Syllabus Distribution

Department of Botany

Session 2020-2021

SEM 1			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSC1A T	Microbes	Viruses – Discovery, general structure, DNA virus, Lytic and lysogenic cycle, RNA virus (TMV); Economic importance	Gurucharan Maity
		Bacteria – Discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance.	Somreeta Mandal
	Algae	General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Classification of algae;	Gurucharan Maity
		Morphology and life-cycles of the following: Nostoc, Chlamydomonas, Oedogonium, Vaucheria, Fucus, Polysiphonia. Economic importance of alga	Somreeta Mandal
	Fungi	General characteristics, ecology and significance, range of thallus organization, cell wall composition , nutrition, reproduction and classification; Life cycle of Rhizopus, Penicillium, Alternaria , Puccinia, Agaricus; Symbiotic Associations-Lichens: General account, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance	Somreeta Mandal
	Introduction to Archegoniate	Unifying features of archegoniates, Transition to land habit, Alternation of generations	Somreeta Mandal
	Bryophytes	General characteristics, adaptations to land habit, Classification, Range of thallus organization. Classification (up to family), morphology, anatomy and reproduction of Marchantia and Funaria. (Developmental details not to be included).	Gurucharan Maity
		Ecology and economic importance of bryophytes with special mention of Sphagnum	Somreeta Mandal
	Pteridophytes	General characteristics, classification, Early land plants (Cooksonia and Rhynia). Classification (up to family), morphology, anatomy and reproduction of Selaginella, Equisetum and Pteris. (Developmental	Gurucharan Maity

		details not to be included). Heterospory and seed habit, stelar evolution. Ecological and economical importance of Pteridophytes	
	Gymnosperms	General characteristics, Classification (up to family), morphology, anatomy and reproduction of Cycas and Pinus. (Developmental details not to be included). Ecological and economical importance.	Gurucharan Maity
DSC1A P	Biodiversity (Microbes, Algae, Fungi and Archegoniate(Practical))	EMs/Models of viruses – T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle.	Gurucharan Maity
		Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation.	Somreeta Mandal
		Study of vegetative and reproductive structures of Nostoc, Chlamydomonas (electron micrographs), Oedogonium, Vaucheria, Fucus* and Polysiphonia through temporary preparations and permanent slides. (* Fucus - Specimen and permanent slides)	Gurucharan Maity
		Rhizopus and Penicillium: Asexual stage from temporary mounts and sexual structures through permanent slides.	Gurucharan Maity
		Marchantia- morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemma cup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore, l.s. sporophyte (all permanent slides).	Somreeta Mandal
		Funaria- morphology, w.m. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, l.s. capsule and protonema.	Somreeta Mandal
		Selaginella - morphology, w.m. leaf with ligule, t.s. stem, w.m. strobilus, w.m. microsporophyll and megasporophyll (temporary slides), l.s. strobilus (permanent slide)	Gurucharan Maity
		Equisetum - morphology, t.s. internode, l.s. strobilus, t.s. strobilus, w.m. sporangiophore, w.m. spores (wet and dry)(temporary slides); t.s rhizome (permanent slide).	Gurucharan Maity
		Cycas - morphology (coralloid roots, bulbil, leaf), t.s. coralloid root, v.s. leaflet, v.s. microsporophyll, w.m. spores (temporary slides), l.s. ovule, t.s. root (permanent slide)	Somreeta Mandal
		Pinus - morphology (long and dwarf shoots, w.m. dwarf shoot, male and female), w.m. dwarf shoot, t.s. needle, t.s. stem, ,l.s./t.s. male cone, w.m. microsporophyll, w.m. microspores (temporary slides), l.s. female cone, t.l.s. &r.l.s. stem (permanent slide).	Somreeta Mandal

SEM 2

Sl.No	Name of the Subject	Course details	Allotted teacher
DSC-1B	Introduction		Somreeta Mandal
	Ecological factors	Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes	Somreeta Mandal
	Plant communities	Characters; Ecotone and edge effect; Succession; Processes and types	Somreeta Mandal
	Ecosystem	Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous	Somreeta Mandal
	Phytogeography	Principle biogeographical zones; Endemism	Somreeta Mandal
	Introduction to plant taxonomy	Identification, Classification, Nomenclature	Gurucharan Maity
	Identification	Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access	Somreeta Mandal
	Taxonomic evidences from palynology, cytology, phytochemistry and molecular data		GurucharanMaity
	Taxonomic hierarchy	Ranks, categories and taxonomic groups	Gurucharan Maity
	Botanical nomenclature	Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations	Gurucharan Maity
	Classification	Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series).	Gurucharan Maity
	Biometrics, numerical taxonomy and cladistics	Characters; variations; OTUs, character weighting and coding; cluster analysis; phenograms, cladograms (definitions and differences).	Gurucharan Maity
DSC1BP	Plant Ecology and Taxonomy(Practical)	Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.	GurucharanMaity
		Comparison of bulk density, porosity and rate of infiltration of water in soil of three habitats. Study of morphological adaptations of hydrophytes and xerophytes (four each)	Gurucharan Maity

		Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)	Somreeta Mandal
		Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law	Somreeta Mandal
		Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification):Brassicaceae - Brassica, Alyssum / Iberis; Asteraceae - Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax; Solanaceae -Solanumnigrum, Withania; Lamiaceae -Salvia, Ocimum; Liliaceae - Asphodelus / Lilium / Allium.	Gurucharan Maity
		Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).	Somreeta Mandal

