ST. MARY'S COLLEGE (Autonomous)

(Re-accredited with 'A^{+}' Grade by NAAC)

Thoothukudi-628001, Tamil Nadu

(Affiliated to Manonmaniam Sundaranar University)

B.Sc. Botany

School of Biological Sciences

Outcome Based Curriculum

(W.e.f.2021)

Preamble

The Department of Botany offers an enriched learning environment in Plant Science. The Botany programme provides basic training in Plant Biology, Ecology, Physiology, Marine Botany, Mycology, Plant Diseases and Biotechnology. The department has excellent laboratory and research facilities to augment research in the fields of botany. Besides, students develop transferable skills, critical and lateral thinking, analytic and interpretive skills and communicating skills. It has great scope for higher education in diverse branches of botany. The programme opens avenues for multiple job opportunities as Soil and Plant Scientist, Biophysicist, Biochemist, Biological Technician, Environmental Scientist, Mycologist, Plant Breeders, Horticulturist and Entrepreneur in plant products and herbal medicine.

Vision : Developing academically, professionally and ethically empowered human resources.

Mission: To provide an academic ambience that strengthens critical thinking, scientific inquiry and problem solving in the frontier areas of plant biology

Programme Outcome

PO. No	**After completion of the Undergraduate programme the students of St. Mary's College will be able to**
PO 1	develop language, numerical, experimental, analytical and computing skills.
PO 2	pursue higher education programmes
PO 3	excel in the recent trends of the world, enhancing the level of knowledge to emerge as a holistic person.
PO 4	function effectively as an individual in multidisciplinary settings and develop their ethical, social and cultural values to serve the nation
PO 5	be proficient in the fields of Arts, Science and Management Studies to qualify for the job.
PO 6	develop their communicative skills using a range of technologies which enable them to express their ideas and views effectively
PO 7	become an environmentally conscious citizen
PO 8	be an empowered and economically independent woman with efficient leadership qualities in an egalitarian society through liberative education.

Programme Specific Outcome

PSO No.	Students of B.Sc Botany will be able to	PO Mapped
PSO-1	identify different groups of plants /organisms and understand their origin, evolution and phylogenetic relationships that will enable to infer the trends of life on earth.	PO-3
PSO-2	find how organism functions at biochemical and genome level and able to relate to growth, development and behavior of different forms of life	PO-3
PSO-3	observe interconnectedness of life on earth through nutrient cycling and energy flow of nutrients and able to articulate the values of natural resources in different walk of life	PO-3, PO-4, PO-6
PSO-4	excel in multidisciplinary science and apply them for biological analysis and problem solving in various fields of science	PO-4
PSO-5	able to learn and analyse the characteristics of coastal and marine environment enabling them to recognize marine resources and sustainable utilization	PO-5, PO-7
PSO-6	practice and demonstrate the techniques that ensure skill development and job option.	PO-1, PO-2, PO-8
PSO-7	extend science to address major environmental and ethical issues to develop just and sustainable solution	PO-7
PSO-8	design, experiment, formulate hypothesis, analysing data and present data for academic classes and scientific forum	PO-1, PO-5, PO-6

Department of Botany
Course Structure (w.e.f. 2021)
Semester –I

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max. Marks		
						CIA	ESE	Total
I	Tamil /	21ULTA11 /	பொதுத் தமிழ் தாள் - I இக்கால இலக்கியம் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, சிறுகதை) ஐவெசழனரஉவழசல குசநஒா ஊழரசளந	6	3	40	60	100
	French	21ULFA11						
II	General English	21UGEN11	Poetry, Prose, Extensive Reading and Communicative English-I	6	3	40	60	100
III	Core I	21UBOC11	Plant Diversity I (Algae, Bryophytes, Fungi and Lichens)	6	6	40	60	100
	Core Practical I	21UBOCR1	Plant Diversity I (Algae, Bryophyte Fungi and Lichens)	2	1	40	60	100
	Allied I	21UZOA11	Invertebrate & Chordate Zoology	4	3	40	60	100
	Allied Practical I	21UZOAR1	Invertebrate & Chordate Zoology	2		40	60	100
IV	Skill Enhancement Course - I	21UBOPE1	Professional English for Botany – I	2	2	20	30	50
	Ability Enhancement Course – I	21UAVE11	Value Education	2	2	20	30	50
Total				**30**	**20**			

Semester II

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max. Marks		
						CIA	ESE	Total
I	Tamil /	21ULTA21 /	பொதுத்தமிழ் தாள் 2 சமய இலக்கியங்களும் நீதி இலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, வாழ்க்கை வரலாறு)	6	3	40	60	100
	French	21ULFA21	Intermediate French Course					
II	General English	21UGEN21	Poetry, Prose, Extensive Reading and Communicative English –II	6	3	40	60	100
III	Core II	21UBOC21	Anatomy, Embryology and Microtechniques	6	6	40	60	100
	Core Practical II	21UBOCR2	Anatomy, Embryology and Microtechniques	2	1	40	60	100
	Allied II	21UZOA21	Genetics, Physiology and Developmental Zoology	4	3	40	60	100
	Allied Practical I	21UZOAR1	Invertebrate & Chordate Zoology, Genetics, Physiology and Developmental Zoology	2	2	40	60	100
IV	Skill Enhancement Course - II	21UBOPE2	Professional English for Botany – II	2	2	20	30	50
	Ability Enhancement Course – II	21UAEV21	Environmental Studies	2	2	20	30	50
Total				**30**	**22**			

Semester III

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
I	Tamil /	21ULTA31/	பொதுத் தமிழ் தாள் 3 : காப்பியங்களும் சிற்றிலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, புதினம்)	6	4	40	60	100
	French	21ULFA31	Advanced French Language					
II	General English	21UGEN31	Poetry, Prose, Extensive Reading and Communicative English-III	6	4	40	60	100
III	Core III	21UBOC31	Plant Diversity II (Pteridophytes, Gymnosperms and Paleobotany)	4	4	40	60	100
	Core Practical III	21UBOCR3	Plant Diversity II (Pteridophytes, Gymnosperms and Paleobotany)	2	2	40	60	100
	Allied III	21UCHA31	Allied Chemistry – I	4	3	40	60	100
	Allied Practical II	21UCHAR2	Allied Chemistry – I	2		40	60	100
	Skill Based Elective	21UBOS31/ 21UBOS32	1. Horticulture 2. Gardening and Nursery Management	2	2	20	30	50
	NME I	21UBON31	Plant Resource Utilization	2	2	20	30	50
IV	Ability Enhancement Course - III	21UAWS31	Women's Synergy	2	2	20	30	50
	Self Study/ MOOC / Internship (Compulsory)	21UBOSS1	Ethnobotany		2		50	50
Total				**30**	**25**			

Semester IV

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
I	Tamil /	21ULTA41 /	பொதுத் தமிழ் தாள் 4: சங்க இலக்கியம்: (செய்யுள், இலக்கணம்,இலக்கிய வரலாறு, உரைநடை, நாடகம்)	6	4	40	60	100
	French	21ULFA41	French Course and Literature					
II	General English	21UGEN41	Poetry, Prose, Extensive Reading and Communicative English – IV	6	4	40	60	100
III	Core IV	21UBOC41	Taxonomy of Angiosperms and Economic Botany	4	4	40	60	100
	Core Practical IV	21UBOCR4	Taxonomy of Angiospermsand Economic Botany	2	2	40	60	100
	Allied IV	21UCHA41	Allied Chemistry – II	4	3	40	60	100
	Allied Practical II	21UCHAR2	Allied Chemistry – I Allied Chemistry – II	2	2	40	60	100
	Skill Based Elective	21UBOS41/ 21UBOS42	1. Organic Farming and Biofertilizer 2. Weed Science	2	2	20	30	50
	NME II	21UBON41	Food Technology	2	2	20	30	50
IV	Ability Enhancement Course - IV	21UAYM41	Yoga & Meditation	2	2	20	30	50
	Self Study / Online course / Internship (Optional)	21UBOSS2	Preservation of fruits and vegetables		+2		50	50
V	NCC, NSS &Sports Extension Activities/CDP/				1 +1			
Total				**30**	**26+3**			

Semester V

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
	Core V (Common Core)	21UBCC51	Biotechnology	4	3	40	60	100
III	Core VI	21UBOC51	Biochemistry	4	4	40	60	100
	Core VII	21UBOC52	Ecology and Phytogeography	4	4	40	60	100
	Core VIII	21UBOC53	Biostatistics and Bioinformatics	4	4	40	60	100
	Core Practical V	21UBOCR5	Biochemistry Ecology and Phytogeography Biostatistics and Bioinformatics	6	3	40	60	100
	Common Core Practical VI	21UBCCR1	Biotechnology	2	1	40	60	100
	Core Elective	21UBOE51/ 21UBOE52	Genetics and Evolution / Pharmacognosy	4	3	40	60	100
IV	Common Skill Based Course	21UCSB51	Computer for Digital Era and Soft Skills	2	2	20	30	50
	Self Study/ Online course / Internship (Optional)	21UBOSS3	Seed Biology	--	+2		50	50
Total				**30**	**24+2**			

Semester VI

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
III	Core IX	21UBOC61	Plant Physiology	4	4	40	60	100
	Core X	21UBOC62	Microbiology and Plant Pathology	4	4	40	60	100
	Core XI	21UBOC63	Cell and Molecular Biology	4	4	40	60	100
	Core XII	21UBOC64	Marine Biology	4	4	40	60	100
	Core Practical VII	21UBOCR6	21UBOC61, 21UBOC62	4	2	40	60	100
	Core Practical VIII	21UBOCR7	21UBOC63, 21UBCC64	4	2	40	60	100
IV	Project (Group)	21UBOP61		6	3	40	60	100
Total				**30**	**23**			
Total				**180**	**140+5**			

Semester	Hours	Credits	Extra Credits
I	30	20	---
II	30	22	---
III	30	25	---
IV	30	26	3
V	30	24	2
VI	30	23	--
Total	**180**	**140**	**5**

Courses	Number of Courses	Hours / week	Credits	Extra Credits
Tamil	4	24	14	--
English	4	24	14	--
Core	12T+8P	52T+24P	50T+14P	--
Skill Based Elective	2	4	4	--
Core Elective	1	4	4	--
Group Project	1	6	3	--
Allied	4T+2P	16T+8P	12T+4P	--
NME	2	4	4	--
Skill Enhancement Course	2	4	4	--
Ability Enhancement Course	4	8	8	--
Common Skill Based Course	1	2	2	--
NCC, NSS & Sports		--	1	
Extension Activities		--		1
Self Study Papers (Optional)	2	--		4
Self Study Papers (Compulsory)	1	--	2	--
Total		**180**	**140**	**5**

பாடத்திட்டத்தின் நோக்கங்கள்

1. அனைத்துத் துறை மாணவர்களும் பயன்பெறும் வகையில் பாடத்திட்டம் வரையறை செய்யப்பட்டுள்ளது.
2. தமிழ் இலக்கியக் கல்வியை எளிமையுடன் ஆழமாக்கிக் கற்பிக்கும் விதமாக இக்கால இலக்கியம் தொடுங்கி சங்க இலக்கியம் வரை கற்பித்தல்.
3. தமிழ் மொழியில் பிழையின்றிக் கற்கும் விதமாக எழுத்து, சொல், பொருள், யாப்பு, அணி என இலக்கணத்தைப் பயிற்றுவித்தல்.
4. மாணவர்களின் நலன் கருதி இலக்கிய வரலாற்றுப் பகுதியானது செய்யுள் அமைப்பிற்கேற்ப வகைப்படுத்தப்பட்டுக் கற்பிக்கப்படுதல்.

பயன்கள்

1. காலந்தோறும் வளர்ந்துவரும் தமிழ்க் கவிதைகளின் வடிவினையும், கருத்தோட்டத்தினையும் மாணவியர் அறிந்துகொள்வர்.
2. தமிழ் மொழியைப் பிழையின்றி எழுதவும் பேசவும் முடியும்.
3. தன்னம்பிக்கை உருவாகும்
4. தகவல் தொடர்புச் சாதனங்கள் தமிழ் வளர்ச்சிக்குப் பயன்படுவதை அறிந்துகொள்வர்.
5. படைப்பாற்றல் வளர்த்துக் கொள்வர்.
6. தமிழ் இலக்கியங்கள் அன்று முதல் இன்றுவரை பெற்றுவரும் சிறப்பை உணர்வர்.
7. இலக்கிய வரலாற்றின் வழி மொழியின் வளர்ச்சியையும் காலந்தோறும் மாறிவரும் இலக்கியங்களின் பல்வேறு வகைகளையும் தெரிந்து கொள்வர்.
8. துறைதோறும் தமிழ் மொழியின் வளர்ச்சியை அறிவர்.
9. சங்கம் வைத்துத் தமிழாய்ந்த மன்னர், புலவர், மக்கள் இவர்களின் வாழ்வியல் அறங்களைக் கண்டுரைப்பர்.
10. பண்பாட்டுச் சிறப்பினை மொழியின் வழி அறிந்து தம் வாழ்வில் கடைப்பிடிப்பர்.
11. வேலை வாய்ப்பிற்கான தேர்வுகளில் தன்னம்பிக்கையுடன் பங்கேற்பர்.

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping

Name of the Course: பொதுத்தமிழ் தாள் - 1 இக்கால இலக்கியம்
(செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, சிறுகதை)

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER – 1			
Part – 1 பொதுத்தமிழ் தாள் - 1 இக்கால இலக்கியம் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, சிறுகதை)			
Course Code: 21ULTA11	**Hrs/Week:6**	**Hrs/Semester: 90**	**Credits: 3**

Objectives:

- மாணவியருக்கு நல்ல மதிப்பீடுகளைக் கற்பித்து வாழ்வில் அவற்றைப் பின்பற்ற வழிவகுத்தல்.
- இலக்கிய மாந்தரின் வாழ்க்கை அனுபவங்கள் மூலம் வாழ்வில் பிரச்சனைகளை எதிர்கொள்ளும் திறம், தன்னம்பிக்கை, ஆளுமைத்திறம், மொழிஅறிவு இவற்றை உருவாக்குதல்.

அலகு – 1 செய்யுள் - 2 மணி

1. தமிழ்மொழி வாழ்த்து – பாரதியார்
2. புதுமைப் பெண் - பாரதியார்
3. புதிய உலகு செய்வோம் - பாரதிதாசன்
4. உலகை மாற்றுவோம் - கவியரசு முடியரசன்
5. கண்ணீரின் இரகசியம் - அப்துல் ரகுமான்
6. மரங்கள் - மு.மேத்தா
7. கால வித்தியாசம் - வைரமுத்து
8. வையத்தை வெற்றி கொள்ள - சி.சிவரமணி
9. கவிதைப் பூங்காடு – பா.விஜய்
10. பெண் இனமே – மைதிலி
11. ஹைக்கூ கவிதைகள்
12. நாட்டார் பாடல்கள்
    அ. தாலாட்டுப் பாடல்
    ஆ. மீனவர் பாடல்

அலகு - 2 இலக்கணம் - 1 மணி
எழுத்து
1. எழுத்து - விளக்கம்,

2. முதலெழுத்துகள், சார்பெழுத்துகள்
3. சுட்டெழுத்துகள், வினா எழுத்துகள்
4. மொழி முதல் எழுத்துகள், மொழி இறுதி எழுத்துகள்
5. வல்லினம் மிகும் இடங்கள், வல்லினம் மிகா இடங்கள்
6. மொழிப்பயிற்சி : புதுக்கவிதை, சிறுகதை, பத்திரிகைக்குச் செய்தி அனுப்புதல்

அலகு - 3 இலக்கிய வரலாறு - 1 மணி

1. புதுக்கவிதை தோற்றமும் வளர்ச்சியும்
2. சிறுகதை தோற்றமும் வளர்ச்சியும்
3. உரைநடை தோற்றமும் வளர்ச்சியும்
4. நாட்டுப்புற இயல் அறிமுகம்

அலகு - 4 உரைநடை - 1 மணி

நீயே வெல்வாய் - க.ப.அறவாணன்

அலகு – 5 சிறுகதை - 1 மணி

1. கேதரியின் தாயார் - கல்கி
2. விடியுமா? - கு.ப.ராஜகோபாலன்
3. காலனும் கிழவியும் - புதுமைப்பித்தன்
4. கருப்பண்ணசாமி யோசிக்கிறார் - அறிஞர் அண்ணா
5. நாற்காலி - கி.ராஜநாராயணன்
6. ராஜா வந்திருக்கிறார் - அழகிரி சாமி
7. ஜோடிப் பொருத்தம் - ஜெயரதி அகஸ்டின்

Course Outcome:

CO.NO	இப்பாடத்திட்டம் மாணவியருக்கு	மதிப்பீடு
CO-1	பெண் சார்ந்த விடுதலை, பொதுமைச் சிந்தனை உணர்வையும் வளர்க்கிறது	வளர்ச்சி
CO-2	இயற்கையைப் பேணுதற்கும் வாழ்வின் வளர்ச்சி நிலையை மேம்படுத்திக் கொள்ளுதற்கும் உதவுகிறது.	நடுமுறைப்படுத்துதல்
CO-3	சமய நல்லிணக்கம், ஒற்றுமை உணர்வு, இறை நம்பிக்கை இவற்றை உருவாக்குகிறது.	உருவாக்கம்
CO-4	மொழியைப் பிழையின்றி பேசவும் எழுதவும் உதவுகிறது.	புரிதல் திறன் மேம்பாடு
CO-5	தனிமனித வாழ்க்கைச் சிக்கல்கள், சமுதாயப் பிரச்சனைகள் எதிர்கொள்ளும் திறனை எடுத்துரைக்கிறது.	நடுமுறைப்படுத்துதல்
CO-6	போடித் தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல் திறன் மேம்பாடு

SYLLABUS 2021-2024

SEMESTER – I Course Code: 21ULTA11

Course Outcomes	Programme Outcomes (PO)								Programme Specific Outcomes (PSO)							
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
CO-1	3	2	3	3	3	2	2	**3**	3	2	3	3	3	3	3	**2**
CO-2	3	3	3	3	3	2	2	**3**	3	3	3	3	3	3	3	**3**
CO-3	2	3	2	3	3	3	3	**3**	3	3	3	3	3	3	3	**3**
CO-4	3	2	3	3	3	3	2	**3**	3	3	2	2	2	3	2	**2**
CO-5	3	3	3	3	2	3	3	**3**	2	3	3	3	3	3	3	**3**
CO-6	3	2	2	3	3	2	2	**3**	2	3	3	3	3	3	3	**3**
Ave.	**2.8**	**2.5**	**2.6**	**3**	**2.8**	**2.5**	**2.3**	**3**	**2.6**	**2.8**	**2.8**	**2.8**	**2.8**	**3**	**2.8**	**2.6**

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: PART – I French Paper – I Introductory French Course

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

I B.A., / B.Sc Part I FRENCH

SEMESTER – I			
PART – I French Paper – I Introductory French Course			
Course Code :21ULFA11	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 3**

Objectives

To initiate a beginner to the francophonic world and to train them to make their maiden efforts in spoken and written French.

To create a number of real-life situations to make the learner express herself in the target language through experiential teaching method.

Unit 1 – Bienvenue !

1.1- Une introductionà la langue française
1.2 – Les Salutations
1.3 – Les pronoms
1.4 – Les couleurs
1.5 – Dans la classe

Unit 2 – Et vous ?

2.1 – Se présenter, demander de se présenter
2.2 – Donner des informations personnelles
2.3 – Demander et donner des coordonnes
2.4 –Artistes francophone
2.5 – Réaliser une fiche d'identité

Unit 3 – On va où ?

3.1 – Demander / Indiquer un chemin
3.2 – Comprendre un itinéraire

3.3 – Se déplacer en métro ou en bus
3.4 – Paris / Montréal : deux villes à découvrir
3.5 – Réaliser un questionnaire sur la vie dans un quartier

Unit 4 – Qu'est-ce qu'on mange ?

4.1 – Comprendre / Donner des horaires
4.2 – Faire des courses / Commander au restaurant
4.3 – Exprimer ses gouts
4.4 – Québec / France : qu'est-ce que vous mangez ?
4.5 – Créer la carte d'un bar a jus

Unit 5 – Les soldes, c'est parti !

5.1 – Situer un moment dans une année
5.2 – Parler du métro
5.3 – Demander / dire la taille et la pointure
5.4 – Décrire un objet, dire à quoi ça sert
5.5 – Demander / Dire un prix

Prescribed Textbook :

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz.*Edito A1Méthode de français*. Paris : Didier, 2016.

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Cahier d'exercises*. Paris : Didier, 2016.

Books, Journals and Learning Resources

- J.Girardet&J.Pécheur avec la collaboration de C.Gibble.*Echo A1*. Paris : CLE International, 2012.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I.* Paris : CLEInternational, 2003.
- Cocton Marie-Noëlle.*Génération 1 Niveau A1, Méthode de français et cahier d'exercices*.Paris : Didier, 2016.
- Dintilhac Anneline, De Oliveira Anouchka, Ripaud Delphine, DupleixDorothée, Cocton Marie-Noëlle.*Saison 1 Niveau 1, Méthode de français et cahierd'exercices*. Paris : Didier, 2015
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	make the initial conversation in French	Un, Re
2.	understand the basic sentence structures and make sentences of their own	Un, Ap
3.	analyse and evaluate intercultural factors	An
4.	understand grammar and apply the acquired grammatical knowledge in solving grammar exercises	Un, Ap
5.	differentiate the French culture	An
6.	understand the French and francophonic lifestyle	Un, Re

PART – I French Paper – I : Introductory French Course

Course Outcomes	**Programme Outcomes (PO)**								**Programme Specific Outcomes (PSO)**							
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**
CO-1	3	3	3	3	3	3	2	**3**	3	3	3	3	3	3	3	**3**
CO-2	3	3	3	3	3	3	2	**3**	3	3	3	3	3	3	3	**3**
CO-3	3	3	2	3	3	3	3	**3**	3	3	3	3	3	3	3	**3**
CO-4	3	3	3	3	3	3	2	**3**	3	3	2	2	2	3	3	**3**
CO-5	3	3	3	3	3	3	3	**3**	2	3	3	3	3	3	3	**3**
CO-6	3	3	3	3	3	3	2	**3**	2	3	3	3	3	3	3	**3**
Ave.	**3**	**3**	**2.8**	**3**	**3**	**3**	**2.3**	**3**	**2.6**	**3**	**2.8**	**2.8**	**2.8**	**3**	**3**	**3**

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Part II General English: Poetry, Prose, Extensive Reading and Communicative English-I

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER-I			
Part II General English	**Poetry, Prose, Extensive Reading and Communicative English-I**		
Course Code 21UGEN11	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits:3**

Objectives:

- To provide adequate exposure and opportunities for students to imbibe, develop, practise and use LSRW skills
- To help students read and comprehend contents in English

Unit I –Poetry

Rabindranath Tagore – Leave This Chanting

W.W. Gibson – The Stone

Ted Hughes – Hawk Roosting

Unit II – Prose

Stephen Leacock – My Lost Dollar

J.B. Priestley – On Doing Nothing

Robin Sharma – Your Commitment to Self- Mastery: Kaizen

Unit III – Short Story

Oscar Wilde – The Model Millionaire
Leo Tolstoy – Three Questions
K.A. Abbas – The Refugee

Unit IV – Grammar

Parts of Speech – Noun, Pronoun, Article, Adjective, Verb - Modals and Auxiliaries – Types of Sentences - Subject -Verb Agreement

Unit V- Communication Skills

Vocabulary, Listening Comprehension – Speaking – Reading, Filling Forms

(TANSCHE – Module I)

Text Books:

Units I-III – To be compiled by the Research Department of English

Unit IV- Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai: Vijay Nicole Imprints Private Limited, 2006. Print.
Unit – V – CLIL (Content & Language Integrated Learning) – Module I by TANSCHE (Tamil Nadu State Council for Higher Education)

Course Outcome:

CO. No.	**Upon completion of this course, students will be able to**	PSO Addressed	**Cognitive Level**
CO- 1	understand and extend their listening and writing skills.	1	Un
CO- 2	apply and incorporate basic grammar and mechanics in writing.	3	Ap
CO- 3	understand literary texts in its socio-cutural contexts	2, 4	Un, Ap
CO- 4	communicate in English with confidence for employability.	3	Ap
CO- 5	appreciate and imbibe ethical and moral values through the study of the literary pieces.	5	Ap, Ev
CO- 6	construct simple sentences and short paragraphs in response to reading and writing.	8	Cr

21UGEN11 Poetry, Prose, Extensive Reading, and Communicative English - I

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**Avg**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**Avg**
CO-1	3	2	3	2	3	2	3	2	2.5	2	3	2	3	2	3	2	3	2.5
CO-2	2	3	2	3	2	3	2	3	2.5	3	2	3	2	3	2	3	2	2.5
CO-3	3	2	3	2	3	2	3	2	2.5	2	3	2	3	2	3	2	3	2.5
CO-4	2	3	2	3	2	3	2	3	2.6	3	2	3	2	3	2	3	2	2.6
CO-5	3	2	3	2	3	2	3	2	2.5	2	3	2	3	2	3	2	3	2.5
CO-6	2	3	2	3	2	3	2	3	2.6	3	2	3	2	3	2	3	2	2.6
Average	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.5		2.5	2.5	2.5	2.5	2.6	2.5	2.6	2.5	
PO Mean									**2.6**	PSO Mean								**3.0**
Strength of PO Correlation				Strong						Strength of PSO Correlation				Strong				

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Plant Diversity I (Algae, Bryophytes, Fungi and Lichens)

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER – I			
Core I	**Plant Diversity I (Algae, Bryophytes, Fungi and Lichens)**		
Course Code: 21UBOC11	**Hrs / Week: 6**	**Hrs / Sem: 90**	**Credits: 6**

Objectives:

- To have comprehensive idea on primitive plants
- To understand the major groups of lower plants and their characteristics.
- To study the effective utilization of algae, fungi, lichen and bryophytes for the environment and human well being

SEMESTER – I			
Core I	**Plant Diversity I (Algae, Bryophytes, Fungi and Lichens)**		
Course Code: 21UBOC11	**Hrs / Week: 6**	**Hrs / Sem: 90**	**Credits: 6**

UNIT I: **Algae**: Introduction - Brief history of Algae, Classification of algae based on Fritsch (1945), Habitat. General characteristics of algae - Range of thallus organization, Methods of reproduction-vegetative, asexual and sexual, Life cycle patterns, Alternation of generation in algae. Algal cytology – cell wall, cytoplasm (algal pigments, reserve food materials), flagella and nucleus. Economic importance of algae: algae as food, SCP, fodder, green manure, role in N_2 fixation, medicine and biofuels. Ecological benefits of algae.

UNIT II: Habitat, thallus structure, reproduction and life cycle of *Oscillatoria*, *Volvox, Caulerpa, Vaucheria*, *Sargassum* and *Gracilaria*.

