

Lesson Plan (2023-24 /Even Semester)

Name of the Teacher- BHUPENDRA

Class – Botany hons. 2ND sem.

Subject- Plant Development and Anatomy (BOT203)

Month	Topics to be covered	Assignments/Test
January 2024	Unit 1 Plant Sporophyte: A bipolar structure; Onset of polarity; Cytodifferentiation and organogenesis during embryonic development; physiological and genetic aspects. Introduction and scope of Plant Anatomy: Applications in systematics, forensics and pharmacognosy. Tissues and Cell Walls: Classification and structure of tissues; cytodifferentiation of tracheary elements and sieve elements; pits and plasmodesmata; wall ingrowths and transfer cells; adcrustation and incrustation; ergastic substances.	
February 2024	Unit 2 Leaf: Development of leaf, histology of C3 and C4 leaves; stomatal complex and diversity of stomata, scale leaves. Stem: Organization of shoot apex (apical cell theory, histogen theory, tunica corpus theory, plastochrone); shoot chimeras; types of vascular bundles; primary phloem and primary xylem; terminal, lateral and adventitious buds; primary thickening meristem. Root: Organization of root apex (apical cell theory, histogen theory, korper-kappe theory); quiescent centre; root cap; primary root tissue: rhizodermis, cortex, endodermis, exodermis, metacutinization, lateral root apices; secondary growth in roots.	ClassTest
March 2024	Vascular Cambium Structure and function; concept of cambial zone; cambial derivatives; seasonal activity of cambium and unusual cambial activity. Secondary Growth: Axially and radially oriented xylary and phloic elements, cyclic aspects, juvenile adult and reaction woods; sap wood and heart wood; Phloem as a dynamic tissue. Periderm : Development and composition of periderm, rhytidome and lenticels.	Assignment
April 2024	Adaptive and Protective Systems Epidermal tissue system (cuticle, epicuticular waxes, trichomes); Anatomical adaptations in stems, leaves and roots of xerophytes, hydrophytes and halophytes. Secretory and Excretory System Hydathodes, salt glands, nectaries; cavities, lithocysts and laticifers	Class test

Bhupendra

Lesson Plan (2023-24 / Even Semester)

Name of the Teacher-BHUPENDRA

Class – B.Sc. BOTANY Hons. 4th sem

Subject-Cell Biology-II (BOT401)

Month	Topics to be covered	Assignments/Test
January 2024	The Plasma Membrane Structure; Transport of small molecules, Endocytosis Cell Wall, the Extracellular Matrix and Cell Interactions Bacterial and Eukaryotic Cell Wall; the extracellular matrix and cell matrix interactions; cell-cell interactions	ClassTest
February 2024	Cell Signaling Signaling molecules and their receptor; functions of cell surface receptors; Intracellular signal transduction pathway; signaling networks. The Cell Cycle ;Eukaryotic Cell Cycle, Regulation of Cell cycle progression, Events of Mitotic Phase, Meiosis and Fertilization	
March 2024	Cell Death and Cell Renewal Programmed Cell Death, Stem Cells and Maintenance of adult tissues, Embryonic Stem Cells and Therapeutic cloning.	Assignment
April 2024	. Cancer Development and Causes of Cancer, Tumor Viruses, Oncogenes, Tumor Suppressor genes, Cancer Treatment- molecular approach	Class Test

Bhupendra

Lesson Plan(2023-24/EVEN Semester)

Name of the Teacher-BHUPENDRA

Class -B.Sc. BOTANY Hons. 6th sem

Subject-Plant Metabolism and Biochemistry (BOT601)