SEM3			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSC 1CT	Meristematic and permanent tissues	Root and shoot apical meristems; Simple and complex tissues	Gurucharan Maity
	Organs	Structure of dicot and monocot root stem and leaf.	Gurucharan Maity
	Secondary Growth	Vascular cambium – structure and function, seasonal activity. Secondary growth in root and stem, Wood (heartwood and sapwood)	Somreeta Mandal
	Adaptive and protective systems	Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes.	Gurucharan Maity
	Structural organization of flower	Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs, organization and ultrastructure of mature embryo sac.	Somreeta Mandal
	Pollination and fertilization	Pollination mechanisms and adaptations; Double fertilization; Seed-structure appendages and dispersal mechanisms.	Somreeta Mandal
	Embryo and endosperm	Endosperm types, structure and functions; Dicot and monocot embryo; Embryo endosperm relationship.	GurucharanMaity
	Apomixis and polyembryony	Definition, types and practical applications.	Somreeta Mandal
DSC1CP	Plant Anatomy	Study of meristems through permanent	GurucharanMaity

	and Embryology(Practical)	slides and photographs	
		Stem: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides).	GurucharanMaity
		Root: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides).	Somreeta Mandal
		Leaf: Dicot and Monocot leaf (only Permanent slides).	Somreeta Mandal
		Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.	GurucharanMaity
		Pollination types and seed dispersal mechanisms (including appendages, aril, caruncle) (Photographs and specimens).	Somreeta Mandal
SEC1T	Bio-fertilizers	General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis.	Somreeta Mandal
		Azospirillum: isolation and mass multiplication – carrier based inoculant, associative effect of different microorganisms. Azotobacter: classification, characteristics – crop response to Azotobacter inoculum, maintenance and mass multiplication.	GurucharanMaity
		Cyanobacteria (blue green algae), Azolla and Anabaena azollae association, nitrogen fixation, factors affecting growth, blue green algae and Azolla in rice cultivation.	GurucharanMaity
		Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants	Somreeta Mandal
		Organic farming – Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes – biocompost making methods, types and method of vermicomposting – field Application.	GurucharanMaity

SEM4			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSC1DT	Plant-water relations	Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure	Somreeta Mandal

		and guttation.	
	Mineral nutrition	Essential elements, macro and micronutrients; Criteria of essentiality of elements; Role of essential elements; Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps	GurucharanMaity
	Translocation in phloem	Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading.	Somreeta Mandal
	Photosynthesis	Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C3, C4 and CAM pathways of carbon fixation; Photorespiration.	GurucharanMaity
	Respiration	Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation, Glyoxylate, Oxidative Pentose Phosphate Pathway.	GurucharanMaity
	Enzymes	Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition	Somreeta Mandal
	Nitrogen metabolism	Biological nitrogen fixation; Nitrate and ammonia assimilation.	GurucharanMaity
	Plant growth regulators	Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene	Somreeta Mandal
	Plant response to light and temperature	Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and far red light responses on photomorphogenesis; Vernalization.	Somreeta Mandal
DSC1DP	Plant Physiology and Metabolism (Practical)	Determination of osmotic potential of plant cell sap by plasmolytic method.	Somreeta Mandal
		To study the effect of two environmental factors (light and wind) on transpiration by excised twig.	GurucharanMaity
		Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.	Somreeta Mandal
		Demonstration of Hill reaction.	GurucharanMaity
		Comparison of the rate of respiration in any two parts of a plant.	GurucharanMaity
SEC2T	Mushroom Culture Technology	Introduction, history. Nutritional and medicinal value of edible mushrooms;Poisonous mushrooms. Types of edible mushrooms available in India - Volvariellavolvacea, Pleurotuscitrinopileatus, Agaricusbisporus..	Somreeta Mandal
		Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation -	GurucharanMaity

		paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production	
		Storage and nutrition : Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.	Somreeta Mandal
		Food Preparation : Types of foods prepared from mushroom. Research Centres - National level and Regional level._Cost benefit ratio - Marketing in India and abroad, Export Value.	GurucharanMaity

SEM5			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSE1T	Origin of Cultivated Plants	Concept of centres of origin, their importance with reference to Vavilov's work	GurucharanMaity
	Cereals	Wheat -Origin, morphology, uses	GurucharanMaity
	Legumes	General account with special reference to Gram and soybean	GurucharanMaity
	Spices	General account with special reference to clove and black pepper (Botanical name, family, part used, morphology and uses)	GurucharanMaity
	Beverages	Tea (morphology, processing, uses)	GurucharanMaity
	Oils and Fats	General description with special reference to groundnut	Somreeta Mandal
	Fibre Yielding Plants	General description with special reference to Cotton (Botanical name, family, part used, morphology and uses)	GurucharanMaity
	Introduction to biotechnology		Somreeta Mandal
	Plant tissue culture	Micropropagation ; haploid production through androgenesis and gynogenesis; brief account of embryo & endosperm culture with their applications	Somreeta Mandal
	Recombinant DNA Techniques	Blotting techniques: Northern, Southern and Western Blotting, DNA Fingerprinting; Molecular DNA markers i.e. RAPD, RFLP, SNPs; DNA sequencing, PCR and Reverse Transcriptase-PCR. Hybridoma and monoclonal antibodies, ELISA and Immunodetection. Molecular diagnosis of human disease, Human gene Therapy	Somreeta Mandal
DSE1P	Economic Botany and Biotechnology(Practical)	Study of economically important plants : Wheat, Gram, Soybean, Black pepper, Clove	GurucharanMaity

