thallus organization, cell wall composition, nutrition and Classification. (Alexopoulos and Mims 1979) up to classes.</p> <p>Study of life cycle fungi with reference to taxonomic position, thallus structure, and reproduction of <i>Mucor</i> (Zygomycotina), <i>Saccharomyces</i> (Ascomycotina), <i>Puccinia</i> (Basidiomycotina), <i>Cercospora</i></p> <p>Theory Internal Exam</p>
3	December	<p>Study of life cycle of fungi with reference to taxonomic position, thallus structure, and reproduction of <i>Penecillium</i></p> <p>Symbiotic Associations - Lichens, <i>Mycorrhiza</i> and their significance</p> <p>Revision, Assignment & question paper discussion</p> <p>Practical Internal Exam</p>

Total lectures conducted: 21 lectures

Student strength: 9

Prof. S. S. Katkar

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022 -23

BO.352: Archegoniate

(Semester– V; Paper – II)

Sr. No	Month	Topics
1	August & September	Introduction to Archegoniate: Introduction , general characters, distribution of Bryophytes to land habit, classification of Bryophytes according to G.M. Smith (1955) up to classes with reasons. Range of thallus organisation , origin of Bryophytes - Pteridophytes and Algal hypothesis, evolution of sporophyte. Study of Life Cycle of Bryophytes with respect to Taxonomic position, Morphology, Anatomy, Reproduction, Gametophytes and sporophytes of <i>Marchantia</i> , Revision, Assignment
2	October	<i>Anthoceros</i> and <i>Funaria</i> . Ecological and economic importance of Bryophyte . Introduction- Vascular Cryptogams, General characteristics, Classification according to K.R. Sporne (1975) up to classes with reasons,
3	November	Diversity and Distribution of Pteridophytes . Resemblances of Pteridophytes with Bryophytes, Differences between Pteridophytes and Bryophytes, Origin of Pteridophytes -Algal and Bryophytes, Evolution of Pteridophytes - Telome Theory and Enation Theory. Study of Life Cycle of Pteridophytes with respect to Taxonomic position, Morphology, Anatomy, Reproduction, Sporophytes and Gametophytes of <i>Psilotum</i> , <i>Selaginella</i> and <i>Equisetum</i> . Theory Internal Exam
5	December	Ecological and Economical Importance of Pteridophytes. Revision, Assignment and Question paper discussion.

Total lectures conducted: 33 lectures

Student strength: 9

Prof. R.V. Mechkar.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022- 23
BO.353: Spermatophyta and Palaeobotany
(Semester– V; Paper – III)

Sr. No	Month	Topics
1	August	Introduction to Gymnosperms General characters
2	September	Introduction to Gymnosperms (cont.) Economic importance and classification according to Chamberlain (1934). Study of life cycle of <i>Pinus</i> with reference to distribution, morphology, anatomy, reproduction, gametophyte, sporophyte, seed structure and alternation of generations. Revision and Assignment
3	October	Study of life cycle of <i>Gnetum</i> with reference to distribution, morphology, anatomy, reproduction, gametophyte, sporophyte, seed Structure and alternation of enerations. Fossil- Definition, process of fossil formation, types of fossils.-Impression, Compression, Petrification, Pith cast and Coal ball. Classification: Outline, Merit and Demerits of Cronquist’s System Revision and Assignment
4	November	Classification (cont.) APG IV system of classification. Study of following families with reference to systematic position (As per Bentham & Hooker), Diagnostic characters,floral formula, floral diagram and any five examples with their economic importance – Nymphaeaceae, Oleaceae, Amaranthaceae, Cannaceae Origin of angiosperms: with reference to time, place and ancestry- 1) Pseudanthial theory 2) Transitional-Combinational Theory Revision and Assignment Theory Internal Exam
5	December	Herbaria and Botanical Gardens Functions of Herbarium, Important herbaria (World: Kew herbarium; India: Central National Herbarium, Kolkata). Botanic gardens of the world (Royal Botanic Garden, Kew) and India Speciation & Endemism Species concept (Biological, Taxonomic & Phylogenetic Species Concept), Speciation (Allopatric, Sympatric &Parapatric), Endemism and its types (Palaeoendemism, Holoendemism and Neoendemism) Practical Internal Exam Revision, Question paper discussion

Total lectures conducted: 32 lectures

Student strength: 09

Dr. Sangeetha J. S.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

BO.354: Plant Ecology

(Semester– V; Paper – IV)

