Department of Botany

Semester **II**
Name of the Course :**Plant Anatomy and Embryology**
Subject code :**BC1721**

Teaching Plan

Unit	Modules	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I Meristem and Tissues						
	1	Meristems – Classification based on origin, position and function. Apical organization of shoot and root.	3	To understand the classification of meristem based on origin, position and function.	Lecture Group discussion PPT	Formative assessment Quiz Short Test Multiple choice questions
	2	Structure and function of simple tissue and complex tissue	3	To be familiarize with the different types of tissues	Lecture Illustration Video Clippings	
	3	Primary Structure of Dicot and Monocot Stem and Root; Dicot and Monocot Leaf	3	To compare and contrast the structure of dicot from monocot	Lecture Group discussion PPT	
II Secondary Growth						
	1	Secondary growth in stem and root – Formation of cambial ring, activity of cambial ring, secondary vascular tissue.	3	To recognize the secondary growth in stem and root	Sectioning Lecture PPT	Formative assessment Quiz Assignment
	2	Formation of periderm, lenticels, annual ring, Wood (heartwood and sapwood).	3	To understand the various changes takes place during secondary wood formation	Specimen Lecture PPT	
	3	Anomalous secondary thickening in dicot stem (Boerhaavia) and monocot Stem (Draceana)	3	To distinguish anamolous secondary thickening in dicot and monocot stem	Microscopic Slides Lecture PPT	
III Epidermal Tissues and Nodes						
	1	Epidermal tissue system, trichomes Glandular hairs, cuticle	2	To be familiarize with epidermal outgrowths	Lecture Microslide PPT	Formative assessment Quiz

	2	Stomata and its types	2	To make-out the structure of stomata and its types	Lecture Group discussion Sectioning	Multiple Choice questions Short test
	3	Nodal anatomy types - unilacunar (*Justicea*), trilacunar (*Azadirachta*) and multilacunar (*Aralia*),	3	To categorize the different types of nodes	Lecture Group discussion sectioning	
	4	Hydathodes and Laticifers	2	To know the structure and functions of Hydathodes and Laticifers	Lecture PPT	
IV Embryology						
	1	Structure of anther; Structure of microsporoangium and microsporogenesis	2	To have a knowledge of microsporogenesis	Lecture Microslide	Formative assessment Quiz
	2	Structure of pollen and development of male gametophyte	2	To get an idea about the formation of male gametophyte	Lecture PPT	Multiple Choice Questions Short Test
	3	Structure and types of ovules, megasporangium and megasporogenesis	3	To have a knowledge of megasporogenesis	Lecture PPT Microslide	
	4	Development of female gametophyte.	2	To recognize the development of female gametophyte	Lecture PPT	
V Embryogenesis						
	1	Types of embryo sac – Monosporic – Polygonum type.	3	To detect the different types of embryo sac formation	Lecture Chart	Formative assessment Quiz Short test Assignment Short test
	2	Fertilization	2	To analyze the events of fertilization	Lecture Illustrations Chart	
	3	Endosperm - types- nuclear, cellular and helobial, Ruminate endosperm and perisperm	2	To differentiate the types of endosperm	Lecture PPT Chart	

	4	Development of embryo in dicot (Capsella) and Monocot (Luzula)	2	To assess the development of dicot and monocot embryo	Lecture PPT	

Course Instructor: A. Anami Augustus Arul H.O.D: C.Jespin Ida

Semester **: II**

Name of the Course **: Taxonomy of angiosperms and plant physiology (Allied –I)**
Subject code **: BA1721**

