Semester - I
Algae, Fungi and Lichens
Course Code: BC2011

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

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
	Algae					
I	1	Classification of Algae according to Fritsch (1945).	1	To classify the different types of algae	Lecture PPT	Short test Assignment Quiz Short test
	2	General Characters, Salient features of the classes, occurrence, Structure and reproduction and life cycle Cyanophyceae– *Nostoc*	2	To know the vegetative and reproductive characters of *Nostoc*.	Lecture PPT, video	
	3	Chlorophyceae- *Volvox*,	2	To study the life cycle of *Volvox*	Lecture PPT, video	
	4	*Caulerpa*	2	To understand the structure and reproduction of *Caulerpa*	Lecture PPT, Group discussion	
	5	Phaeophyceae- *Sargassum*	2	To be familiarize with the vegetative and reproductive characters of Sargassum	Lecture PPT	
	Algae					
II	1	Rhodophyceae- *Gracilaria*	2	To realize the vegetative and reproductive e characters of *Gracilaria*	Lecture PPT	Assignment Short test Group discussion Quiz
	2	Xanthophyceae – *Vaucheria*	2	To understand the life cycle of *Vaucheria*	Lecture PPT video	

	3	Bacillariophyceae – *Diatoms*	2	To be familiarize with the structure and reproduction of *Diatoms*	Lecture PPT video	
	4	Economic and Ecological importance of Algae	3	To learn the economic and ecological importance of Algae	Lecture PPT	
Fungi						
III	1	Classification of fungi according to Alexopoulos and Mims (1979).	3	To understand the different types of algae	Lecture PPT	Short test Quiz Short test, CIA-I
	2	General characters, salient features of the classes, occurrence,Structure, reproduction and life cycle of Oomycetes - *Albugo*	2	To realize the vegetative and reproductive characters of *Albugo*	Lecture PPT Video	
	3	Zygomycetes - *Rhizopus*	2	To understand the structure, reproduction and life cycle of *Rhizopus.*	Lecture PPT	
	4	Economic importance of Fungi	2	To learn the economic importance of Fungi	Lecture PPT	
Fungi						
IV	1	Ascomycetes - *Aspergillus,*	2	To know the vegetative and reproductive characters of *Aspergillus*	Lecture, PPT, Videos	Assignment Short test Quiz
	2	*Peziza*	2	To learn the structure and reproduction of *Peziza.*	Lecture. PPT	
	3	Basidiomycetes - *Polyporus*	3	To realize vegetative and reproductive	Lecture, PPT	

				structures of *Polyporus*		
	4	General account on Glomeromycota-VAM Fungi	2	To understand the vegetative and reproductive characters of VAM fungi.	Lecture, PPT, Video	
Lichens						
V	1	General characters of Lichens	2	To know the general characters of Lichens	Lecture, PPT,	Short test Assignment Quiz Group discussion, CIA-II
	2	Classification of Lichens	2	To understand the different types of Lichens	Lecture, PPT	
	3	Ascolichen- *Usnea*	3	To study the structure and reproduction of *Usnea*	Lecture, PPT Video	
	4	Economic importance of Lichens	2	To learn the economic importance of Lichens	Lecture, PPT,	

Course Constructor: Dr. Bojaxa A. Rosy **HOD: Dr. C. Jespin Ida**

Allied - Chemistry of Life
Sub. Code: BA2011

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

Unit	Module	Topics	Lecture Hours	Learning outcome	Pedagogy	Assessment/ Evaluation
	Cell Biology					
I	1.	Objectives and importance of Cell Biology Structure: Prokaryotic cell and Eukaryotic	2	To realize the importance of Cell Biology and also to learn the ultra structure of prokaryotic cell.	Online Lecture	Assignment Short test Group discussion Quiz

	2.	Structure of plant cell	1	To Learn the ultra structure of a typical plant cell	Video clippings	
	3.	Chemical composition and functions of Plasma membrane (fluid mosaic model),	2	To know the fluid mosaic model of plasma membrane and integrates that with its functions	Online Lecture ,PPT	
	4.	Chemical composition and functions of Chloroplast	2	To understand how the structure of chloroplast is involved in photosynthesis	Online Lecture ,PPT	
	5.	Chemical composition and functions of Mitochondria	2	To study the structure and functions of Mitochondria	Online Lecture	
	Cell Biology					
II	1.	Ultrastructure and functions of nucleus.	2	To know the Ultrastructure and functions of nucleus.	Online Lecture PPT	Assignment Short test Group discussion Quiz
	2.	Cell division – cell cycle	2	To understand the events occurring in cell cycle	Online Lecture PPT	
	3.	Mitosis and its significance	2	To differentiate the various stages of mitosis	Online Lecture PPT	
	4.	Meiosis and its significance	2	To categorize the different stages of meiosis and also to know its significance in maintaining the chromosome sets	Online Lecture and group discussion	
	5.	Nonliving inclusions – starch grains, aleurone grain, cystolith and raphide.	1	To know the different types of non-living inclusions present in plants	Online Lecture	
	Biochemistry					

III	1.	Chemical bonds	3	To know the basics of bonds and its importance in bio-molecules	Online Lecture	Assignment Short test Group discussion Quiz CIA-I
	2.	Types of bonds:co-ordinate, covalent and hydrogen.	3	To understand and distinguish the different types of chemical bonds	Online Lecture PPT	
	3.	Monosaccharides : Structure and properties of glucose.	2	To study the Structure and properties of glucose	Lecture	
	4.	Disaccharides Structure and properties of sucrose	2	To understand the Structure and properties of sucrose	Lecture PPT	
	5.	Polysaccharides: Structure and properties of starch.	3	To state the structural organizations of starch	Online Lecture	
	Biochemistry					
IV	1.	Protein: Structure– primary, secondary, tertiary (myoglobin) and quaternary (hemoglobin).	2	To learn the Structure of protein at different levels-primary, secondary, tertiary and quaternary	Lecture ,PPT	Assignment Short test Group discussion Quiz
	2.	Vitamins - importance, sources, deficiency symptoms of water soluble and fat soluble vitamins.	2	To know the importance, sources, deficiency symptoms of water soluble and fat soluble vitamins	Online Lecture, Group discussion	
	3.	General account of simple lipids - Triglycerides	2	To understand the distinguishing features triglycerides	Lecture Video	
	4.	Compound lipids – Phospholipids	2	To learn the importance of Phospholipids with examples	Lecture PPT	

	5.	Derived lipids – Cholesterol	1	To know the structure of Cholesterol and also its importance	Online Lecture	
V	**Physiology**					
	1.	Photosynthesis- Mechanism of photosynthesis	2	To understand a brief introduction on photosynthesis	Video clippings	Assignment Short test Group discussion Quiz , CIA-II
	2.	pigment systems, light dependent reactions(cyclic and non-cyclic)	2	To learn and compare the mode of action of cyclic and non-cyclic electron transport systems	Lecture	
	3.	C_3 Cycle.	2	To understand the various events takes place in C3 cycle	PPT	
	4.	Factors affecting photosynthesis.	2	To study the various factors that affect photosynthesis	Online Lecture	
	5.	Defense mechanism in plants	1	To have a clear picture of the common defense mechanisms seen in plants	Lecture PPT	

Course Instructor:Dr.Jespin Ida **HoD:Dr.C.Jespin Ida**

Non Major Elective Course I - Gardening and Floriculture
Course Code: BNM201

Unit	Modules	Topics	Hours	Learning Outcome/ CO addressed	Pedagogy	Assessment
I	**Garden Nursery Structures (6 hrs.)**					
	1	Nursery Bed	2	Demonstrate nursery bed. **(CO-1,4)**	Video lecture	Formative Assessment I & Quiz I **Assignment: Essay on manures.**
	2	Mist Chamber	2	Illustrate mist chamber. **(CO-1,4)**	Jamboard	
	3	Manures and Vermicompost	2	Validate manures and vermicompost. **(CO1,4-)**	Blended learning	
II	**Plant Propagation (6 hrs.)**					
	1	Asexual methods - Air layering and Veneer Grafting.	3	Elucidate asexual methods of propagation.**(CO-2,4)**	PPT, Flow chart	Formative Assessment I & Quiz I

	2	Micropropagation - Induction of rooting and flowering.	3	Explain Micropropagation.**(CO-2,4)**	PPT, Video, Mind map	**Class test: Micropropagation**
III	**Green houses for tropical countries (6 hrs.)**					
	1	Pot mixture	1	Identify and assemble pot mixture.**(CO-1,4)**	Group discussion	Formative Assessment I & Quiz I (1,2). Formative Assessment II & Quiz II (3,4).
	2	Pot culture	2	Practice pot culture.**(CO-1,3,4)**	Virtual hands-on training	
	3	Packaging of Nursery Stock	2	Prepare nursery stock.**(CO-1,2,4)**	Classroomscreen	
	4	Marketing of Nursery Stock	1	Explain the marketing of Nursery Stock.**(CO-1,4)**	PPT	
IV	**Indoor Gardening(6 hrs.)**					
	1	Layout of lawns	1	Evaluate theLayout of lawns.**(CO-1,4)**	Virtual visits	Assignment: Bonsai Formative Assessment II & Quiz II
	2	Rockery	2	Analyse the features of a rockery.**(CO-1,4)**	Videos	
	3	Bonsai	2	Explicate Bonsai. **(CO-1,2,3,4)**	PPT, Video, Virtual tour	
	4	Hanging basket	1	Practice hanging basket gardening at home.**(CO-1,4)**	PPT, Virtual visits	
V	**Commercial Floriculture(6 hrs.)**					
	1	Cultivation of cut flowers - Rose	2	Elucidate the cultivation of rose.**(CO-1,2,3,4)**	PPT, Brain storming	Formative Assessment II & Quiz II Class test: Quizizz
	2	Cultivation of cut flowers - Orchids	2	Explain the cultivation of Orchids.**(CO-1,2,3,4)**	PPT, Video, Discussion	
	3	Flower arrangements	1	Perform flower arrangements. **(CO-2,4)**	Pictures, Video	
	4	Methods to prolong vase life	1	Analyse themethods to prolong vase life.**(CO-2,4)**	Blended learning	
Course Instructors					**Head of the Department**	
Dr. S. Mary Mettilda Bai		Dr. C. Anitha			Dr. F. Brisca Renuga	

Plant Anatomy and Developmental Botany

Sub. Code: BC2021

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
Meristem and Tissues						

I	1	Meristems – Classification (origin, position and function);	2	To Analyse the growth of the plant	Lecture	Formative assessment Assignment Short test Assessing their creative knowledge Quiz
	2	Evolution of concept of organization of shoot apex (Histogen theory, Tunica Corpus theory).	2	To understand the growth of shoot apex	Lecture Video clippings	
	3	Organization of root apex (Histogen theory, Korper-Kappe theory); Quiescent centre; Root cap.	2	To correlate the difference between shoot and root tip	Lecture Illustrations	
	4	Tissues – Structure and function of simple tissue (parenchyma, collenchyma and sclerenchyma) and complex tissue (xylem and phloem).	2	To be familiarize with the functions of tissues	Lecture PPT presentation	
	5	Types of vascular bundles.	1	To recall the types of vascular bundles	Lecture, PPT, demonstration	
Primary and Secondary Structure						
I	1	Primary growth; Primary structure of dicot and monocot stem, root and leaf.	4	To compare the difference between monocot and dicot internal structure	Lecture, PPT, demonstration	Formative assessment Assignment Short test Assessing their creative knowledge

		Secondary growth in stem and root –				Quiz
	2	Formation of cambial ring, activity of cambial ring,	2	To recall the activity of cambial ring	Lecture, PPT, demonstration	
	3	secondary vascular tissue, formation of periderm, lenticels, dendrochronology, annual ring, Wood (heartwood and sapwood).	3	To know the formation of sap and hard wood	Lecture, PPT, demonstration	
Anomalous secondary thickening, Epidermis and node						
III	1	Anomalous secondary thickening in dicot stem (*Boerhaavia*) and monocot stem (*Dracaena*).	2	To understand the secondary thickening in dicot and monocot	Lecture' Images	Formative assessment Assignment Short test Assessing their creative knowledge Quiz
	2	Epidermal tissue system, cuticle, epicuticular waxes, trichomes (uni-and multicellular, glandular and nonglandular, two examples of each), stomata and its types;	3	To know the different tissues and its importance	demonstration	
	3	Nodal anatomy types - unilacunar	4	To be familiarize	demonstration	

		(*Justicia*), trilacunar (*Azadirachta*) and multilacunar (*Aralia*), Hydathodes and laticifers.		the nodal anatomy		
Embryology – Structure						
IV	1	Embryology – Structure of anther;	2	To understand the structure of anther	Lecture	Formative assessment Group discussion Short test Quiz
	2	Structure of microsporangium, microsporogenesis structure of pollen; development of male gametophyte.	3	To understand the structure of pollen and its development	Lecture with PPT	
	3	Structure and types of ovules; Structure of megasporangium, megasporogenesis.	3	To corelate the types of ovules	Lecture with Video clippings	
	4	Development of female gametophyte.	1	To know the development of female gametophyte	Lecture with demonstration	
Types of embryo, Pollination, Fertilization						
V	1	Types of embryo sac – Monosporic – Polygonum type.	2	To compare the different types of embryo	Lecture PPT,	Group discussion Formative assessment, Quiz Short test
	2	Pollination mechanisms and adaptations.	2	To realize the importance of pollination	Lecture,	
	3	Fertilization, endosperm - types- nuclear, cellular and helobial, ruminate endosperm, perisperm.	3	To apply the types of endosperm	Lecture with Video clippings	

	4	Development of embryo in dicot (*Capsella*) and monocot (*Luzula*). Apomixis and polyembryony.	2	To understand the development of embryo	Lecture, Group discussion	

Course Instructor: Dr. Sr.Leema Rose **HoD: Dr. C. Jespin Ida**

Allied - Taxonomy of Angiosperms and Herbal Technology

Subject code:BA2021

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

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
Morphological modification of roots, stems and leaves.,Classification by Bentham & Hooker and Binomial nomenclature						
I	1	Objectives and importance of systematic botany	1	To understand the objectives and importance of systematic botany	Lecture	Assignment Short test Group discussion Quiz
	2	Morphology of root, stem,& leaves and their modifications.	2	To know the morphology of root, stem and leaf with their modifications	Lecture, specimens and PPT	
	3	Types of Inflorescences and fruits	3	To Learn about the different types of inflorescences, and fruits	Lecture Live specimens	
	4	Systems of classification; Natural –	2	To know how Bentham and Hooker classified plants	Lecture Group discussion PPT	