		Tea, Cotton, Groundnut through specimens, sections and microchemical tests	
		Familiarization with basic equipments in tissue culture	Somreeta Mandal
		Study through photographs: Anther culture, somatic embryogenesis, endosperm and embryo culture; micropropagation	Somreeta Mandal
		Study of molecular techniques: PCR, Blotting techniques, AGE and PAGE.	GurucharanMaity
SEC3T	FloricultureIntroduction	History of gardening; Importance and scope of floriculture andlandscape gardening.	Somreeta Mandal
	Nursery Management and Routine Garden Operations	Sexual and vegetative methods of propagation; Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators	GurucharanMaity
	Ornamental Plants	Flowering annuals; Herbaceous perennials; Divine vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and Selaginellas; Cultivation of plants in pots; Indoor gardening; Bonsai	GurucharanMaity
	Principles of Garden Designs	English, Italian, French, Persian, Mughal and Japanese gardens; Features of a garden (Garden wall, Fencing, Steps, Hedge, Edging, Lawn, Flower beds, Shrubbery, Borders, Water garden. Some Famous gardens of India	Somreeta Mandal
	Landscaping Places of Public Importance	Landscaping highways and Educational institutions.	Somreeta Mandal
	Commercial Floriculture	Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life; Cultivation of Important cut flowers (Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold,Rose, Lilium, Orchids).	GurucharanMaity
	Diseases and Pests of Ornamental Plants.		Somreeta Mandal

SEM6			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSE2T	Heredity	1. Brief life history of Mendel 2. Terminologies 3. Laws of Inheritance 4. Modified Mandelian Ratios: 2:1- lethal Genes; 1:2:1- Co - dominance,	GurucharanMaity

		incomplete dominance;- 9:7; 9:4:3; 13:3; 12:3:1. 5. Chi Square 6. Pedigree Analysis 7. Cytoplasmic Inheritance: Shell Coiling in Snail, Kappa particles in Paramecium, leaf variegation in Mirabilis jalapa, Male sterility. 8. Multiple allelism 9. Pleiotropism 10. Chromosome theory of Inheritance.	
	Sex-determination and Sex-linked Inheritance		Somreeta Mandal
	Linkage and Crossing over	Linkage: concept & history, complete & incomplete linkage, bridges experiment, coupling & repulsion, recombination frequency, linkage maps based on two and three factor crosses. Crossing over: concept and significance, cytological proof of crossing over.	Somreeta Mandal
	Mutations and Chromosomal Aberrations	Types of mutations, effects of physical & chemical mutagens. Numerical chromosomal changes: Euploidy, Polyploidy and Aneuploidy ; Structural chromosomal changes: Deletions, Duplications, Inversions & Translocations.	Somreeta Mandal
	Plant Breeding	Introduction and objectives. Breeding systems: modes of reproduction in crop plants. Important achievements and undesirable consequences of plant breeding.	GurucharanMaity
	Methods of crop improvement	Introduction: Centres of origin and domestication of crop plants, plant genetic resources; Acclimatization; Selection methods: For self pollinated, cross pollinated and vegetatively propagated plants; Hybridization: For self, cross and vegetatively propagated plants – Procedure, advantages and limitations.	GurucharanMaity
	Quantitative inheritance	Concept, mechanism, examples. Monogenic vs polygenic Inheritance.	Somreeta Mandal
	Inbreeding depression and heterosis	History, genetic basis of inbreeding depression and heterosis; Applications.	GurucharanMaity
	Crop improvement and breeding	Role of mutations; Polyploidy; Distant hybridization and role of biotechnology in crop improvement	Somreeta Mandal

DSE2P	Genetics and Plant Breeding(Practical)	Mendel's laws through seed ratios. Laboratory exercises in probability and chisquare.	Gurucharan Maity
		Pedigree analysis for dominant and recessive autosomal and sex linked traits.	Gurucharan Maity
		Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4)	Gurucharan Maity
		Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes through photographs.	Somreeta Mandal
		Hybridization techniques - Emasculation, Bagging (For demonstration only).	Somreeta Mandal
		Induction of polyploidy conditions in plants (For demonstration only).	Somreeta Mandal
SEC4T	Medicinal Botany	History, Scope and Importance of Medicinal Plants. Indigenous Medicinal Sciences; Definition and Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridoshaconcepts, Rasayana, plants used in ayurvedic treatments, 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.	Gurucharan Maity
		Conservation of endangered and endemic medicinal plants. Definition: endemic and endangered medicinal plants, Red list criteria; In situ conservation: Biosphere reserves, sacred groves, National Parks; Ex situ conservation: Botanic Gardens, Ethnomedicinal plant Gardens. Propagation of Medicinal Plants: Objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding.	Somreeta Mandal
		Ethnobotany and Folk medicines. Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-	Gurucharan Maity

		ethnobotany. folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities ofIndia. Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases.	

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	Fungi	General characteristics, ecology and significance, range of thallus organization, cell wall composition , nutrition, reproduction and classification; Life cycle of Rhizopus, Penicillium, Alternaria , Puccinia, Agaricus; Symbiotic Associations-Lichens: General account, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance	Somreeta Mandal
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		Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation.	Somreeta Mandal
		Study of vegetative and reproductive structures of Nostoc, Chlamydomonas (electron micrographs), Oedogonium, Vaucheria, Fucus* and Polysiphonia through temporary preparations and permanent slides. (* Fucus - Specimen and permanent slides)	Gurucharan Maity
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		Funaria- morphology, w.m. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, l.s. capsule and protonema.	Somreeta Mandal
		Selaginella - morphology, w.m. leaf with ligule, t.s. stem, w.m. strobilus, w.m. microsporophyll and megasporophyll (temporary slides), l.s. strobilus (permanent slide)	Gurucharan Maity
		Equisetum - morphology, t.s. internode, l.s. strobilus, t.s. strobilus, w.m. sporangiophore, w.m. spores (wet and dry)(temporary slides); t.s rhizome (permanent slide).	Gurucharan Maity
		Cycas - morphology (coralloid roots, bulbil, leaf), t.s. coralloid root, v.s. leaflet, v.s. microsporophyll, w.m. spores (temporary slides), l.s. ovule, t.s. root (permanent slide)	Somreeta Mandal
		Pinus - morphology (long and dwarf shoots, w.m. dwarf shoot, male and female), w.m. dwarf shoot, t.s. needle, t.s. stem, ,l.s./t.s. male cone, w.m. microsporophyll, w.m. microspores (temporary	Somreeta Mandal

		slides), l.s. female cone, t.l.s. &r.l.s. stem (permanent slide).	

