

HOLY CROSS COLLEGE, AGARTALA
DEPARTMENT OD BOTANY

Lesson Plan (Academic Session 2021-22, Odd Semester)		
Name of the Faculty	Dr. Dipanwita Chaudhuri Sil	
Department	Botany	
Semester	1 st	
Course	Botany (Major) Theory	
Paper	I	
Unit I:	Topic	Learning objectives
	Fundamental Botany	Origin of life, Difference between plant and animal cell. Time line of plant evolution. Three domains of classification – Archaea, Bacterial Eukaryota. History of Plant classification: Natural (Bentham & Hooker), Artificial (Linnaeus) and Phylogenetic (Hutchinson) system of Classification. Plant life cycle pattern & alternation of generation. Darwin's theory of evolution, Macro & micro evolution Species concept, Isolation & mechanism of speciation
Course	Botany (General) Theory	
Paper	I	
Unit 1	Topic	Learning objectives
	Fundamental Botany	Origin of life, Difference between plant and animal cell. Three domains of classification – Archaea, Bacterial Eukaryota. History of Plant classification: Natural (Bentham & Hooker), Artificial (Linnaeus) and Phylogenetic (Hutchinson) system of Classification. Darwin's theory of evolution, Species concept, Isolation & mechanism of speciation
Semester	3 rd	
Course	Botany (Major)	
Paper	3A (Theory)	
Unit: I	Topic	Learning objectives

	Fungi and Plant Resource Utilization	General account of Phycomycetes, Life history of <i>Mucor</i> , <i>Synctitricum</i> ; General account of Ascomycetes, Life history of <i>Pecicillium</i> , <i>Ascobolus</i> ; General account of Deuteromycetes, Life history of <i>Fusarium</i> , Cereal – Rice, Wheat; Pulses – Gram, Moong and Lens Beverages – Tea and Coffee: Fruits – Mango, Citrus and Papaya; Drug yielding – Cinchona, Rauwolfia, Digitalis and Papaver: Spices – Ginger, Cumin and Clove; Oil yielding – Mustard, Groundnut, Coconut and Linseed: Vegetables – Potato, Radish and Cabbage; Fibre yielding – Cotton and Jute; Timber yielding – Teak and Sal; Sugar yielding – Sugarcane and Sugar beet. Cultivation of Rice, Jute, Rubber and Tea.
Paper	3B (Practical)	
SI	Topic	Learning objectives
	Experiments related to theory paper are taken up.	
Course	Botany (GENERAL)	
Paper	3A (Theory)	
Unit: I	Topic	Learning objectives
	Fungi and Plant Resource Utilization	General account of Phycomycetes, Life history of <i>Mucor</i> General account of Basidiomycetes, Life history of <i>Polyporus</i> , General account of Deuteromycetes, Life history of <i>Fusarium</i> , Cereal – Rice, Wheat; Pulses – Gram, Moong and Lens; Beverages – Tea and Coffee: Fruits – Mango, Citrus and Papaya; Drug yielding – Cinchona, Rauwolfia, Digitalis and Papaver: Spices – Ginger, Cumin and Clove; Oil yielding – Mustard, Groundnut, Coconut and Linseed: Vegetables – Potato, Radish and Cabbage; Fibre yielding – Cotton and Jute; Timber yielding – Teak and Sal; Sugar yielding – Sugarcane and Sugar beet Cultivation of Rice, Jute and Tea
Paper	3B (Practical)	
Unit: I	Topic	Learning objectives
	Experiments related to theory paper are taken up	
Semester	5th	
Course	Botany (Major)	
Paper	5A (Theory)	
	Topic	Learning objectives

Unit I	Cell Biology	Chromosome morphology and Organization of Eukaryotic Chromosome (Nucleosome concept); Centromere and telomere – structure and function;
Unit II	Molecular Biology	Structure, forms salient features of Nucleic Acids (DNA and RNA); DNA replication – Semi-conservative replication in Prokaryotes with proof (Meselson and Stahl's Experiment), Mechanism of DNA replication in Prokaryotes, Transcription: Initiation, elongation and termination in Prokaryotes. Translation in Prokaryotes: Amino-acylation of RNA, initiation and elongation termination of polypeptide chain: Concept of Lac Operon (Positive and Negative control).
Paper	5B (Practical)	
Unit III	Topic	Learning objectives
Experiments related to theory paper are taken up.		
Course	Botany (General)	
Paper	5A (Theory)	
Unit I	Topic	Learning objectives
	Cell Biology and Molecular Biology, Cytogenetics and Plant Breeding	Cell cycle and Cell division, Structure and function of Cell Organelles (Nucleus, Mitochondria, Chloroplast, Ribosome) Chromosome morphology and Organization of Eukaryotic Chromosome (Nucleosome concept) Structure forms and salient features of Nucleic Acids (DNA and RNA); DNA replication, Mechanism of DNA replication in Prokaryotes, Lac Operon (brief idea).
	Plant Physiology and Plant Biotechnology:	Totipotency and concept of plant tissue culture; Function and organization of a typical plant tissue culture laboratory; Transformation: <i>Agrobacterium</i> mediated gene transfer.
Paper	5 B (Practical)	
Sl	Topic	Learning objectives
Experiments related to theory paper are taken up.		


