Teaching Plan

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

Applied Aspects of Plant Sciences (BOT-101-T)

(Semester – I; Paper – I)

Name of the Teacher: Dr. K. M. Nitnaware

Sr. No.	Month	Topics
1	June	Introduction to Applied Plant Sciences 1.1. Overview of key concepts and principles 1.2. Importance of applied plant sciences in addressing global challenges.
2	July	Plant Biotechnology 2.1. Genetic engineering techniques in crop improvement. 2.2. Plant Tissue Culture for improvement of crop productivity. 2.3. Biopharmaceuticals and plant-derived drugs. 2.4. Applications of biotechnology in plant breeding and biotic/abiotic stress tolerance. **Revision, Assignment**
3	August	Precision Agriculture 3.1. Remote sensing and GIS applications in agriculture. 3.2. Use of drones and sensors for crop monitoring and management. **Revision, Assignment**
4	September	Sustainable Agriculture Practices 4.1. Organic farming methods and principles. 4.2. Integrated pest management strategies. Plant-Microbe Interactions 5.1. Role of plant-associated microbes in plant health and productivity. 5.2. Applications of beneficial microbes in agriculture. Climate Change and Plant Sciences 6.1. Impact of climate change on plant growth and agriculture. 6.2. Strategies for mitigating climate change effects through plant science interventions. **Revision, Assignment**
5	October	Urban Agriculture and Vertical Farming 7.1. Challenges and opportunities in urban agriculture. 7.2. Vertical farming technologies and their applications. 7.3. Ornamental plant cultivation. 7.4. Urban gardening and landscaping. Plant Health and Disease Management 8.1. Diagnosis and management of plant diseases. 8.2. Emerging technologies for disease detection and control. Postharvest Technology 4.1. Techniques for prolonging shelf life and maintaining quality of harvested produce. 4.2. Importance of postharvest management in reducing food loss and waste. Environmental applications 10.1. Plant ecology and conservation 10.2. Ecological restoration techniques 10.3. Phytoremediation and air purification. **Revision, Assignment** **Question paper discussion**

Teaching Plan

S.Y.B.Sc. Botany (CBCS): 2024 - 25
Taxonomy of Angiosperms and Plant Ecology (BO-231)
(Semester III, Paper I)

Name of the Teacher: Dr. Sangeetha J.S.

Sl. No	Month	Topic
1	July	**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. 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 **Revision**
2	August	**3. Study of plant families** Salient features, floral formula, floral diagram and any five examples with their economic importance- Annonaceae, Brassicaceae, Myrtaceae, Rubiaceae, Solanaceae, Apocynaceae, Nyctaginaceae and Amaryllidaceae. **4. Botanical Nomenclature** Concept of nomenclature, brief history, Binomial nomenclature, International code of nomenclature of Algae, Fungi and Plants (ICN),Principles, Rules and Recommendations. 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 citations. **Revision**
3	September	**6. Ecological grouping of plants** with reference to their significance of adaptive external and internal features with examples. a) Hydrophytes, b) Mesophytes c) Xerophytes d) Halophytes **5. 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: quadrate method, transect method, plot less method
4	October	**Revision and Assignment** **Question paper discussion** **Revision** **Theory Internal Exam**

Teaching Plan

S. Y. B. Sc. Botany; CBCS 2024 -25
BO: 232; Plant Physiology
(Semester III, Paper II)

Name of the Teacher: Dr. K. M. Nitnaware

Sr. No.	Month	Topic
1	**June**	**Introduction to Plant Physiology** Brief history, Scope and applications of plant physiology
2	July	**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
3	August	**Transpiration** Definition , Types of transpiration – cuticular, lenticular and stomatal Structure of stomata , Mechanism of opening and closing of stomata, Steward's hypothesis, Active K+ transport mechanism, Factors affecting the rate of transpiration, Significance of transpiration, Antitranspirants Guttation Exudation **Revision and Assignment**
4	September	**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, **Revision and Assignment** **Theory Internal Examination**
5	October	**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** 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 **Revision, Assignment** **Question paper discussion** **Practical Internal Examination** **Revision and Assignment, Question paper discussion**

