SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS), Salem- 636 016

Reaccredited with 'B++' Grade by NAAC (Affiliated to Periyar University)



OUTCOME BASED SYLLABUS

DEPARTMENT OF BOTANY (DBT STAR COLLEGE SCHEME Sponsored)

B.SC. BOTANY

(For the students admitted in 2022 – 23)

Programme Title: B. Sc. Botany

Programme Outcome

- PO1: To develop skilled and efficient professionals who can effectively cater to the growing demands of plant based industries.
- PO2: To acquire diverse knowledge to earn advanced degrees for the changing needs.
- PO3: To broaden the students' horizon in research organizations, herbal product companies, biotechnology industries and related disciplines for the betterment of the society.
- PO4: To face entrance and competitive examinations to pursue their career in state and national departments as an individual or in groups.
- PO5: To favour the graduates as entrepreneurs in developing and marketing products using modern technology for human needs.

Sri Sarada College for Women (Autonomous), Salem-16 DEPARTMENT OF BOTANY

(DBT Star College Scheme Sponsored)

Programme Structure under CBCS (For the students admitted in 2022–23)

Total Credits: 140 + Extra Credits (Maximum 28)

SEMESTER I						
Part	Course	Course Title	Code	Hrs./ week	Credits	
Ι	Language - 1	Tamil/ Hindi/ Sanskrit – I	22ULTC1/ 22ULHC1/ 22ULSC1	6	3	
II	English – I	Communicative English – I	22ULEC1	6	3	
	Core Course – I	Plant Diversity – I	22UBOC1	6	5	
	Core Practical – I	Core Practical – I	22UBOQC1	4	2	
III	Allied Course – I	Chemistry – I	22UBOAC1	3	3	
	Allied Practical - I	Allied Chemistry Practical	-	2	-	
IV	Skill Based –I	Nursery Raising Techniques	22UBOSQC1	2	2	
V	Extension Activity	Group Project based on Extension Activity	22UEXAC	1	1	
			TOTAL	30	19	
VI	 Articulation and Id Physical Fitness Pr Advanced Diploma Level 1: Certifica 	dea Fixation skills 6 ractice – 35 hrs. per semester a in Horticulture te course - 100 Hrs. per year				

SEMESTER II

	Language – II	Tamil/ Hindi/ Sanskrit – II	22ULTC2/		
Ι			22ULHC2/		_
			22ULSC2	6	3
II	English – II	Communicative English – II	22ULEC2	6	3
	Core Course – II	Plant Anatomy and	22UBOC2	5	5
		Embryology			
	Core Practical – II	Core Practical – II	22UBOQC2	4	2
Ш	Allied Course – I	Chemistry – II	22UBOAC2	3	3
111	Allied Dreatical I	Chamistury Durastical			4
	Alled Practical – I	Chemistry Practical	220BOAQCI	2	4
	Skill Based –II (Practical)	Home Gardening and		2	2
	Skill Based II (Flactical)	Floriculture	220000QC2	2	2
		Fioriculture			
		Environmental Studies	22UEVSC		1
IV			2201150		1
				2	
		Group Project based on	22UEVSPC		1
		Environmental Studies			
			TOTAL	30	24
VI	 Articulation and Idea Physical Fitness Practi Advanced Diploma Co Level 1: Certificate co 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extr purse in Horticulture purse - 100 hrs. per year -2 Extra 19 – 30 hrs 1 Extra Credit	a Credit 1 Credits		
VI	 Articulation and Idea Physical Fitness Practi Advanced Diploma Co Level 1: Certificate co Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extr ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit i for extra skills and courses qual	a Credit 1 Credits lified in MOOC/NPT	<u>`EL</u>	
VI	 Articulation and Idea Physical Fitness Practi Advanced Diploma Co Level 1: Certificate co Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extr ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit 1 for extra skills and courses qual SEMESTER III	a Credit 1 Credits lified in MOOC/NPT	<u>`EL</u>	
VI Part	 Articulation and Idea Physical Fitness Practi Advanced Diploma Co Level 1: Certificate co Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extro ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit i for extra skills and courses qual SEMESTER III	a Credit 1 Credits lified in MOOC/NPT Code	ÈEL	Credits
VI Part	 Articulation and Idea Physical Fitness Practi Advanced Diploma Co Level 1: Certificate co Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extro ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit a for extra skills and courses qual SEMESTER III Course Title	a Credit 1 Credits lified in MOOC/NPT Code	`EL Hrs/ week	Credits
VI Part	 Articulation and Idea Physical Fitness Practi Advanced Diploma Co Level 1: Certificate co Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extr ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit a for extra skills and courses qual SEMESTER III Course Title	a Credit 1 Credits lified in MOOC/NPT Code	`EL Hrs/ week	Credits
VI Part	 Articulation and Idea Physical Fitness Praction Advanced Diploma Conducted Level 1: Certificate course Yog Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extr ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III	a Credit Credits lified in MOOC/NPT Code 22ULTC3/	`EL Hrs/ week	Credits
VI Part	 Articulation and Idea Physical Fitness Practi Advanced Diploma Co Level 1: Certificate co Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extro ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit a for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III	a Credit Credits lified in MOOC/NPT Code 22ULTC3/ 22ULTC3/ 22ULHC3/	`EL Hrs/ week	Credits
VI Part	 Articulation and Idea Physical Fitness Practi Advanced Diploma Co Level 1: Certificate co Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extr ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit a for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III	a Credit Credits lified in MOOC/NPT Code 22ULTC3/ 22ULTC3/ 22ULHC3/ 22ULSC3	<u>`EL</u> Hrs/ week	Credits
VI Part I	 Articulation and Idea I Physical Fitness Practi Advanced Diploma Co Level 1: Certificate co Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extr ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit a for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III	a Credit Credits lified in MOOC/NPT 22ULTC3/ 22ULTC3/ 22ULSC3	<u>`EL</u> Hrs/ week 6	Credits
VI Part I	 Articulation and Idea I Physical Fitness Praction Advanced Diploma Conducted Level 1: Certificate course Yog Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extr ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit i for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III	a Credit Credits lified in MOOC/NPT 22ULTC3/ 22ULHC3/ 22ULSC3 22ULEC3	YEL Hrs/ week 6 6	Credits 3 3
VI Part I	 Articulation and Idea I Physical Fitness Practi Advanced Diploma Co Level 1: Certificate co Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extro ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit a for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III	a Credit Credits lified in MOOC/NPT 22ULTC3/ 22ULTC3/ 22ULHC3/ 22ULSC3 22ULEC3	EL Hrs/ week 6	Credits 3 3
VI Part I II	 Articulation and Idea I Physical Fitness Practi Advanced Diploma Co Level 1: Certificate co Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extro ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit a for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III Communicative English – III	a Credit Credits lified in MOOC/NPT 22ULTC3/ 22ULTC3/ 22ULAC3/ 22ULEC3 22ULEC3	YEL Hrs/ week 6 6 5	Credits 3 3 5
VI Part I II III	 Articulation and Idea I Physical Fitness Practi Advanced Diploma Concevel 1: Certificate concevel 1: Certificate course Yog Extra credits are given Course Language – III English – III Core Course – III	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extr ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit i for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III Communicative English – III	a Credit Credits lified in MOOC/NPT 22ULTC3/ 22ULTC3/ 22ULHC3/ 22ULEC3 22ULEC3 22UBOC3	EL Hrs/ week 6 6 5	Credits 3 3 5
VI Part I II	 Articulation and Idea I Physical Fitness Practi Advanced Diploma Co Level 1: Certificate co Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extro ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit a for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III Communicative English – III Plant Diversity – II Core Practical – III	a Credit Credits lified in MOOC/NPT 22ULTC3/ 22ULTC3/ 22ULHC3/ 22ULEC3 22ULEC3 22UBOC3 22UBOQC3	YEL Hrs/ week 6 6 5 4	Credits 3 3 5 2
VI Part I II III	 Articulation and Idea I Physical Fitness Practi Advanced Diploma Concevent Level 1: Certificate course Yog Certificate Course Yog Extra credits are given 	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extr ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit a for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III Communicative English – III Plant Diversity – II Core Practical – III	a Credit Credits lified in MOOC/NPT 22ULTC3/ 22ULTC3/ 22ULC3/ 22ULEC3 22ULEC3 22UBOC3 22UBOQC3 22UBOAC3	YEL Hrs/week 6 6 5 4 3	Credits 3 5 2 3
VI Part I II III	 Articulation and Idea I Physical Fitness Practi Advanced Diploma Concevent Level 1: Certificate concevent Sector Certificate Course Yog Extra credits are given Course Language – III English – III Core Course – III Core Practical – III Allied – II	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extr ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit i for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III Communicative English – III Plant Diversity – II Core Practical – III Zoology – I	a Credit Credits lified in MOOC/NPT 22ULTC3/ 22ULTC3/ 22ULHC3/ 22ULEC3 22UBOC3 22UBOC3 22UBOQC3 22UBOAC3	YEL Hrs/ week 6 5 4 3	Credits 3 3 5 2 3
VI Part I II III	 Articulation and Idea I Physical Fitness Practi Advanced Diploma Concevel 1: Certificate course Yog Certificate Course Yog Extra credits are given Course Language – III English – III Core Course – III Core Practical – III Allied – II Allied Practical	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extr ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III Communicative English – III Plant Diversity – II Core Practical – III Zoology – I Zoology Practical	a Credit Credits lified in MOOC/NPT 22ULTC3/ 22ULTC3/ 22ULHC3/ 22ULSC3 22ULEC3 22UBOC3 22UBOQC3 22UBOAC3 22UBOAC2	YEL Hrs/ week 6 5 4 3 2	Credits 3 3 5 2 3 -
VI Part I III III	 Articulation and Idea I Physical Fitness Practi Advanced Diploma Concevent Level 1: Certificate course Yog Certificate Course Yog Extra credits are given Course Language – III English – III Core Course – III Core Practical – III Allied – II Allied Practical	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extra ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit i for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III Communicative English – III Plant Diversity – II Core Practical – III Zoology – I Zoology – I	a Credit Credits lified in MOOC/NPT Code 22ULTC3/ 22ULTC3/ 22ULEC3 22ULEC3 22UBOC3 22UBOQC3 22UBOAC3 22UBOAQC2	YEL Hrs/ week 6 5 4 3 2	Credits 3 3 5 2 3 -
VI Part I II III	 Articulation and Idea I Physical Fitness Practi Advanced Diploma Concentration Level 1: Certificate concentration Certificate Course Yog Extra credits are given Course Language – III English – III Core Course – III Core Practical – III Allied – II Allied Practical Skill Based – III	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extra ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit i for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III Communicative English – III Plant Diversity – II Core Practical – III Zoology – I Zoology Practical Analytical Techniques in Plant	a Credit Credits lified in MOOC/NPT 22ULTC3/ 22ULTC3/ 22ULHC3/ 22ULEC3 22UBOC3 22UBOC3 22UBOQC3 22UBOAC3 22UBOAQC2 22UBOSQC3	YEL Hrs/ week 6 5 4 3 2 2 2	Credits 3 3 5 2 3 - 2
VI Part I III III	 Articulation and Idea I Physical Fitness Practi Advanced Diploma Concevel 1: Certificate course Yog Certificate Course Yog Extra credits are given Course Language – III English – III Core Course – III Core Practical – III Allied – II Allied Practical Skill Based –III	Fixation skills -1 Extra Credit ice – 35 hrs. per semester- 1 Extr ourse in Horticulture ourse - 100 hrs. per year -2 Extra ga –30 hrs 1 Extra Credit for extra skills and courses qual SEMESTER III Course Title Tamil/ Hindi/ Sanskrit – III Communicative English – III Plant Diversity – II Core Practical – III Zoology – I Zoology Practical Analytical Techniques in Plant Science	a Credit Credits lified in MOOC/NPT 22ULTC3/ 22ULTC3/ 22ULHC3/ 22ULEC3 22UBOC3 22UBOQC3 22UBOAC3 22UBOAC2 22UBOAQC2 22UBOSQC3	YEL Hrs/ week 6 5 4 3 2 2	Credits 3 3 5 2 3 - 2

IV	Non Major Elective - I				2	2		
				TOTAL	30	20		
	Extension Activity	Grou Activ	p project based on Extension vity					
	Life Skill Course	Cour	se I : Communication Skills		2	2(Extra)		
VI	 Articulation and Idea Fixation skills Physical Fitness Practice – 35 hrs. per semester Advanced Diploma in Horticulture Level 2: Diploma Course - 100 Hrs. per year Extra credits are given for extra skills and courses qualified in MOOC/NPTEL 							
	Non Moior Elective	o I	II					
		c = 1	Horuculture	22UBONECT				
	Allied Botany		For Zoology Students (Theory Practical)	& 22UZOAC3	_			
			SEMESTER IV					
I	Language – IV	Γ		22ULTC4/				
				22ULHC4/ 22ULSC4	6	3		
II	English – IV	(Communicative English – IV	22ULEC4	6	3		
	Core Course – IV	N	Aicrobiology	22UBOC4	4	5		
III	Elective – I	F A	Plant Biotechnology/ Agricultural Microbiology	22UBOEC1/ 22UBOESC1	5	5		
	Allied – II	Z	Zoology – II	22UBOAC4	3	3		
	Allied Practical	A	Allied Zoology Practical	22UBOAQC2	2	2+2		
IV	Skill Based –IV (Practical)	I A	Laboratory Techniques in Applied Biology	22UBOSQC4	2	2		
1,	Non-Major Elective – II				2	2		
		<u> </u>		TOTAL	30	27		
	Extension Activity	C E	Group project based on Extension Activity			2(Extra)		
	Life Skill Course	0	Course II : Professional Skills		2	2(Extra)		
VI	 Articulation and Idea F Physical Fitness Practic Advanced Diploma in F 	Fixation and the second second and the second secon	on skills-1 Extra Credit 5 hrs. per semester -1 Extra (ulture	Credit		<u> </u>		