HEAD
 Department of Botany,
 HOLY CROSS COLLEGE, AGARTALA

Lesson Plan (Academic Session 2021-22, Odd Semester)		
Name of the Faculty	Dr. Debasree Lodh	
Department	Botany	
Semester	1 st	
Course	Botany (Major) Theory	
Paper	I	
Unit IV	Topic	Learning objectives
	Industrial Botany – II (Plant Nursery and Floriculture Industry)	<p>Concept and types of nurseries: ornamental plant nursery, fruit plant nursery, medicinal plant nursery, vegetable plant nursery and orchid nursery (with reference to infrastructure required and commercial applications).</p> <p>Propagation methods: Seed propagation, natural vegetative propagation and artificial vegetative propagation (Cutting: Stem, Layering: Air layering, Grafting: Stone grafting and Approach grafting, Budding: T budding).</p> <p>Introduction to floriculture: Important floricultural crops, open cultivation practices, harvesting and marketing.</p>
Course	Botany (General) Theory	
Paper	I	
Unit IV	Topic	Learning objectives
	Industrial Botany – II (Plant Nursery and Floriculture Industry)	<p>Concept and types of nurseries: ornamental plant nursery, fruit plant nursery, vegetable plant nursery (with reference to infrastructure required and commercial applications).</p> <p>Propagation methods: Seed propagation, natural vegetative propagation and artificial vegetative propagation (Cutting, Layering and grafting)</p> <p>Introduction to floriculture: Important floricultural crops, open cultivation practices, harvesting and marketing.</p>
Semester	3 rd	
Course	Botany (Major)	
Paper	3A (Theory)	
Unit: II	Topic	Learning objectives

	Microbiology and Plant pathology	General characteristics of Plant virus and Bacteriophage, Growth cycle Lytic (T ₄) and Lysogenic (λ virus); Bacteria-Cell structure Endospore formation Genetic Recombination-Conjugation, transformation and transduction
Paper	3B (Practical)	
Sl	Topic	Learning objectives
		Experiments related to theory paper are taken up.
Course	Botany (GENERAL)	
Paper	3A (Theory)	
Unit: II	Topic	Learning objectives
	Microbiology and Plant pathology	General characteristics of Plant virus and Bacteriophage, Growth cycle Lytic (T ₄) and Lysogenic (λ virus); Bacteria-Cell structure Endospore formation Genetic Recombination-Conjugation, transformation and transduction
Paper	3B (Practical)	
Unit: I	Topic	Learning objectives
		Experiments related to theory paper are taken up.
Semester	5th	
Course	Botany (Major)	
Paper	5A (Theory)	
Unit III	Topic	Learning objectives
	Cytogenetics	Mendelian inheritance; Gene interactions: Incomplete Dominance (1:2:1), Modified dihybrid ratio (12:3:1, 9:3:4, 9:7, 9:6:1, 13:3), Atavism, Pleiotropism; Crossing Over: Cytological proof of crossing over (McClintock's experiment); Molecular basis of Crossing Over; Complete and incomplete linkage. Thee point test cross, Problems on Gene Mapping; Sex linked trait and sex linked inheritance; Aneuploidy and Euploidy, role of polyploidy in crop improvement Chromosomal aberration: Types and meiotic behavior of deletion, duplication, translocation and inversion;; Molecular mapping – FISH technique; Bioinformatics: Genomics and proteomics (A brief idea).

Unit IV	Plant Breeding and Biostatistics	Methods of plant breeding: Introduction, emasculation, Hybridization and Acclimatization; Selection: Mass selection and pure selection; Male sterility: Genetic, Cytoplasmic and Cytoplasmic-genetic male sterility; Heterosis and hybrid vigour;
Paper	5B (Practical)	
Unit III	Topic	Learning objectives
	Experiments related to theory paper are taken up.	
Course	Botany (General)	
Paper	5A (Theory)	
Unit I	Topic	Learning objectives
	Cell Biology and Molecular Biology, Cytogenetics and Plant Breeding	Mendelian inheritance; Gene interactions: Incomplete Dominance (1:2:1), Modified dihybrid ratio (12:3:1, 9:3:4, 9:7), Crossing Over: Cytological proof of crossing over (McClintock's experiment); Complete and incomplete linkage; Aneuploidy and Euploidy, role of polyploidy in crop improvement; Chromosomal aberration: deletion, duplication, translocation and inversion; Methods of plant breeding: Introduction, emasculation
Paper	5 B (Practical)	
Sl	Topic	Learning objectives
	Experiments related to theory paper are taken up.	


HEAD
 Department of Botany,
 HOLY CROSS COLLEGE, AGARTALA

Lesson Plan (Academic Session 2021-22, Odd Semester)		
Name of the Faculty	Dr. Somnath Kar	
Department	Botany	
Semester	1 st	
Course	Botany (Major) Theory	
Paper	I	
Unit I:	Topic	Learning objectives
	Environment al Botany	<p>Pollution: Definition and categories</p> <p>Air pollution: Types and sources of air pollutants and their effects on plants and animals.</p> <p>Water pollution: Types and sources of pollutants and their effects on plants and animals.</p> <p>Soil pollution: Sources of pollutants and their effects on living organisms.</p> <p>Bioremediation, noise pollution, acid rain, classical and photochemical smog, heavy metal pollution and radioactive pollution.</p> <p>ozone hole – types of ozone depleting chemicals and their interactions.</p>
Course	Botany (General) Theory	
Paper	I	
Unit II	Topic	Learning objectives
	Environment al Botany	<p>Pollution: Definition and categories</p> <p>Air pollution: Types and sources of air pollutants</p> <p>Water pollution: Types and sources of pollutants and their effects on plants and animals.</p> <p>Soil pollution: Sources of pollutants and their effects on living organisms.</p> <p>Noise pollution</p> <p>Heavy metal pollution and radioactive pollution</p>
Semester	3 rd	
Course	Botany (Major)	
Paper	3A (Theory)	
Unit: II	Topic	Learning objectives
	Microbiology and Plant pathology	<p>Disease concepts, Symptoms-necrotic, hypoplastic and hyperplastic; Necrotrophs and biotrophs, mode of pathogenesis.</p> <p>Defense mechanism with special references to phytoalexins, Plant quarantine;</p> <p>Koch's postulates,</p> <p>Symptoms, Casual organisms, Disease cycle and Control measures of Late blight of potato, Brown sport of rice, Black stem of wheat and Stem rot of Jute</p>
Paper	3B (Practical)	

