**GOVERENMENT COLLEGE BAHADURGARH**
**LESSON PLAN**
**SESSION: 2025-26**

**Subject : Botany**
**Paper Name : Diversity of Microbes**
**Subject Code : 24BOTM401DS01**
**Semester : First Sem**
**Teacher Name: Dr. Neetu Kataria**

| Months | Topics |
|---|---|
| **July** | **Bacteria:** Discovery, general characteristics; Types-archaebacteria, eubacteria, wall-less forms (mycoplasma and spheroplasts); Cell structure; Nutritional types; Reproduction-vegetative, asexual and |
| **August** | recombination (conjugation, transformation and transduction). Economic importance of bacteria with reference to their role in agriculture and industry (fermentation and medicine).**Viruses:** Discovery, physiochemical and biological characteristics; classification (Baltimore), general structure with special reference to viroids and prions; replication (general account), DNA virus (T-phage), lytic and lysogenic cycle; RNA virus (TMV). |
| **September** | **Cyanobacteria:** General characters; thallus organization; cell structure; heterocyst and akinete development; reproduction; Life-cycle of *Nostoc.* Economic Importance of Cyanobacteria. **Algae**: General characteristics; Algae in diversified habitats (terrestrial, freshwater, marine); thallus organization; cell ultrastructure; reproduction (vegetative, asexual and sexual); Algal classification criteria- pigments, reserve food and flagella; Classification upto classes (Smith, 1955); algal blooms and red tides; algal biofertilizers. |
| **October** | Morphology and life-cycle of *Volvox*, *Oedogonium* (Chlorophyceae), *Vaucheria* (Xanthophyceae), *Ectocarpus*(Phaeophyceae) and *Polysiphonia* (Rhodophyceae) Economic importance of algae;**Lichens**: Classification, morphology, internal structure, reproduction and Economic importance **Mycorrhiza**: Ectomycorrhiza and endomycorrhiza and their significance |
| **November** | **Fungi**: General characteristics; organization of thallus; nutrition and reproduction; Classification upto classes (Ainsworth, 1966); orphology and life-cycles of *Phytophthora* (Mastigomycotina), *Mucor* (Zygomycotina), *Penicillium* (Ascomycotina), *Puccinia*, *Agaricus* (Basidiomycotina), *Colletotrichum* (Deuteromycotina); Economic importance of fungi |

**GOVERENMENT COLLEGE BAHADURGARH**
**LESSON PLAN -ODD SEMESTER**
**SESSION: 2025-26**

**Subject : Botany**
**Paper Name : Biofertilizers & Biopesticides**
**Subject Code : 24BOT401SE01**
**Semester : First Sem**
**Teacher Name: Dr. Neetu Kataria**

| Months | Topics |
|---|---|
| **July** | Introduction to Biofertilizers: Biofertilizers: Definition, scope, status, and importance; Advantages and limitations of biofertilizers compared to chemical fertilizers, Types of biofertilizers (e.g. nitrogen-fixing, phosphate-solubilizing, plant growth promoting), |
| **August** | Structure and characteristic features of bacterial (Azospirillum, Azotobacter, Rhizobium), actinomycetes (Frankia), cyanobacterial (Anabaena, Nostoc, Hapalosiphon) and fungal (AM and ectomycorrhiza) biofertilizers. Production and applications of biofertilizers: Production of biofertilizers: Strain selection, sterilization, growth, equipment, fermentation (solid state and liquid), mass production of carrier based and liquid bio fertilizers, Factors affecting the production of biofertilizers (i.e., temperature, pH, aeration, carbon source); quality control of biofertilizers, Application methods and dosage of biofertilizers, Effect of biofertilizers on soil fertility, plant growth, and yield. |
| **September** | Commercialization and future prospects of biofertilizers: Biofertilizers -storage, shelf life, quality control and marketing; regulatory framework and certification for biofertilizers, Application technology for seeds, seedlings, tubers, sets etc.; factors influencing the efficacy of bio fertilizers, Economic feasibility and cost-benefit analysis of using biofertilizers, Future prospects and potential of biofertilizers in sustainable agriculture and environmental protection. |
| **October** | Biopesticides and Applications: Biopesticides: Definition and classification; advantages and limitations of biopesticides compared to chemical pesticides. Modes of action and mechanisms of biopesticides, Characteristics and applications of microbial pesticides – bacteria, fungi and viruses, Characteristics and applications of botanical pesticides (plant extracts and essential oils) and biochemical (pheromones and repellents), |
| **November** | Biocontrol agents (Trichoderma spp., Pseudomonas spp. and Bacillus spp) and their efficacy on seed borne and soil borne plant pathogens. |

