

Academic calendar 2021-2022

DEPARTMENT OF BOTANY

HONOURS/GENERAL CBCS	COURSES	PAPER/ NUMBER OF LECTURES	JULY-SEPTEMBER	OCTOBER -DECEMBER	JANUARY
SEMESTER-I	CORE- C1	BOTACOR01 T 60 (THEORY)	UNIT 1: INTRODUCTION TO MICROBIAL WORLD, UNIT 2: VIRUSES, UNIT 3: BACTERIA, UNIT 4: ALGAE: GENERAL ACCOUNT, NO. OF CLASSES= 32	UNIT 5: CYANOPHYTA AND XANTHOPHYTA, UNIT 3: CHLOROPHYTA AND CHAROPHYTA, UNIT 7: PHAEOPHYTA AND RHODOPHYTA. NO OF CLASSES=28	U N I V E R S I T Y F I N A L E X A M I N A T I O N
		BOTACOR01 P 30 (PRACTICAL)	MICROBIOLOGY: 1. VIRUS, 2. BACTERIA. PHYCOLOGY: 1. STUDY OF VEGETATIVE AND REPRODUCTIVE STRUCTURE. NO. OF CLASSES=16	MICROBIOLOGY: 1. MEDIUM PREPARATION, STERILIZATION, 4. GRAM STAINING. PHYCOLOGY: 2. PRISM DRAWING AND MEASUREMENT. NO. OF CLASSES=14	
	CORE- C2	BOTACOR02 T 60 (THEORY)	UNIT 1: BIOMOLUCULES: CARBOHYDRATES, LIPIDS, PROTEINS, NUCLEIC ACIDS, UNIT 2: BIOENERGETICS, UNIT 4: THE CELL, UNIT 5: CELL WALL AND PLASMA MEMBRANE NO. OF CLASSES= 32	UNIT 3: ENZYMES, UNIT 6: NUCLEUS, CYTOSKELETON, CHLOROPLAST, MITROCHONDRIA AND PEROXISOME. UNIT 7: CELL DIVISION NO. OF CLASSES= 28	
		BOTACOR02 P 30 (PRACTICAL)	1. QUALITATIVE TESTS 2. STUDY OF PLANT CELLS, 3. MICROMETRY, 4. CELL COUNTING. NO. OF CLASSES= 16	5. STUDY OF CELL ORGANELLES, 6. DNA STAINING, 7. MEMBRANE PERMEABILITY TEST, STUDY OF DIFFERENT STAGES OF MITOSIS AND MEIOSIS. NO. OF CLASSES= 14	
	GE I/DSC 1A	BOTHGEC01 T / BOTGCORO1T-60 (THEORY)	UNIT 1: MICROBS, UNIT 2: ALGAE, UNIT 3: FUNGI NO. OF CLASSES=34	UNIT 4: ARCHEGONIATE, UNIT 5: BRYOPHYTES, UNIT 6: PTERIDOPHYTES, UNIT 7: GYMNOSPERMS. NO. OF CLASSES=26	
		BOTHGEC01 P / BOTGCORO1P -30 (PRACTICAL)	1. GRAM STAINING, 2. ALGAE, 3-5 FUNGI, 6. LICHEN, 7 MYCORRHIZA, 8. MARCHANTIA, NO. OF CLASSES=16	9. FUNARIA. 10. SELAGINELLA, 11. EQUISETUM, 12. PTERIS, 13. CYCAS, 14. PINUS. NO. OF CLASSES=14	
			JANUARY-MARCH	APRIL-JUNE	JULY
SEMESTER-II	CORE- C3	BOTACOR03 T 60 (THEORY)	UNIT 1: INTRODUCTION FUNGI, UNIT 2: CHITRIDOMYCOTA AND ZYGOMYCOTA, UNIT 3: ASCOMYCOTA, UNIT 4: BASIDIOMYCOTA NO. OF CLASSES=32	UNIT 5: ALLIED FUNGI, UNIT 6: OOMYCOTA, UNIT 7: MYCOLOGY, UNIT 9. PHYTOPATHOLOGY. NO. OF CLASSES= 28	T E S T E X A M I N A T I O N
		BOTACOR03 P 30 (PRACTICAL)	1. STUDY OF FUNGI, 2. MICROMETRY, 3. RHIZOPUS, 4. ASPERGILLUS AND PENICILLIUM, 5. ASCOBOLLUS, 8. AGARICUS 6. ALTERNARIA, NO. OF CLASSES=16	7. PUCCINIA, 9. ALBUGO, 10. LICHENS, 11. PHYTOPATHOLOGY: BACTERIAL DEASES, VIRAL DISEASES, FUNGAL DISEASES. NO. OF CLASSES=14	
	CORE- C4	BOTACOR04 T 60 (THEORY)	UNIT 1: INTRODUCTION ARCHAEGONIATES. UNIT 2: BRYOPHYTES, UNIT 3: TYPES STUDIES-BRYOPHYTES NO. OF CLASSES=32	UNIT 4: PTERIDOPHYTES, UNIT 5: TYPE SYDIES- PTERIDOPHYTES, UNIT 6: GYMNOSPERMS. NO. OF CLASSES=28	
	BOTACOR04 P 30 (PRACTICAL)	1. RICCIA, 2. MARCHANTIA, 3. ANTHOCEROS, 4. SPHAGNUM, 5. FUNARIA, 6. PSILOTUM, 7. SELAGINELLA NO. OF CLASSES=14	8. EQUISETUM, 9. PTERIS, 10. CYCAS, 11. PINUS, 12. GNETUM, 13. BOTANICAL EXCURSION NO. OF CLASSES=16		