Teaching Plan

Unit	Modules	Topics	Lecture hours	Learning outcome	Pedagogy	Assesment/ Evaluation
I Taxonomy						
	1	Morphology: Root, stem, leaf	3	To identify modifications in root, stem, leaf	Using models Lecture	Multiple choice Quiz Short test Formative assessment
	2	Inflorescence and fruit types	3	To differentiate and classify inflorescence and fruits	Lecture Presentation	
	3	Classification – artificial, natural (Bentham & Hooker's) phylogenetic, Bionomial nomenclature	3	To distinguish the different types of classification	Group discussion Lecture	
II Taxonomy						
	1	Families and their economic importance - Annonaceae, Rutaceae, Lamiaceae,	5	To analyze the floristic features of families under study and impart the economic importance of these families.	Demonstration Lecture	Formative assessment Quiz Short test
	2	Families and their economic importance - Euphorbiaceae and Poaceae.	4	To analyze the floristic features of families under study and impart the economic importance of these families.	Hands on training Lecture	
III Plant Physiology						
	1	Importance of water to	5	To observe	Experiment	Quiz

		plant life - imbibition, diffusion,osmosis and plasmolysis. Absorption of water - passive and active mechanisms		the water relationship in plant	Lecture	Short test Formative assessment
	2	Ascent of sap, transpiration – types	2	To analyze the ascent of sap and types of transpiration	Experiment Video Clippings	.
	3	Brief note on stomatal movement.	2	To infer the stomatal movement	Lecture	
IV Plant Physiology						
	1	Photosynthesis: photosynthetic apparatus, Mechanism of photosynthesis, Pigment systems, light dependent reactions - C_3 Cycle	7	To know the mechanism of photosynthesis	Lecture, Group discussion, Video Clippings	Formative assessment Group test Quiz
	2	Factors affecting photosysnthesis.	2	To Know the factors affecting photosynthesis	Lecture PPT	
V Plant Physiology						
	1	Respiration: Types - aerobic (glycolysis, Kreb's cycle and oxidative phosphorylation) Anaerobic (fermentation)	5	To understand the respiratory processes carried out by plants	Lecture, Illustration	Formative assessment Short test Multiple choice
	2	Factors affecting respiration	2	To observe the various factors affecting respiration	Demonstrration Lecture	
	3	Plant growth - Growth hormones – physiological role of auxins and Gibberellins	2	To interpret the role of growth hormones in plants	Flow Chart Lecture	

Course Instructor: A. Anami Augustus Arul H.O.D: C.Jespin Ida

Semester **II**
Name of the Course :**Eco- Friendly Technology(NMEC)**
Subject code :**BNM172**

Teaching Plan

Unit	Modules	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
1. Mushroom						
	1	Historical background, Nutritional value of mushroom	3	To Know the nutritive value of mushroom	Lecture	Formative assessment
	2	Differentiation of edible and poisonous mushroom Distribution of edible mushrooms , present status of mushroom cultivation in India	3	To understand the methods of identifying edible and poisonous mushroom	Lecture Video clippings,	Assignment Short test Quiz, Depiction of models
	3	Cultivation methods Control of pathogens, Cultivation of *Pleurotus*	2	To be familiarize with various methods of Cultivation of common mushrooms	Lecture Illustrations hands on training	
	4	Harvesting methods	1	To know the novel methods of harvesting	Lecture PPT presentation	
II.Vermicompost						
	1	Importance of vermicomposting, Requirements of vermicomposting	2	To realize the importance of vermicomposting	Lecture	Group discussion Formative assessment Quiz Assignment
	2	Mechanism of vermicomposting – flowchart, Vermiculture	3	To understand easily the mechanism of vermicomposting – flowchart,	Lecture, PPT, group discussion	
	3	Preparation of vermibed, Innoculation of earthworm feeding and watering the vermibed	3	To know the various steps involved in vermicompost	Lecture, PPT, group discussion	
	4	Methods of vermicomposting, Biological characteristics of Vermicompost	1	To know the various steps involved in	Lecture, PPT, group discussion	

