SARASWATHI NARAYANAN COLLEGE
(An Autonomous Institution Affiliated to Madurai Kamaraj University)
(Reaccredited with Grade 'B' by NAAC)
MADURAI – 625 022.

DEPARTMENT OF BOTANY

Choice Based Credit System (CBCS)
Learning Outcomes-based Curriculum Framework (LOCF)

B.Sc. Botany Programme
(For those who join in June 2022)

PRINCIPAL

Dr. M. Kannan , M.A., M.Phil., PGDTE.,Ph.D.

DEPARTMENT OF BOTANY

1. **Dr. N.Vasudevan , M.Sc., B.Ed.,M.Phil., Ph.D., - Associate Professor & Head**
2. **Dr. D.Kathiresan , M.Sc., B.Ed.,M.Phil., Ph.D., - Associate Professor**
3. **Dr. S.Rajendran , M.Sc., M.Phil., Ph.D., - Associate Professor**
4. **Dr.S.Sankaralingam , M.Sc., B.Ed.,M.Phil., Ph.D., - Assistant Professor**
5. **Dr.K.Suresh , M.Sc., M.Phil., Ph.D., - Assistant Professor**
6. **Dr.S.Prakash , M.Sc., Ph.D., - Assistant Professor**
7. **Dr.T.Athiperumalsami , M.Sc., M.Phil., Ph.D., - Assistant Professor**
8. **Dr.A.Saravanakumar , M.Sc., M.Phil.,PMCPGE., Ph.D., - Assistant Professor**
9. **Dr.P.Packiaraj , M.Sc., M.Phil., PGDCA.,Ph.D., - Assistant Professor**
10. **Dr.S.Karthickkumaran , M.Sc(Biotech).,MBA., M.Sc(Bot).,M.Phil., Ph.D., - Assistant Professor**

PROFILE OF THE COLLEGE

Thiru. L.Narayanan Chettiar, a renowned philanthropist founded Saraswathi Narayanan College at Perungudi near Madurai Airport in the year 1966. The college is a prestigious academic powerhouse catering to the educational needs of students hailing from economically weaker and socially oppressed section of our society. It imparts education of the highest quality to students irrespective of caste, creed and religion. The guiding principles of our college are duty, devotion and distinction. The institution has proved an innovative leader and a catalyst in the best educational, cultural and economic interests of students. It is committed to make the students morally upright, intellectually resourceful , socially advantaged and globally competent. It is devoted to teaching, research and extension activities with equal importance.

The college set off its academic journey with Pre-University Courses in the year 1966-67. The Institution started offering UG programmes from the academic year 1968-69. It was upgraded as Post-Graduate Institution in 1979-80 and as Research Institution in 1984-85. The Co-educational system was introduced for M.Phil programmes in the academic year 2001-02 and for PG programmes in the year 2002-03 with the noble objective of promoting higher education among girls in rural areas. Girls have been enrolled in UG programmes also since the academic year 2010-11.

The green campus of 66 acres has a built-up area of 1,70,059 sq.ft. A new library housed at Silver Jubilee building at the cost of Rs.25,00,000/- and it was inaugurated by his excellency Dr.M.Chenna Reddy, the then Governor of Tamilnadu on 04.04.1994. The library was dedicated to the memory of Achi. The major donor of this building was Tmt. Saraswathi Narayanan , the better half of the Founder President Thiru. L. Narayanan Chettiar. Sri Vidhya Ganapathi Temple was built and consecrated on 27.08.2015.

The Departments of Botany, Mathematics, Commerce, English, Economics and Chemistry have been upgraded as university recognized research centres to carry out M.Phil . and Ph.D research programmes in the college. NAAC accredited the college with grade B+ in the year 2005. UGC accorded the Status of Autonomy of our institution in the year 2007. NAAC re-accredited the college with grade B (CGPA of 2.78) in the year 2016. UGC extended the Status of Autonomy to the institution for another period of five years from the academic year 2016-17.