		Bentham and Hooker		and also understood the merits and demerits of that classification		
	5	Nomenclature – Binomial System	1	To understand the importance of binomial system of nomenclature	PPT Lecture	
Detailed study of the following families with their economic importance						
II	1	Detailed study of the family Rutaceae along with their economic important plants	2	To understand the distinguishing features and economic importance of the family Rutaceae	Lecture demonstration	Quiz Slip Test Short test CIA MCQs QUIZZIZZ
	2	Detailed study of the family Apiaceae with their economic importance	2	To understand the distinguishing features and economic importance of the family Apiaceae	Lecture PPT	
	3	Detailed study of the family Lamiaceaewith their economic importance	2	To understand the distinguishing features and economic importance of the family Lamiaceae	Lecture Chalk and board	
	4.	Detailed study of the family Euphorbiaceae	2	To learn the distinguishing features and economic importance of the family Euphorbiaceae	Lecture Showing many plants of that family	
	5.	Elaborate study of the family Liliaceae.	1	To study the characteristic features and economic importance of	Lecture Ppt	

				the family Liliaceae		
Herbal medicines						
III	1	Herbal medicines-History and scope	1	To have a brief knowledge on herbal medicine and the underlying principles	Lecture	Quiz Slip Test Short test CIA MCQs QUIZZIZZ, CIA-I
	2	Knowledge on-Ayurveda& Siddha	3	To be familiarize with the Principles and practices of Ayurveda & Siddha	Lecture PPT	
	3	Knowledge onUnani and Homeopathy	1	To know the importance and uniqueness of Unani and Homeopathy practices	Lecture Group discussion	
	4	Herbal preparation: decoction, extract& infusions	2	To know themethods of preparation ofdecoction, extract& infusions	Group discussion Lecture	
	5	Herbal preparation: oils, shampoos and powders	2	To learn the techniques of preparations of: oils, shampoos and powders	Group discussion Demonstration	
Phytochemistry						
IV	1	Phytochemistry - active principles and common methods of testing	1	To know the classification and economic importance of fungi	Lecture Chart	Quiz Slip Test Short test CIA MCQs QUIZZIZZ
	2	Iidentification and utilization of the medicinal herb *Catharanthus roseus* (cardiotonic),	2	To understand how the active principles of *Catharanthus roseus* acts ascardiotonic	Lecture	

	3	Withaniasomnifera (drugs acting on nervous system),	2	To know the drug of *Withaniasomnifera* and its potentiality	Lecture	
	4	*Clerodendronphlomoides* (anti-rheumatic)	2	To understand the active principle present in *Clerodendronphlomoides*	Lecture PPT	
	5	*Centella asiatica* (memory booster).	2	To realise the secondary metabolite of *Centella asiatica*as memory booster	Lecture	
Analytical pharmacognosy						
V	1	Analytical pharmacognosy	1	To understand the importance ofpharmacognosy	Lecture	Short test Slip test Assignment CIA Quiz, CIA-II
	2	Drug adulteration - types, methods of drug evaluation	2	To analyze the different adulterants used during drug formulation	Lecture Chart	
	3	Biological testing of herbal drugs	2	To know the importance of biological testing of herbal drugs	Lecture	
	4	Phytochemical screening tests for secondary metabolites-alkaloids& flavonoids	2	To identify the secondary metabolites through simple tests.	Lecture Demonstration	
	5	Phytochemical screening tests for secondary metabolites-steroids, triterpenoids& phenolic compounds	2	To distinguish betweensteroids, triterpenoids & phenolic compounds on the basis of their qualitative tests	Demonstration PPT	

Course Instructor: Dr.Jespin Ida **HOD: Dr. C. Jespin Ida**

Semester - II
Biofertilizers, Biofuels and Biopesticides (NMEC)
Sub. Code: BNM202
Modules

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/Evaluation
Biofertilizer						
I	1	Scope and importance of biofertilizers	1	To provide an insight on the importance of biofertilizers	Lecture Group Discussion	Formative assessment Assignment Quiz Short test
	2	Reasons for preference of biofertilizer to chemical fertilizer	1	To compare biofertilizers with chemical fertilizers	Lecture PPT	
	2	Biofertilizers using nitrogen fixing microbes	1	To learn more number of nitrogen fixing microbes	Lecture Video clippings	
	4	Mass Multiplication of *Azolla*	2	To produce Commercially available Biofertilizer using *Azolla*	Hands on training in the field	
Biofuel Production						
II	1	Major algal species for biofuel production	1	To know the important algae involved in biofuel production	Lecture and Hands on training	Assessing their practical knowledge in field work Short test
	2	Downstream processing for the biofuel production	2	To practice the production of biofuel	Lecture with video clippings and Hands on training	

	3	Advantages of biofuel production	1	To understand the need of future fuel	Lecture	
Vesicular Arbuscular Mycorrhizae (VAM) & Vermicomposting						
III	1	Isolation, multiplication,	1	To understand the importance of VAM fungi and its isolation	Lecture	Classroom quiz CIA
	2	Application Carrier-based inoculants, Quality control, agronomic importance.	2	To utilise the theory knowledge in the field by applying Carrier-based inoculants to crops	Lecture with hands on training in field	
	3	Methods and preparation of vermicomposting and its application.	3	To provide students with the knowledge and skills of preparation of vermicompost	Lecture with hands on training in field	
Biopesticides:						
IV	1	Advantages and disadvantages of biopesticides	1	To know the advantages and disadvantages of biopesticides	Lecture	Formative assessment Quiz
	2	Biological methods of pest control	1	To be aware of the biological methods to control pest	Lecture PPT	

	3	**Mode of action of *Bacillus thuringiensis*.**	2	To learn how the bacterium *Bacillus thuringiensis* works as a pest biocontrol	Lecture, Video clippings and Hands on Training	
Biological Control						
V	1	Microbial control of plant pathogens- *Trichoderma*	1	To understand the importance of Microbial control of plant pathogens	Lecture with Hands on Training	Formative assessment Assignment Quiz Short test
	2	Use of Baculovirus and protozoa in biological control.	2	To know the use of Baculovirus and protozoa in biological control measures	Lecture with Hands on Training	
	3	Use of fungi in biological control	2	To realise the importance of fungi as biocontrol	Lecture	

Course Instructor: Dr. C. Anitha HoD: C. Jespin Ida

Major Core III - Archegoniate
Course. Code: BC2031

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

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
Bryophytes						
I	1	Unifying features of Bryophytes, transition to land habit	2	To analyse the unifying factors of bryophytes	Lecture PPT	Short test Assignment

				and its transition to land		Quiz Open Book Test
	2	Classification by Rothmaler (1951).	1	To understand the basics of classification of bryophytes	Lecture Group Discussion	
	3	Distribution, systematic position, morphology, anatomy, reproduction and life cycle of *Marchantia*	2	To learn about the *Marchantia*	Lecture, Demonstration with live specimen	
	4	Distribution, systematic position, morphology, anatomy, reproduction and life cycle of *Polytrichum*	2	To understand a type specimen of bryophyte- *Polytrichum*	Lecture Slides and Specimen of *Polytrichum*	
	5	Ecological and economic importance of Bryophytes.	2	To analyse the importance of bryophytes to ecology and economy	Lecture PPT	
Pteridophytes						
II	1	General characteristics of Pteridophytes	2	To understand the characteristics of Pteridophyta	Lecture	Class test Assignment Formative assessment Quiz Open Book Test
	2	Classification by Smith (1955) and life cycle patterns.	4	To analyze the classification of Pteridophyta and its life cycle patterns	Lecture PPT	

	3	Distribution, systematic position, morphology, anatomy, reproduction and life cycle of *Psilotum*	3	To learn about *Psilotum*	Lecture Video Specimen of *Psilotum*	
Pteridophytes						
III	1	Distribution, systematic position, morphology, anatomy, reproduction and life cycle of *Selaginella*	3	To understand a type specimen of Pteridophyte - *Selaginella*	Lecture Demonstration with *Selaginella*	Class test Assignment Formative assessment Quiz Open Book Test CIA-I
	2	Distribution, systematic position, morphology, anatomy, reproduction and life cycle of *Marsilea*	3	To be familiarize with Marsilea	Lecture With slides and specimen of *Marsilea*	
	3	Heterospory, seed habit, stelar evolution and types of stele.	1	To learn about Heterospory, seed habit, stelar evolution and types of stele.	Lecture Group Discussion	
	4	Ecological and economical importance of Pteridophytes.	3	To understand the importance of Pteridophytes to ecology and economy.	Lecture PPT	
Gymnosperms						
IV	1	General characteristics of Gymnosperms	1	To learn about general characteristics of Gymnosperms	Lecture PPT	Class test Assignment

	2	Classification by Chamberlain (1935).	2	To understand the classification of Gymnosperms	Lecture Group Discussion	Formative assessment Quiz Open Book Test
	3	Distribution, systematic position, morphology, anatomy and reproduction of *Pinus*	3	To understand a type specimen of gymnosperms - *Pinus*	Lecture Field Visit	
	4	Ecological and economical importance of Gymnosperms.	3	To understand the importance of Gymnospermsto ecology and economy.	Lecture Video	
	Fossils					
V	1	Geological time scale.	1	To introduce the students to geological time scale	Lecture Video	Class test Assignment Formative assessment Quiz Open Book Test CIA-II
	2	Fossils –Types and methods of fossilization and importance of fossils.	3	To understand the importance and types of fossils and its methods	Lecture PPT	
	3	Distribution, systematic position, morphology, anatomy and reproduction of *Rhynia*	2	To understand fossil with the study of*Rhynia*	Lecture PPT	

	4	Distribution, systematic position, morphology, anatomy and reproduction of *Lyginopteris*.	3	To analyze about a fossil *Lyginopteris*.	Lecture with slide of *Lyginopteris*.	
	2	Fossils –Types and methods of fossilization and importance of fossils.	3	To understand the importance and types of fossils and its methods	Lecture PPT	

Course Instructor: Dr.A. Anami Augustus Arul **HOD: Dr. C. Jespin Ida**

Major – Elective I (a) Herbal Botany
Subject code:BC2032

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

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/Evaluation
knowledge on Ethnomedicine						
I	1	History and scope of Herbal medicines, Brief Knowledge on-Ayurveda, Siddha, Unani and Homeopathy.	5	Tohave an insight into the herbal medicine and the underlying principles and practices	Lecture Group Discussion	Classroom quiz Short test Formative assessment Quiz Evaluation through find out the ethnomedicinal plants
	2	Brief knowledge on Ethnomedicine	4	To provide a thorough	Lecture with PPT	

		, Most commonly used Ethnomedicinal plants of Kanyakumari District.		understanding of ethnomedicine.		
Folk medicines						
II	1	Folk medicines including grandmother medicinal practices for common ailments like cold, fever, cough, diarrhoea	3	To practice the grandmother medicinal practices	Lecture Demonstration and Hands on training	Assignment Quiz Practical knowledge Formative Assessment
	2	Introduction to Ayurvedic formulations with methods of preparation: Churna, Arishta, Taila and Lehyam.	3	To produceAyurvedic formulations	Lecture Demonstration and Hands on training	
	3	Skin and hair care: Herbal preparation of oils, shampoos and powders.	2	To produce herbal products of skin and hair care	Lecturing with PPT	
Drug yielding plants						
III	1	Botanical name, family, morphology of medicinally importance of useful parts, active principles	4	To identify medicinal plants and understand the effects of plant chemical constituents on humans.	Lecture with presentation	Class test Quiz Formative assessment Short test Formative assessment

		and utilization of *Catharanthus roseus, Ocimum sanctum,Curcuma longa*and *Centella asiatica*.				CIA-I
	2	Drug yielding plants: therapeutic and habit forming drugs with special reference to *Cinchona officinalis, Withaniasomnifera*, and *Cannabissativus*	5	To understand the therapeutic and habit forming drugs	Lecture cum demonstration using live specimen	
IV Physio chemical properties of herbal drugs.						
	1	Evaluation and standardization of herbal drugs. Physio chemical properties - Ash, Flurosence analysis.	3	To provide students with the knowledge and skills concerning authentication and quality assurance of medicinal plants	Lecture Group Discussion	Short test Assignment Formative assessment Quiz Assessing their practical knowledge Mini Projects
	2	Analytical pharmacognosy: Drug adulterationand detection.	2	To identify some of the common food adulterants	Lecture PPT Demonstration	

	3	Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, terpenoids and phenolic compounds).	4	To identify the secondary metabolites through simple tests.	Lecture Hands on Training	
Cultivation and utilization of medicinal plants						
V	1	Cultivation, harvesting, processing, storage, marketing and utilization of medicinal plants - *Trigonella foenum-graecum*(Seed),*Adathodavasica*(Stem)	4	To understand the cultivation methods, collection, storage and uses of *Trigonella foenum-graecum* and *Adathodavasica*	Lecturing Field Visit	Multiple choice questions Formative assessment Evaluation through short test Assignment CIA-II
	2	Cultivation, harvesting, processing, storage, marketing and utilization of medicinal plants Rhizome – *Zingiber officinale*	2	To understand the cultivation methods, collection, storage and uses of *Zingiber officinale*		
	3	Conservation of medicinal plants: *in situ* and *ex situ.*	3	To distinguish between*in situ* and *ex situ..*	Lecturing with PPT	

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

Semester - III
Major Elective – I (b) Nursery and Gardening
Sub. Code: BC2033

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/Evaluation
I. Nursery						
	1	Objectives, scope and building up of infrastructure for nursery	3	To know how to make infrastructure for nursery	Lecture Images Group Discussion	Classroom quiz Short test Formative assessment
	2	Direct seeding and transplants	2	To know planting methods	Video clipping	Assignment
	2	Nursery practices for some important crops – Coconut, Areca nut, Pepper and Cardamom	4	To provide a thorough Knowledge of Nursery practices for Coconut, Areca nut, Pepper and Cardamom	Lecture with PPT and Video clippings	Evaluation through growing any one economic important crop
II Commercial cultivation						
	1	Importance and scope of ornamental horticulture in India. Making and maintenance of lawn, hedges and edges.	3	To practice making and maintenance of lawn, hedges and edges.	Lecture and Hands on training	Assessing their practical knowledge in field work
	2	Commercial cultivation of Rose, Canna, Marigold and Gladiolus.	4	To produce Commercial cultivation of Rose, Canna, Marigold and Gladiolus	Lecture with video clippings and Hands on training	Assessing their practical knowledge in field work

	3	Flower arrangement and techniques to prolong vase life of flowers.	2	To practice the Flower arrangement and techniques to prolong vase life of flowers.	Lecturing with PPT	Assessing their Flower arrangement and technical knowledge through competition
III Vegetative propagation						
	1	Brief introduction about grafting, cutting- selection of cutting, treatment of cutting, rooting medium and planting of cuttings and layering - air and ground layering	5	To understand and practice of grafting, cutting, rooting and layering methods.	Lecture with hands on training in field	Assessing their horticultural knowledge through demonstration
	2	Hardening of plants – greenhouse, mist chamber, shade house and glass house.	4	To provide students with the knowledge and skills of hardening of plants	Lecture with images	Assignment
IV Gardening:						
	1	Definition and scope, types of gardens- formal (Mughal) and informal (Japanese).	2	To know and differentiate the formal and informal garden	Lecture With images and video clippings	Short test Assignment Formative assessment Quiz