				vermicompost		
III Fermentation						
	1	Bioreactors -types, models and designs,	1	To compare the different models of bioreactors	Lecture, models	Group discussion Assessing their Practical knowledge Assignment Formative assessment Assessing group project
	2	Formulation of feed stock, sterilization, isolation and selection of microorganisms	3	To know the principles of sterilization	Demonstration	
	3	Role of microorganisms in fermentation, Culture of microorganisms in the bioreactor	2	To compare the role of microorganisms in fermentation	Lecture	
	4	Brief account of various fermentation products, Production of alcoholic beverages - a general account	1	To understand the production of alcoholic beverages	Lecture, models	
	5	Production of Wine , Production of Vinegar in Small scale and in large scale	2	To understand the production of wine & vinegar	Industrial visit, group discussion	
IV Biofuel Technology						
	1	General account of biogas, Characteristic features of biogas	1	To know the importance of biogas	Lecture	Formative assessment Assignment Quiz
	2	Structure of biogas plant, Biogas - KVIC model - construction and working mechanism	3	Te understand the working mechanism of biogas plant	Lecture, Model	
	3	Importance of solar energy - Advantages and disadvantages, Solar cooker - importance and operation mechanism	3	To know the importance of solar energy	Lecture	
	4	Solar lamps, Solar water heater - construction and advantages	2	To compare the construction and advantages of solar lamps & solar water heater	Lecture	
V Fibre Technology						
	1	Banana fibre quality and importance	2	To know the importance of fibre	Lecture	Short test Formative assessment

	2	Processing of Banana fibre. Different steps involved in processing	2	To understand the various steps involved in processing of Banana	Lecture, Assignment	Quiz
	3	Collection and Storage of fibre, Cutting, Slicing, arranging and slitting	2	To be aware of the post processing steps in banana processing	Lecture,PPT presentation	
	4	Separation of fibre ,Drying, Packing and Marketing	1	To be aware of the post processing steps in banana processing	Lecture	
	5	Uses of Banana fibre, Craft articles made out of Banana fibre, Palm and *Cyperus*	2	To get hands on training on making craft articles from Banana fibre, Palm and *Cyperus*	Lecture, hands on training	

Course Instructor: A.R. Florence H.O.D: C.Jespin Ida

Semester : **IV**
Name of the Course : **Plant Ecology and Phytogeography**
Subject code : **BC1741**

Teaching Plan

Unit	Modules	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
1. Soil						
	1	Importance, Origin, Formation of soil	3	To understand the importance, origin and formation of soil	Lecture	Formative assessment Group discussion

	2	Types and Profile of soil	3	To Know the types and Profile of soil	Lecture, images	Short test Assignment
	3	Composition of soil, Physical, chemical and biological components of soil	3	To be familiarize with the Composition and components of soil	Lecture	
	4	Role of climate in soil development.	2	To know the novel methods of harvesting	Lecture Video clippings	
II. Water						
	1	Importance of water, States of water in the environment	2	To realize the importance and States of	Lecture	Quiz, Evaluation, Assignment Quiz
	2	Precipitation types (rain, fog, snow, hail, dew)	2	To categorize the Precipitation types	Lecture Video clippings	
	3	Atmospheric moisture; Water in soil; Water table	4	To identify the Atmospheric moisture; Soil Water; Water table	Lecture,	
	4	Water bodies: Aquifers Water shed management.	3	To know the Water bodies and Water shed management	Lecture, group discussion	Assignment
III. Ecological groups						

	1	Morphological, anatomical and physiological adaptations of hydrophytes	3	To understand the special structures produced by plants to adapt	Lecture Classroom Discussion	Diagrammatic assessment Assessing their Practical knowledge
	2	Morphological, anatomical and physiological adaptations of xerophytes	4	To identify the xerophytes and study their anatomical and physiological	Lecture with blackboard	
	3	Morphological, anatomical and physiological adaptations of halophytes	4	To learn the modifications made by plants to adapt high salinity.	Lecture Classroom Discussion	
	4	Study of vegetation by quadrat and transect method.	4	To analyse the vegetation by quadrat and transect method.	Field study	
IV. Ecosystem						
	1	Fresh water (pond ecosystem) and marine ecosystem	2	To understand the producers, consumers and decomposers of these	Lecture with blackboard	Formative assessment Class test
	2	Trophic organization, basic source of energy, autotrophy and heterotrophy	2	Know the behavior of organisms in each trophic	Lecture with blackboard	