Sl	Topic	Learning objectives
		Experiments related to theory paper are taken up
Course	Botany (GENERAL)	
Paper	3A (Theory)	
Unit: II	Topic	Learning objectives
	Microbiology and Plant pathology	Disease concepts, Symptoms-necrotic, hypoplastic and hyperplastic; Necrotrophs and biotrophs, mode of pathogenesis. Defense mechanism with special references to phytoalexins, Plant quarantine; Koch's postulates, Symptoms, Casual organisms, Disease cycle and Control measures of Late blight of potato, Brown sport of rice, Black stem of wheat and Stem rot of Jute
Paper	3B (Practical)	
Unit: I	Topic	Learning objectives
		Experiments related to theory paper are taken up.
Semester	5th	
Course	Botany (Major)	
Paper	5A (Theory)	
Unit III	Topic	Learning objectives
		Structure and function of Cell Organelles (Nucleus, Mitochondria, Chloroplast, ER, Golgi Apparatus, Peroxisomes and Glyoxysomes, Ultra-structure of ribosome in Prokaryotes and Eukaryotes,) Plasma membrane – Structure (Fluid mosaic model) and function; Organization of cp and mt DNA and their significance;
	Plant Breeding and Biostatistics	Collection of data (Variable and attribute, Primary and Secondary data, Population and sample); Types of charts and diagrams: Frequency distribution (Simple, Grouped and Cumulative); Measures of Central tendency: Mean Mode and Median; Measure of dispersion: Mean deviation and Standard Deviation; Standard Error; Correlation and Coefficient of Correlation (r); Student t-test; Chi Square test for goodness of fit; Classical definition of Probability, Addition and Multiplication rules
Paper	5B (Practical)	
Unit III	Topic	Learning objectives
		Experiments related to theory paper are taken up.

Course	Botany (General)	
Paper	5A (Theory)	
Unit II	Topic	Learning objectives
	Plant Physiology and Plant Biotechnology	Water potential and its components; Water absorption by roots (apoplastic and symplastic pathways); Photosynthesis: photochemical reactions, Mechanism of electron transport in PS-I and PS-II, Calvin cycle; C ₃ and C ₄ plants and photosynthetic efficiency, photorespiration, Crassulacean acid metabolism (CAM); Transpiration and anti-transpirant. Respiration: Glycolysis, Oxidative Phosphorylation, Mitochondrial ETS; N-metabolism: Assimilation of Nitrogen, Biological Nitrogen fixation: role of nitrogenase in N ₂ fixation; Photoperiodism: Photoperiodic responses and classification of plants, Photomorphogenesis; Plant growth regulators, physiological role and modes of action (IAA, Gibberellins and Cytokinins).
Paper	5 B (Practical)	
Sl	Topic	Learning objectives
		Experiments related to theory paper are taken up.


HEAD
 Department of Botany,
 HOLY CROSS COLLEGE, AGARTALA

Lesson Plan (Academic Session 2021-22, Odd Semester)		
Name of the Faculty	Dr. Sudipta Sinha	
Department	Botany	
Semester	1 st	
Course	Botany (Major) Theory	
Paper	I	
Unit III	Topic	Learning objectives
	Industrial Botany – I (Agri Industries and microbial fermentation and food)	Organic farming – Concept, need, types of organic fertilizers, advantages and limitations. Importance of seed industries, Seed production. Seed processing and marketing, major seed industries & corporation of India. Production of SCP from algae – <i>Spirulina</i> culture technique. Mushroom production and harvesting (<i>Volvariella</i> sp. and <i>Pleurotus</i> sp.) Commercial production of Ethyl alcohol, Citric acid and Penicillin. Concept of biofuel and its need, Plants used for biofuel production.
Course	Botany (General) Theory	
Paper	I	
Unit III	Topic	Learning objectives
	Industrial Botany – I (Agri Industries and microbial fermentation and food)	Organic farming – Concept, need, types of organic fertilizers, advantages and limitations. Importance of seed industries, Seed production. Seed processing and marketing, major seed industries & corporation of India. Production of SCP from algae – <i>Spirulina</i> culture technique. Mushroom production and harvesting (<i>Volvariella</i> sp.) Commercial production of Ethyl alcohol and Citric acid
Semester	3 rd	
Course	Botany (Major)	
Paper	3A (Theory)	
Unit: I	Topic	Learning objectives

	Fungi and Plant Resource Utilization	An outline classification of fungi upto class character (Hawksworth – 1995). Lichens and their significance. Fungal spore form. Sexual reproduction and degeneration of sex, General account of Basidiomycetes, Life history of <i>Polyporus</i> and <i>Agaricus</i> Mycotoxins Economic importance of fungi
Paper		
SI	Topic	3B (Practical)
		Learning objectives
Course		Experiments related to theory paper are taken up.
Paper		Botany (GENERAL)
Unit: I	Topic	3A (Theory)
		Learning objectives
	Fungi and Plant Resource Utilization	An outline classification of fungi upto class character (Hawksworth – 1995). Lichens and their significance. Fungal spore form. Sexual reproduction and degeneration of sex, General account of Basidiomycetes, Life history of <i>Polyporus</i> and <i>Agaricus</i> Mycotoxins Economic importance of fungi
Paper		
Unit: I	Topic	3B (Practical)
		Learning objectives
Semester		Experiments related to theory paper are taken up.
Course		5th
Paper		Botany (Major)
Unit III	Topic	5A (Theory)
	Cell Biology	Learning objectives
	Molecular Biology	Cell cycle and Cell division, equational and reductional division with respect to 'C' value, Cell cycle regulation, Theories of anaphasic movement; Apoptosis.
		Genetic code: Properties, deciphering of genetic code; Gene Mutation: Transition, Transversion and Frame shift mutation, Effects of chemical mutagens (Base analogues and Nitrous acid) Physical agents (UV rays); DNA damage and repair, Restriction enzymes: types and function; PCR and its application (A brief idea)
Paper		5B (Practical)