SEM 2			
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DSC-1B	Introduction		Somreeta Mandal
	Ecological factors	Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes	Somreeta Mandal
	Plant communities	Characters; Ecotone and edge effect; Succession; Processes and types	Somreeta Mandal
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	Phytogeography	Principle biogeographical zones; Endemism	Somreeta Mandal
	Introduction to plant taxonomy	Identification, Classification, Nomenclature	Gurucharan Maity
	Identification	Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access	Somreeta Mandal
	Taxonomic evidences from palynology, cytology, phytochemistry and molecular data		GurucharanMaity
	Taxonomic hierarchy	Ranks, categories and taxonomic groups	Gurucharan Maity
	Botanical nomenclature	Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations	Gurucharan Maity
	Classification	Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series).	Gurucharan Maity
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		deficiency by rapid field test.	
		Comparison of bulk density, porosity and rate of infiltration of water in soil of three habitats. Study of morphological adaptations of hydrophytes and xerophytes (four each)	Gurucharan Maity
		Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)	Somreeta Mandal
		Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law	Somreeta Mandal
		Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification):Brassicaceae - Brassica, Alyssum / Iberis; Asteraceae - Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax; Solanaceae -Solanumnigrum, Withania; Lamiaceae -Salvia, Ocimum; Liliaceae - Asphodelus / Lilium / Allium.	Gurucharan Maity
		Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).	Somreeta Mandal

SEM3			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSC 1CT	Meristematic and permanent tissues	Root and shoot apical meristems; Simple and complex tissues	Gurucharan Maity
	Organs	Structure of dicot and monocot root stem and leaf.	Gurucharan Maity
	Secondary Growth	Vascular cambium – structure and function, seasonal activity. Secondary growth in root and stem, Wood (heartwood and sapwood)	Somreeta Mandal
	Adaptive and protective systems	Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes.	Gurucharan Maity
	Structural organization of flower	Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs, organization and ultrastructure of mature embryo sac.	Somreeta Mandal
	Pollination and fertilization	Pollination mechanisms and adaptations; Double fertilization; Seed-structure appendages and dispersal mechanisms.	Somreeta Mandal

	Embryo and endosperm	Endosperm types, structure and functions; Dicot and monocot embryo; Embryo endosperm relationship.	GurucharanMaity
	Apomixis and polyembryony	Definition, types and practical applications.	Somreeta Mandal
DSC1CP	Plant Anatomy and Embryology(Practical)	Study of meristems through permanent slides and photographs	GurucharanMaity
		Stem: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides).	GurucharanMaity
		Root: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides).	Somreeta Mandal
		Leaf: Dicot and Monocot leaf (only Permanent slides).	Somreeta Mandal
		Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.	GurucharanMaity
		Pollination types and seed dispersal mechanisms (including appendages, aril, caruncle) (Photographs and specimens).	Somreeta Mandal
SEC1T	Bio-fertilizers	General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis.	Somreeta Mandal
		Azospirillum: isolation and mass multiplication – carrier based inoculant, associative effect of different microorganisms. Azotobacter: classification, characteristics – crop response to Azotobacter inoculum, maintenance and mass multiplication.	GurucharanMaity
		Cyanobacteria (blue green algae), Azolla and Anabaena azollae association, nitrogen fixation, factors affecting growth, blue green algae and Azolla in rice cultivation.	GurucharanMaity
		Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants	Somreeta Mandal
		Organic farming – Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes – biocompost making methods, types and method of vermicomposting – field Application.	GurucharanMaity

SEM4			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSC1DT	Plant-water relations	Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation.	Somreeta Mandal
	Mineral nutrition	Essential elements, macro and micronutrients; Criteria of essentiality of elements; Role of essential elements; Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps	GurucharanMaity
	Translocation in phloem	Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading.	Somreeta Mandal
	Photosynthesis	Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C3, C4 and CAM pathways of carbon fixation; Photorespiration.	GurucharanMaity
	Respiration	Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation, Glyoxylate, Oxidative Pentose Phosphate Pathway.	GurucharanMaity
	Enzymes	Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition	Somreeta Mandal
	Nitrogen metabolism	Biological nitrogen fixation; Nitrate and ammonia assimilation.	GurucharanMaity
	Plant growth regulators	Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene	Somreeta Mandal
	Plant response to light and temperature	Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and far red light responses on photomorphogenesis; Vernalization.	Somreeta Mandal
DSC1DP	Plant Physiology and Metabolism (Practical)	Determination of osmotic potential of plant cell sap by plasmolytic method.	Somreeta Mandal
		To study the effect of two environmental factors (light and wind) on transpiration by excised twig.	GurucharanMaity
		Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.	Somreeta Mandal
		Demonstration of Hill reaction.	GurucharanMaity
		Comparison of the rate of respiration in any two parts of a plant.	GurucharanMaity
SEC2T	Mushroom Culture Technology	Introduction, history. Nutritional and medicinal value of edible mushrooms;Poisonous mushrooms. Types of edible mushrooms available in India - Volvariellavolvacea, Pleurotuscitrinopileatus, Agaricusbisporus..	Somreeta Mandal
		Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag,	GurucharanMaity

		vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production	
		Storage and nutrition : Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.	Somreeta Mandal
		Food Preparation : Types of foods prepared from mushroom. Research Centres - National level and Regional level._Cost benefit ratio - Marketing in India and abroad, Export Value.	GurucharanMaity