	3	Food chains and food webs, ecological pyramids	4	Learn the predators and preys and their interconnections	Lecture with charts	Quiz
	4	Plant interactions- symbiosis, commensalism and	2	Understand the relationship between plant and other organisms.	Lecture with PPT	
V. Phytogeography						
	1	Principles of phytogeography	2	Know the pattern and process in plant distribution.	Lecture with blackboard	Short test Choose the correct answer Formative assessment
	2	Types of plant distribution – continuous, discontinuous and endemic.	4	Understand the different types of distribution of plants.	Lecture PPT	
	3	Plate tectonics, continental drift, theory of land bridges, age and area hypothesis.	5	Learn about the movements of continents.	Lecture PPT	
	4	Centers of origin of cultivated crops.	2	Know about the origin of crops	Lecture PPT	

Course Instructor: Bojaxa A.Rosy H.O.D: C.Jespin Ida

Semester : **IV Major Elective-II (a)**

Name of the Course : **Biological Resources**

Subject code : **BC1742**

Teaching Plan

Unit	Modules	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
1. **Biofertilizers**						
	1	Introduction, Scope and importance of biofertilizers.	2	To Know the importance of	Lecture	Formative assessment
	2	Mass production and uses of Bacterial Fertilizer **(***Rhizobium)*	3	To understand the methods of Mass production	Lecture Video clippings,	Assignment
	3	Mass production and application of *Nostoc*	2	To be familiarize with various methods of Mass production of *Nostoc*	Lecture Illustrations	Short test
	4	Mass production and application of *Azolla*	2	To know the novel methods of mass production of	Lecture PPT presentation	assessing their creative
	5	Mass production and application of vermicompost.	3	To know the various steps involved in vermicompost	Lecture, PPT, demonstration	Assessing their practical knowledge
II. Single Cell Protein and Mycoprotein						
	1.	Sources of single cell protein, Nutritive value of single cell protein.	2	To recall the sources and Nutritive value of single cell protein.	Lecture' Images	Formative assessment
	2.	Mass Cultivation of *Spirulina*.	2	To understand the Mass production of *Spirulina*.	demonstration	Assessing their practical
	3.	Mushroom CultivationM *Pleurotus* and *Agaricus*,	4	To develop the Mass cultivation of *Pleurotus* and *Agaricus*	demonstration	Field visit

	4.	Nutritional values and value added products.	2	To know the Nutritional values and value added products.	Lecture with images	Assignment
III Forest resources						
	1	Forest cover, forest resources	2	To study the Forest cover and forest resources	Video clippings	Group discussion
	2	Utility and Values of forests	2	To learn the uses and values of forests	Lecture, PPT	Assignment
	3	Commercial benefits, benefits and ecological of	3	To know the various benefits of forests	Lecture	Assessing their forest knowledge
IV Biofuels						
	1.	Introduction and Importance of biofuel	1	To understand the various sources of biofuels and its Importance	Lecture	Formative assessment
	2.	Biodiesel Production – *Pongamia* and *Jatropa*.	2	To practice the production of Biodiesel from plants	Lecture with PPT	Group discussion
	3.	Alcohols – the liquid fuel- ethanol production.	2	To know the liquid fuel produced from ethanol	Lecture with Video clippings	Short test
	4.	Gaseous fuels: Biogas production and Hydrogen fuel.	3	To develop biogas fuel from organic wastes and study the hydrogen fuel	Lecture with demonstration	Assessing their forest
V. Biopesticides:						
	1	Introduction of biopesticides, desirable qualities of biopesticides.	2	To realize the importance of	Lecture	Group discussion
	2	Microbial Pesticides – fungi,viruses and bacteria.	2	To understand the activity of Microbial	Lecture, PPT,	Formative assessment, Quiz

	3	Advantages and disadvantages of Microbial	2	To know the various steps involved	Lecture, PPT,	Short test
	4	Application of Biopesticides.	2	To apply biopesticides to	Lecture, group discussion	Short test

Course Insructor: A. R.Florence H.O.D: C.Jespin Ida

Semester : **IV**

Name of the Course : **Cell Biology and Plant Anatomy (Allied)**
Subject code : **BA1742**