UNIT III: **Bryophytes:** General characteristics of Bryophytes. Classification of Bryophytes by Rothmaler (1951). Habitat, thallus structure, reproduction and life cycle of *Marchantia* and *Polytrichum.* Economic importance of

Bryophytes - biological, ecological, medicinal and as potting material. Affinities between algae and bryophytes.

UNIT IV: **Fungi :** Classification of fungi based on Alexopoulus and Mims (1979), General characters. Habitat, somatic structure, asexual reproduction, sexual reproduction and life cycle of *Albugo, Aspergillus, Peziza,* and *Polyporous*. Role of fungi in medicine, industry, food and food products.

UNIT V: **Lichens:** Classification of lichen based on habit, habitat, anatomy, nature of partners, different views on lichen association, organization, process of lichenization. Vegetative propagules - isidia, soredia, cyphellae, cephalodia.Thallus structure and reproduction of *Collema, Parmelia* and *Usnea*. Economic and ecological significance of lichens.

Text Books:

1. Pandey S.N. and Trivedi. P.S. *A Text Book of Botany* Vol. I and II. New Delhi: Vikas Publishing House Pvt. Ltd., 2006.
2. Sharma O.P. *Text Book of Algae.* New Delhi: Tata Mc. Graw-Hall Publications, 2006.
3. Johri, R.M., Smeh Lata and Kavitha Tyagi. 2011. *A Text Book of Fungi*, Dominant Publishers and Distributors Pvt. Ltd., New Delhi
4. Singh V. Pandey P.C. and Jain D.K.. A *Text Book of Botany*. Meerut: Rastogi Publication, 2002

Books for Reference:

1. Fritsch F.E. *The Structure and Reproduction of Algae*. London: Vol.I all II. Cambridge Univeristy Press, 1972.
2. Kamat N.D. *Topics in Algae*. Aurangabad: Sai Kraipa Prakasham, 1982.
3. Parihar N.S. *Bryophyta*. Allahabad: Central Book Depot Publications in Botany, 1967.
4. Robert Edward Lee. *Phycology*: Cambridge University Press, 2009.
5. Vashishta B.R, Sinha A.K. and Singh V.P. *Algae*. New Delhi: S. Chand and Co. Ltd. 2007.
6. Vashishta B.R Sinha A.K. and Singh V.P. *Bryophyta*: New Delhi: S. Chand and Co. Ltd., 2006.
7. Ahmadjian V and Hale M.E. *The lichens.* London: Academic Press, 1973.
8. Alexpoulous C.J. Mims C.W. and Blackwell M. *Introductory Mycology.* New Delhi: Wiley Eastern Limited, 1988.
9. Dubey H.C. *An introduction of fungi.* New Delhi: Vikas Publishing House, 2005.
10. Pandey B.P. *Plant Pathology.* New Delhi: S.Chand and Co.Ltd, 2007.
11. Rangasamy G. *Diseases of Crop Plants in India Prenties*. New Delhi. Hall of India, 1992.

12. Singh R.S. *Plant Diseases.* New Delhi: Oxford IBH, 1991.

Practicals

Hr/ week: 2

- Micropreparation and evaluation of *Oscillatoria, Volvox*, Diatoms, *Vaucheria, Caulerpa, Sargassum, Dictyota, Acanthophora, Gracilaria*
- Micropreparation evaluation of *Riccia, Marchantia* and *Polytrichum*
- Micropreparation evaluation of *Albugo, Aspergillus, Peziza* and *Polyporous*.
- Micropreparation evaluation of *Usnea*and*Parmelia*
- Identification of microscopic and macroscopic algae
- Identification of Bryophytes
- Identification of microscopic and macroscopic fungi
- Field visit: No of days: 2 (Collection of seaweeds and bryophytes)
- Submission of specimen (algae/ bryophytes/ fungi/ lichen)

Submission: Record note book

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	illustrate general characteristics of algae, fungi, lichen and bryophytes	1	Un
CO-2	compare and contrast algae, fungi, lichen and bryophytes	2, 3	Un
CO-3	critique the importance of algae, fungi, lichen and bryophytes and their role in everyday life and environment.	3	Ev
CO-4	distinguish life cycle pattern in algae, fungi and bryophytes	2	An
CO-5	identify algal, fungal, lichen and bryophytes samples and compare adaptive feature of the specified plant groups	1	Un, Re
CO-6	implement the knowledge acquired for self-employability	6, 7	Un, Ap

21UBOC11 Plant Diversity I (Algae, Bryophytes, Fungi and Lichens)

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2.8**	3	3	3	3	3	3	3	3	**3.0**
CO-2	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**2.8**	3	3	3	3	2	3	3	3	**2.9**
CO-3	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2.8**	3	3	3	3	3	2	3	3	**2.9**
CO-4	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2.8**	3	3	3	3	3	2	2	3	**2.8**
CO-5	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2.6**	3	3	3	3	3	2	2	3	**2.8**
CO-6	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**2.6**	3	3	3	3	3	3	3	3	**3.0**
Average	**3.0**	**3.0**	**2.2**	**3.0**	**3.0**	**2.3**	**2.5**	**2.7**		**3.0**	**3.0**	**3.0**	**3.0**	**2.8**	**2.5**	**2.7**	**3.0**	
PO Mean									**2.7**	PSO Mean								**2.9**
Strength of PO Correlation				Strong						Strength of PSO Correlation					Strong			

Attainment of Programme Outcome
B.Sc. Zoology
CO, PO and PSO Mapping
Name of the Course: Invertebrate & Chordate Zoology

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER I			
Allied I	**Invertebrate & Chordate Zoology**		
Course Code: 21UZOA11	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Objectives:

- To enlighten the students about the diverse forms of invertebrates and vertebrates
- To develop broad foundational knowledge of the extreme diversity in animal form, function, adaptation and natural history.

Unit I

General characters of invertebrates

Protozoa: General characters–*Paramecium caudatum*–external morphology – reproduction – binary fission and conjugation

Porifera: General characters - *Leucosolenia* - external morphology Coelenterata: General characters - Obelia - structure

General Topics: Protozoan parasites – *Entamoeba histolytica*

Unit II

Platyhelminthes: General characters - *Fasciola hepatica* - external morphology and life cycle Annelida: General characters – *Hirudinaria* (Leech) – external morphology

General Topic: Human Helminth parasites – *Ascaris lumbricoides* – life cycle, pathogenecity and control measures

Unit III

Arthropoda: General characters – *Periplaneta americana* - external morphology and digestive system – mouth parts of honey bee.

Mollusca: General characters *Lamellidens marginalis* - external characters

Echinodermata: General characters - *Asterias rubens* – external characters

Unit IV

General characters and outline classification of Chordata upto classes Pisces: General characters – *Scoliodon* – external characters

Amphibia: General characters – *Rana hexadactyla* - external characters and respiratory system.

Reptilia: General characters - *Calotes versicolor* – external characters.

General topic: Identification of poisonous and non poisonous snakes

Unit V

Aves: General characters - *Columba livia* – external characters

Mammalia: General characters – *Oryctolagus cuniculus*–external characters and urinogenital system.

General topic: Adaptations of aquatic mammals.

Text Books

1. Nair, N.C, Leelavathi, S and Soundara Pandian, N.A. *Text book of Invertebrates*. Nagercoil: Saras Publication, 2006.
2. Thangamani. A, Prasanna Kumar. S. Narayanan. L.M, and Arumugam, N. *Chordata*. Nagercoil: Saras Publication, 2006.

Books for Reference

1. Ekambaranatha Ayyer M.A and Viswanathan S. *Manual of Zoology*. Vol I Chennai : Viswanathan Printers and Publishers, 1993.
2. Ekambaranatha Ayyer M.A and Viswanathan S. *Manual of Zoology*. Vol II Chennai : Viswanathan Printers and Publishers, 1993.
3. Arumugam N. *Text Book of Chordates*. Revised edition. Nagercoil: Saras Publication, 2010.
4. Jordon E.C and Verma P.S. Invertebrate Zoology. Revised edition. New Delhi : S. Chand and Company Ltd., 2009.
5. Shukla G.S. and Upadhyay V.B. Economic Zoology. First edition. Meerut : Rastogi Publication,1985.

PRACTICALS

Course Code : 21UZOAR1

Hrs/Week–2 **Credit–1**

Cockroach : Digestive system

Mounting**:**

Honey bee – Mouth parts

Earth worm – Body setae

Shark – Placoid scale

Virtual dissection

Frog (Respiratory System)

Slides/ Models/ Charts:

Invertebrata: *Paramecium caudatum*, *Leucosolenia*, *Obelia*, *Entamoeba histolytica, Fasciola hepatica, Ascaris lumbricoides* (male and female), sea anemone, hermit crab, *Asterias*, redia and cercaria

Chordata: *Amphioxus, Scoliodon*, *Naja naja, Rana hexadactyla*, *Columba livia*, aquatic mammals - *Orcinus* (killer whale) and *Delphinus* (dolphin)

Books for Reference

1. Leelavathy S., Soundara Pandian N. and Murugan T. *Practical Zoology* Vol. I *Invertebrata.* Nagercoil : Saras Publication, 2013.
2. Verma P.S. *A manual of Practical Zoology, Chordates*. Ramnagar, Delhi:

S. Chand and Company Ltd, 2008.

Course outcome:

Co. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	differentiate the invertebrate and chordate animals	1	Un
CO-2	identify the common and distinctive features of invertebrate phyla	2	Re
CO-3	associate the parasitic adaptation through their mode of life	3	Un
CO-4	analyze the unique features and evolutionary relationship between each chordate group	1	An
CO-5	apply the knowledge of biological diversity to our daily life and conservation of bioresources	5	Ap
CO-6	evaluate the interaction of organisms with environment and their adaptive mechanisms	3	Ev

21UZOA11 Allied Invertebrate & Chordate Zoology

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	2	3	3	2	3	2	**2.6**	3	3	3	2	3	2	2	2	**2.5**
CO-2	3	3	3	3	2	2	2	3	**2.6**	3	3	3	3	3	2	2	3	**2.7**
CO-3	3	3	3	3	3	2	3	2	**2.7**	3	3	3	2	3	2	2	3	**2.6**
CO-4	3	3	2	3	3	2	2	2	**2.5**	3	3	3	3	3	3	2	3	**2.8**
CO-5	3	3	3	3	3	2	2	3	**2.8**	3	3	3	3	3	2	2	3	**2.7**
CO-6	3	3	3	2	3	3	2	2	**2.6**	3	3	3	3	2	3	3	3	**2.8**
Average	**3**	**3**	**2.6**	**2.8**	**2.8**	**2.2**	**2.3**	**2.3**		**3**	**3**	**3**	**2.6**	**2.8**	**2.3**	**2.2**	**2.8**	
PO Mean									**2.6**	PSO Mean								**2.7**
Strength of PO Correlation				Strong						Strength of PSO Correlation					Strong			

SEMESTER – I			
Skill Enhancement Course - I Professional English for Botany – I			
Course Code: 21UBOPE1	**Hrs / Week: 2**	**Hrs / Sem: 30**	**Credits: 2**

Objectives:

- To enhance the lexical, grammatical, sociolinguistic and communicative competence in an increasingly complex, interdependent world.
- To develop intellectual flexibility, creativity and critical thinking skills of students by offering adequate practice in professional context.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	organize the words used in life science and improve their competence in using the language	1	An
CO-2	critique unfamiliar texts and describe biological processes and appraise critical and theoretical approaches to the reading and analysis of various texts in life science	7, 3	Ev, An
CO-3	discuss critically, negotiate and present without committing errors and develop entrepreneurship skills	2	Un
CO-4	describe the technical words used life science laboratory settings and construct error free sentences for content writing	8	Re
CO-5	present simple sentences without spelling or grammatical error and develop strategic competence through active listening	7	Ap
CO-6	construct English proficiency with good vocabulary and speak confidently in academic/ professional environment and face interviews with confidence	7	Ap

SEMESTER – I			
Skill Enhancement Course - I Professional English for Botany – I			
Course Code: 21UBOPE1	**Hrs / Week: 2**	**Hrs / Sem: 30**	**Credits: 2**

UNIT I: Communication

1. Listening: Listening to instructions and following – Instructions to use microscope
2. Speaking: Pair Walk – Dialogue between a teacher and student about the usage of microscope (formal conversation)
3. Reading: Comprehension passage – GregorJohann Mendel
4. Writing: Developing a story with pictures – Life cycle of *Aspergillus/ Sargassum*
5. Vocabulary - Unit specific - Incorporated into the LSRW tasks

UNIT II: Description

1. Listening: Listening to process description-drawing a flow chart- How to dissect *Datura* plant/ *Musa paradisiaca*
2. Speaking- Role play- - Conversation between a Botany teacher and a student regarding the colonization of lichen
3. Reading - Skimming/Scanning – Basic equipment used in Biology experiments
4. Process Description-Compare & Contrast – Nutrition in fungi
5. Vocabulary - Unit specific - Incorporated into the LSRW tasks

UNIT III: Negotiation Strategies

1. Listening: Listening to interviews of specialist – Dr. M.S. Swaminathan (Green Revolutionist) https://www.youtube.com/watch?v=-M7QqZcY_Z4
2. Speaking: Brainstorming (Mind mapping) – Symbiotic relationship of Fungi
3. Reading: Longer reading passages for comprehension – Cell organelles
4. Writing: – Essay writing – Economic importance of Algae
5. Vocabulary - Unit specific - Incorporated into the LSRW tasks

UNIT IV: Presentation Skill

1. Listening: Listening to Lecture – General characters of Bryophyte https://www.youtube.com/watch?v=VA2LNWkZNWo

2. Speaking: Short Talks – Bryophytes are Amphibians of plant kingdom
3. Reading: Comprehension – passage - I.O.P. Iyengar
4. Writing: Recommendations - (Using laptop or PC)
5. Vocabulary - Register specific (Incorporated into the LSRW tasks)

UNIT V: Critical Thinking Skills

1. Listening: Listening Comprehension – Introduction to Horticulture
2. Speaking - Making Presentation- Etiquettes in laboratory
3. Reading-Comprehension Passages, Note making - Photosynthesis
4. Writing - Problem & Solution Essays, Creative writing–Marine Ecosystem
5. Vocabulary - Register specific (Incorporated into the LSRW tasks)

Text Books:

1. Tamil Nadu State Council for Higher Education (TANSCHE). *Professional English for Life Sciences - I.*

Books for Reference:

1. Pandey S.N. and Trivedi P.S. *A Text Book of Botany,* Vol. I and II. New Delhi: VIKAS Publishing House Pvt. Ltd., 2006.
2. Sharma O.P. *Text Book of Algae*. New Delhi: Tata Mc. Graw-Hall Publications, 2006.
3. Pandey, S.N. and P.S Trivedi. *A Text Book of Botany,* Vol. I. New Delhi: Vikas Publishing House Pvt. Ltd., 2006.
4. Singh V. Pandey P.C. and Jain D.K. *A Text Book of Botany*.Meerut: Rastogi Publication, 2002.

SEMESTER - I			
Ability Enhancement Course	**Value Education**		
Code : 21UAVE11	**Hrs/Week : 2**	**Hrs / Semester: 30**	**Credits : 2**

Unit I: Introduction to Value Education

Concept of Values -Types of Values- Approaches to values - Benefits of Value Education-Characteristics of Values

Unit II: Human Values

Human Values -Sources of Human Values - Love -Compassion - Gratitude - Courage - Optimism - Forgiveness- the need and urgency to reinforce Human Values

Unit III: Social Values

Role of family and society in teaching values - Role of educational institutions in inculcating values-Three general functions of education for society-Self-Reflection- Our society's needs - Social Responsibilities of a student

Unit IV: Spiritual Values

Spiritual Values - Spiritual Development -Moral Development - Importance of Spiritual Values - Cultivation of Spiritual Values -Five most common spiritual values -Spiritual Resources

Unit V: Values for Life Enrichment

Goal Setting - Building relationship - Friendship - Love relationship - Family relationship - Professional relationship Interpersonal Relationship -Essential Life Skills that Help in Students Future Development-Life Enrichment Skills Domain

Books for Reference:

1. Sneha M. & K. Pushpanadham Joshi. *Value Based Leadership in Education Perspective and Approaches*, Anmol Publications Pvt. Limited, 2002.
2. Venkataiah.N. *Value Education*, APH Publishing, 1998
3. Pramod KumarM.*A Handbook on Value Education*, Ramakrishna Mission Institute of Culture (RMIC) 2007
4. Jagdosh Chand.*Value Education*. Shipra Publication 2007
5. Indrani Majhi (Shit)Ganesh Das, *Value Education*, Laxmi Publication Pvt. Ltd., 2017
6. Arumugam, N. S. Mohana, Lr.Palkani, *Value Based Education*, Saras Publication 2014

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping

Name of the Course Part -1 பொதுத்தமிழ் - தாள் 2 சமய இலக்கியங்களும் நீதி இலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, வாழ்க்கை வரலாறு)

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER - II			
Part -1 nghJj;jkpo - jhs; 2 rka ,yf;fpaq;fSk; ePjp ,yf;fpaq;fSk (nra;As;> ,yf;fzk ,yf;fpa tuyhW› ciueil tho;f;if tuyhW)			
Course Code: 21ULTA21	**Hrs/Week:6**	**Hrs/ Semester : 90**	**Credits :3**

Objectives:

- வாழ்வியல் நன்னெறிகளான மனிதநேயம், சமத்துவம் போன்றவற்றை வளர்த்துக் கொள்ளக் கற்றுக் கொடுத்தல்
- அறநெறியைக் கடைப்பிடிப்பதே நிலையானதும் நீடித்ததுமான நன்மையைத் தருவது என்பதைச் சான்றோரின் வாழ்க்கை நெறிகள் மூலம் உணரச்செய்தல், மொழி அறிவு,

அலகு - 1 செய்யுள் - 2 மணி

சமய இலக்கியங்கள்

இறைவணக்கம் - திருநாவுக்கரசர்

சைவம் 1. தேவாரம் - திருஞான சம்பந்தர், திருநாவுக்கரசர், சுந்தரர்

2. திருவாசகம் - மாணிக்கவாசகர்
3. திருமந்திரம் - திருமூலர்
4. திருப்புகழ் - அருணகிரி நாதர்

வைணவம்: 1. திருப்பாவை - ஆண்டாள்

2. திருவாய்மொழி- நம்மாழ்வார்

பௌத்தம்: மணிமேகலை - சீத்தலைச்

சாத்தனார் கிறித்தவம்: 1. தேம்பாவணி - வீரமாமுனிவர்

2. இயேசு காவியம் - கவிஞர் கண்ணதாசன்

இசுலாமியம்: பேட்டை ஆம்பூர் அப்துல் காதிர் சாகிபு பாடல் - சக்கறாத்து நாமா **நீதி இலக்கியங்கள்**

1. திருக்குறள் - ஊக்கமுடைமை
2. நாலடியார் - 1. நன்னிலைக் கண்

2. உறங்கும் துணையது

3. பழமொழி நானூறு- 1. பொல்லாத சொல்லி

2. வருவாய் சிறிதெனினும்

அலகு - 2 இலக்கணம் - 1 மணி

1. சொல்லின் பொது இலக்கணம்
2. ஒரெழுத்து ஒருமொழி, சொல்லின் வகைகள்
3. பெயர்ச்சொல் - அறுவகைப் பெயர்கள்
4. வினைச்சொல் - வகைகள்- முற்று, எச்சம், ஏவல், வியங்கோள், செய்வினை, செயப்பாட்டுவினை, தன்வினை, பிறவினை
5. இடைச்சொல் - ஏகார, ஓகார, உம்மை இடைச்சொற்கள்
6. உரிச்சொல் - இலக்கணம், வகைகள் மொழிப்பயிற்சி – ஒலி வேறுபாடு அறிதல்

அலகு - 3 இலக்கிய வரலாறு – 1 மணி

1. சைவ இலக்கியங்கள்
2. வைணவ இலக்கியங்கள்
3. கிறித்தவம் தமிழுக்குச் செய்த தொண்டு
4. இசுலாமியம் தமிழுக்குச் செய்த தொண்டு
5. பதினெண் கீழ்க்கணக்கு நூல்களில் 11 அறநூல்கள்

அலகு - 4 உரைநடை - 1 மணி

நிறைவான வாழ்க்கைக்கு நேரம் ஒதுக்குங்கள் - ஜே.மெளரஸ் (10 முதல் 19 வரை உள்ள கடிதங்கள்)

அலகு – 5 வாழ்க்கை வரலாறு - 1 மணி

மனிதமே புனிதம் - சுடர்ந்தெழு - முனைவர் அருட்சகோதரி ஆ.மரிய சாந்தி

Course Outcome

CO.No.	இப்பாடத்திட்டம் மாணவியருக்கு	மதிப்பீடு
CO-1	இறை ஆற்றலை உணர்ந்து கொள்ள உதவுகிறது	மதிப்பீடு
CO-2	நல்ல நண்பர்களையும் நல்ல மனிதர்களையும் இனம் கண்டுகொள்ளவும், அன்பு, இரக்கம், நற்சொல், நற்செயல் போன்ற நற்பண்புகளோடு வாழவும் வழி வகுக்கிறது.	நடுமுறைப்படுத்துதல்
CO-3	மனித நேய பண்புகளோடு வாழ்ந்த சான்றோரின் அனுபவங்களைப் பெற்றுக்கொள்ள உதவுகிறது	நடுமுறைப்படுத்துதல்
CO-4	தனிமனித வாழ்க்கைச் சிக்கல்களையும் பிரச்சனைகளையும் எதிர்கொள்ளும் ஆற்றலை உருவாக்குகிறது.	நடுமுறைப்படுத்துதல், திறன் மேம்பாடு
CO-5	இறைவன் முன் அனைவரும் சமம் என்ற சிந்தனையை உருவாக்குகிறது.	மதிப்பீடு
CO-6	போட்டித்தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல்

SEMESTER – II **Course Code: 21ULTA21**

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
CO-1	3	2	3	3	3	2	2	3	3	2	3	3	3	3	3	2
CO-2	3	3	3	3	3	2	2	3	3	3	2	3	3	3	3	3
CO-3	2	3	2	3	3	3	3	3	3	3	3	3	3	2	3	3
CO-4	3	3	3	3	3	3	3	3	3	3	2	2	2	3	2	2
CO-5	3	3	3	3	2	3	3	2	2	3	3	3	3	2	3	3
CO-6	3	2	2	3	3	2	2	3	2	3	3	3	3	3	3	3
Ave.	**2.8**	**2.6**	**2.6**	**3**	**2.8**	**2.5**	**2.5**	**2.8**	**2.6**	**2.8**	**2.6**	**2.8**	**2.8**	**2.6**	**2.8**	**2.6**

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course PART – I French Paper – II Intermediate French Course

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

IB.A., / B.Sc Part I FRENCH

SEMESTER – II			
PART – I French Paper – II Intermediate French Course			
Course Code :21ULFA21	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 3**

Objectives

To develop and improve upon the acquisition of four competencies of language learning.

To motivate the learner through role plays as to create real life situations. To prepare her for the real communication challenges.

Unit 1 – C'est quoi le programme ?

1.1 –Parler de ses activités quotidiennes
1.2 – Demander/ Dire l'heure
1.3 – Proposer/ fixer / accepter ou refuser un rendez-vous.
1.4 – Réserver par téléphone
1.5 – Créer un mini-article sur un loisir

Unit 2 – Félicitations !

2.1 – Comprendre un arbre généalogique
2.2 – Présenter sa famille
2.3 – Féliciter / adresser un souhait
2.4 – Décrire le physique et le caractère d'une personne
2.5 – Créer les personnages d'une famille pour un film

Unit 3 – Chez moi

3.1 – Comprendre un état des lieux simple
3.2 – Se renseigner sur un logement
3.3 – Comprendre un règlementintérieur d'immeuble

3.4 – Exprimer des règles de vie commune
3.5 – S'excuser dans un message

Unit 4 – Bonnes vacances

4.1 – Comprendre un site de réservation en ligne
4.2 – Exprimer la préférence / Hésiter
4.3 – Ecrire un mail formel / une carte postale
4.4 – Exprimer des sensations, une émotion positive, la surprise
4.5 – Ecrire une liste de voyage

Unit 5 – Le texte littéraire

5.1. Le Petit Prince (Chapitre 1) - Antoine de Saint Exupéry
5.2. La colombe poignardée et le jet d'eau – Calligramme - Guillaume Apollinaire

Prescribed Textbook :

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1Méthode de français*. Paris : Didier, 2016.
Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Cahier d'exercises*. Paris : Didier, 2016.

Books, Journals and Learning Resources

- J.Girardet & J.Pécheur avec la collaboration de C.Gibble.*Echo A1*. Paris : CLE International, 2012.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I.* Paris : CLEInternational, 2003.
- Cocton Marie-Noëlle.*Génération 1 Niveau A1, Méthode de français et cahier d'exercices*.Paris : Didier, 2016.
- Dintilhac Anneline, De Oliveira Anouchka, Ripaud Delphine, DupleixDorothée, Cocton Marie-Noëlle.*Saison 1 Niveau 1, Méthode de français et cahier d'exercices*. Paris : Didier, 2015
- Apollinaire Guillaume, *Calligrammes :Poèmes de la paix et de la guerre 1913-1916*.Paris: Gallimard, 1966.
- Antoine de Saint-Exupéry.*Le Petit Prince*. Paris : Gallimard, 2007.
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	listen, understand and make basic conversation in French	Un, Ap
2.	demonstrate proficiency in vocabulary	Re, Ap
3.	be involved in simulation and role-play	Re, Ap
4.	analyse her culture and compare it with French Culture	Re, Un
5.	create passages on her own	Ap, Cr
6.	get a gist of the French literature	Un

Name of the Course PART – I French Paper – II Intermediate French Course

Course Outcomes	Programme Outcomes (PO)								Programme Specific Outcomes (PSO)							
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
CO-1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO-2	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3
CO-3	3	3	3	3	3	3	2	3	3	3	3	2	3	3	3	3
CO-4	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO-5	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3
CO-6	3	3	3	3	3	3	2	3	3	3	3	3	3	3	2	3
Ave.	**2.8**	**3**	**3**	**3**	**3**	**3**	**2.3**	**3**	**3**	**3**	**3**	**2.8**	**3**	**3**	**2.8**	**3**

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course PART – II General English Poetry, Prose, Extensive Reading and Communicative English –II

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER-II			
Part II General English	**Poetry, Prose, Extensive Reading and Communicative English –II**		
Course Code 21UGEN21	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits:3**

Objectives

- To help students realise how life, literature and language are closely connected
- To expose students to language skills through the core subjects

Unit I –Poetry

William Wordsworth – Resolution and Independence
Henry W. Longfellow – Psalm of Life
Toru Dutt – The Lotus

Unit II – Prose

A.G. Gardiner – On Courage
Desmond Morris – A Little Bit of What You Fancy
Kalpana Chawla – The Sky is the Limit

Unit III – Short Story

Saki – Mrs. Packletide's Tiger
Liam O'Flaherty – The Sniper
Langston Hughes – Thank You Ma'am

Unit IV – Grammar

Tenses: Present, Past and Future

Unit V- Communication Skills

Listening, Reading, Pronunciation, Key Functions, Speaking (TANSCHE - Module - II)

Text Books:

Units I-III – To be compiled by the Research Department of English

Unit – IV - Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai: Vijay Nicole Imprints Private Limited, 2006.