GE 2/DSC1B	BOTHGEC02 T / BOTGCORO2T- 60 (THEORY)	UNIT 1: ECOLOGY- INTRODUCTION, UNIT 2: ECOLOGICAL FACTORS, UNIT 6: PLANT TAXONOMY- INTRODUCTION, UNIT 7: IDENTIFICATION, UNIT 8: TAXONOMIC EVIDANCES, UNIT 10: BOTANICAL NOMENCLATURE. NO. OF CLASSES=32	UNIT 3: PLANT COMMUNITIES, UNIT 4: ECOSYSTEM, UNIT 5: PHYTOGEOGRAPHY, UNIT 9: TAXONOMIC HIERARCHY, UNIT 11: CLASSIFICATIO, UNIT 12: NOMENCLATURE. NO. OF CLASSES=26		
		BOTHGEC02 P / BOTGCORO2P -30 (PRACTICAL)	1. GRAM STAINING, 2. ALGAE, 3-5 FUNGI, 6. LICHEN, 7 MYCORRHIZA, 8. MARCHANTIA, NO. OF CLASSES=16	9. FUNARIA. 10. SELAGINELLA, 11. EQUISETUM, 12. PTERIS, 13. CYCAS, 14. PINUS. NO. OF CLASSES=14	

HONOURS/GENERAL CBCS	COURSES	PAPER/ NUMBER OF LECTURES	JULY-SEPTEMBER	OCTOBER -DECEMBER	JANUARY
SEMESTER-III	CORE- C5	BOTACOR05 T 60 (THEORY)	UNIT 1: INFLORESCENCE, UNIT 2: FLOWER, UNIT 3: FRUIT AND SEED, UNIT 4: INTRODUCTION TO ANATOMY, UNIT 5: STRUCTURE AND DEVELOPMENT OF PLANT BODY NO. OF CLASSES= 32	UNIT 6: TISSUE, UNIT 7: APICAL MERISTEMS, UNIT 8: VASCULAR CAMBIUM AND WOOD, UNIT 9: ADAPTIVE AND PROTECTIVE SYSTEMS. NO. OF CLASSES=16	U N I V E R S I T Y F I N A L E X A M I N A T I O N
		BOTACOR05 P 30 (PRACTICAL)	1.(a-g) a. Apical meristem, b. Distribution and types of permanent tissue, c. Xylem d. Wood types, e. Phloem, f. Epidermal system, g. Periderm; lenticels; C4 leaves (Kranz anatomy); Secretory tissues: cavities, lithocysts NO. OF CLASSES=16	2. Preparation of permanent slides by double staining: a. Root (monocot – Orchid), dicot (Sunflower); b. Stem (monocot- maize), (dicot – Cucurbita). c. Leaf: (Tube rose, Mango), d. Adaptive anatomy: (Nerium leaf, Nymphaea petiole) NO. OF CLASSES= 16	
	CORE- C6	BOTACOR06 T 60 (THEORY)	UNIT 1: ORIGIN OF CULTIVATED PLANTS, UNIT 2: CEREALS. UNIT 3: LEGUMES, UNIT 4: SOURCES OF SUGARS AND STARCHES, UNIT 5: SPICES, UNIT 6: DRINKS NO. OF CLASSES= 32	UNIT 7: SOURCES OF OILS AND FATS, UNIT 8: NATURAL RUBBER, UNIT 9: DRUG YIELDING PLANTS, UNIT 10: TIMBER PLANTS, UNIT 11: FIBERS NO. OF CLASSES= 28	
		BOTACOR06 P 30 (PRACTICAL)	1. CEREALS: 2. LEGUMES: 3. SOURCES OF SUGARS AND STARCHES: 4. SPICES: 5. BEVERAGES: 6. SOURCES OF OILS AND FATS: NO. OF CLASSES= 16	7. ESSENTIAL OIL-YIELDING PLANTS: 8. RUBBER: 9. DRUG-YIELDING PLANTS: 10. TOBACCO: 11. WOODS: 12. FIBER-YIELDING PLANTS: NO. OF CLASSES= 14	
	CORE- C7	BOTACOR07 T 60 (THEORY)	UNIT 1: MENDELIAN GENETICS AND ITS EXTENSION, UNIT 2: EXTRACHROMOSOMAL INHERITANCE UNIT 3: LINKAGE, CROSSING OVER AND CHROMOSOME MAPPING NO. OF CLASSES= 34	UNIT 4: VARIATION IN CHROMOSOME NUMBER AND STRUCTURE, UNIT 5: GENE MUTATIONS, UNIT 6: FINE STRUCTURE OF GENE, UNIT 7. POPULATION AND EVOLUTIONARY GENETICS. NO. OF CLASSES= 26	
		BOTACOR07 P 30 (PRACTICAL)	1a. Mitosis (<i>Allium cepa</i> , <i>Lens esculentus</i> , <i>Aloe vera</i>). b. Meiosis (<i>Allium cepa</i> , <i>Rhoeo discolor</i>). 2. Mendel's laws through seed ratios(3:1, 1:1, 9:3:3:1, 1:1:1:1). 3. Chromosome mapping using point test cross data. 4. Incomplete dominance and gene interaction(ratio-9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4). NO. OF CLASSES= 18	5. Study of aneuploidy: 6. Photographs and permanent slides showing translocation ring, Laggards and Inversion Bridge, Multipolarity, Sticky Bridge, Fragmentation and Pollen mitosis. 7. Study of human genetic traits: Sickle cell anemia, xeroderma pigmentosum, albinism, red-green colour blindness, widow's peak, rolling of tongue, Hitchhiker's thumb and attached ear lobe. NO. OF CLASSES= 12	