SEM5			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSE1T	Origin of Cultivated Plants	Concept of centres of origin, their importance with reference to Vavilov's work	GurucharanMaity
	Cereals	Wheat -Origin, morphology, uses	GurucharanMaity
	Legumes	General account with special reference to Gram and soybean	GurucharanMaity
	Spices	General account with special reference to clove and black pepper (Botanical name, family, part used, morphology and uses)	GurucharanMaity
	Beverages	Tea (morphology, processing, uses)	GurucharanMaity
	Oils and Fats	General description with special reference to groundnut	Somreeta Mandal
	Fibre Yielding Plants	General description with special reference to Cotton (Botanical name, family, part used, morphology and uses)	GurucharanMaity
	Introduction to biotechnology		Somreeta Mandal
	Plant tissue culture	Micropropagation ; haploid production through androgenesis and gynogenesis; brief account of embryo & endosperm culture with their applications	Somreeta Mandal
	Recombinant DNA Techniques	Blotting techniques: Northern, Southern and Western Blotting, DNA Fingerprinting; Molecular DNA markers i.e. RAPD, RFLP, SNPs; DNA sequencing, PCR and Reverse	Somreeta Mandal

		Transcriptase-PCR. Hybridoma and monoclonal antibodies, ELISA and Immunodetection. Molecular diagnosis of human disease, Human gene Therapy	
DSE1P	Economic Botany and Biotechnology(Practical)	Study of economically important plants : Wheat, Gram, Soybean, Black pepper, Clove Tea, Cotton, Groundnut through specimens, sections and microchemical tests	GurucharanMaity
		Familiarization with basic equipments in tissue culture	Somreeta Mandal
		Study through photographs: Anther culture, somatic embryogenesis, endosperm and embryo culture; micropropagation	Somreeta Mandal
		Study of molecular techniques: PCR, Blotting techniques, AGE and PAGE.	GurucharanMaity
SEC3T	FloricultureIntroduction	History of gardening; Importance and scope of floriculture andlandscape gardening.	Somreeta Mandal
	Nursery Management and Routine Garden Operations	Sexual and vegetative methods of propagation; Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators	GurucharanMaity
	Ornamental Plants	Flowering annuals; Herbaceous perennials; Divine vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and Selaginellas; Cultivation of plants in pots; Indoor gardening; Bonsai	GurucharanMaity
	Principles of Garden Designs	English, Italian, French, Persian, Mughal and Japanese gardens; Features of a garden (Garden wall, Fencing, Steps, Hedge, Edging, Lawn, Flower beds, Shrubbery, Borders, Water garden. Some Famous gardens of India	Somreeta Mandal
	Landscaping Places of Public Importance	Landscaping highways and Educational institutions.	Somreeta Mandal
	Commercial Floriculture	Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life; Cultivation of Important cut flowers (Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold,Rose, Lilium, Orchids).	GurucharanMaity
	Diseases and Pests of Ornamental Plants.		Somreeta Mandal

SEM6

Sl.No	Name of the Subject	Course details	Allotted teacher
DSE2T	Heredity	1. Brief life history of Mendel 2. Terminologies 3. Laws of Inheritance 4. Modified Mandelian Ratios: 2:1- lethal Genes; 1:2:1- Co - dominance, incomplete dominance;- 9:7; 9:4:3; 13:3; 12:3:1. 5. Chi Square 6. Pedigree Analysis 7. Cytoplasmic Inheritance: Shell Coiling in Snail, Kappa particles in Paramecium, leaf variegation in Mirabilis jalapa, Male sterility. 8. Multiple allelism 9. Pleiotropism 10. Chromosome theory of Inheritance.	GurucharanMaity
	Sex-determination and Sex-linked Inheritance		Somreeta Mandal
	Linkage and Crossing over	Linkage: concept & history, complete & incomplete linkage, bridges experiment, coupling & repulsion, recombination frequency, linkage maps based on two and three factor crosses. Crossing over: concept and significance, cytological proof of crossing over.	Somreeta Mandal
	Mutations and Chromosomal Aberrations	Types of mutations, effects of physical & chemical mutagens. Numerical chromosomal changes: Euploidy, Polyploidy and Aneuploidy ; Structural chromosomal changes: Deletions, Duplications, Inversions & Translocations.	Somreeta Mandal
	Plant Breeding	Introduction and objectives. Breeding systems: modes of reproduction in crop plants. Important achievements and undesirable consequences of plant breeding.	GurucharanMaity
	Methods of crop improvement	Introduction: Centres of origin and domestication of crop plants, plant genetic resources; Acclimatization; Selection methods: For self pollinated, cross pollinated and vegetatively propagated plants; Hybridization: For self, cross and vegetatively propagated plants – Procedure, advantages and limitations.	GurucharanMaity
	Quantitative inheritance	Concept, mechanism, examples. Monogenic vs polygenic Inheritance.	Somreeta Mandal