Teaching Plan

Unit	Modules	Topics	Lecture hours	Learning outcome	Pedagogy	Assesment/ Evaluation
I Cell						
	I	Cell - Prokaryotic and Eukaryotic; Structure of plant cell	3	To differentiate Prokaryotes	Lecture with PPT illustration	Short test Multiple choice questions Quiz
	2	Chemical composition and functions of	3	To evaluate the functions of plasma	Lecture and discussion	
	3	Study of Chloroplast and Mitochondria	3	To compare the structure and functions of Chloroplast and Mitochondria	Lecture with Chart	
II Cell and Cell Cycle						
	1	Non living inclusions – starch grains, Aleurone grain,	3	To know the non-living inclusions of	Lecture with PPT illustration	Multiple choice questions Group test Quiz
	2	Ultrastructure and functions of nucleus.	3	To analyse the importance of	Group discussion Lecture	
	3	Cell division – cell cycle Mitosis and	3	To Compare thevarious	Chart models Lecture	

		meiosis - significance.		mitotic and meiotic cell division in plant and to learn about cell		
III Anatomy :Tissues						
	1	Meristems – Classification	2	To identify the different types of meristems	Presentation Lecture	Short test Quiz Multiple choice Formative Assessment
	2	Structure and functions of simple simple tissues – parenchyma Collenchyma,	3	To cite structure and functions of simple tissues	Small group discussion	
	4	Structure and functions of complex tissues – xylem and phloem.	4	To know the complexity of xylem and	Experiments Lecture PPT	
IV Anatomy: Primary structure						
	1	Primary Structure of dicot and monocot stem and root.	5	To compare and contrast the internal structure dicot and monocot stem	Demonstration Lecture	Formative assesment Quiz Group Discussion
	2	Primary Structure of dicot and monocot root	4	To compare and contrast the internal structure dicot and monocot	PPT Lecture	
V Anatomy: Leaf, Secondary Thickening						
	1	Internal structure of dicot leaf, monocot leaf	4	To compare the anatomy of monocot and dicot leaf	Hands on training PPT	Formative assessment Quiz Slip test
	2	Normal Secondary Thickening of dicot stem	5	To realize the formation of phellogen and	Chart Lecture	

Course Insructor: Sr. Leema Rose

H.O.D: C.Jespin Ida

Semester - VI

Major Core IX - Biotechnology and Molecular Biology

Sub. Code: BC1762

Modules

Total contact hours: 60 (Including lectures, assignments, and tests)

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/Evaluation
I. Gene cloning, cloning vectors, restriction enzymes & Gene transfer						
	1	Definition and scope of biotechnology. Introduction to genetic engineering- Principles of recombinant DNA technology, gene cloning.	3	To understand the importance of recombinant molecules	Lecture with PPT	Classroom quiz Short test Formative assessment
	2	cloning vectors- plasmids, cosmids, binary and shuttle vectors	3	To learn and categorize different types of cloning vectors	Lecture with PPT	Quiz Slip test
	3	restriction enzymes – exonucleases, endonucleases: type I, II and III. and Ligases.	3	To understand the functions and importance of restriction enzymes	Lecture with PPT	Short test
	4	Gene transfer methods- Fragmentation, Microinjection, Shot Gun Method.	3	To know the different Gene transfer methods	Lecture with PPT	Formative assessment
II Plant Tissue Culture						
	1	Scope and importance, laboratory requirements for plant tissue culture, Sterilization techniques	4	To practice the plant tissue culture, Sterilization techniques and Culture media preparation in laboratory	Lecture Demonstration and Hands on training	Practical knowledge