	GE 3/DSC3	BOTHGEC03 T / BOTGCOR03T-60 (THEORY)	UNIT 1: MERISTEMIC AND PERMANENT TISSUE, UNIT 2: ORGANS, UNIT 3: SECONDARY GROWTH, UNIT 4: ADAPTIVE AND PROTECTIVE SYSTEM NO. OF CLASSES=34	UNIT 5: STRUCTURAL ORGANIZATION OF FLOWER, UNIT 6: POLLINATION AND FERTILIZATION, UNIT 7: EMBRYO AND ENDOSPERM, UNIT: 8 APOMIXIS. NO. OF CLASSES=26	
		BOTHGEC03 P / BOTGCOR03P -30 (PRACTICAL)	1. STUDY OF MERISTEMS, 2 STUDY OF PERMANENT TISSUES., 3-5 ANATOMY OF STEM, ROOT, LEAF, 6. ADAPTIVE ANATOMY. NO. OF CLASSES=16	8. STUDY OF OVULES, 9. EGG APPARATUS. 10. PALYNOLOGY, 11. EMBRYOLOGY, 12. STUDY OF POLLEN GERMINATION. NO. OF CLASSES=14	
	SEC 1	BOTSSEC01M/ BOTSSEC01	UNIT 1: PLANT DIVERSITY AND ITS SCOPE, UNIT 2: LOSS OF BIODIVERSITY. NO. OF CLASSES=16	UNIT 3: CONSERVATION OF BIODIVERSITY, UNIT 4: ROLE OF PLANTS IN RELATION TO HUMAN WELFARE. NO. OF CLASSES=14	
			JANUARY-MARCH	APRIL-JUNE	JULY
SEMESTER-IV	CORE- C8	BOTACOR08 T 60 (THEORY)	UNIT 1: NUCLEIC ACIDS: CARRIERS OF GENETIC INFORMATION, UNIT 2. THE STRUCTURES OF DNA AND RNA / GENETIC MATERIAL, UNIT 3: THE REPLICATION OF DNA UNIT 4: CENTRAL DOGMA AND GENETIC CODE. NO. OF CLASSES=26	UNIT 5: TRANSCRIPTION, UNIT 6: PROCESSING AND MODIFICATION OF RNA, UNIT 7: TRANSLATION. NO. OF CLASSES= 34	U N I V E R S I T Y F I N A L E X A M I N A T I O N
		BOTACOR08 P 30 (PRACTICAL)	1. Preparation of LB medium, 2. DNA isolation from cauliflower head. 3. DNA estimation by diphenylamine reagent/UV Spectrophotometry. 4. Study of DNA replication mechanisms through photograph. NO OF CLASSES=16	5. Study of structures of prokaryotic RNA polymerase. 6. Photographs establishing nucleic acid as genetic material, 7. Study of assembly of Spliceosome machinery; splicing mechanism in group I & group II introns; ribozyme and alternative splicing. NO. OF CLASSES=14	
	CORE- C9	BOTACOR09T 60 (THEORY)	UNIT 1: INTRODUCTION -ECOLOGY. UNIT 2: SOIL, UNIT 3: WATER, UNIT 4: LIGHT, TEMPERATURE, WIND AND FIRE, UNIT 5: BIOTIC INTERACTIONS, UNIT 6: POPULATION ECOLOGY. NO. OF CLASSES=28	UNIT 7: PLANT COMMUNITIES, UNIT 8: ECOSYSTEMS, UNIT 9: FUNCTIONAL ASPECTS OF ECOSYSTEM, UNIT 10: PHYTOGEOGRAPHY, NO. OF CLASSES=32	
		BOTACOR09 P 30 (PRACTICAL)	1. Study of microclimatic variables: 2. Determination of pH of various soil and water samples. 3. Analysis for carbonates, chlorides, nitrates, organic matter and base by rapid field tests. 4. Determination of organic carbon of different soil samples. 5. Determination of dissolved oxygen and carbon dioxide of water. 10. Field visit to familiarize students with ecology of different sites. NO. OF CLASSES=20	6. (a). Study of anatomical adaptations of hydrophytes and xerophytes. (b). Study of biotic interactions: Stem parasite (<i>Cuscuta</i>), Epiphytes (<i>Vanda</i> root), Predation (Insectivorous plants). 7. Determination of minimum size of quadrat. 8. Quantitative analysis with Raunkiaer's frequency distribution law. 9. Quantitative analysis for density and abundance. NO OF CLASSES= 10	