	Level 2: Diploma Cours Extra credits are given for oriented Group Projects 	e - 100 Hrs r extra skil	s. per year -2 Extra Cre ls and courses qualified	edits 1 in MOOC/NPTE	L and S	Societal	
	Non-Major Elective –	II Home	Gardening	22UBONEC2			
	Allied Botany	For Zo Practica	ology Students (Theory & I)	22UZOAC4/ 22UZOACQ2			
			EMESTER V				
III	Core Course – V	Cytology		22UBOC5	5	5	
	Core Course - VI	Morphol Angiospe	ogy and Taxonomy of erms	22UBOC6	6	5	
	Core Course – VII	Biochem	istry and Biophysics	22UBOC7	5	5	
	Elective – II	Biostatis Bioinstru	tics and Bioinformatics / imentation	22UBOEC2/ 22UBOESC2	5	5	
	Core Practical – IV		ctical – IV Cytology, ogy and Taxonomy of erms, Biochemistry and matics	22UBOQC4	6	2	
	Non Major Skill Based – I	Dioinion			2	2	
IV	IV Value Education			22UVENC	1	-	
				TOTAL	30	24	
	Extension Activity	Group pr Activity	oject based on Extension	n			
	Life Skill Course	Course I Manager	II : Leadership and nent Skills		2	2 (Extra)	
 Articulation and Idea Fixation skills Physical Fitness Practice – 35 hrs. per semester Advanced Diploma in Horticulture Level 3: Advanced Diploma Course - 100 hrs. per year Extra credits are given for extra skills and courses qualified in MOOC/NPTEL Internship Training - 1 Extra Credit 							
	Non-Major Skill Bas	sed – I	Mushroom	22UBONSC1			
	For III BA/ B.Sc./B.	Com.	Cultivation				
		SI	EMESTER VI				
	Core Course – VIII	Plant Ph	ysiology	22UBOC8	6	5	

	Core Course – IX	Genetics, Plant Breeding and Evolution	22UBOC9	5	5
III	Core Course – X	Plant Ecology	22UBOC10	5	5
	Core Practical – V	Core Practical – V Plant Physiology, Genetics and Plant Ecology	22UBOQC5	6	2
	Elective – III	Project and Viva Voce	22UBOEPC	5	5
	Non Major Skill Based - II			2	2
IV	Value Education		22UVENC	1	2
			TOTAL	30	26
	Extension Activity	Group project based on Extension Activity		-	2(Extra)
VI					
VI	Life Skill Course	Course IV : Universal Human Values		2	2(Extra)

Non-Major Skill Based – II	Herbal Therapy	22UBONSC2
For III BA/B.Sc./B.Com.		

PART I & II	-	24
PART III	-	95
PART IV	-	20
PART V	-	01
TOTAL CREDITS	-	140

Programme Title	: B.Sc. Botany
Course Title	: Plant Diversity I
Course Code	: 22UBOC1
Semester	: I

Hours/Week : 5 Credits : 5

Course Objectives : The course aims

- To understand the fundamentals of the plant kingdom.
- To study the structure and reproduction of lower plants.
- To study the commercial importance of lower groups of plants such as Algae, Fungi and Lichen.
- To understand the relationship between Algae and Fungi forming Lichen.
- To differentiate disease causing microbes (pathogens) from beneficial and cause diseases in plants under plant pathology.

SYLLABUS

Unit – I (Hours: 15)

Introduction. General characters of Algae. Classification (Silva, 1982). Criteria for classification, algal distribution, thallus organization, reproduction, life cycle patterns. A detailed study of structure, reproduction and life cycle of the following genus (development excluded).

Cyanophyta: Unicellular – *Chalamydomonas*, Filamentous - *Oscillatoria*, *Nostoc*

Unit – II (Hours: 15)

A detailed study of structure, reproduction and the life cycle of the following genera (development excluded)

Chlorophyta: Colonial - *Volvox*, Foliaceous - *Ulva*, Filamentous - *Oedogonium*, Siphonaceous - *Caulerpa*.

Charophyta – Filamentous - Chara

Unit – III (Hours: 15)

A detailed study of structure, reproduction and life cycle of the following genera (development excluded)

Phaeophyta:	Parenchymatous - Sargassum
Bacillariophyta:	Unicellular - Diatoms - Navicula
Rhodophyta:	Siphonaceous Polysiphonia

Economic importance of Algae – Algae as food, medicine, fodder, agriculture, space research. Commercial products of algae – Agar agar, alginates, carrageenan, diatomite. Harmful aspects of algae.

Unit – IV (Hours: 15)

Introduction. General characters of Fungi. Classification of fungi (Alexopoulos and Mims, 1978). Criteria for classification. Characteristic features, structure, reproduction and life history of the following genera (development excluded).

Oomycetes:	Albugo
Ascomycetes:	Saccharomyces
Basidiomycetes:	Puccinia and Agaricus

Economic importance of fungi: Medicine, food, biopesticides, biofertilizers and industrial uses such as alcohol, acids and enzymes. Harmful effects of fungi.

Unit – V (Hours: 15)

Plant pathology – History, detailed studies of the nature of plant disease and its causal organisms, symptoms and control measures of the following - Red rot of sugarcane (*Saccharomyces*), Blast of rice (*Pyricularia*), Leaf spot of Tikka disease of groundnut (*Cercospora*) and Citrus Canker (Xanthomonas). Structure, types and reproduction of Lichens – Crustose (*Haematomma*), Foliose (*Paramelia*) and Fruticose (*Usnea*). Economic importance and ecological significance of Lichens.

Phytochemical constituents of above mentioned type study (self study)

Books for Study:

- 1. Srivastava, H.N. 2004. Algae. Pradeep Publications. (Unit I,II & III)
- 2. Srivastava, H.N. 2004. Fungi. Pradeep Publications.(Unit IV & V)

Books for Reference:

- 1. Bold, H.C. and Wynne, M.J.1978. Introduction to the Algae, Prentice-Hall, New Jersey.
- 2. Fritsch, F.E. 1945. The Structure and Reproduction in Algae, Cambridge University Press.
- 3. Kumar, H.D. 1990. Introductory Phycology. East-West Press Pvt. Ltd.
- 4. Sharma, O.P. 1992. Text book of Thallophytes. Tata McGraw Hill Publishing Company Ltd.
- 5. Smith, G.M. 1955. Cryptogamic Botany Vol-I, McGraw Hill Publishing Company Ltd.
- 6. Alexopoulos, C.J., Mims, C.S., Blackwell, M. 1996. Introductory Mycology. Wiley. NY.

7. Sharma, O.P. 2004. *Text book of Thallophyta*. Tata McGraw – Hill, Publishing Company Ltd.

Web Resources:

https://diatom.ansp.org

https://www.nature.com/articles/nmicrobiol2017120

https://www.psalgae.ord/ algal- web. links/#general links.

СО	CO Statement	Knowledge
Number		Level
CO1	Demonstrate the fundamentals concepts related to Algae, Fungi and Lichen	K2
CO2	Develop skills to illustrate Plant diseases.	K3
CO3	Examine the Morphology and life cycles of genera under Algae, Fungi and Lichens.	K4
CO4	Evaluate the significance of Fungi and its different types.	K5
CO5	Justify the economic importance of Algae and Fungi.	K5

Course Outcomes (CO): On completion of the course, students will be able to

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation; K6-Synthesis

Mapping of COs with POs:

POs	PO1	PO2	РОЗ	PO4	PO5
COs					
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
C05	S	S	S	S	S

Programme Title	: B. Sc. Botany	
Course Title	: Core Practical I	
Course Code	: 22UBOQC1	Hours/Week : 4
Semester	: I	Credits: 2

SYLLABUS

A detailed study of the genera included in Algae, Fungi and Lichens.

UNIT - I

Cyanophyta - Chalymodomonas, Oscillatoria, Nostoc

UNIT – II

Chlorophyta - Volvox, Ulva, Oedogonium, Caulerpa.

Charophyta - Chara

UNIT - III

Phaeophyta - Sargassum

Bacillariophyta - Diatoms - Navicula

Rhodophyta - Polysiphonia

$\mathbf{UNIT}-\mathbf{IV}$

Oomycetes - *Albugo* Ascomycetes - *Saccharomyces* Basidiomycetes - *Puccinia* and *Agaricus* Lichen - Crustose, Foliose and Fruticose

UNIT - V

Causative organisms and its symptoms

Red rot of sugarcane

Blast of rice

Tikka disease of groundnut

Citrus Canker

Students will submit the above mentioned diseased plant parts as a herbarium. (For Unit V)

Programme Title	: B. Sc. Botany	
Course Title	: Skill Based I (Practical): Nurser	y Raising Techniques
Course Code	: 22UBOSQC1	Hours/Week : 2
Semester	:I	Credits: 2
a ou a		

Course Objectives : The course aims

- To emphasize the basic principles and practices in nursery raising.
- To impart knowledge about various propagation techniques.
- To know how the nurseries provide growers a head on start on plant production.

SYLLABUS

- Garden tools Spade, Fork, Garden knife, Secateurs, Shears, Toppers, Pruning saw, Watering can.
- Preparation of nursery bed Containers and field
- Preparation of soil mixture
- Raising of seedlings
- Techniques in propagation
 - (i) Cutting Soft wood and Hard wood
 - (ii) Layering Ground Simple, Compound and Air Layering
 - (iii) Grafting Cleft and Whip
 - (iv) Budding T- budding and Patch
 - (v) Pruning Pinching and Disbudding

Books for Study:

- 1. Kumaresan, V., 2016. Horticulture, Saras Publication, Nagercoil.
- 2. Kumar, N. 2010. Introduction to Horticulture, Rajalakshmi Publications, Nagercoil,

Kanyakumari.

Books for Reference:

1. George Acquaah, 2002. *Horticulture – Principles and Practices*, 2nd edition, Prentice – Hall of India Pvt. Ltd., New Delhi.

- 2. Deena Beverley, 2004. Practical Gardening, Paragon Publishers, bath BAI IHE, UK.
- 3. Manibhushan Rao, K. 2005. *Text book of Horticulture*, Second Edition, Macmillan Publications, New Delhi.

Web Resources:

<u>https://www.nature.com</u> > hortres > about

<u>https://vfic.tanu.edu</u> > about > concepts

CO Number	CO Statement	Knowledge Level
CO1	Apply the basic principle and practices in nursery raising	К3
CO2	Analyse the different methods of plant propagation.	K4
CO3	Develop the skills to do various propagation techniques.	K6

Course Outcomes (CO) : On completion of the course, students will be able to

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation; K6-Synthesis

Mapping of COs with POs:

POs	PO1	PO2	PO3	PO4	PO5
COs					
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	М	S

Programme Title: B. Sc. BotanyCourse Title: Plant Anatomy and EmbryologyCourse Code: 22UBOC2Semester: IICredits: 5

Course Objectives : The course aims

• To know basic concepts of cell and Tissue systems and their organization in higher plants.

• To differentiate dicot plants and their growth pattern from monocot plants.

• To understand the abnormal (anomalous) secondary growth in higher plants as well as wound healing and abscission processes.

- To study and differentiate ovules and their types.
- To know the importance of polyembryony and development patterns in higher plants.

SYLLABUS

UNIT – I (Hours: 15)

Introduction to plant anatomy. Types of Tissues – Simple permanent – Structure, occurrence and functions of parenchyma, collenchyma, sclerenchyma. Structure and functions of Complex permanent tissues - xylem and phloem. Classification, distribution, structure and functions of meristem - theories of shoot apex (Histogen theory, Tunica corpus theory) and root apex (Apical cell theory, Korper - Kappe theory). Types of vascular bundles, Secretory tissues – lactiferous tissues.

UNIT – II (Hours: 15)

Primary Structure – root, stem and leaf of dicots and monocots. Types of stomatadiacytic, paracytic, tetracytic, actinocytic, anamocytic, anisocytic and graminaceous. Normal secondary growth in dicot root and stem – secondary xylem – axial system and ray system, annual rings, dendrochronology. Heart wood and sap wood, tyloses, lenticels. Components of secondary phloem.