	Inbreeding depression and heterosis	History, genetic basis of inbreeding depression and heterosis; Applications.	GurucharanMaity
	Crop improvement and breeding	Role of mutations; Polyploidy; Distant hybridization and role of biotechnology in crop improvement	Somreeta Mandal
DSE2P	Genetics and Plant Breeding(Practical)	Mendel's laws through seed ratios. Laboratory exercises in probability and chisquare.	Gurucharan Maity
		Pedigree analysis for dominant and recessive autosomal and sex linked traits.	Gurucharan Maity
		Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4)	Gurucharan Maity
		Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes through photographs.	Somreeta Mandal
		Hybridization techniques - Emasculation, Bagging (For demonstration only).	Somreeta Mandal
		Induction of polyploidy conditions in plants (For demonstration only).	Somreeta Mandal
SEC4T	Medicinal Botany	History, Scope and Importance of Medicinal Plants. Indigenous Medicinal Sciences; Definition and Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridoshaconcepts, Rasayana, plants used in ayurvedic treatments, 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.	Gurucharan Maity
		Conservation of endangered and endemic medicinal plants. Definition: endemic and endangered medicinal plants, Red list criteria; In situ conservation: Biosphere reserves, sacred groves, National Parks; Ex situ conservation: Botanic Gardens, Ethnomedicinal plant Gardens. Propagation of Medicinal Plants: Objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting	Somreeta Mandal

		and budding.	
		Ethnobotany and Folk medicines. Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethnobotany. folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities ofIndia. Application of natural products to certain diseases-Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases.	Gurucharan Maity

Session 2022-2023

SEM 1			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSC1A T	Microbes	Viruses – Discovery, general structure, DNA virus, Lytic and lysogenic cycle, RNA virus (TMV); Economic importance	Gurucharan Maity
		Bacteria – Discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance.	Somreeta Mandal
	Algae	General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Classification of algae;	Gurucharan Maity
		Morphology and life-cycles of the following: Nostoc, Chlamydomonas, Oedogonium, Vaucheria, Fucus, Polysiphonia. Economic importance of alga	Somreeta Mandal
	Fungi	General characteristics, ecology and significance, range of thallus organization, cell wall composition , nutrition, reproduction and classification; Life cycle of Rhizopus, Penicillium, Alternaria , Puccinia, Agaricus; Symbiotic Associations-Lichens: General account, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance	Somreeta Mandal
	Introduction to Archego	Unifying features of archegoniates, Transition to land habit, Alternation of generations	Somreeta Mandal

	niate		
	Bryophytes	General characteristics, adaptations to land habit, Classification, Range of thallus organization. Classification (up to family), morphology, anatomy and reproduction of Marchantia and Funaria. (Developmental details not to be included).	Gurucharan Maity
		Ecology and economic importance of bryophytes with special mention of Sphagnum	Somreeta Mandal
	Pteridophytes	General characteristics, classification, Early land plants (Cooksonia and Rhynia). Classification (up to family), morphology, anatomy and reproduction of Selaginella, Equisetum and Pteris. (Developmental details not to be included). Heterospory and seed habit, stelar evolution. Ecological and economical importance of Pteridophytes	Gurucharan Maity
	Gymnosperms	General characteristics, Classification (up to family), morphology, anatomy and reproduction of Cycas and Pinus. (Developmental details not to be included). Ecological and economical importance.	Gurucharan Maity
DSC1A P	Biodiversity (Microbes, Algae, Fungi and Archegoniate(Practical))	EMs/Models of viruses – T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle.	Gurucharan Maity
		Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation.	Somreeta Mandal
		Study of vegetative and reproductive structures of Nostoc, Chlamydomonas (electron micrographs), Oedogonium, Vaucheria, Fucus* and Polysiphonia through temporary preparations and permanent slides. (* Fucus - Specimen and permanent slides)	Gurucharan Maity
		Rhizopus and Penicillium: Asexual stage from temporary mounts and sexual structures through permanent slides.	Gurucharan Maity
		Marchantia- morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemma cup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore, l.s. sporophyte (all permanent slides).	Somreeta Mandal
		Funaria- morphology, w.m. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, l.s. capsule and protonema.	Somreeta Mandal
		Selaginella - morphology, w.m. leaf with ligule, t.s. stem, w.m. strobilus, w.m. microsporophyll and megasporophyll (temporary slides), l.s. strobilus (permanent slide)	Gurucharan Maity
		Equisetum - morphology, t.s. internode, l.s. strobilus, t.s. strobilus, w.m. sporangiophore, w.m. spores (wet and dry)(temporary slides); t.s rhizome (permanent slide).	Gurucharan Maity
		Cycas - morphology (coralloid roots, bulbil, leaf),	Somreeta Mandal

		t.s. coralloid root, v.s. leaflet, v.s. microsporophyll, w.m. spores (temporary slides), l.s. ovule, t.s. root (permanent slide)	
		Pinus - morphology (long and dwarf shoots, w.m. dwarf shoot, male and female), w.m. dwarf shoot, t.s. needle, t.s. stem, ,l.s./t.s. male cone, w.m. microsporophyll, w.m. microspores (temporary slides), l.s. female cone, t.l.s. &r.l.s. stem (permanent slide).	Somreeta Mandal

SEM 2			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSC-1B	Introduction		Somreeta Mandal
	Ecological factors	Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes	Somreeta Mandal
	Plant communities	Characters; Ecotone and edge effect; Succession; Processes and types	Somreeta Mandal
	Ecosystem	Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous	Somreeta Mandal
	Phytogeography	Principle biogeographical zones; Endemism	Somreeta Mandal
	Introduction to plant taxonomy	Identification, Classification, Nomenclature	Gurucharan Maity
	Identification	Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access	Somreeta Mandal
	Taxonomic evidences from palynology, cytology, phytochemistry and molecular data		GurucharanMaity
	Taxonomic hierarchy	Ranks, categories and taxonomic groups	Gurucharan Maity
	Botanical nomenclature	Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations	Gurucharan Maity
	Classification	Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series).	Gurucharan Maity