	2	Special types of gardens – Rock garden, water garden, Bog or Marsh garden, Sunken garden and roof garden.	5	To make special types of gardens in their areas	Lecture, Hands on Training	Assessing their knowledge to make anyone garden in their houses
	3	Gardening operations: soil laying, manuring, watering, management of pests and diseases.	2	To learn some Gardening operations	Lecture, Video clippings and Hands on Training	Mini Projects
V Cultivation and utilization of medicinal plants						
	1	Cultivation of vegetable crops – Tomato and Brinjal.	2	To understand the cultivation methods of vegetable crops	Lecture with Hands on Training	Assessing their cultivation knowledge through field work
	2	Cultivation of Root Crops – Radish and Carrot.	2	To understand the cultivation methods of root crops	Lecture with Hands on Training	Assessing their cultivation knowledge through field work
	3	Cultivation of Cucurbits- Cucumber and Bitter gourd.	2	To understand the cultivation methods of cucurbits	Lecture with Hands on Training	Assessing their cultivation knowledge through field work
	4.	Storage and marketing procedures of vegetable crops	2	To know the Storage and marketing procedures of vegetable crops	Lecture with PPT	Assignment and Quiz

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

Major Elective – I (c) Agricultural Botany
Sub. Code: BC2034

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

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
CROPPING						
I	1	Introduction to agriculture	1	To understand the need of agriculture	Lecture	Short test Assignment Formative assessment Quiz Open Book Test
	2	Agricultural Finance	1	To analyze finance for agriculture and crop rotation	Lecture, Group Discussion	
	3	Crop rotation-principles, limitation, advantages, rotational intensity cropping scheme, cropping intensity.	4	To be familiarize with principle, limitation and advantages of crop rotation	Lecture, PPT	
	4	Cropping system – intercropping, mixed cropping, multiple cropping and relay cropping.	3	To learn about the types of cropping system	Lecture Group Discussion	
Cultivation						
II	1	Area, soil, seed rate requirements, manuring, weed management and	3	To study the cultivation	Lecture Video	Class test Assignment

		harvest of Cereals and Millets: Rice and Maize		techniques of rice and maize		Formative assessment Quiz Open Book Test
	2	Area, soil, seed rate requirements, manuring, weed management and harvest of Pulses: Green gram and Black gram	3	To understand the cultivation technique of green gram and black gram	Lecture PPT	
	3	Area, soil, seed rate requirements, manuring, weed management and harvest of Oil Seeds: Ground nut and Sesame	3	To learn about the cultivation of ground nut and sesame	Lecture Video	
Seed technology						
III	1	Seed Viability, Dormancy.	2	To understand about the viability of seed	Lecture	Class test Assignment Formative assessment Quiz Open Book Test CIA-I
	2	Methods of breaking dormancy, Seed processing	3	To be familiarize with the process of breaking seed dormancy	Lecture PPT	
	3	Seed treatment for storage and seed certification.	4	To understand the importance of seed treatment and seed certification	Lecture Group Discussion	
Factors affecting agricultural crops						

IV	1	Biotic: Insects, Pests, Rodents, Weeds.	2	To learn about the biotic factors affecting agricultural crops	Lecture PPT	Class test Assignment Formative assessment Quiz Open Book Test
	2	Abiotic: Soil, Wind, Water, Atmospheric air, Humidity, Temperature.	2	To understand the abiotic factors affecting agricultural crops	Lecture Group Discussion	
	3	Agricultural Machinery: primary and secondary tillage.	2	To realize the usage of agricultural machinery	Lecture PPT	
	4	Seed drills and paddy transplanters	2	To learn about seed drills and paddy transplanters	Lecture PPT	
	5	Plant protection and harvesting tools.	1	To realize the methods of plant protection and use of harvest tools	Lecture Demonstration	
	Beneficial microorganisms in Agriculture					
V	1	Brief account on Biofertilizer(Cyanobacteria), microbial insecticides.	2	To introduce the students with biofertilizer	Lecture Video	Class test Assignment

				especially cyanobacteria		Formative assessment Quiz Open Book Test CIA-II
	2	Microbial agents for control of plant diseases	2	To understand the microbial agents used to control plant diseases	Lecture PPT	
	3	Genetically Modified Crops (Bt – Cotton and Golden rice).	3	To be familiarize with genetically modified crops	Lecture PPT	
	4	Implications of GM crops.	2	To learn about the implications of GM crops	Lecture	

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

Allied II – Theory: Plant Diversity -I
Algae, Fungi, Bryophytes and Pteridophytes
Sub. Code: BA2031

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

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
Algae						
I	1	General Characters,	1	To understand the general characters of algae	Lecture	Class test Assignment Formative assessment Quiz
	2	Classification of algae according to Fritsch, 1945 (up to class level) thallus	2	To classify the different types of algae	Lecture PPT	

	3	structure, reproduction and life cycle of the following (Development aspect not included) Cyanophyceae– *Nostoc*	3	To know the vegetative and reproductive characters of *Nostoc*.	Lecture PPT, video	
	4	Chlorophyceae- Volvox	3	To study the life cycle of *Volvox*	Lecture PPT,	
	Algae					
II	1	Phaeophyceae- *Sargassum*	3	To be familiarize with the vegetative and reproductive characters of Sargassum	Lecture PPT	Assignment Formative assessment Short test Quiz
	2	Rhodophyceae- *Gracilaria*	3	To realize the vegetative and reproductive e characters of *Gracilaria*	Lecture PPT	
	3	Economic importance of Algae	3	To know the economic importance of Algae	Lecture PPT	
Fungi						
III	1	General characters, a brief introduction of fungi	1	To learn the general characters of fungi	Lecture	Short test Quiz Formative assessment Class test Assignment CIA-I
	2	classification by Alexopoulos and Mims, 1979 (upto class level), thallus	2	To understand the different types of algae	Lecture PPT	
	3	structure, reproduction and life cycle of the following (Development aspect not included) Ascomycetes - *Aspergillus*	2	. To realize the vegetative and reproductive characters of *Aspergillus*	Lecture PPT Video	
	4	Basidiomycetes - *Puccinia*	2	To understand the structure, reproduction	Lecture PPT	

				and life cycle of *Puccinia*		
	5	Economic importance of Fungi	2	To learn the economic importance of Fungi	Lecture PPT	
Bryophytes:						
IV	1	General characters, A brief introduction of bryophyta	1	To know the general characters of Bryophyta	Lecture, PPT	Class test Assignment Quiz Formative assessment
	2	classification by Rothmaler,1951(up to class level),	3	To classify the bryophytes according to Rothmaler	Lecture. PPT	
	3	morphology, anatomy, reproduction and life cycle of *Polytrichum*. (Developmental details not to be included).	3	To realize vegetative and reproductive structures of *Polytrichum*	Lecture	
	4	Economic importance of Bryophytes.	2	To learn the economic importance of Bryophytes	Lecture, PPT	
Pteridophytes:						
V	1	General characteristics, A brief introduction of pteridophyte	1	To know the general characters of pteridophytes	Lecture	Group discussion Assignment Quiz Short test Formative Assessment CIA-II
	2	classification by Smith, 1955(upto class level)	3	To classify the pteridophytes according to Smith.	Lecture, PPT	
	3	morphology, anatomy, reproduction and life cycle of *Selaginella* (Developmental details not to be included).	3	To study the structure and reproduction of *Selaginella*	Lecture, PPT Video	
	4	Economic importance of Pteridophytes.	2	To learn the economic importance of Pteridophytes.	Lecture, PPT	

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

Major Core – IV Plant Ecology and Phytogeography
Sub. Code: BC2041

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

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
Ecosystem						
I	1	Fresh water (pond ecosystem) and marine ecosystem	2	To understand the producers, c onsumers and decomposers of these ecosystems.	Lecture with blackboard	Formative assessment Class test Quiz Group discussion Short test
	2	Trophic organization, energy flow, autotrophy and heterotrophy	2	Know the behavior of organisms in each trophic level of an ecosystem.	Lecture with blackboard	
	3	Food chains and food webs, ecological pyramids	2	Learn the predators and preys and their interconnections in an ecosystem.	Lecture with charts	
	4	Plant interactions-symbiosis, commensalism and parasitism	2	Understand the relationship between plant and other organisms.	Lecture with PPT	
Soil						
II	1	Importance, Origin, Types Formation of soil	2	To understand the importance, origin,	Lecture	Formative assessment

				types and formation of soil		Group discussion Short test Assignment Quiz
	2	Composition of soil, Physical, chemical and biological components of soil	2	To be familiarize with the Composition and components of soil	Lecture	
	3	SoilProfile, Role of climate in soil development.	2	To know the profile of soil androle of climate in soil development.	Lecture Video clippings	
Water						
III	1	Importance of water, States of water in the environment	2	To realize the importance and States of water	Lecture	Formative assessment Class test Quiz Group discussion Short test CIA-I
	2	Atmospheric moisture; Precipitation types (rain, fog, snow, hail, dew)	3	To categorize the Precipitation types	Lecture Video clippings	
	3	Water bodies: Water in soil; Water table, Aquifers, Water shed management.	4	To know the Water bodies and Water shed management	Lecture, group discussion	
Ecological groups						
IV	1	Morphological, anatomical and physiological adaptations of hydrophytes	2	To understand the special structures produced by plants to adapt water habitats.	Lecture Classroom Discussion	Diagrammatic assessment Assessing their Practical knowledge
	2	Morphological, anatomical and physiological	3	To identify the xerophytes and study their	Lecture with blackboard	

		adaptations of xerophytes		anatomical and physiological adaptations		Formative assessment Class test Quiz Group discussion Short test
	3	Morphological, anatomical and physiological adaptations of halophytes	3	To learn the modifications made by plants to adapt high salinity.	Lecture Classroom Discussion	
	4	Study of vegetation by quadrat and transect method.	3	To analyse the vegetation by quadrat and transect method.	Field study	
Phytogeography						
V	1	Principles of phytogeography	2	Know the pattern and process in plant distribution.	Lecture with blackboard	Short test Choose the correct answer Formative assessment Assignment Quiz CIA-II
	2	Types of plant distribution – continuous, discontinuous and endemic.	3	Understand the different types of distribution of plants.	Lecture PPT	
	3	Plate tectonics, continental drift, theory of land bridges, age and area hypothesis.	4	Learn about the movements of continents.	Lecture PPT	
	4	Centers of origin of cultivated crops.	1	Know about the origin of crops	Lecture PPT	

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

Semester - IV
Major Elective – II (a) Biological Resources
Sub. Code: BC2042

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation

Biofertilizer						
I	1	Brief introduction of biological resources and types. Biofertilizers: Scope and importance.	2	To Know the scope and importance of biofertilizers.	Lecture	Formative assessment Assignment Short test Assessing their creative knowledge Assessing their practical knowledge Quiz
	2	Bacteria –*Rhizobium* – mass production and uses.	1	To understand the methods of Mass production of *Rhizobium*	Lecture Video clippings,	
	3	Algae- *Nostoc* - mass production and application.	2	To be familiarize with various methods and application of Mass production of *Nostoc*	Lecture Illustrations	
	4	Pteridophyte *Azolla*-mass production and application.	2	To know the novel methods of mass production of	Lecture PPT presentation	
	5	Vermicompost – Mass production and application.	2	To know the importance of vermicompost	Lecture, PPT, demonstration	
Mass Cultivation						
II	1.	Single Cell Protein and Mycoprotein: Sources of single cell protein, Nutritive value of single cell protein.	2	To understand the sources and Nutritive value of single cell protein.	Lecture' Images	Formative assessment Assignment Short test Assessing their creative knowledge Assessing their practical knowledge Quiz Field Visit
	2.	Mass Cultivation of *Spirulina*.	2	To distinguish the Mass production of *Spirulina*.	demonstration	
	3.	Mushroom Cultivation-*Pleurotus* and *Agaricus*,	3	To develop the Mass cultivation of *Pleurotus* and *Agaricus* mushroom	demonstration	
	4.	Nutritional values and value-added products.	2	To realize the Nutritional values and value-added products.	Lecture with images	

Forest Cover, Management and Conservation						
III	1	Forest cover, forest resources – Utility (Major and Minor Products) and Values of forests:	3	To recall the Forest cover and forest resources	Video clippings	Formative assessment Assignment Short test Assessing their creative knowledge Assessing their practical knowledge Quiz
	2	Commercial benefits, ecological benefits and aesthetic benefits.	3	To know to value the uses of forests	Lecture, PPT	
	3	Forest management and conservation - Regeneration - Tending operations - Sustainable utilization of forest resources.	3	To realize the various benefits of forests	Lecture	
Biofuels						
IV	1.	Biofuels: Importance of biofuel	2	To understand Importance of biofuels	Lecture	Formative assessment Assignment Short test Assessing their creative knowledge Assessing their practical knowledge Quiz
	2.	Biodiesel Production – *Pongamia* and *Jatropha*.	2	To extract the production of Biodiesel from plants	Lecture with PPT	
	3.	Alcohols – liquid fuel- bioethanol production.	2	To know the liquid fuel produced from ethanol	Lecture with Video clippings	
	4.	Gaseous fuels: Biogas production and Hydrogen fuel.	3	To develop biogas fuel from organic wastes and study the hydrogen fuel.	Lecture with demonstration	
Biopesticides						
V	1	Biopesticides: Introduction, desirable qualities of biopesticides.	2	To realize the importance of biopesticides	Lecture	Formative assessment Assignment Short test

	2	Microbial Pesticides – fungi, viruses and bacteria.	2	To understand the activity of Microbial Pesticides	Lecture, PPT,	Assessing their creative knowledge Assessing their practical knowledge Quiz
	3	Advantages and disadvantages of Microbial Pesticides,	3	To analyze the advantage and disadvantage of Microbial Pesticides	Lecture, PPT,	
	4	Application of Biopesticides.	2	To apply biopesticides to various plants	Lecture, group discussion	

Elective - II (b) Food Science

Sub. Code: BC2043

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

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
Food science						
I	1	Definition, aim, constituents of food and their value.	1	To understand the constituents of food and their value.	Lecture	Short test Assignment Formative assessment Quiz Open Book Test
	2	Energy value ofbalanced diet, carbohydrates, proteins, lipids, enzymes and vitamins.	3	To analyse the Energy value ofbalanced diet	Lecture, PPT	
	3	Cooking- Objectives of cooking, Preliminary preparations	2	To be familiarize with objectives of cooking	Lecture, PPT	