		Culture media preparation (M.S. Medium).				
	2	Concept of totipotency – differentiation, de-differentiation and redifferentiation..	4	To know the Concept of totipotency	Lecture with images	Assignment Quiz
	3	Explants- culture of explants, callus induction and maintenance, callus sub culture on a fresh nutrient medium, Organogenesis	4	To provide students with the knowledge and skills of preparation of sub culture	Lecture Demonstration and Hands on training	Practical knowledge
UNIT III Plant tissue culture and Transgenic plants						
	1	Protoplast culture-Isolation and purification, culture and regeneration, uses of cultured protoplasts. Somatic hybridization-methods, production of Hybrids and Cybrids.	4	To identify, isolate and purify the Protoplast and culturing methods	Lecture Demonstration and Hands on training	Class test Quiz Practical knowledge
	2	Production of haploid plants – Anther culture and Pollen culture. Production of somatic embryos	3	To learn different culture methods	Lecture Demonstration and Hands on training	Practical knowledge
		GM crops (Bt – Cotton and Golden rice) Transgenic plants-merits and demerits; Cryopreservation, Brief knowledge on IPR	5	To know the GM crops, merits and demerits of Transgenic plants	Lecture with live specimen and PPT	Classroom quiz Short test Formative assessment
IV DNA Replication and Protein Synthesis						

	1	DNA Replication in prokaryotes and transcription in prokaryotes,	6	To understand the DNA Replication and transcription	Lecture and video clippings	Memory power test Formative assessment
	2	Protein Synthesis- Translation, post translation processing, inhibitors of protein synthesis	6	To acquire knowledge on Protein Synthesis	Lecture and video clippings	Assessing their knowledge through diagrammes
V	**Gene regulation and mutation**					
	1	Characteristic of Genetic Code, Codons, anticodons. Degeneracy of codons, Wobble hypothesis.	6	To understand the Gene regulation, mutation and characteristics of codons	Lecturing With PPT	Multiple choice questions Formative assessment
	2	Gene regulation in Prokayotes- Lac Operon. Gene Mutation- Molecular mechanism, Mutagens, DNA Repair mechanisms.	6	To understand the Gene regulation and Gene Mutations		Evaluation through short test

Course Instructor: Bojaxa A. Rosy **HOD: C. Jespin Ida**

Semester - VI
Organic farming
Sub. Code: BC2065

Modules
Total contact hours: 60 (Including lectures, assignments, and tests)

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I.						
	1	Introduction, A legacy of damaged soils.	1	To understand the legacy of damaged soils.	Lecture	Class test
	2	Retail chemicals farming made cheap and easy.	2	To know about chemical farming	Lecture PPT	Assignment
	3	Contamination of food products by pesticides and chemicals. Threat to biodiversity.	3	To know the Contamination of food and biodiversity.	Lecture PPT, video	Formative assessment
	4	Present status of organic farming in India	3	To study the Present status of organic farming	Lecture PPT,	Quiz
II.						
	1	Assessment of soil, Fertility of soil,	3	To be familiarize with the assessment of soil	Lecture PPT	Assignment
	2	Importance of organic matter, Water retentivity	3	To realize the importance of Water retentivity	Lecture PPT	Formative assessment
	3	aeration of soil, Soil pH, Soil reclamation	3	To understand soil aeration, pH and reclamation.	Lecture PPT	Short test
III.						
	1	Balanced Nutrient Supply-Sources of nutrients for organic farming. FYM, Rural Compost, City Compost, Oil cakes, Animal waste,	2	To learn the types of manure	Lecture	Short test
	2	Bio-fertilizer and Vermicompost.	3	To understand the biofertilizers	Lecture PPT	Quiz

				and vermicompost		
	3	Nutrient content of the above source (data chart).	2	To learns the nutrient content of different fertilizers	Lecture PPT Video	Formative assessment
	4	Green manure, Liquid manure (Panchagavya)	2	To understand about green manure and liquid manure.	Lecture PPT	Class test
IV.						
	1	Plants: Choosing the right crop for the environment	1	To know the plants suitable for a particular environment	Lecture, PPT	Class test
	2	Best management practices for organic farming	3	To understand the management of the organic farm.	Lecture. PPT	Assignment
	3	Definition, Concepts, and benefits	3	To know the definition, concepts and benefits of organic farming	Lecture	Quiz
	4	Pure Organic Farming, Integrated Organic system (Combination of organic and inorganic) and mixed farming	2	To learn about the types of farming	Lecture, PPT	Formative assessment
V. Pteridophytes:						
	1	Pest management – Integrated pest and disease management	1	To know about the pest management practices	Lecture	Group discussion
	2	Organic pesticides, Bio-pesticides	3	To classify the types of organic and biopesticides	Lecture, PPT	Assignment
	3	Feasibility of complete dependence of organic sources.	3	To study the feasibility of complete dependence of organic sources.	Lecture, PPT Video	Quiz