Month	Topics to be covered	Assignments/Test
January 2024	Unit 1: Enzymes :Historical background, classification, nomenclature and importance of enzymes; role of enzymes as catalysts; physiochemical and biological properties; concept of holoenzymes; coenzyme; apoenzyme and prosthetic groups; mechanism and kinetics of enzyme action; enzyme inhibitors; isoenzymes; allosteric enzymes; Industrial aspects of enzymology.	
February 2024	Unit 2: Carbon Assimilation: Role of chlorophylls and accessory pigments; antennae molecules and active center molecules; evidences for two photosystems; reduction of NADP; photophosphorylation; reduction of CO ₂ into glucose; Benson and Calvin cycle; Hatch and Slack pathway; Crassulacean acid metabolism; energetics of CO ₂ reduction; factors affecting CO ₂ reduction. , Carbon Oxidation: Glycolysis, anaerobic conversion of pyruvate into ethanol or lactate, energy balance, reversibility and inhibition of glycolysis, Pasteur effect, oxidative decarboxylation of pyruvate into acetyl CoA, TCA cycle, oxidative phosphorylation, oxidation of RuBP (photorespiration), factors affecting oxidative processes, regulation of TCA cycle, role of glyoxalate cycle	Class Test
March 2024	Unit 3: Carbohydrate Metabolism: Structure, properties and importance of mono-, di- and polysaccharides; Synthesis of di- (sucrose) and polysaccharides (starch and cellulose). Nitrogen and Protein Metabolism :Biological nitrogen fixation and nitrogen cycle, Catabolism of amino acids, ammonia assimilation, transamination, deamination, structure and general properties of amino acids and proteins (protein folding). Lipid Metabolism: Structure, properties, classification and functional significance of fatty acids, triglycerides and steroids; Synthesis and breakdown, formation of glycerides; oxidation of fatty acids, beta oxidation; energy balance.	Assignment
April 2024	Unit 4: Intermediary Metabolism: Interrelationship of carbohydrates, lipids and protein metabolism.) Regulation of Metabolism :Nature of integrated metabolism, role of acetyl CoA, control at the level of transcription and Translation, control of enzyme action. Secondary Metabolites and Plant Defense :Introduction to alkaloids, phenolics, plant terpenes, phytoalexins, sesquiterpenes and sterols.	Class test

Bhupendra

Lesson Plan for Even Session (2023-24)

Name: NISHA

Class: BSC Medical 2nd Sem

Lesson Plan: DIVERSITY OF ARCHEGONIATES

January-2024

Bryophyta- General characters, classification (upto classes), alternation of generations, evolution of sporophytes and economic importance

February-2024

Bryophyta: Structure and reproduction (excluding development) of *Marchantia* (Hepaticopsida), *Anthoceros* (Anthocerotopsida) and *Funaria* (Bryopsida)

March-2024

Pteridophyta- General characters, classification (upto classes): Structure and reproduction (excluding development) of *Rhynia* (Psilopsida), *Selaginella* (Lycopsida), *Equisetum* (Sphenopsida) Revision and class test

April-2024

Pteris (Pteropsida) Alternation of generations, heterospory, Apospory, apogamy and economic importance; General account of stellar evolution, Revision and class test

May-2024

Exams

Nisha

Name: NISHA

Class: BSC Medical 2nd Sem

Lesson Plan: PAPER – II GENETICS

January-2024

Genetic Material: DNA - the genetic material, DNA structure and replication, DNA- Protein interaction, The Nucleosome Model, Genetic Code, Satellite and Repetitive DNA.

February-2024

Genetic Inheritance: Mendelism: Laws of Segregation and Independent Assortment; Linkage Analysis; Allelic and non-allelic interactions.

March-2024

Extra-nuclear Inheritance: Presence and function of Mitochondrial and Plastid DNA; Plasmids. **Genetic Variations:** Mutations - spontaneous and induced; Transposable genetic elements; DNA damage and repair,

April -2020

Modern concept of gene; RNA; Ribosomes; Transfer of genetic information – transcription, Translation; Structure of proteins; Regulation of gene expression in prokaryotes and eukaryotes
Revision and test

May-2024

Exams

Nisha
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Name: NISHA

Class: BSC Medical 6th Sem

Lesson Plan: Biochemistry and Plant Biotechnology

January-2024

Basics of Enzymology: Discovery and nomenclature; characteristics of enzymes; concept of holoenzyme, apoenzyme, coenzyme and co-factors; regulation of enzyme activity; mechanism of action.

February-2024

Respiration: ATP – the biological energy currency; aerobic and anaerobic respiration; Krebs cycle; electron transport mechanism (chemiosmotic theory); redox -potential; oxidative phosphorylation; pentose phosphate pathway

March-2024

Lipid metabolism: Structure and functions of lipids; fatty acid biosynthesis; β -oxidation; saturated and unsaturated fatty acids; storage and mobilization of fatty acids. Nitrogen metabolism: Biology of nitrogen fixation; importance of nitrate reductase and its regulation; ammonium assimilation. Revisions and test

April -2024

Genetic engineering and Biotechnology: Tools and techniques of recombinant DNA technology; cloning vectors; genomic and cDNA library; transposable elements; aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis; biology of *Agrobacterium*; vectors for gene delivery and marker genes. Revisions and test

May-2024

Exams

Nisha

Name: Dr. Archana Singh

Class: BSc Botany Hons 2nd Sem

Lesson Plan: Diversity of Gymnosperms

Jan 2024

General account of fossils, techniques used to study fossil. Evolution of gymnosperms. Classification and distribution of Gymnosperms in India. Contribution of Prof. Birbal Sahni

Feb -2024

Characteristic features and life cycle patterns of Gymnosperms. Patterns of variation in morphology of gymnosperms,. Ecological and Economic importance of Gymnosperms. Assignment.