Unit - V – CLIL (Content & Language Integrated Learning) – Module II by TANSCHE (Tamil Nadu State Council for Higher Education)

Course Outcome:

CO.No.	**Upon completion of this course, students will be able to**	**PSO Addressed**	**Cognitive Level**
CO-1	enhance their vocabulary through the texts.	1	Un
CO- 2	demonstrate effective communication skills.	3	Un, Ap
CO- 3	comprehend passages and interpret on their own.	1, 2	Un, Ap
CO- 4	construct paragraphs and essays, make notes and sum up passages.	8	An
CO- 5	analyse literary pieces and inculcate ethical values.	5	An
CO- 6	evaluate how language and literature are closely related to life.	5,6	Cr

21UGEN21 Poetry, Prose, Extensive Reading, and Communicative English - II

	PO									**PSO**								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**Avg**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**Avg**
CO-1	3	2	3	2	3	3	2	2	2.5	3	2	3	3	2	2	3	2	2.4
CO-2	2	3	2	3	2	2	3	3	2.5	2	3	2	2	3	3	2	3	2.5
CO-3	3	2	2	3	3	2	2	3	2.5	3	2	3	2	3	2	3	2	2.5
CO-4	3	3	3	2	2	3	2	3	2.6	2	3	3	2	3	3	2	2	2.6
CO-5	2	3	2	3	3	2	3	2	2.5	3	3	2	3	3	2	2	3	2.5
CO-6	3	2	3	3	2	3	3	2	2.6	2	3	3	2	2	3	3	2	2.6
Average	**2.6**	**2.5**	**2.6**	**2.5**	**2.6**	**2.5**	**2.5**	**2.5**		**2.6**	**2.5**	**2.6**	**2.5**	**2.6**	**2.5**	**2.6**	**2.5**	
PO Mean									**2.6**	PSO Mean								**2.6**
Strength of PO Correlation				Strong						Strength of PSO Correlation					Strong			

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Anatomy, Embryology and Microtechniques

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER – II			
Core II	**Anatomy, Embryology and Microtechniques**		
Course Code: 21UBOC21	**Hrs / Week: 6**	**Hrs / Sem: 90**	**Credits: 6**

Objectives:

- To understand the fundamental organization of tissues, developmental events of plants and related techniques
- To understand the developmental process from flower to fruit
- Application of biotechniques in anatomical and embryological studies

UNIT I: Meristematic tissues: Classification based on position. Shoot apex (Tunica corpus theory) and root apex (Histogen theory). Permanent Tissues: Simple tissue - parenchyma (chlorenchyma, aerenchyma), collenchymas and sclerenchyma. Complex tissues – xylem and phloem.Organs: Primary structure of dicot and monocot root, stem and leaf.Nodal anatomy – Unilacunar (*Nerium*), Trilacunar (*Azadirachta*), Multilacunar (*Aralium*).

UNIT II: Secondary growth: Secondary growth in root and stem. Vascular cambium – structure (fusiform initial, ray initial) and function, seasonal activity – annual ring.Structure of wood, secondary medullary rays, heart wood and sap wood.Cork cambium – structure and function. Bark. Lenticels. Adaptive and Protective system: Epidermis, cuticle, stomata. General account of adaptations in xerophytes and hydrophytes.

UNIT III: Structural organization of flower: Structure of anther and pollen, structure and

type of ovules, types of embryo sacs, organization and ultra structure of mature embryo sac. Pollination and fertilization: Pollination mechanisms and adaptations. Pollen pistil interaction.Phenomenon of double fertilization.

UNIT IV: Embryo and endosperm: Dicot and monocot embryo. Endosperm - type, structure and functions. Embryo endosperm relationship.Seed-structure appendages and dispersal mechanisms.Apomixis and polyembryony: Definition, types and applications

UNIT V: Microtechnique: Preparation of permanent free hand sections. Microtomy: Fixation, dehydration, embedding, sectioning, staining (general staining and double staining) and mounting. Micrometry – definition, types and uses.

Books for Reference:

1. Bhojwani S.S. and Bhatnagar S.P. *The embryology of Angiosperms*. Uttar Pradesh: Vikas Publishing house PVT. Ltd., 2007.
2. Dwivedi J.N and Singh R.B. *Essential of plant techniques*. Jodhpur: Chant printers, 1985.
3. Eames, A.J and L.H Mac Danniels. *An Introduction to Plant Anatomy*. New Delhi: Tata McGraw- Hill Publishing Company Ltd, 1972.
4. Fahn A. *Plant Anatomy*. United Kingdom, Pergamon Press.1990
5. Maheswari, P. *Introduction to embryology of angiosperm*. India: Tata Mc Graw Hill publications and Co. 1971.
6. Pandey B.P. *Plant Anatomy*. India: S. Chand Co. 1978.
7. Ruth L.W. *Microtechniques*, New York: Mc millaian Company, 1971.
8. Singh V Pandey P.C and Jain D.K. 1987. Meerut: *Anatomy of Seed Plants*. Rastogi, Publication,

Practicals
Hr/ week: 2

- Observation of tissues - parenchyma, collenchyma and sclerenchyma.
- To measure the dimensions of the given tissue types using stage micrometer and ocular micrometer

- Sectioning of stem - monocot (*Dracaena*), dicot (*Polyalthea* and *Boerhaavia*)
- Sectioning of root – Dicot (*Azadirachta*), Monocot (*Crinum*)
- Nodal anatomy: Taking series of transverse sections in the nodal region and identify the types of nodal anatomy
- Study of the types of stomata from the epidermal peeling of *Hybiscus/ Cucurbita/* grass
- Adaptive antomy: Xerophytic – (*Nerium* leaf), hydrophytes (*Hydrilla* stem)
- Structure of young and mature anther (permanent slide)
- Types of ovule: Anatropus (permament slide), orthotropus, circinotropus, amphitropus, campylotropus (models)
- Dissection of embryo from developing seeds

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	classify tissue system and explain the organization of root and shoot apex	2	Ev, An
CO-2	distinguish the organization of tissues and cellular archiceture between root and stem and learn the process of secondary growth in plants	2	An
CO-3	describe the cytological events associated with the flower development	2	Un , E
CO-4	explain the physiological changes during pollen pistil interaction.	1	Un
CO-5	understand fertilization and double fertilization.	3	Ev
CO-6	explain the development of seed and dispersal mechanism	1	Un

Name of the Course: Anatomy, Embryology and Microtechniques

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	2	3	3	2	3	3	**2.8**	3	3	3	3	3	3	3	3	**3.0**
CO-2	3	3	2	3	3	3	2	3	**2.8**	3	3	3	3	2	3	3	3	**2.9**
CO-3	3	3	2	3	2	2	3	3	**2.6**	3	3	3	3	3	2	3	3	**2.9**
CO-4	3	3	2	3	2	2	3	3	**2.6**	3	3	2	3	3	2	2	3	**2.8**
CO-5	3	3	2	3	3	3	2	2	**2.6**	3	3	2	3	3	2	2	3	**2.8**
CO-6	3	3	2	3	3	2	2	2	**2.5**	3	3	3	3	3	3	3	3	**3.0**
Average	**3.0**	**3.0**	**2.0**	**3.0**	**2.7**	**2.3**	**2.5**	**2.7**		**3.0**	**3.0**	**2.7**	**3.0**	**2.8**	**2.5**	**2.7**	**3.0**	
PO Mean									**2.6**	PSO Mean								**2.8**
Strength of PO Correlation				Strong						Strength of PSO Correlation					Strong			

Attainment of Programme Outcome

B.Sc. Zoology

CO, PO and PSO Mapping

Name of the Course: Genetics, Physiology and Developmental Zoology

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER II			
Allied II	**Genetics, Physiology and Developmental Zoology**		
Course Code: 21UZOA21	**Hrs/ Week:4**	**Hrs/ Sem:60**	**Credits:3**

Objectives:

- To highlight the importance of genetics, physiology and developmental zoology to the students
- To learn the developmental stages, structure and functions of various organ systems of human.

Unit I Genetics

Simple Mendelian traits in man – multiple alleles – ABO blood group – Rh factor in man – erythroblastosis foetalis – sex determination in man- sex linked inheritance in man – haemophilia and colour blindness – nondisjunction - Down's and Klinefelter's syndrome.

Unit II Physiology - Digestion

Nutrition: Food constituents – carbohydrates, proteins and fats. Digestion: Role of enzymes in the digestion of carbohydrates, proteins and fats. Absorption:

Absorption of digested food.

Unit III Respiration and Nervous Co-ordination

Respiration : Haemoglobin – transport and exchange of oxygen and carbon dioxide. Nervous co–ordination: Structure and types of neurons – conduction of nerve impulse through neuron and synapse.

Unit IV Excretion and Reproduction

Excretion: Structure of kidney and nephron - urine formation. Reproduction: Structure of human testis and ovary, Graafian follicle, menstrual cycle and its hormonal control, menopause.

Unit V Developmental Zoology

Man - structure of sperm and ovum – fertilization – cleavage, gastrulation – fate map. Placenta in mammals – types (diffuse, cotyledonary and discoidal) and functions – Birth control measures – contraceptive devices, infertility - ART, IVF, IUI, Twins.

Text Books:

1. Verma P.S., Tyagi B.S.& Agarwal V.K. *Animal Physiology.* 6th Edition. New Delhi: S. Chand & Company Ltd. 2000.

2. Verma P.S. and Agarwal V.K. *Chordate Embryology.* 10th Edition. New Delhi: S. Chand & Company Ltd. 2010.

3. Meyyan R.P. *Genetics.* Nagercoil: Saras Publication. 2007.

Books for Reference:

1. Verma P.S. and V.K. Agarwal. *Cell Biology*, Genetics, Molecular Biology, Evolution & Ecology. New Delhi: S. Chand & Company Ltd. 2013.

2. Arumugam N. *Developmental Zoology.* Nagercoil: Saras Publication. 2009.

3. Meyyan R. P. *Genetics.* Nagercoil: Saras Publication. 2007.

4. Verma P.S. Tyagi B.S. & Agarwal V.K. *Animal Physiology*, 6th Edition. New Delhi: S. Chand & Company Ltd. 2000.

PRACTICALS

Course Code : 21UZOAR1 **Hrs/ Week : 2** **Credit: 1**

1. Simple Mendelian traits in man
2. ABO blood grouping
3. Qualitative tests for glucose, protein and lipid
4. Examination of excretory products (ammonia, urea and uric acid crystals)
5. Museum specimens: Slides/ Charts/ Models

   Sex linked inheritance of colour blindness, haemophilia, Down syndrome. Frog - sperm and egg, diffuse placenta (pig), cotyledonary placenta (sheep). Villus, nephron, neuron, human sperm and human egg

Book for Reference:

1. Jeyasurya, Dulsy Fatima, Kumaresan and Selvaraj. *Practical Zoology* Volume -3 . . . Nagercoil: Saras Publication. 2013.

Course outcomes

CO. No	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	explain the importance of genetics and welfare of human society	2	Un
CO-2	list out the nutritive components in the food	2	Re
CO-3	describe the physiology of digestion, respiration and excretion	3	Re
CO-4	appraise the structure and function of human nervous system and the process of nervous conduction	1,2	An
CO-5	illustrate the anatomy, physiology of human reproductive system, fertilization and post fertilization events	3	Un
CO-6	categorize the types of contraceptive devices and suggest treatment for infertility.	3,8	An

21UZOA21 Allied II **Genetics, Physiology and Developmental Zoology**

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	3	3	3	2	3	2	**2.8**	3	3	3	2	3	2	3	2	**2.6**
CO-2	3	3	2	3	2	3	2	3	**2.6**	3	3	3	3	3	2	3	3	**2.9**
CO-3	3	3	2	3	3	3	3	2	**2.8**	2	3	3	2	3	3	2	2	**2.5**
CO-4	2	2	3	3	3	2	2	2	**2.4**	3	3	3	3	3	3	2	3	**2.9**
CO-5	3	3	3	3	3	2	3	3	**2.9**	3	2	3	3	3	3	3	3	**2.9**
CO-6	3	3	3	3	3	3	2	2	**2.8**	3	2	3	2	3	3	3	3	**2.8**
Average	**2.8**	**2.8**	**2.7**	**3**	**2.8**	**2.5**	**2.5**	**2.3**		**2.8**	**2.7**	**3.0**	**2.5**	**3.0**	**2.7**	**2.7**	**2.7**	
PO Mean									**2.7**	PSO Mean								**2.8**
Strength of PO Correlation				Strong						Strength of PSO Correlation						Strong		

SEMESTER – II			
Skill Enhancement Course - II Professional English for Botany – II			
Course Code: 21UBOPE2	**Hrs / Week: 2**	**Hrs / Sem: 30**	**Credits: 2**

Objectives:

- To enhance the lexical, grammatical, sociolinguistic and communicative competence in an increasingly complex, interdependent world.
- To develop intellectual flexibility, creativity and critical thinking skills of students by offering adequate practice in professional context.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	categorize the words used in life science and improve their competence in using the language in daily life	1	An
CO-2	appraise the critical and theoretical approaches to the reading and analysis of various texts in life science and critique the biological processes	3, 7	An, Ev
CO-3	discuss critically, negotiate and present without committing errors and develop entrepreneurship skills	2, 6	Un
CO-4	prepare reports and minutes for various academic events	7	Cr
CO-5	write essays creatively and innovatively on view of images	7	Ap
CO-6	develop script for topics on interest	7	Cr

SEMESTER – II			
Skill Enhancement Course - II Professional English for Botany – II			
Course Code:21UBOPE2	**Hrs / Week: 2**	**Hrs / Sem: 30**	**Credits: 2**

UNIT I: Communication

Listening: Listening to audio text and answering questions: Primary Tissues in plants

Pair Work: Pairwise reading of a conversation script (e.g. difference between plant cell and animal cell) prepared by each pair of their choice. (The script can be based on any topic in plant science)

Reading: Comprehension passage- JanakiAmmal, the Indian Botanist

Writing: Developing a story with pictures: Story of seed

Vocabulary: Unit oriented

UNIT II: Description

Listening: Listening to Process Description - Mitosis

Role play: Deforestation

Reading Passages on Environment conservation

Process Description - Compare & Contrast Algae and Fungi

Vocabulary: Unit oriented

UNIT III: Negotiation Strategies

Listening to the interviews of James Watson, Stephen Hawking, SasiTharoor

Small group discussion - Green Revolution, impacts, limits, and the path ahead

Reading: Passage reading - Pseudoscience, the paranormal, and science education

Writing: Developing essay from the passage -Healthy diet.

Vocabulary: Unit oriented

UNIT IV: Presentation Skills

Listening : Listening to lectures and notes taking-
(https://www.youtube.com/watch?v=Dh9ptiJj7TE)

Speaking: Organized speech – Frustrations of people in Pandemic situation. (informative)

Reading: Comprehensive passage - Embryogenesis and answering questions.

Writing: Descriptive writing- Interpretation-Animals for ever (Gerald Durrell's)

Vocabulary: Unit oriented

UNIT V: Critical Thinking Skills

Listening: Listening for information - Introduction to enzymes

Speaking: Preparation of Power Point presentation –Small group discussion on errors in Power
Point presentation: History of Botany
Reading: Note making –Professional Competence and Professional Ethics
Writing: Summary writing – Drug designing.

Text Book:

1. Tamil Nadu State Council for Higher Education (TANSCHE).*Professional English for Life Sciences - I.*

Books for Reference:

1. Verma P.S. and Agarwal. V.K. *Cell biology, Genetics, Molecular Biology, Evolution and Ecology*. New Delhi, S. Chand and Co., 2007.
2. Bhojwani S.S and Bhatnagar S.P. *The embryology of Angiosperms*. New Delhi: Vikas Publishing house PVT. Ltd., 2007.
3. Dubey, R.C. 2006. *Text Book of Biotechnlogy*, fourth edition. New Delhi. S. Chand and Co Ltd., 2006.

Semester – II			
Environmental Studies			
Code : 21UAEV21	**Hrs/ Week : 2**	**Hrs/Sem:30**	**Credits : 2**

Course Outcomes:

Upon completion of this course, the students will be able to

1 Recognize the biotic and abiotic components of ecosystem and how they function.
2 Use natural resources more efficiently and know more sustainable ways of living.
3. Acquire an attitude of concern for the environment.
4. Participate in improvement and protection of environment.
5. Manage unpredictable disasters.
6 Create awareness about environmental issues to the public.

Unit I Environment and Ecosystem

Aim and need for Environmental Awareness - Components of Environment Ecosystem - Components of Ecosystem: Abiotic and biotic factors (Producer, Consumer and Decomposer) – Food Chain, Tropic Levels - Food Web, Energy flow and Ecological pyramids

Unit II Natural Resources:

Renewable and non-renewable resources – Water Resources: Uses and Conservation of Water – Rain Water Harvesting – Forest Resources: Importance of Forests - Conservation of Forest Energy Resources: Solar Fossil Fuel – Wind – Role of individuals in the conservation of natural resources

Unit III Environmental Pollution

Pollutants – Types of pollution: Air, Water, Noise and Plastic Pollution – Causes, effects and Control measures – Global warming and Climate Change

Unit IV **Human Population and Environment**

Effect of human population on environment – Population Explosion problems related to population explosion – Involvement of population in conservation ofenvironment

Unit V – Measures adopted by the Government to control population growth – Environment and human health

Unit V **Disaster Management**

Floods–Drought–Earthquakes– Cyclones – Landslide–Tsunami–Control measures

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping

Name of the Course: Part-I பொது த் தமிழ் - தாள் 3 காப்பிய இலக்கியங்களும் சிற்றிலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, புதினம்,)

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER – III			
Part-I பொது த் தமிழ் - தாள் 3 காப்பிய இலக்கியங்களும் சிற்றிலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, புதினம்,)			
Course Code: 21ULTA31	**Hrs / Week:6**	**Hrs / Semester: 90**	**Credits: 4**

Objectives:

- மாணவியர் இறை நம்பிக்கையிலும், நற்பண்புகளிலும் வளர்ந்து, இலக்கிய அறிவிலும் மொழித்திறனிலும் சிறந்து விளங்க வழிகாடுதல்.
- காப்பிய மாந்தரின் வாழ்க்கையின் மூலமாக கடவுள் நம்பிக்கை, நல்ல உறவுகள், இயற்கையை நேசித்தல், மொழி அறிவு போன்றவற்றை வளரச் செய்தல்.

அலகு - 1 செய்யுள் - 2
மணி காப்பியங்கள்

1. சிலப்பதிகாரம் - அடைக்கலக் காதை : 11 – 94 பாடுலடிகள்
2. மணிமேகலை – ஆபுத்திரன் திறன் அறிவித்த காதை : 1 முதல் 56 பாடுலடிகள்
3. பெரியபுராணம் - கண்ணப்ப நாயனார் புராணம். (பாடல்கள்: 757 - 762, 67, 74, 81, 84,85, 804, 05, 06, 12, 14, 18, 19, 825 – 832, 834.
4. கம்பராமாயணம் - நடுப்க்கோடு படுலம்.
5. சீறாப்புராணம் - கள்வரை நதி மறித்த படுலம்.

6. தேம்பாவணி - வளன் சனித்த படலம்- 9 முதல் 31 பாடுல்கள்.

சிற்றிலக்கியம்

1. திருக்குற்றாலக் குறவஞ்சி. ஐஏ குறவஞ்சி நாடகம். 8. எங்கள் மலையே.

அலகு - 2 இலக்கணம் -

1 மணி **பொருள்**

இலக்கணம்

1. அகப்பொருள் : எழுதிணை விளக்கம் - முதல், கரு, உரிப்பொருள்

2. புறப்பொருள் : வெட்சித்திணை முதல் பாடாண்திணை வரை விளக்கம் மட்டும் **யாப்பு இலக்கணம்**

1. யாப்பு உறுப்புகள். (எழுத்து, அசை, சீர், தளை, அடி, தொடை) **அலகு - 3 இலக்கிய வரலாறு** - 1 மணி

1. ஐம்பெருங்காப்பிங்கள்
2. ஐஞ்சிறுகாப்பியங்கள்
3. சிற்றிலக்கியத்தின் தோற்றமும் வளர்ச்சியும், பிள்ளைத்தமிழ், கலம்பகம், குறவஞ்சி, பரணி.
4. புதினம் தோற்றமும் வளர்ச்சியும்.. **அலகு - 4**

உரைநடை - 1மணி

இப்பொழுது இவள் - ப. தருமன. **அலகு - 5**

புதினம் - 1 மணி

தேரியாயணம் (சமூக நாவல்) - கண்ணகுமார விஸ்வரூபன்.

Course Outcome:

CO.No.	இப்பாடத்திட்டம் மாணவியருக்கு	அறிவுசார் மதிப்பீடு
CO-1	பெண்களின் சட்டங்கள் உரிமைகள், வேலைவாய்ப்பு பற்றிய விபரங்களை அறிந்து கொள்ள உதவுகிறது.	நடுமுறைப்படுத்தல்
CO-2	அரசியல் சூழ்ச்சி, இனம், சாதி குறித்த பாகுபாடு இவற்றிலிருந்து விடுதலை பெறும் வழிவகைகளைக் கற்றுக்கொடுக்கிறது.	நடுமுறைப்படுத்தல்
CO-3	இலக்கிய அறிவினை வளர்க்க, காப்பியச் சுவை உணர்ந்து சுவைக்க வாய்ப்பளிக்கிறது.	நடுமுறைப்படுத்தல்
CO-4	தனிமனித வாழ்க்கைச் சிக்கல்களை எதிர்கொள்ளும் நிலையை உருவாக்குகிறது	நடுமுறைப்படுத்தல்
CO-5	இப்பகுதியில் வாழும் அடித்தட்டு மக்களின் வாழ்வு நிலையை அறிந்து கொள்ள உதவுகிறது. பெண்கள் நீதிக்குப் போராடும் உணர்வை வளர்க்கிறது.	நடுமுறைப்படுத்தல் , திறன் மேம்பாடு
CO-6	போட்டித் தேர்வகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல்,திறன் மேம்பாடு

SEMESTER – III **Course Code: 21ULTA31**

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
CO-1	3	2	3	3	3	2	2	3	3	2	3	3	3	3	3	2
CO-2	3	3	3	3	3	2	2	3	2	3	2	3	3	3	3	3
CO-3	2	3	2	3	3	3	3	3	3	3	3	3	3	2	3	3
CO-4	3	3	3	3	3	3	3	3	3	3	2	2	2	3	2	2
CO-5	2	3	3	3	2	3	3	2	2	3	3	3	3	2	3	3
CO-6	3	3	2	3	3	2	2	3	2	3	3	3	3	3	3	3
Ave.	2.6	2.8	2.6	3	2.8	2.5	2.5	2.8	2.5	2.8	2.6	2.8	2.8	2.6	2.8	2.6

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: PART – I French Paper – III Advanced French Language

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER – III			
PART – I French Paper – III Advanced French Language			
Course Code : 21ULFA31	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Objectives

To enhance the acquisition of all the four competencies of language learning.

Unit 1 – Pas de chance !

1.1 –Se plaindre / plaindre quelqu'un
1.2 – Donner une explication
1.3 – Exprimer une émotion négative
1.4 – Demander et dire le poids et la taille
1.5 – Chance et malchance

Unit 2 – Beau travail ?

2.1 – Comprendre un programme d'échange universitaire
2.2 – Exprimer le but, le souhait et un projet professionnel
2.3 – Exprimer une capacite, une compétence
2.4 – Comprendre des taches professionnelles
2.5 – Universités 2.0

Unit 3 – Au grand air

3.1 – Comprendre une BD sur un changement de vie

3.2 – Exprimer son insatisfaction
3.3 – Exprimer un choix de vie
3.4 – Décrire son mode de vie
3.5 – Je cultive mon jardin

Unit 4 – C'était bien ?

4.1 – Parler de ses difficultés
4.2 – Encourager, rassurer
4.3 – Parler d'un projet
4.4 – Exprimer son accord, son désaccord et intérêt
4.5 – Les Français en chanson

Unit 5 – Le texte littéraire

5.1 – Demain dès l'aube - Victor Hugo
5.2 – La Laitière Et Le Pot Au Lait - Jean De La Fontaine

Prescribed Textbook :

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob, Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1Méthode de français*. Paris : Didier, 2016.

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Cahier d'exercises*. Paris : Didier, 2016.

Books, Journals and Learning Resources

- J.Girardet&J.Pécheur avec la collaboration de C.Gibble.*Echo A1*. Paris : CLE International, 2012.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I.* Paris : CLEInternational, 2003.
- Cocton Marie-Noëlle.*Génération 1 Niveau A1, Méthode de français et cahier d'exercices*.Paris : Didier, 2016.
- Dintilhac Anneline, De Oliveira Anouchka, Ripaud Delphine, DupleixDorothée, Cocton Marie-Noëlle.*Saison 1 Niveau 1, Méthode de français et cahier d'exercices*. Paris : Didier, 2015
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com
- https://www.frenchtoday.com/french-poetry-reading/

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	analyse and Interpret French realities	Un, Ap
2.	understand and analyse the various components of French life	Un, An
3.	evaluate French civilisation, appreciate the differences between eastern and western civilisation	Ev
4.	understand grammar and apply the acquired grammatical knowledge to do the grammar exercises	Re, Un, Ap
5.	create passages on her own civilisation in the target language	Un, Cr
6.	comprehend French literature	Un

PART – I French Paper – III Advanced French Language

Course Outcomes	Programme Outcomes (PO)								Programme Specific Outcomes (PSO)							
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
CO-1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO-2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO-3	3	3	2	3	3	3	3	3	2	3	3	3	3	3	3	3
CO-4	2	3	3	3	3	3	2	3	3	3	3	2	3	3	2	3
CO-5	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3
CO-6	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3
Ave.	**2.8**	**3**	**2.8**	**3**	**3**	**3**	**2.7**	**3**	**2.7**	**3**	**3**	**2.8**	**3**	**3**	**2.8**	**3**

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Part II English Poetry, Prose, Extensive Reading and Communicative English - III

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER – III			
Part II English Poetry, Prose, Extensive Reading and Communicative English - III			
Course Code: 21UGEN31	**Hrs/ Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Objectives:

- To acquaint students with literary art and writings of universal appeal.
- To strengthen the proficiency of communicative English through literary based study.