UNIT – III (Hours: 15)

Anomalous secondary growth in Dicot stem (*Bignonia, Boerhaavia* and *Nyctanthes*) and Monocot stem (*Dracaena*). Abscission and wound healing. Nodal Anatomy - Unilacunar, trilacunar and multilacunar nodes. Applications of Plant Anatomy in other fields.

UNIT – IV (Hours: 15)

Structure of mature anther, microsporogenesis and pollen morphology. Structure of ovule, megasporogenesis. Types of ovules - monosporic (*Polygonum*), bisporic (*Allium*) and tetrasporic (*Peperomia*).

UNIT – V (Hours: 15)

Double fertilization, endosperm, types - cellular, nuclear, helobial and ruminate. Haustoria and its functions. Embryo development in Monocots (*Luzula* type) and Dicots (*Crucifer* type), Apomixis and Polyembryony - Types, causes and practical application. Application of embryology in other fields.

Books for Study:

- 1. Pandey, S.N. and Chadha, A. 2006 (Reprint Edition). *Plant Anatomy*. S. Chand and Co. (For Unit I, II & III)
- 2. Annie Ragland and Kumaresan, V. 2010. *Developmental Botany and Experimental Embryology*. Saras Publication, Nagercoil. (For Unit IV &V)

Books for Reference:

- 1. J. Eames and L.H. Mac Daniels. 1953. *An Introduction to Plant Anatomy*. McGraw HillBook Company.
- 2. Cutter E.G. 1969. *Plant Anatomy* Part I and II Edition Wesley Publishers.
- 3. Maheswari. P. 1971. *An Introduction to the Embryology of Angiosperms*. Tata McGraw HillPub. Co. Ltd.
- 4. Esau. K. 1985. *Plant Anatomy*. Wiely Eastern Pvt. Ltd.
- 5. Fahn. A. 1987. Plant Anatomy. Pergamon Press.
- 6. Bhojwani, S.S and Bhat Nagar, S.P. 2009. *The Embryology of Angiosperms*. Vikas Publishing House (P) Ltd. New Delhi

Web Resources:

https://catalog.princeton.edu https://searchworks.stanford.edu

Course Outcomes (CO) : On completion of the course, students should be able to

CO	CO Statement	Knowledge
Number		Level
CO1	Describe the organization of cell and tissue systems in higher	K2
	plants.	
CO2	Explain anomalous secondary growth in higher plants.	K2
CO3	Distinguish the internal structure of dicot plants from monocots.	K4

CO4	Examine the Microsporogenesis and Megasporogenesis.	K4
CO5	Elaborate the mode of embryo development in dicots and	K6
	monocots.	

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation;

K6- Synthesis

Mapping of COs with POs:

POs Cos	PO1	PO2	PO3	PO4	PO5
C01	М	S	S	S	М
CO2	М	S	М	S	М
CO3	М	S	S	S	М
CO4	М	S	S	S	М
CO5	М	S	S	S	М

Programme Title	: B. Sc. Botany
Course Title	: Core Practical – II
Course Code	: 22UBOQC2
Semester	: II

Hours/Week : 4 Credits: 2

SYLLABUS

- 1. Simple and complex tissue in cross section and maceration, and types of wall thickening to be observed.
- 2. Internal structure of stem Dicotyledonous stem Young Aristolochia, *Cucurbita* and old stem - *Corchorus* Monocotyledonous stem – *Maize*.
- Internal structure of root, dicot young and old roots Bean, Monocot root Maize, Aerial root – Tinospora, Ficus. Anomalous secondary growth in stems – Nyctanthes, Bignonia, Boerhaavia, Dracaena.
- 4. Internal structure of leaf– Dicot leaf Isobilateral *Nerium*, *Eucalyptus*, Dorsiventral *Hibiscus*.
- 5. Monocot leaf Graminaceous *Grass*. Non-Graminaceous *Tradescantia* or *Allium*, Stomatal types.

Embryology

- 1. Pollen morphology Invitro germination
- 2. Anther T.S. young and mature
- 3. Ovule L.S. showing embryo sac & developing stages 2 & 4 Nucleate stage
- 4. Embryo mounting *Tridax* or *Cucumber*.

Programme Title	: B. Sc. Botany	
Course Title	: Skill Based II (Practical): 1	Home Gardening and Floriculture
Course Code	: 22UBOSQC2	Hours/Week : 2
Semester	: II	Credits: 2
Course Objectives	: The course aims	

- To provide basic knowledge about various types of garden.
- To impart the importance of organic manuring.
- To inculcate career opportunities and self-entrepreneurial skills.

SYLLABUS

- Training on establishment of various types of garden
 - (i) Herbal garden (Medicinal plants)
 - (ii) Terrace garden
 - (iii) Kitchen garden
 - (iv) Ornamental garden
 - (v) Bottle garden
- Bonsai
- Protocol for preparing organic manure
- Display of flowers Floral designing Circular, Triangular, Line and Holiday arrangements
- Flower projects for the home Greeting card; Gift card; Gift tag & Family album
- Bouquet making

Books for Study:

- 1. Manibhushan Rao, K. 2005. *Text book of Horticulture*, Second Edition, Macmillan Publications, New Delhi.
- Kumar, N. 2010. *Introduction to Horticulture*, Rajalakshmi Publications, Nagercoil, Kanyakumari.
- 3. Kumaresan, V., 2016. Horticulture, Saras Publication, Nagercoil.

Books for Reference:

- 1. Jane Newdick, Veevers-Carter, M. 1993. *The Complete Flower Arranger*, Colour LibraryBooks, Singapore.
- Charles Griner, 1995. Floriculture Designing and Merchandizing, Delmer Publishers[™], New York.
- 3. Joanna Sheen, 1995. Flower projects for the Home, Premier editions, London.

Web Resources:

https://okcareertech.org

Course Outcomes (CO) : On completion of the course, students will be able to

СО	CO Statement	Knowledge
Number		Level
CO1	Illustrate the fundamental principle and utilize the elements of home gardening.	K2,K3
CO2	Apply basic knowledge on various types of garden.	K3
CO3	Utilize opportunities in home gardening.	K3

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation;

K6- Synthesis

Mapping of COs with POs :

POs	PO1	PO2	PO3	PO4	PO5
Cos					
CO1	S	S	S	S	S
CO2	S	S	М	S	S
CO3	S	М	М	М	S

Programme Title	: B. Sc. Botany
Course Title	: Plant Diversity- II
Course Code	: 22UBOC3
Semester	: III

Hours/Week : 5 Credits: 5

Course Objectives: The course aims

• To understand the basics of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany.

• To study the structure, reproduction and life history of plants.

• To highlight the importance of Bryophytes, Pteridophytes and Gymnosperms in the plant kingdom.

SYLLABUS

Unit I - (Hours:15)

Bryophytes – General characters and classification (Proskauer and Reimer, 1954). A detailed study of the structure and life history of the following genera. (Excluding the developmental stages)

Marchantia and Polytrichum

Unit II - (Hours:15)

Pteridophytes – General characters and classification (Reimer's, 1958). Eusporangiate and Leptosporangiate development. Homospory, heterospory and seed habit. Embryo development – endoscopic and exoscopic, apogamy, apospory and parthenogenesis. Stelar evolution.

Unit III - (Hours:15)

A detailed study of the structure and life history of the following genera (excluding the developmental stages)

Lycopodium, Selaginella and Equisetum

Unit IV - (Hours:15)

A detailed study of the structure and life history of the following genera (excluding the developmental stages)

Adiantum and Marsilea

Gymnosperms - General characters and classification (Sporne, 1962). A detailed study of the structure and life history of the following genera (excluding the developmental stages) *Cycas* and *Gnetum*

Unit V - (Hours:15)

Fossils, Fossilization, Dating of Fossil – Carbon dating method, Geological time scale. Study of form genera – *Rhynia*

Ecological and Economic importance of Bryophytes, Pteridophytes, Gymnosperms.

Books for Study:

Srivastava, H.N. 2004. *Bryophyta*. Pradeep Publications, New Delhi. 2. Srivastava, H.N.
 2004. *Pteridophyta*, Pradeep Publications, New Delhi. 3. Srivastava, H.N. 2004.
 Gymnosperms. Pradeep Publications, New Delhi.

Books for Reference:

Vashishta, B.R. 1991. Bryophyta. S. Chand and Company Ltd. Ram Nagar, New Delhi. 2.
 Eames, A.J. 1936. Morphology of Lower Vascular Plants. McGraw Hill. 3. Vashishta,
 P.C.1987. Vascular Cryptogams Pteridophyta. S. Chand & Company Ltd. Ram Nagar, New Delhi.

4. Vashishta, P.C, Sinha, A.K. and Anil Kumar, 2006. *Gymnosperms*. S. Chand & Company Ltd. Ram Nagar, New Delhi.

5. Gangulee and Kar. 1999. *College Botany* Vol. II. Revised Edition S. Chand& Company Ltd. RamNagar, New Delhi.

Web Resources:

https://onlinecourses.swayam2.ac.in/cec20_bt11/preview

CO Number	CO Statement	Knowledge Level
CO1	List out the fundamental characters of Bryophytes, Pteridophytes and Gymnosperms	K1
CO2	Explain the general characters, stelar evolution in Pteridophytes, heterospory and origin of seed habit.	K2
CO3	Examine the morphology, structure, reproduction and life cycle of Bryophytes, Pteridophytes and Gymnosperms	K4
CO4	Analyse the alternation of the generation of Cryptogams and Gymnosperms.	K4
CO5	Discuss the fossil and fossilization, the economic importance of Bryophytes, Pteridophytes and Gymnosperms.	K6

Course Outcomes (CO): On completion of the course, the students will be able to

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation; K6- Synthesis

Mapping of COs with POs:

POs	PO1	PO2	PO3	PO4	PO5
COs					
C01	М	S	S	S	М
CO2	М	S	S	S	М
CO3	М	S	S	S	М
CO4	М	S	S	S	М
CO5	М	S	S	S	М

Programme Title	: B. Sc. Botany
Course Title	: Core Practical III
Course Code	: 22UBOQC3
Semester	: III

Hours/Week: 4 Credits: 2

SYLLABUS

A Study of Morphological, Anatomical and Reproductive Structure of:

Bryophytes : Marchantia and Polytrichum.

Pteridophytes: Lycopodium, Selaginella, Equisetum, Adiantum and *Marsilea*. Gymnosperms: Cycas and Gnetum.

Fossils: Rhynia

Programme Title	: B. Sc. Botany	
Course Title	: Skill Based III (Practical): Analy	tical techniques in Plant Science
Course Code	: 22UBOSQC3	Hours/Week: 2
Semester	: 111	Credits: 2

Course Objectives : The course aims

1. To provide basic knowledge about analytical techniques used in plant science.

- 2. To improve practical skills for higher studies.
- 3. To inculcate lab-oriented skills among students.

SYLLABUS

- ➤ Safety guidelines General guidelines for lab session (Good Laboratory practice GLP)
- ► Guidelines for working with bacteria
- > Universal precautions Biosafety levels I, II, III, IV

Handling of microscopes – Light microscope, Dark field, Phase contrast; Microscope accessories – Micrometer, Camera Lucida and Ultrascope.

Homogenizer (Mortar and Pestle), Magnetic stirrer, Vortex mixer, Bunsen Burner, Water Bath, Glass Distillation Apparatus

> Centrifuge and Spectrophotometry – Principles and working mechanism.

Books for Study:

1. Rajan, S., Selvi Christy, R. 2015. *Experimental Procedures in Life Sciences*, Anjanaa Book house Publishers, Chennai.

Books for Reference:

1. Kalaichelvan, P.T., 2008. *Microbiology and Biotechnology – A laboratory manual*, MJP Publishers, Chennai.

2. Sadasivam, S., Manickam, A. 2008. *Biochemical Methods*, 3rd edition, New age international (P) Ltd., Publishers, New Delhi.

3. David T Plummer. 2017. *An Introduction to Practical Biochemistry*, 3ed edition, Mac Graw Hill Publications, New York

4. Jayaraman, J. 2011. *Laboratory Manual in Biochemistry*, New Age International Publishers, Bengaluru.

5. Das, S. and Saha, R. 2020. Microbiology Practical Manual, CBS Publishers, New Delhi.

Web Resources:

https://microbiologyonline.org/file/7926d7789d8a2f7b2075109f68c3175e.pdf elte.prompt.hu/sites/default/files/tananyagok/PracticalMicrobiology/book.pdf Course Outcomes (CO): On completion of the course, the students will be able to

СО	CO Statement	Knowledge
Number		Level
CO1	Interpret the safety guidelines for working with microorganisms.	K2
CO2	Organize the usage of instruments employed in plant Science research	K3
CO3	Categorize the laboratory Equipments in Plant Science	K4
CO4	Choose appropriate techniques adapted in Plant Science	K6

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation;

K6- Synthesis Mapping of COs with POs :

POs Cos	PO1	PO2	PO3	PO4	PO5
CO1	М	S	S	S	М
CO2	S	S	S	М	М
CO3	М	S	S	М	М
CO4	S	S	S	S	S

Programme Title	: B. Sc. (Zoology)		
Course Title	: Allied Botany – I (Morphology, Taxonomy, Anatomy and		
	Embryology)		
Course Code	: 22UZOAC3	Hours/Week : 3	
Semester	: III	Credits: 3	
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Course Objectives : The course aims

- To study the morphology of the plant parts.
- · To study the characters and economic importance of selected families.
- To understand the internal structure of various plant parts.
- To acquire knowledge about the reproductive parts of plants.