	CORE- C10	BOTACOR10 T 60 (THEORY) BOTACOR10 P 30 (PRACTICAL)	UNIT 1: SIGNIFICANCE OF PLANT SYSTEMATICS. UNIT 2: TAXONOMIC HIERARCHY: CONCEPT OF TAXA (FAMILY, GENUS, SPECIES); CATEGORIES AND TAXONOMIC HIERARCHY; SPECIES CONCEPT, UNIT 3: BOTANICAL NOMENCLATURE, UNIT 4: SYSTEMS OF CLASSIFICATION. - NO. OF CLASSES=38 1.Study of Anther: 2. Study of Pollen grains: 3. Study of Ovule: NO OF CLASSES= 12	UNIT 5: BIOMETRICS, NUMERICAL TAXONOMY AND CLADISTICS: CHARACTERS; VARIATIONS; OTUS, CHARACTER WEIGHTING AND CODING; CLUSTER ANALYSIS; PHENOGRAMS, CLADOGRAMS). UNIT 6: PHYLOGENY OF ANGIOSPERMS. NO. OF CLASSES=22 4. Study of Female gametophyte through permanent slides/ photographs: 5. Endosperm: 6. Embryogenesis. NO OF CLASSES= 18	
	GE 4/DSC4	BOTHGEC04 T / BOTGCOR04T- 60 (THEORY) BOTHGEC04 P / BOTGCOR04P -30 (PRACTICAL)	UNIT 1: PLANT WATER RELATION, UNIT 2: MINERAL NUTRITION, UNIT 3: PHOTOSYNTHESIS, UNIT 4: RESPIRATION, UNIT 6: ENZYMES. NO. OF CLASSES=34 1. OSMOTIC POTENTIAL, 2. STUDY OF ENVIRONMENTAL FACTORS ON TRANSPIRATION, 3-STOMATAL INDEX AND STOMATAL FREQUENCY. NO. OF CLASSES=16	UNIT 7: NITROGEN METABILISM, UNIT 8: PLANT GROWTH REGULATORS, UNIT 9:PLANT RESPONSE TO LIGHT AND TEMPERATURE. NO. OF CLASSES=26 4. STUDY OF CATALASE ACTIVITY. 5. O ₂ EVOLUTION IN PHOTOSYNTHESIS, 6.RESPIRATION NO. OF CLASSES=14	
	SEC 2	BOTSSEC02M/ BOTSSEC02	UNIT 1: ETHNOBOTANY, UNIT 2: METHODOLOGY OF ETHNOBOTANICAL STUDIES. NO. OF CLASSES=12	UNIT 3: ROLE OF ETHNOBOTANY IN MODERN MEDICINE, UNIT 4: ETHNOBOTANY AND LEGAL ASPECTS. NO. OF CLASSES=18	

HONOURS/GENERAL CBCS	COURSES	PAPER/ NUMBER OF LECTURES	JULY-SEPTEMBER	OCTOBER -DECEMBER	JANUARY
SEMESTER-V	Core Course XI: Reproductive Biology of Angiosperms	BOTACOR11T 60 (THEORY) BOTACOR11P 30 (PRACTICAL)	Unit 1: Introduction (4 lectures) History and scope. Unit 2: Reproductive development (6 lectures) Induction of flowering; flower as a modified determinate shoot. Flower development: genetic and molecular aspects. Unit 3: Anther and pollen biology (10 lectures) Anther wall: Structure and functions, microsporogenesis, callose deposition and its significance. Microgametogenesis; pollen wall structure, MGU (male germ unit) structure, NPC system; palynology and scope (a brief account); pollen wall proteins; pollen viability. Unit 4: Ovule (10 lectures) Structure; types; female gametophyte– megasporogenesis (monosporic, bisporic and tetrasporic) and megagametogenesis (details of Polygonum type); organization of mature embryo sac. 1. Anther: Tapetum (amoeboid and glandular); spore tetrads, uninucleate, bicelled and dehisced anther stages through slides/micrographs, male germ unit (MGU) through photographs and schematic representation. 