	4	Cooking methods, (Moist heatmethods, Dry heat methods, Microwave cooking, Solar cooking).	3	To learn about cooking methods	Lecture Video	
Food colourants and Food additives						
II	1	Food colourants - Natural, Artificial and Safety measures of food additives.	2	To study the different types of food colourants	Lecture Video	Class test Assignment Formative assessment Quiz Open Book Test
	2	Special flavours: Spices and Condiments.	2	To understand about spices and condiments	Lecture PPT	
	3	Food additives – Sweeteners, Emulsifiers and Stabilisers, Antioxidants, Flavour improvers	2	To learn about different types of condiments	Lecture Video	
	4	Fermented Food Products: Milk (butter and cheese), Vegetable (sauerkraut and cucumber).	2	To analyse the fermented products of milk	Lecture Group Discussion	
	5	Food Enrichment - Fortification.	1	To be familiar with fortification	Lecture with chart	
Preparation of Jam, Jelly, Squash and Pickle						
III	1	Preparation of Jam: Tomato and Pineapple	2	To understand about the preparation of jam	Lecture PPT	Class test Assignment Formative assessment Quiz
	2	Preparation of Jelly: Grapes and Plums	3	To be familiarize with the process of	Lecture PPT	

				preparation of jelly		Open Book Test CIA-I
	3	Preparation of Squash: Grapes and Mango	2	To understand the science behind squash preparation	Lecture Group Discussion	
	4	Preparation of Pickle: Gooseberry and Lemon	3	To learn the preservation gooseberry and lemon by pickling.	Lecture Practical Preparation	
Food Preservation						
IV	1	Food preservation: Aims and objectives of preservation & processing of foods, Foodspoilage	2	To learn the process of food preservation	Lecture PPT	Class test Assignment Formative assessment Quiz Open Book Test
	2	Methods of food preservation – preservation by low (freezing, types of freezing i.e.slow freezing, quick freezing, introduction to thawing, changes during thawing and its effecton food).	3	To understand method of preservation by low temperature	Lecture PPT	
	3	Methods of food preservation – preservation by high temperature (Sterilization, Pasteurization, and Blanching).	3	To realize the method of preservation by high temperature	Lecture PPT	

	4	Canned food.	1	To learn the process of canning food	Lecture Group Discussion	
	Beneficial microorganisms in Agriculture					
V	1	Industrial production of the following:Alcoholic beverages –Beer and Wine	5	To introduce the students with alcoholic beverages	Lecture Video	Class test Assignment Formative assessment Quiz Open Book Test CIA-II
	2	Industrial production of the following:Non-alcoholic beverages - Coffee and Tea.	4	To understand the industrial production of coffee and tea	Lecture PPT	

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

Elective – II (c) Biodiversity and Human Welfare
Sub. Code: BC2044

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

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
Biodiversity						
I	1	scope and types of Genetic diversity	2	To understand the different types of genetic diversity	Lecture Group discussion	Short test Quiz Formative assessment Assignment
	2	species diversity and ecosystem biodiversity.	2	To know the types of species and ecosystem biodiversity	Lecture	

	3	Agro biodiversity and cultivated plant taxa, wild taxa.	3	To learn about the agrobiodiversity and cultivated and wild taxa	Lecture PPT,	
	4	Values of biodiversity; Ethical and aesthetic values of biodiversity	2	To understand the ethical and aesthetic values of biodiversity	Lecture video	
Biodiversity Hot spots						
II	1	History and origin of hotspots.	1	To learn the history and origin of hotspots	Lecture Group discussion	Group discussion Formative assessment Short test Assignment
	2	Critical role of hotspots in species richness and endemism.	2	To understand the role of hotspots	Lecture PPT	
	3	Biodiversity in tropics, National biodiversity hotspots, hottest biospots of Western Ghats,	3	To be familiarize with the biodiversity hotspots and hottest biospots	Lecture	
	4	Biodiversity of Tamilnadu.	3	To realize the biodiversity of Tamilnadu	Lecture video	
Economical values of biodiversity						
III	1	Economical values of biodiversity-plants, animals and microbes.	3	To study the values of biodiversity	Lecture	Class test Formative assessment Quiz Short test CIA-I
	2	Loss of genetic diversity, loss of species diversity, loss of ecosystem diversity, loss of agro biodiversity,	3	To realize the loss of different biodiversity.	Lecture PPT	
	3	Consequences and implications;	1	To learn the consequences and implications of biodiversity	Lecture PPT	
	4	projected scenario for biodiversity loss.	2	To understand the projected scenario for biodiversity loss.	Lecture	

Organizations associated with Biodiversity management						
IV	1	IUCN, UNEP, UNESCO, WWF, NBPGR, CITES and CBD;	4	To study about the various organizations associated with biodiversity management	Lecture, PPT	Quiz Class test Assignment Formative Assessment
	2	National Biodiversity Authority,	2	To understand about the National Biodiversity Authority	Lecture	
	3	Nature Conservation Foundation. Rio de Janeiro, 2012	3	To know about the Nature Conservation Foundation	Lecture, PPT	
Conservation of Biodiversity						
V	1	Role of NGOs in biodiversity conversation,	2	To understand the Role of NGOs	Lecture	Quiz Assignment Group discussion Class test CIA-II
	2	Conservation of genetic diversity, species diversity and ecosystem diversity,	3	To study the conservation of diversity	Lecture, PPT	
	3	in situ and ex situ conservation, social approaches for conservation,	2	To learn about the conservation of biociversity	Lecture, PPT Video	
	4	biodiversity awareness programmes, sustainable development.	2	To realise the importance of awareness programmes	Lecture	

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

Allied II- Theory

Plant Diversity – II (Gymnosperms, Angiosperms) and Plant Physiology

Subject Code: BA2041

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment / Evaluation
Gymnosperms						

I	1	General characteristics of Gymnosperms.	1	To analyse the General characteristics of Gymnosperms	Lecture	Formative assessment Assignment Short test Assessing their creative knowledge Quiz
	2	Distribution, Systematic Position, Morphology, Anatomy of *Pinus*.	3	To understand the morphology and anatomy of *Pinus*	Lecture Video clippings	
	3	Reproduction and Life History of *Pinus*.	3	To be familiar with reproduction and life history of *Pinus*	Lecture Illustrations	
	4	Economic importance of Gymnosperms.	2	To be familiarize with the importance of gymnosperms	Lecture PPT presentation	
Morphology						
II	1	Morphology of root, stem,	3	To compare the different types of root and stem and its modification	Lecture with PPT	Formative assessment Assignment Short test Assessing their creative knowledge Quiz
	2	Morphology of leaf, inflorescence,	3	To realize the morphology of leaf and inflorescence	Lecture with Video clippings	
	3	Morphology of flower and fruit – their modifications.	3	To understand the morphology of flower and fruit	Lecture with live specimen	
Taxonomy						
III	1	Study of the following families and their economic	3	To compare the difference between	Lecture, PPT, demonstrati on	Formative assessment Assignment Short test

		importance- Brassicaceae, Rutaceae,		Brassicaceae and Rutaceae		Assessing their creative knowledge Quiz
	2	Study of the following families and their economic importance - Lamiaceae, and Arecaceae	3	To recall the importance of Lamiaceae and Arecaceae	Lecture, PPT, demonstration	
	3	Study of the following families and their economic importance - Euphorbiaceae	3	To know the family details of Euphorbiaceae	Lecture, PPT, demonstration	
Photosynthesis						
IV	1	Pigment systems	2	To understand the structure and uses of pigment systems	Lecture	Formative assessment Group discussion Short test Quiz
	2	Light dependent (cyclic and non-cyclic photophosphorylation)	3	To understand the light dependent photosynthesis	Lecture with PPT	
	3	Light independent (C_3cycle).	3	To corelate light independent photosynthesis	Lecture with Video clippings	
	4	Factors affecting photosynthesis.	1	To know the factors affecting photosynthesis	Lecture with demonstration	
Respiration and Phyto hormones						
V	1	Anaerobic (Fermentation), Glycolysis	2	To understand the different types of anaerobic respiration	Lecture PPT,	Group discussion Formative assessment, Quiz Short test
	2	Aerobic (Kreb's cycle)	2	To realize the importance of Kerb's cycle	Lecture, video	

	3	Electron Transport System and Oxidative phosphorylation.	2	To analyze electron Transport System and Oxidative phosphorylation.	Lecture with Video clippings	
	4	Factors affecting respiration.	1	To understand the factors affecting respiration	Lecture, Group discussion	
	5	Physiological role of auxins, gibberellins and ethylene.	2	To learn about the physiological role of auxins, gibberellins and ethylene.	Lecture PPT	

Course Instructor: Dr. A. Anami Augustus Arul **HoD: Dr. C. Jespin Ida**

Semester - V

Major Core-V Taxonomy of Angiosperms and Economic Botany

Sub. Code: BC2051

Number of Hours Per week	Number of Credits	Total Number of Hours	Marks
6	6	90	100

Objectives:1. To know the principles of classification of taxa.

2. To evaluate the medicinal importance of selected angiosperms.

3. To acquire knowledge on the botanical vocabulary and taxonomical terminology to identify plants.

CO	Upon completion of this course the students will be able to:	PSO addressed	CL

CO - 1	relate the modifications in plant parts.	PSO–1	U
CO - 2	differentiate the artificial, natural and phylogenetic classification and learn about ICN rules.	PSO–2	An
CO - 3	evaluate the taxonomists of India.	PSO–1	Ev
CO - 4	recall the characters of some important families.	PSO–1	R
CO - 5	understand the economically important products of plants and their use at various levels.	PSO - 2	U
CO - 6	construct digital herbarium and learn about Herbarium techniques.	PSO - 5	C

Unit	**Module**	**Topics**	**Lecture Hour**	**Learning outcome**	**Pedagogy**	**Assessment/ Evaluation**
I	**Morphological modifications and contribution by taxonomists**					
1	1	Botanical nomenclature: Principles and rules of International Code of Nomenclature (ICN)	2	To Understand *binomial nomenclature* and realize the Principles and rules of ICN	Lecture	Class test Formative assessment
	2	Ranks and names; Typification, author citation, valid publication, rejection of names, principle of priority and its limitations	3	To know the Typification, author citation and valid publication	Lecture Chalk and Talk	
	3	Morphology of root, stem and their modifications	3	To differentiate the morphology of root, and stem with theirmodifications	Lecture PPT	
	4	Morphology of leaf, fruit and their modifications	3	To learn about the different types of leaf and fruit with their modifications	Lecture, Demonstration with live Specimens	

	5	Morphology of inflorescence, flower and their modifications	4	To learn about the different types of inflorescence and flower with their modifications	Lecture, Demonstration live Specimens	
II	**Different systems of classification, principles of ICN and herbarium techniques**					
2	1	Systems of classification; Detailed study on Sexual system-Carolus Linnaeus	2	To gain knowledge on Sexual system of classification	Lecture PPT	Quiz Class Test Multiple choice questions
	2	Natural System – Bentham and Hooker	2	To gain knowledge on natural system of classification	Lecture with flow chart	
	3	Phylogenetic System - APG Classification (2016)	2	To gain knowledge on phylogenetic system of classification	Lecture with flow chart	
	4	Functions of Herbarium; Virtual herbarium; E-flora; Herbarium techniques.	5	To learn different herbarium techniques	Lecture group discussion PPT	
	5	Contribution to systematic botany by Indian Taxonomists: K.M. Mathew and Hermenegild Santapau.	4	To study the renowned contribution to systematic botany by Hermenegild and Santapau's of Indian taxonomy	Lecture chalk and talk	
III	**Detailed study of the following families with their economic importance**					
	1	Detailed study of the family Annonaceae and Rutaceae with their economic importance	3	To understand the distinguishing features and economic importance of the family Annonaceae and Rutaceae	Lecture with live Specimens	Formative assessment Quiz Short test Assignment
	2	Detailed study of the family Caesalpiniaceae and Meliaceae with their	4	To understand the distinguishing	Lecture with live Specimen	

3		economic importance		features and economic importance of the family Caesalpiniaceae and Meliaceae		
	3	Detailed study of the family Anacardiaceae and Cucurbitaceae with their economic importance	4	To understand the distinguishing featuresand economic importanc e of the family Anacardia ceae and Cucurbita ceae	Lecture with live Specimens	
	4	Detailed study of the familyRubiaceae and Sapotaceae with their economic importance	4	To understand the distinguishing features and economic importance of the family Rubiaceae and Sapotaceae.	Lecture with live Specimen	
IV	**Detailed study of the following families with their economic importance**					
4	1	Detailed study of the family Apocynaceae and Asclepiadaceae with their economic importance	4	To learn the distinguishing features and economic importance of thefamily Apocynaceae and Asclepiadaceae	Lecture with live Specimens	Short test Multipl choice questions
	2	Detailed study of the family Lamiaceae and Euphorbiaceae with theireconomic importance	4	To know the distinguishing features and economic importance of the family Lamiaceae and Euphorbiaceae	Lecture with live Specimens	

	3	Detailed study of the family Amaranthaceae, Cannaceae with their economic importance	3	To understand the distinguishing features and economic importance of the family Amaranthaceae and Cannaceae	Lecture with live Specimens	
	4	Detailed study of the family Orchidaceae and Poaceae with their economic importance	4	To learn the distinguishing features and economic importance of the family Orchidaceae and Poaceae	Lecture with live Specimen	
V	**Detailed study of useful part, economic products and uses of plants**					
5	1	Morphology of useful part, economic products and uses of Cereals (Paddy, Wheat) Pulses (Green gram, Bengal gram)	3	To know the economic products of Cereals and Pulses	Lecture	Short test Multipl choice questions
	2	Morphology of useful part, economic products and uses of Tuber crops (Tapioca, Potato); Spices (Pepper, Cardamom)	3	To learn the economic products of of Tuber crops and Spices	Lecture	
	3	Morphology of useful part, economic products and uses of Beverages (Tea, Coffee) Oil yielding plants (Coconut, Groundnut)	3	To understand the economic products of Beverages and Oil yielding plants	Lecture	
	4	Morphology of useful part, economic products and uses of Fibre yielding plants (Cotton, Coir) Timber yielding plants (Teak, Rose wood)	3	To understand the economic products of Fibre yielding and Timber yielding plants	Lecture	
	5	Morphology of useful part, economic products and uses of Latex yielding plants (Para rubber,	3	To know the economic products of Latex yielding and	Lecture	

		Sapota) Ornamental plants (Rose, Orchids		Ornamental plants		

Course Instructor: Dr. Bojaxa A. Rosy **HOD: Dr. A. Anami Augustus Arul**

Semester **: V**

Name of the Course **: Biochemistry and Biophysics**

Subject code **: BC2052**

Number of hours per week	Credit	Total no.of hours	Marks
6	**6**	**90**	**100**

Course Outcomes (COs)

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	apply the usage of P H and buffers in biological experiments..	PSO - 3	Ap
CO - 2	understand the importance of Bio-molecules.	PSO - 1	U
CO - 3	describe its biological roles and significance of lipids.	PSO - 1	U
CO - 4	analyze enzyme activity	PSO - 2	An
CO - 5	demonstrate thermodynamic principles in biological energy conversion.	PSO - 7	E