SYLLABUS

UNIT - I (Hours:9)

Morphology of Angiosperms – Root and Stem – structure and types. Leaves – stipules, phyllotaxy, venation and types – simple, compound (modifications excluded).

UNIT - II (Hours:9)

Inflorescence – types – Racemose, Cymose and Special Types. Flower – Parts of the flower – calyx, corolla, androecium and gynoecium. Fruit – Fleshy and dry fruits.

UNIT - III (Hours:9)

Taxonomy - Outline of Bentham and Hooker's system of classification. A detailed study of the range of characters in the following families - Annonaceae, Rutaceae, Cucurbitaceae, Rubiaceae, Amaranthaceae and Poaceae.

UNIT - IV (Hours:9)

Anatomy – Introduction, Meristem - classification and types: Tissues - Simple Permanent tissues; Complex tissues (A brief outline of xylem and phloem), Primary (Dicot and Monocot) and Secondary (Dicot) structures of stem and root (excluding anomalous). Leaf – dicotyledon (*Hibiscus, Nerium*) and monocotyledon (Grass).

UNIT - V (Hours:9)

Embryology - Structure of Anther - Microsporangium, Male gametophyte, Structure of Ovule - Megasporangium, female gametophyte, dicot embryo – *Capsella bursa-pastoris* (development excluded).

Books for Study:

 Rao, K. N., Krishna Murthy, K.V. and Sudhakara, Rao G. 1993, *Ancillary Botany*, Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai

Books for Reference:

1. Muneeswaran, A., 1983, A Text Book of Botany, 2nded, Brighton Book House, Chennai.

2. Gangulee, H.C and Kar, A.K. 2002. *College Botany*, Vol.II, Revised Edition, New Central Book Agency (P) Ltd., Kolkata.

3. Rasod, S. K., Sekar, T., 2004. *Allied Botany* Paper II, 1st ed., Popular Book Depot, Chennai.

4. Gangulee, H.C., Das, K.S. and C. Duta, 2007. *College Botany*, Vol.I, 6thed. New Central Book Agency (P) Ltd., Kolkata.

5. Annie Ragland, Kumaresan, V. & Arumugam, N. 2014. *Algae, Fungi, Bryophytes and Plant pathology*. Saras Publication, Nagercoil.

Web Resources:

www.freebookcentre.net/Biology/Botany-Books.html

СО	CO Statement	Knowledge
Number		Level
CO1	Demonstrate the Morphology of vegetative parts of plants.	K2
CO2	Describe the basic concepts in Plant Anatomy and Embryology.	K2
CO3	Identify the morphology of reproductive structures of the Plant.	К3
CO4	Classify the plants based on Bentham and Hooker's system of classification.	K4
CO5	Examine the internal structure of various plant organs.	K4

Course Outcomes (CO):On completion of the course, the students will be able to

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation; K6- Synthesis

Mapping of COs with POs

POs Cos	PO1	PO2	PO3	PO4	PO5
C01	М	S	М	S	М

CO2	М	S	М	S	М
CO3	М	S	М	S	М
CO4	М	S	М	S	М
CO5	М	S	М	S	М

Programme Title	: B.A./ B. Sc./ B.Com.	
Course Title	: Non Major Elective I: Horticulture	
Course Code	: 22UBONEC1	Hours/Week:2
Semester	: III	Credits – 2
Course Objectives	: The course aims	

• To incorporate the principles and practices of horticulture.

- To provide knowledge of the propagation techniques.
- To create an aesthetic value among students.
- To offer immense scope for growing horticultural plants.
- To highlight the value of cultivating horticultural crops.

SYLLABUS

Unit – I (Hours : 6)

Introduction, divisions and scope of Horticulture, A brief knowledge of ornamental plants - annuals, biennials and perennials.

Unit –II (Hours: 6)

Propagation techniques – Cuttage and its types - root cuttings, stem cuttings – herbaceous, soft wood, semi-hard wood, hard wood cuttings, leaf and leaf bud cuttings. Layering and its types – ground layering – tip, simple, compound, trench, mound layering and air layering.

Unit – III (Hours : 6)

Budding and its types -T - budding, patch, chip, flap, ring and flute budding. Graftage and its types – approach or inarching, whip, cleft, top, veneer, epicotyl and bud grafting.

Unit – IV (Hours: 6)

Pruning - root, ringing, notching, smudging, bending, pinching and thinning. System of irrigation – surface, sub-surface and overhead irrigation.

Unit – V (Hours: 6)

Types of manures, fertilizers and its applications, types of pots and containers, pot mixtures for horticultural plants.

Books for Study:

1. Kumar, N. 1986. *Introduction to Horticulture*, Rajalakshmi Publications, Nagercoil, Kanyakumari.

2. Kumeresan, V. 2009. Horticulture, Saras publication, Nagercoil, Kanyakumari.

Books for Reference:

1. Adams, C. R., K. M. Banford and M. P. Early. 1993. *Principles of Horticulture*. Butterworth Heineman Ltd., London.

2. Edmond, J. B., T. L. Senn, F.S. Adrews and R. J. Halfacre. 1977. *Fundamentals of Horticulture* (4th Ed.) Tata McGraw-Hill, New Delhi.

3. Rao, K .M 1991. A Text Book of Horticulture. McMillan India Ltd, New Delhi.

Web Resources:

www.agrimoon.com/horticulture-icar-ecourse-pdf-books/

Course Outcomes (CO) : On completion of the course, the students will be able to

CO	CO Statement	Knowledge
Number		Level
CO1	List out the various groups of Horticultural plants	K1
CO2	Outline plant propagation techniques and its applications.	K2
CO3	Apply the principles and practices of Horticulture.	K3
CO4	Classify the manures and fertilizers for Horticultural plants	K4
CO5	Distinguish different groups of ornamental plants	K4

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation;

K6- Synthesis Mapping of COs with POs

POs	PO1	PO2	PO3	PO4	PO5
COs					
C01	М	М	М	S	S
CO2	М	М	М	М	S
CO3	S	М	М	М	S
CO4	S	М	М	М	S
CO5	S	М	М	S	S

Programme Title: B. Sc. BotanyCourse Title: MicrobiologyCourse Code: 22UBOC4Semester: IV

Hours/Week :4 Credits – 4

Course Objectives: The course aims

• To understand the scope of Microbiology.

• To know the structure and classification of bacteria and viruses.

• To provide knowledge about the spoilage of food and preservation.

• To study the production of antibiotics, alcohol and organic acids.

SYLLABUS

UNIT - I (Hours:12)

History and scope of Microbiology - Biogenesis, Abiogenesis, Germ theory of diseases, Koch postulates, Whittaker's Five Kingdom Concept.

An outline classification of bacteria (Bergey's system), Ultrastructure of bacteria – Capsule, Flagella (structure and locomotion – spirochetal and gliding), Pili. Cell wall – chemical composition, Gram-positive and Gram-negative bacteria. Bacterial growth – growth curve, Cultivation techniques – pour plate, spread plate, streak plate, subculturing and broth culture.

Unit II - (Hours:12)

Nutritional types of bacteria – Autotrophs – Photoautotrophs, Chemoautotrophs; Heterotrophs and its types. Genetic recombination in bacteria - Transformation, Conjugation, Transduction, Lysogeny. Economic importance of bacteria.

UNIT - III (Hours:12)

An outline classification of viruses. Viruses – general characters, symptoms, structure and replication. General characters of Bacteriophage, Cyanophage, Mycophage; Structure and reproduction of Tobacco Mosaic Virus (TMV).

UNIT - IV (Hours:12)

Microbes in industries – Antibiotics – Penicillin (fermentation, recovery), Production of organic acids – Vinegar (substrate, method) and citric acid (fermentation, medium manufacturing process, recovery and uses) production. Microbiology of water – sewage treatment – primary, secondary and tertiary.

UNIT - V (Hours:12)

Food Microbiology – Spoilage of food, methods of food preservation – physical and chemical. Diary Microbiology – Dairy Products – Cheese and yogurt; Single Cell Protein (SCP) – definition, advantages and mass culture of Spirulina.

Books for Study:

1. Dubey, R.C. & Maheswari, D. K. 2000. *A Textbook of Microbiology*. S. Chand and Company Ltd., Ram Nagar, New Delhi.

2. Biswas, S.B. 1976. An Introduction to Virus. Vikas Publishing House Ltd.

Books for Reference:

1. Atlas, R.M. 1996. *Principles of Microbiology*, Second Edition, W.M.T. Brown Publishers.

2. Willey, J.M., Sherwood, L.M., Woolverton, C.J. 2008. *Prescott, Harley and Klein's Microbiology*, Seventh Edition, McGraw Hill Higher Education

3. Pelczar, M.J., Chan, E.C.S., Kreig, N.R. 1993. *Microbiology*. Fifth Edition. McGraw Hill Book Company.

4. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L., Painter, P.R. 2005. *General Microbiology*, Fifth Edition, McMillan.

5. Tortora, G.J., Funke, B.R., Case, C.L. 2008. *Microbiology: An Introduction*. Ninth Edition. Pearson's Education.

Web Resources:

https://microbiologynotes.org/

https://nptel.ac.in/courses/102/103/102103015/

Course Outcome (CO): On completion of the course, the students will be able to

СО	CO Statement	Knowledge
Number		Level
CO1	Comprehend the principles and scope of Microbiology.	K2
CO2	Explain salient features of microorganisms.	K2
CO3	Organize the fundamentals of the association of microbes in industry.	К3
CO4	Analyse the role of microbes in the production of food and food spoilage.	K4
CO5	Choose experiments to study microorganisms and their applications	K6

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation; K6- Synthesis

Mapping of COs with POs

POs	PO1	PO2	PO3	PO4	PO5
COs					
C01	М	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

Programme Title: B. Sc. BotanyCourse Title: Elective I: Plant BiotechnologyCourse Code: 22UBOEC1Semester: IV

Hours/Week: 5 Credits: 5

Course Objectives: The course aims

• To understand the basic concepts of Biotechnology.

• To learn tissue culture techniques.

• To understand the importance of producing virus free plants through tissue culture. • To study different kinds of techniques of Plant Biotechnology.

• To create awareness about the plant products obtained through transgenic plants.

SYLLABUS

UNIT - I (Hours:15)

Introduction – History of tissue culture; Establishment of tissue culture lab, Sterilization techniques – Wet, Dry, Flame, Filter and Surface Sterilization methods, Nutritional composition of the medium. Types of media – Solid (MS and Nitsch) and Liquid (B5 and Gamborg's). Micropropagation- Tissue and Organ. Anther and embryo culture.

UNIT - II (Hours:15)

Callus culture – initiation and maintenance of callus, suspension culture – types – batch, continuous and immobilized cultures, Subculturing, Hardening, Somatic Embryogenesis.

UNIT - III (Hours:15)

Meristem culture – production of virus-free plants, culture, browning of the medium, thermotherapy, Cryotherapy and Chemotherapy. Virus – indexing, maintenance of virus–free stocks, applications and limitations.

UNIT - IV (Hours:15)

Somatic hybridization – protoplast isolation, fusion, selection of hybrid cells, regeneration of hybrid plants, symmetric and asymmetric hybrids, fate of plasma genes, Cybrids.

UNIT - V (Hours:15)

In vitro Plant Secondary metabolite production – Alkaloids, Terpenoids and Phenolic Compounds, Factors affecting secondary metabolite production, Synthetic seed Technology.

Books for Study:

1. Singh.B.D., 2015. Biotechnology. Kalyani Publishers, Ludhiana.

 Sathyanarayana.U & Chakrapani. U 2020. *Biotechnology* Biotechnology books & Allied Ltd. Books& Ltd.

Books for Reference:

1. Reinest, J., and Bajaj, Y.P.S., 1990. *Plant, Cell, Tissue and Organ culture*. NarosaPublication, New Delhi.

2. Singh, B.D., 2003. Biotechnology, Kalyani Publishers, Ludhiana.

3. Ramawat, K.G., 2006. *Plant Biotechnology*. S. Chand and Co. Ram Nagar, New Delhi 4. Chawla, H.S., 2003. *Laboratory Manual for Plant Biotechnology*. Oxford and IBH Publication PVT Ltd., New Delhi.

5. Razdan.M.K. (2003), Introduction to Plant Tissue Culture (2nd Edition) Enfield.N.H. (u.a). Oxford Publishers,

Web Resources:

https://www.university.youth4works.com https://agrimoon.com

CO Number	CO Statement	Knowledge Level
CO1	Define the fundamentals of Biotechnology and Tissue culture	K1
CO2	Interpret the significance of Sterilization Techniques, Callus culture and Somatic Embryogenesis.	K2
CO3	Apply the various techniques adapted to develop Somatic hybrids and Plasma genes	К3
CO4	Analyse the techniques to protect the plants from viral diseases.	K4
CO5	Discuss the production of Secondary metabolites with factors	K6

Course Outcomes (CO): On completion of the course, the students will be able to

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation; K6- Synthesis

Mapping of COs with POs

and Synthetic Seed Technology.