Teaching Plan

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

BO: 351 Cryptogamic Botany

(Semester– V; Paper – I)

Name of the Teacher: Prof. P.D.Kad

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

Teaching Plan

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

BO.352: Archegoniate

(Semester– V; Paper – II)

Name of the Teacher: Prof. P.D.Kad

Sr. No	Month	Topics
1	July	**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 andAlgal hypothesis, evolution of sporophyte.
2	August	Study of Life Cycle of Bryophytes with respect to Taxonomic position, Morphology, Anatomy, Reproduction, Gametophytes and sporophytes of ***Marchantia***, ***Anthoceros*** and ***Funaria.*** Ecological and economic importance of **Bryophyte.** **Introduction**- Vascular Cryptogams, General characteristics, Classification according to K.R. Sporne (1975) up to classes with reasons, **Revision, Assignment**
3	September	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 ***Psilotum***, ***Selaginella*** and ***Equisetum.*** Ecological and Economical Importance of Pteridophytes. **Revision, Assignment** **Theory Internal Exam**
4	October	**Revision, Assignment and Question paper discussion.** **Practical Internal & external Exam**

Prof. P. D. Kad

Teaching Plan

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

BO.353: Spermatophyta and Palaeobotany

(Semester– V; Paper – III)

Name of the Teacher: Dr. Sangeetha J.S.

Sr. No	Month	Topics
1	July	**Introduction to Gymnosperms** General characters Economic importance and classification according to Chamberlain (1934). **Revision, Assignment**
1	August	**Study of life cycle of *Pinus*** with reference to distribution, morphology, anatomy, reproduction, gametophyte, sporophyte, seed structure and alternation of generations. **Study of life cycle of *Gnetum*** with reference to distribution, morphology, anatomy, reproduction, gametophyte, sporophyte, seed Structure and alternation of generations. **Fossil**- Definition, process of fossil formation, types of fossils.-Impression, Compression, Petrifaction, Pith cast and Coal ball. **Revision, Assignment**
2	September	**Classification:** Outline, Merit and Demerits of Cronquist's System 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**
3	October	**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 and Assignment** **Question paper discussion** **Theory Internal Exam**

Teaching Plan

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

BO.354: Plant Ecology

(Semester– V; Paper – IV)

Name of the Teacher: Prof. P.D.Kad

Sr. No	Month	Topics
1	July	**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	August	**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 **Biogeochemical cycles:** The carbon cycle, Nitrogen cycle, Phosphorus cycle, and Hydrologic cycle **Revision & Assignment**
3	September	**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 **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 **Theory Internal Exam**
4	October	**Revision, and Question paper discussion** **Practical Internal Exam**

Teaching Plan

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

BO.355: Cell and Molecular Biology

(Semester– V; Paper – V)

Name of the Teacher: Dr. K. M. Nitnaware

Sr. No	Month	Topics
1	July	**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	August	**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.
3	September	**Genetic material DNA**: historical perspective from 1953 to 2020, Griffith's and Avery's transformation experiments, Hershey-Chase bacteriophage experiment. DNA replication (Prokaryotes and Eukaryotes): Molecular mechanism of DNA replication. Enzymes involved in both prokaryotic and eukaryotic DNA replication and their inhibitors (antibiotics). **Theory Internal Exam**
4	October	**Gene expression**:Transcription (Prokaryotes in details and passing remarks on Eukaryotes) Types of RNA: mRNA, tRNA, rRNA; Types of promoters; types of RNA polymerase enzymes in eukaryotes; molecular mechanism of transcription. **Translation** (Prokaryotes and Eukaryotes): Definition, concept and properties of genetic code; molecular mechanism of translation. **Regulation of gene expression**: Concept of operon, *lac* operon and *trp* operon, positive and negative control, one gene one enzyme hypothesis. **Cell signaling:** Introduction and definition, Signaling molecules and receptors, Calcium signaling pathway in plants

Teaching Plan

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

BO.356: Genetics

(Semester– V; Paper – VI)

Name of the Teacher: Dr. S. M. Jagtap

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- Varigation 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**