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I. CHEMICAL BONDS						
	1	Types (co-ordinate, covalent, hydrogen); Acids and Bases - pH and Buffer System	3	To know about the basics of bonds and buffering systems	Lecture, PPT, Chart	Experimental analysis, Group Discussion, Short test, Online Quiz
	2	. Classification of carbohydrates; Monosaccharides: Structure of glucose (linear, open chain, ring form) and fructose, properties of monosaccharides. .	3	To classify carbohydrates .with suitable examples	Lecture, PPT, Charts	
	3	Disaccharides: Structure and properties of maltose, sucrose and lactose	3	To understand the importance of disaccharides with examples	Lecture, Video clippings,	
	4	Polysaccharides: Structure and properties of starch and cellulose. (Seminar)	4	To know about the biological importance of polysaccharides	Lecture, Charts	
II. AMINO ACIDS						
	1	Classification, structure and properties. Protein – primary, secondary, tertiary (myoglobin) and quaternary (hemoglobin).Protein denaturation and biological roles of proteins	4	To categorize the different types of proteins	Lecture, PPT	Diagramatic representation, Question – answer session, class test Online Quiz
	2	Water-soluble vitamins e.g., Thiamine, Riboflavin and Niacin	3	To understand the basic structure and uses of water soluble vitamins	Lecture, PPT, Video clippings	
	4	Fat-solublle vitamins e.g., vitamin A- retinol, Vitamin D –	4	To know the importance of fat soluble vitamins	Lecture, Chart	

		Ergosterol				
III. LIPIDS						
	1	Saturated and unsaturated fatty acids. Classification-structure and properties of simple lipids (waxes and triglycerides)	4	To differentiate Saturated and unsaturated fatty acids	Lecture, PPT	Group Discussion, Multiple Choice Questions, CIA -I
	2	Compound lipids (phospholipid and glycolipid)	3	To analyze the different compound lipids and its importance	Lecture, PPT, Laboratory tests	
	3	Derived lipids (cholesterol, carotenoids and terpenes).	4	To know about the derived Lipids with examples	Lecture, PPT, Laboratory practice	
IV. ENZYMES						
	1	Classification, nomenclature based on IUB	3	To classify enzymes based on IUB	Lecture, PPT	Short test, Online Quiz, Models
	2	Activation energy, active site, cofactors, coenzymes (NAD, CoA), isoenzyme	3	To differentiate cofactors and isoenzyme	Lecture, PPT	
	3	Mechanism of enzyme action (lock and key model, induced - fit theory),	3	To analyze the mechanism of enzyme action	Lecture, PPT, Video clippings	
	4	Enzyme inhibition and factors affecting enzyme activity	**3**	To evaluate enzyme inhibition with examples	Lecture, PPT	
V. PHOTOBIOLOGY						
	1	Dual nature of light and its characteristics. Electromagnetic Spectrum, Action and Absorption spectrum, Emission spectrum – excitation and de-excitation. .	3	To categorize the different spectrum of electromagnets	Lecture, PPT	Short test, Online Quiz, Open Book test, CIA –II
	2	Phosphorescence, fluorescence and bio-luminescence, Bioenergetics: Laws of	2	To understand the mechanism of bioenergetics	Lecture, PPT	

		thermodynamics, concept of free energy, endergonic and exergonic reactions, coupled reactions, redox reactions.				
	3	ATP: structure, its role as an energy currency molecule	3	To analyze the role of ATP	Lecture, PPT	

Course Instructor: Ms. J. Albino Wins HOD: Dr. A. Anami Augustus Arul

Semester - V

Major Core – VII – Microbiology and Plant Pathology

Sub. Code: BC2053

Number of Hours Per week	Number of Credits	Total Number of Hours	Marks
6	5	90	100

Objectives: 1. To provide the students with the comprehensive understanding and appreciation for the diversity and significance of microbes on planet earth.

2. To study the interaction between plant and pathogen and to develop method of disease management.
3. To know the working principal and mechanism of action of instruments related to microbiology.

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO – 1	get an insight on the structure and reproduction of bacteria and viruses.	PSO - 1	U
CO – 2	explore the role and relevance of bacteria and viruses in the field of microbiology.	PSO - 1	An
CO–3	learn the sterilization techniques and preparation of culture media.	PSO–2	Ap
CO– 4	Become an expert in operating microbiological instruments thereby undertaking careers in that field.	PSO - 5	Ap
CO -5	Understand the economic and pathological importance of bacteria, viruses and fungi.	PSO - 1	U

Unit	Module	Topics	Lecture Hours	Learning Outcome	Pedagogy	Assessment /Evaluation
UNIT: I Introduction to microbial world						
I	1	**Bacteria:** General characteristics; Archaebacteria, Eubacteria, wall-less forms (mycoplasmas). **Ultrastructure**	**3**	To be familiarize with different types of bacteria and it's structure	Lecture PPT Microslides	Formative Assessme ntQuiz Short test Group Discussion Slip Test
	2	Nutritional types of bacteria - autotrophs and heterotroph s,	3	To know the Nutritional types of bacteria	Lecture Charts Video clippin gs	
	3	Reproduction and recombination (conjugation, transformation and transduction). Binary fission and endospore.	3	To differentiate bacteria based on their mode of reproduction	Lecture Illustration	
	4	Economic importance of bacteria with reference to their role in agriculture and industry (fermentation and medicine).	3	To understand the economic importance of bacteria	Lecture Group Discussion PPT	
UNIT: II VIRUSES						
II	1	General characteristics; classification (Baltimore),	2	To understand the characters of virus and it's classification	Lecture Group discussion	Formative assessment Quiz Multiple choice questions Short test
	2	Structure and replication of DNA virus(T4)	2	To study the structure of T-phage DNA virus	Lecture, PPT	

	3	Lytic and lysogenic cycle	2	To differentiate lytic cycle from lysogenic cycle	Lecture Debate	
	4	RNA virus (TMV, Corona Virus), viroids and prions.	3	To learn about the RNA virus	Lecture PPT	
	5	Economic importance of viruses with reference to vaccine production, role in research, medicine and diagnostics, as causal organisms of plant diseases.	3	To comprehend the economic importance of viruses	Lecture Chart, Video clippin gs	
UNIT: III Preparation of Microbiology Lab						
III	1	Sterilization of glassware	2	To learn the sterilization techniques	Lecture Demonstrat ion	Formative Assessme ntQuiz Short test Group Discussion Slip Test Assignment
	2	Preparation of agar medium.	1	To perceive the agar media preparation	Lecture Chart	
	3	Bacterial growth- growth curve- pure culture, batch culture and continuous culture.	2	To study the different types of bacterial growth	Lecture PPT	
	4	Physical and chemical agents for controlling microorganisms. Dry and Wet sterilization	2	To be familiar with the various physical and chemical agents to control the growth of microorganisms	Lecture Demonstrat ion	
	5	Working principles of Autoclave, Laminar Air Flow and Incubator.	2	To be able to operate the microbiological instruments	Lecture Hands on training	
	6	Contributions to Microbiology: Anton Van Leeuwenhoek, Louis Pasteur and Robert Koch.	3	To apprehend the valuable **contribution of microbiologists**		
UNIT: IV Food, Dairy and Water Microbiology						
	1	Food Microbiology: General account of food spoilage through microbes.	2	To assay the food spoiled by microbes	Lecture Demonstrat Ion	Formative Assessme ntQuiz Short test Group

						Discussion Slip Test Assignment
	2	Food borne infections and preventions – Botulism and Salmonellosis	3	To perceive food borne infection and treatment	LecturePPT	
	3	Dairy microbiology – Sources of milk contamination, Pasteurization technique, Test for grading milk quality	2	To create an awareness about sources of milk contamination and milk grading	Lecture Demonstration	
	4	Potable and non potable water	2	To identify portable and non-portable water	Lecture Field Visit	
	5	Municipal sewage treatment process: Primary, Secondary, (aerobic and anaerobic process), chemical treatment: chlorination. Disposal of treated sewage. (sludge as fertilizer ; irrigation and dilution)	1	To learn about the municipal sewage treatment	Lecture Group Discussion	
	6	Test for detection of coliform bacteria	2	To test coliform bacteria in water	Lecture Hands on training	
UNIT: V Plant Pathology, Study of selected plant diseases						
V	1	Terms and concepts; General symptoms; Etiology; Symptomology; Host-Pathogen relationships; Disease	3	To realize the importance of plant pathology and to learn the terminologies of Plant Pathology	Lecture	Formative Assessment Quiz Short test Group Discussion Slip Test

	cycle and environmental relation; prevention and control of plant diseases, and role of quarantine				Assignment
2	Bacterial diseases – Citrus canker and angular leaf spot of Cotton.	3	To apprehend the characters of Citrus canker and angular leaf spot of Cotton and its prevention	Lecture PPT Specimen	
3	Viral diseases –Bunchy Top of Banana, Vein clearing in lady's finger.	3	To know the disease cycle and prevention measures of bunchy top of Banana and Vein clearing in lady's finger.	Lecture Specimen Chart	
4	Fungal diseases – Late blight of Potato and Tikka Disease of Groundnut	3	To grasp the microorganism involved in Late blight of Potato and Tikka Disease of Groundnut	Lecture PPT	

Course Co-Ordinator: Dr. A. Anami Augustus Arul HoD: Dr. A. Anami Augustus Arul

Semester - VI
Major Core VIII - Genetics, Biostatistics and Bioinformatics
Sub. Code: BC2061

Number of Hours Per week	Number of Credits	Total Number of Hours	Marks
6	6	90	100

Objectives: 1. To have knowledge of Mendelian and non-Mendelian inheritance.

2. Develop skills in data tabulation, its treatment, analysis and interpretation of data.

3. Introduce the vast repositories of biological data knowledge.

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO – 1	understand Mendelian principle and predict genetic inheritance patterns.	PSO - 1	U
CO – 2	analyze the facts of non-Mendelian inheritance and have conceptual knowledge on alleles and their linkage.	PSO - 3	Ap
CO – 3	examine the various stages of cell division and also a clear knowledge on DNA structure.	PSO - 3	U
CO – 4	generate biological interpretations and conclusions from data of scientific research.	PSO -3	C
CO – 5	develop skills to become employable as professionals in biochemical industries.	PSO - 5	C

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I GENETICS AS A SCIENCE						
	1	History, Experiments of Mendel with *Pisum sativum*, Principles of inheritance, Mendelian laws-monohybrid	3	To differentiate monohybrid and dihybrid	Lecture, Problem based learning	Class test, Group Discussion, Quiz.

		and dihybrid cross, test cross and back cross (Assignment)		crosses and solving the related problems		
	2	Modification of Mendelian ratio: Incomplete dominance – *Mirabilis jalapa,*Co-dominance – MN blood group in man	3	Able to solve the problems in incomplete dominance and co-dominance	Lecture, Problem based learning	
	3	Lethal genes: Dominant lethality - Coat colour in Mice, Recessive lethality – Chlorophyll content in Maize. (Seminar)	3	To distinguish dominant and lethal genes	Lecture, PPT, Problem based learning	
	4	Genetic interaction: Dominant Epistasis – fruit colour in summer squashes, Recessive epistasis – coat colour in mice;Complementary genes – flower colour in sweet pea.Non-epistasis - comb pattern in Fowls	2	To learn about interaction of genes and solve the problems	Lecture, PPT, Problem based learning	
II LINKAGE AND CROSSING OVER						
	1	Sex Linked inheritance (eye colour in *Drosophila*) Polygenic inheritance with reference to (ear length in maize)		To understand the basics of inheritance and solve the problems	Lecture, Charts, problem solving	Diagrammatic representation, Short test.

	2	Multiple alleles -ABO blood group in man, Rh factor. Non-Mendelian inheritance		To distinguish mendelian and non-mendelian inheritance	Lecture, Models	
	3	Extra-chromosomal inheritance: chloroplast mutation –variegation in 4 O'clock plant; mitochondrial mutations in yeast. Maternal effects – shell coiling in snail		To evaluate the mutation patterns in chloroplast and mitochondria	Lecture, PPT	
	4	Linkage: Morgan's views on linkage, crossing over – types, mechanism of crossing over and its significance		To understand and differentiate linkage and crossing over	Lecture, Video Clippings, Problem solving	
	5	Holliday model for genetic recombination.		To analyse the recombination patterns	Lecture, Video clippings	
CELL CYCLE AND NUCLEIC ACIDS						
	1	Cell division (mitosis and meiosis), Significance of mitosis and meiosis.	3	To understand and differentiate the mechanisms of	Lecture, PPT, Chart	Short test, Question – Answer session, Group discussion, Continuou

				mitosis and meiosis		s Internal Assessment I (CIA - I).
	2	Chromosomes: Chromosome morphology – (metacentric, submetacentric, acrocentric and telocentric) and Chromosome. Structure, Special type of chromosomes: giant chromosomes (salivary gland chromosomes, Lamp brush chromosomes), supernumerary chromosomes (B chromosome).	3	To analyse the different patterns of chromosome with special reference to giant chromosomes	Lecture, Models	
	3	Brief account on Nucleic acids; DNA as the genetic material: Griffith's and Avery's transformation experiment, Hershey – Chase bacteriophage experiment,RNA as the carrier of genetic information (Fraenkel-Conrat). DNA Structure (Watson and Crick) Salient features of double helix	3	To understand the basics of nucleic acids with experiments	Lecture, PPT	
	4	,Types of RNA: structure and functions of mRNA, rRNA and tRNA.	3	To differentiate the different forms of RNA	Lecture, Charts, PPT	
IV BIOSTATISTICS						
	1	Importance of statistics in Biology, sampling - random sampling, collection and interpretation of data,	3	To know and practice the basics of	Lecture, Problem solving	Quiz, Group discussio

		tabulation		biostatistics		ns
	2	Presentation of data - frequency distribution, frequency curve, frequency polygon, histogram and bar diagrams	3	To understand the data presentation with graphical representation	Lecture, PPT, Problem solving	
	3	Measures of central tendencies -mean, median and mode. Measures of dispersion – standard deviation, standard error (Seminar)	3	To acquire skills to solve probems based on measures of central tendencies and dispersion	Lecture, Problem solving	
	4	Null hypothesis - Chi - square test.	3	To evaluate the test of significance in various data	Lecture, PPT, Problem solving	
V BIOINFORMATICS						
	1	Aims and scope and applications- Virtual library, e-books and e- journals	3	To understand the concepts of bioinformatics	Lecture, PPT	Multiple Choice Questions, Group discussions, Computer analysis, Continuous Internal
	2	Major areas of biological data bases- classification; primary, secondary, specialized	3	To differentiate the different forms of of biological data bases	Lecture, PPT	

	3	Importance data bases- NCBI, SWISS-PROT, DDBJ	3	To construct the databases in computers	Lecture, Video clipping, Compute r teaching practices	Assessment II (CIA -II).
	4	Tools and softwares in Bioinformatics – similarity search – BLAST – FASTA sequence alignment tools. Application of Bioinformatics.	3	To evaluate and practice the softwares of bioinformatics	Lecture, Video clipping, software analysis	

Course Instructor: Dr. J. Albino Wins HOD: Dr. Anami Augustus Arul

Major Core IX - Biotechnology and Molecular Biology

Sub. Code: BC2062

Number of Hours Per week	Number of Credits	Total Number of Hours	Marks
6	6	90	100

Objectives: 1. To learn and apply the general principles of biotechnology and ensure adequate training in modern biotechnology.