	4	Required management practices for organic farming certification	2	To learn the required management practices for organic farming certification	Lecture, PPT	Short test

Course constructor: Dr. Sr. Leema Rose **HOD: C. Jespin Ida**

Major Core VIII

Semester : VI

Name of the Course: Genetics, Biostatistics, and Bioinformatics
Subject code: BC1761

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I GENES AND ITS INTERACTIONS						
	1	Mendel's laws of heredity with reference to monohybrid and dihybrid crosses.	3	To differentiate monohybrid and dihybrid crosses and solve the problems	Lecture, Problem based learning	Class test, Group Discussion, Quiz.
	2	Gene interactions - complementary genes (flower colour in sweet Pea). Supplementary genes – inheritance (Comb shapes in fowls)	3	To solve the problems in gene interactions	Lecture, Problem based learning	
	3	Epistasis – Dominant Epistasis (12:3:1), Recessive Epistasis (9:3:4), Lethal genes (Dominant Coat colour in Mice, Recessive – Chlorophyll content in Maize) (Seminar)	3	To analyze different forms of epistasis	Lecture, PPT, Problem based learning	

	4	Incomplete dominance (*Mirabillis jalapa*), and Codominance (Coat colour in cattle)	2	To distinguish incomplete dominance and co-dominance	Lecture , PPT	
II GENE INHERITANCE						
	1	Sex Linkage inheritance (eye colour in *Drosophila*)	3	To distinguish the sex linked characters	Lecture , Charts	Diagrammatic representation, Short test.
	2	Polygenic inheritance with reference to (ear length in maize)	2	To analyze polygenic inheritance with examples	Lecture , Models	
	3	Multiple alleles with reference to (ABO blood group in man), Rh factor	3	To evaluate the multiple allele mechanisms in human blood	PPT, Charts	
	4	Non Mendelian inheritance cytoplasmic, shell coiling in snails. Morgon's views on linkage	2	To understand the non-mendelian inheritance pattern	Lecture , Video clippings	
	5	Crossing over – types, mechanism of crossing over and its significance, Holiday model	3	To learn about crossing over and mapping	Lecture, Video clippings	
III REPLICATION AND MUTATION						
	1	Cell division (mitosis and meosis)	3	To understand basics of cell division	Lecture , PPT, Videos	Short test, Question – Answer session, Group discussion, Continuous Internal Assessment
	2	DNA as the genetic material, double helical DNA structure , semi conservative method of replication of DNA	3	To differentiate the different forms of DNA	Lecture , Models	

				replication		I (CIA -I).
	3	Chromosomal aberrations- addition, deletion, translocation, inversion, polyploidy	3	To understand the different patterns of chromosoma l abberations	Lecture , PPT	
	4	Types of point mutations, mutagenic agents - physical and chemical. Chromosomal abnormality- Down Syndrome and Klinefelter Syndrome	3	To identify and critically analyse genetic diseases in terms of mutation	Lecture , Charts	
IV BIOSTATISTICS						
	1	Importance of statistics in Biology, sampling - random sampling, collection and interpretation of data, tabulation, presentation of data	3	To know and categorize the biological data collection	Lecture, Problem solving	Quiz, Group discussions
	2	Frequency distribution, frequency curve, frequency polygon, histogram and bar diagrams	3	To understand the different forms of frequency distribution	Lecture , PPT, Proble m solving	
	3	Measures of central tendencies -mean, median and mode	3	To acquire skills in performing statistical analysis	Lecture, Problem solving	
	4	Measures of dispersion – standard deviation, standard error, Null hypothesis - Chi - square test	3	To acquire skills in analyzing measures of dispersion	Lecture , PPT, Proble m solving	
V **BIOINFORMATICS**						