March-2024

Unit 3 Morphology and anatomy of Cycas, Pinus, Ephedra, Gnetum. Reproduction in Cycas, Pinus, Ephedra, Gnetum, (developmental stages and EM studies not included). Assignment.

April-2024

Modern methods of propagation of gymnosperms: somatic embryogenesis, haploids and protoplast culture. Test and Revision

Name: Dr. Archana Singh

Class: BSC Medical 4th Sem

Lesson Plan: PAPER-I BIOLOGY AND DIVERSITY OF SEED PLANTS-II

Jan-2024

Taxonomy and Systematics, fundamental components of taxonomy (identification, classification, description, nomenclature and phylogeny), Role of chemotaxonomy, cytotaxonomy and taxometrics in relation to taxonomy, Botanical Nomenclature, principles and rules

Feb -2024

Principle of priority, Keys to identification of plants.

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 Inflorescence. Assignment

March-2024

Diversity of Flowering Plants: Diagnostic features and economic importance of the following families: Ranunculaceae, Brassicaceae, Malvaceae, Euphorbiaceae, Rutaceae, Fabaceae, Cucurbitaceae, Apiaceae, Asclepiadaceae, Lamiaceae,

April-2024

Diversity of Flowering Plants: Diagnostic features and economic importance of the families: Solanaceae, Asteraceae, Liliaceae and Poaceae

Test and Revision

Name: Dr. Archana Singh

Class: BSC Medical 4th Sem

Lesson Plan: PAPER-II PLANT EMBRYOLOGY

Jan-2024

Flower-a modified shoot, Microsporangium, its wall and dehiscence mechanism. Microsporogenesis, pollen grains and its structure (pollen wall).

Feb -2024

Pollen germination (microgametogenesis), Male gametophyte, Pollen-pistil interaction; self incompatibility, Pollination: types and agencies, Structure of Megasporangium (ovule), its curvatures; Assignment

March-2024

Megasporogenesis and Megagametogenesis, Female gametophyte (mono, bi and tetrasporic), Double fertilization, Endosperm types and its biological importance. Embryogenesis in Dicot and Monocot; Polyembryony

April-2024

Structure of Dicot and Monocot seed, Fruit types; Dispersal mechanisms in fruits and seeds. Test and Revision

Lesson Plan 2023-24 / Even Semester

Name of Teacher : DR. SHWETA PANDHEY
CLASS : B.Sc. Medical 2nd Sem.
Subject : Diversity of Aschegoniales

Month	Topics	Assignment/ Test
January 2024	Bryophyta - General characters classification, alternation of generation evolution of sporophytes & economic importance	Assignment 1
February 2024	Structure & Reproduction of Marchantia, Anthoceros Funaria	Assignment 2
March 2024	Pteridophyta - General characters classification, alternation of generation economic importance, stellar evolution	Test 1
April 2024	Pteridophyta - Structure & reproduction of Rhynia, Selaginella, Equisetum Pteris	Test 2

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(SHWETA PANDHEY)

Lesson Plan 2023-24 Even Semester

Name of Teacher: Dr. SHWETA PANDAY

Class : B.Sc. Botany Hons. 6th Sem.

Subject : Plant Biotechnology

Month	Topics	Assignment/ Test
January 2024	Historical Perspective, MS media Hormone, Totipotency, Embryogenesis Micropropagation, Tissue culture Applications	Assignment 1
February 2024	Tools & techniques of Genetic engineering, PCR, DNA Sequencing, Genomic Library DNA Fingerprinting, RAPD RFLP	Test 1
March 2024	Plant transformation Technology Gene transfer, Electroporation Microin- jection, Gene-gun, Marker Reporter genes.	Assign. 2
April 2024	Pest resistant plant, Bt-cotton Herbicide, Transgenic crops edible vaccines, industrial enzyme, Application of Plant Biotechnology.	Test 2

Dr. SHWETA PANDAY

Lesson Plan (2023-24 /Even Semester)

Name of the Teacher –Amita Kumari

Class – B.Sc. Pass Course Medical 6th sem

Subject- Biochemistry and Plant Biotechnology (6.1)