2. To understand the various steps in DNA replication, protein synthesis and gene regulation in prokaryotes.

3. To gain knowledge on different types of IPR.

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO – 1	acquaint the core concepts and fundamentals of plant biotechnology.	PSO – 1	U
CO – 2	develop competency on different types of plant tissue culture.	PSO – 3	Ap
CO – 3	understand the mechanisms of genetic information.	PSO –1	U
CO – 4	get an insight of chromosome abnormalities and related human syndromes.	PSO –7	An
CO – 5	develop skills to become employable as professionals in Biotechnology Industries.	PSO –7	C

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/Evaluation
Unit I						
	1	Definition and scope of biotechnology, Principles of recombinant DNA technology, Steps and Applications of rDNA technology;	3	To understand the importance of recombinant molecules	Lecture with PPT	Group discuss ion Assignment Quiz Continuous Internal Assessment Class test
	2	Restriction Enzymes – Nomenclature and	3	To learn and categorize different types of restriction	Lecture with PPT	

		Classification; Cloning Vectors - Plasmids,Cosmids , Phagemidsand shuttle vectors;		enzymes and cloning vectors		
	3	DNA cloning - Steps and Applications;	3	To understand the steps and importance of DNA cloning	Lecture with PPT	
	4	Basic techniques – Agarose gel electrophoresis, Northern blotting, Southern blotting and RFLP.	3	To know the different separation techniques	Lecture with PPT	
Unit II						
	1	Scope and importance of plant tissue culture, Totipotency of cells, Tissue culture laboratory-organization and requirements,	3	To practice the plant tissue culture, Sterilization techniques and Culture media preparation in laboratory	Lecture Demonstration and Hands on training	Group discuss ion Assignment Quiz Continuous Internal Assessment Class test Slip test
	2	MS medium composition and preparation;	3	To know the preparation of MS medium.	Lecture, demonstration Demonstration and Hands-on training	
	3	Sterilization techniques; Types of tissue culture - Callus culture, apical meristem culture, Micropropagation and Protoplast culture;	3	To provide students with the knowledge and skills of sterilization and propagation of explants.	Lecture Demonstration and Hands-on training	
	4	Artificial seed: production, applications and limitations; Cryopreservation techniques.	3	To understand artificial seed production and cryopreservation techniques	Lecture PPT	
Unit III						
	1	General Features of DNA Replication: General principles –semi-	4	To learn different methods of DNA replication.	Lecture PPT	Group discuss ion Assignment Quiz Continuous

		conservative and semi discontinuous replication; Semi conservative model of replication – Watson and Crick,				Internal Assessment Class test Short test
	2	DNA damage; DNA repair mechanism. Photoreactivation, Mismatch repair;	3	To learn DNA damage and different repair mechanisms.	Lecture PPT	
	3	Mutations – Gene mutation and Chromosomal mutation; Mutagens; Chromosomal abnormalities- Down Syndrome and Klinefelter Syndrome.	5	To know about mutations and its effects.	Lecture and PPT	
Unit IV						
	1	Genetic code and wobble hypothesis;	2	To learn the characteristics of genetic code and wobble hypothesis.	Lecture and PPT	Group discuss ion Assignment Quiz Continuous Internal Assessment Class test Short test
	2	Transcription in prokaryotes and eukaryotes;	3	To understand the transcription in prokaryotes and eukaryotes	Lecture and video clippings	
	3	Assembly of ribosomes; Protein synthesis - initiation, elongation, and termination	3	To acquire knowledge on Protein Synthesis	Lecture and video clippings	
	4	Gene regulation in Prokayotes- Operon concept, Lac Operon; Transposons in Prokaryotes and Eukaryotes.	4	To understand gene regulation and transposons.	Lecture, PPT and video	
Unit V						
	1	DNA transfer techniques: Physical method (Microinjection), Chemical method (Calcium phosphate method), Electrical	4	To understand the Gene regulation, mutation and characteristics of codons	Lecturing With PPT	Group discuss ion Assignment Quiz Continuous Internal Assessment

		method (Electroporation);				Class test Multiple Choice Question
	2	Gene transfer in plants – Agrobacterium transformation;	2	To understand the Gene transfer methods	Lecturing with PPT	
	3	GM plants –Bt Brinjal, Bt Cotton,; Transgenic crops with improved quality traits in major crops (FlavrSavr tomato, Golden rice).	4	To learn about GM plants.	Lecture, PPT, and video	
	4	IPR – Scope and different kinds of IPR.	2	To get a brief knowledge of IPR.	Lecture and PPT	

Course Instructor: Dr. Bojaxa A. Rosy HOD: Dr. A. Anami Augustus Arul

Major Core X - Plant Physiology and Metabolism

Sub. Code: BC2063

Number of Hours Per week	Number of Credits	Total Number of Hours	Marks
6	5	90	100

Objectives: 1. Comprehend the fundamental concepts of plant physiology.

2. Describe the physiological mechanisms of plant growth, function, and development.
3. Recognize and describe how plants respond to their environment.

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO – 1	understand water relation of plants with respect to various physiological processes.	PSO - 1	U
CO – 2	explaindeficiency symptoms of macro and micro nutrients in plants.	PSO –2	U
CO – 3	relate complementary metabolic pathways such as photosynthesis and respiration in energy acquisition.	PSO –1	An
CO – 4	analyse nitrogen metabolism and its significance.	PSO –1	An
CO – 5	assess dormancy and germination in plants.	PSO –1	An

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I Plant and cell architecture						
	1	Importance of water to plant life.	3	To know about the basics and importance of water to plant life	Lecture PPT, Chart	Class test, Group Discussion, Slip test Quiz, Internal Assessment
	2	Physical properties of water; Imbibition, diffusion, osmosis and plasmolysis.	3	To understand the physical properties of water	Lecture Problem based learning	
	3	Concepts of water potential and its components. The Concept of the Soil Plant Atmosphere Continuum	3	To evaluate the concepts	Lecture PPT, Video clipping	

		(SPAC).		of water potential and the concept of SPAC	s	
	4	Transpiration –Definition, types of transpiration, structure and opening and closing mechanism of stomata; guttation and anti-transpirants. Factors affecting transpiration.	3	To analyze the process of transpiration and the factors influencing it.	Lecture, PPT	
II Mineral nutrition						
	1	Essential elements, micro and macronutrients; Criteria of essentiality of elements;	3	To understand the essentiality of elements to plants	Lecture Demonstration	Quiz, Class test, Short test, Internal Assessment Group Discussion Slip test
	2	General functions, specific role and deficiency symptoms of macronutrients (Nitrogen, Phosphorus, and Potassium) and micronutrients (Iron, Magnesium, Molybdenum and zinc)	3	To learn about the specific role and deficiency symptoms of micro and macronutrients	Lecture, PPT, Video clipping, Live specimen	
	3	Absorption and translocation of solutes (organic and inorganic) – active & passive uptake.	3	To analyze the absorption and translocation of solutes	PPT, Lecture, Video clipping	
	4	Hydroponics, types, aquaponics and significance.	3	To evaluate the mechanism and significance of hydroponics	Lecture, PPT, Demonstration	
III Photosynthesis						
	1	Photosynthesis: Importance of photosynthesis for food security and environment	2	To understand the importanc	Lecture PPT, Videos	Short test, Question – Answer session,

				e of photosynthesis		Group discussion, Continuous Internal Assessment Quiz
	2	Ultrastructure of chloroplast	1	To know the ultrastructure of chloroplast	Chart, PPT Models	
	3	Light reaction: Radiant energy, photosynthetic apparatus, light harvesting complex; light absorption, composition and characteristics of pigment systems, photosynthetic electron transport,	3	To know about the light reaction in photosynthesis	Lecture PPT Video clipping	
	4	Dark reaction: Carbon dioxide fixation in C3, C4 and CAM plants,	4	To understand the different types of dark reaction and its significance	Lecture Charts, PPT	
		Photorespiration and its significance, factors affecting photosynthesis.	2	To learn about photorespiration and the factors affecting respiration	Lecture, PPT, Video clippings	
IV Respiration						
	1	Ultrastructure of mitochondria, Aerobic and anaerobic respiration, cyanide independent respiration, Fermentation	3	To differentiate the different forms of respiration	Lecture, PPT	Short test, Question – Answer session, Group discussion, Continuous Internal Assessment Quiz
	2	Glycoysis, Krebs cycle and generation of ATP synthesis through oxidative electron transfer chain (cytochrome system)	3	To learn the generation of ATP through different process	Lecture, PPT, Charts	
	3	Chemiosmotic regeneration of ATP, Guconeogenesis, Factors affecting respiration	3	To know about chemiosmotic processes with	Lecture, PPT, Video clippings	

				exampes		
	4	Nitrogen nutrition, organic nitrogen, nitrogen fixation in microbes / legumes, nif genes and NOD factors, nitrate and ammonia assimilation, nitrogenase	**3**	To analyze the mechaniam of biological nitrogen fixation	Lecture, PPT, Video clippings	
V Plant Growth Regulators						
	1	Growth, Growth curve, Growth and development, phytochrome and light control, role of phytochrome in tropism, flowering and fruiting	3	To know the growth pattern of plants and the role of phytochromes	Lecture, PPT	Short test, Question – Answer session, Group discussion, Continuous Internal Assessment Quiz
	2	Physiological role of auxins, gibberellins, abscisic acid and ethylene	3	To understand the role of plant hormones with suitable examples	Lecture, Charts, PPT	
	3	Vernalization – dormancy of seeds, methods of breaking dormancy, mechanism of seed germination	3	To evaluate seed dormancy and seed germination process	Lecture, PPT	
	4	Plant response to environmental stresses – Polyamines, brassinosteroids and their functions	3	To analyse the response of plants to environmental stresses	Lecture, PPT	

Course Instructor: Dr. J. Albino Wins HOD: Dr. A. Anami Augustus Arul

Semester - VI

Elective –IV (a) Marine Botany

Sub. Code: BC2064

Number of Hours Per week	Number of Credits	Total Number of Hours	Marks
4	3	60	100

Objectives: 1. Understand the diversity of marine organisms.

2. Learn about the marine plants and their medicinal property.

3. Acquire knowledge on marine pollution and conservation methods.

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO – 1	describe the types of marine habitat and their relationship with environment	PSO - 1	R
CO – 2	compare the threats and conservation of seaweeds and sea grasses	PSO –4	An
CO – 3	evaluate how natural events and human activities affect coastal habitats	PSO – 4	Ev
CO – 4	create a broad knowledge about themarine products and their economic value	PSO – 5	C
CO – 5	describe the role of mangroves in conservation of marine flora and fauna.	PSO –4	U

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I.	**Classification of Marine habitat**					
	1	Classification of marine habitat – pelagic, neritic and oceanic province, benthic – zonation	2	To classify the types of marine habitats	Lecture Video	Group discussion Assignment Quiz Continuous Internal Assessment Class test
	2	– shore environment – muddy, rocky and sandy, waves and tides deep sea bottom – pelagic deposits.	3	To understand the shore environment	Lecture	
	3	physical and chemical properties of sea water.	2	To learn the properties of sea water	Lecture PPT	
	4	Salt marshes and sand dune vegetation.	2	To be able to understand the	Lecturing with PPT	

				salt marshes and sand dunes.		
II. Marine biodiversity						
	1	phytoplankton- Nekton, Benthos. Marine Phytoplankton- Dino - flagellates, Nano-plankton, Ultra-plankton, marine bacteria, marine fungi, marine Lichens.	5	To study the marine organisms	Lecture PPT	Group discussion Assignment Quiz Continuous Internal Assessment Class test
	2	Threats and conservation of seaweeds and sea grasses.	4	To realize the importance of seaweeds and sea grasses	Lecture PPT Video	
III. Marine products						
	1	traditional uses - human food and agriculture.	4	To learn about the traditional uses of marine products	Lecture	Group discussion Assignment Quiz Continuous Internal Assessment Class test
	2	Isolation of agar–agar. Scope of the seaweed industry: Brown seaweeds as food, Red seaweeds as food.	4	To study the marine products	Lecture PPT Video	
	3	Medicinal uses of marine seaweeds and sea grasses.	1	To assess the medicinal importance of seaweeds and sea grasses	Lecture with PPT	
IV. Marine pollution:						
	1	Pollution due to heavy metals - radioactive wastes, thermal, sewage, algal blooms and oil spills –	5	To analyse the impact of marine pollution	Lecture, PPT	Group discussion Assignment Quiz Continuous Internal Assessment Class test
	2	possible remedies – oil eating bacteria – GMO and pollution abatement	4	To understand the remedies for marine pollution	Lecture. PPT	
V. Mangroves						
	1	Salient features of Rhizophora and Avicennia.	3	To know the salient features of selected mangroves	Lecture	Group discussion Assignment Quiz Continuous Internal Assessment
	2	Definition, distribution, stresses on mangroves, regeneration of mangroves,	3	To study the stress and	Lecture, PPT	

				regeneration of mangroves		Class test
	3	coral reefs – ecology, species interaction, economic importance and conservations.	3	To learn about the coral reefs	Lecture, PPT Video	

Course Instructor: Dr. Bojaxa A. Rosy HOD: Dr. A. Anami Augustus Aru

B.SC. PROGRAMME OUTCOME (POs)

PO	Upon completion of B.Sc Programme, the graduates will be able to:
PO - 1	utilize scientific knowledge to pursue higher studies in the relevant field.
PO - 2	create innovative ideas to enhance entrepreneurial skills for economic independence.
PO - 3	face challenging competitive examinations that offer rewarding careers.
PO - 4	reflect upon green initiatives and take responsible steps to build a sustainable environment.
PO - 5	handle ethical issues with social responsibility.
PO - 6	communicate effectively and collaborate successfully with peers to become competent professionals.