Unit III	Topic	Learning objectives
		Experiments related to theory paper are taken up.
Course	Botany (General)	
Paper	5A (Theory)	
Unit I	Topic	Learning objectives
Unit I	Molecular Biology	Translation in Prokaryotes: Amino-acylation of RNA, initiation, elongation and termination of polypeptide chain: Gene Mutation: Transition, Transversion and Frame shift mutation
Unit I	Plant Breeding	Hybridization and Acclimatization; Selection: Mass selection and pure selection; Male sterility: Genetic, Cytoplasmic and Cytoplasmic-genetic male sterility; Heterosis and hybrid vigour;
Unit II	Plant Physiology and Plant Biotechnology	Transformation: <i>Agrobacterium</i> mediated gene transfer.
Paper	5 B (Practical)	
Sl	Topic	Learning objectives
		Experiments related to theory paper are taken up.

Resources/Materials Used	Whiteboard, Marker, Projector, Reference books & previous year question papers
Basis of Class taken	Detailed discussion on the topics and citing examples related to different topics with an aim to develop fair concept among the students.
Assessment	Class Test/Assignment/Internal exams
Feedback to students	Performance based discussion/ necessary steps taken/ reviewing weak points & nurturing their concept.
Revision / Remedial Classes	Revision will be done after completion of syllabus and remedial classes will be taken for the slow learners.


HEAD
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HOLY CROSS COLLEGE, AGARTALA
DEPARTMENT OD BOTANY

Lesson Plan (Academic Session 2021-22, Even Semester)		
Name of the Faculty	Dr. Dipanwita Chaudhuri Sil	
Department	Botany	
Semester	2 nd	
Course	Botany (General) Theory	
Paper	I	
	Topic	Learning objectives
Unit I	Bryophyte	General account: Origin of Bryophytes, Amphibian nature, Life history: Gametophyte structure & reproduction, Development of sporophyte, Spore dispersal of <i>Marchantia</i> , <i>Anthoceros</i> , <i>Funaria</i> . Evolution of sporophyte - Progressive theory
Paper	2B (Practical).	
	Topic	Learning objectives
		Experiments related to theory paper are taken up
Semester	2 nd	
Course	Botany (Major) Theory	
Paper	I	
	Topic	Learning objectives
Unit I	Bryophyte	General account: Origin of Bryophytes, Amphibian nature, Life history: Gametophyte structure & reproduction, Development of sporophyte, Spore dispersal of <i>Marchantia</i> , <i>Anthoceros</i> , <i>Funaria</i> . Evolution of sporophyte - Progressive theory
Paper	2B (Practical)	
	Topic	Learning objectives
		Experiments related to theory paper are taken up
Semester	4 th	
Course	Botany (General)	
Paper	(Theory)	
	Topic	Learning objectives

Unit: I	Morphology	Morphology. Inflorescence- types with examples, flower types, floral parts- calyx, corolla (Forms and aestivation), stamens (cohesion and adhesion), carpel (Apocarpous and Syncarpous). Placentation types, fertilization process;
Paper	4B (Practical).	
Unit: I	Topic	Learning objectives
Experiments related to theory paper are taken up		
Course	Botany (Major)	
Paper	4A (Theory)	
	Topic	Learning objectives
Unit I	Morphology and Embryology,	Morphology- Inflorescence- types with examples, flower types, floral parts- calyx, corolla (Forms and aestivation), stamens (cohesion and adhesion), carpel (Apocarpous and Syncarpous), Placentation types, fertilization process; Fruits- types.
Paper	4B (Practical)	
Experiments related to theory paper are taken up.		
Semester	6th	
Course	Botany (Major)	
Paper	6A (Theory)	
	Topic	Learning objectives
Unit – I	Biochemistry	Structure and properties of water, co-valent and non-covalent bonds, hydrogen bonds, Vander Waal's forces, pH, buffer and isoelectric points; Carbohydrate: Classification, structure and properties; Lipids: Classification and function: Protein: Classification and structure (Primary, Secondary, Tertiary and Quaternary structure); Amino acids: Structure, charge and polarity; essential amino-acids; Enzyme: Classification and function, Isozymes, Allosteric enzymes and Coenzymes; Glycolysis, conversion of pyruvic acid to Acetyl Co-A, TCA cycle; Membrane chemistry, transport and mechanism of ion uptake; Signal transduction pathway and second messenger concept-G protein.
Paper	6B (Practical)	
Experiments related to theory paper are taken up.		

Lesson Plan (Academic Session 2021-22, Even Semester)

Name of the Faculty	Dr. Debasree Lodh
Department	Botany
Semester	2nd
Course	Botany (Major) Theory
Paper	I

	Topic	Learning objectives
Unit I	Algae	General account: Thallus organization, Ultra-structure of plastid & flagella, Origin & evolution of sex. Outline classification (Lee-1999) up to phylum with characters. Chlorophyceae-Salient features, Life history: <i>Chlamydomonas</i> , <i>Oedogonium</i> . Charophyceae – Salient features, Life history : <i>Chara</i> . Xanthophyceae – Salient features, Life history – <i>Voucheria</i> . Bacillariophyceae (Diatom): 6.1 Cell structure, 6.2 Auxospore formation in <i>Centrales</i> and <i>Pennales</i> . Phaeophyceae – Salient features, Life history – <i>Ectocarpus</i> . Rhodophyceae – Salient features, Life history – <i>Polysiphonia</i> . Economic importance of algae.

2B (Practical)

Paper	
Unit: I	Learning objectives
	Experiments related to theory paper are taken up.