Unit I –Poetry

William Shakespeare – All the World's a Stage
Dylan Thomas – Do not go gentle into that good
night Sri Aurobindo Ghosh – The Divine Worker

Unit II – Prose

Bertrand Russell – How to Avoid Foolish Opinions
Virginia Woolf – Men and Women
M.K. Gandhi – At School

Unit III – Fiction

Charlotte Bronte -*Jane Eyre* (Abridged Version)

Unit IV – Grammar

Active and Passive Voice, Direct and Indirect Speech

Unit V –Communication Skills

Listening Comprehension, Close Reading, Conversational English, Formal Writing

Text Books:

Units I – III – Compiled by the Research Department of English.

Units IV – Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai:

Vijay Nicole Imprints Private Limited, 2006.

Unit V – CLIL (Content & Language Integrated Learning) – Module IV by TANSCHE.

Course Outcome:

CO.No.	**Upon completion of this course, students will be able to**	**PSO Addressed**	**CL**
CO-1	understand the language and literary components of texts	1	Un
CO-2	develop interest and appreciate literary texts	2	Un, Ev
CO-3	comprehend aspects of grammar and its application	6	Un
CO-4	evaluate perspectives and human values for life	4, 5	Ev
CO-5	adopt appropriate technique to enhance communication and writing	3, 7	Ap, Cr
CO-6	enrich vocabulary and develop skills of formal writing and communication	7, 8	Ap, Cr

21UGEN31 Poetry, Prose, Extensive Reading

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**Avg**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**Avg**
CO-1	3	3	2	3	3	3	3	2	**2.7**	3	2	3	3	3	3	2	3	**2.7**
CO-2	3	3	2	3	2	2	3	3	**2.6**	2	3	3	3	3	2	3	2	**2.6**
CO-3	2	3	3	3	2	3	3	2	**2.6**	3	3	3	2	3	2	3	3	**2.7**
CO-4	3	3	2	3	3	3	2	3	**2.7**	2	3	2	3	3	2	3	2	**2.5**
CO-5	3	2	3	3	3	3	2	3	**2.7**	3	3	2	3	3	2	3	3	**2.7**
CO-6	3	2	3	3	2	3	3	2	**2.6**	2	3	3	3	2	3	3	2	**2.6**
Average	**2.8**	**2.6**	**2.5**	**3**	**2.5**	**2.8**	**2.6**	**2.5**		**2.5**	**2.8**	**2.6**	**2.8**	**2.8**	**2.3**	**2.8**	**2.5**	
PO Mean									**2.6**	PSO Mean								**2.6**
Strength of PO Correlation				Strong						Strength of PSO Correlation					Strong			

Dttainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Plant Diversity II (Pteridophytes, Gymnosperms and Paleobotany)

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER – III			
Core III Plant Diversity II (Pteridophytes, Gymnosperms and Paleobotany)			
Course Code: 21UBOC31	**Hrs / Week:4**	**Hrs / Semester: 60**	**Credits:4**

Objectives:

- To investigate and illustrate the key characteristics of fossil and living pteridophytes and gymnosperms through micropreparation and microscopic observation
- To provide firsthand experience in plant collection, identification preservation and data collection for future studies.
- To impart knowledge on the ecology, economic importance, phylogenic importance of pteridophytes and to infer the evolution of seed habit from pteridophytes.

UNIT I: General Characters of pteridophytes (upto genus level). Classification of pteridophytes: Pteridophyte Phylogeny Group (PPG) by Erics (2016) (upto order level). Stelar Evolution. Heterospory and seed habit. Economic importance: food, fodder, medicine, ecological indicators, ornamental and biofertilizer

UNIT II: Distribution, external structure, internal structure, reproduction, types of gametophyte and life cycle of *Lycopodium* and *Selaginella*

(Developmental details not required).

UNIT III: Distribution, external structure, internal structure, reproduction, types of gametophyte and life cycle of *Adiantum* and *Marsilea* (Developmental details not required)

UNIT IV: General characters of gymnosperms, outline the classification of gymnosperms by Chamberlain (1934). Distribution, external structure, internal structure, reproduction and life cycle of *Pinus* and *Gnetum.* (Developmental details not required)

UNIT V: Economic importance of gymnosperms: food, fodder, ornamentals and industrial uses. Fossils: introduction, process of fossilization, theories of fossilization, types of fossils, techniques to study fossils. Geological time scale. Fossil pteridophyte: *Rhynia,* Fossil gymnosperm: *Lyginopteris* constructed plant parts.

Text Book:

1. Pandey S.N., Trivedi P.S. and Misra S.P. *A text Book of Botany Vol. II.*New Delhi:Vikas Publishing House Pvt. Ltd., 2006.

Books for Reference:

1. Rashid A. *An introduction to Pteridophyta*. New Delhi: Vani Educational Books. Vikas Publishing House Pvt. Ltd., 1985.
2. Vashishta P.C., Sinha A.K. and Anil Kumar, *Botany for degree students – pteridophyte.*New Delhi.S. Chand & Co., 2007.
3. Vashishta P.C., Sinha A.K. and Anil Kumar, *Botany for degree students - Gymnosperms.*New Delhi.S. Chand & Co., 2007.
4. Chamberlain C.J., *Gymnosperms* – Structure and evolution. New Delhi: CBS Publishers & Distributors, 1986.
5. Shukla A.C. and Misra S.P. *Essentials of Paleobotany*. New Delhi: Vikas Publishing House Pvt. Ltd., 1982.

Practicals:
Hrs/We

ek: 2

Pteridophytes:

- *Lycopodium* - Habit, section – T.S. of stem Permanent slide: L.S. of cone
- *Selaginella* - Habit, section – T.S of rhizophore, stem and L.S. of cone
- *Adiantum* - Habit, section – T.S. of rachis Permanent slide: L.S. of sporophyll
- *Marsilea*- Habit, section – T.S. of rhizome, petiole and sporocarp Permanent slides: sporocarp at different plane

Gymnosperms:

- *Pinus* - Twig, dwarf shoot, section- T.S. of young stem and needle
  Permanent slides: T.S. of old stem, L.S. of young and mature male, female cone, seed entire
- *Gnetum* - Twig, section – T.S. of stem and leaf, wood showing anomalous secondary thickening
  Permanent slides: L.S. of male and female inflorescence, seed entire

Fossils :

- *Rhynia* (Stem)
- *Lyginopteris*- Constructed plant parts

Field Study

Submission: Record note book

Laboratory manual for reference:

Srivastava H. N. *Practical Botany Volume I.* Jalandhar: Pradeep Publications, 1987

Course Outcomes:

CO.No.	Upon completion of this programme, students will be able to	PSO addressed	CL
CO-1	summarize the general characters of pteridophytes and gymnosperms and outline the classification of these groups of plants	1,2	Un
CO-2	specify the criteria of classification and assign the taxonomic hierarchical rank to the taxa	2,3	Un, Ap
CO-3	explore the ecological and economic significance of pteridophytes and gymnosperms	1,3	An
CO-4	highlight the phenomenon of heterospory in pteridophytes and infer its significance in origin of seed habit	2	An
CO-5	examine microscopically the key characteristics of (morphological, anatomical and ecological) pteridophytes and gymnosperms and make sketches of the same.	6	Ap
CO-6	record the geological time scale and relate the geological era with evolution of plants	2.4	Un

Plant Diversity II (Pteridophytes, Gymnosperms and Paleobotany)

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2.8**	3	3	3	3	3	3	3	3	**3.0**
CO-2	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**2.8**	3	3	3	3	2	3	3	3	**2.9**
CO-3	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2.6**	3	3	3	3	3	2	3	3	**2.9**
CO-4	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2.6**	3	3	2	3	3	2	3	3	**2.8**
CO-5	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2.6**	3	3	2	3	3	2	3	3	**2.8**
CO-6	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**2.5**	3	3	3	3	3	3	3	3	**3.0**
Average	**3.0**	**3.0**	**2.0**	**3.0**	**2.7**	**2.3**	**2.5**	**2.7**		**3.0**	**3.0**	**2.7**	**3.0**	**2.8**	**2.5**	**3.0**	**3.0**	
PO Mean									**2.6**	PSO Mean								**2.9**
Strength of PO Correlation				Strong						Strength of PSO Correlation					Strong			

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: ALLIED CHEMISTRY -I

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER III			
Part III	**ALLIED CHEMISTRY -I**		
Code: 21UCHA31	**Hrs/Week :4**	**Hrs/ Sem : 60**	**Credits : 3**

Vision : Develop an appreciation of Chemistry and its application in daily life
Mission :
Understand the importance of quantum numbers.
Know the fundamental concepts in organic chemistry.
Know the basic concepts of nuclear reactors.
Recognize the significance of Chromatography.
Develop skills to separate the plant materials using Chromatographic technique.

UNIT I ATOMIC STRUCTURE AND CHEMICAL BONDING

Quantum numbers and their significance- Pauli's exclusion principle – Aufbau principle – Hund's rule – Electronic configuration of elements (atomic number 1 to 36) Lattice energy – Born-Harber cycle–Factors affecting the dissolution of ionic compounds – M.O. Theory of covalent bond – Bonding, antibonding and non bonding orbital – M.O. Configuration of H_2,N_2 ,O_2-Bond order – Band theory of metallic bond- Conductors, insulators, semi conductors- Hydrogen bonding – types and effects – Vander Wall's London forces

UNIT II BASIC CONCEPTS IN ORGANIC CHEMISTRY

Hybridization -Hybridization in methane(sp3) , ethylene (sp2), acetylene(sp). electrophilies – nucleophilies –Types of organic reactions- Substitution – Addition –,elimination- polymerization reactions – Aromaticity - Huckel's rule - benzenoid and non-benzenoid- aromatic compounds-Examples.

Isomerism-Optical isomerism-symmetry-elements of symmetry-cause of optical activity- Resolution-racemisation- Geometrical isomerism-illustrated by maleic and fumaric acid-keto enol tautomerism-examples- difference between resonance and tautomerism

UNIT III NUCLEAR CHEMISTRY

Fundamental particles of nucleus - isotopes, isobars, isotones and nuclear isomers. Differences between chemical reactions and nuclear reactions-fusion and fission and its applications - radioactive series, group displacement law- mass defect- Applications of radio isotopes-carbon dating-rock and medicinal applications.

UNIT IV BIOMOLECULES

Carbohydrates- classification- configurations of D-glucose, D-fructose, D-mannose and D-galactose (structures only) – interconversions of glucose and fructose-interconversions of arabinose and glucose-epimerisation- muta rotation- general study of starch and cellulose

Amino acids - classification-essential amino acids-isolation from proteins-peptide linkage-polypeptides. Proteins- classification- colour reactions- structure.

UNIT V CHROMATOGRAPHY

Chromatography-Classification-AdsorptionChromatography-Principle–Adsorbents Characteristics of good Adsorbents- Principle, Experimental method and applications of Column Chromatography- -Thin layer Chromatography- Ion Exchange Chromatography

Text Books:

1. Arun Bahl and B.S. Bahl, Advanced Organic Chemistry. S.Chand and Company Ltd., Reprint, 2005.

2. Puri, B.R., Sharma, L.R. and K.C.Kalia, Principles of Inorganic Chemistry. Milestone Publishers and Distributers, Delhi, 2010.

3. Arun Bahl, B.S. and Bahl, G.D.Tuli, Essentials of Physical Chemistry. S.Chand &Company Ltd., New Delhi, 2008..

Books for Reference :

1. Jerry March, Advanced Organic Chemistry, Reactions Mechanisms and Structure. 4th Edition, 2013.

2. Tewari, K.S., Vishnoi, N.K. and S.N.Mehrotra, A Text Book of Organic Chemistry. 2 nd Revised Edition, 1998..

3. Puri, B.R., Sharma, L.R. and Madan S. Pathania, Principles of Physical Chemistry, Vishal Publishing Co, 2008..

4. Jain, M.K. and S.C.Sharma, Modern Organic chemistry. Vishal Publishing Co. 2012

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO 1	Know the quantum numbers and electronic configuration	**1**	**Un**
CO 2	understand hybridization of different organic molecules	**1**	**Un**
CO 3	know the difference between chemical reaction and nuclear reaction	**1**	**Re**
CO 4	Identify the importance of rock dating and carbon dating	**3**	**An**
CO 5	describe the configuration of D-glucose, D-fructose, D-mannose and D-galactose	**5**	**Ap**
CO 6	Identify the good adsorbent for Chromatography	**3**	**An**

Level of Correlation between PO's, PSO's and CO's

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**Avg**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**Avg**
CO-1	2	2	3	3	3	2	1	2	**2.2**	3	3	3	2	3	2	2	2	2.6
CO-2	2	2	3	3	3	2	1	2	**2.2**	3	2	2	2	3	2	2	1	2.5
CO-3	3	3	3	3	3	3	3	2	**2.8**	3	3	2	2	3	2	2	2	2.6
CO-4	3	3	3	3	3	3	3	2	**2.8**	3	3	2	2	3	2	2	2	2.6
CO-5	2	2	3	3	3	1	1	2	**2.1**	3	3	2	2	3	2	2	2	2.6
CO-6	2	2	3	3	3	3	1	1	**2.2**	3	3	2	2	3	3	2	1	**2.3**
Average	**2.3**	**2.3**	**3**	**3**	**3**	**2.3**	**1.7**	**1.8**		**3**	**2.8**	**3**	**2.8**	**2.8**	**2**	**2**	**2**	
PO Mean									**2.4**	PSO Mean								**2.5**
Strength of PO Correlation				Strong						Strength of PSO Correlation				Strong				

SEMESTER - III			
Skill Based Elective	**Horticulture**		
Course Code: 21UBOS31	**Hrs/week: 2**	**Hrs/Semester: 30**	**Credit: 2**

Objectives:

- To provide knowledge and skills in horticultural techniques.
- To use appropriate horticultural designs based on the geographical region, microclimateand requirement there by maximize its economic and aesthetic value of the produce.
- To effectively adapt plant propagation technique in relation to their environment for income generation.

UNIT I: Horticulture : scope and its importance, divisions of horticulture. Garden implements: spade, pick axe, tiller, digging fork, pruning scissors, budding knife, grafting knife, sprayer, water can, making plant growing structure using waste material, pot mixture making.

UNIT II: Methods of propagation - Cutting: leaf cutting, stem cutting: herbaceous stem cutting, soft wood cutting, semi-hard wood cutting, hard wood cutting, root cutting. layering; simple layering, compound layering, air layering, mound layering, tip layering and trench layering.

UNIT III: Grafting: Approach grafting, side grafting, splice grafting, saddle grafting, flat grafting, cleft grafting. budding: 'T' budding, chip, patch budding, vegetative propagules: bulbs, tubers, rhizomes.

UNIT IV: Kitchen garden: selection of site, lay out and choice of plants, designing kitchen garden using Grow Veg software. Storage and preservation of fruits and vegetables.

UNIT V: Gardening: Purpose, plant choice and caring, Design and establishment of hanging basket, rockery, bonsai, flower beds, terrarium Floriculture: cut flowers, flower arrangement: types of flower arrangement-western style, eastern style, components of flower arrangement, arranging the flower in the container.

Text Book:

1. Kumar, N. *Introduction to Horticulture*. India: Rajalakshmi Publications. 1997.

Books for Reference:

1. Choudhri D and Amal Metha. D. *Flower crops cultivation and management.* Jaipur:Oxford book company, 2010.
2. Andrew, F.S. and Halfacre, R.G. *Fundamentals of Horticulture.* New Delhi:Tata Mc. GrawHill, 1977.
3. Hartmann & Kester. *Plant propagation Prentice*. New Delhi: Hall India Pvt. Ltd., 1989,
4. Mallikarjuna Reddy and Aparna Rao. *Plant propagation in horticulture.*New Delhi:Pacific book international, 2010.
5. Randahawa, G.S. *Floriculture in India.* Mumbai:Allied publishers, 1985.
6. Utpal Banerji. *Horticulture.* Jaipur:Mangal Deep Publication, 2008.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	explain the various divisions of horticulture and importance.	1	Un
CO-2	design a landscape and interior scope project.	8	Cr
CO-3	apply the concept of horticulture science to select, manage, improve plants and their production.	6	Ap
CO-4	demonstrate employability skills in the field of horticulture	6	Ap
CO-5	equip the skill in gardening and floriculture to enhance sense of aesthetic appreciation.	6	An
CO-6	synthesize and integrate information to solve horticultural problems.	4	Ap

Name of the Course: Horticulture

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2.8**	3	3	3	3	3	3	3	3	**3.0**
CO-2	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**2.8**	3	3	3	3	2	3	2	3	**2.8**
CO-3	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2.6**	3	3	3	3	3	2	3	3	**2.9**
CO-4	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2.6**	3	3	2	3	3	2	2	3	**2.6**
CO-5	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2.6**	3	3	2	3	3	2	3	3	**2.8**
CO-6	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**2.5**	3	3	3	3	3	3	3	3	**3.0**
Average	**3.0**	**3.0**	**2.0**	**3.0**	**2.7**	**2.3**	**2.5**	**2.7**		**3.0**	**3.0**	**2.7**	**3.0**	**2.8**	**2.5**	**2.7**	**3.0**	
PO Mean									**2.6**	PSO Mean								**2.8**
Strength of PO Correlation				Strong						Strength of PSO Correlation					Strong			

SEMESTER III			
Skill Based Elective	**Gardening and Nursery Management**		
Course Code:21UBOS32	**Hrs/week:2**	**Hrs/Semester:30**	**Credit:2**

Objectives:

- To supplyelite planting material of the highest possible quality forest abolishment of new orchards.
- To grow plants in an open environment, maintain a good quality of plants and protect the plants from pests and diseases.
- To create awareness about kitchen gardening, to improve skills for growing fresh and safe vegetables without use of any pesticide.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	recollect the scope and Understand the different types of gardens and suggest plant choices on the basic concepts of gardening	1	Re,Un
CO-2	describe the importance, features and maintenance of commercial gardening.	6	An
CO-3	acquire knowledge regarding theory and practice of cultural and production techniques and methods.	5	An
CO-4	equip the skill in landscaping, gardening and floriculture and enhance sense of beautification and aesthetic values	4	Cr
CO-5	understand the importance, types and establishment of Nursery	5	Un
CO-6	learn practices like nutrition, water management and pest management	5	Ap

SEMESTER III			
Skill Based Elective	**Gardening and Nursery Management**		
CourseCode:21UBOS32	**Hrs/week:2**	**Hrs/Semester:30**	**Credit:2**

UNIT I: Scope and introduction to gardening. Different types of garden and their suitability. Gardening features,importance of garden and suitable plants for different types of garden. Designing aplan for acommercial garden.

UNIT II: Home garden – suitable plants for home gardening. Detailed aspects of roof garden, terrace garden and vertical garden. Advantages and limitations of roof, terrace and vertical garden. Plants suitable for different types of gardening. Importance, features and maintenance of commercial gardening.

UNIT III: Different shade loving plants for home gardening. Suitable annuals, perennials and flowering trees for commercial/ornamental gardening. Detailed description of potted plants such as outdoor, foliage, flowers, creepers, climbers etc., Introduction to bonsai training, pruning and wiring. Introduction on terrarium technique

UNIT IV: Introduction, importance, development. Establishment of nursery: Selection of site - location, soil and climate for nursery, topography, wind, elevation of nursery place, irrigation and drainage facilities, insects pest anddiseases control in nursery. Types of Nursery: multipurpose or mixednurseries, mono purpose or general nursery, specialized nursery, attached orauxiliaryor subsidiary nursery.

UNIT V: Location of nursery: Scientific layout of nursery, collection of mother plant and their management, source of available root stocks and their proper utilization. Use of standard methods of plant propagation, proper management of seed, arrangement of good selling, proper testing facilities, arrangement of training and demonstration, arrangement of nurseryexhibitions.

Text Books:

1. Kumar, N. *Introduction to Horticulture*. Nagercoil, India. Rajalakshmi Publications, 1997.
2. YashwantraoChavanNewDelhi.MaharashtraOpenUniversity,Resource Book on Horticulture Nursery Management, ICAR.

Book for Reference:

1. Utpal Banerji. *Horticulture* Jaipur: Mangal Deep Publication, 2008.
2. Edmund Senn-Andrew–Halfacre. *Fundamentals of Horticulture.* Tata Mc.Graw Hill,1977.
3. Randahawa *Floriculture in India.* Alliedpublishers,1985.
4. Mallikarjuna Reddy and Aparna rao *Plant propagation in horticulture.* New Delhi:Pacific book international, 2010.

SEMESTER - III			
NMEI	**Plant Resource Utilization**		
Course Code:21UBON31	**Hrs/week: 2**	**Hrs/Semester:30**	**Credit:2**

Objectives:

- To provide knowledge on distribution, cultivation, harvesting techniques and uses of crop plants
- To know the commercial values of plants resources
- To appreciate the relevance of crop plants to the economy of the people

CourseOutcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	recall the history of agriculture and scope of agricultural crops	1	Re
CO-2	discuss the knowledge on geographical area of cultivation, production and marketing of various food crops and their finished goods	1	Un
CO-3	present the importance of tropical and temperate fruits for human wellbeing, cultivation practices and extraction of oil from oil crops	3	Ap
CO-4	critique the value of spices, condiments and beverage in international trades and confectionery industries	3	Ev
CO-5	evaluate the wealth of cash crops in India and their importance in improving trade and industrial growth	3	Ev
CO-6	indicate fibers are an alternative source of plastics, explain the use of beverages and their production	5, 6	Un

SEMESTER - III			
NMEI	**Plant Resource Utilization**		
Course Code:21UBON31	**Hrs/week: 2**	**Hrs/Semester:30**	**Credit:2**

UNIT I: Botanical description, distribution, cultivation, harvesting and economic and nutritional valuesof cereals:rice, wheat, maize.

UNIT II: Botanical description, distribution, cultivation, harvesting and economic and nutritional values of legumes:soyabean, blackgram, green gram and bengalgram. Vegetables: stem– potato, garlic, herbage– cabbage, cauliflower, fruit-tomato, brinjal.

UNIT III: Botanical description, distribution, cultivation, harvesting and economic and nutritional valuesof fruits: tropical fruits – banana and papaya.

UNIT IV: Botanicaldescription, distribution, cultivation, harvesting and economic and nutritional values of spices and condiments: roots – asafoetida, stem – ginger, bark –cinnamon, leaf – curry leaves, flower bud –clove, fruit – capsicum, coriander and blackpepper.

UNIT V: Beverages: botanical description, distribution, cultivation, harvesting and economic and nutritional values ofteaand wine preparation from fruits. Oil extraction techniques – lemon grass oil and cinnamon oil.

Textbook:

1. Pandey B.P. Economic Botany. New Delhi: S. Chand. 1999.

Books forReference:

1. Chrispeels M.J and Sandava D.*Plants,Food and People*. San Fancisco: W.H.Preeman& Co., 1977.
2. Kocchar S.L. *Economic Botany of the Tropics*. India: Mac Millan Ltd. Fourth edition, 2012.
3. Sammbamurty A.V.S.S and Subrahmanyam N.S.*A textbook of Modern Economic Botany.*India: CBS publishers and Distributors.2008.
4. Sharma O.P. *Hills Economic Botany*. New Delhi:Tata Mc Graw Hill.Co.Ltd., 1996.
5. Sunidhi Miglani.*Text Book of Economic Botany*.Delhi: ABS Books. 2016.
6. Swaminathan M and Kochar S.L. *Plants and Society*.Macmillan Education., 1989.
7. Wickens G.E. *Economic Botany.Principles and Practices*. New York: Springer, Kluer Academic Publishers, 2004.

Semester – III			
Women's Synergy			
Code : 21UAWS31	**Hrs/ Week : 2**	**Hrs/Sem:30**	**Credits : 2**

Unit I - Physical Health

Woman's Structural Organisation – Levels of organisation – Body image - Reproductive health – Hormonal Cycle and its Psycho-somatic implications – Child birth – lactation – Nutritional status of women.

Unit II – Psychological Health

Examining factors determining psychological conditions of women – Depression, anxiety, stress, hysteria – Socio – cultural and familial conditioning of women's minds – Self Image, Discrimination against women.

Unit III – Women and Legal Awareness

Women specific – centered legislations – legal issues – laws to prevent gender based violence National / State Pro-women schemes – educational and Employment schemes. Laws for protection of Women – Women's rights to property – Women's Rights in the Indian Constitution – Maternity benefit act.

Unit IV – Women and Finance

Manager of domestic finance – Budgeting basics – Create a family budget - Set financial goals – Plan for financial emergencies – Budget for travel – Saving strategies – Investment options

Unit V – Women's Empowerment in Various Domain

Introduction - Women created history in sports and music – P. T. Usha, M. S. Subbulakshmi - Women who crossed hurdles in Social Service – Mother Theresa, Muthulakshmi Reddy, Medha Patkar - Role of Women in Indian independence movement and Politics – Indira Gandhi, Aruna Asaf Ali.

SEMESTER - III		
Self Study (Compulsory)	**Ethnobotany**	
Course Code: 21UBOSS1		**Credits:2**

Objectives:

- To give an overall view of ethnobotany, tribal medicines and their importance.
- To value the role of tribal people's in biodiversity conservation through their religious experience and their dependence on herbal medicines
- To recommend and dessiminate the importance of traditional medicines and their formulation to the society.

UNIT 1: **Ethnobotany:** Introduction, concept, scope and objectives. Basic knowledge of tribes in India with special reference to Tamil Nadu: Todas, Irulas, Kani and Paliyars. Tribal knowledge towards disease diagnosis, treatment, medicinal plants, plant conservation and cultivation. Tribal medicines and their role in community herbal gardens.

UNIT II: **Herbal Preparations:** Collection of wild herbs. Capsules, compresses, elixirs. Hydro therapy or herbal bath. Herbal oils, liquid extracts or tincture, poultices, salves, slippery elm, slurry tea. Drug adulteration.

UNIT III: **Plants in folk religion:** *Aegle marmelos, Ficus benghalensis, Curcuma domestica, Cyanodon dactylon and Sesamum indicum*. Medicinal uses and their significance: coconut, banana and betel.

UNIT IV: **Role of Ethnobotany in conservation:** Sacred grooves, taboos and deity associated ecological role. Elementary account on the sacred grooves in Tamil Nadu. Sthalavrikshas and its importance. Endangered taxa and forest management.

UNIT V: **Ethnobotany and legal aspect:** Ethnobotany as a tool to protect interests of ethnic groups. Traditional knowledge in relation to Intellectual Property Rights (IPR), Biopiracy.