**GOVERENMENT COLLEGE BAHADURGARH**
**LESSON PLAN -ODD SEMESTER**
**SESSION: 2025-26**

**Subject : Botany**
**Paper Name : Plant Taxonomy**
**Subject Code : 25BOTM403DS01**
**Semester : Third Sem (2nd Year)**
**Teacher Name: Dr. Neetu Kataria**

| Months | Topics |
|---|---|
| **July** | Taxonomy and Systematics, Fundamental components of taxonomy (identification, classification,description, nomenclature and phylogeny; |
| **August** | Role of chemotaxonomy, cytotaxonomy and taximetrics in relation to taxonomy, Botanical nomenclature, principles and rules, principle of priority, Type concept, taxonomic ranks, Keys to identification of plant. |
| **September** | 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 Inflorescences.BSI, NBPGR, NBRI. Indian contribution in plant taxonomy |
| **October** | Biodiversity hotspots: Global and Indian perspectives Diversity of Flowering Plants: Diagnostic features and economic importance of the following families: Ranunculaceae, Brassicaceae, Malvaceae, Euphorbiaceae, Rutaceae, Fabaceae and Cucurbitaceae |
| **November** | Diversity of Flowering Plants: Diagnostic features and economic importance of the following families: Rosaceae, Apocyanaceae, Apiaceae, Asclepiadaceae, Lamiaceae, Solanaceae, Asteraceae, Liliaceae and Poaceae |

**GOVERENMENT COLLEGE BAHADURGARH**
**LESSON PLAN -ODD SEMESTER**
**SESSION: 2025-26**

**Subject : Botany**
**Paper Name : Ecology**
**Subject Code : BOT 5.2**
**Semester : Fifth Sem (3nd Year)**
**Teacher Name: Dr. Neetu Kataria**

| Months | Topics |
|---|---|
| **July** | Introduction to Ecology: Definition; scope and importance; levels of organization Environment: Introduction; environmental factors-climatic (water, humidity, wind, |
| **August** | light, temperature), edaphic (soil profile, physico-chemical properties), topographic and biotic factors (species interaction),Adaptations of plants to water stress and salinity (morphological and anatomical |
| **September** | features of hydrophytes, xerophytes and halophytes).Population ecology: Basic concept; characteristics; biotic potential, growth curves; ecotypes and ecads. |
| **October** | 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. |
| **November** | 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 |

**GOVERENMENT COLLEGE BAHADURGARH**
**LESSON PLAN**
**SESSION: 2025-26**

**Subject : Botany**
**Paper Name : Plant Physiology**
**Subject Code : BOT 5.1**
**Semester : Fifth Sem (5th Sem)**
**Teacher Name: Dr. Mukesh Kumar**

| Months | Topics |
|---|---|
| **July** | Plant-water relations: Importance of water to plant life; physical properties of water;imbibition, diffusion and osmosis; absorption and transport of water; transpiration; |
| **August** | physiology of stomata. Mineral nutrition: Essential macro and micro elements and their role; mineral uptake;deficiency symptoms. |
| **September** | 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; photo-phosphorylation; Calvin cycle; C4 pathway; CAM plants; photorespiration |
| **October** | 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; |
| **November** | 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. |