Course	Botany (General) Theory
Paper	I

	Topic	Learning objectives
Unit I	Algae	General account: Thallus organization, Economic importance of algae. Diatom: Cell structure, Auxospore formation in <i>Centrales</i> and <i>Pennales</i> . Life history: <i>Oedogonium</i> , <i>Chara</i> , <i>Ectocarpus</i> and <i>Polysiphonia</i> .

Paper	2B (Practical)	
Unit: I	Topic	Learning objectives
		Experiments related to theory paper are taken up.
Semester	4th	
Course	Botany (Major)	
Paper	4A (Theory)	
	Topic	Learning objectives
Unit: II	Anatomy	Anatomy-Cell wall (Gross structure and chemical composition), Meristematic and Permanent tissue (structure, distribution and function); Vascular bundles types, stele- types and evolution, Normal secondary growth; Anomalous secondary growth (Stems of <i>Boerhaavia</i> , <i>Chenopodium</i> , <i>Mirabilis</i> , <i>Bignonia</i> , <i>Nyctanthes</i> , Root of <i>Tinospora</i>);
Paper	4B (Practical)	
Sl	Topic	Learning objectives
		Experiments related to theory paper are taken up.
Course	Botany (General)	
Paper	4A (Theory)	
	Topic	Learning objectives
Unit: II	Anatomy	Anatomy-Cell wall (Gross structure and chemical composition), Meristematic and Permanent tissue (structure, distribution and function), Vascular bundles- types, stele- types and evolution Normal secondary growth;
Paper	4B (Practical)	
Sl	Topic	Learning objectives
		Experiments related to theory paper are taken up.
Semester	6th	
Course	Botany (Major)	
Paper	6A (Theory)	
	Topic	Learning objectives
Unit – I	Plant physiology:	Water potential and its components; Water absorption by roots (apoplastic and symplastic pathways); Photosynthesis: Components of photosynthesis, Types of chlorophyll and carotenoids and their structures and functions; Red drop effect and Enhancement effect, Antenna complex, photochemical reactions,

		<p>Mechanism of electron transport in PS-I and PS-II, Calvin cycle; HSK pathway; C₃ and C₄ plants and photosynthetic efficiency, photorespiration, Crassulacean acid metabolism (CAM); Stomatal physiology; role of CO₂ ions, ABA and light, transpiration and anti-transpirant. Respiration: Oxidative Phosphorylation, Mitochondrial ETS and uncouplers, PP pathway; N-metabolism: Assimilation of Nitrogen, Biological Nitrogen fixation: symbiotic fixation; 'nod' genes and 'nif' genes, role of nitrogenase in N₂ fixation; Photoperiodism: Photoperiodic responses and classification of plants, Circadian Clock Photomorphogenesis; Phytochromes as photoreceptor in Photoperiodism, Vernalization, Florigen and transition to flowering; Plant growth regulators, physiological role and modes of action (IAA, Gibberellins and Cytokinins), Brassinosteroids, polyamines.</p>
Paper	6B (Practical)	
Experiments related to theory paper are taken up.		


HEAD
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 HOLY CROSS COLLEGE, AGARTALA

Lesson Plan (Academic Session 2021-22, Even Semester)

Name of the Faculty	Dr. Somnath Kar	
Department	Botany	
Semester	2nd	
Course	Botany (Major) Theory	
Paper	I	
	Topic	Learning objectives
Unit II	Gymnosperm	Progymnosperm – Diagnostic characters, Vegetative & reproductive structures of <i>Archeopteris</i> . Life histories – Distribution in India, vegetative and reproductive structure, Development of gametophytes and embryogeny of <i>Cycas</i> , <i>Pinus</i> <i>Gnetum</i> .
Unit II	Palaeobotany	Plant fossil – Types of fossils, Different modes of preservation (Schopf – 1975), Importance of fossil study. Geological time scale with dominant plant groups through ages.
Course	Botany (General) Theory	
Paper	I	
Unit	Topic	Learning objectives
Unit II	Gymnosperm	Progymnosperm – A brief concept. Life histories – Distribution in India, vegetative and reproductive structure, Development of gametophytes and embryogeny of 4.1. <i>Cycas</i> , 4.2. <i>Pinus</i> 4.3 <i>Gnetum</i> .
Unit II	Palaeobotany	Plant fossil – Types of fossils, Different modes of preservation (Schopf – 1975), Importance of fossil study. Geological time scale with dominant plant groups through ages.
Semester	4th	
Course	Botany (Major)	
Paper	4A (Theory)	
	Topic	Learning objectives
Unit I	Taxonomy	Taxonomy - Nomenclature and rules of ICBN, Magnoliaceae, Poaceae, Orchidaceae, Mimosaceae, Caesalpinaceae, Fabaceae, Malvaceae, Brassicaceae, Solanaceae, Apocynaceae, Lamiaceae, Rubiaceae

		and Asteraceae; Embryology- Micro and mega sporogenesis (Monosporic, bisporic and tetrasporic) Development of embryo, development of endosperm.
Unit: II	Ecology	Ecology. Habitat and Niche (preliminary idea), Ecological succession- Hydrosere and Xerosere, Endemism, Ecological adaptation - Hydrophytes and xerophytes, Red Data Book; Ecological adaptation of Halophytes;
Paper	4B (Practical)	
Experiments related to theory paper are taken up.		
Course	Botany (GENERAL)	
Paper	4A (Theory)	
	Topic	Learning objectives
Unit I	Taxonomy	Taxonomy- Magnoliaceae, Poaceae, Orchidaceae, Mimosaceae, Caesalpiniaceae, Fabaceae, Malvaceae. Brassicaceae, Solanaceae, Apocynaceae, Lamiaceae, Rubiaceae and Asteraceae.
Unit: II	Ecology	Ecology- Habitat and Niche (preliminary idea), Ecological succession- Hydrosere and Xerosere, Endemism, Red Data Book:
Paper	4B (Practical)	
Experiments related to theory paper are taken up.		
Semester	6th	
Course	Botany (Major)	
Paper	6A (Theory)	
	Topic	Learning objectives
Unit – IV	Plant Biotechnology	Totipotency and concept of plant tissue culture; Function and organization of a typical plant tissue culture laboratory; Techniques of plant tissue culture: cell suspension culture technique, protoplast culture technique, Meristem tip culture technique; Modes of <i>in vitro</i> regeneration and applications; <i>In vitro</i> exudation and remedial Measures; Callus culture and applications; Haploid and embryo culture; Prokaryotic vector system and marker genes; Transformation: <i>Agrobacterium</i> mediated gene transfer, Particle Bombardment method.
Paper	6B (Practical)	
Experiments related to theory paper are taken up.		