Month	Topics to be covered	Assignments/Test
Jan 2024	Basics of Enzymology: Discovery and nomenclature; characteristics of enzymes; concept of holoenzyme, apoenzyme, coenzyme and co-factors; regulation of enzyme activity; mechanism of action.	Assignment
Feb 2024	Respiration: ATP – the biological energy currency; aerobic and anaerobic respiration; Krebs cycle; electron transport mechanism (chemiosmotic theory); redox -potential; oxidative phosphorylation; pentose phosphate pathway. Lipid metabolism: Structure and functions of lipids; fatty acid biosynthesis; β -oxidation; saturated and unsaturated fatty acids;	Oral Test
March 2024	storage and mobilization of fatty acids. Nitrogen metabolism: Biology of nitrogen fixation; importance of nitrate reductase and its regulation; ammonium assimilation. Genetic engineering and Biotechnology: Tools and techniques of recombinant DNA technology; cloning vectors; genomic and cDNA library	Assignment
April 2024	transposable elements; aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis; biology of <i>Agrobacterium</i> ; vectors for gene delivery and marker genes.	Test And Revision



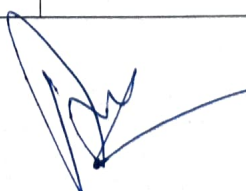
Lesson Plan (2023-24 /Even Semester)

Name of the Teacher-Amita Kumari

Class – B.Sc. Pass Course Medical 6th sem

Subject- Economic Botany (6.2)

Month	Topics to be covered	Assignments/Test
Jan 2024	N.I. Vavilov and his centres of origin of crop plants and basic knowledge of Origin, distribution, botanical description, brief idea of cultivation and economic uses of cereals like rice, wheat and maize. Origin, distribution, botanical description, brief idea of cultivation and economic uses of pulses (gram, arhar and pea), vegetables (potato, tomato and onion).	Assignment
Feb 2024	Origin, distribution, botanical description, brief idea of cultivation and economic uses of Fibers- cotton, jute and flax. Origin, distribution, botanical description , brief idea of cultivation and economic uses of Oils- groundnut, mustard, sunflower and coconut.	Test
March 2024	Origin, distribution, botanical description, brief idea of cultivation and economic uses of Fibers- cotton, jute and flax. Origin, distribution, botanical description , brief idea of cultivation and economic uses of Oils- groundnut, mustard, sunflower and coconut. Beverages- tea and coffee	Assignment
April 2024	Rubber plant - <i>Hevea</i> ; Botanical description, processing and uses of sugarcane plant. Also have general knowledge and sources of timber; energy plantations and bio-fuels.	Test and revision



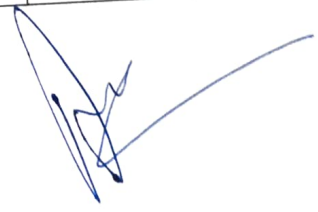
Lesson Plan (2023-24 /Even Semester)

Name of the Teacher- Amita Kumari

Class – Botany hons. 6th Sem

Subject- Tools and Techniques (BOT-605)

Month	Topics to be covered	Assignments/Test
Jan 2024	simple microscopy, phase contrast microscopy, florescence and electron microscopy and its type. pH meter and its uses, absorption and emission spectroscopy technique.	
Feb 2024	Instruments, basic principles and usage of absorption fluorimetry, colorimetry, spectrophotometry (visible, UV, infra-red). Instruments, basic principles and usage of Centrifugation, cell fractionation techniques, isolation of sub-cellular organelles, Paper chromatography, thin layer chromatography, column chromatography: silica and gel filtration, affinity and ion exchange chromatography	Assignment
March 2024	, gas chromatography, HPLC. electrophoresis techniques Starch-gel, polyacrylamide gel (native and SDS-PAGE), agrose-gel electrophoresis, immuno electrophoresis, isoelectric focusing, western blotting. Different types of fermenters: principles operating characteristics of fermenters, air lift, continous stirred tank	Oral test
April 2024	fluidized and photofermenter aeration and agitation system, antiformal agents, pH, temperature and dissolved oxygen measurements and control, computer and automation	Test and revision



**LESSON PLAN- PAPER 4 BOT - 504
GENETICS AND GENOMICS-I**

Name: Anjana Anand
Class - B.Sc. Botany Hons. ^{VIth} sem.

January 2024

Introduction to Genetics: Mendel's work on transmission of traits, Genetic Variation, Molecular basis of Genetic Information, Interrelation between the cell structure and the genetics function, Mitosis, Meiosis (explaining Mendel's ratios), Principles of Inheritance, Chromosome theory of inheritance, Laws of Probability, Pedigree analysis Incomplete and codominance,

Multiple alleles, Lethal alleles, Epistasis, Pleiotropy,

Environmental effects on phenotypic expression, sex linked inheritance.