Programme Specific Outcomes (PSO)

PSOs No.	Upon completion of B.Sc. Degree Programme, the graduates of Botany will be able to :	PO Addressed
PSO - 1	develop a strong and competent knowledge in Botany.	1
PSO - 2	communicate appropriately and effectively in science and also interact productively with people from diverse background.	6
PSO - 3	understand the basic professional skills through various laboratory technical training, to analyze the relevant biological situations.	2
PSO - 4	create green environment to protect nature for future sustenance.	4
PSO - 5	seek entrepreneurship through skill based, value added and related courses.	2
PSO - 6	understand the professional, ethical, legal and social issues related to gender.	5
PSO - 7	integrate the related topics from other branches of science to carry out projects to have a successful career.	3

Teaching Plan for the Academic Year 2020-2021

Odd Semester

Semester - III

Name of the Course : **Archegoniate**
Subject code : **BC1731**

No. of hours per week	Credit	Total no. of hours	Marks
4	4	60	100

CO	**Upon completion of this course the students will be able to :**	**PSO addressed**	**CL**
CO- 1	Describe the general characters of land plants	PSO-1, 7	U
CO- 2	Interpret the ecological and economic importance of archegoniate	PSO-2,4,7	Ap
CO- 3	Describe the external, internal and reproduction of archegoniate	PSO-1,5	U
CO -4	Understand the unique characters of Bryophytes	PSO-1,7	An
CO- 5	Classify pteridophytes based on spore formation	PSO-1,3	U
CO-6	Comment on the stelar evolution in Pteridophytes and compare with gymnosperms	PSO-1, 7	An
CO -7	Compare the fossil of pteridophytes and gymnosperms	PSO-1, 2	An

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

Unit	**Section**	**Topics**	**Lecture hours**	**Learning outcome**	**Pedagogy**	**Assessment/Evaluation**
I Bryophytes						
	1	Unifying features of bryophytes, transition to land habit Classification by Rothmalar (1951).	2	To familiarize with the characteristics of Bryophytes and its classification	Lecture Chart PPT	Quiz Short test Formative assessment
	2	Distribution,morphology, anatomy reproduction of *Marchantia*	3	To identify the structural features and different methods of	Lecure Group Discussion	

				reproduction in *Marchantia*		
	3	Distribution, morphology, anatomy, reproduction and life cycle of *Polytrichum*	2	To characterize the structural features and reproduction in *Polytrichum.*	Demonsration Model	
	4	Ecological and economic importance of Bryophytes	2	To imbibe the Ecological and economic importance of Bryophytes	Lecture Group Discussion	
II Pteridophytes						
	1	General characteristics of Pteridophytes Classification by Smith (1955)	3	To familiarize with the unique features of pteridophytes and also its classification	Lecture Classroom Discussion	Class test Assignment Formative assessment
	2	Types of stele and life cycle patterns of pteridophytes	2	To learn about the stelar evolution and life cycle patterns in pteridophytes	Lecture with PPT	
	3	Distribution, morphology, anatomy, reproduction and life cycle of *Psilotum*	4	To review the structure and life cycle of *Psilotum*	Lecture, demonstrating and showing charts	
III Pteridophytes						
	1	Distribution, morphology, anatomy, reproduction and life cycle of *Selaginella*	4	To apprehend the life cycle of *Selaginella.*	Lecture PPT	Class test Quiz Formative Assessment
	2	Distribution, morphology, anatomy, reproduction and life cycle of *Marsilea* Heterospory, seed habit and stelar evolution	3	To know the life cycle of Marsilea and to recognize the seed habit.	Lecturing, demonstration Charts	
	3	Ecological and economical importance of Pteridophytes	2	To grasp the ecological and economical importance of Pteridophytes	Lecture Classroom discussion	
IV Gymnosperms						

	1	General characteristics of Gymnosperms Classification by Chamberlain (1935)	3	To realize the general characters and the classification of Gymnosperms	Lecture Flow Chart	Class test Classroom quiz Formative assessment
	2	Salient features, distribution, morphology, anatomy and reproduction of *Pinus*.	4	To be aware of the special features and reproduction in *Pinus*	Lecture PPT	
	3	Ecological and economical importance of Gymnosperms.	2	To grasp the ecological and economical importance of Gymnosperms	Lecture Presentation	
V Fossils						
	1	Geological time scale	2	To understand the concept of eras	Lecture with PPT	Short test Multiple choice questions Choose the correct answer Formative assessment
	2	Methods of fossilization and importance of fossils.	2	To interpret the types of fosilization	Lecture PPT	
	3	Distribution, morphology, anatomy and reproduction of *Rhynia*	2	To figure-out the characteristics of pteridophytic fossil Rhynia	Lecturing, Chart	
	4	Distribution, systematic position, morphology, anatomy and reproduction of *Lyginopteris*	3	To get knowledge about the gymnosperm fossil- *Lyginopteris*	Lecture Fossil Specimen	

Course Instructor: **HoD: Dr. C. Jespin Ida**

Dr. Bojaxa. A. Rosy

Semester : **III**

Name of the Course: Major Elective – I (b)Nursery and Gardening

Sub. Code: BC1733

Number of Hours Per week	Number of Credits	Total Number of Hours	Marks

4	4	60	100

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	incorporate lab to land programme by raising home garden and nurseries	PSO - 5	Ap
CO - 2	evaluate seed dormancy	PSO - 4	E
CO - 3	practice the different techniques in propagating horticultural plants	PSO - 5	Ap
CO - 4	explain the needed fertilizers in soil management	PSO - 7	U
CO - 5	understand the external factors necessary for plant growth	PSO - 3	U
CO - 6	explain the cultivation of different vegetable	PSO - 5	U

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

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I. Nursery:						
	1	Definition, objectives and scope of nursery	1	To know the definition, objectives and scope of nursery	Lecture Chalk and Talk	Formative assessment Assignment Quiz Short test
	2	Building up of infrastructure for nursery	1	To understand the building up of infrastructure for nursery	Lecture Video Clippings	
	3	Planning and seasonal activities - Planting	1	To be familiarize with planning and seasonal activities like planting	Lecture PPT	
	4	Planning and seasonal activities - Direct seeding and transplants.	2	To study the direct seeding and transplanting	Lecture Group discussion	
	5	Nursery practices for some important crops – Coconut and Arecanut	2	To practice the cultivation of Coconut and Arecanut	Lecture PPT	

	6	Nursery practices for some important crops – Pepper and Cardamom.	2	To practice the cultivation of Pepper and Cardamom.	Lecture PPT	
1I. **Seed**						
	1	Structure and types of seeds	2	To Know the Structure and types of seeds	Chalk and talk	Formative assessment Assignment Short test Quiz Assessing their creative knowledge
	2	Seed dormancy; causes and methods of breaking dormancy	2	To be familiarize the causes and methods of breaking dormancy of seeds	Lecture Illustrations	
	3	Seed banks and factors affecting seed viability	2	To understand the importance of Seed banks and seed viability	Lecture	
	4	Seed production technology; seed testing and certification.	3	To analyze the testing and certification of seeds	Lecture Video Clippings	
III. Hardening of plants**:**						
	1	Vegetative propagation: Layering - air and ground layering,	1	To understand the different types of vegetative propogation	Lecture, PPT	Group Discussion Formative Assessment Assignment Quiz Short test
	2	Vegetative propagation: Cutting, selection of cutting, collecting season	1	To learn about the cutting and its selection	Lecture, Video Clippings	
	3	Treatment of cutting, rooting medium and planting of cuttings.	1	To know the treatment and planting of cuttings	Lecture, Chalk and Talk	

	4	Greenhouse	1	To realize the importance of greenhouse	Lecture, PPT	
	5	Mist chamber	1	To practice the plants grow through mist chamber	Lecture, Video clippings	
	6	Shade house	2	To know the importance of shade house	Lecture, Video clippings	
	7	Glass house	2	To apply the various methods to make glass house	Lecture, Group discussion	
IV. Gardening:						
	1	Gardening -Definition and scope	1	To learn about the definition and scope of gardening	Lecture	Formative Assessment Assignment Quiz Short test Group Discussion
	2	Formal - Mughal	2	To understand the formal type of gardening with reference to Mughal gardens	Lecture PPT Video clippings	
	3	Informal - Japanese	1	To understand the informal type of gardening with reference to Japanese gardens	Lecture PPT Video clippings	
	4	Rock garden and water garden,	1	To learn about the construction of rock and water garden	Lecture PPT Video clippings	
	5	Bog or Marsh garden, Sunken garden and Roof garden.	2	To know about Marsh, Sunken and Roof garden	Lecture PPT Video clippings	
	6	Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.	2	To realize the importance of gardening operations	Lecture PPT Video clippings	

V. Cultivation of crops:						
	1	Cultivation of vegetable crops – Tomato, Brinjal	2	To know the Cultivation of vegetable crops – Tomato, Brinjal	Lecture, demonstration	Assessing their practical knowledge Formative Assessment Assignment Quiz Short test
	2	Cultivation of root crops– Radish, Carrot	2	To study the Cultivation methods of Radish and Carrot	Lecture, demonstration	
	3	Cultivation of Cucumber, Bitter gourd	2	To practice the cultivation of Cucumber and Bitter gourd	Lecture, demonstration	
	4	Storage and marketing procedures of economic important edible crops	3	To apply the Storage and marketing procedures of edible crops	Lecture, videos	

Course Instructor: **HoD: Dr. C. Jespin Ida**

Dr. A. Anami Augustus Arul

Semester : **III**
Name of the Course : **Taxonomy of Angiosperms and Plant Physiology (Allied –II)**

Subject code : **BA1731**

Number of Hours Per week	Number of Credits	Total Number of Hours	Marks
4	4	60	100

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO-1	Recall the main features of angiosperms	PSO-2,6	R
CO-2	Understand the respiratory processes carried out by plants	PSO-4,7	U

CO-3	Apply their physical and biochemical knowledge to evaluate the processes involved in photosynthesis	PSO-1,2,4	Ap
CO-4	Analyze the various processes involving in water uptake and transport in plants.	PSO-3,4	An
CO-5	Classify the different plants by the natural, artificial and phylogenetic classification	PSO-1,2,6	An
CO-6	Interpret the role of growth hormones in plants	PSO-2,4,9	Cr

Modules

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

Unit	Section	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/Evaluation
I Taxonomy						
	1	Morphology: Root, stem, leaf	3	To identify modifications in root, stem, leaf	Using models Lecture	Multiple choice Short test Assignment Formative assessment Quiz
	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	2	To analyze the floristic features of families under study and impart the economic	Demonstration Lecture	Formative assessment Quiz Short test Assignment

				importance of Annonaceae		
	2	Families and their economic importance of Rutaceae, Lamiaceae	3	To analyze the floristic features of families under study and impart the economic importance of Rutaceae, Lamiaceae	Demonstration Lecture	
	3	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 plant life - imbibition, diffusion,osmosis and plasmolysis. Absorption of water - passive and active mechanisms	5	To observe the water relationship in plant	Experiment Lecture	Formative assessment. Short test Assignment Quiz
	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,	7	To know the mechanism	Lecture, Group discussion,	Formative assessment Quiz

		Mechanism of photosynthesis, Pigment systems, light dependent reactions - C_3 Cycle		of photosynthesis	Video Clippings	Assignment Group test
	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 Quiz Assignment
	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: Dr. A.R. Florence **HoD: Dr. C. Jespin Ida**

Semester - V

Name of the course: Taxonomy and Economic Botany Sub.

Code: BC1751

Number of Hours Per week	Number of Credits	Total Number of Hours	Marks
6	5	90	100

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	Relate the modifications in plant parts	PSO - 7	U
CO - 2	Evaluate the taxonomists of India	PSO - 1	Ev
CO - 3	Differentiate the artificial, natural and phylogenetic classification and learn about ICN rules	PSO - 1	An
CO - 4	construct digital herbarium and learn about Herbarium techniques	PSO - 5	C
CO - 5	Recall the characters of some important families	PSO - 6	R
CO - 6	Understand the economic importance of plants and their use at various levels	PSO - 1	U

Unit	Module	Topics	Lecture Hours	Learning outcome	Pedagogy	Assessment/ Evaluation
I	**Morphological modifications and contribution by taxonomists**					
	1.	Objectives and importance of systematic botany	2	To realizethe objectives and importance of systematic botany	Lecture	Class test Formative assessment
	2.	Morphology of root, stem, leaf and their modifications.	4	To differentiate the morphology of root, stem and leaf and their modifications	Lecture Demonstration with live Specimens	
	3.	Morphology of inflorescence, flower, fruit and their modifications	5	To learn about the different types of inflorescence, flower and fruit	Lecture Demonstration with live Specimens	

	4.	Contribution to systematic botany by Indian Taxonomist – K.M. Mathew	2	To study the renowned contribution of K.M Mathew in the field of Indian taxonomy	Lecture using chalk and board	
	5.	Contribution to systematic botany by Indian Taxonomist – HermenegildSantapau	2	To appreciate the contribution to systematic botany by HermenegildSantapau's	Lecture using chalk and board	
II	**Different systems of classification, principles of ICN and herbarium techniques**					
	1.	Systems of classification; Artificial – Linnaeus Natural – Bentham and Hooker Phylogenetic - Engler and Prantle merits and demerits	4	To gain knowledge on different types of classification	Lecture PPT	Quiz Class Test Multiple choice questions
	2.	APG Classification – an outline	3	To know the classification of families based on DNA sequences	Lecture and group discussion	
	3.	Chemotaxonomy	2	To categorizeplants on the basis of secondary metabolites present	Lecture using chalk and board	
	4.	Nomenclature – Binomial system	2	To understand *binomial system of nomenclature*	Lecture group discussion	
	5.	Principles of ICN Type method, Principle of priority and Author citation Effective and valid publication	3	To know the principles of ICN in detail	Lecture PPT	

	6.	Herbarium techniques. Digital Herbarium	1	To learn different herbarium techniques	Lecture Demonstration	
III	**Detailed study of the following families with their economic importance**					
	1.	Detailed study of the family Annonaceae with their economic importance	3	To understand the distinguishing features and economic importance of the family Annonaceae	Lecture Demonstration	Formative assessment Quiz Short test Assignment
	2.	Detailed study of the family Brassicaceae with their economic importance	2	To understand the distinguishing features and economic importance of the family Brassicaceae	Lecture PPT	
	3.	Detailed study of the family Rutaceae with their economic importance	2	To understand the distinguishing features and economic importance of the family Rutaceae	Lecture Chalk and board	
	4.	Detailed study of the family Meliaceae with their economic importance	3	To understand the distinguishing features and economic importance of the family Meliaceae	Lecture PPT	
	5.	Detailed study of the family Caesalpiniaceae with their economic importance	2	To understand the distinguishing features and economic importance of the family Caesalpiniaceae	Lecture demonstration	
	6.	Detailed study of the family Myrtaceae with their economic importance	3	To understand the distinguishing features and economic importance of the family Myrtaceae	Lecture demonstration	
IV	**Detailed study of the following families with their economic importance**					
	1.	Detailed study of the family Cucurbitaceae with their	3	To learn the distinguishing features and economic importance of the	Lecture Group discussion	Short test Multiple choice questions

		economic importance		family Cucurbitaceae		Quiz Assignment
	2.	Detailed study of the family Rubiaceae with their economic importance	3	To know the distinguishing features and economic importance of the family Rubiaceae	Lecture chalk and board	
	3.	Detailed study of the family Solanaceae with their economic importance	3	To understand the distinguishing features and economic importance of the family Solanaceae	Lecture demonstration	
	4.	Detailed study of the family Sapotaceae with their economic importance	2	To learn the distinguishing features and economic importance of the family Sapotaceae	Lecture Group discussion	
	5.	Detailed study of the family Apocynaceae and Asclepiadaceae with their economic importance	4	To know the distinguishing features and compare the characters of both the families - Apocynaceae&Asclepiadaceae	Lecture Demonstration	
V	**Detailed study of the following families with their economic importance**					
	1.	Detailed study of the family Lamiaceae with their economic importance	3	To know the distinguishing features and economic importance of the family Lamiaceae	Lecture demonstration	Quiz Formative assessment Short test
	2.	Detailed study of the family Euphorbiaceae with their economic importance	3	To learn the distinguishing features and economic importance of the family Euphorbiaceae	Lecture demonstration	