Lesson Plan (Academic Session 2021-22, Even Semester)

Name of the Faculty	Dr. Sudipta Sinha	
Department	Botany	
Semester	2nd	
Course	Botany (Major) Theory	
Paper	I	
	Topic	Learning objectives
Unit II	Pteridophyta	Life history: Sporophyte structure, reproduction and structure of gametophyte of <i>Lycopodium</i> , <i>Selaginella</i> , <i>Equisetum</i> , <i>Pteris</i> Telome concept & its significance.
Course	Botany (General) Theory	
Paper	I	
Unit	Topic	Learning objectives
Unit II	Pteridophyta	Life history: Sporophyte structure, reproduction and structure of gametophyte of <i>Lycopodium</i> , <i>Selaginella</i> , <i>Equisetum</i> , <i>Pteris</i> Telome concept & its significance.
Semester	4th	
Course	Botany (Major)	
Paper	4A (Theory)	
	Topic	Learning objectives
Unit: II	Phytogeography	Phytogeography- Phytogeographical regions of India (D. Chatterjee-1960); Vegetation of Western and Eastern Himalaya, Sundarban and Tripura.
Paper	4B (Practical)	
Experiments related to theory paper are taken up.		
Course	Botany (GENERAL)	
Paper	4A (Theory)	
	Topic	Learning objectives

Unit: II	Phytogeography	Phytogeography-Phytogeographical regions of India (D. Chatterjee-1960): Vegetation of Western and Eastern Himalaya and Tripura.
Paper	4B (Practical)	
Experiments related to theory paper are taken up.		
Semester	6th	
Course	Botany (Major)	
Paper	6A (Theory)	
	Topic	Learning objectives
Unit – III	Pharmacognosy:	Importance of pharmacognosy in modern medicine; Drugs: crude and commercial drugs; Method of commercial drug production, drug adulteration; Classification and evaluation of drugs: organoleptic, microscopic, chemical and physical evaluation; Secondary metabolites and secondary metabolic biosynthetic pathways; Major types of secondary metabolites with source plant: Flavonoids, steroids, terpenoids, resins, phenolics and alkalids; Organoleptic study of whole plant of <i>Andrographis paniculata</i> , Bark of <i>Alstonia</i> sp., Rhizome of Ginger, Tuber of <i>Dioscoria</i> sp., Leaves of <i>Adhatoda</i> sp.
Paper	6B (Practical)	
Experiments related to theory paper are taken up.		

Resources/Materials Used	Whiteboard, Marker, Projector, Reference books & previous year question papers
Basis of Class taken	Detailed discussion on the topics and citing examples related to different topics with an aim to develop fair concept among the students.
Assessment	Class Test/Assignment/Internal exams
Feedback to students	Performance based discussion/ necessary steps taken/ reviewing weak points & nurturing their concept.
Revision / Remedial Classes	Revision will be done after completion of syllabus and remedial classes will be taken for the slow learners.



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DEPARTMENT OF BOTANY

Lesson Plan (Academic Session 2022-23, Even Semester)		
Name of the Faculty	Dr. Dipanwita Chaudhuri Sil	
Department	Botany	
Semester	2 nd	
Course	Botany (General) Theory	
Paper	I	
	Topic	Learning objectives
Unit I	Bryophyte	General account: Origin of Bryophytes, Amphibian nature, Life history: Gametophyte structure & reproduction, Development of sporophyte, Spore dispersal of <i>Marchantia</i> , <i>Anthoceros</i> , <i>Funaria</i> . Evolution of sporophyte - Progressive theory
Paper	2B (Practical).	
	Topic	Learning objectives
		Experiments related to theory paper are taken up
Semester	2 nd	
Course	Botany (Major) Theory	
Paper	I	
	Topic	Learning objectives
Unit I	Bryophyte	General account: Origin of Bryophytes, Amphibian nature, Life history: Gametophyte structure & reproduction, Development of sporophyte, Spore dispersal of <i>Marchantia</i> , <i>Anthoceros</i> , <i>Funaria</i> . Evolution of sporophyte - Progressive theory
Paper	2B (Practical)	
	Topic	Learning objectives
		Experiments related to theory paper are taken up
Semester	4 th	
Course	Botany (General)	