February 2024

Linkage and crossing over, Cytological basis of crossing over, Molecular mechanism of crossing over, Recombination frequency as a measure of linkage intensity, two factor and three factor crosses, Interference and coincidence, Somatic cell genetics – an alternative approach to gene mapping.

March 2024

Chromosomal Mutations: Deletion, Duplication, Inversion, Translocation, Aneuploidy and Polyploidy; Gene mutations: Induced versus Spontaneous mutations, Back versus Suppressor mutations, Molecular basis of Mutations in relation to UV light and chemical mutagens, Detection of mutations: CLB method, Attached X method, DNA repair mechanisms, Sex Determination, Environmental factors determining sex determination, Barr bodies, Dosage compensation.

April 2024

Extrachromosomal Inheritance : Chloroplast mutation/Variation in Four o' clock plant and *Chlamydomonas*, Mitochondrial mutations in *Neurospora* and yeast, Maternal effects, Infective heredity- Kappa particles in *Paramecium*, Quantitative and multifactor inheritance, Transgressive variations, Heterosis.

May 2024

Exams

Lesson plan (2022-23, even Sem.)

Name of teacher: Dr. Anjana Anand

Class: B.sc. Botany Hons 6th sem.

Subject and paper: Reproductive Biology of Angiosperms

Month	Topics to be covered	Assignment	Class test /Group discussion
January	Introduction: History and scope, Anther: Structure, ontogeny; tapetum; structure and functions; micro-sporogenesis; callose deposition and its significance.	Assignment on any topic of this paper	class test on the topics taught
February	Microgametogenesis, pollen wall caruncle, hypostase, epistase: female gametophyte – megasporogenesis and Pollination and Fertilization: Pollination types and significance; adaptations; development, MGU (male germ unit) structure, NPC system, pollen wall proteins; pollen viability, storage and germination; pollen tube structure.		class test on the topics taught
March	caruncle, hypostase, epistase: female gametophyte – megasporogenesis and megagametogenesis: organization and ultra structure of mature embryo sac, pollen-pistil interaction; structure of stigma and style; double fertilization. Self Incompatibility; Basic concepts; methods to overcome self incompatibility.		class test on the topics taught
	Types, development and functions; endosperm haustoria. Embryogenesis: Classification, development, organization and differentiation of crucifer and Najas embryo; embryo– endosperm relationship; physiological and genetical control. Polyembryony and Apomixes: Introduction; classification; causes and applications.		class test on the topics taught and Revision Presentation by students
	author citation, valid publication; rejection of names, principle of priority and its limitation; names of		class test on the topics taught

Lesson plan (2022-23, Odd Sem.)

Name of teacher: Dr. Anjana Anand

Class: B.sc. Botany Hons 5th sem sem.

Subject and paper: Plant Systematics and Evolution

Month	Topics to be covered	Assignment	Class test /Group discussion
August	What is systematics; Identification, Classification and Nomenclature of plants; Field inventory		class test on the topics taught
September	Herbarium preparation and management; important herbaria and botanical gardens of the world and India. Classification by Bentham and Hooker	Assignment on any topic of this paper	class test on the topics taught
October	Classification by Engler and Prantl & Takhtajan; brief reference of Angiosperm Phylogeny Group (APG) Classification		class test on the topics taught
November	Documentation: Flora, Monographs, Journals, Online Journals and Keys; Evidences from morphology, palynology, cytotaxonomy, chemotaxonomy, serology, and molecular systematics. Concept of taxa; categories and hierarchy; species concept (taxonomic, biological, evolutionary). Principles and rules of nomenclature; ranks and names; type method		class test on the topics taught
	Classification by Engler and Prantl & Takhtajan; brief reference of Angiosperm Phylogeny Group (APG) Classification		
	author citation, valid publication; rejection of names, principle of priority and its limitation; names of hybrids and cultivars. role of Computers in systematics; Characters and attributes; OTUs, character weighing and coding; cluster analysis, phenograms, cladistics.		class test on the topics taught
December	Unit 4: Terms and concepts (homology, analogy,		

parallelism, convergence, monophyly, polyphyly, clades); origin & evolution of angiosperms; co-evolution of angiosperms and animals; methods of illustrating evolutionary relationship (phylogenetic tree, cladogram).

January

Revision

Representation by students