POs Cos	PO1	PO2	PO3	PO4	PO5
C01	S	S	S	S	S

CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
C05	S	S	S	S	S
Programme Title: B. Sc. BotanyCourse Title: Elective I: Agricultural MicrobiologyCourse Code: 22UBOESC1Semester: IV

Hours/Week : 5 Credits: 5

Course Objectives : The course aims

• To understand the basic concepts of soil-microbe interaction.

• To create awareness on restoration of soil fertility through microbes.

SYLLABUS

UNIT - I (Hours:15)

Types of Microorganisms in soil - bacteria, fungi, actinomycetes, algae and protozoa.

UNIT - II (Hours:15)

Brief account of microbial interaction: Symbiosis, neutralism, Commensalism, Competition, Ammensalism, Synergism, Parasitism.

UNIT - III (Hours:15)

Role of rhizosphere, microorganism in improving soil fertility. Crop Rotation. Role of microorganism in decomposition of organic matter.

UNIT - IV (Hours:15)

Nitrogen cycle in nature – biological nitrogen fixation, biofertilizer, *Rhizobium* – root nodulation – mass multiplication methods, field application. *Azospirillum*, mass multiplication methods.

UNIT - V (Hours:15)

Biological control of soil-borne microbial pathogens and nematodes - Microbial pesticides. Interaction of synthetic pesticides with soil Microorganisms. Entomopathogenic fungi.

Books for Study:

 Bagyaraj, D. J., Rangaswami, G. 2007. Agricultural Microbiology. 2nd edition, PHI Learning Pvt. Ltd. New Delhi.

2. Subba Rao, N.S. 1999. Soil Microbiology. 4th edition, Oxford and IBH Publishing, New Delhi.

3. Craig C. Sheaffer and Kristine M. Moncada. 2012. Introduction to Agronomy-Food crops and Environment (Second Edition), Cengage Learning.

4. Reddy S.R. 2017. Principles of Agronomy, Kalyani Publishers.

5. George Acquaah, 2015. Principles of Crop production: Theory, Techniques and Technology, Prentice Hall India Learning Private Limited.

Web Resources:

https://www.university.youth4works.com

https://agrimoon.com

Course Outcomes (CO): On completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Summarize different groups of soil microorganisms.	K2
CO2	Compare the interaction between microorganisms and plants.	K4
CO3	Distinguish different components of soil and its role in Agricultural Microbiology.	K4

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation; K6- Synthesis

Mapping of COs with POs

POs COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S

Programme Title: B. Sc. BotanyCourse Title: Skill Based – IV (Practical): Laboratory techniques in AppliedBiologyCourse Code: 22UBOSQC4Hours/Week : 2Semester: IVCourse Objectives: The course aims

• To create awareness among students about basic techniques of applied biology. • To cultivate lab-oriented skills among students.

• To acquire hands-on training in Microbiology and Biotechnology.

• To enhance the practical knowledge of students for their higher studies.

SYLLABUS

Sterilization – Principles and methods – (i) Wet sterilization – Autoclave (ii) Dry sterilization – Hot Air Oven (iii) Flame sterilization (iv) Filter sterilization

➤ Laminar air flow hood

- Staining of Bacteria Simple staining; Differential staining Gram staining
- ≻ Temporary wet mount of microorganism (TWM)
- Hanging drop technique
- > Preparation of glass wares for Plant Tissue Culture (PTC)
- ➤ Sterilization of explants in PTC

Media preparation – Nutrient agar and broth (Bacteria); Potato Dextrose Agar (Fungi); Murashige & Skoog's (MS medium) and inoculation of explants in PTC > Cultivation and subculturing of bacteria.

- ► Isolation and enumeration of bacteria.
- Growth curve of bacteria
- > Cultural Characteristics IMViC tests
 - a. Indole Production test
 - b. Methyl-Red and Voges-Proskauer test
 - c. Citrate Utilization Test
- > Antibacterial potency of natural products

Books for Study:

1. Aneja, K.R., 2003. *Experiments in Microbiology, Plant pathology and Biotechnology* (Fourth Revised edition, New Age International (P Ltd, Publishers, New Delhi).

Books for Reference:

1. Kalaichelvan, P.T., 2008. *Microbiology and Biotechnology – A Laboratory manual*, MJP Publishers, Chennai.

2. Gayatri, M.C., Kavyashree, R., 2015. *Plant tissue culture – Protocols in Plant Biotechnology*, Narosa Publishing House Pvt. Ltd., New Delhi.

3. Das, S. and Saha, R. 2020. Microbiology Practical Manual, CBS Publishers, New Delhi.

4. Tejovathi G, Vimala Y, RekhaBhadauria. 1996. *Practical Manual for Plant Biotechnology*, CBS Publishers.

5. Ali, S.M. 2009. Practical Manual of Biotechnology, Aavishkar Publishers.

Web Resources:

https://microbiologyonline.org/file/7926d7789d8a2f7b2075109f68c3175e.pdf

Course Outcomes (CO): On completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the basic techniques of Applied Biology.	K2
CO2	Apply the sterilization techniques in Microbiology and Biotechnology.	K3
CO3	Distinguish different plant tissue culture techniques.	K4
CO4	Develop the skill of handling microbes.	K6

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation;

K6- Synthesis

Mapping of COs with POs and PSOs

POs	PO1	PO2	PO3	PO4	PO5
COs					
CO1	S	S	S	М	S
CO2	S	S	S	М	S
CO3	S	S	S	S	S
CO4	S	S	S	М	S

- To understand the diversity among the Cryptogams.
- To study the reproduction and life cycle of Cryptogams and Gymnosperms.
- To understand the metabolic activities of plants.

SYLLABUS

UNIT - I (Hours:9)

Algae – Detailed study of structure and reproduction of the following genera *Oscillatoria* and *Oedogonium*

UNIT - II (Hours:9)

Fungi - Detailed study of structure and reproduction of the genus *Polyporus*. Bryophytes - Detailed study of structure and reproduction of the genus *Funaria*

UNIT - III (Hours:9)

Pteridophytes - Detailed study of structure and reproduction of the genus

Lycopodium.

Gymnosperms - Detailed study of structure and reproduction of the genus Cycas

UNIT – IV (Hours:9)

Absorption of water - (Active & Passive) and salts (Contact ion exchange theory, Carbonic acid theory).Transpiration and its types.

UNIT - V (Hours:9)

Photosynthesis - Light and Dark reaction. Respiration - aerobic and anaerobic, Glycolysis and Kreb's cycle.

Books for Study:

1. Rao, K. N., Krishna Murthy, K.V., and Sudhakara, Rao G., 1993, *Ancillary Botany*, Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai.

Books for Reference:

1. Muneeswaran, A., 1983, A Text Book of Botany, 2nded, Brighton Book House, Chennai.

2. Gangulee, H.C and Kar, A.K. 2002. *College Botany*, Vol.II, Revised Edition, New Central Book Agency (P) Ltd., Kolkata.

3. Rasod, S. K., Sekar, T., 2004. *Allied Botany* Paper II, 1st ed., Popular Book Depot, Chennai.

4. Gangulee, H.C., Das, K.S. and C. Duta, 2007. *College Botany*, Vol.I, 6th ed. New Central Book Agency (P) Ltd., Kolkata.

5. Annie Ragland, Kumaresan, V. & Arumugam, N. 2014. *Algae, Fungi, Bryophytes and Plant Pathology*. Saras Publication, Nagercoil.

Web Resources:

www.freebookcentre.net/Biology/Botany-Books.html

Course Outcomes (CO): On completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
C01	Relate the diversity of Algae, Fungi, Bryophytes and Pteridophytes at various levels.	K1
CO2	Demonstrate the Structure and reproduction in Cryptogams.	K2
CO3	Explain the significance of Photosynthesis and Respiration.	K2
CO4	Examine the Structure and reproduction of Gymnosperms.	K4
CO5	Discuss the basic concepts related to Plant Physiology.	K6

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation;

K6- Synthesis Mapping of COs with POs:

POs	PO1	PO2	PO3	PO4	PO5
COs					
CO1	М	S	S	S	S
CO2	М	М	S	S	М
CO3	М	S	S	S	М
CO4	М	S	S	S	М
CO5	М	S	S	S	М

Programme Title	: B. Sc. (Zoology)
Course Title	: Allied Botany Practical
Course Code	: 22UZOAQC2
Semester	: IV

Hours/Week:2 Creditss: 2+2

SYLLABUS

1. Description in technical terms of plants belonging to the families prescribed and identification of the family.

- 2. Suitable micro preparation of stem, root and leaf of Angiosperms and leaflet and rachis of Gymnosperm included in the syllabus.
- 3. Demonstration and recording of the following Plant Physiology experiments included in the syllabus.
 - a. Osmosis
 - b. Imbibition
 - c. T/A Balance
 - d. Ganong's Potometer
 - e. Test tube Funnel Experiment
 - f. Light Screen Experiment
 - g. Aerobic Respiration
 - h. Anaerobic Respiration

Programme Title	: B.A./ B. Sc. / B.Com.	
Course Title	: Non Major Elective II: Home Gardening	
Course Code	: 22UBONEC2	Hours/Week :2
Semester	: IV	Credits:2
Course Objectives	: The course aims	

• To help the students to gain knowledge on planning and maintaining of garden

- To widen their knowledge to create garden of their own interest.
- To upsurge the student community about gardening as a leisure activity.

SYLLABUS

Unit – I (Hours: 6)

Introduction and importance of home gardening: Kitchen garden – selection of site, size and shape, layout, soil, climate, cropping season, raising of nursery, transplanting, irrigation, manuring, stacking, training, pruning, weeding and harvesting.

Unit – II (Hours: 6)

General aspect of terrace garden; cultivation aspects of vegetables and fruits (mention any three examples in each group).

Unit – III (Hours: 6)

Bonsai – introduction, principle and importance. Tools and accessories. Ideal environment – containers and potting compost, methodology – repotting, fixing in shallow pots, dwarfing, watering, weeding and feeding. Different styles. Training of Bonsai – disbudding, pruning, wiring and other methods.

Unit – IV (Hours: 6)

Water gardens – types - formal and informal pools; planting, management and plants for the water garden. Rock garden – establishment, construction, management and suitable plants for rockery.

Unit –V (Hours: 6)

Lawn – Definition; Methods of lawn making – From seed, by turfing, turf plastering and dibbling roots, Maintenance of lawn; Plants suitable for planting in lawn, commonly growing grass species.

Books for Study:

1. Kumar, N. 1986. *Introduction to Horticulture*, Rajalakshmi Publications, Nagercoil, Kanyakumari.

Books for Reference:

- 1. Dey, S.C. 2006. Bonsai An Art of miniature plant culture. Agrobios,
- 2. Amarnath, V. 2007. Nursery and Landscaping. Agrobios, Jodhpur, India.
- 3. Sheela, V.L. 2011. Horticulture, MJP Publishers, Triplicane, Chennai.

Web Resources:

www.agrimoon.com/horticulture-icar-ecourse-pdf-books/

Course Outcomes (CO): On completion of the course, the students will be able to

СО	CO Statement	Knowledge
Number		Level
CO1	Outline the importance and maintenance of Home Gardening.	K1
CO2	Summarize the significance of water gardens and propagate variety of aquatic plants.	K2
CO3	Develop the skills in creating lawns and their maintenance.	K3
CO4	Apply the knowledge of growing Bonsai as realistic representations.	К3
CO5	Recommend the designs of terrace garden tailored to suit individual's taste.	K5

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation;

K6- Synthesis

Mapping of COs with POs and PSOs

POs	PO1	PO2	PO3	PO4	PO5
COs					
CO1	М	М	М	S	S
CO2	S	S	S	S	S
CO3	S	S	М	М	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

Programme Title: B. Sc. BotanyCourse Title: CytologyCourse Code: 22UBOC5Semester: V

Course Objectives: The course aims

• To understand the basic structure and function of the plant cell.

• To gain knowledge about the cellular organelles of the plant cell.

- To study the cell division in plants.
- To know the evolutionary concept and theories.

SYLLABUS

UNIT - I (Hours:15)

Ultrastructure of prokaryotic and eukaryotic cells. Ultrastructure of a cell wall and Plasma Membrane – their chemical composition - Lamellar model, Fluid mosaic model. Cytoplasm - Structure and functions of nucleus.

UNIT - II (Hours:15)

Structure and functions of the following organelles - Endoplasmic Reticulum, Ribosomes, Lysosome, Mitochondria and Chloroplast.

UNIT - III (Hours:15)

Chromosomes – structure, types and chemical composition. Cell Division: Cell cycle -G1, S, G2 and M phase, Mitosis, Meiosis. Significance of Mitosis and Meiosis.