Paper	(Theory)	
	Topic	Learning objectives
Unit: I	Morphology	Morphology. Inflorescence- types with examples, flower types, floral parts- calyx, corolla (Forms and aestivation), stamens (cohesion and adhesion), carpel (Apocarpous and Syncarpous). Placentation types, fertilization process;
Paper	4B (Practical).	
	Topic	Learning objectives
Unit: I	Experiments related to theory paper are taken up	
Course	Botany (Major)	
Paper	4A (Theory)	
	Topic	Learning objectives
Unit I	Morphology and Embryology,	Morphology- Inflorescence- types with examples, flower types, floral parts- calyx, corolla (Forms and aestivation), stamens (cohesion and adhesion), carpel (Apocarpous and Syncarpous). Placentation types, fertilization process; Fruits- types.
Paper	4B (Practical)	
	Experiments related to theory paper are taken up.	
Semester	6th	
Course	Botany (Major)	
Paper	6A (Theory)	
	Topic	Learning objectives
Unit - I	Biochemistry	Structure and properties of water, co-valent and non-covalent bonds, hydrogen bonds, Vander Waal's forces, pH, buffer and isoelectric points; Carbohydrate: Classification, structure and properties; Lipids: Classification and function; Protein: Classification and structure (Primary, Secondary, Tertiary and Quaternary structure); Amino acids: Structure, charge and polarity; essential amino-acids; Enzyme: Classification and function, Isozymes, Allosteric enzymes and Coenzymes; Glycolysis, conversion of pyruvic acid to Acetyl Co-A, TCA cycle; Membrane chemistry, transport and mechanism of ion uptake; Signal transduction pathway and second messenger concept-G protein.
Paper	6B (Practical)	
	Experiments related to theory paper are taken up.	

Lesson Plan (Academic Session 2022-23, Even Semester)

Name of the Faculty

Dr. Debasree Lodh

Department	Botany	
Semester	2nd	
Course	Botany (Major) Theory	
Paper	I	
	Topic	Learning objectives
Unit I	Algae	<p>General account: Thallus organization, Ultra-structure of plastid & flagella, Origin & evolution of sex. Outline classification (Lee-1999) up to phylum with characters. Chlorophyceae-Salient features, Life history: <i>Chlamydomonas</i>, <i>Oedogonium</i>. Charophyceae – Salient features, Life history : <i>Chara</i>. Xanthophyceae – Salient features, Life history – <i>Voucheria</i>. Bacillariophyceae (Diatom): 6.1 Cell structure, 6.2 Auxospore formation in <i>Centrales</i> and <i>Pennales</i>. Phaeophyceae – Salient features, Life history – <i>Ectocarpus</i>. Rhodophyceae – Salient features, Life history – <i>Polysiphonia</i>. Economic importance of algae.</p>
	2B (Practical)	
Paper		
Unit: I	Topic	Learning objectives
		Experiments related to theory paper are taken up.
Course	Botany (General) Theory	
Paper	I	
	Topic	Learning objectives
Unit I	Algae	<p>General account: Thallus organization, Economic importance of algae. Diatom: Cell structure, Auxospore formation in <i>Centrales</i> and <i>Pennales</i>. Life history: <i>Oedogonium</i>, <i>Chara</i>, <i>Ectocarpus</i> and <i>Polysiphonia</i>.</p>
Paper	2B (Practical)	
Unit: I	Topic	Learning objectives
		Experiments related to theory paper are taken up.
Semester	4th	
Course	Botany (Major)	
Paper	4A (Theory)	

	Topic	Learning objectives
Unit: II	Anatomy	Anatomy-Cell wall (Gross structure and chemical composition), Meristematic and Permanent tissue (structure, distribution and function); Vascular bundles types, stele- types and evolution, Normal secondary growth; Anomalous secondary growth (Stems of <i>Boerhaavia</i> , <i>Chenopodium</i> , <i>Mirabilis</i> , <i>Bignonia</i> , <i>Nyctanthes</i> , Root of <i>Tinospora</i>);
Paper	4B (Practical)	
SI	Topic	Learning objectives
		Experiments related to theory paper are taken up.
Course	Botany (General)	
Paper	4A (Theory)	
	Topic	Learning objectives
Unit: II	Anatomy	Anatomy-Cell wall (Gross structure and chemical composition), Meristematic and Permanent tissue (structure, distribution and function), Vascular bundles- types, stele- types and evolution Normal secondary growth;
Paper	4B (Practical)	
SI	Topic	Learning objectives
		Experiments related to theory paper are taken up.
Semester	6th	
Course	Botany (Major)	
Paper	6A (Theory)	
	Topic	Learning objectives
Unit – I	Plant physiology:	Water potential and its components; Water absorption by roots (apoplastic and symplastic pathways); Photosynthesis: Components of photosynthesis, Types of chlorophyll and carotenoids and their structures and functions; Red drop effect and Enhancement effect, Antenna complex, photochemical reactions, Mechanism of electron transport in PS-I and PS-II, Calvin cycle; HSK pathway; C ₃ and C ₄ plants and photosynthetic efficiency, photorespiration, Crassulacean acid metabolism (CAM); Stomatal physiology; role of CO ₂ ions, ABA and light, transpiration and anti-transpirant. Respiration: Oxidative Phosphorylation, Mitochondrial ETS and uncouplers, PP pathway; N-metabolism: Assimilation of Nitrogen, Biological Nitrogen fixation: symbiotic fixation; 'nod' genes and 'nif' genes, role of nitrogenase in N ₂ fixation; Photoperiodism: Photoperiodic responses and classification of plants, Circadian Clock Photomorphogenesis; Phytochromes as photoreceptor in Photoperiodism, Vernalization, Florigen and transition to flowering; Plant growth regulators, physiological role and modes of action (IAA, Gibberellins and Cytokinins), Brassinosteroids, polyamines.

Paper	6B (Practical)
Experiments related to theory paper are taken up.	