Sr. No	Month	Topics
1	August	Introduction , interrelationship between the living world and the environment, levels of organization, components and dynamism of ecosystem, homeostasis, niche concept, concept of limiting factors
2	September	Population ecology : Definition, characteristics, population growth form, r and k selection Community ecology : Introduction and Definition, community structure, physiognomy, Raunkiaer's life form classification, keystone species, edge and ecotone Revision & Assignment
3	October	Biogeochemical cycles : The carbon cycle, Nitrogen cycle, Phosphorus cycle, and Hydrologic cycle
4	November	Ecological Impact Assessment (EIA) Introduction, Historical Review of EIA, Objectives of EIA, Stages of EIA process: Screening; Scoping; Baseline study; Impact prediction and assessment; Mitigation; Producing Environmental Impact Statement (EIS); EIS review; Decision making; Monitoring, Compliance and Enforcement; Benefits of EIA. Remote Sensing Definition, basic principles, process of ecological data acquisition and interpretation, global positioning system, application of remote sensing in ecology. Ecological management : Concepts, sustainable development, sustainability indicators Theory Internal Exam
5	December	Environmental Audit Meaning and concept, need, objectives, benefits, types, audit protocol, process, certification, personnel environmental audit Biogeography : Floristic realms, speciation and its types, biogeographic regions of India, Plant indicators Revision, Seminars and Question paper discussion Practical Internal Exam

Total lectures conducted: 30 lectures

Student's strength: 9

Prof. P. D. Kad.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

BO.355: Cell and Molecular Biology

(Semester– V; Paper – V)

Sr. No	Month	Topics
1	October	Introduction to Cell Biology : Definition, Brief history of Cell Biology, Units of measurement for cell, Interdisciplinary nature of Cell Biology Cell organelles: Ultrastructure, components and functions of Cell wall and cell membranes, mitochondria and Chloroplast, endoplasmic Reticulum, Golgi apparatus, Lysosomes, Vacuoles
2	November	Nucleus: Morphology and ultrastructure of nucleus, nucleolus and nucleolar organizer Nuclear envelope – structure of nuclear pore complex, transport of molecules across nuclear envelope. Revision and Assignment Chromosomes: Euchromatin and heterochromatin Histones, Packing of DNA into chromosomes in eukaryotes, Karyotype and ideogram, Polytene chromosomes and lampbrush chromosomes. Genetic material DNA: historical perspective from 1953 to 2020, Griffith's and Avery's transformation experiments, Hershey-Chase bacteriophage experiment. Revision and Assignment Theory Internal Exam

Total lectures conducted: 16 lectures

Student's strength: 9

Prof. R.V. Mechkar.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

BO.356: Genetics

(Semester– V; Paper – VI)

Sr. No	Month	Topics
1	August	Introduction to Genetics. History, Definition, Concept, branches and applications of Genetics.
2	September	Mendelism Genetical terminology, Monohybrid cross, Law of dominance, Incomplete dominance, Law of segregation, Dihybrid cross, Dihybrid ratio, Law of independent assortment, Back cross and Test cross. Neo Mendelism (Gene Interaction) Genetic interaction, Epistatic interactions –supplementary gene (recessive epistasis 9:3:4), Inhibitory genes (13:3), Masking genes (12:3:1), Non- Epistatic inter-allelic genetic interactions-Complementary genes (9:7), Duplicate genes (15:1)
3	October	Multiple alleles Definition, Concept, Characters of multiple alleles, Examples of multiple alleles – Blood group in human and self-incompatibility in Nicotiana Linkage, Recombination and Crossing Over Linkage- Definition and Types, Crossing over: Definition and Types, Construction of a linkage map by two point test cross and three point testcross, Recombination: Concept, definition and types Revision & Assignment
4	November	Mutation: Concept, definition and types Numerical alterations of chromosomes.: Euploidy, Aneuploidy-Concept and Types, Aneuploidy in Plants and Human, Polyploidy in Plants & Animals, Induced Polyploidy, applications of Polyploidy Structural alterations of chromosomes.: Types, cytology and genetic effects of Deletion, Duplication Inversion and Translocation with examples. Cytoplasmic & Quantitative Inheritance: Concept of quantitative inheritance, Inheritance of quantitative trait in Maize (Cob length), Theory Internal exam
5	December	Cytoplasmic inheritance Definition and concept, Chloroplast- Variegation in Four O'clock plants, Mitochondria- Petite mutants in yeast. Sex Linked Inheritance: Concept of Sex chromosomes and autosomes, Inheritance of X-linked genes –Inheritance of colour blindness in humans, Inheritance of Y-linked (Holandric genes) in humans, Sex influenced genes, Sex-limited genes. Revision, Seminars and Question paper discussion Practical Internal Exam