UNIT - IV (Hours:15)

Occurrence, Structure of Nucleic acids - DNA - forms of DNA - A, B, C, D and Z - DNA, RNA - Types - rRNA, mRNA and tRNA.

UNIT - V (Hours:15)

Organization of genetic material - Unique and repetitive DNA - Uninterrupted genes, Split genes, Overlapping genes and pseudogenes. Fine structure of the gene - Cistron, muton and recon. Replication of DNA - semi-conservative method. Salient features of Genetic code; Translation in Prokaryotes; Translation in Eukaryotes, post-translational modification.

Books for Study:

1. Verma, P.S. and V.K. Agarwal. 2004. *Cell Biology, Genetics, Molecular Biology and Evolution*. S.Chand& Co. New Delhi.

Books for Reference:

1. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

Hours/Week: 5 Credits: 5 2. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.

3. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition.LippincottWilliams and Wilkins, Philadelphia.

4. Karp, G.1996. Cell and *Molecular Biology*. John Wiley & Sons Inc.New York.

5. Powar, C.B. 2010. Cell Biology. Himalaya Publishing House.

Web Resources:

https://www.docsity.com/en/subjects/cellular-and-molecular-biology/ https://onlinecourses.swayam2.ac.in/cec20_bt03/preview

Course Outcomes (CO): On completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Classify different types of Plant cells and cell organelles.	K2
CO2	Describe the structure and functions of cell organelles.	K2
CO3	Identify the concepts of Genetic material.	К3
CO4	Analyse the general structure of Plant cell and cell divisions	K4
CO5	Distinguish the structure and functions of Nucleic acid and translation process.	K4

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation;

K6- Synthesis

Mapping of COs with POs:

POs	PO1	PO2	PO3	PO4	PO5
Cos					
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

Programme Title: B. Sc. BotanyCourse Title: Morphology & Taxonomy of AngiospermsCourse Code: 22UBOC6Semester: VCourse Objectives: The course aims

• To know the basic morphological features of plant parts.

• To study the classification of plants based on morphological characters.

• To study the morphological, taxonomic details, and economic importance of plants belonging to some selected families.

SYLLABUS

UNIT - I (Hours:18)

Morphology - Root system and its modifications - Shoot system - Types and Modifications. Leaf Types and Modification, Phyllotaxy and its types. Inflorescence – Racemose, Cymose and mixed types. Descriptive terminologies of the flower.

UNIT - II (Hours:18)

Fruits - Types, Dispersal of fruits and seeds, seed germination - epigeal, hypogeal and viviparous. Taxonomy and its importance, Flora, Herbarium techniques. System of classifications – Bentham and Hooker (Natural), Cronquist (Modern) - Merits and Demerits; Taxonomic hierarchy. Plant nomenclature –ICN, Typification; Identification methods - Keys (Indented and Bracketed). A brief account of Chemotaxonomy and Numerical Taxonomy.

UNIT - III (Hours:18)

A detailed study and economic importance of the following families: Annonaceae, Capparidaceae, Rutaceae, Caesalpiniaceae, Mimosaceae, Myrtaceae, Cucurbitaceae and Apiaceae

UNIT - IV (Hours:18)

Asteraceae, Apocynaceae, Asclepiadaceae, Lamiaceae, Acanthaceae, Amaranthaceae, Euphorbiaceae, Moraceae, Cannaceae, Liliaceae, Orchidaceae and Poaceae. **UNIT - V (Hours:18)**

Medicinal values of plants and their products: Sources (botanical name, family, common name and morphology of the useful parts for the following ailments): indigestion (coriander and mentha leaves, cumin, pepper, ginger), laxatives (castor oil, senna leaves), cough and cold (tulsi, Coleus) mouth ulcers - black nightshade (Solanum nigrum), diabetes (fenugreek and jambolana seed powder), antioxidants (green tea and beetroot), herb drinks (juice of amla and lime).

Books for Study:

1. Annie Ragland and Kumaresan V. 2004, *Taxonomy of Angiosperms*. Saras Publication. Nagercoil.

2. Rao, K.N. and Krishnamurthy, K.V. 1990. Angiosperms, Viswanathan Publishers.

Books for Reference:

1. Jeffrey, C. 1968. *Introduction to Plant Taxonomy*. Allied Publishers. J.A.Churchill. London.

 Sivarajan, V.V. 1986. *Introduction to Plant Taxonomy*. Oxford and IBH Publishers & Co. Pvt., Ltd., New Delhi.

3. Datta, S.C. 1988. Systematic Botany (4th Ed.). Wiley Eastern Ltd.

4. Gurucharan Singh. 2004. *Plant systematic - Theory and Practice*. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi. 2nd Edition.

5. Gangulee, H.C., Das, K.S. and Datta, C. 2011. *College Botany* Vol. I. New Central Book Agency. Calcutta.

Web Resources:

https://www.easybiologyclass.com/angiosperm-systematics-and-taxonomy-free-online...

CO Number	CO Statement	Knowledge Level
CO1	Describe traditional aspects of Plant Taxonomy.	K2
CO2	Identify and classify plants based on morphological features.	K2, K3
CO3	Apply an insight on the association among plants belonging to various families.	К3
CO4	Organize scientific knowledge to meet the needs of current requirements.	K4
CO5	Develop skills to collect, preserve and identify Herbarium specimen.	K6

Course Outcomes (CO): On completion of the course, the students will be able to

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation; K6- Synthesis

Mapping of COs with POs

POs	PO1	PO2	PO3	PO4	PO5
Cos					
C01	S	М	М	S	М
CO2	М	S	М	S	S
CO3	М	S	S	S	М
CO4	S	S	S	S	S
CO5	S	S	S	S	S

Programme Title: B. Sc. BotanyCourse Title: Biochemistry and BiophysicsCourse Code: 22UBOC7Semester: VCourse Objectives: The course aims

Hours/Week: 5 Credits: 5

• To understand the role of chemistry in Biology.

• To analyze chemical reactions occurring in living organisms.

• To understand the interrelationships of structure, properties and functions of plants. • To impart the knowledge about the structure of proteins, carbohydrates, lipids, amino acids, Enzymes and coenzymes.

• To make an emphatic study on Enzyme kinetics and physical, chemical organizations of protoplasm.

SYLLABUS

UNIT - I (Hours:15)

Biochemistry - definition and scope. Atoms and molecules, Chemistry of solutions, colloid and its properties, Chemical bonds - ionic bond, covalent bond and hydrogen bond. Principle and working mechanism of pH meter, Centrifugation - Rotary, Zonal and Ultracentrifuge and Colorimetry. Chromatography – Principle, classification. Paper and Thin layer.

UNIT - II (Hours:15)

Carbohydrates - Classification, Structure, Chemical Properties and Functions of monosaccharides, disaccharides and polysaccharides. Amino Acids and Proteins - Classification (based on structure and chemical nature of amino acids), structure & properties.

UNIT - III (Hours:15)

Lipids - Classification, structure, properties and functions. Enzymes - IUBAB - classification, properties, mechanism of enzyme action and factors affecting enzyme activity.

UNIT - IV (Hours:15)

Light- Nature, properties, Absorption and Action spectrum - fluorescence and phosphorescence. Laws of thermodynamics; First Law of thermodynamics and its applications - Entropy - its physical significance.

UNIT - V (Hours:15)

Electron transport chain:- Role of respiratory chain in mitochondria; in energy capture; respiratory control. Oxidative phosphorylation:- Mechanism of oxidative phosphorylation; Chemiosmotic theory; uncouplers of oxidative phosphorylation

Books for Study:

1. Deb, A.C. 2004. Fundamentals of Biochemistry. New Central Book Agency.

2. Satyanarayana, U. and U.Chakrabani. 2007. *Essentials of Biochemistry*. Book and Allied Pvt. Ltd. Kolkata.

3. Arumugam, N. and V. Kumaresan. 2012. *Biophysics and Bioinstrumentation*. Saras Publication. Nagercoil.

Books for Reference:

1. Boyer, R. 2002. Concepts in Biochemistry 2nd edition Brooks Cole.

2. Eric. E.C. and P.K.Stumpf-John.2004. *Outlines of Biochemistry*. Wiley and Sons, Inc. New York.

3. Harper's Biochemistry (2012) 29th ed., Murray, R.K., Granner, D.K., Mayes and P.A., Rodwell, V.W., Lange Medical Books/McGraw Hill

4. Voet and Voet (2010) Biochemistry. 4th Edition. John Wiley and Sons 5. Lehninger (2013) Principles of Biochemistry 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company, New York.

Web Resources:

www.colby.edu/chemistry/BC176/CH1.pdf

 $https://www.saddleback.edu/faculty/jzoval/mypptlectures/ch15_metabolism/lecture_notes_c$

h 15_metabolism_current-v2.0.pdf

Course Outcomes	(CO) : On	completion	of the course,	the students	will be able to
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СО	CO Statement	Knowledge
Number		Level
CO1	Describe fundamental concepts and principles of chemistry of life.	K2
CO2	Comprehend the chemical nature and behaviour of living matter and their transformation in biological systems.	K2
CO3	Apply physical concepts and techniques to address problems in biology.	К3
CO4	Distinguish biomolecules and its chemical organization within plant cells.	K4
CO5	Analyse the importance of bioenergetics in Biological systems.	K4

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation; K6- Synthesis

Mapping of COs with POs

POs Cos	PO1	PO2	PO3	PO4	PO5
C01	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	М	S	S

Programme Title	: B. Sc. Botany	
Course Title	: Elective II – Biostatistics and Bioinformatics	
Course Code	: 22UBOEC2	Hours/Week : 5
Semester	: V	Credits: 5
Course Objectives	: The course aims	

• To facilitate the students, an investigative approach to understand science observed through mathematical data.

• To bridge the gap between the exposition of subject matter to exercise practical problems.

• To link biology to the world of technology.

SYLLABUS

UNIT - I (Hours:15)

Biostatistics - Definition. Data - objectives, types, classification and collection methods - Primary and secondary. Methods of classification- individual, discrete & continuous series. Tabulation - parts - simple and Complex tables.

UNIT - II (Hours:15)

Graphic presentation of data - Kinds of Diagram - line, bar, pie, pictograms, cartograms, histogram, Frequency polygon and Frequency curve-limitations, rules and significance.

UNIT - III (Hours:15)

Measures of Central Tendency - Definition and calculation of mean, median and mode. Definition and calculation of standard deviation, standard error and variance. Chi square test and Test for Goodness of fit.

UNIT - IV (Hours:15)

Bioinformatics - Definitions; Fundamentals of Computer - Hardware components, CPU and peripherals, Software types - system and application. CPU Operating System, Network types - LAN, WAN and INTERNET.

UNIT - V (Hours:15)

Application of Bioinformatics in various fields. Classification of Biological Databases - Primary and secondary Databases - Protein - PDB, PIR, SWISS-PROT and Nucleic acid Database - NCBI, DDBJ, EMBL and specialized database - MMDB.

Books for Study:

1. Sundarrajan, S. and Balaji, R. 2002. *Introduction to Bioinformatics*. Himalaya Publishing House, Mumbai.

2. Arumugam, N. 2011. Basic concepts of Biostatistics. Saras Publication, Nagercoil.

Books for Reference:

1. Ignachimuthu. S.J. 2006, *Basic Bioinformatics*. Narosa Publishing House, New Delhi. 2. Ramkrishnan, P. 2010. *Biostatistics*. Saras Publication, Nagercoil.

3. Sundar Rao, P.S.S. and Richard, J. 2012. Introduction to Biostatistics and Research Methods, PHI Learning Pvt. Ltd., New Delhi

4. Shanmughavel, P. and Wadhwa, G. 2009, Practicals in Bioinformatics, Pointer Publishers, Rajasthan.

5. Rastogi, S. C. 2009. Bioinformatics Concepts, Skills & Applications, CBS Publications,

New Delhi

Web Resources:

https://www.easybiologyclass.com/biostatistics-free-lecture-notes-online-tutorials-ppts-and mcqs/

https://nptel.ac.in/courses/102106065/

Course Outcomes	(CO) : On	completion	of the course.	the students	will be able to
course ourcomes	(00)	compression	or the course,		min be able to

СО	CO Statement	Knowledge
Number		Level
CO1	Comprehend the fundamental concepts of mathematics to understand Biology.	K2
CO2	Describe the concepts of computer databases.	К2
CO3	Apply statistical analysis for collection and interpretation of biological data.	К3
CO4	Examine different public domains for Nucleic acids and proteins sequence retrieval.	K4
CO5	Develop skills in Data tabulation and graphical representation of Data.	K6

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation;

K6- Synthesis

Mapping of COs with POs

POs Cos	PO1	PO2	PO3	PO4	PO5
C01	S	S	S	S	S
CO2	S	S	S	S	М

CO3	S	S	S	S	S
CO4	S	М	S	S	S
CO5	S	S	М	S	S

Programme Title	: B. Sc. Botany
Course Title	: Elective II – Bioinstrumentation
Course Code	: 22UBOESC2
Semester	: V
Course Objectives	: The course aims

Hours/Week: 5 Credits: 5

1. To gain knowledge on measurements in cellular and molecular biology.

2. To understand basic principles and application of tools and techniques in biology for higher studies and research based careers.