2. Pollen grains: Fresh and acetolyzed showing ornamentation and aperture, monads, dyads, polyads, pollinia (slides/photographs,fresh material), ultrastructure of pollen wall(micrograph); Pollen viability: Tetrazolium test germination: Calculation of percentage germination in different media using hanging drop method.	Unit 4: Pollination and fertilization (6 lectures) Pollination - types and significance; adaptations; structure of stigma and style; path of pollen tube in pistil; double fertilization. Unit 5: Self incompatibility (10 lectures) Basic concepts (interspecific, intraspecific, homomorphic, heteromorphic, GSI and SSI); methods to overcome self-incompatibility - mixed pollination, bud pollination, stub pollination; intraovarian and in vitro pollination, parasexual hybridization; cybrids, in vitro fertilization. Unit 6: Embryo, Endosperm and Seed (10 lectures) Structure and types; general pattern of development of dicot and monocot embryo and endosperm; suspensor - structure and functions; embryo-endosperm relationship; nutrition of embryo; unusual features; embryo development in Capsella bursa-pastorisseed structure, importance and dispersal mechanisms. Units 7: Polyembryony and apomixis (6 lectures) Introduction; classification; causes and applications.	U N I V E R S I T Y F I N A L E X A M I N A T I O N
	Core Course XII: Plant Physiology	BOTACOR12T 60 (THEORY) BOTACOR12P 30 (PRACTICAL)	Unit 1: Plant-water relations (10 lectures) Water potential and its components, water absorption by roots, aquaporins, pathway of water movement, symplast, apoplast, transmembrane pathways, root pressure, guttation. Ascent of sap– cohesion-tension theory ;transpiration and factors affecting transpiration, antitranspirants, mechanism of stomatal movement.	Unit 3: Nutrient Uptake (8 lectures) Soil as a nutrient reservoir, transport of ions across cell membrane, passive absorption, electrochemical gradient, facilitated diffusion, active absorption, role of ATP, carrier systems, proton ATPase pump and ion flux, uniport, co-transport, symport, antiport.	

			<p>Unit 2: Mineral nutrition (8 lectures) Essential and beneficial elements, macro and micronutrients, methods of study and use of nutrient solutions, criteria for essentiality, mineral deficiency symptoms, roles of essential elements, chelating agents.</p> <ol style="list-style-type: none"> Determination of osmotic potential of plant cell sap by plasmolytic method. Determination of water potential of given tissue (potato tuber) by weight method. Study of the effect of wind and light on the rate of transpiration in Colocasia leaf. Calculation of stomatal index and stomatal frequency from the two surfaces of leaves of a mesophyte (<i>Basella</i>) and xerophytes (<i>Ficus benghalensis</i>). To determine the proportion of area covered by stomatal pore with respect to the total leaf area Page 33 of 81 for mesophyte (<i>Basella</i>) and xerophyte (<i>Ficus benghalensis</i>) (both surfaces). To study the phenomenon of epigeal and hypogeal seed germination with respect to light (gram and corn seeds). To study the effect of different concentrations of IAA on Avena coleoptile elongation (IAA bioassay). To study the induction of amylase activity in germinating wheat/barley grains. 		