**GOVERENMENT COLLEGE BAHADURGARH**
**LESSON PLAN**
**SESSION: 2025-26**

**Subject : Botany**
**Paper Name : Fundamentals of Plant Ecology**
**Subject Code : 24BOT401MI01**
**Semester : First Sem (Ist year)**
**Teacher Name: Dr. Mukesh Kumar**

| Months | Topics |
|---|---|
| **July** | **Introduction to Ecology:** Definition; scope and importance; levels of organization. Environment: Introduction; environmental factors- climatic |
| **August** | water, humidity, wind, light, temperature),<br>edaphic (soil profile, physico-chemical properties), topographic and biotic factors (species interaction, **Adaptation:** Adaptations of plants to water stress and salinity (morphological and anatomical features of hydrophytes, xerophytes and halophytes). |
| **September** | **Population ecology**: Basic concept; characteristics; biotic potential, growth curves; ecotypes and ecads.**Community ecology**: Concepts; characteristics (qualitative and quantitative-analytical and synthetic); methods of analysis; ecological succession |
| **October** | Ecosystem: Structure (components) and functions (trophic levels, food chains, food webs, ecological pyramids and energy flow)<br>Biogeochemical cycles: Carbon, nitrogen, phosphorus and hydrological cycle. |
| **November** | **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 |

**GOVERENMENT COLLEGE BAHADURGARH**
**LESSON PLAN**
**SESSION: 2025-26**

**Subject : Botany**
**Paper Name : Basics of Plant Genetics**
**Subject Code : 24BOT402MI01**
**Semester : Third Sem (2rd year)**
**Teacher Name: Dr. Mukesh Kumar**

| Months | Topics |
|---|---|
| **July** | Mendelian genetics and its extension: Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes; |
| **August** | pedigree analysis; Incomplete dominance and co-dominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Recessive and Dominant traits, Penetrance and Expressivity, Numericals; Polygenic inheritance. |
| **September** | Extrachromosomal Inheritance: Chloroplast mutation: Variegation in Four-o'-clock plant; Mitochondrial m u t a t i o n s in yeast; Maternal effects-shell coiling in snail; Infective heredity Kappa particles in Paramecium Linkage, crossing over and chromosome mapping: Linkage and crossing over-Cytological basis of crossing over; Recombination frequency, Numericals based on gene mapping; Sex Linkage. |
| **October** | Chromosomal aberrations: Structural and Numerical - deletions, duplications, translocations,Position effect, inversions, aneuploidy, polyploidy. Sex chromosomes and Sex determination in Plants. Gene mutations: Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: ClB method.Role of Transposons in mutation. |
| **November** | Fine structure of gene: Classical vs molecular concepts of gene; Cis-Trans complementation test for functional allelism; Population and E v o l u t i o n a r y Genetics: Allele frequencies, Genotype frequencies, Hardy- Weinberg Law, role of natural selection, mutation, genetic drift. Genetic variation and Speciation. |

**GOVERENMENT COLLEGE BAHADURGARH**
**LESSON PLAN**
**SESSION: 2025-26**

**Subject : Botany**
**Paper Name : Plant Propagation and Nursery Technique**
**Subject Code : 25BOT403SE01**
**Semester : Third Sem (2rd year)**
**Teacher Name: Dr. Mukesh Kumar**

| Months | Topics |
|---|---|
| **July** | **Nursery**: Objectives and scope; infrastructure for d e v e l o p m e n t o f nursery; Propagation structures: Mist chambers, humidifiers, greenhouses, glasshouses, cold frames, hotbeds, poly-houses; nursery tools and implements; planning and seasonal activities |
| **August** | **Seed**: Structure and types; Seed dormancy: causes and methods of breaking dormancy; Seed storage: Seed banks, factors affecting seed viability. **Preparation of Soil:** Land preparation, manuring, watering, sowing/raising of seeds and seedlings; transplantation of seedlings. |
| **September** | **Potting media**: media for propagation and growing nursery plants- soil, sand, peat, sphagnum moss, vermiculite, perlite. Vermicompost production-preparation, use of vermicompost in the nursery. Common diseases and their management: Anthracnose, blights, die back, leaf spots, powdery mildew; Insect/pest/disease control in the nursery |
| **October** | **Propagation:** Need and potentialities for plant multiplication, vegetative propagation: cutting, layering, grafting and budding and propagation through specialized organs; rhizome, corm, runners and suckers. Use of growth regulators in vegetative propagation. |
| **November** | Factors influencing rooting of cuttings and layering, graft incompatibility. Maintenance of mother trees, collection of scion wood sticks, scion stock relationship and their influences. |