SYLLABUS

UNIT - I (Hours : 15)

General Biophysical methods- Measurement of pH, Radioactive labeling and counting, Autoradiography.

UNIT - II (Hours : 15)

Separation & Identification of Materials- concept of Chromatography (Partition Chromatography, Paper Chromatography, Adsorption Chromatography, TLC, GLC, Ion Exchange Chromatography, Gel Chromatography, HPLC, Affinity Chromatography); Electrophoresis (Gel Electrophoresis, Paper Electrophoresis).

UNIT - III (Hours : 15)

Centrifugation – Basic Principle of Centrifugation, Instrumentation of Ultracentrifuge (Preparative, Analytical), Factors affecting Sedimentation velocity, Standard Sedimentation Coefficient, Centrifugation of associating systems, Rate-Zonal centrifugation, sedimentation equilibrium Centrifugation.

UNIT - IV (Hours : 15)

X-Ray Crystallography – X-ray diffraction, Bragg equation, Reciprocal lattice, Miller indices & Unit cell, Concept of different crystal structure, determination of crystal structure concept of rotating crystal method, powder method.

UNIT - V (Hours : 15)

Spectroscopy: Absorption Spectroscopy – Simple theory of the absorption of light by molecules, Beer-Lambert law, Instrumentation for measuring the absorbance of visible light, Factors affecting the absorption properties of a Chromophore. Instrumentation of UV-Vis Spectrophotometer.

Reference Books:

1. John G. Webster., 2003. Bioinstrumentation. Wiley Publisher.

2. Veerakumari, L. 2006. Bioinstrumentation. MJP Publishers.

3. Kalaichelvan, P.T., 2008. *Microbiology and Biotechnology – A laboratory manual*, MJP Publishers, Chennai.

4. Sadasivam, S., Manickam, A. 2008. *Biochemical Methods*, 3rd edition, New age international (P) Ltd., Publishers, New Delhi.

5. David T Plummer. 2017. *An Introduction to Practical Biochemistry*, 3ed edition, Mac Graw Hill Publications, New York

Course Outcomes (CO): On completion of the course, students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall fundamental knowledge in instruments of biology.	K1
CO2	Illustrate the techniques employed in X – ray crystallography and spectroscopy useful for higher studies.	K2
CO3	Distinguish the principle, concepts and mechanism of various separation techniques.	К3

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation;

K6- Synthesis

Mapping of COs with POs

POs Cos	PO1	PO2	PO3	PO4	PO5
C01	S	S	S	S	S
CO2	S	S	М	S	S
CO3	S	S	S	М	S

Programme Title	: B. Sc. Botany		
Course Title	: Core Practical IV (Morphology & Taxonomy of Angiosperms,		
	Cytology, Biochemistry & Bioinformatics)		
Course Code	: 22UBOQC4	Hours/Week : 6	
Semester	: V	Credits: 2	

SYLLABUS

Morphology and Taxonomy of Angiosperms

1. Training in dissection, observation and sketching of the vegetative and floral parts of plants belonging to the following families.

Annonaceae, Capparidaceae, Rutaceae, Caesalpiniaceae, Mimosaceae, Myrtaceae, Cucurbitaceae, Apiaceae Asteraceae, Apocynaceae, Asclepiadaceae, Lamiaceae, Acanthaceae, Amaranthaceae, Euphorbiaceae and Poaceae.

2. Description of plants in technical terms; Training in herbarium techniques. (Locally available plants - Preparation of minimum of 10 herbarium sheets to be valued internally).

Cytology

Structure of cell - Onion peeling - Hydrilla leaf cells showing chloroplast and rotation of protoplasm.

Electron Micrographs

- a. Ultrastructure of Plant cell
- b. Endoplasmic reticulum
- c. Chloroplast
- d. Mitochondria
- e. Golgicomplex
- f. Nucleus

Models

- a. Plasma membrane
- b. Chromosome
- c. DNA
- d. tRNA

Cell division - Squash technique –Mitosis - Onion root tip. Meiosis - Tradescantia (Demo only).

Biochemistry

- 1. Histochemical staining of cellulose
- 2. Histochemical staining of starch
- 3. Histochemical staining of callose
- 4. Histochemical staining of protein (Mercuric bromophenol blue method)
- 5. Isolation of starch from potato
- 6. Isolation of casein from milk
- 7. Determination of pH of the soil sample
- 8. Determination of pH of the plant sap
- 9. Study of catalase activity in plant tissue
- 10. Study of peroxidase activity in plant tissue
- 11. Study of dehydrogenase activity in plant tissue
- 12. Identification of metabolites from Plant samples
- 13. Qualitative analysis of Carbohydrate
- a. Reagent preparation for analysis of carbohydrates
- b. Analysis of monosaccharides (Glucose)
- c. Analysis of disaccharides (Lactose)
- d. Analysis of polysaccharides (Starch)
- 14. Estimation of reducing sugars by Nelson-Somogyi method
- 15. Estimation of protein by Lowry's method.

Bioinformatics

1. Accession of various databases, bioinformatics tools and data retrieval systems from NCBI.

- 2. Retrieving structural data of a protein using PDB database.
- 3. Retrieving protein sequence from SWISS-PROT.
- 4. Retrieving nucleic acid sequence from GenBank.

: B.A. / B. Sc. / B. Com.	
: Non Major Skill Based – I: Mushr	oom Cultivation
: 22UBONSC1	Hours/Week : 2
: V	Credit: 2
	: B.A. / B. Sc. / B. Com. : Non Major Skill Based – I: Mushr : 22UBONSC1 : V

Course Objectives : The course aims

1. To know about the food and energy value of mushrooms.

2. To study the cultivation of different kinds of mushrooms.

3. To know about the medicinal value of mushrooms.

4. To make aware of diseases and storage of mushrooms.

SYLLABUS

UNIT – I (Hours: 6)

Mushroom - morphology, types and advantages of mushroom cultivation. Medicinal and nutritional value of mushrooms. Edible and poisonous mushroom.

UNIT – II (Hours: 6)

Mushroom cultivation: Spawn and spawning - different types of spawn - virgin, flake, brick and grain spawn. Methods of spawning - double layer, top, through , shake-up, active mycelium, spot and super spawning, storage of spawn. Casing - sterilization, Time of casing.

UNIT – III (Hours: 6)

Techniques in mushroom cultivation - mushroom farm location, layout. Cultivation of Paddy straw mushroom - Standard bed, Hollow bed, Cage method - Substrates, spawn making methods and field cultivation.

UNIT - IV (Hours: 6)

Oyster and White button Mushroom cultivation - substrates, spawn making methods and field cultivation. Factors affecting Mushroom cultivation.

UNIT – V (Hours: 6)

Storage of mushrooms-blanching, steeping, sun-drying, canning, pickling and freeze drying. Do's and Don'ts of mushroom growing. Diseases of mushrooms - Bacterial, Fungal, Viral diseases and other diseases caused by insects, mites and nematodes. Recipes for mushrooms (omelette, tikka, chilly, soup and pickle).

Books for Study:

1. Pandey, R.K. and S.K. Ghosh. 1999. A Handbook on Mushroom Cultivation. Emkay Publications, Delhi

Books for Reference:

 Bahl, N. 1988. Hand book on Mushrooms. Oxford and IBH publishing Co. Pvt. Ltd., Delhi. (2nd Edition). 2. Suman, B.C. and V.P. Sharma. 2011. Mushroom Cultivation and Uses. Agrobios Publication, Jodhpur.

3. V.P. Sharma and B.C. Suman, 2011. Diseases and pests of Mushroom. Agrobios publication, Jodhpur.

Web Resources:

https://www.agricultureguruji.com

СО	CO Statement	Knowledge
Number		Level
CO1	List out the significance of food and energy value of mushrooms.	K1
CO2	Illustrate cultivation methods of various kinds of mushrooms.	K2
CO3	Apply the medicinal values of mushrooms in terms of human welfare.	К3
CO4	Compile different kinds of diseases and mushroom preservation methods.	K4
CO5	Create different food recipes using mushrooms.	K6

Course Outcomes (CO) : On completion of the course, students should be able to

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation;

K6- Synthesis Mapping of COs with POs

POs Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	М	S	S
CO3	S	S	S	М	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

Programme Title: B. Sc. BotanyCourse Title: Plant PhysiologyCourse Code: 22UBOC8Semester: VICourse Objectives: The course aims

Hours/Week :6 Credits: 5

• To lay an emphasis on the physiological functions in plants.

• To understand the growth of the plants.

• To reveal the knowledge about the scope and role of plant physiology in applied sciences.

SYLLABUS

UNIT - I (Hours:18)

Water – Molecular structure, properties and its importance; Physical processes – diffusion, osmosis, plasmolysis and imbibition. Plant cell as an osmotic system – relationship of water, solute, pressure potential and DPD. Absorption of water – active and passive absorption theories; Ascent of sap – Transpiration pull and cohesion theory. Transpiration – types, mechanism and significance, Steward's hypothesis, ATP driven (H⁺)-K⁺ exchange pump theory. Mineral nutrition – physiological role of micro and macronutrients. Translocation of ions – cytochrome pump and protein lecithin theory. Translocation of organic solutes – MunchMass flow hypothesis.

Unit II (Hours:18)

Photosynthesis – pigment types, Light reaction – Red drop and Emerson's enhancement effect, photosystems I & II, cyclic and non-cyclic Electron transport and Photophosphorylation, significance of light reaction. Dark reaction – C3 & C4 cycle and its differences. CAM pathway, Photorespiration and its significance. Factors affecting photosynthesis.

Unit III (Hours:18)

Respiration – Types – Glycolysis; Mechanism of anaerobic respiration, Different types of fermentation (Alcoholic, Lactic, Butyric and Acetic Acid); Aerobic Respiration – Kreb's cycle and its significance. Respiratory Quotient, ETS chain and Chemiosmotic hypothesis – ATP energy Budget – Factors affecting respiration.

Unit IV (Hours:18)

Nitrogen metabolism – Nitrogen cycle – Nodule formation – Biochemistry of Nitrogen fixation. Biosynthesis of Amino Acids – Reductive amination and Transamination – Protein synthesis. Fat metabolism – α , β -oxidation and Glyoxylate cycle.

Unit V (Hours:18)

Growth Hormones – Physiological role of Auxin, Gibberellin, Cytokinin and Ethylene. Physiology of Flowering – Photoperiodism and Vernalization – Role of phytohormone in flowering. Plant movements. Physiology of Fruit ripening and Seed germination.

Books for Study:

1. Jain, V.K. 2014. Fundamentals of Physiology. S.Chand& Co. New Delhi.

2. Annie Ragland, K.Rajkumar, M.Jayakumar & K.Rajarathinam. 2011., *Plant Physiology*. Saras Publications. Nagercoil.

Books for Reference:

1. Devlin, R. M. and Witham, F. H. 1983. Plant Physiology. PWS Publishers.

2. Salisbury, F. B. and Ross. C. 1991. Plant Physiology. 4th revised edition, Brooks/ Cole Publishers.

3. Gill, P.S. 2000. Plant Physiology. S.Chand & Co. New Delhi.

- 4. Pandey, S.N.& B.K. Sinha. 2000. Plant Physiology. Vikas Publications. New Delhi.
- 5. Sinha, R.K.2004. Modern Plant Physiology. Narosa Publications House. New Delhi.

6. Srivastava, H.N.2005. Plant Physiology. Pradeep Publications. New Delhi.

Web Resources:

https://www.cliffsnotes.com/study-guides/biology/plant-biology

https://www.easybiologyclass.com/plant-physiology-free-lecture-notes-online-tutorials

lecture-notes-ppts-mcqs/

https://onlinecourses.swayam2.ac.in/cec19_bt09/preview

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the various Plant water relationships.	K2
CO2	Outline the significance of Photosynthesis and	K2
	Photorespiration.	
CO3	Explain the physiological process that regulates energy	K3
	metabolism in plants.	
CO4	Distinguish Nitrogen and Fat metabolism in plant growth and	K4
	development.	

Course Outcomes (CO): On completion of the course, the students will be able to

CO5	Compare the Physiology of dormancy, flowering and seed	K5
	germination.	

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation; K6- Synthesis

Mapping of Cos with Pos

Pos	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

Programme Title: B. Sc. BotanyCourse Title: Genetics, Plant Breeding and EvolutionCourse Code: 22UBOC9Semester: VICourse Objectives: The course aims

• To know the role of genes in character determination of an organism.

• To know the change in the gene order, how it brings the change in the external morphology and the characters in an organism.

• To know the production of hybrids

• To know the techniques in hybridization which brings the new varieties.

SYLLABUS

UNIT – I (Hours:15)

Introduction – Designating symbols for genes. Mendel's Laws of inheritance – Monohybrid and Dihybrid cross. Deviations from Mendelian ratio – Allelic and non – allelic gene interactions with plant examples – Multiple alleles – pseudoalleles – isoalleles – polygenic inheritance.