<p>Unit 4: Translocation in the phloem (8 lectures) Experimental evidence in support of phloem as the site of sugar translocation; pressure flow model; phloem loading and unloading; source-sink relationship. Unit 5: Plant growth regulators (14 lectures) Discovery, chemical nature (basic structure), bioassay and molecular aspects of the physiological roles of auxin, gibberellins, cytokinin, abscisic acid, ethylene. Brief account of Brassinosteroids and Jasmonic acid. Unit 6: Physiology of flowering (6 lectures) Photoperiodism, flowering stimulus, florigen concept, vernalization, seed dormancy and germination. Unit 7: Phytochrome, cryptochromes and phototropins (6 lectures) Discovery, chemical nature, role in photomorphogenesis, low energy responses (LER) and high irradiance responses (HIR), mode of action.</p>	
			MARCH-APRIL		MAY-JUNE	JULY
SEMESTER-VI	Core Course XIII: Plant Metabolism	Course Code: BOTACOR13 T 60 (THEORY) BOTACOR13 P 30 (PRACTICAL)	<p>Unit 1: Concept of metabolism (6 lectures) Introduction, anabolic and catabolic pathways, regulation of metabolism, enzymes - mechanism and factors, kinetics, role of regulatory enzymes (allosteric, covalent modulation and isozymes), enzyme inhibition. Unit 2: Carbon assimilation (14 lectures) Photosynthetic pigments, role of photosynthetic pigments (chlorophylls and accessory pigments), antenna molecules and reaction centres, photochemical reactions, photosynthetic electron transport, PSI, PSII, Q cycle, CO₂ reduction, photorespiration, C₄ pathways; Crassulacean acid metabolism; factors affecting CO₂ reduction. Unit 3: Carbohydrate metabolism (2 lectures) Synthesis and catabolism of sucrose and starch. Unit 4: Carbon Oxidation (10 lectures) Glycolysis, fate of pyruvate, regulation of glycolysis, oxidative pentose phosphate pathway, oxidative decarboxylation of pyruvate, regulation of PDH, NADH shuttle; TCA cycle, amphibolic role, anaerobic reactions, regulation of the cycle, mitochondrial electron transport, oxidative phosphorylation, cyanide-resistant respiration, factors affecting respiration.</p>		<p>Unit 5: ATP-Synthesis (8 lectures) Mechanism of ATP synthesis, substrate level phosphorylation, chemiosmotic mechanism (oxidative and photophosphorylation), ATP synthase; role of uncouplers. Unit 6: Lipid metabolism (8 lectures) Synthesis and breakdown of triglycerides, β-oxidation, glyoxylate cycle, gluconeogenesis and its role in mobilisation of lipids during seed germination, α oxidation. Unit 7: Nitrogen metabolism (8 lectures) Nitrate assimilation, biological nitrogen fixation (examples of legumes and non-legumes); Physiology and biochemistry of nitrogen fixation; ammonia assimilation and transamination. Unit 8: Mechanisms of signal transduction (4 lectures) Receptor-ligand interactions; G protein; second messenger concept, calcium calmodulin, MAP kinase cascade.