Books for Reference:

1. Dr. M. P. Singh, B.C. Oraon, Narendra Prasad. *Medicinal Plants*. New Delhi: APH Publishing Corporation, 2009.
2. Ramesh Bhadari. *Medicinal Plants and their Conservation*. New Delhi: Cyber Tech Publications, 2011.
3. Pravin Chandra Trivedi, Sharma N.K..*Ethnomedical plants*. New Delhi: Pointer Publishers, 2004.
4. Rosaline, A. *Pharmacognosy*. Chennai: MJP Publishers, 2011.
5. Jain S.K. *Glimpses of Indian Ethnobotany*. Chennai: MJP Publishers, 2004.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	gain knowledge about the ethnic tribals of Tamil Nadu	1, 2	Un
CO-2	discuss about the various methods of herbal medicine preparation	1, 2	Ap
CO-3	identify the different form of herbal medicines	6	Ap
CO-4	understand the basic knowledge about the plants used in folk religion	1, 2	An
CO-5	apply this knowledge to conserve the endangered plants and forest management	1, 6	An
CO-6	understand the concept of intellectual property rights in tribal medicines	1, 2	Un

Name of the Course: Ethnobotany

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	2	2	3	2	3	3	**2.6**	3	3	3	3	3	3	3	3	**3.0**
CO-2	3	3	2	2	3	3	2	3	**2.6**	3	3	3	3	2	3	2	3	**2.8**
CO-3	3	3	2	2	2	2	3	3	**2.5**	3	3	3	3	3	2	3	3	**2.9**
CO-4	3	3	2	2	2	2	3	3	**2.5**	3	3	2	3	3	2	2	3	**2.6**
CO-5	3	3	2	2	3	3	2	2	**2.5**	3	3	2	3	3	2	3	3	**2.8**
CO-6	3	3	2	2	3	2	2	2	**2.4**	3	3	3	3	3	3	3	3	**3.0**
Average	**3.0**	**3.0**	**2.0**	**2.0**	**2.7**	**2.3**	**2.5**	**2.7**		**3.0**	**3.0**	**2.7**	**3.0**	**2.8**	**2.5**	**2.7**	**3.0**	
PO Mean									**2.5**	PSO Mean								**2.8**
Strength of PO Correlation					Strong					Strength of PSO Correlation						Strong		

B.SC BOTANY

CO, PO and PSO Mapping

Name of the Course: பொதுத்தமிழ் - தாள் 4 சங்க இலக்கியம்
(செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, நாடகம்)

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER – IV			
Part-1 பொதுத்தமிழ் - தாள் 4 சங்க இலக்கியம் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, நாடகம்)			
Course Code: 21ULTA41	**Hrs / Week:6**	**Hrs / Semester: 90**	**Credits: 4**

Objectives:

- மாணவியருக்கு நல்ல மதிப்பீடுகளைக் கற்பித்து, வாழ்வில் அவற்றைப் பின்பற்ற வழிவகுத்தல்.
- இலக்கியமாந்தரின் மூலம் நல்ல வாழ்க்கை அனுபவங்களைப் பெறச்செய்து தன்னம்பிக்கை, ஆளுமைத் திறம், மொழி அறிவு இவற்றை உருவாக்குதல்.

அலகு - 1 செய்யுள் - 2 மணி எடுத்தொகை

1. நற்றிணை - பாடல்கள் : 64, 318
2. குறுந்தொகை - பாடல்கள் : 3, 20, 75
3. ஐங்குறுநூறு - செலவு அழுங்குவித்தப் பத்து - பாடல்கள் : 304, 307, 308, 309
4. பதிற்றுப்பத்து - பாடல் : 25
5. பரிபாடல் - பாடல் 6 (1-10 அடிகள்)
5. கலித்தொகை - பாடல் : 51
6. அகநானூறு - பாடல்கள் : 20, 194
7. புறநானூறு - பாடல்கள் : 191, 204

பத்துப்பாட்டு

மதுரைக்காஞ்சி - 63 வரிகள்

அலகு -2 இலக்கணம் - 1 மணி

1. **பாவகைகள்** - வெண்பா, ஆசிரியப்பா பொது இலக்கணம்
2. **அணி இலக்கணம்** -
   உவமை, உருவகம், வேற்றுமை, வஞ்சப்புகழ்ச்சி, சிலேடை, தற்குறிப்பேற்றம்
3. வாக்கிய வகைகள்
4. பிறமொழிச் சொற்களை நீக்கி எழுதுதல்
   அ. ஆங்கிலச் சொற்கள்
   ஆ. வடமொழிச் சொற்கள்
   இ. தெலுங்குச் சொற்கள்

அலகு 3 இலக்கியவரலாறு - 1 மணி

1. எட்டுத்தொகை நூல்கள்
2. பத்துப்பாட்டு நூல்கள்
3. சங்க இலக்கியத்தின் தனிச்சிறப்புகள்
4. நாடகம் - தோற்றமும் வளர்ச்சியும்

அலகு - 4 உரைநடை - 1மணி

இலக்கியத் தென்றல் - தமிழ்த்துறை - கடுகூரைத் தொகுப்பு, தூய மரியன்னைகல்லூரி (தன்னாட்சி), தூத்துக்குடி

அலகு -5 நாடகம் - 1 மணி

ஆயிரம் பூக்கள் மலரட்டும் - கந்தக்குளம் வில்லவன்

Course Outcome:

CO.No.	இப்பாடத்திட்டம் மாணவியருக்கு	அறிவுசார் மதிப்பீடு
CO-1	அனுபவ அறிவை வளர்க்கிறது.	நடுமுறைப்படுத்தல்
CO-2	பழந்தமிழர் வாழ்வியல் முறைகளை கற்று பயனடைய உதவுகிறது.	நடுமுறைப்படுத்தல்
CO-3	மனிதநேயம், இணைநம்பிக்கை இவற்றை உருவாக்குகிறது.	உருவாக்கம்
CO-4	தனிமனித வாழ்க்கைச் சிக்கல்களை எதிர்கொள்ளும் நிலையை உருவாக்குகிறது	நடுமுறைப்படுத்தல் , உருவாக்கம்
CO-5	சமுதாய பிரச்சினைகளை எதிர்கொள்ளும் திறம் கிடைக்கிறது.	நடுமுறைப்படுத்தல் , திறன் மேம்பாடு
CO-6	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல், திறன் மேம்பாடு

SEMESTER – IV **Course Code: 21ULTA41**

Course Outcomes	Programme Outcomes (PO)								Programme Specific Outcomes (PSO)							
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
CO-1	3	2	3	3	3	2	2	3	3	2	3	3	3	2	3	2
CO-2	3	3	3	2	3	2	3	3	3	3	3	2	3	3	3	3
CO-3	2	3	2	3	3	3	3	2	3	3	3	3	3	3	3	3
CO-4	2	2	3	3	3	3	3	3	3	3	2	2	2	3	2	2
CO-5	3	3	3	2	2	3	3	3	2	3	3	3	3	2	3	3
CO-6	3	2	2	3	3	2	3	3	2	3	3	2	3	3	3	3
Ave.	2.6	2.5	2.6	2.6	2.8	2.5	2.8	2.8	2.6	2.8	2.8	2.5	2.8	2.6	2.8	2.6

B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: PART – I French Paper – IV French Course and Literature

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER – IV			
Course Title : PART – I French Paper – IV French Course and Literature			
Course Code : 21ULFA41	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Objectives

To create and develop the taste for literary readings in the target

language. To motivate students to appreciate the French literature.

Unit 1 – XVII^{e}siècle

1.1 – Le Corbeau et le Renard - Jean de la Fontaine
1.2 – Le Petit Chaperon Rouge - Charles Perrault
1.3 – Le Passe Composé

Unit 2 – XVIII^{e}siècle

2.1 – Zadig : La danse - Voltaire
2.2 – La Révolution française
2.3 – L'imparfait

Unit 3 – IX^{e}siècle

3.1 – Chansons d'automne - Paul Verlaine
3.2 – Le Père Goriot *(extrait)* - Honoré de Balzac
3.3 – Les Pronoms relatifs

Unit 4 – XX^{e}siècle

4.1 – Le Pont Mirabeau - Guillaume Apollinaire
4.2 – L'Etranger *(extrait)* - Albert Camus
4.3 – Les Indicateurs temporels

Unit 5 – La littérature francophone

5.1 – Le Grand Cahier*(extrait)* - Agota Kristof

5.2 – Le fils à la recherche de sa mère- Pape Faye
5.3 – Le Futur proche et le futur simple

Books, Journals and Learning Resources

- K. Madanagobalane, N.C.Mirakamal.*Le Francais par les Textes*. Chennai :Samhita Publications, 2019.
- Blondeau Nicole, Allouache Ferroud jà, Ne Marie-Françoise.*Littérature Progressive du Français*.Paris : CLE International,2004.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I*. Paris : CLE International, 2003.
- Akyuz Anne,Bazelle-Shahmaei Bernadette, Bonenfant Joelle, Gliemann Marie-Francoise. *Les 500 exercices de grammaire*. Paris : Hachette livre,2005
- Grégoire Maria.*Grammaire Progressive du français*. Paris : CLE International, 2002.
- Sirejols Evelyne, Tempesta Giovanna, Grammaire. *Le Nouvel Entrainez-vous avec 450 Nouveaux Exercices.* Paris : CLE International, 2002
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com
- https://www.conte-moi.net/node/120

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	reflect upon the author's ideas and transform their own personality	Un
2.	explore a literary text, with the perspective of analyzing the content and manner of writing	Un, An
3.	create critical appreciations	Ev
4.	evaluate the literary piece in comparison with any other of another language	An, Ap
5.	identify grammar rules in literary text and apply the grammatical knowledge to do grammar exercises	Re, Un, Ap
6.	discover, interrogate and reflect on the humanistic value	An

Course Outcomes	Programme Outcomes (PO)								Programme Specific Outcomes (PSO)							
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
CO-1	3	2	3	3	3	3	2	3	2	2	3	3	3	3	3	3
CO-2	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3
CO-3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO-4	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3
CO-5	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3
CO-6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Ave.	3	2.8	3	3	3	3	2.3	3	2.8	2.8	3	3	3	3	3	3

B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Part II English Poetry, Prose, Extensive Reading and Communicative English - IV

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER – IV			
Part II English Poetry, Prose, Extensive Reading and Communicative English - IV			
Course Code 21UGEN41	**Hrs/ Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Objectives:

- To advance students' understanding of literary art and writings of universal appeal.
- To further the proficiency of communicative English through literary studies.

Unit I –Poetry

John Keats – Bright star, would I were steadfast

E.E. Cummings – I carry your heart with me

Jayanta Mahapatra – Relationship

Unit II – Prose

Helen Keller – Three Days to See

Jerzy Kosinski – TV as a Baby Sitter

Bhabani Bhattacharya – Names are not Labels

Unit III – Fiction

Thomas Hardy – *Tess of the d' Urbervilles* (Abridged Version)

Unit IV – Grammar

Types of Sentences, Transformation of Sentences

Unit V – Communication Skills

Verbal and Non-Verbal Communication, Interview, CV- Resume, Presentation Skills

Text Books:

Units I – III – Compiled by the Research Department of English.

Units IV – Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai: Vijay Nicole Imprints Private Limited, 2006.

Unit V – CLIL (Content& Language Integrated Learning) – Module IV by TANSCHE.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	comprehend better the language and literary components of texts	1	Un
CO-2	gain deeper insight into literary experience and expressions of writers	2	Un
CO-3	be competent in conversational and functional English	3	Ap
CO-4	employ nuances of verbal and non-verbal techniques in communication	5, 6	Ap
CO-5	adopt right perspectives of human values for life	4, 5	Ap
CO-6	face interviews and competitive exams with confidence	7	Ap

21UGEN41 Poetry, Prose, Extensive Reading

	PO									PSO								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**Avg**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**Avg**
CO-1	3	3	2	3	3	3	3	2	**2.7**	3	2	3	3	3	3	2	3	**2.7**
CO-2	3	3	2	3	2	2	3	3	**2.6**	3	3	3	3	3	3	3	2	**2.8**
CO-3	2	3	3	3	3	3	3	2	**2.7**	3	3	3	2	3	2	3	3	**2.7**
CO-4	3	3	2	3	3	3	3	3	**2.8**	2	3	2	3	3	3	3	3	**2.7**
CO-5	3	3	3	3	3	3	2	3	**2.8**	3	3	2	3	3	2	3	3	**2.7**
CO-6	3	3	3	3	2	3	3	2	**2.7**	2	3	3	3	3	3	3	2	**2.7**
Avera ge	**2.8**	**3**	**2.6**	**3**	**2.6**	**2.8**	**2.8**	**2.6**		**2.6**	**2.8**	**2.6**	**2.8**	**3**	**2.6**	**2.8**	**2.6**	
PO Mean									**2.7**	PSO Mean								**2.7**
Strength of PO Correlation				Strong						Strength of PSO Correlation				Strong				

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Taxonomy of Angiosperms and Economic Botany

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER IV			
Core IV	**Taxonomy of Angiosperms and Economic Botany**		
Course Code: 21UBOC41	**Hrs/week: 4**	**Hrs/Semester: 60**	**Credit: 4**

Objectives:

- To recall and outline the system of classification and scientific contribution done by naturalist/ taxonomist
- To gain the art of plant collection, identification and prepare herbaria to secure plant repository for type species.
- To describe the diagnostic features of different plants in technical terms to infer the evolutionary significances and to assign the hierarchical rank of plant species.

Unit I: Taxonomy: definition and scope. Contribution of Mathew and Santappa. Modification of root and stem. Leaf: venation, leaf apices, leaf margins, leaf arrangements. Stipules: types and modification. Inflorescence: types of inflorescence (simple, compound and special). Flower: terms used in description of calyx, corolla, androecium and gynoecium.

Unit II: Floral formula: symbols employed in floral formula. Floral diagram: important features and sequential drawing of floral diagrams. Systems of classification: natural (Bentham and Hooker) and phylogenetic (Engler and Prantl's system).

Botanical nomenclature: vernacular names, binomial. Principles of ICBN.

Unit III: Vegetative, floral characters and economic importance of Annonaceae, Rutaceae, Caesalpiniaceae, Myrtaceae, Cucurbitaceae.

Unit IV: Vegetative, floral characters and economic importance of Rubiaceae, Sapotaceae, Apocynaceae, Asclepiadaceae and Acanthaceae.

Unit V: Vegetative, floral characters and economic importance of Lamiaceae, Amaranthaceae, Euphorbiaceae, Orchidaceae, Arecaceae and Poaceae.

Text Books:

1. Pandey B.P. *Taxonomy of Angiosperms*. New Delhi: S.Chand & Company Ltd., 2005.
2. Shukla P. and Misra S.P. *An introduction to Taxonomy of angiosperms*. New Delhi: Vikas Pub. House Ltd., 1997.
3. Vashista P.C. *Taxonomy of Angiosperms*. New Delhi: Vikas Publications, 1985.

Books for Reference:

1. Gurcharan Singh. *Plant Systematics.* New Delhi: Oxford &IBH Publishing Co. PVT. Ltd., 2004.
2. Naik V.N. *Taxonomy of Angiosperms*. New Delhi: R. Chand & Co., 1984.
3. Rendle. *The classification of flowering plants vol. II & I.* Sahibabad U.P.: Vikas Publishing House Pvt. Ltd., 1979.
4. Sharma O.P. *Plant Taxonomy*. New Delhi: Tata MC Graw – Hill publishing Company Ltd., 1996.
5. Singh V. and Jain. *Taxonomy of Angiosperms*. New York: Rastogi publications, 1997.
6. Pandey B.P. *Economic Botany.* New Delhi: S.Chand & Company Ltd.,1999

Practical

Hrs/ week: 2

- Dissect and display the floral parts of the typical members of the families prescribed in the syllabus.
- Survey of locally available plant species belonging to the families prescribed in the syllabus and preparation of digital herbarium.
- Field trip: submission of 2 herbarium sheets and 10 photographs.
- Study of various modifications and record of economically important products from the members of the families prescribed in the syllabus.

Submission: Record note book/ Herbarium / Field note book

Taxonomic manuals for Reference:

1. Ashok Bendre and Ashok Kumar. *Text Book of Practical Botany II*. Meerut: Rastogi Publications, 2008.
2. Gamble J.S. *Flora of Presidency of madras, Volume I to III.* London: Adlard and Son Ltd., 1997.
3. Henry A.N., Chitra, V. and Balakrishnan N.P. *Flora of Tamil Nadu, India, Volume III.* Coimbatore: Botanical Survey of India, Southern circle, 1989.
4. Henry A.N., Kumari G.R. and Chitra V. *Flora of Tamil Nadu, India, Volume II.* Coimbatore: Botanical Survey of India, 1987.
5. Mathew K.M. *The flora of Tamil Nadu, Carnatic. Volume I to III.* Tiruchirapalli: Rapinet herbarium, St. Joseph's College, 1981 to 1984.

Course Outcomes:

CO. No.	Upon completion of this programme, students will be able to	PSO addressed	CL
CO-1	describe the general principles of classification and outline the systems of classification	1	Cr
CO-2	apply binomial nomenclature for species naming	4	Un
CO-3	learn floristic features in technical term and provide an illustrious explanation on floral components of the flower and develop skill in plant identification.	4,6	Ap
CO-4	familiarise and evaluate the economic importance of angiosperms	6	Ev
CO-5	attain field experience and preparation of herbaria for digital database and gain the art of plant collection and protection	6, 8	An, Cr
CO-6	compare and contrast the diagnostic features of different families of angiosperms prescribed in the syllabus	1	An

Name of the Course: Taxonomy of Angiosperms and Economic Botany

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2.8**	3	3	3	3	3	3	3	3	**3.0**
CO-2	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**2.8**	3	3	3	3	2	3	3	3	**2.9**
CO-3	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2.8**	3	3	3	3	3	2	3	3	**2.9**
CO-4	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2.8**	3	3	3	3	3	2	2	3	**2.8**
CO-5	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2.6**	3	3	3	3	3	2	2	3	**2.8**
CO-6	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**2.6**	3	3	3	3	3	3	3	3	**3.0**
Average	**3.0**	**3.0**	**2.2**	**3.0**	**3.0**	**2.3**	**2.5**	**2.7**		**3.0**	**3.0**	**3.0**	**3.0**	**2.8**	**2.5**	**2.7**	**3.0**	
PO Mean									**2.7**	PSO Mean								**2.9**
Strength of PO Correlation				Strong						Strength of PSO Correlation					Strong			

B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: ALLIED CHEMISTRY -II

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER IV			
Part III	**ALLIED CHEMISTRY -II**		
Code: 21UCH A41	**Hrs/Week :4**	**Hrs/ Sem : 60**	**Credits : 3**

Vision : Acquire an appropriate knowledge and understanding in Chemistry underlying in metallurgical process and industrial important polymers.

Mission :

Knowledge on steps involved in metallurgical process
Know the importance of colloids in day to-day life
Significance of synthetic reagents in organic chemistry.
Importance of nanochemistry in various fields.

UNIT I METALLURGY

Ores and Minerals- types of ores – methods of ore dressing- roasting –calcination, reduction of metal oxide by aluminium (aluminothermic process)-smelting- flux and slag -purification by electrolysis and ion exchange method - oxidativerefining- zone refining- Kroll process - van Arkel de Boer method- types of furnaces – klins – blast – reverberatory- muffle and electric furnace. Extraction, propertiesand uses of titanium and vanadium. Preparation of Titanium tetrachloride and Vanadium pentoxide

UNIT II COLLOIDS AND EMULSIONS

Definition- Classification of Colloids –comparison of lyophilic and lyophobic colloids- Preparation of sols-Dispersion method (Bredig's Arc method) –Aggregation method(oxidation , reduction,double decomposition)-Properties – Optical(Tyndall effect) – kinetic(Brownian movement)Electrical (electrical double layer) – Coagulation of colloids –

Hardy Schulze law – protective colloids – gold number – Gels – classification, preparation properties(imbibition,synerisis and thixotropy). Emulsion – types and their distinction.Emulsifiers – surfactants– applications of colloids-food, medicine, thixotropic paints, clarificationof municipal water, formation of delta.

UNIT III SYNTHETIC REAGENTS AND SOME IMPORTANT ORGANIC COMPOUNDS

Synthetic reagents-preparation, properties of ethyl zinc-methyl lithium-diethyl malonate and tetra ethyl lead (TEL) Preparation and properties and uses of Saccharin- chloramines - T-Salicylic acid -Aspirin

UNIT IV ALKALOIDS AND TERPENOIDS

Alkaloids-Definition-General methods of structure determination- Hoffmann's exhaustive methylation with coniine as example- structure and synthesis of coniine and nicotine

Terpenes-Definition-classification-examples-isoprene rule-general methods of structure determination- structure and synthesis of citral and menthol

UNIT V NANOCHEMISTRY Nanoparticles – Definition – Types– nanoparticles of metals, semiconductors and oxides – Synthesis of nano sized compounds – reduction methods, sol-gel method– nanoclusters – nanorod- nano wire and uses . Carbon nanotubes – single walled nanotube- multiwalled nanotube. Application of nanochemistry in various fields.

Text Books:

1. Arun Bahl and B.S. Bahl.. Advanced Organic Chemistry. S.Chand and Company Ltd., Reprint, 2005
2. Puri, B.R., Sharma, L.R. and K.C.Kalia,. Principles of Inorganic Chemistry. Milestone Publishers and Distributers, Delhi, 2010.
3. Arun Bahl, B.S. and Bahl, G.D.Tuli. Essentials of Physical Chemistry. S.Chand &Company Ltd., New Delhi, 2008..

Books for Reference :

1. Jerry March, Advanced Organic Chemistry, Reactions Mechanisms and Structure. 4th Edition, 2013.
2. Tewari, K.S., Vishnoi, N.K. and S.N.Mehrotra. A Text Book of Organic Chemistry. 2 nd Revised Edition, 1998..
3. Puri, B.R., Sharma, L.R. and Madan S. Pathania, Principles of Physical Chemistry. Vishal Publishing Co, 2008.
4. Jain, M.K. and S.C.Sharma, Modern Organic chemistry. Vishal Publishing Co. 2012.

Course outcomes

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO 1	explain the methods of purification of ores and differentiate ores and minerals	**1**	**Un**
CO 2	correlate the importance of colloids in day to day life	**5**	**An**
CO 3	Know the types of emulsions and emulsifiers	**4**	**Re**
CO 4	Know the importance of synthetic reagents	**1**	**Re**
CO 5	Determine the structure of various alkaloids	**4**	**Ap**
CO 6	Correlate the importance of nanochemistry in various fields	**5**	**An**

Level of Correlation between PO's, PSO's and CO's

	PO									**PSO**								
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**Avg**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**Avg**
CO-1	3	2	3	3	3	2	1	2	**2.4**	3	3	3	3	3	3	3	3	3
CO-2	2	2	3	3	3	2	1	2	**2.2**	3	3	3	3	3	2	2	2	2.6
CO-3	3	1	3	3	3	3	1	2	**2.4**	3	3	2	3	3	2	2	2	2.5
CO-4	3	3	3	3	3	3	2	2	**2.7**	3	3	2	3	3	2	2	2	2.5
CO-5	2	2	3	3	3	1	1	2	**2.1**	3	3	2	3	3	2	2	2	2.5
CO-6	3	3	3	3	3	3	1	2	**2.6**	3	3	3	3	3	3	3	3	**3**
Average	**2.7**	**2.2**	**3**	**3**	**3**	**2.3**	**1.7**	**2**		**3**	**3**	**2.5**	**3**	**3**	**2.3**	**2.3**	**2.3**	
PO Mean									**2.4**	PSO Mean								**2.7**
Strength of PO Correlation			Strong							Strength of PSO Correlation			Strong					

SEMESTER - IV			
Skill Based Elective	**Organic Farming and Biofertilizer**		
Course Code: 21UBOS41	**Hrs/Week 2**	**Hrs/Semester 30**	**Credits: 2**

Objectives

- To create knowledge on organic farming practices.
- To sensitizes the values and needs of organic farming.
- To develop organic farming management skills.

UNIT I: Introduction: need of organic farming, benefits of organic farming. Organic fertilizers: introduction, need of organic fertilizer, benefits of organic fertilizer.

UNIT II: Preparation of organic fertilizer: Animal waste (bone meal, blood meal, FYM and vermicompost), Plant based fertilizer (seaweed liquid fertilizer, green manure and biocompost). Panchakavya.

UNIT III: Organic pesticide: introduction, types and uses. Insecticides: Neem leaf, Onion and Garlic spray, *Chrysanthemum* flower tea.

UNIT IV: Organic weedicides: vinagreen and DIY safe organic weed killer. organic fungicide: organic homemade natural fungicides

UNIT V: Preparation of organic growing structure. Growing medium for plants: coir peat and vermiculite. Growth hormone from kitchen waste. Guidelines for organic farming certification.

Text Books

1. Arun K Sharma. *Hand book of organic farming*. Jodhpur: Agrobios (India) Publisher, 2005.
2. Chandrasekaran B., Annadurai K. and Somasundaram E. *Text book of agronomy*. New Delhi: New Age International (P) Ltd. Publishers, 2010.

Books for Reference:

1. Fred C. Blank. *Essential aspects of agricultural crop production*. Jodhpur: Agrobios (India) Publisher, 2006.
2. Palaniappan S.P. and Annadurai. *Organic farming-Theory and Practice.* New Delhi:

Scientific Publishers Journals Dept., 2010.
3. Sharma J.P. *Organic crop production (Principles and practices Vol-I: Principles and General Aspects)*. New Delhi: KP publisher, 2017.
4. Balasubramanian R., Balakrishnan K. and Sivasubramanian K. *Principles and practices of organic farming.* New Delhi*:* Satish Serial Publishing House, 2017.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand overall perspective on organic farming.	2,7	Un
CO-2	realize the advantages of traditional organic farming over modern system of farming	4 , 6	An
CO-3	identify and formulate mechanical and biological managements of insects/pests/ weeds.	4	An
CO-4	recognize the importance of composting and bio fertilizers over chemical fertilizers for soil sustainability	2,7	Ev
CO-5	understand and implement crop protection techniques of fruits and vegetables	4, 6	Un
CO-6	know the process of food certification and to assess the socioeconomic benefit of organically grown foods and enhance self employability and improve their economy	6	Ap

Name of the Course: Organic Farming and Biofertilizer

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	2	3	3	2	3	3	**2.8**	3	3	3	3	3	3	3	3	**3.0**
CO-2	3	3	2	3	3	3	3	3	**2.8**	3	3	3	3	3	3	2	3	**2.9**
CO-3	3	3	2	3	2	2	3	3	**2.6**	3	3	3	3	3	2	3	3	**2.9**
CO-4	3	3	2	3	2	2	3	3	**2.6**	3	3	2	3	3	2	2	3	**2.6**
CO-5	3	3	2	3	3	3	3	3	**2.6**	3	3	2	3	3	2	3	3	**2.8**
CO-6	3	3	2	3	3	2	3	3	**2.5**	3	3	3	3	3	3	3	3	**3.0**
Average	**3.0**	**3.0**	**2.0**	**3.0**	**2.7**	**2.3**	**3.0**	**2.7**		**3.0**	**3.0**	**2.7**	**3.0**	**3.0**	**2.5**	**2.7**	**3.0**	
PO Mean									**2.7**	PSO Mean								**2.9**
Strength of PO Correlation					Strong					Strength of PSO Correlation					Strong			

SEMESTER IV			
Skill Based Elective	**Weed Science**		
Course Code: 21UBOS42	**Hrs/week: 2**	**Hrs/semester: 30**	**Credits: 2**

Objectives

- To provide knowledge on ecology of weeds and its dynamic interaction with human activities
- To evaluate herbicides and its long time impact to environment and non-targeted organism
- To identify and survey weeds distribution and apply various weed management techniques

Course Outcomes:

CO. No.	Upon completion of this programme, students will be able to	PSO addressed	CL
CO-1	characterize and classify weeds	1	An
CO-2	predict the method of propagation, dispersal mechanism and its perpetuation in its ecological niches	6	Ap
CO-3	recognize competition between crop and weed in terms of light, space, moisture and nutrition	2	An
CO-4	investigate allelopathic effects between crops in their rhizosphere	3	An
CO-5	defend the mechanism action of herbicides	3	Ev
CO-6	relate the long term importance of herbicides to the environment and non targeted organisms	7	Ap

SEMESTER IV			
Skill Based Elective	**Weed Science**		
Course Code: 21UBOS42	**Hrs/week: 2**	**Hrs/semester: 30**	**Credits: 2**

UNIT I: Weeds**:** Definition, characteristics and classification of weeds. Harmful and beneficial effects of weeds. Biology and ecology of weeds.