Total lectures conducted: 36 lectures

Student's strength: 9

Prof. P.D.Kad

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

Skill Enhancement course

BO.3510: Medicinal Botany

(Semester– V; Paper – X)

Sr. No	Month	Topics
1	October	Medicinal Plants: History, Scope and Importance 01 2 Indigenous Medicinal Sciences; Definition and Scope Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments.
2	November	Siddha: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. Unani: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations. Revision and Assignment Theory Internal Exam

Total lectures conducted: 10 lectures

Student's strength: 09

Prof. R.V. Mechkar.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

Skill Enhancement course

BO.3511: Plant Diversity and Human Health

(Semester– V; Paper – XI)

Sr. No	Month	Topics
1	October	Plant diversity and its scope- Genetic diversity, Species diversity, Plant diversity at the ecosystem level. Agrobiodiversity and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Precautionary principle, Methodologies for valuation, Uses of plants, Uses of microbes.
2	November	Loss of Biodiversity: Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agrobiodiversity, Projected scenario for biodiversity loss. Management of Plant Biodiversity: Organizations associated with biodiversity management-Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations. Conservation of Biodiversity: Conservation of genetic diversity, species diversity and ecosystem diversity, In situ Theory Internal Exam
3.	December	Conservation of Biodiversity : Ex situ conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development. Role of plants in relation to Human Welfare a) Importance of forestry their utilization and commercial aspects b) Avenue trees c) Ornamental plants of India. d) Alcoholic beverages through ages. Fruits and nuts: Important fruit crops their commercial importance. Wood and its uses. Practical Internal Exam Revision, Question paper discussion

Total lectures conducted: 7 lectures

Student's strength: 9

Prof. S.S.Katkar

**KTSP MANDAL'S
HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR, PUNE**

DEPARTMENT OF BOTANY

All the practicals of F.Y. B.Sc., S.Y. B.Sc. and T.Y. B.Sc., Term-I were completed on time as per the guidelines of Savitribai Phule Pune University.

Faculties:

1. Dr. K.M. Nitnaware
2. Dr. Sangeetha J.S.
3. Dr. S.M. Jagtap
4. Prof. P.D. Kad
5. Prof. R.V. Mechkar
6. Prof. S.S. Katkar

Dr. K.M. Nitnaware
Head,
Dept. of Botany

Syllabus Completion Report
F.Y.B.Sc. Botany CBCS Pattern
(Semester II, Paper I) 2022-23
BO-121: PLANT LIFE AND UTILIZATION II

Sr. No.	Month	Topic Covered
1	March	<p>Credit I</p> <p>1. INTRODUCTION: Introduction to plant diversity- Pteridophytes, Gymnosperms and Angiosperms with reference to vascular plants.</p>
2	April	<p>2. PTERIDOPHYTES: General characters, Outline classification according to Sporne (1976) up to classes with reasons. Life cycle of Nephrolepis w.r.t. Habit, habitat, distribution, morphology, anatomy of stem and leaf, Reproduction – vegetative and sexual.</p> <p>3. Utilization and economic importance of Pteridophytes</p>
3	May	<p>Credit II</p> <p>1. GYMNOSPERMS: General characters, Outline classification according to Sporne (1977) up to classes with reasons. Life cycle of Cycas w.r.t. Habit, Habitat, Distribution, Morphology and Anatomy of Stem, leaf and reproductive organs- Male cone, Microsporophyll, microspores and megasporophyll, megaspore; structure of seed; Utilization and economic importance of gymnosperms.</p> <p>2. ANGIOSPERMS: General characters, Outline of classification of Bentham and Hooker’s system up to series, comparative account of monocotyledons and dicotyledons.</p> <p>3. Utilization and economic importance of Angiosperms: In food, fodder, fibers, horticulture and medicines.</p> <p>Theory Internal Examination Practical Internal Examination Practical External Examination Revision & Assignment</p>

Dr. K. M Nitnaware

Syllabus Completion Report
F. Y. B. Sc. [Botany]: 2022-23
CBCS

BO-122; Principles of Plant Sciences
(Semester II, Paper II)