</p> <ol style="list-style-type: none"> Chemical separation of photosynthetic pigments. Demonstration of absorption spectrum of photosynthetic pigments (spectrophotometer). To study the effect of light intensity on the rate of photosynthesis. Effect of carbon dioxide on the rate of photosynthesis (volume measurement) To compare the rate of respiration in different parts of a plant. To demonstrate activity of Nitrate reductase in germinating leaves of different plant sources. To study the activity of lipases in germinating oilseeds. 	UNIVERSITY FINAL EXAM INATION

	Core Course XIV: Plant Biotechnology	Course Code: BOTACOR14T 60	<p>Unit 1: Plant Tissue Culture (16 lectures) Historical perspective; composition of media; nutrient and hormone requirements (role of vitamins and hormones); totipotency; organogenesis; embryogenesis (somatic and zygotic); protoplast isolation, culture and fusion; Tissue culture applications (micropropagation, androgenesis, virus elimination, secondary metabolite production, haploids, triploids and hybrids; cryopreservation; germplasm conservation), hardening of the tissue culture raised plants for field plantation.</p> <p>Unit 2: Recombinant DNA technology (12 lectures) Restriction Endonucleases (Types I-IV, biological role and application); Restriction mapping (linear and circular); cloning vectors: prokaryotic (pBR322, Ti plasmid, BAC); lambda phage, cosmid; eukaryotic vectors (YAC).</p> <p>Unit 3: Gene Cloning (10 lectures) Recombinant DNA, bacterial transformation and selection of recombinant clones, PCR-mediated gene cloning; gene construct; construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by genetic selection; complementation, colony hybridization; PCR.</p>	<p>Unit 4: Methods of gene transfer (8 lectures) Agrobacterium-mediated direct gene transfer by electroporation, microinjection, Microprojectile bombardment; selection of transgenics– selectable marker and reporter genes (luciferase, GUS, GFP).</p> <p>Unit 5: Applications of Biotechnology (14 lectures) Pest resistant (Bt-cotton); herbicide resistant plants (round up ready soybean); transgenic crops with improved quality traits (Golden rice); improved horticultural varieties (Moondust carnations); role of transgenics in bioremediation (Superbug); edible vaccines; industrial enzymes (aspergillase, protease, lipase); genetically engineered products–human growth hormone; humulin; biosafety concerns</p> <ol style="list-style-type: none"> (a) Preparation of MS medium. (b) Process of in vitro sterilization and inoculation methods by using different explants (leaf, nodal bud and seeds of tobacco, Datura, Brassica) Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & artificial seeds through photographs. Construction of restriction map of circular and linear DNA from the data provided. Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, microprojectile bombardment. Study of steps of genetic engineering for production of Bt cotton, Golden rice, Flavr Savr tomato through photographs. Isolation of genomic DNA and its gel electrophoresis. 	