UNIT II: Propagation and persistence**:** Propagation, dispersal and persistence of weeds.

UNIT III: Crop - weed competition**:** Crop - weed competition for light, space, moisture and nutrients. Critical period of crop - weed competition. Allopathic effects of weeds on crops.

UNIT IV: Weed management**:** Principles, prevention, eradication and control of weed. Mechanical, cultural, chemical and biological methods of weed control.

UNIT V: Herbicide**:** Definition. Objectives and scope of herbicide application.Formulation. Mechanism of action of herbicides. Toxic symptoms of herbicide in weeds and crops. Effects of herbicide on the environment.

Text Books

1. Grafts A. S. and Robbins W. W. *Weed Control*. New Delhi: Tata-McGraw-Hill, Publishing Co. Ltd., 1973.
2. Zimdahl R. L. *Fundamentals of Weed Science*. U.S.A: Academic Press, 1983.

Books for Reference:

1. Aldrich R.J. *Weed - crop ecology- principles in Weed Management*. Massachusetts, U. S. A.: Breton Publishers, 1984.
2. Fryer J.D. and Makepeace. *Weed Control Handbook Vol. II*. London: Blackwell Scientific Publication, 1978.
3. Hance R.J. and Holy K. *Weed Control Handbook*. Oxford: Blackwell Scientific Publication, 1990.
4. Narwal S. S. *Allelopathy in Crop Production*. Jodhpur: Scientific Publishers, 1994.
5. Gupta O. P. *Scientific Weed Management*. New Delhi: Today & Tomorrow's Printers & Publishers, second revised & enlarged edition, 1984.
6. Gupta O. P. and Lamba P. S. *Modern Weed Science*. New Delhi: Today and Tomorrow's Printers and Publishers, 1978.
7. Rao V. S. *Principles of Weed Science*. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd., third edition, 1988.
8. Subramanian S., Mohamed Ali A. and Joya Kumar R. *All about Weed Control*. New Delhi: Kalyani Publishers, 1997.

SEMESTER IV			
NME II	**Food Technology**		
Course Code: 21UBON41	**Hrs/week:2**	**Hrs/Semester:30**	**Credit: 2**

Objectives:

- To provide cognizant on the chemistry of food components, microbial interaction with food product and apply scientific methods of food preservation to restrict microbial growth.
- To develop skill in food processing techniques and apply it to their professional accomplishment.
- To encourage collaborative learning and develop skill to introduce novelty in quality improvement and enhancing marketing values.

Course Outcomes:

CO. No.	Upon completion of this programme, students will be able to	PSO addressed	CL
CO-1	manufacture a range of simple nutritious and novel food products and learn quality improvement and ingredient substitution.	6	Ap
CO-2	identify and explain nutrients in foods and the specific functions in maintaining health.	2	Re
CO-3	commends on causes and deterioration mechanisms of foods and methods to control food spoilage and principles of food preservation	3	An
CO-4	understand the compositional and technological improvement in dairy and bakery industries	6	Un
CO-5	learn nutritious values of food and employ technologies in production and preservation	3	Ap
CO-6	apply preservation principles in product design and presentation	8	Ap

SEMESTER IV			
NME II	**Food Technology**		
Course Code: 21UBON41	**Hrs/week:2**	**Hrs/Semester:30**	**Credit: 2**

UNIT I: Technology of Vegetables**:** Nutritive value of vegetable, storage of vegetable, factors affecting storage life, spoilage of vegetables. Methods of preservation: refrigeration, freezing, canning, drying and dehydration, and chemical preservatives. Preparation - pickles (lemon, mango), soups (mixed vegetables, tomato).

UNIT II: Bakery Technology**:** Ingredients & processes for breads, cakes. Equipments used, product quality characteristics, faults and corrective measures. Different types of icings.

UNIT III: Dairy Technology**:** Milk and dairy products, Pasteurization, sterilization, HTST and UHT processes. Preparation of butter, ghee, ice-cream, paneer.

UNIT IV: Technology of Fruits**: C**omposition and nutritive values of fruits. Spoilage of fruits. Preparation of jam - mixed fruits jam. Fruit juices pineapple and grapes. Squash – lemon. Sauce- tomato.

UNIT V: Technology of millets: Types of millets, nutrient content of millets, health benefits of millets, ways to incorporate millet into diet. Processing - hand pound method and machine method. Preparation of millet bread, millet roti, porridge and laddu.

Text Book:

1. Raina U. Kashyap S. Narula V. Thomas S. Suvira S. and Chopra S. *Basic Food Preparation-A complete Manual*. Hyderabad: Orient Longman Pvt. Ltd., third edition, 2007.

Books for Reference:

1. Dubey S.C. *Basic Baking*. New Delhi: Chanakya Mudrak Pvt. Ltd., fifth edition, 2007.
2. Frazier W.C. and West Holf D.C. *Food Microbiology*. New Delhi: Tata McGraw Hill publishing Co Ltd., 1995.

3. Kulshrestha S.K. *Food preservation.* New Delhi: Vikas publishing House. 1994.
4. Srivastava R. P. *Preservation of fruits and vegetable products***.** Dehra Dun: Bishen Singh Mahendra Pal Singh, 1982.
5. Srivastava R. P. and Kumar S. *Fruit and Vegetable Preservation: Principles and Practices.* Lucknow: International Book Distributing Co., 2002.
6. Swaminathan M. *Handbook of Food Science and Experimental foods*. Banglore: The Banglore printing and publishing Co. Ltd., 1992.

SEMESTER- IV			
Ability Enhancement Course: Yoga and Meditation			
Code: 21UAYM41	**Hrs/Week : 2**	**Hrs/Semester : 30**	**Credits: 2**

Course Outcome:

- To learn and practice various meditation, yoga methods to transform the ordinary life into a healthy, harmonious life leading to holistic wellbeing,
- To create an eco-friendly, loving and compassionate world.
- Acquire knowledge and skill in yoga for youth empowerment.
- Increase their power of concentration
- Learn the causes and ways to overcome fear and sadness.
- Create a ecofriendly, loving and compassionate world.

Unit I: Meditation (6 Hrs)

Meditation – Purposes of meditation– Major types of meditations: Zazen, Mindfulness, Vipasana, Yoga, Self-inquiry, Listening, Qi Gong, Taoist, Tantra– Health benefits of meditation: physical, psychological, spiritual–Meditation and Silence:Silence of the body, mind, heart,and beyond – General methodology of meditation – Tips for better meditation

Exercises: Practicing Zazen meditation – Self-enquiry meditation exercises

Unit II: Self-Awareness (6 Hrs)

Awareness – Self-awareness – Importance of self-awareness – Shades of self-awareness – Difference between Awareness and Concentration – Power of concentration – Levels of concentration – How to increase concentration? – Beauty of living here and now – Ways to develop your presence – Self-awareness and Ecology: interconnectedness

Exercises: Body Scan exercise – Self-Witnessing exercise – Eating Raisin with full awareness

Unit III: Yoga (6 Hrs)

Meaning and importance of yoga – Yoga and human physical system – Principles of Yoga – Different types of yoga – Yoga and balanced diet – Yoga and energy balance – Pranayama – Surya namaskaram– Basic asanas for healthy life – Therapeutic benefits of simple yogasanas – Naturopathy for common ailments.

Exercises:Practicing basic Asanas – Doing Sun Salutation

Unit IV: Mindfulness (6 Hrs)

Definition of mindfulness – Three components of mindfulness– Benefits of mindfulness – Mindfulness and Brainwave patterns – Myths about mindfulness – Scientific Facts about mindfulness – Formal method to practice mindfulness – Qualities of Mindfulness – Obstacles for mindfulness – informal ways of practicing mindfulness – Mindfulness to get rid of addictions

Exercises: Practice Mindful Walking –Practice Mindful Talking

Unit V: Heartfulness (6 Hrs)

Attitude to life – Power of positive attitude – Techniques to develop positive attitude – Positive vs negative people – Forms of negative attitude – Heartfulness – Managing fear: Basic 5 fears, Ways to overcome fear–Handling anger: Anger styles, Tips to tame anger – Coping with sadness: Causes and ways to overcome sadness, dealing with depression – Ultimacy of compassion: Compassion to oneself, towards others: Forgiveness, to nature: Seeing God in all

Exercises: Practice Loving-Kindness meditation– Doing compassionate actions

Text Book:

1) Thamburaj Francis. *Meditation and Yoga for Holistic Wellbeing.* Trichy:Grace Publication. 2019.

Books References:

1) Osho. *Meditation the Only Way.* New Delhi: Full Circle Publication, 2009.
2) Thamburaj Francis. *Journey from Excellence to Godliness: Zen Meditation for Transformation.* Grace Publication, Trichy, 2017.
3) Osho. *Awareness: The Key to Living in Balance.* New York: St.Martin's Griffin Publication, 2001.
4) Tolle Eckart.*The Power of Now: A Guide to Spiritual enlightenment.* New World Library, 2004.
5) Swami Gnaneswarananda. *Yoga for Beginners.* Calcutta: Sri Ramakrishna Math, 2010.
6) HanhThichNhat. *The Miracle of Mindfulness: An Introduction to the Practice of Meditation.* Beacon Press, 2016.
7) Kamlesh D. Patel and Joshua Pollock. *The Heartfulness Way: Heart-Based Meditations for Spiritual Transformation.* Westland Publications, 2018.

Assessment

Internal Assessment :

Class Exercises (Unit wise exercises as given in syllabus)	5x10	50
Homework (Assignment, Charts, Aids, creative works, etc)	5x 5	25

External Assessment

Objective Type Questions	5x10	25
Total		100

SEMESTER IV	
Self Study (Optional) **Preservation of Fruits and Vegetables**	
Course Code: 21UBOSS2	**Credit: +2**

Objectives:

- To understand the scientific principles in spoilage and preservation of fruits and vegetables.
- To give knowledge about types of fruits and vegetable, their composition and nutritive value; handling.
- To give knowledge about storage and processing of different kind of products like juices, jams and ketch up

UNIT I: **Fruits and vegetables**: Introduction. **Vegetables**: Nutritive values of vegetables, storage of vegetables, factors affecting storage life, role of vegetables in cookery. **Fruits**: Composition and nutritive values of fruits.

UNIT II: **Methods of preservation**: refrigeration, freezing, canning, drying and dehydration and chemical preservatives. Spoilage of fruits and vegetables.

UNIT III: **Canning of fruits:** mango, apple and banana. **Canning of vegetables**: bean, carrot and tomato.

UNIT IV **Drying of fruits**: banana, dates, grapes, fig and mango. **Containers for packing:** tin and glass containers.

UNIT V **Preparation of jam**: cashew apple and mixed fruits jam. **Fruit juices**: pineapple and grapes. **Squash**: orange and lemon. **Sauces and Ketchup**: mango and tomato. Analysis of food quality and strategies.

Reference Books:

1. Srivastava, R. P. *Preservation of fruits and vegetable products*. Dehra Dun:Shailendra Rajan. Publisher, 1982.
2. Frazier, W.C and West Holf, D.C. *Food Microbiology*. New Delhi: Tata Mc Graw Hill publishing Co. Ltd., 1995.
3. Kulshrestha, S.K. *Food preservation*. New Delhi: Vikas publishing House, 1994.
4. Swaminathan, M. *Handbook of Food Science and Experimental foods*. Bangalore: the Banglore printing and publishing Co. Ltd., 1992.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	understand the nutritive components of vegetables and fruits	4,6	Un
CO-2	understand the factors affecting the storage life of fruits and vegetables	6	Un
CO-3	identify novel technologies in the processing of vegetables and fruits	6, 8	K, Ap
CO-4	adapt the methods of preservation of vegetables and fruits	6	C
CO-5	acquire the knowledge of chemical preservatives	6	Un
CO-6	develop the skill to analyze the quality like sugar such as jam, jelly etc. and identify the different techniques of packaging and storage	6, 8	C, K

Name of the Course: Preservation of Fruits and Vegetables

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	2	2	3	2	3	3	**2.6**	3	3	3	3	3	3	3	3	**3.0**
CO-2	3	3	2	2	3	3	2	3	**2.6**	3	3	3	3	2	3	2	3	**2.8**
CO-3	3	3	2	2	2	2	3	3	**2.5**	3	3	3	3	3	2	3	3	**2.9**
CO-4	3	3	2	2	2	2	3	3	**2.5**	3	3	2	3	3	2	2	3	**2.6**
CO-5	3	3	2	2	3	3	2	2	**2.5**	3	3	2	3	3	2	3	3	**2.8**
CO-6	3	3	2	2	3	2	2	2	**2.4**	3	3	3	3	3	3	3	3	**3.0**
Average	**3.0**	**3.0**	**2.0**	**2.0**	**2.7**	**2.3**	**2.5**	**2.7**		**3.0**	**3.0**	**2.7**	**3.0**	**2.8**	**2.5**	**2.7**	**3.0**	
PO Mean									**2.5**	PSO Mean								**2.8**
Strength of PO Correlation					Strong					Strength of PSO Correlation					Strong			

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Biotechnology

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER -V			
Core V	**Common Core - Biotechnology**		
Course Code: 21UBCC51	**Hrs/Week:4**	**Hrs/Sem: 60**	**Credit: 3**

Objectives:

- To provide broad scope of biotechnology in various fields including agriculture, medicine, environment and forensic studies through effective teaching modules
- To attain competence in handling biotechnological experiments that enable them to carryout research projects and lifelong profession accomplishment
- Create awareness in applying modern tools for biotechnological innovation and priorities the ethical implementation of potential biotechnology

UNIT I: **Cloning Vectors:** Introduction, scope and importance of biotechnology. **Gene cloning techniques** - Cloning vehicles: bacterial plasmid vectors - pBR322 and Ti plasmid; bacteriophage vectors - lambda and M13; plant viral vector - CaMV, Gemini virus and tobamo virus; animal viral vector – SV40. Role of restriction and modification enzymes.

UNIT II: **Gene Cloning and Screening:** Gene cloning: methods of introduction of cloned genes into host cells, transformation, liposome mediated transfer, electroporation, particle bombardment gun, viral vector method. DNA library; PCR; hybridization technique - Southern, Northern and Western.

UNIT III: **Animal Cell Culture and Genome Project:** Culture media; **Cell culture**

techniques: monolayer culture and immobilized culture of cell lines. Techniques and applications of human embryonic stem cell culture; tissue engineering of artificial skin and cartilage. **Human Genome Project**: Types. **DNA sequencing methods**: Maxam and Gilbert method, Sanger method; Potential benefits to mankind.

UNIT IV: Environmental and Bioprocess technology: Biotechnological methods for sewage and waste water treatment. Bioremediation: Degradation of xenobiotic (hydrocarbons and pesticides). Role of genetically engineered microbes in biomining and bioleaching. **Industrial production**: Penicillin, ethanol, biodiesel. **Biofertilizer:** Mass cultivation and application of *Azolla*.

UNIT V: Plant tissue culture and Health Care Biotechnology: Plant tissue culture: Media, callus culture, plant embryo culture, *in-vitro* pollination, organ culture, suspension culture and anther culture. **GMO:** Edible vaccines, Bt cotton, Golden rice. DNA probes and diagnosis of genetic disorders, DNA fingerprinting technique, gene therapy and treatment of genetic diseases.

Text Books

1. Dubey R.C. S. *A text book of Biotechnology*. New Delhi: Chand and Comp. Ltd., 2004.
2. Kumaresan, V. *Biotechnology.* Nagercoil:Saras Publication, 2010.
3. Sathyanarayana U. *Biotechnology*. Kolkata: Books And Allied (p) Limited, 2017.

Books for Reference

1. Clark and J. Pazdernik. *Biotechnology*. California, USA: Elsevier, 2009.
2. Dubey R.C. *Text Book of Biotechnlogy*. New Delhi: S. Chand and Co Ltd. 4th edition, 2006.
3. Ramadass, P. *Animal Biotechnology – Recent Concepts and Development*. Chennai: MJP Publishers, 2009.
4. Rema L.P. *Applied Biotechnology*. Chennai: MJP Publishers, 2009.
5. Shailendra Singh, *Applied Biotechnology*. New Delhi: Campus Books International, 1st edition, 2007.
6. Singh B.D. *Biotechnology,* Chennai: Kalyani Publishers. *Revised edition,* 2005.

Practical
Hrs/Week: 2

1. Isolation of Blue Green Algae
2. Isolation of protoplast
3. Plant tissue culture – anther culture, embryo culture and nodal culture
4. Preparation of synthetic seed
5. Estimation of dissolved oxygen and BOD
6. Separation of protein by column chromatography
7. Isolation of Plasmid
8. DNA Estimation by UV-Visible Spectrophotometric method
9. Preparation of animal tissue culture media
10. Preparation of SDS – PAGE (Gel mould only)

Book for Reference:

1. Aneja K.R. *Experiments in Microbiology Plant Pathology and Tissue Culture*. New Delhi: Wishwa Prakashan, A Division of Wiley Eastern Ltd., 1996.

Course Outcomes:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	discuss different types of animal and plant cloning vectors and scan the role of restriction enzyme in genetic modification	1,2	Un
CO-2	clarify the human genome sequences and its application in human welfare	4,7	Un, An
CO-3	apply various gene transfer techniques to generate genetically modified organisms	2,7	Ap
CO-4	perform cell culture, organ culture and stem cell culture to realize the positive impact in health care	6	Un, Ap
CO-5	encapsulate the characteristic features of microbes and their role in production of industrial products and environmental reacalamtation	5,6	An
CO-6	get hands on experience to conduct experiments, analyze and interpret data for investigating problems in biotechnology and allied fields	7,8	Ap

Name of the Course: Biotechnology

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2.8**	3	3	3	3	3	3	3	3	**3.0**
CO-2	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**2.8**	3	3	3	3	2	3	3	3	**2.9**
CO-3	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2.6**	3	3	3	3	3	2	3	3	**2.9**
CO-4	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2.8**	3	3	2	3	3	2	2	3	**2.6**
CO-5	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2.6**	3	3	2	3	3	2	2	3	**2.6**
CO-6	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**2.5**	3	3	3	3	3	3	3	3	**3.0**
Average	**3.0**	**3.0**	**2.0**	**3.0**	**2.8**	**2.3**	**2.5**	**2.7**		**3.0**	**3.0**	**2.7**	**3.0**	**2.8**	**2.5**	**2.7**	**3.0**	
PO Mean									**2.7**	PSO Mean								**2.8**
Strength of PO Correlation				Strong						Strength of PSO Correlation				Strong				

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Biochemistry

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER V			
Core VI	**Biochemistry**		
Course Code: 21UBOC51	**Hrs/Week: 4**	**Hrs/Semester: 60**	**Credit: 4**

Objectives:

- To introduce molecular structure and interactions present in various biomolecules that help in functioning and organization of living cell.
- To provide the hands on experience to quantitatively analyze the biomolecules from the plant issues.
- To understand the role of vitamins and enzymes in carrying out biological functions.

UNIT I: Biomolecules: Introduction. Chemical Bonds: Covalent bond, non - covalent bond, ionic bond, Van der Waals forces, hydrogen bond. pH: Acid – base concept, Henderson-Hasselbach equation. Buffers: Biological buffer systems in body fluids.

UNIT II: **Carbohydrates:** Definition, classification and functions. Monosaccharides: structure and properties, chirality and optical activity, stereoisomerism, absolute and relative configuration (D & L and R & S), open and cyclic structure of glucose and fructose (pyranose and furanose). **Disaccharides:** Structure and properties - reducing sugar (maltose), non-reducing sugar (sucrose). **Polysaccharides:** structure and properties – **Homopolysaccharide:** structural

polysaccharide (cellulose), storage polysaccharide (starch). Nutritional importance of carbohydrates

UNIT III: **Amino acids:** Structure, classification (based on composition and polarity of R group), physical properties and chemical reactions of amino acids. Biologically important peptides. **Proteins:** peptide bond, Psi and Phi angle, Ramachandran plot. **Structural organization of proteins:** primary, secondary, tertiary and quaternary structure. Properties of protein. Nutritional importance of protein. Protein .

UNIT IV: **Enzymes:** Structure of enzyme: holoenzyme, apoenzyme, prosthetic group (cofactors, coenzymes). Classification and nomenclature of enzymes. Mechanism of action (activation energy, lock and key hypothesis, induced fit theory). Factors affecting enzyme activity. Applications of enzymes. **Vitamins:** source and deficiency symptoms of vitamin A, B,C,D,E and K.

UNIT V: **Lipids:** Structure, classification: simple lipids (waxes and triglycerides), compound lipids (phospholipid and glycolipid) and derived lipids (steroids, carotenoids and terpenes). Properties of lipids. Nutritional importance of lipids

Text Book:

1. Jain J.L. *Fundamentals of Biochemistry*. New Delhi: S. Chand & Co., 2005.

Books for Reference:

1. Conn, E.J. and Stumpf P.K. *Outlines of Biochemistry.* Bombay: Wiley Eastern Ltd., 1996.
2. Lehninger A.L. *Biochemistry*. New Delhi: CBS Publishers, 1987.
3. Philip W., Kuchel and Ralston G.B. Biochemistry. New Delhi: Tata McGraw – Hill publishing company Ltd., 2003.
4. Salil Bose. *Elements of Biophysics*. Madurai: Jjothi Books., 1986.
5. Stryer, L. Biochemistry. New Delhi: CBS. Publishers, 1982.

Practicals
Hrs/Week: 2

- Preparation of acetate buffer

- Estimation of total sugar (phenol sulphuric acid method)
- Estimation of free amino acid from plant tissues (Ninhydrin method)
- Separation of amino acids (ascending paper chromatography)
- Separation of photosynthetic pigments (column chromatography).
- Absorption spectrum of pigments
- Study of enzyme kinetics and determination of Km value.
- Saponification value of two vegetable oil
- Enzyme assay – Protease

Submission: Record note book

Laboratory Manual for Reference:

1. Jayaraman J. *Laboratory manual in Biochemistry.* New Delhi: New Age International publisher, 2001.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the types of chemical bonds involved in the structure of biomolecules and basic concepts of acid, base and buffer	1	Un
CO-2	classify carbohydrates of different domain based on their physical, chemical organization and their biological significance	8	An
CO-3	understand and describe the structure and properties of amino acids, protein and lipids and their role in organization of life	8	Un
CO-4	layout enzyme groups and know the nomenclature that enables to deduce the specificity of enzyme's action	8	Un
CO-5	discuss the sources of vitamins and symptoms specific to vitamin deficiency in human beings.	8	Re
CO-6	apply theoretical knowledge in biochemical laboratory techniques	3, 5	Ap

Name of the Course: Biochemistry

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2.8**	3	3	3	3	3	3	3	3	**3.0**
CO-2	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**2.8**	3	3	3	3	2	3	3	3	**2.9**
CO-3	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2.6**	3	3	3	3	3	2	3	3	**2.9**
CO-4	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2.6**	3	3	2	3	3	2	2	3	**2.6**
CO-5	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2.6**	3	3	2	3	3	2	2	3	**2.6**
CO-6	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**2.5**	3	3	3	3	3	3	3	3	**3.0**
Average	**3.0**	**3.0**	**2.0**	**3.0**	**2.7**	**2.3**	**2.5**	**2.7**		**3.0**	**3.0**	**2.7**	**3.0**	**2.8**	**2.5**	**2.7**	**3.0**	
PO Mean									**2.6**	PSO Mean								**2.8**
Strength of PO Correlation					Strong					Strength of PSO Correlation						Strong		

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Ecology and Phytogeography

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER V			
Core VII	**Ecology and Phytogeography**		
Course Code:21UBOC52	**Hrs/week:4**	**Hrs/semester:60**	**Credit:4**

Objectives:

- To implement the theoretical knowledge and practical experiences to raise ornamental plants which are valuable economically and aesthetically.
- To provide knowledge and skill in designing different types garden for beautification of living site and landscaping.
- To develop skills necessary to raise nurseries, nursery maintenance for commercial level production of plants.

UNITI: Introduction. Ecological factors: Climatic factors –light, temperature, wind, precipitation and humidity. Bioticfactors – Interaction between plants and animals, interaction between plants growing in a community and interaction between plants and microorganisms. Edaphic factors– soil temperature, soil nutrients and soil organisms.

UNITII: Plant adaptations – morphological, anatomical and physiological adaptations of hydrophytes, xerophytes and halophytes.

UNIT III: Plant communities – Characteristic features, methods of analysis- quadrats and transect methods, units of vegetation. Plant succession-types, causes, processes. Hydrosere and xerosere. Climax and its concepts.

UNITIV: Phytogeography: introduction, theory of tolerance, endemism. Phytogeography

of India. Vegetation region of India. Biomes: Brief description of major terrestrial biomes(one each from tropical, temperate and tundra).

UNITV: Principlesofplantgeographydispersalandmigration-types-ageandareahypothesis - continuous range, cosmopolitan, circumpolar, circumboreal, circumaustral, pantropical. Discontinuous distribution - Wegner's theory of continental drift.

TextBooks:

1. Sharma,P.D..*Elementsofecology*.Meerut:RastogiPublications,1999
2. Shukla,R.S.and Chandal,S.S.*PlantEcology*. NewDelhi: S.ChandandCo., 1991.