Sr. No	Month	Topics
1	February	Credit - I Introduction to Plant Physiology Diffusion
2	March	Osmosis Plasmolysis Growth – Definition, Revision & Assignment
3	April	Growth (Cont.) - Factors affecting growth, plant growth regulators Structure of Prokaryotic & Eukaryotic plant cell Plant Cell wall Ultra structure of Chloroplast Cell Cycle in Plants- Mitosis, Meiosis Plasma Membrane Revision & Assignment
4	May	Introduction to Molecular Biology Structure of DNA Watson & Crick model of DNA Types of Chromosomes Structure and types of RNA DNA replication Theory Internal Examination Practical Internal Examination Practical External Examination

Dr. Sangeetha J.S.

Syllabus Completion Report
S. Y. B. Sc. [Botany]: 2022-23
CBCS

BO: 241; Plant Anatomy and Embryology
(Semester IV, Paper I)

Month	Topics
March	<p>Credit – I; Plant anatomy Introduction – Definition and scope of plant anatomy 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 Revision & Assignment</p>
April	<p>Mechanical tissue system (cont.) Vascular tissue system - Structure and function of xylem, phloem and cambium Structure and function of cambium Normal secondary growth Introduction, Normal secondary Growth in Dicotyledonous stem Development of annual rings, periderm, bark, tyloses and lenticels. Anomalous secondary growth Introduction, Causes, anomalous secondary growth Anomalous secondary growth in: Dicot stem (<i>Bignonia</i>), Dicot root (<i>Raphanus</i>) and monocot stem (<i>Dracaena</i>) Introduction to plant embryology Definition and scope of plant embryology Microsporangium and male gametophyte Structure of tetrasporangiate anther, 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</p>
May	<p>Megasporangium and female gametophyte (cont.) Female gametophyte: structure of typical embryo sac; Types of embryo sacs – monosporic, bisporic and tetrasporic 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 – nuclear, helobial and cellular; Structure of Dicotyledonous and Monocotyledonous embryo Revision & Assignment Theory Internal Examination Practical Internal Examination Practical External Examination</p>

Syllabus Completion Report

S.Y.B.Sc. Botany (CBCS): 2022-23

BO 242: Plant Biotechnology

(Semester IV, Paper II)

Sr. No.	Month	Topics
1	March	Chapter 1 Introduction to Plant Biotechnology History and definition, Scope and importance of plant biotechnology, Current status of biotechnology in India.
2	April	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, 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 <i>Spirulina</i> and Yeast; Importance & acceptability of SCP Revision & Assignment
5	May	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 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 Revision & Assignment Theory Internal Examination Practical Internal Examination Practical External Examination

Dr. K.M. Nitnaware

Syllabus Completion Report
T. Y. B. Sc. - Botany: 2022-23

BO. 341: PLANT PHYSIOLOGY AND METABOLISM
(Semester– VI; Paper – I)

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

Dr. Sangeetha J.S.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

BO.362: Biochemistry

(Semester– VI; Paper – II)

February	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.
March	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.
April	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. 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. Revision, assignment
May	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 and practical external examination

Prof. P. D. Kad

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

BO.363: Plant Pathology

(Semester– VI; Paper – III)

February	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
March	Disease Development: Concept of disease cycle, Inoculation, Prepenetration, Penetration, Infection, Dissemination. 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.
April & May	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. 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 Theory internal and practical external examination

Prof. P. D. Kad

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

BO.364: Evolution and population genetics

(Semester– VI; Paper – IV)

February	<p>Organic Evolution: Distinction between Origin of life and Organic Evolution, Historical account of Origin of life, Origin of Earth Vs Origin of life: Gaia Hypothesis, Earliest Fossils, Prebiotic Evolution, Abiotic synthesis of organic matter, Primordial soup, origin of membranes, Oparin's Coacervate model, Theory of Panspermia, Early life and RNA and Origin of genetic code</p> <p>Organic Evolution: The concept of organic evolution, Theories of Evolution, Pre-Darwinian period, Theory of Inheritance of acquired characters (Lamarck's), Darwinism- Theory of Natural Selection, Post-Darwinian period- Modern synthetic theory</p>
March	<p>Evidences of Evolution Direct evidences and conclusions from fossil records, Indirect evidences, Evidences from Genetics, Evidences from bio-geographical relations</p> <p>Evolution Through Ages: Fossils and Geological Time scale: Fossils and Fossilization, Conditions of fossilization, Dating of fossils: Uranium Lead method, Radio-carbon method, U-series and ESR method, Geological Time scale: Eras, Periods, epochs, and duration in millions of years and plant life.</p> <p>Population Genetics and Evolution: Concept of Mendelian population, Gene Pool and its models, Hardy-Weinberg law of gene frequencies, Factors affecting allelic frequency, Genetic polymorphism</p>
April	<p>Speciation and Isolating Mechanisms: Introduction, Morphological Criteria for Species and Races, Allopatric and Sympatric Populations, Isolating Mechanisms: Pre zygotic Isolation mechanisms: Concept, Spatial & Ecological, Seasonal Isolation, Ethological Isolation, Mechanical Isolation, Post zygotic Isolation mechanisms: Concept, Hybrid in viability, Hybrid sterility & Hybrid breakdown.</p> <p>Revision, assignment</p>