	Biometrics, numerical taxonomy and cladistics	Characters; variations; OTUs, character weighting and coding; cluster analysis; phenograms, cladograms (definitions and differences).	Gurucharan Maity
DSC1BP	Plant Ecology and Taxonomy(Practical)	Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.	GurucharanMaity
		Comparison of bulk density, porosity and rate of infiltration of water in soil of three habitats. Study of morphological adaptations of hydrophytes and xerophytes (four each)	Gurucharan Maity
		Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)	Somreeta Mandal
		Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law	Somreeta Mandal
		Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification):Brassicaceae - Brassica, Alyssum / Iberis; Asteraceae - Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax; Solanaceae -Solanumnigrum, Withania; Lamiaceae -Salvia, Ocimum; Liliaceae - Asphodelus / Lilium / Allium.	Gurucharan Maity
		Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).	Somreeta Mandal

SEM3			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSC 1CT	Meristematic and permanent tissues	Root and shoot apical meristems; Simple and complex tissues	Gurucharan Maity
	Organs	Structure of dicot and monocot root stem and leaf.	Gurucharan Maity
	Secondary Growth	Vascular cambium – structure and function, seasonal activity. Secondary growth in root and stem, Wood (heartwood and sapwood)	Somreeta Mandal
	Adaptive and protective systems	Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes.	Gurucharan Maity

	Structural organization of flower	Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs, organization and ultrastructure of mature embryo sac.	Somreeta Mandal
	Pollination and fertilization	Pollination mechanisms and adaptations; Double fertilization; Seed-structure appendages and dispersal mechanisms.	Somreeta Mandal
	Embryo and endosperm	Endosperm types, structure and functions; Dicot and monocot embryo; Embryo endosperm relationship.	GurucharanMaity
	Apomixis and polyembryony	Definition, types and practical applications.	Somreeta Mandal
DSC1CP	Plant Anatomy and Embryology(Practical)	Study of meristems through permanent slides and photographs	GurucharanMaity
		Stem: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides).	GurucharanMaity
		Root: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides).	Somreeta Mandal
		Leaf: Dicot and Monocot leaf (only Permanent slides).	Somreeta Mandal
		Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.	GurucharanMaity
		Pollination types and seed dispersal mechanisms (including appendages, aril, caruncle) (Photographs and specimens).	Somreeta Mandal
SEC1T	Bio-fertilizers	General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis.	Somreeta Mandal
		Azospirillum: isolation and mass multiplication – carrier based inoculant, associative effect of different microorganisms. Azotobacter: classification, characteristics – crop response to Azotobacter inoculum, maintenance and mass multiplication.	GurucharanMaity
		Cyanobacteria (blue green algae), Azolla and Anabaena azollae association, nitrogen fixation, factors affecting growth, blue green algae and Azolla in rice cultivation.	GurucharanMaity
		Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants	Somreeta Mandal
		Organic farming – Green manuring and	GurucharanMaity

		organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes – biocompost making methods, types and method of vermicomposting – field Application.	

SEM4			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSC1DT	Plant-water relations	Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation.	Somreeta Mandal
	Mineral nutrition	Essential elements, macro and micronutrients; Criteria of essentiality of elements; Role of essential elements; Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps	GurucharanMaity
	Translocation in phloem	Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading.	Somreeta Mandal
	Photosynthesis	Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C3, C4 and CAM pathways of carbon fixation; Photorespiration.	GurucharanMaity
	Respiration	Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation, Glyoxylate, Oxidative Pentose Phosphate Pathway.	GurucharanMaity
	Enzymes	Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition	Somreeta Mandal
	Nitrogen metabolism	Biological nitrogen fixation; Nitrate and ammonia assimilation.	GurucharanMaity
	Plant growth regulators	Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene	Somreeta Mandal
	Plant response to light and temperature	Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and far red light responses on photomorphogenesis; Vernalization.	Somreeta Mandal
DSC1DP	Plant Physiology and Metabolism (Practical)	Determination of osmotic potential of plant cell sap by plasmolytic method.	Somreeta Mandal
		To study the effect of two environmental factors (light and wind) on transpiration by excised twig.	GurucharanMaity
		Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.	Somreeta Mandal
		Demonstration of Hill reaction.	GurucharanMaity
		Comparison of the rate of respiration in any two parts of a plant.	GurucharanMaity

SEC2T	Mushroom Culture Technology	Introduction, history. Nutritional and medicinal value of edible mushrooms;Poisonous mushrooms. Types of edible mushrooms available in India - Volvariellavolvacea, Pleurotuscitrinopileatus, Agaricusbisporus..	Somreeta Mandal
		Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production	GurucharanMaity
		Storage and nutrition : Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.	Somreeta Mandal
		Food Preparation : Types of foods prepared from mushroom. Research Centres - National level and Regional level._Cost benefit ratio - Marketing in India and abroad, Export Value.	GurucharanMaity