Books for Reference:

1. Asthana and Meera Asthana. *Environmental problems and solutions*. New Delhi: S. Chand and Co.Ltd., 2001.
2. Balasubramanian, D; C. F. A. Bryee, K. Dharmalingam, J. Green and K. Jeyaraman, *Concepts in Biotechnology*. Universities Press, 2005.
3. Dash, M.C. *Fundamentals of ecology*. New Delhi: Tata McGraw Hill publishing Co. Ltd., 2001
4. Murugesan, A.G.and Rajakumari. *Environmental Science and Biotechnology, theory and Techniques*. Chennai: M.J.P. Publishers,2005.
5. Trivedi P. R, Sharma P.L and Sundarshan K.N. *Natural environment and Constitution of India*. New Delhi: Efficient offset printers, 1994.
6. Tyller Miller G.*Environment Science.Singapore*: Thompson Brooks/Col, 2004.
7. VarshneyC.K. *Water pollution and management*.Noida:S. P. Printers. 1988.

Practical Hrs/week: 2

- DeterminationofsoilpH (at least 3typesofsoil)
- Determination of soil texture.
- Determination of soil moisture.
- Determination of soil bulk density.
- Determination of soil porosity.
- Determination of soil organic matter content.
- Dye reduction test.
- Adaptation of plants- hydrophytes, xerophytes and halophytes,
- Raunkiaers Frequency diagram – Quadrant / Transect method.
- Shannon Wiener Index and Abundance.

Scientific Visits: Visit to any near by place to observe the ecosystem and its succession.

Submission: Record Note Book

Books for Reference:

1. Murugesan A.G. and Rajakumari. *Environmental Science and Biotechnology, Theory and Techniques*. Chennai:MJPPublishers.2005.

Course Outcomes:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the ecological, edaphic and biotic factor of the community	3	Re, Un
CO-2	reveal the range of plant community and their relationship in the environment	1	Un
CO-3	enable the students to understand how the plant interact with their environment	1	An
CO-4	categorize the plants based on adaptation to its environments	1	An
CO-5	understand the concept of various plant Communities and their characteristics	2	Un
CO-6	understanding of geographical region and vegetation types of India	2	Un

Name of the Course: Ecology and Phytogeography

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2.8**	3	3	3	3	3	3	3	3	**3.0**
CO-2	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**2.8**	3	3	3	3	2	3	3	3	**2.9**
CO-3	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2.6**	3	3	3	3	3	2	3	3	**2.9**
CO-4	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2.6**	3	3	2	3	3	2	2	3	**2.6**
CO-5	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2.6**	3	3	2	3	3	2	2	3	**2.6**
CO-6	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**2.5**	3	3	3	3	3	3	3	2	**2.9**
Average	**3.0**	**3.0**	**2.0**	**3.0**	**2.7**	**2.3**	**2.5**	**2.7**		**3.0**	**3.0**	**2.7**	**3.0**	**2.8**	**2.5**	**2.7**	**2.8**	
PO Mean									**2.6**	PSO Mean								**2.8**
Strength of PO Correlation					Strong					Strength of PSO Correlation					Strong			

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Biostatistics and Bioinformatics

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER – V			
Core VIII	**Biostatistics and Bioinformatics**		
Course Code: 21UBOC53	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Objectives:

- To provide knowledge for collection, presentation and interpretation of numerical data for emergence of meaningful solution.
- To employ appropriate statistical tools to draw the expected interpretation and solutions.
- To facilitate implementation of computational algorithm and software tools on biological data processing with the goal of serving human wellbeing.

Unit I: Introduction and scope of biostatistics. Types of data: primary and secondary, Collection of data, sampling: random sampling methods and sampling error. Classification of data, preparation of frequency distribution table (discrete and continuous series).

Unit II: Presentation of data: Tabular (parts of table, types); diagrammatic: bar, pie diagram and pictogram; graphic: line graph, histogram, cumulative frequency curve.

Unit III: Measures of central tendency: simple arithmetic mean, median and mode (direct method). Measures of dispersion: standard deviation (direct method), standard error. Chi-square test (goodness-of-fit, independence of attributes). Student t-test (comparison of means of two small samples).

Unit IV: Definition and scope of Bioinformatics. Biological Databases: Nucleic acid databases (NCBI, DDBJ, and EMBL), Protein databases (Primary, Secondary and Composite). Specialized Genome databases: SGD and TIGR. Structure databases: CATH, SCOP and PDBsum.

Unit V: Introduction to Sequences, alignments and Dynamic Programming, Local alignment and Global alignment (algorithm and example), Pairwise alignment (BLAST and FASTA) and multiple sequence alignment (Clustal W), Molecular Visualization tool: RASMOL and Drug designing software: Ligand explorer

Text Books:

1. Gurumani N. *An Introduction to Biostatistics*. Chennai: M.J.P. Publishers, Second edition, 2005.
2. Rastogi *et al.Bioinformatics: Concepts, Skills and Applications*. New Delhi: CBS publishers, 2003.
3. Attwood TK and Parry-Smith DJ. *Introduction to bioinformatics*. New York: Pearson Education Publishers, 2014.

Books for Reference:

1. Palanisamy S. and Manoharan. *Statistical methods for biologists*. Palani: Palani paramount publishers, 1991.
2. Pranab Kumar Banerjee. *Introduction to Biostatistics*. New Delhi: S. Chand & Company Ltd., 2004.
3. Satguru Prasad. *Fundamentals of Biostatistics*. New Delhi: Emkay Publications, Fourth edition., 2003.
4. Veera Bala Rastogi. *Fundamentals of Biostatistics*. Chennai: Ane Books Pvt. Ltd., Second edition, 2009.
5. Jin Xiong. *Essential Bioinformatics.* Cambridge: Cambridge University Press, 2006.
6. Claverie J.M. and Notredame C. *Bioinformatics for Dummies*. New York: Wiley Editor. CRC Press, 2003.
7. Durbin R., Eddy S., Krogh A. and Mithchison G. *Biological Sequence Analysis.* Cambridge: Cambridge University Press, 2007.
8. Lesk, A.M. *Introduction to Bioinformatics*. Oxford: Oxford University Press, second edition, 2005.
9. Rashidi and Buchler. *Bioinformatics Basics*. New York: CRC Press, 2000.

Practical

Hrs/ week: 2

- Univariate analysis of statistical data: Statistical tables, mean, mode, median, standard deviation and standard error (using leaf length and weight).
- Determination of goodness of fit in Mendellian and modified mono-and dihybrid ratios (3:1 and 9:3:3:1) by Chi-square analysis and comment on the nature of inheritance.
- Basic idea of computer programme for statistical analysis of ‘t’ test, standard error, standard deviation.(MS Excel)
- Entrez: NCBI’s multi-purpose search engine

- Database resources at the NCBI
- Retrieval of a protein/nucleotide sequence from NCBI GenBank database.
- Gene Prediction
- Retrieve the gene sequence in FASTA format
- Similarity between sequences using BLAST
- Similarity between sequences using FASTA
- Multiple Sequence and Phylogenetic Analysis
- Secondary structure prediction
- Tertiary structure prediction
- Browse genomic resources for plant, yeast genomes.
- Evaluate the structure of proteins: Procheck, Ramachandran plot, ProSAII plot

Submission: Record note book

Books for Reference:

1. Prof. Chandrakant Kokare. *Biostatistics and research methodology*. New Delhi: Nirali Prakashan, 2021.
2. Iftekhar M. *Bioinformatics Practical Manual*. California: Create Space Independent Publishing Platform, 2015.
3. Jaspreet Kaur and Jasvinder Kaur. *Bioinformatics Practical Manual: An Easy Guide to In-Silico Analysis*. New Delhi: NP New Delhi Publishers, 2016.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	define and comment on fundamentals of statistical analysis	4	Un
CO-2	apply the learned procedure for collecting data, presenting data	6	An
CO-3	choose necessary tool to interpret the results and find solution to the problems and work with computer skill especially in MS Excel	6	Ev, Un
CO-4	understand the relationships among living things and analyze biological problems using biological concepts, algorithms, and tools available in computer science	2,4	Un
CO-5	apply molecular methods to study genetic variation within and between species	3	Ap
CO-6	apply knowledge of bioinformatics in a practical	4	Ap

Name of the Course: Biostatistics and Bioinformatics

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	3	3	3	2	2	3	**2.8**	2	2	2	3	2	3	3	3	**2.5**
CO-2	3	2	2	3	2	2	2	3	**2.4**	2	2	2	3	2	3	3	3	**2.5**
CO-3	3	2	2	2	2	2	3	3	**2.4**	2	2	2	3	2	3	3	3	**2.5**
CO-4	3	2	2	3	2	2	3	3	**2.5**	2	2	2	3	2	3	3	3	**2.5**
CO-5	3	2	2	2	3	3	2	2	**2.4**	2	2	2	3	2	3	3	3	**2.5**
CO-6	2	2	2	3	3	2	2	2	**2.3**	2	2	2	3	2	3	3	3	**2.5**
Average	**2.8**	**2.2**	**2.2**	**2.7**	**2.5**	**2.2**	**2.3**	**2.7**		**2.0**	**2.0**	**2.0**	**3.0**	**2.0**	**3.0**	**3.0**	**3.0**	
PO Mean									**2.4**	PSO Mean								**2.5**
Strength of PO Correlation					Strong					Strength of PSO Correlation						Strong		

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Genetics and Evolution

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER V			
Core Elective	**Genetics and Evolution**		
Course Code:21UBOE51	**Hrs/Weeks:4**	**Hrs/Semester:60**	**Credits:3**

Objectives:

- Provide information about genes, alleles, gene functions and pattern of inheritance of characters from an analysis of Mendelian and Non Mendelian genetic crosses
- Infer how phenomenon of linkage affect assortment of alleles during meiosis and how certain genes persist for several generation
- Highlight theory of evolution to explain the mechanism of organic evolution and different perspective of origin of life

UNIT I: Genetic terminology. Mendel work - Hybridization technique, Mono hybridization test. Phenomenon of dominance and law of segregation- Law of independent assortment. Variation in dominance reaction: Incomplete dominance (flower colour in pea plant), codominance (coat colour in cattle)

UNIT II: Genetics and genes interaction: Non epistatic inter allelic genetic interaction (Comb shapes in fowls), Epistatic interaction - Dominant epistatic interaction (fruit colour in squash), Recessive epistatic interaction (coat colour in mice), duplicate genes with cumulative effects (coat colour in pig), duplicate recessive genes (Flower color in sweet pea). Duplicate gene action. Quantitative genetics- Inheretance of multiple genes (kernel color in Wheat)

UNIT III: Linkage - Concept, Scientist's views on linkage. Crossing over- Characteristics, types and mechanism of crossing over- Hoidays modelof crossing over, Sex linked inheritance- Characteristic- eye color in drosophila. Cytoplasmic inheritance in plants. Mutation- Chromosomal aberrations and gene mutation.

UNIT IV: **Evolution**: Evolution concept and idea. Evidences of organic evolution - palaeontological, comparative anatomical,neurological and biochemical. Theories of organic evolution: Lamarchism,Darwinism, Germplasam and mutation theory. Theories on origin of life

Unit V: **Processes of evolution**: Phenomenon of natural selection; supportive evidences - industrial melanism, resistance to pesticides and antibiotics. Types of natural selection and speciation - adaptive radiation and organic evolution. Phylogeny of terrestrial plants and origin of man. Isolation mechanism and role of isolation in speciation.

Text Books:

1. Verma P.S. Agarwal V.K. *Genetics*. New Delhi: S. Chand and Company Ltd., 1994.
2. P.S. Verma and Agarwal V.K. *Cell biology*, *Molecular biology*, *Evolution and Ecology Edition. New Delhi:* S. Chand Publication, 2004.

Books for references:

1. Mark Ridley. *Evolution*. Hoboken, New Jersey: Blackwell Publishing. Third edition, 2004.
2. Mathur, Tomar, Singh. *Evolution and behaviour.* Merrut: Rastogi publication, 2008.
3. Mohan P. Arora. *Evolutionary Biology*, Bombay: Publishing house, 2000.
4. Strickberger. *Evolution*. India: Jones and Bartlet Publishers, Fourth edition, 2004.
5. Theodore H. Jr. Eaton. *Evolution*. New York: W.W. Norton and Company. First edition, 1969

Course Outcomes:

CO. No.	Upon completion of this course the students will be able to	PSO addressed	CL
CO – 1	design genetic crosses to get information about genes, alleles and gene function	1	U
CO – 2	compare the phenotypes that results from Mendelian principles of inheritance, X linked and cytoplasmic model of inheritance.	3	U
CO – 3	explain how the quantitative traits and the results of many gene combination that each can contribute a varying amount to a phenotype	3	U
CO – 4	explain diagrammatically the process of homologous recombination during meiosis and interpret how it can it lead to re combination of genes and there by variation.	3	C
CO – 5	evaluate how Darwin's theory of natural selection helped to study organic evolution and able to detect evolutionary forces (natural selection, genetic drift, recombination, migration, mutaion) that drive the pattern and process of organic evolution at different levels	5	C
CO -6	answer the scientific questions how organism have evolved overtime and formulate a hypothesis about origin of life on the earth.	6	U

Name of the Course: Genetics and Evolution

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	2	2	3	3	3	3	**2.8**	3	3	3	3	3	3	3	3	**3.0**
CO-2	3	3	2	2	3	3	3	3	**2.8**	3	3	3	3	2	3	3	3	**2.9**
CO-3	3	3	2	2	2	2	3	3	**2.5**	3	3	3	3	3	2	3	3	**2.9**
CO-4	3	3	2	2	2	2	3	3	**2.5**	3	3	2	3	3	2	2	3	**2.6**
CO-5	3	3	2	2	3	3	2	2	**2.5**	3	3	2	3	3	2	2	3	**2.6**
CO-6	3	3	2	2	3	2	2	2	**2.4**	3	3	3	3	3	3	3	3	**3.0**
Average	**3.0**	**3.0**	**2.0**	**2.0**	**2.7**	**2.5**	**2.7**	**2.7**		**3.0**	**3.0**	**2.7**	**3.0**	**2.8**	**2.5**	**2.7**	**3.0**	
PO Mean									**2.6**	PSO Mean								**2.8**
Strength of PO Correlation					Strong					Strength of PSO Correlation						Strong		

SEMESTER V			
Core Elective	**Pharmacognosy**		
Course Code:21UBOE52	**Hrs/week:4**	**Hrs/semester:60**	**Credit:3**

Objectives:

- To screen, characterize and produce new crude drugs for aliments.
- To apply botanical knowledge to classify and name the medicinal plants and also to extract quantitatively the bioactive compounds from the plant species.
- To gain working knowledge for evaluating biological properties, its efficacy in living system and to recognize drug developing process and pharmacy education.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	define and identify the more valuable medicinal plants based on their pharmaceutically active compounds	3	Re,
CO-2	formulate medicinal product and apply the knowledge for proper storage and distribution	8	Ap
CO-3	analyse and evaluate the purity of herbal medicine.	5	Ev
CO-4	define, classify and explain the importance of herbal medicine.	6	An
CO-5	identify the crude drugs by morphological, organoleptic and histological characters.	1	Un
CO-6	know and explain the important phyto constituents of therapeutic value.	6	Un

SEMESTER V			
Core Elective	**Pharmacognosy**		
Course Code:21UBOE52	**Hrs/week:4**	**Hrs/semester:60**	**Credit:3**

UNITI: Definition, scope and applications of herbal medicine. Classification (morphological, therapeutic, chemical. taxonomical and chemo taxonomic classifications) and identification of drugs.

UNITII: Drug adulteration. Methods of drug evaluation (morphological, microscopic, physical, chemical and biological).

UNITIII: Botanical name family, useful part, chemical constituents, adulterants and uses of the following drug.

Glycosides - *Senna*, *Aloe*, *Digitalis*, *Liquorice*

Terpenoids - Coriander, Fennel, Lemon, Cinnamom

Alkaloids - *Datura*, *Opium*, *Vinca*, Pepper

Lipids - Castor, Neem, Sesame oil.

UNITIV: Methods of collection, process and storage of medicinal plants; purification of raw drugs; factors causing drug contamination, methods of storage of drugs

UNITV: Extraction methods and medicinal uses of *Eucalyptus*, Castor and Lemon grass oil. Conservation of medicinal plants–*in-situ* and *ex-situ*methods

Text book:

1. Roseline.A. *Pharmacognosy*, Chennai: MJP Publishers, 2011.

Books for Reference

1. Anonymous. *The Ayurvedic Formulary of India.* New Delhi: Govt. of India,1978.
2. Anonymous. *Formulary of Siddha Medicine.* Chennai: The Indian Medical Practitioners' Co-operative Pharmacy and Stores Ltd.,1989.
3. Anonymous. *The Ayurvedic Pharmacopoeia of India. Vol. I (1&2).*New Delhi: Ministry of Health and Family Welfare, Govt. India.
4. Chauhan,M.G.andA.P.G.Pillai.MicroscopicProfileofPowdered Drugs Used in Indian Systems of Medicine.Jamnagar: *Institute of Ayurvedic Medicinal Plant Sciences, 2005.*
5. Daljith simha,K. *Unani Dravyaguna Darshana*. Lucknow: Ayurvedic and Tibbi

Academy,1974.

6. Kumar, N.C. *An Introduction to Medicinal Botany and pharmacognosy*. Delhi. Emkay Publications,1993.
7. Gokhale, S.B., Kokate, C.K. and Purohit, A.P. *A Textbook of Pharmacognosy*. Pune: Nirali Prakashan,2004.
8. Murugesh,N. *A Concise Text Book of Pharmacognosy*. Madura: SathyaPublishers, 2002.

Semester - V			
Common Skill Based Core	**Computer for Digital Era and Soft Skills**		
Code : 21UCSB51	**Hrs / Week : 2**	**Hrs / Sem : 30**	**Credits : 2**

Course Outcome

- Identify different types of computer systems.
- Classify various types of software being used.
- Compare various digital payments and use them in day to day life.
- Recognise the innovative technologies IoT and integrate it in various fields.
- Analyze various social networking platforms and use them efficiently.
- Distinguish various cyber attacks and apply preventive measures.
- Understand the various soft skills needed to become successful.
- Analyze self and adapt oneself to work in a team.

Unit I: Fundamentals of Computers:

Introduction to computers - Components of computers - Working principle - Types of computers – Tablet - Notebook - Smart phone – PDA - Impact of computers on society - Types of software.

Unit II: Recent Trends in Computer Science and e-Governance:

IoT - applications- Mobile applications - E-Learning - E-Commerce - digital payments

Unit III: Social Media:

Face book - Twitter - Linked In – Instagram - Advantages of Social Networking - Issues/Risks of Social Networking - Protecting ourselves from social Networking problems – Cybercrimes – Hacking – Phishing - Cyber Security

Unit IV: Introduction to Soft Skills:

Learning objectives – What are soft skills?-Categories of Soft Skills-Integral Parts of Soft Skills.

Unit V: Understanding Self and Team Building:

Transactional Analysis (TA) - Structural analysis of Ego states- The functional model of Ego states - Egogram-Storkes - Life Position - Egogram and Life Positions Questionnaire-Team and Team Building- Features of effective creative teams

Books for Reference:

1. Peter Norton, Introduction to Computers 6th Edition

2. Charles P Pfleeger, Shari Lawrence Pfleeger, Security in Computing, I Edition, Pearson Education, 2003.
3. E.Balagurusamy, Fundamentals of Computers, McGraw Hill

4. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang , E-Commerce fundamentals and applications, Wiley Student edition
5. Benita Bhatia Dua, DeepaJeyaraman, Profit with Social Media, CNBC

6. Dr.K.Alex, Soft Skills, S.Chand & Co

7. http://www.digitalindia.gov.in/content/social-media-analytics

8. https://www.researchgate.net/publication/307878962_Introduction_to_E-Governance
9. http://www.ijqr.net/journal/v10
10. https://www.researchgate.net/publication/258339295_FUNDAMENTALS_OF_COMPUTER _STUDIES

SEMESTER – V	
Self-study (Optional) **Seed Biology**	
Course Code: 21UBOSS3	**Credits:+2**

Objectives:

- To understand the basic principles of quality seed production
- To gain knowledge on the principle and techniques of seed processing for quality up-gradation and of storage for maintenance of seed quality
- To study the importance of seeds with high viability, vigor, free from contamination.

UNIT I: Introduction and classification of seeds. Morphology and structural details of seeds: Paddy, Wheat and Castor, Seed variability: external, internal, chemical and physiological. Chemical composition of seeds. Importance of seed.

UNIT II: General account of seed germination. Epigeal and Hypogeal germination, Germination mechanism. Seed germination test under laboratory conditions using paper (BP & TP) sand and soil. Germination ecology: Environmental factors and germination behaviour.

UNIT III: Seed viability; Topographical Tetrazolium Test. Preparation of solution and methods of application & evaluation. Seed vigour: Concept, Direct and Indirect vigour tests.

UNIT IV: Dormancy – Primary and secondary dormancy. Significance, factors involved, methods used to break dormancy.

UNIT V: Seed quality enhancement treatment-types, Pathological testing of seed, quality assurance in seed testing, seed certification, seed testing organizations, seed storage and conservation

Books for Reference

1. Mayer A. M & Poljakoff Mayer .*Germination of seeds*. England: Pergamon press, third edition, 1982.
2. Bryant J. A. *Seed physiology*. London: Edward Arnold, 1985.
3. Rattan Lal Agarwal. *Seed technology*. Oxford & IBH publishing.second edition, 2017.
4. Pandey B. P. *Economic Botany*, New Delhi: S. Chand Limited. 1999.
5. Larry O.Copeland Miller B. McDonald. *Principles of seed science and Technology*, third edition, 1999.

6. Amarjit S. Basra. *Handbook of seed science and technology*, Jodhpur- India: Scientific publisher, 2007.
7. Kozlowski T.T. *Seed biology importance, development and germination*. India: volume I- Academic press INC, 1972.
8. Neelamkhetar Paul. Rajbala Grewal. Sudesh Jood. *Bakery Science and Cereal Technology*, Delhi: Daya publishing house, 2005. Derek Beeley J. Kent J. Brad ford. Henk W.M. Hilhorst. Hironogaki. *Seeds Physiology of development, Germination and dormancy*, Springer, third edition, 2013.
9. Tetzu Chag, Eliseo A. Bardeas, Arnulfo C. Delrosario. *The morphology and varietal Characteristics of the rice plant*, Manila:The international rice research institute, 1965.
10. Vanagamudi K. Sasthri G. Kalaivani S. Selvakumari A. MallikaVanagamudi. Srimathi.P *Seed quality enhancement principles and practices*. India scientific publisher, 2010.
11. Dhirendrakhare, Bhale M.S. *Seed technology*. India: Scientific publisher. second edition, 2014.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	describe the morphology and structural details of seeds.	1	Un
CO-2	explain the storage and conservation of seeds.	5	Un
CO-3	have the knowledge of national and international seed quality control organizations and seed certification agencies.	6	Ap, An
CO-4	understand the germination ecology of seeds.	1	Un
CO-5	explain the different types of seed quality enhancement treatments.	6	Un
CO-6	identify the viable, pure and vigor seeds.	1	An

Name of the Course: Seed Biology

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	2	2	3	2	3	3	**2.6**	3	3	3	3	3	3	3	3	**3.0**
CO-2	3	3	2	2	3	3	2	3	**2.6**	3	3	3	3	2	3	2	3	**2.8**
CO-3	3	3	2	2	2	2	3	3	**2.5**	3	3	3	3	3	2	3	3	**2.9**
CO-4	3	3	2	2	2	2	3	3	**2.5**	3	3	2	3	3	2	2	3	**2.6**
CO-5	3	3	2	2	3	3	2	2	**2.5**	3	3	2	3	3	2	3	3	**2.8**
CO-6	3	3	2	2	3	2	2	2	**2.4**	3	3	3	3	3	3	3	3	**3.0**
Average	**3.0**	**3.0**	**2.0**	**2.0**	**2.7**	**2.3**	**2.5**	**2.7**		**3.0**	**3.0**	**2.7**	**3.0**	**2.8**	**2.5**	**2.7**	**3.0**	
PO Mean									**2.5**	PSO Mean								**2.8**
Strength of PO Correlation					Strong					Strength of PSO Correlation					Strong			

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Plant Physiology

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER – VI			
Core IX	**Plant Physiology**		
Course Code: 21UBOC61	**Hrs/week: 4**	**Hrs/ Semester: 75**	**Credit: 4**

Objectives:

- To understand the complexity of life process in plants and learn the metabolism at the biochemical level through lecture mode
- To apply physiological techniques and other transferable skills to conduct experiments and record the data
- To provide knowledge on genetic and environmental cues that control the life activities of the plant.

UNIT I: **Plant Water Relations:** Importance of water to plant life. Physical properties of water**,** Imbibition, Diffusion, Osmosis, Plasmolysis and Water potential. **Absorption and transport of water:** active and passive absorption, ascent of sap – path and mechanism (Dixon's cohesion theory). **Transpiration:** types, mechanism of stomatal movement (starch- sugar inter conversion theory and proton transport and hormonal regulation theory), guttation, factors affecting transpiration, importance of transpiration

UNIT II: **Solute relations: Mineral nutrition** – role of essential macro and micro elements in plant nutrition, deficiency and toxicity symptoms. Mechanism of mineral absorption-modern views of solute transport across membrane. **Translocation of organic solutes:** Path of translocation of organic solutes, mechanism of phloem transport, source-sink relationship, factors affecting translocation. **Nitrogen metabolism:** outline of biological nitrogen fixation.

UNIT III: **Photosynthesis:** Concepts - Electromagnetic spectrum, red drop and Emerson enhancement effect, absorption and action spectrum, quantum requirement and quantum yield. Photosynthetic apparatus- thylakoid membrane, light harvesting complex. **Photochemical reaction and e^-transport:** cyclic and non-cyclic photophosphorylation. **CO_2 fixation:** C_3 cycle, carbon concentration mechanism- C4 cycles. Factors affecting photosynthesis.

UNIT IV: **Respiration:** Respiratory substrates, **types of respiration:** aerobic- glycolysis, Krebs cycle, Electron transport cycle and chemiosmotic synthesis of ATP. **Anaerobic respiration:** lactic acid fermentation, alcohol fermentation. Pentose Phosphate Pathway (PPP). Factors affecting respiration.

UNIT V: **Growth:** definition, growth curve, phases of growth- factors affecting growth. **Plant growth regulators:** origin and early experiments, physiological action and practical applications, types-auxin, gibberellin cytokinin, abscisic acid and ethylene **Physiology of flowering:** Photoperiodism-role of phytochrome, vernalization. **Seed dormancy:** causes and methods of seed dormancy, physiology and biochemistry of seed germination.

Text Book:

1. Jain, V.K. *Fundamentals of Plant Physiology*. New Delhi: S. Chand & Ltd., 2004.

Books for Reference:

1. Noggle, G. R. and Fritz. G.J. *Introductory Plant Physiology*. New Delhi: Prentice Hall of India, Pvt. Ltd., 2008.
2. Pandey, K.K. and Sinha, B.K. *Plant Physiology*. New Delhi: Vikas publications, 2005.
3. Salisbury, F.B. and Ross C.W. *Plant physiology*. Singapore: Thompson. Asia. Pvt. Ltd., 2007.