	3.	Detailed study of the family Amaranthacea e with their economic importance	3	To understand the distinguishing features and economic importance of the family Amaranthaceae	Lecture group discussion	
	4.	Detailed study of the family Arecaceae with their economic importance	2	To learn the distinguishing features and economic importance of the family Arecaceae	Lecture demonstrati on	
	5.	Detailed study of the family Cannaceaeand Orchidaceaewi th their economic importance	2	To know the distinguishing features and compare the characters of both the families – Cannaceae& Orchidaceae	Lecture PPT	
	6.	Detailed study of the family Poaceae with their economic importance	2	To learn the distinguishing features and economic importance of the family Poaceae	Lecture demonstrati on	

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

Name of the Course: Biochemistry and Biophysics

Sub. Code: BC1752

Number of Hours Per week	Number of Credits	Total Number of Hours	Marks
6	5	90	100

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	identify the levels of structure in proteins and describe its biological roles	PSO - 3	R
CO - 2	understand the structure, properties and fundamentals of biomolecules	PSO - 3	U
CO - 3	demonstrate thermodynamic principles in biological energy conversion	PSO - 4	Ap
CO - 4	analyze enzyme activity	PSO - 9	An
CO - 5	compare the structure of saturated fatty acids with unsaturated fatty acids	PSO - 9	E
CO - 6	analyse the biological data and interpret data with the hypothesis	PSO - 3	An

Unit	Module	Topics	Lecture Hours	Learning out come	Pedagogy	Assessment/ Evaluation
I	**Carbohydrates**					
	1	Types ofbonds	2	Distinguish the different types of bonds under study	Lecture Illustration	Short test Quiz Assignment on applications. Formative assessment
	2	P^H and Buffer	2	Evaluate the importance of buffer in biological systems	Experimental learning	
	3	Monosaccharides structure and properties of glucose and fructose Isomers of monosaccha	5	Learn the structure and properties selected monosaccharides	Lecture with PPT	

		rides				
	4	Disaccharides- structure and properties of maltose, Sucrose and Lactose	3	Analyze the structure and properties of disaccharides	Lecture with PPT	
	5	Polysaccharides- structure and properties of starch and cellulose	3	Compare the structure and properties of homo and hetero polysaccharides	Lecture with PPT	
II	**Proteins and Vitamins**					
	1	Amino Acids structure and properties	3	Know the importance of Amino Acids	Lecture with PPT	Short test Quiz Short questions Multiple choice questions Formative assessment Multiple Choice Questions
	2	Protein- Primary and secondary structure and properties	3	Explain the different bonds involved in primary and secondary structure of proteins	Lecture with PPT	
	3	Protein - tertiary and quaternary structure; Biological roles of proteins	3	Learn the structure of myoglobin and haemoglobin and biological functions of Proteins	Lecture with PPT	
	4	Vitamins - structure, importance, sourcesand deficiency symptoms of Thiamine, riboflavin and niacin	3	Analyze the structure and importance of thiamine, riboflavin and niacin	Lecture Discussion with PPT illustration	
	5	Fat soluble	3	Understand the	Lecture Group	

		vitamins- A, D and Ergosterol		fat-soluble vitamins and its importance	Discussion	
III	**Lipids and Nucleic Acids**					
	1	Lipids - classification and properties	3	Understand the classification of lipid based on its characteristics	Illustration Lecture	Short Test Short questions Quiz Multiple Choice Questions Formative assessment
	2	Fatty acids structure and functions essential fatty acids.	3	Discuss the structure and properties of fatty acids and their biological functions	Lecture PPT	
	3	General account of lipids (simple lipids Compound lipids and derived lipids)	3	Compare the structure and properties of triglycerides, phospholipids and cholestrol	Lecture Discussion	
	4	Nucleic acids- Structure of DNA	2	To study the double helical model of DNA structure (Watson and Crick)	Brain Storming Lecture	
	5	Nucleic acids- Structure of RNA.	4	Differentiate the structure and role of tRNA, mRNA and rRNA	PPT 3D structure Lecture	
IV	**Enzymes**					
	1	Nomenclature and classification of enzymes	3	Discuss the classification, nomenclature of enzyme	Illustration Lecture	Listing out important terms Slip test Formative assessment Short test Quiz Formative Assessment
	2	Structure of enzymes Activesite	3	Understand the role of active site in an enzyme	Lecture PPT	
	3	Cofactors, coenzymes,	3	Compare the role of cofactors,		

		isoenzyme		coenzymes, isoenzyme		
	4	Mechanism of enzyme action (activation energy, lock and key hypothesis, Induced - fit theory),	3	Analyze the mode of action of enzyme	Lecture PPT	
	5	Enzyme inhibition and factors affecting enzyme activity	3	Recall the inhibitory properties of enzymes	Lecture PPT	
V	**Bioenergetics**					
	1	Laws concept of free energy, endergonic and exergonic reactions, coupled reactions and redox reactions.	3	Analyse the law of thermodynamics and concepts of energy	Lecture, PPT Group discussion	Quiz Formative Assessment Short test Open book test Slip test
	2	ATP: structure, its role as a energy currency molecule	3	Imbibeknowledg e on the role of ATPin human body	Lecture PPT	
	3	Photobiology - Dual nature of light and its characteristics.	2	Know the dual nature of light	Lecture	
	4	Electro Magnetic Spectrum, Action and Absorption	3	Compare the different types of spectrum based on their function	Lecture PPT Group discussion	

		spectrum,.				
	5	Emission spectrum – excitation and de-excitation Phosphorescence, fluorescence and bio-luminescence.	4	Differentiate different types of light emissions	Lecture PPT	

Course Instructor: Dr. Sr. P. Leema Rose HOD: Dr. C. Jespin Ida

Name of the Course : Microbiology and Plant Pathology
Subject Code : BC1753

Number of Hours Per week	Number of Credits	Total Number of Hours	Marks
5	4	75	100

CO	Upon completion of this course the students will be able to:	PSO addressed	CL
CO - 1	be familiarize with basic information about microbiology and microbiologists	PSO - 1	U
CO - 2	explore the role and relevance of viruses and bacteria in the field of microbiology	PSO - 4	Ap
CO - 3	work safely, competently and effectively in the microbiology laboratory	PSO - 9	An
CO - 4	undertake careers in microbiology through the hands – on - training techniques they learnt	PSO - 3	C
CO - 5	recognize the signs and symptoms of important plant diseases and the major issues that arise due to such infections	PSO - 7	U

Unit	Module	Topics	Lecture Hours	Learning Outcome	Pedagogy	Assessment /Evaluation
Bacteria- Structure, Nutrition and Reproduction						
I	1	Bacteria- size, shape and arrangement	2	To be familiarize with different types of bacteria	Lecture PPT Microslides	Formative Assessment Quiz Short test
	2	Bacterial cell wall and cytoplasmic membrane	3	To know theE.M structureof bacterial cell	Lecture Charts	
	3	Bacterial flagella, pili, capsule and mesosomes	2	To study the different types bacterial cell components	Lecture Illustration	
	4	Nutritional type of bacteria	2	To differentiate bacteria based on their mode of nutrition	Lecture Group Discussion	
	5	Reproduction in bacteria	3	To understand the bacterial reproduction	Lecture Models	
Contribution of microbiologists, Virus-Structure, reproduction and types						
II	1	Contribution of Leeuwenhoek, Pasteur and Koch	4	To apprehend the valuable contribution of microbiologists	Lecture Group discussion	Formative assessment Quiz Multiple choice questions Short test
	2	Virus- General Characters	2	To understand the characters of virus	Lecture Debate	
	3	Reproduction in bacteriophage	2	To differentiate lytic cycle from lysogenic cycle	Lecture PPT	
	4	Structure of DNA virus	2	To study the structure of T-phage DNA virus	Lecture Chart	
	5	Structure of RNA virus	2	To differentiate DNA from RNA virus	Lecture PPT	
Growth of Microorganisms, Sterilization Methods						
III	1	Growth Curve, Pure, batch and continuous culture	3	To comprehend growth of microorganisms	Lecture Demonstration	Formative Assessment Quiz Assignment
	2	Characteristics of bacteria	2	To perceive the characteristic features of bacteria	Lecture Chart	
	3	Physical and chemical agents for controlling	2	To be familiar with the various	Lecture PPT	

		microorganisms		physical and chemical agents to control the growth of microorganisms		
	4	Dry and wet sterilization	2	To know the types of sterilization methods	Lecture Demonstration	
	5	Working principles of Autoclave, Laminar Air Flow and Incubator	3	To study the principles, working mechanisms and uses of various microbiologicaleq uipments	Lecture Hands on training	
Food, Dairy and Water Microbiology						
IV	1	Food spoilage through microbes	2	To assay the food spoiled by microbes	Lecture Demonstration	Formative assessment Quiz Short test Testing their Practical skill
	2	Food borne infections and preventions- Botulism and Salmonellosis	3	To perceive food borne infection and treatment	Lecture PPT	
	3	Sources of milk contamination Test for grading milk	2	To create an awareness about sources of milk contamination and milk grading	Lecture Demonstration	
	4	Pasteurization technique	2	To understand the steps involved in pasteurization	Lecture Field Visit	
	5	Portable and nonportable water	1	To identify portable andnon-portable water	Lecture Group Discussion	
	6	Test for detection of coliform bacteria	2	To test coliform bacteria in water	Lecture Hands on training	
Plant Pathology, Study of selected plant diseases						
V	1	Introduction to plant pathology	2	To realize the importance of plant pathology	Lecture	Class test Multiple choice questions Formative assessment Identification of diseased
	2	Causal organism, symptoms, dissemination, disease cycle and control measures of citrus	2	To apprehend the characters of citrus canker and its prevention	Lecture PPT Specimen	

		canker				plants
	3	Causal organism, symptoms, dissemination, disease cycle and control measures of bunchy top of banana	2	To know the disease cycle and prevention measures of bunchy top of banana	Lecture Specimen Chart	
	4	Causal organism, symptoms, dissemination, disease cycle and control measures of tikka disease of ground nut	2	To grasp the microorganism involved in tikka disease of ground nut	Lecture PPT	
	5	Causal organism, symptoms, dissemination, disease cycle and control measures of red rot of sugarcane	2	To be aware of red rot of sugarcane and its disease cycle	Lecture Specimen	
	6	Causal organism, symptoms, dissemination, disease cycle and control measures of late blight of potato	2	To study life cycle of fungus that infects potato and causes the late blight disease	Lecture Group Discussion	

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

Name of the course: Biological techniques(c)

Sub. Code: BC1756

Number of Hours Per week	Number of Credits	Total Number of Hours	Marks
5	5	75	100

CO	Upon completion of this course the students will be able to :	PSO addressed	CL
CO - 1	determine the basic principles and techniques of instrument used in biology	PSO - 1	U
CO - 2	apply the skill ofmicrotechniques in preparing permanent slides	PSO – 3,5	Ap
CO - 3	understand the basic units of measurement	PSO - 1	U

CO - 4	recall the structure and functions of given instruments and develop creative skills for establishment	PSO – 6,9	R,C
CO - 5	demonstrate, use the techniques, skills, and tools necessary in research	PSO – 3,6	Ap
CO - 6	handle the biological instruments properly, competently and effectively in the laboratory	PSO - 9	An

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
Microscopy and micrometry						
I	1	General introduction of Microscopy and micrometry	2	To Know the importance of Microscopy and micrometry	Lecture	Assessing their knowledge through simple questions Formative assessment Short test
	2	Principles and techniques of Light microscope	3	To understand the working mechanism of Light microscope	Lecture Illustrations	
	3	Principles and techniques of EM	2	To study the Principles, specimen preparation for EM	Lecture, Video clippings	
	4	Principles and techniques of TEM and SEM	3	To be familiarize the Principles, working mechanism and comparison of TEM and SEM	Lecture Video clippings	
	5	Principles and techniques of Fluorescent microscopy	2	To study the principle and the applications of Fluorescent microscope	PPT presentation	
Microtechniques						
II	1.	Introduction to microtechniques	1	To recall the scope ofmicrotechnique	Chalk and talk method	Formative assessment Quiz Assessing
	2.	Aims, types and mechanism of fixation and common cytological fixatives	3	To understand the importance of fixation and common fixatives	Lecture	

	3.	Dehydration, embedding and sectioning with rotary microtome. Types of stains and staining; mechanism of staining	5	To learn and demonstrate the various stepsinvolved in permanent slide preparation	Demonstration	their practical knowledge
	4.	Principles and methods of microphotography	3	To understand the Principles and methods of microphotography	PPT Presentation	
Basic units and Centrifugation						
III	1	Introduction to basic units	1	To know the basic units of weights	Lecture	Quiz
	2	Atomic weight, molecular weight, Gram molecular weight, Equivalent weight and Gram equivalent weight	4	To differentiate the various units of weight	Lecture; Chalk and talk	Group discussion
	3	Preparation of solutions: Molar (M), Normal (N), Weight - volume per cent w/v, osmolar, molal (m), parts per million(ppm).	4	To learn the preparation of Normal and Molar solutions	Demonstration	Solving problem related to preparation of different concentrations of solutions
	4	Ultracentrifuge-Basic principles, types and their applications	3	To know the Centrifugation techniques, principle and working mechanism of Ultracentrifuge	Chalk and talk method	
Instrumentation						
IV	1.	Structure and functions of pH meter	2	To understand basic principle, working mechanism and usage ofpH meter	Lecture Demonstration	Group discussion Short test
	2	Structure and functions of Colorimeter	2	To understand the aim and working mechanism of	Lecture Demonstration	Assessing their practical knowledge

				Colorimeter		
	3.	Introduction to Spectroscopic techniques	2	To know the principles of light absorption	Lecture with PPT	
	4.	Basic principlesand laws of UV-Vis spectrophotometry	3	To study the working mechanism and application ofUV-Vis spectrophotometry	Lecture with demonstration	
	5.	Principle and working mechanism of Atomic Absorption Spectrophotometer	3	To learn theworking mechanism of Atomic Absorption Spectrophotometer	Lecture Video clippings	
Chromatographic & Electrophoretic Techniques						
V	1	Basic principles and applications of Paper ChromatographyandThin Layer Chromatography	2	To understand the principles behind the separation of phytochemicals through Thin Layer Chromatography	Lecture Demonstration	Group Discussion Formative assessment, Quiz Short test
	2	Basic principles and applications of Column Chromatography	2	To know the principles and applications of Column Chromatography	Lecture PPT	
	3	Basic principles and applications of HPLC	2	To study the basic principles and applications of HPLC	Lecture and PPT	
	4	Principles, types and applications of Agarose gel electrophoresis	2	To realize the principle and applications of Agarose gel electrophoresis	Lecture Video clippings	
	5	Principles, types and applications of Native PAGE and SDS –PAGE electrophoresis	2	To understand the Principles, types and applications of PAGE electrophoresis	Lecture PPT	