	1	Introduction to Bioinformatics: aims and scope and applications- Virtual library, e-books and e-journals	3	To differentiate e-library, e-books and e-journals	Lecture, PPT	Multiple Choice Questions, Group discussions, Continuous Internal Assessment II (CIA - II).
	2	Major areas of Biological data bases- classification; primary, secondary, specialized.	3	To understand the major areas of Biological data bases	Lecture, PPT	
	3	Importance data bases- NCBI, SWISS-PROT, DDBJ. Tools and softwares in Bioinformatics	3	To construct the databases using softwares	Lecture, Video clippings	
	4	Similarity search – BLAST – FASTA sequence alignment tools. Application of Bioinformatics.	3	To evaluate the similarity searches of biological datas	Lecture, Video clippings	

Course Instructor: Dr. J. Albino Wins **HOD: Dr. C. Jespin Ida**

Semester: VI

Major Core - X

Name of the Course: Plant Physiology and Metabolism
Subject code: BC1763

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I PLANT-WATER RELATIONS						
	1	Importance of water	2	To understand the importance of water to plants	Lecture, PPT	Class test, Group Discussion, Quiz.
	2	Imbibition, diffusion, osmosis and plasmolysis.	3	To analyze the various actions of water in plants	Lecture, Experimental Learning	
	3	Concepts of water potential and its components.	2	To analyze the concepts of water potential and its components	Lecture, PPT	
	4	Transpiration and its significance, guttation. Factors affecting transpiration	4	To distinguish between transpiration and guttation and its importance	Lecture, PPT, Experimental Learning	
II MINERAL NUTRITION						
	1	Essential elements, macro and micronutrients Ascent of sap.	3	To understand the essential elements for plants	Lecture, PPT	Quiz, Class Test, Short test.
	2	Criteria of essentiality of elements; Role of essential elements	3	To analyze the criteria and role of essential elements	Lecture, PPT	

	3	Mechanism SPAC Concept	2	To learn SPAC concept	PPT, Lecture, Model	
	4	Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps, root pressure theory.	3	To understand the transport of ions	Lecture, Animation Video	
	5	Hydroponics	1	To acquire the skill of hydroponics	Lecture, Experimental model	
III PHOTOSYNTHESIS						
	1	Ultrastructure of chloroplast	1	To learn the structure of chloroplast	Lecture, Chart	Short test, Question – Answer session, Group discussion, Continuous Internal Assessment I (CIA -I).
	2	Photosynthetic pigments structure; Photosystem I and II, reaction centre, antenna molecules	3	To understand the pigments and photosystem	Lecture, PPT	
	3	Electron transport (cyclic and non cyclic) and photophosphorylation	3	To differentiate cyclic and non-cyclic photophosphorylation	Lecture, PPT	
	4	C3, C4 and CAM pathways of carbon fixation	4	To understand the various pathways of carbon fixation	Lecture, PPT	
	5	Photorespiration	1	To learn about photorespiration	Lecture	

IV RESPIRATION						
	1	Ultrastructure of mitochondria	1	To learn the structure of mitochondria	Lecture, Chart	Quiz, Group Discussion Class test
	2	Glycolysis, anaerobic respiration, TCA cycle	4	To understand Respiration	Lecture, PPT, Animation Video	
	3	Oxidative phosphorylation, GS-GOGAT pathway	3	To acquire knowledge on GS-GOGAT pathway	Lecture, PPT, Chart	
	4	Nitrogen metabolism**:** Biological nitrogen fixation; Nitrate and ammonia assimilation	4	To learn about the nitrogen metabolism	Lecture, PPT,	
V PLANT GROWTH REGULATORS						
	1	Growth, Growth curve	3	To understand the plant growth	Lecture, PPT	Multiple Choice Questions, Group discussions, Continuous Internal Assessment II (CIA - II).
	2	Physiological roles of Auxin, Gibberellin, Abscisic acid and Ethylene	3	To analyze the physiological role of plant hormones	Lecture, PPT	
	3	Photoperiodism (SDP, LDP, Day neutral plants);	3	To evaluate different photoperiods effect on plants	Lecture, PPT	
	4	Vernalization, Phytochrome	3	To learn about vernalization and phytochrome	Lecture, Experiment learning	

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