Lesson Plan (Academic Session 2022-23, Even Semester)

Name of the Faculty	Dr. Somnath Kar	
Department	Botany	
Semester	2 nd	
Course	Botany (Major) Theory	
Paper	I	
	Topic	Learning objectives
Unit II	Gymnosperm	Progymnosperm – Diagnostic characters, Vegetative & reproductive structures of <i>Archeopteris</i> . Life histories – Distribution in India, vegetative and reproductive structure, Development of gametophytes and embryogeny of <i>Cycas</i> , <i>Pinus</i> <i>Gnetum</i> .
Unit II	Palaeobotany	Plant fossil – Types of fossils, Different modes of preservation (Schopf – 1975), Importance of fossil study. Geological time scale with dominant plant groups through ages.
Course	Botany (General) Theory	
Paper	I	
Unit	Topic	Learning objectives
Unit II	Gymnosperm	Progymnosperm – A brief concept. Life histories – Distribution in India, vegetative and reproductive structure, Development of gametophytes and embryogeny of 4.1. <i>Cycas</i> , 4.2. <i>Pinus</i> 4.3 <i>Gnetum</i> .
Unit II	Palaeobotany	Plant fossil – Types of fossils, Different modes of preservation (Schopf – 1975), Importance of fossil study. Geological time scale with dominant plant groups through ages.
Semester	4 th	
Course	Botany (Major)	
Paper	4A (Theory)	
	Topic	Learning objectives
Unit I	Taxonomy	Taxonomy - Nomenclature and rules of ICBN, Magnoliaceae, Poaceae, Orchidaceae, Mimosaceae, Caesalpiniaceae, Fabaceae, Malvaceae, Brassicaceae, Solanaceae, Apocynaceae, Lamiaceae, Rubiaceae and Asteraceae; Embryology- Micro and mega sporogenesis (Monosporic, bisporic and tetrasporic) Development of embryo, development of endosperm.

Paper	4B (Practical)	
	Experiments related to theory paper are taken up.	
Course	Botany (GENERAL)	
Paper	4A (Theory)	
	Topic	Learning objectives
Unit I	Taxonomy	Taxonomy- Magnoliaceae, Poaceae, Orchidaceae, Mimosaceae, Caesalpiniaceae, Fabaceae, Malvaceae, Brassicaceae, Solanaceae, Apocynaceae, Lamiaceae, Rubiaceae and Asteraceae.
Paper	4B (Practical)	
	Experiments related to theory paper are taken up.	
Semester	6th	
Course	Botany (Major)	
Paper	6A (Theory)	
	Topic	Learning objectives
Unit – IV	Plant Biotechnology	Totipotency and concept of plant tissue culture; Function and organization of a typical plant tissue culture laboratory; Techniques of plant tissue culture: cell suspension culture technique, protoplast culture technique, Meristem tip culture technique; Modes of <i>in vitro</i> regeneration and applications; <i>In vitro</i> exudation and remedial Measures; Callus culture and applications; Haploid and embryo culture; Prokaryotic vector system and marker genes; Transformation: <i>Agrobacterium</i> mediated gene transfer, Particle Bombardment method.
Paper	6B (Practical)	
	Experiments related to theory paper are taken up.	

Lesson Plan (Academic Session 2022-23, Even Semester)

Name of the Faculty	Dr. Sudipta Sinha	
Department	Botany	
Semester	2nd	
Course	Botany (Major) Theory	
Paper	I	
	Topic	Learning objectives
Unit II	Pteridophyta	Life history: Sporophyte structure, reproduction and structure of gametophyte of <i>Lycopodium</i> , <i>Selaginella</i> , <i>Equisetum</i> , <i>Pteris</i> Telome concept & its significance.
Course	Botany (General) Theory	

Paper	I	
Unit	Topic	Learning objectives
Unit II	Pteridophyta	Life history: Sporophyte structure, reproduction and structure of gametophyte of <i>Lycopodium</i> , <i>Selaginella</i> , <i>Equisetum</i> , <i>Pteris</i> Telome concept & its significance.
Semester	4th	
Course	Botany (Major)	
Paper	4A (Theory)	
	Topic	Learning objectives
Unit: II	Ecology	Ecology. Habitat and Niche (preliminary idea), Ecological succession- Hydrosere and Xerosere, Endemism, Ecological adaptation - Hydrophytes and xerophytes, Red Data Book; Ecological adaptation of Halophytes;
Unit: II	Phytogeography	Phytogeography- Phytogeographical regions of India (D. Chatterjee-1960); Vegetation of Western and Eastern Himalaya, Sundarban and Tripura.
Paper	4B (Practical)	
Experiments related to theory paper are taken up.		
Course	Botany (GENERAL)	
Paper	4A (Theory)	
	Topic	Learning objectives
Unit: II	Ecology	Ecology- Habitat and Niche (preliminary idea), Ecological succession- Hydrosere and Xerosere, Endemism, Red Data Book:
Unit: II	Phytogeography	Phytogeography-Phytogeographical regions of India (D. Chatterjee-1960): Vegetation of Western and Eastern Himalaya and Tripura.
Paper	4B (Practical)	
Experiments related to theory paper are taken up.		
Semester	6th	
Course	Botany (Major)	
Paper	6A (Theory)	
	Topic	Learning objectives

Unit – III	Pharmacognosy:	Importance of pharmacognosy in modern medicine; Drugs: crude and commercial drugs; Method of commercial drug production, drug adulteration; Classification and evaluation of drugs: organoleptic, microscopic, chemical and physical evaluation; Secondary metabolites and secondary metabolic biosynthetic pathways; Major types of secondary metabolites with source plant: Flavonoids, steroids, terpenoids, resins, phenolics and alkalids; Organoleptic study of whole plant of <i>Andrographis paniculata</i> , Bark of <i>Alstonia</i> sp., Rhizome of Ginger, Tuber of <i>Dioscoria</i> sp., Leaves of <i>Adhatoda</i> sp.
Paper	6B (Practical)	
Experiments related to theory paper are taken up.		

Resources/Materials Used	Whiteboard, Marker, Projector, Reference books & previous year question papers
Basis of Class taken	Detailed discussion on the topics and citing examples related to different topics with an aim to develop fair concept among the students.
Assessment	Class Test/Assignment/Internal exams
Feedback to students	Performance based discussion/ necessary steps taken/ reviewing weak points & nurturing their concept.
Revision / Remedial Classes	Revision will be done after completion of syllabus and remedial classes will be taken for the slow learners.


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