SEM5			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSE1T	Origin of Cultivated Plants	Concept of centres of origin, their importance with reference to Vavilov's work	GurucharanMaity
	Cereals	Wheat -Origin, morphology, uses	GurucharanMaity
	Legumes	General account with special reference to Gram and soybean	GurucharanMaity
	Spices	General account with special reference to clove and black pepper (Botanical name, family, part used, morphology and uses)	GurucharanMaity
	Beverages	Tea (morphology, processing, uses)	GurucharanMaity
	Oils and Fats	General description with special reference to groundnut	Somreeta Mandal
	Fibre Yielding Plants	General description with special reference to Cotton (Botanical name, family, part used, morphology and uses)	GurucharanMaity
	Introduction to biotechnology		Somreeta Mandal
	Plant tissue culture	Micropropagation ; haploid production	Somreeta

		through androgenesis and gynogenesis; brief account of embryo & endosperm culture with their applications	Mandal
	Recombinant DNA Techniques	Blotting techniques: Northern, Southern and Western Blotting, DNA Fingerprinting; Molecular DNA markers i.e. RAPD, RFLP, SNPs; DNA sequencing, PCR and Reverse Transcriptase-PCR. Hybridoma and monoclonal antibodies, ELISA and Immunodetection. Molecular diagnosis of human disease, Human gene Therapy	Somreeta Mandal
DSE1P	Economic Botany and Biotechnology(Practical)	Study of economically important plants : Wheat, Gram, Soybean, Black pepper, Clove Tea, Cotton, Groundnut through specimens, sections and microchemical tests	GurucharanMaity
		Familiarization with basic equipments in tissue culture	Somreeta Mandal
		Study through photographs: Anther culture, somatic embryogenesis, endosperm and embryo culture; micropropagation	Somreeta Mandal
		Study of molecular techniques: PCR, Blotting techniques, AGE and PAGE.	GurucharanMaity
SEC3T	FloricultureIntroduction	History of gardening; Importance and scope of floriculture andlandscape gardening.	Somreeta Mandal
	Nursery Management and Routine Garden Operations	Sexual and vegetative methods of propagation; Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators	GurucharanMaity
	Ornamental Plants	Flowering annuals; Herbaceous perennials; Divine vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and Selaginellas; Cultivation of plants in pots; Indoor gardening; Bonsai	GurucharanMaity
	Principles of Garden Designs	English, Italian, French, Persian, Mughal and Japanese gardens; Features of a garden (Garden wall, Fencing, Steps, Hedge, Edging, Lawn, Flower beds, Shrubbery, Borders, Water garden. Some Famous gardens of India	Somreeta Mandal
	Landscaping Places of Public Importance	Landscaping highways and Educational institutions.	Somreeta Mandal
	Commercial Floriculture	Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life; Cultivation of Important cut flowers (Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold,Rose, Lilium, Orchids).	GurucharanMaity

	Diseases and Pests of Ornamental Plants.		Somreeta Mandal

SEM6			
Sl.No	Name of the Subject	Course details	Allotted teacher
DSE2T	Heredity	1. Brief life history of Mendel 2. Terminologies 3. Laws of Inheritance 4. Modified Mandelian Ratios: 2:1- lethal Genes; 1:2:1- Co - dominance, incomplete dominance;- 9:7; 9:4:3; 13:3; 12:3:1. 5. Chi Square 6. Pedigree Analysis 7. Cytoplasmic Inheritance: Shell Coiling in Snail, Kappa particles in Paramecium, leaf variegation in Mirabilis jalapa, Male sterility. 8. Multiple allelism 9. Pleiotropism 10. Chromosome theory of Inheritance.	GurucharanMaity
	Sex-determination and Sex-linked Inheritance		Somreeta Mandal
	Linkage and Crossing over	Linkage: concept & history, complete & incomplete linkage, bridges experiment, coupling & repulsion, recombination frequency, linkage maps based on two and three factor crosses. Crossing over: concept and significance, cytological proof of crossing over.	Somreeta Mandal
	Mutations and Chromosomal Aberrations	Types of mutations, effects of physical & chemical mutagens. Numerical chromosomal changes: Euploidy, Polyploidy and Aneuploidy ; Structural chromosomal changes: Deletions, Duplications, Inversions & Translocations.	Somreeta Mandal
	Plant Breeding	Introduction and objectives. Breeding systems: modes of reproduction in crop plants. Important achievements and undesirable consequences of plant breeding.	GurucharanMaity
	Methods of crop improvement	Introduction: Centres of origin and domestication of crop plants, plant genetic resources; Acclimatization; Selection methods: For self pollinated, cross pollinated and vegetatively propagated plants;	GurucharanMaity

		Hybridization: For self, cross and vegetatively propagated plants – Procedure, advantages and limitations.	
	Quantitative inheritance	Concept, mechanism, examples. Monogenic vs polygenic Inheritance.	Somreeta Mandal
	Inbreeding depression and heterosis	History, genetic basis of inbreeding depression and heterosis; Applications.	GurucharanMaity
	Crop improvement and breeding	Role of mutations; Polyploidy; Distant hybridization and role of biotechnology in crop improvement	Somreeta Mandal
DSE2P	Genetics and Plant Breeding(Practical)	Mendel's laws through seed ratios. Laboratory exercises in probability and chisquare.	Gurucharan Maity
		Pedigree analysis for dominant and recessive autosomal and sex linked traits.	Gurucharan Maity
		Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4)	Gurucharan Maity
		Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes through photographs.	Somreeta Mandal
		Hybridization techniques - Emasculation, Bagging (For demonstration only).	Somreeta Mandal
		Induction of polyploidy conditions in plants (For demonstration only).	Somreeta Mandal
SEC4T	Medicinal Botany	History, Scope and Importance of Medicinal Plants. Indigenous Medicinal Sciences; Definition and Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridoshaconcepts, Rasayana, plants used in ayurvedic treatments, 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.	Gurucharan Maity
		Conservation of endangered and endemic medicinal plants. Definition: endemic and endangered medicinal plants, Red list criteria; In situ conservation: Biosphere reserves, sacred groves, National Parks; Ex situ conservation: Botanic Gardens, Ethnomedicinal plant Gardens. Propagation of Medicinal	Somreeta Mandal

		Plants: Objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding.	
		Ethnobotany and Folk medicines. Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethnobotany. folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities ofIndia. Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases.	Gurucharan Maity