	Discipline Specific Elective Courses	Analytical Techniques in Plant Sciences BOTADSE04T BOTADSE04P	<p>Unit 1: Imaging and related techniques (15 lectures) Principles of microscopy; Light microscopy; Fluorescence microscopy; Confocal microscopy; Use of fluorochromes: (a) Flow cytometry (FACS); (b) Applications of fluorescence microscopy: Chromosome banding, FISH, chromosome painting; Transmission and Scanning electron microscopy – sample preparation for electron microscopy, cryofixation, negative staining, shadow casting, freeze fracture, freeze etching.</p> <p>Unit 2: Cell fractionation (8 lectures) Centrifugation: Differential and density gradient centrifugation, sucrose density gradient, CsCl₂ gradient, analytical centrifugation, ultracentrifugation, marker enzymes.</p> <p>Unit 3: Radioisotopes (4 lectures) Use in biological research, auto-radiography, pulse chase experiment.</p> <ol style="list-style-type: none"> Study of Blotting techniques: Southern, Northern and Western, DNA fingerprinting, DNA sequencing, PCR through photographs. To separate nitrogenous bases by paper chromatography. To separate sugars by thin layer chromatography. To estimate protein concentration through Lowry's methods. 	<p>Unit 5: Chromatography (8 lectures) Principle; Paper chromatography; Column chromatography, TLC, GLC, HPLC, Ion-exchange chromatography; Molecular sieve chromatography; Affinity chromatography.</p> <p>Unit 6: Characterization of proteins and nucleic acids (6 lectures) Mass spectrometry; X-ray diffraction; X-ray crystallography; Characterization of proteins and nucleic acids; Electrophoresis: AGE, PAGE, SDS-PAGE</p> <p>Unit 7: Biostatistics (15 lectures) Statistics, data, population, samples, parameters; Representation of Data: Tabular, Graphical; Measures of central tendency: Arithmetic mean, mode, median; Measures of dispersion: Range, mean deviation, variation, standard deviation; Chi-square test for goodness of fit.</p> <ol style="list-style-type: none"> To separate proteins using PAGE. To separate DNA (marker) using AGE. Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, fluorescence and FISH). Preparation of permanent slides (double staining)- any material with saffranin and light green stain. 	

		<p>Biostatistics</p> <p>BOTADSE06T BOTADSE06P</p>	<p>Unit 1:Biostatistics (12 lectures) Definition - statistical methods - basic principles. Variables - measurements, functions, limitations and uses of statistics. Page 47 of 81 Unit 2:Collection of data primary and secondary (12 lectures) Types and methods of data collection procedures - merits and demerits. Classification - tabulation and presentation of data - sampling methods</p> <ol style="list-style-type: none"> 1) Calculation of mean, standard deviation and standard error. 2) Calculation of correlation coefficient values and finding out the probability. 3) Calculation of 'F' value and finding out the probability value for the F value. 		<p>Unit 3:Measures of central tendency (14 lectures) Mean, median, mode, geometric mean - merits & demerits. Measures of dispersion - range, standard deviation, mean deviation, quartile deviation - merits and demerits; Co- efficient of variations. Unit 4:Correlation (12 lectures) Types and methods of correlation, regression, simple regression equation, fitting prediction, similarities and dissimilarities of correlation and regression. Unit 5:Statistical inference (10 lectures) Hypothesis - simple hypothesis - student 't' test - chi square test.</p>	
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