Practical Hrs/week – 2

- Osmosis by plasmolytic method.
- Ash analysis.
- Imbibition by direct weight method.
- Determination of water potential by Chardakov's method (falling drop method).
- Determination of differential transpiration of leaf surface using cobalt chloride method.
- Estimation of magnesium in plant tissue.
- Determination of effect of light intensity on photosynthesis.
- Rate of photosynthesis in different concentration of bi-carbonate (bubble count method)

- Extraction and separation of chloroplast pigments by ascending paper chromatography
- Amylase activity
- Estimation of auxin

Submission: Record note book

Laboratory Manual for Reference:

1. Francis H Witham, David F Blaydes and Robert N Devlin. *Experiments in Plant Physiology*. New Delhi: Vanmostr and Rainhold Company. 1970.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the plant's water relation and functions of root that influence the transfer of inorganic nutrients from the soil into the plants	2,3	Un
CO-2	analyse the mechanism of their assimilation of inorganic molecules into organic molecular components.	2,3,8	Un
CO-3	analyse light enhanced photochemical reactions that culminates in the synthesis of ATP and NADPH and fixation of carbon dioxide into organic compounds	2,3,8	Un
CO-4	describe respiration with its associated carbon metabolism and releasing of energy stored in chemical bonds in the controlled manner for cellular use	2	Re, Cr
CO-5	comment on the hormone controlled and light mediated morphogenetic events in plants	2	An
CO-6	design and conduct scientific experiments and analyse the data critically	4,8	Cr

Name of the Course: Plant Physiology

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	2	3	3	2	3	3	**2.8**	3	3	3	2	3	3	3	3	**2.9**
CO-2	3	3	2	3	3	3	2	3	**2.8**	3	3	3	2	2	3	3	3	**2.8**
CO-3	3	3	2	3	2	2	3	3	**2.6**	3	3	3	2	3	2	3	3	**2.8**
CO-4	3	3	2	3	2	2	3	3	**2.6**	3	3	2	2	3	2	2	3	**2.5**
CO-5	3	3	2	3	3	3	2	2	**2.6**	3	3	2	2	3	2	2	3	**2.5**
CO-6	3	3	2	3	3	2	2	2	**2.5**	3	3	3	2	3	3	3	3	**2.9**
Average	**3.0**	**3.0**	**2.0**	**3.0**	**2.7**	**2.3**	**2.5**	**2.7**		**3.0**	**3.0**	**2.7**	**2.0**	**2.8**	**2.5**	**2.7**	**3.0**	
PO Mean									**2.6**	PSO Mean								**2.7**
Strength of PO Correlation				Strong						Strength of PSO Correlation					Strong			

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Microbiology and Plant Pathology

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER VI			
CoreX	**Microbiology and Plant Pathology**		
Course Code: 21UBOC62	**Hrs/week: 4**	**Hrs/semester: 60**	**Credits: 4**

Objectives:

- To equip with the knowledge to handle microbes and basic instrumentations used in microbiology laboratory to isolate culture and characterize the microbes morphologically and physiologically
- To infuse knowledge to integrate microbes and its application with day today life such as nutrition, quality control, food safety and health care
- To offer broad instruction towards all aspects of plant disease (causes, prevention, disease cycle, controlling measures) and preparing them to think critically to reveal the plant pathological problem and economic losses.

UNIT I: Brief history and scope of microbiology. Contributions of Alexander Flemming and Louis Pasteur. Morphology and ultra-structure of Bacteria. Reproduction: binary fission, conjugation, transduction and transformation. Nutrition types: chemosynthetic, photosynthetic, saprophytic, parasitic and symbiotic.

UNIT II: **Methods of sterilization**: dry, heat, moist heat, fumigation and filtration.Media for microorganisms: NA, PDA and Czapek-Dox. Methods of culturing bacteria: broth culture, agar plate culture and agar slant culture. Growth in batch culture and continuous culture.

UNIT III: **Virus**: General characters, types of viruses based on structure. Structure andmultiplication of T4bacteriophage. **Fermentation technology**: Types of fermentors: stirred tank, tower and air lift. Commercial production of citric acid and vitamin B_{12}.

UNIT IV: **Food microbiology**: types of food spoilage and methods of food preservation. Microorganisms as food: single cell protein production from bacteria, fungi and yeast. **Milk microbiology**: bacterial flora in milk, types of contamination and pasteurization of milk. **Water microbiology**: testing potability of water and methods of purification of potable water.

UNIT V: **Plant pathology**: General account of plant disease due to fungi, bacteria and viruses. Host - microbe interaction. Symptoms, morphology of the causal organism, disease cycle and disease management of the following: Tikka disease of ground nut, Red rot of sugarcane, Bacterial leaf spot of Mango, Blast of paddy and Leaf curl of papaya.

Text Books:

1. Dubey R.C. and Maheswari D.K. *A textbook of Microbiology*. NewDelhi: S. Chand company Ltd., 2003.
2. Sharma P.D. *Plant Pathology*. Meerut: Rastogi Publications, 2013-14.

Books for Reference:

1. Kalaichelvan P.T. Microbiology and Biotechnology – Lab Manual. Chennai: MJPPublishers, 2005.
2. Patel A.H. *Industrial Microbiology*. NewDelhi: Mac Milan India Ltd., 2004.
3. Pelzar M.H. Chan E.C.S. and Krieg, N.R. *Microbiology*. NewDelhi: Tata MC. GrawHill Pub. Co. Ltd., 2005.
4. Purohit S.S. *Microbiology*. India: Agro Botanical Publishers,1988.
5. Pandey B.P. *Plant Pathology*. New Delhi: S. Chand and Co. Ltd., 2007.
6. Rangasamy G. *Diseases of Crop Plants in India*. New Delhi: Prenties Hall of India. 1992.
7. Singh R.S. *Plant Diseases*. New Delhi: Oxford IBH, 1991.
8. Sharma, P.D. *Microbiology and Plant Pathology*. Meerut: Rastogi Publications, Third Edition 2012.
9. Mehrotra R.S. and Ashok Agarwal. *Plant Pathology*. New Delhi: Tata Mc Graw- Hill Publishing Company Ltd., 2003.

Practical Hrs week: 2

- Sterilization (dry heat, moist heat and fumigation)
- Preparation of media- NA, Czapek-Dox and PDA
- Demonstration of plating and serial dilution technique
- Pure culture technique – streak plate method
- Staining of Bacteria (Gram's staining)
- Enumeration of bacteria found in milk- SPC method.
- Analysis of milk – dye reduction test
- Bacterial analysis of water for coliforms - MPN

Study of diseased plant materials:

- Tikka disease of groundnut
- Red rot of sugarcane
- Bacterial leaf spot of mango
- Blast of paddy
- Leaf curl of papaya.

Spotters

- Ultra structure of bacterial cell
- T_4 Bacteriophage
- Colony counter
- Agar Slant/ stab/ Plate
- Fermentors- stirred tank, tower and air lift
- Milk samples
- Spoiled food

Submission: Record note book

Laboratory manual for Reference:

1. Lakshmanan .M, Kunthala Jeyaraman, Jeyaraman and Gnanam. *Laboratory experiments in microbiology and molecular biology*. Chennai: Higginbothams Pvt. Ltd., 1971.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	acquire knowledge on the basic concept of microbes, their taxonomy, mode of nutrient and give insight on microbial culture	1	Un
CO-2	understand the structure and growth characteristics of microorganism that enabling the learner to identify and classify microorganisms by themselves	2	Un
CO-3	use various microbiological techniques to isolate bacterial species for morphological and physiological studies	6	An
CO-4	understand the role of microorganisms in fermentation technology for production of food based and pharmaceutical products	6	Ap
CO-5	enumerate the microbial flora of milk and determine milk quality	2	Ev
CO-6	provide a thorough knowledge about the microbes causing plant diseases, their symptoms and preventive measures	7	Ap

Name of the Course: Microbiology and Plant Pathology

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	2	3	3	2	3	3	2.8	3	3	2	3	3	2	3	3	2.8
CO-2	3	3	2	3	3	3	2	3	2.8	3	3	2	3	3	3	2	3	2.8
CO-3	3	3	2	3	3	2	3	3	2.6	3	3	2	3	3	2	3	3	2.8
CO-4	3	3	2	3	3	2	3	3	2.6	3	3	2	3	3	2	3	3	2.8
CO-5	3	3	2	3	3	3	2	2	2.6	3	3	2	3	3	3	2	2	2.6
CO-6	3	3	2	3	3	2	2	2	2.5	3	3	2	3	3	2	2	2	2.5
Average	3.0	3.0	2.0	3.0	2.7	2.3	2.5	2.7		3.0	3.0	2.0	3.0	3.0	2.3	2.5	2.7	
PO Mean									2.6	PSO Mean								2.7
Strength of PO Correlation					Strong					Strength of PSO Correlation					Strong			

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Cell and Molecular Biology

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

SEMESTER - VI			
Core XI	**Cell and Molecular Biology**		
Course Code:21UBOC63	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Objectives:

- To underst and the basic cellular components and their functions
- To understand the structure and chemical organization of subcellular components of the plant cell
- To upgrade the knowledge about the latest concepts of prokaryotic and eukaryotic genome and expression

UNIT I: **Cell Biology:** introduction, definition and brief history. Units of measurement of cell: Prokaryotic and eukaryotic cell. Cytoplasmic matrix: physicochemical nature of cytoplasmic matrix. Structure and functions of cytoplasmic organelles: mitochondria, chloroplast, endoplasmic reticulum, golgi apparatus, ribosomes, lysosome, glyoxisome and vacuoles.

UNIT II: **Plant Cell:** nucleus and chromosomes. Nucleus: morphology, ultrastructure, nucleoplasm, nucleolus, functions. **Cell divisions:** Cell cycle - mitosis, meiosis. Chromosome: number, morphology, structure, karyotype and ideogram, chemical composition, euchromatin and heterochromatin, giant chromosomes.

UNIT III: **Molecular Biology:** history, scope and importance. Central dogma of molecular biology. Nature of genetic material - characteristics of genetic material, physical and biological evidences to prove DNA as genetic material, Chargaff's law, Franklin and Wilkin's work, Watson and Cricks Model of DNA, RNA as genetic material-TMV. **DNA damage and repair:** Introduction, causes and types, DNA repair system - photoreactivation, dark excision repair.

UNIT IV: **DNA replication:** Prokaryotes: rolling circle model, eukaryotes – replication, fork, Messelson and Stahl's experiment, molecular mechanism of DNA replication. **Gene Organization:** Promoter-structure and function in prokaryotes and eukaryotes,

Terminators, units of Gene, enhancers, split genes, jumping genes. Mechanism of transcription in prokaryotes.

UNIT V: **Genetic code and translation:** Genetic code: definition, concept, work of Nirenburg and Khorana, properties of genetic code, translation - definition, mechanism of translation - initiation, elongation and termination. **Gene action and regulation:** Relation of gene and enzymes - one gene one enzyme hypothesis, regulation of metabolism, inducible and repressible enzymes, Gene regulation - in prokaryotes (Lac Operon Model) and eukaryotes (Britten and Davidson's Model).

Text Books:

1. Rastogi S.C. *Cell and Molecular Biology*. India: New Age International Publishers. 2010
2. Verma P.S and Agarwal. V.K. *Cytology*. India: S. Chand & Company. 2006
3. Powar C.B. *Cell Biology*. New Delhi: Himalaya Publishing House. 2006
4. Veer Bala Rastogi. *Fundamentals of Molecular Biology*. India: MEDTECH. 2016

Books for Reference:

1. De Robertis E.D.P and De Robertis E.M.F. *Cell and Molecular Biology*. USA. CCH, a Wolters Kluwer Business. Eigth edition 2017
2. Lodish Harvey, Berk Arnold, Matsudaira Paul and Kaiser Chri. *Molecular Cell Biology*. W. H. Freeman. Fifth edition 2004
3. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter Walter. *The Molecular Biology of the Cell*. New York: Garland Science. 2002
4. Gerald Karp, Janet Iwasa and Wallace Marshall. *Cell and Molecular Biology Concepts and Experiments*. USA. Wiley. Eigth edition 2015

Practical

Hrs/week-2

- Cytological techniques-preparation of fixatives, preparation of stains (acetocarmine and aceto-orcein).
- Study of various stages of mitosis and meiosis
- Study of chromosomes morphology (from colchicines pretreated onion root tip cells)
- Study of polytene chromosome from *Chironomus* larvae
- Plant Genomic DNA extraction from Cauliflower
- Simple problems of molecular biology on DNA coding sequence
- Problems on sequences in transcription and translation

- Molecular weight prediction using gel images

Laboratory Manual for Reference

1. William D. Stansfield, Jame S. Colome and Raul J. Cano. *Theory and problems Molecular and cell biology*. Schaum's outline series, First edition. McGraw-Hill. 2019

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	indicate the structure and function of basic organelles of plant cells	1, 2	Un
CO-2	illustrate the structural organization and function of nucleus	1, 2	Un
CO-3	infer and quote the general principles of chromosome organization	1, 4	Un, Re
CO-4	sequence the gene regulation mechanisms at various levels	2	Un
CO-5	compare the complexity of gene expression in eukaryotes over prokaryotes and infer molecular mechanism of DNA replication	5	An, Re
CO-6	present laboratory skill in conducting experiment and draw data and interpret it	6	Ap

Name of the Course: Cell and Molecular Biology

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	2	3	3	2	3	3	**2.8**	3	3	3	3	2	3	3	3	**2.9**
CO-2	3	3	2	2	3	3	2	3	**2.6**	3	3	3	3	2	3	3	3	**2.9**
CO-3	3	3	2	3	2	2	2	3	**2.5**	3	3	3	3	2	2	3	3	**2.8**
CO-4	3	3	2	3	2	2	3	3	**2.6**	3	3	2	3	2	2	2	3	**2.5**
CO-5	3	3	2	3	3	3	2	2	**2.6**	3	3	2	3	2	2	2	3	**2.5**
CO-6	3	3	2	3	3	2	2	2	**2.5**	3	3	3	3	2	3	3	3	**2.9**
Average	**3.0**	**3.0**	**2.0**	**2.8**	**2.7**	**2.3**	**2.3**	**2.7**		**3.0**	**3.0**	**2.7**	**3.0**	**2.0**	**2.5**	**2.7**	**3.0**	
PO Mean									**2.6**	PSO Mean								**2.7**
Strength of PO Correlation					Strong					Strength of PSO Correlation					Strong			

Attainment of Programme Outcome
B.SC BOTANY
CO, PO and PSO Mapping
Name of the Course: Marine Biology

	Section	Unit I	Unit II	Unit III	Unit IV	Unit V
Blueprint of the question paper	Section A	2	2	2	2	2
	Section B Any FIVE	2	2	1	1	1
	Section C Either OR	2	2	2	2	2
	Section D Any THREE	1	1	1	1	1

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SEMESTER VI			
Core XII	**Marine Biology**		
Course Code: 21UBOC64	**Hrs/week: 4**	**Hrs/semester: 60**	**Credits: 4**

Objectives:

- To understand the different types of marine habitats and the adaptation of life therein.
- Provide laboratory skill to analyze the physico chemical and biological characterization of marine environment.
- To understand the role of marine products and their socio economic and environmental significance

UNIT I: Marine environment - classification, physical and chemical properties of seawater, characteristics and adaptations of pelagic (planktonic), benthic (littoral and deep sea)organisms.

UNIT II: Introduction to marine plants - Phytoplankton – sea weeds and sea grasses- introduction, adaptation, biology, ecology, economic and medicinalsignificance.

UNIT III: Coastal vegetation – sandy shore and sand dunes - introduction, daptation, biology, ecology, economic and medicinalsignificance.

UNIT IV: Coastal shore vegetation – salt marshes and mangroves - introduction, adaptation, biology, ecology, economic and medicinalsignificance.

UNIT V: Laboratory culture of marine algae, commercial cultivation of seaweeds – general methods – *Gracilaria* and *Porphyra*. Economic importance of marine algae in food and agriculture. Phycocolloids – agar agar, algin, alginate,

carrageenan – commercial production, properties and uses, diatomite, antibiotics and vitamins. Conservation of coastal ecosystem with special reference to coral reefs and mangroves.

Text Books:

1. Bilgrami, K.S. and L.C. Saha, *Textbook of Algae.* New Delhi: CBS publishers & Distributors, 2004.
2. Tait, *Elements of marine ecology*. London: Butterworth & Co. (Publishers) Ltd., 1978.

Books for Reference:

1. Boaden P.J.S. and R. Seed An *Introduction to coastal ecology.* New Delhi: Thomas Press Limited,1985.
2. Chapman, V.J. and Chapman, *Seaweeds and their uses* London: Chapman and Hall,1980.
3. Dawes, C.J. *Marine Botany*. New york: John Wiley & Sons, 1981.
4. Lobban, C.S. and M. J. Wynne. *The biology of Seaweeds*.London: Blackwell Scientific publications. Oxford, 1981.
5. Newell and Newell. *Marine Plankton a practicalguide.* Hutchinson and Co. Ltd., 1977.
6. Sinha P. C. *Marine pollution*, New Delhi. Anmol publications Pvt. Ltd.,1998.
7. Sverdrup H.U. *The Oceans* – Modern Asia Edition, 1972.
8. Venkataraman, G.S. *The cultivation of algae*, IARI, 1969.

Practicals Hrs/Week - 2

- Determination of acidity of marine water.
- Estimation of alkalinity of marine water.
- Determination of salinity of marine water.
- Estimation ofcalcium of marine water.
- Estimation of magnesium of marine water.
- Estimation of sodium of marine water.
- Estimation of Potassium of marine water.
- Determination of total hardness of marine water.
- Estimation of nitrate (Colorimetry) of marine water.
- Estimation of Phosphate (Colorimetry) of marine water.
- Phytoplanktons - Collection and identification
- Culture ofmicroalgae
- Seaweeds- *Ulva, Sargassum, Hypnea* and *Gracilaria*

- Study of sand dune, salt marsh and mangrove vegetation in their natural habitat.

Field Visit - Visit any nearby coastal ecosystem to study the marine environment

Submission - Record, photographs and field report for internal evaluation.

Books for Reference:

1. Murugesan A.G. and Rajakumari *Environmental Science and Biotechnology and Biotechnology, Theory and Techniques,* Chennai: MJP Publishers,2005.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the marine environment and classify them and analyze how marine organism adapt to their dynamic environment	1	Un, An
CO-2	able to signify the characteristic feature of phytoplanktons sea weeds sea grass their ecology and their economic importance	5	Re
CO-3	achieve practical skills in processing, preserving and culturing marine plants	6	Ev
CO-4	evaluate the uses of marine resources and realize the role of marine plants in the economy of the ocean	5	Ap
CO-5	able to signify the characteristic feature of mangroves, coral reefs and their role in coastal protection and biodiversity conservation	5	An
CO-6	explain the ecological relationship between organisms and their environment	2	An

Name of the Course: Marine Biology

	PO									PSO								
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Avg	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	Avg
CO-1	3	3	2	3	3	2	3	3	**2.8**	3	3	3	3	3	3	3	3	**3.0**
CO-2	3	3	2	3	3	3	2	3	**2.8**	3	3	3	3	2	3	3	3	**2.9**
CO-3	3	3	2	3	2	2	3	3	**2.6**	3	3	3	3	3	2	3	3	**2.9**
CO-4	3	3	2	3	2	2	3	3	**2.6**	3	3	2	3	3	2	2	3	**2.8**
CO-5	3	3	2	3	3	3	2	2	**2.6**	3	3	2	3	3	2	2	3	**2.8**
CO-6	3	3	2	3	3	2	2	2	**2.5**	3	3	3	3	3	3	3	3	**3.0**
Average	**3.0**	**3.0**	**2.0**	**3.0**	**2.7**	**2.3**	**2.5**	**2.7**		**3.0**	**3.0**	**2.7**	**3.0**	**2.8**	**2.5**	**3.0**	**3.0**	
PO Mean									**2.6**	PSO Mean								**2.9**
Strength of PO Correlation				Strong						Strength of PSO Correlation					Strong			

Attainment of Course Outcomes of the BSc Botany

Course Code	Name of the Course	Course Outcomes															
		Programme Outcomes (PO)								Programme Specific Outcomes (PSO)							
		PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
21ULTA11	Part-I Tamil	2.8	2.5	2.6	3	2.8	2.5	2.3	3	2.6	2.8	2.8	2.8	2.8	3	2.8	2.6
21ULFB11	Part-I French	3	3	2.8	3	3	3	2.3	3	2.6	3	2.8	2.8	2.8	3	3	3
21UGEN11	Part-II General English	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.5	2.5	2.5	2.5	2.5	2.6	2.5	2.6	2.5
21UBOC11	Plant Diversity I (Algae, Bryophytes, Fungi and Lichens)	3.0	3.0	2.2	3.0	3.0	2.3	2.5	2.7	3.0	3.0	3.0	3.0	2.8	2.5	2.7	3.0
21UZOA11	Invertebrate & Chordate Zoology	3	3	2.6	2.8	2.8	2.2	2.3	3	3	3	2.6	2.8	2.3	2.2	2.8	3
21ULTA21	Part-I Tamil	2.8	2.6	2.6	3	2.8	2.5	2.5	2.8	2.6	2.8	2.6	2.8	2.8	2.6	2.8	2.6
21ULFB21	Part-I French	2.8	3	3	3	3	3	2.3	3	3	3	3	2.8	3	3	2.8	3
21UGEN21	Part-II General English	2.6	2.5	2.6	2.5	2.6	2.5	2.5	2.5	2.6	2.5	2.6	2.5	2.6	2.5	2.6	2.5
21UBOC21	Anatomy, Embryology and Micro techniques	3.0	3.0	2.0	3.0	2.7	2.3	2.5	2.7	3.0	3.0	2.7	3.0	2.8	2.5	2.7	3.0
21UZOA21	Genetics, Physiology and Developmental Zoology	2.8	2.8	2.7	3	2.8	2.5	2.5	2.3	2.8	2.7	3.0	2.5	3.0	2.7	2.7	2.7
21ULTA31	Part-I Tamil	2.6	2.8	2.6	3	2.8	2.5	2.5	2.8	2.5	2.8	2.6	2.8	2.8	2.6	2.8	2.6
21ULFB31	Part-I French	2.8	3	2.8	3	3	3	2.7	3	2.7	3	3	2.8	3	3	2.8	3
21UGEN31	Part-II General English	2.8	2.6	2.5	3	2.5	2.8	2.6	2.5	2.5	2.8	2.6	2.8	2.8	2.3	2.8	2.5
21UBOC31	Plant Diversity II (Pteridophytes, Gymnosperms and Paleobotany)	3.0	3.0	2.0	3.0	2.7	2.3	2.5	2.7	3.0	3.0	2.7	3.0	2.8	2.5	3.0	3.0
21UCHA31	Allied Chemistry – I	2.3	2.3	3	3	3	2.3	1.7	1.8	**3**	**2.8**	**3**	**2.8**	**2.8**	**2**	**2**	**2**

21UBOS31	Horticulture	3.0	3.0	2.0	3.0	2.7	2.3	2.5	2.7	3.0	3.0	2.7	3.0	2.8	2.5	2.7	3.0
21UBOSS1	Ethnobotany	3.0	3.0	2.0	2.0	2.7	2.3	2.5	2.7	3.0	3.0	2.7	3.0	2.8	2.5	2.7	3.0
21ULTA41	Part-I Tamil	2.6	2.5	2.6	2.6	2.8	2.5	2.8	2.8	2.6	2.8	2.8	2.5	2.8	2.6	2.8	2.6
21ULFB41	Part-I French	3	2.8	3	3	3	3	2.3	3	2.8	2.8	3	3	3	3	3	3
21UGEN41	Part-II General English	2.8	3	2.6	3	2.6	2.8	2.8	2.6	2.6	2.8	2.6	2.8	3	2.6	2.8	2.6
21UBOC41	Taxonomy of Angiosperms and Economic Botany	3.0	3.0	2.2	3.0	3.0	2.3	2.5	2.7	3.0	3.0	3.0	3.0	2.8	2.5	2.7	3.0
21UCHA41	Allied chemistry -II	2.7	2.2	3	3	3	2.3	1.7	2	3	3	2.5	3	3	2.3	2.3	2.3
21UBOS41	Organic Farming and Biofertilizer	3.0	3.0	2.0	3.0	2.7	2.3	3.0	2.7	3.0	3.0	2.7	3.0	3.0	2.5	2.7	3.0
21UBOSS2	Preservation of Fruits and Vegetables	3.0	3.0	2.0	2.0	2.7	2.3	2.5	2.7	3.0	3.0	2.7	3.0	2.8	2.5	2.7	3.0
21UBCC51	Biotechnology	3.0	3.0	2.0	3.0	2.8	2.3	2.5	2.7	3.0	3.0	2.7	3.0	2.8	2.5	2.7	3.0
21UBOC51	Biochemistry	3.0	3.0	2.0	3.0	2.7	2.3	2.5	2.7	3.0	3.0	2.7	3.0	2.8	2.5	2.7	3.0
21UBOC52	Ecology and Phytogeography	3.0	3.0	2.0	3.0	2.7	2.3	2.5	2.7	3.0	3.0	2.7	3.0	2.8	2.5	2.7	2.8
21UBOC53	Biostatistics and Bioinformatics	2.8	2.2	2.2	2.7	2.5	2.2	2.3	2.7	2.0	2.0	2.0	3.0	2.0	3.0	3.0	3.0
21UBOE51	Genetics and Evolution	3.0	3.0	2.0	2.0	2.7	2.5	2.7	2.7	3.0	3.0	2.7	3.0	2.8	2.5	2.7	3.0
21UBOC61	Plant Physiology	3.0	3.0	2.0	3.0	2.7	2.3	2.5	2.7	3.0	3.0	2.7	2.0	2.8	2.5	2.7	3.0
21UBOC62	Microbiology and Plant Pathology	3.0	3.0	2.0	3.0	2.7	2.3	2.5	2.7	3.0	3.0	2.0	3.0	3.0	2.3	2.5	2.7
21UBOC63	Cell and Molecular Biology	3.0	3.0	2.0	2.8	2.7	2.3	2.3	2.7	3.0	3.0	2.7	3.0	2.0	2.5	2.7	3.0
21UBOC64	Marine Biology	3.0	3.0	2.0	3.0	2.7	2.3	2.5	2.7	3.0	3.0	2.7	3.0	2.8	2.5	3.0	3.0
Average Correlation		**2.9**	**2.8**	**2.4**	**2.8**	**2.8**	**2.5**	**2.5**	**2.7**	**2.8**	**2.9**	**2.7**	**2.8**	**2.8**	**2.6**	**2.7**	**2.8**
Mean Overall Score		**2.7**	**The POs and PSOs are strongly correlated with the COs of the programme**														