Prof. R.V.Mechkar

Syllabus completion report

T. Y. B. Sc. - Botany: 2022-23

BO: 365 Advanced Plant Biotechnology

(Semester– VI; Paper – V)

Sr. No	Month	Topics
1	February	Biotechnology: Introduction, Traditional and modern Biotechnology. Impact of Biotechnology on Health care, Agriculture, and Environment Plant Tissue Culture: Concepts of Cell theory & Cellular totipotency, Landmarks in plant tissue culture. Pluripotency, Differentiation, dedifferentiation, redifferentiation, Hormones used in PTC, 'Explant' for plant tissue culture and Response of explants in vitro– callus formation,
2	March	Organogenesis (direct and indirect) and embryogenesis (direct and indirect). Micro propagation of Banana (in detail from Selection of explant to hardening and marketing) Techniques of Genetic Engineering and Methods of gene transfer in Plants- Cryopreservation and Germplasm Conservation Definition and concept, techniques of cryopreservation, cold storage, long term and short term storage, applications. Germplasm Conservation: Preservation of Cell, tissue, organ, whole organism. Concept of Gene Bank, DNA Bank, Seed Bank, Pollen Bank etc
3	April	Nano- biotechnology : Definition and concept, Applications of nanotechnology in agriculture (Fertilizers and pesticides) Biotechnology and Society: Biotechnology- Benefits, GM foods and its safety, Recombinant foods and religious beliefs, Recombinant therapeutic product for human health care. Patenting of biotechnological inventions and Intellectual property rights.
4	May	Microbial Biotechnology: Biochemistry of fermentation, Microorganism used in fermentation, fermentable substrate, Ethanol fermentation methods, Distilleries producing alcohols. Commercial production: Alcoholic beverages, organic acids, citric acids. Advantages of fermentation. Transgenic Plants as Bioreactors: Metabolic engineering of starch, cyclodextrins, fructans, Bioplastics, Genetically engineered plants as protein factories, Production of therapeutic proteins from plants. Theory Internal Examination Practical Internal Examination Practical External Examination

Prof. R.V. Mechkar.

Syllabus Completion Report

T. Y. B. Sc. - Botany: 2022-23

BO 3610: Nursery and Gardening Management

(Semester– VI; Paper – X)

March	<p>Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.</p> <p>Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion –Seed production technology - seed testing and certification.</p>
April	<p>Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants– greenhouse - mist chamber, shed root, shade house and glass house.</p>
May	<p>Gardening: definition, objectives and scope - 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.</p> <p>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.</p> <p>Revision, assignment Theory internal and practical external examination</p>

Prof. S. S. Katkar

Syllabus Completion Report
T. Y. B. Sc. - Botany: 2022-23

BO 3611: BIOFERTILIZERS
(Semester– VI; Paper – XI)

February	<p>Introduction: Introduction, Scope and importance of Biofertilizers. General account of the microbes used as Biofertilizers</p> <p>Bacterial Biofertilizers Isolation of Rhizobium, Identification, Mass multiplication, Carrier based inoculants.</p>
March	<p>Bacterial Biofertilizers 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.</p>
April	<p>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</p> <p>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.</p> <p>Compost and Manure Organic Farming, green manuring, organic manures and their uses. Recycling by composting method of biodegradable, municipal, agricultural and industrial wastes.</p>
May	<p>Compost and Manure Biocompost making methods, Types and methods of vermicomposting. Benefits of vermicompost, field applications.</p> <p>Revision, Assignment Theory internal and practical external examination</p>

Prof. S. S. Katkar