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B.Sc Botany – Course Structure for the Academic year 2022-23

SEMESTER - I								
Part	**Course Type**	**Title of the course**	**Course Code**	**Hrs/ Week**	**Credit**	**Exam Hrs.**	**CIA**	**Ext.**
I	LC-T1	Tamil-I	LUP1TA11	6	3	3	25	75
II	LC-E1	English-I	LUP2EN11	6	3	3	25	75
III	CC-1	Algae and Bryophytes	LUBYCT11	4	4	3	25	75
III	CC-2	Organic Farming	LUBYCT12	4	4	3	25	75
III	CC-3	**Major Botany Practical – 1** Algae, Bryophytes, Fungi, Lichens & Plant Pathology	LUBYCL21	2	-	-	-	-
III	GEC-1	Allied Zoology-I	LUZOGE11	4	4	3	25	75
III	GEC-2	Allied Zoology Practical – I	LUZOGL21	2	-			
IV	AEC-1	EVS	LUP4ES11	2	2	3	25	75
				30	**20**			

SEMESTER - II								
Part	**Course Type**	**Title of the course**	**Course Code**	**Hrs/ Week**	**Credit**	**Exam Hrs.**	**CIA**	**Ext.**
I	LC-T2	Tamil-II	LUP1TA21	6	3	3	25	75
II	LC-E2	English-II	LUP2EN21	6	3	3	25	75
III	CC-4	Fungi, Lichen & Plant Pathology	LUBYCT21	4	4	3	25	75
III	CC-3	**Major Botany Practical – 1** Algae, Bryophytes, Fungi, Lichens & Plant Pathology	LUBYCL21	2	2	-	40	60
III	GEC-3	Allied Zoology-II	LUZOGE21	4	4	3	25	75
III	GEC-2	Allied Zoology Practical – I	LUZOGL21	2	2		40	60
IV	SEC-1	Biomolecules & Cell Biology	LUBYSE21	2	2	3	25	75
		Global Climate Change	LUBYSE22					
IV	SEC-2	Microbial Technology	LUBYSE23	2	2	3	25	75
		Fermentation Technology	LUBYSE24					
IV	AEC-2	Value Education	LUP4VE21	1	1	3	25	75
IV	AEC-3	YOGA (only CIA)	LUP4YA21	1	1		50	-
V	AEC-4	NSS/NCC/LE/PE	LUP5NS21 LUP5NC21 LUP5LE21 LUP5PE21	-	1	3	25	75
	SLC-1	History of Indian Science	LUBYSC21	-	-	2		100
		Personality Development	LUBYSC22					
				30	**25**			

SEMESTER - III								
Part	**Course Type**	**Title of the course**	**Course Code**	**Hrs/ Week**	**Credit**	**Exam Hrs.**	**CIA**	**Ext.**
I	LC-T3	Tamil-III	LUP1TA31	6	3	3	25	75
II	LC-E3	English-III	LUP2EN31	6	3	3	25	75
III	CC-5	Pteridophytes, Gymonosperms& Paleobotany	LUBYCT31	4	4	3	25	75
III	CC-6	**Major Botany Practical – II** Pteridophytes, Gymnosperms & Paleobotany & Plant Anatomy & Embryology	LUBYCL41	2	-	-	-	-
III	GEC-4	Allied Zoology-III	LUZOGE31	4	4	3	25	75
III	GEC-5	Allied Zoology Practical – II	LUZOGL41	2		-	-	-
III	GEC-6	Allied Chemistry - I	LUCHGE31	4	4	3	25	75
III	GEC-7	Allied Chemistry Practical– I	LUCHGL41	2	-	-	-	-
	SLC-2	Intellectual Property Rights	LUBYSC31	-	-	2		100
		Economic Botany	LUBYSC32					
	MOOC	MOOC		-	-	-	-	-
				30	**18**			

SEMESTER - IV								
Part	**Course Type**	**Title of the course**	**Course Code**	**Hrs/ Week**	**Credit**	**Exam Hrs.**	**CIA**	**Ext.**
I	LC-T4	Tamil-IV	LUP1TA41	6	3	3	25	75
II	LC-E4	English-IV	LUP2EN41	6	3	3	25	75
III	CC-7	Plant Anatomy & Embryology	LUBYCT41	4	4	3	25	75
III	CC-6	**Major Botany Practical – II** Pteridophytes, Gymnosperms & Paleobotany & Plant Anatomy & Embryology	LUBYCL41	2	2	-	40	60
III	GEC-8	Allied Zoology-IV	LUZOGE41	4	4	3	25	75
III	GEC-5	Allied Zoology Practical – II	LUZOGL41	2	2	3	40	60
III	GEC-9	Allied Chemistry - II	LUCHGE41	4	4	3	25	75
III	GEC-7	Allied Chemistry Practical - I	LUCHGL41	2	2	3	40	60
	SLC-3	Field Methods for Vegetation Mapping	LUBYSC41	-	-	2		100
		Traditional system of Indian Medicine	LUBYSC42					
	MOOC	MOOC		-	-	-	-	-
				30	**24**			