Unit II (Hours:15)

Linkage – complete & incomplete, coupling and repulsion theory. Crossing over – mechanism and theories. Cytological proof for crossing over. Mapping of genes on chromosome – two point and three point test cross. Sex determination – chromosome, genic balance and single gene. Sex linkage – sex linked inheritance.

Unit III (Hours: 15)

Mutation – types – gene mutation – chemical basis (tautomerism, base analogues). Chromosomal aberrations, Polyploids and heteroploids. Extranuclear inheritance – Plastid inheritance, Kappa particles, Male sterility in Maize and its applications.

Unit IV (Hours:15)

Plant breeding – Principles involved in plant breeding – Green revolution.

Hybridization techniques. Methods of crop improvement – Introduction and Acclimatization, Selection – Definition and types- mass, pure line and clonal. Breeding for disease resistance. Seed production, Multiplication, Maintenance and testing of improved seeds. Heterosis – its effects and causes.

Unit V (Hours : 15)

Evolution – Evolutionary concepts – Theories of Lamarck, Charles Darwin and the modern synthetic theories. Population genetics – gene pool, gene frequency and Hardy–Weinberg law. Factors affecting gene frequencies.

Books for Study:

1. Verma, P.S. and V.K.Agarwal. 2009. Genetics. S.Chand& Co. New Delhi.

2. Singh, B.D. 2001. *Plant Breeding. Principles and Methods*. Kalyani Publications. New Delhi.

3. Kochhar, P.L. 1989. Genetics and Evolution. RatanPrakashanMandir, Agra.

Books for Reference:

- 1. Stansfield, W.D. 1986. Theory and Problems of Genetics. McGraw Hill. New York
- 2. Kochhar, P.L. 1995. Genetics and Evolution. Ratan Prakashan Mandir, Agra.
- 3. Chaudhary, R.C. 2008. Introduction to Plant Breeding. Oxford &Ibh Co Pvt Ltd, India.
- 4. Singh, B.D.2009. Fundamentals of Genetics. Kalyani Publications. New Delhi.
- 5. Gupta, P.K. 2014. Genetics. Rastogi Publications. Meerut. India.

Web Resources:

https://www.thinkswap.com

https://www.nature.com

https://onlinecourses.swayam2.ac.in/cec20_bt06/preview

Course Outcomes (CO): On completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Outline the fundamental principles of Genetics and traits in plants.	K2
CO2	Choose the concepts of Mendelian inheritance in gene interactions.	К3
CO3	Apply the different concepts of plant breeding and Evolution.	К3
CO4	Categorize the experiments by establishing principles of Genetics.	K4
CO5	Assess the concepts of Mendelian inheritance in gene interactions.	К5

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation; K6- Synthesis

Mapping of Cos with Pos

Pos	PO1	PO2	PO3	PO4	PO5
Cos					
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	М	S	S	М	S

Programme Title	: B. Sc. Botany	
Course Title	: Plant Ecology	
Course Code	: 22UBOC10	Hours/Week: 5
Semester	: VI	Credits: 5
Course Objectives	: The course aims	

1. To understand the interactions of abiotic and biotic factors to maintain the ecosystem.

2. To acquire knowledge about the structure of a community along with ecological succession.

3. To study the effects of different types of pollution and its control measures.

4. To impart the knowledge of conservation and management of natural resources.

SYLLABUS

UNIT – I (Hours: 15)

Ecology – its importance. Autecology and Synecology, Abiotic factors – light, temperature, precipitation and wind. Edaphic factors – formation of soil – Soil Profile – Physicochemical properties – Soil erosion and soil conservation.

UNIT – II (Hours: 15)

Biotic factors – relationships among organisms – positive, negative and neutral interactions; Interaction between plants and animals, among plants and between plants and microorganisms. Morphological, anatomical and physiological adaptations of plants – hydrophytes, mesophytes, xerophytes, epiphytes and halophytes.

UNIT – III (Hours: 15)

Community ecology – Definition, characteristics, composition and structure of a community. Ecological succession – Ecosystem – Definition, types – Food chain, Food web, Ecological Pyramid and Energy flow in an ecosystem. Hydrosere and xerosere.

UNIT – IV (Hours: 15)

Pollution – Definition and types; Study of Source, Causes, effects and control measures of air, water and soil pollution. Pollutants – Definition and types.

UNIT – V (Hours: 15)

Management of Plant Biodiversity- Organisations associated with biodiversity management – Methodology for execution – IUCN (International Union for Conservation ofNature and Natural Resources), UNEP (United Nations Environment Programme), UNESCO (United Nations Educational, Scientific and Cultural Organization), WWF (World Wide Fund for Nature/World Wildlife Fund), NBPGR (National Bureau of Plant Genetic Resources), NBA (National Biodiversity Authority): Biodiversity legislation and conservations, Biodiversity information management and communication.

Books for Study:

1. Sharma, P.D. 2013. Elements of Ecology. Rastogi Publications, New Delhi.

2. Krishnamurthy, K.V. 2004. An Advanced Text book of Biodiversity - Principles &

Practices. Oxford & IBH Publications Co. Pvt. Ltd. New Delhi.

Books for Reference:

1. Ambasht, R.S. 1990. *Text Book of Plant Ecology*. 4th Edition. Students friends & Co. Varanasi, India.

 Chapman, R.S.M. 1995. Ecology, Principles and Applications. Cambridge. London. 3.
Odam, E.P. 2004. Fundamentals of Ecology. Saunders, Philadelphia. 4. Bhatia, K.N. 2005. A Treatise on Plant Ecology. Pradeep Publications. Jalandhar. 5. Shukla, R.S. and Chandel, P.S. 2005. Plant Ecology and Soil Science. Chand & Co., New Delhi.

Web Resources:

https://www.yourarticlelibrary.com> notes >

https://biologydiscussion.com

https://coursehero.com

CO Number	CO Statement	Knowledge Level
CO1	Outline the core concepts of Biotic and Abiotic components in environment.	K2
CO2	Apply the characteristics of different plant communities and concepts of Ecological plant succession.	K3
CO3	Analyse different causes of pollution and their remedies.	K4
CO4	Compare the adaptations of Plants in relation to their physical environment.	К5
CO5	Discuss the conservation and management of natural resources	K6

Course Outcomes (CO): On completion of the course, students should be able to

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation; K6- Synthesis

Mapping of Cos with Pos:

Pos	PO1	PO2	PO3	PO4	PO5
Cos					
C01	S	S	S	S	S
CO2	S	S	М	S	S
CO3	М	S	S	S	S
CO4	S	S	М	S	S
CO5	S	S	М	S	S

Programme Title	: B. Sc. Botany		
Course Title	: Core Practical – V (Plant Physiology, Genetics, and Plant		
	Ecology)		
Course Code	: 22UBOQC5	Hours/Week : 6	
Semester	: VI	Credits: 2	

SYLLABUS

Physiology

The following experiments to be performed and recorded by the students

- 1. Osmosis in living cells-Potato Osmoscope.
- 2. Determination of osmotic pressure by plasmolytic method.
- 3. Determination of diffusion pressure deficit.
- 4. Determination of transpirational pull.
- 5. Determination of water transpiration / absorption ratio by weighing method.
- 6. Separation of plant pigments by paper Chromatography.
- 7. Rate of photosynthesis under varying CO2 concentrations in a water plant
- 8. Rate of photosynthesis under different light intensities in a water plant
- 9. Measurement of respiration rate in germinating seeds or flower buds using simple respirator.

The following experiments are to be demonstrated only and these experiments also to be recorded in the note book.

- 1. Imbibition and imbibitional pressure.
- 2. Membrane permeability affected by chemicals.
- 3. Study of relative rates of transpiration in different plants- Ganong's Potometer.
- 4. Comparison of stomatal and cuticular transpiration by cobalt chloride method.
- 5. Molish injection method.
- 6. Lever Auxanometer
- 7. Ascent of sap.
- 8. Essentiality of light by using Ganong's light screen.
- 9. Fermentation-Kuhn's experiment.
- 10. Anaerobic respiration.
- 11. Nitrification by soil microorganism.
- 12. Estimation of cholorophyll by Arnon method.
Genetics

Problems on monohybrid, dihybrid, gene interaction and modified dihybrid ratios. Problems on gene mapping.

Ecology

A study of the morphological and structural adaptations of : Hydrophytes–Hydrilla, Eichhornia, Nymphaea and Typha Xerophytes –Asparagus, Casuarina and Acacia Epiphytes – Vanda Halophytes – Avicennia , Suaeda and Vivipary – Rhizophora

Programme Title	:B.A./ B. Sc./B.Com.	
Course Title	: Non Major Skill Based – II: Herbal Therapy	
Course Code	: 22UBONSC2	Hours/Week : 2
Semester	: VI	Credits: 2

Course Objectives : The Course aims

1. To understand about Indian system of medicine like Ayurveda and Siddha.

- 2. To acquire knowledge about some herbal remedies for some common ailments.
- 3. To know about herbal remedies for skin and hair problems.
- 4. To gain knowledge about Aroma therapy and its uses.

SYLLABUS

UNIT – I (Hours: 6)

Introduction, Basic principles of Ayurveda, Naturopathy and Siddha medicine-

Panchabhutas – Tridosha concept – Vatta, Pitta and Kapha dosha.

UNIT – II (Hours: 6)

Preparation of Ayurvedic and Siddha medicine. Herbal remedies for some common infection diseases: Asthma, Chickenpox, Cold, Diarrhoea, Dental care, fever Worms.

UNIT – III (Hours: 6)

Herbal remedies for some common disorders – Menstrual disorder, Hypertension, Jaundice, Diabetics and Ulcer (symptoms, causes and home remedies).

UNIT – IV (Hours: 6)

Symptoms, causes and herbal remedies for Acne, Black heads, Corns, Warts, Boils, Stings and Bites (symptoms, causes and home remedies).

UNIT – V (Hours: 6)

Dandruff, Premature greying and loss of Hair (symptoms, causes and home remedies). Aroma Therapy – Essential oils and its uses and Nutraceuticals.

Books for Study:

 Jaibala,S. and G. Balakrishnan. 1975. A Hand Book of Common Remedies Based on Siddha Medicine. Ed. St. Louis Institute Press, Madras.

Books for Reference:

1. Vaidya Bhagwar Dash, 1978. *Fundamentals of Ayurvedic Medicine*, Konark, Publishers Pvt. Ltd. Delhi.

2. Saha, N.N.1981. Herbal Remedies. Universal Publication – New Delhi.

3. Bakhru, H.K. 1992. Herbs that Heals. Vision Books Ltd., New Delhi.

4. Prajapati, N.D., S.S. Purohit & U. Kumar.2003. *A Hand Book of Medicinal Plant*. Agrobios Publication, India.

5. Frank, H. & M. Martin. 2006. *Herbal Medicine and Botanical Medicinal fads*. Viva Books Pvt., Ltd., New Delhi.

6. Despandey, D.J.2008. A Handbook of Herbal Remedies. Agrobios, Jodhpur, India.

Web Resources:

https://www.ayusante.com > articles

Course Outcomes (CO) : On completion of the course, students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply the practice of using herbs and their remedies to maintain health and cure diseases.	К3
CO2	Categorize Indian system of medicine such as Ayurveda, Siddha, Unani and Naturopathy.	К4
CO3	Choose different herbal remedies for skin and hair care.	К5
CO4	Improve skills in better usage of herbal medicines.	K6
CO5	Prioritize about Aromatherapy and its applications.	K5

K1-Knowledge; K2-Comprehension; K3-Application; K4-Analysis; K5-Evaluation;

K6- Synthesis Mapping of Cos with Pos

Pos Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

L – Low; M – Medium; S - Strong

Question paper pattern for MAJOR and ALLIED

Time: 3Hrs.

Max. Marks: 70

SECTION - A (20x1=20)

Twenty compulsory questions covering all the five units.

SECTION - B (5x4=20)

Five questions with internal choice (i.e) either or type.

Each carries 4 marks. One question from each unit

SECTION - C (3x10=30)

Out of five THREE have to be answered (open choice). One from each unit.

Question paper pattern for NME/NMSB

Time: 3Hrs.

Max. Marks: 70

Computer based Test for Non major elective and Non Major Skill Based. 70 Compulsory Objective type questions. 14 from each unit. Each carries onemark.

CIA distribution for B.Sc. Botany and Allied Botany (Theory, Major and Skill Based Practicals)

Theory	Internal -30 Marks	External - 70 Marks
	Test - 5	Duration - 3 Hrs
	Internal components -15	
	Model examination- 5	
	Attendance – 5	
Total	30	70
Practical	Internal -40 Marks	External - 60 Marks
Practical	Internal -40 Marks Test - 20	External - 60 Marks Duration - 3 Hrs
Practical	Internal -40 Marks Test - 20 Class performance -	External - 60 Marks Duration - 3 Hrs Record - 10
Practical	Internal -40 Marks Test - 20 Class performance - 10 Viva-Voce -10	External - 60 Marks Duration - 3 Hrs Record - 10 Practical – 50