SEMESTER - V								
Part	**Course Type**	**Title of the course**	**Course Code**	**H / W**	**Credit**	**Exam Hrs.**	**CIA**	**Ext.**
III	CC-8	Plant Morphology and Taxonomy of Angiosperms	LUBYCT51	3	3	3	25	75
III	CC-9	Plant Physiology	LUBYCT52	3	3	3	25	75
III	CC-10	Plant Biochemistry	LUBYCT53	3	3	3	25	75
III	CC-11	**Major Botany** **Practical – III** Plant Morphology and Taxonomy of Angiosperms	LUBYCL51	5	3	3	40	60
III	CC-12	**Major Botany** **Practical – IV** Plant Biochemistry and Physiology Lab	LUBYCL52	3	3	3	40	60
III	DSE-1	Molecular biology & Biostatistics	LUBYDS51	3	3	3	25	75
		Aquatic Botany	LUBYDS52					
III	GEC-10	Allied chemistry - III	LUCHGE51	4	3	3	25	75
III	GEC-11	Allied Chemistry Practical – II	LUCHGL51	2	-	-	-	-
IV	GEC-12	**NME-I** Plants for Mankind	LUBYNM51	2	2	3	25	75
IV	SEC-3	Bio-Analytical Techniques	LUBYSE51	2	2	3	25	75
		Environmental impact analysis	LUBYSE52					
	SLC-4	Forensic Botany	LUBYSC51	-	-	2		100
		Ethnomedicobotany	LUBYSC52					
	MOOC	MOOC		-	-	-	-	-
				30	**25**			

SEMESTER - VI								
Part	**Course Type**	**Title of the course**	**Course Code**	**H / W**	**Credit**	**Exam Hrs.**	**CIA**	**Ext.**
III	CC-13	Plant Biotechnology	LUBYCT61	3	3	3	25	75
III	CC-14	Plant Ecology and Biodiversity	LUBYCT62	3	3	3	25	75
III	CC-15	Genetics	LUBYCT63	4	3	3	25	75
III	CC-16	**Major Botany Practical – V** Genetics and plant breeding	LUBYCL61	4	4	3	40	60
III	CC-17	**PROJECT**	LUBYPJ61	3	3	-	50	50
III	DSE-2	Botany/ Life Science for competitive examinations	LUBYDS61	3	2	3	25	75
		Medicinal and Aromatic Plants	LUBYDS62					
III	GEC-13	Allied Chemistry - IV	LUCHGE61	4	4	3	25	75
III	GEC-11	Allied chemistry Practical – II	LUCHGL61	2	2	-	-	-
IV	GEC-12	**NME-II** Medicinal Botany	LUBYNM61	2	2	3	25	75
IV	SEC-6	Elements of Plant Breeding	LUBYSE61	2	2	3	25	75
		Bio resource Management	LUBYSE62	2	2	3	25	75
	MOOC	MOOC						

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DEPARTMENT OF TAMIL – UG – CBCS
PART I- TAMIL

Title of the Course: பழந்தமிழ் இலக்கியமும் உரைநடையும்	**Semester : I**
Course Code : LUPITA11 Contact Hours : 6hrs/w	**Credit: 3**

பாடத் திட்டத்தைக் கற்றுக் கொண்ட பின்பு மாணவர்கள் பெறும் பயன்கள் :

1. சங்க நூல்களைப் படிப்பதன் மூலம் மாணவர்கள் வாழ்வியல் செய்திகளை அறிந்து கொள்ள முடிகிறது.
2. மாணவர்கள் ஒழுக்கத்தினை அற இலக்கியங்கள் வாயிலாகக் கற்றுக் கொள்கின்றனர்
3. உரை நடைக் கட்டுரைகளை வாசிக்கும் போது மாணவர்கள் சமூகக் கருத்துக்களைத் தெரிந்து கொள்கின்றனர்.
4. அக, புற, இலக்கணங்கள் மாணவர்கள் வாழ்வில் செம்மையுற உதவுகின்றன.
5. தமிழ் இலக்கிய வரலாற்றினைப் படிப்பதனால் மாணவர்கள் அறிவுத்திறன் மேம்ப்படுத்தப்பட்டு போட்டித் தேர்வுக்குத் தயார்படுத்தப்படுகிறார்கள்.

பாடத்திட்டத்திற்குத் தேவையான முன் அறிவு :

- ❖ சங்கத் தமிழரின் வாழ்வியல் முறைகளை அறிந்து கொள்ளல்
- ❖ நீதி இலக்கியங்களைக் கற்றல்
- ❖ மாணவர்கள் வாசிப்புத் திறனை வளர்த்துக் கொள்ளல்

கூறு I: செய்யுள்

1. பத்துப்பாட்டு

நெடுநல்வாடை முழுவதும்

எட்டுத் தொகை

2. நற்றிணை -5 பாடல்கள் - 1, 115, 216, 305, 388

3. குறுந்தொகை - 5 பாடல்கள் 2, 4, 43, 67, 157
4. பதிற்றுப்பத்து -4 பாடல்கள் 62 (வென்றிச் சிறப்பு)
5. புறநானூறு -5 பாடல்கள் 74, 112, 204, 257, 312
6. அகநானூறு -5 பாடல்கள் 2, 10, 35, 36, 54

கூறு II: அற இலக்கியம்

1. திருக்குறள் - விருந்தோம்பல், வினைத்திட்பம், ஒழுக்கமுடைமை
2. நான்மணிக்கடிகை - முதல் 10 பாடல்கள்
3. இனியவை நாற்பது - முதல் 10 பாடல்கள்
4. மூதுரை - முதல் 10 பாடல்கள்

கூறு III: உரைநடைக் கட்டுரைத் தொகுப்பு

1. அறநெறி அண்ணல் - இரா.ராஜராஜேஸ்வரி
2. கல்வி - திரு.வி.கலியாணசுந்தரனார்
3. சூழலியல் ஒரு அறிமுகம் - ஏ.சிங்கராயர்
4. பாதை பெரிது, பயணம் தொடங்கு - கு.வெ.பாலசுப்பிரமணியன்
5. தனித்திரு, விழித்திரு பசித்திரு - பெ.பழனிராஜன்
6. நாட்டார் சிந்து கதைப்பாடல்கள் ஓர் அறிமுகம் - பா.சுபாஷ்போஸ்
7. சிறகு முளைத்த பின்பும் - ஜே.ஆர். இலட்சுமி டார்வின்

கூறு IV: இலக்கணம்

1. அகத்திணைகள் - கைக்கிளை, நடுவண் ஐந்திணை, பெருந்திணை (முதல், கரு, உரிப்பொருள்)
2. புறப்பொருள் திணைகள் - வெட்சி, வஞ்சி, காஞ்சி, உழிஞை, தும்பை, வாகை, பாடாண்

கூறு V: இலக்கிய வரலாறு

1. சங்க இலக்கிய வளர்ச்சி
2. அற இலக்கிய வளர்ச்சி
3. உரைநடை வரலாறு

பரிந்துரைக்கப்பட்ட நூல்கள்:

1. சரசுவதி (செய்யுள் தொகுப்பு)
   சரசுவதி நாராயணன் கல்லூரி
   நியூ செஞ்சுரி புக் ஹவுஸ் (பி) லிட்.அம்பத்தூர்,

சென்னை – 600050

2. பார்வை நூல்கள் :

- சங்க இலக்கியம் - பத்துப்பாட்டு- ச.வெ.சுப்பிரமணியன் உரை
- சங்க இலக்கியக் குறுந்தொகை- தமிழண்ணல் உரை
- சங்க இலக்கிய புறநானூறு - இரா.இளங்குமரன் உரை
- திருக்குறள் - இராமசாமி உரை
- தமிழ்க்காதல் - வா.சுப.மாணிக்கம்
- சங்க இலக்கியத்தில் கைக்கிளை - மு.மணிவேல்
- உரைநடையின் தோற்றமும் வளர்ச்சியும்- இ.சிவத்தம்பி
- நற்றிமிழ் இலக்கணம் - தொ.பரமசிவம்
- நன்னூல் - வெள்ளை வாரணனார் உரை

3.இணைய ஆதாரங்கள் :

சங்க இலக்கியம்

https://ta.vikaspedia.in/education/ba4baebbfbb4bcdba8bc2bb2bcdb95bb3bcd/%E0%AE%9A%E0%AE%99%E0%AF%8D%E0%AE%95%E0%AE%87%E0%AE%B2%E0%AE%95%E0%AF%8D%E0%AE%95%E0%AE%BF%E0%AE%AF%E0%AE% AE%E0%AF%8D-%E0%AE%93%E0%AE%B0%E0%AF%8D%E0%AE%85%E0%AE%B1%E0%AE%BF%E0%AE%AE%E0%AF%81%E0%AE%95%E0%AE%AE%E0%AF%8D

அற இலக்கியம்

http://neelamegan.blogspot.com/2020/01/blog-post_5.html?m=1

உரைநடை

https://ta.m.wikipedia.org/wiki/%E0%AE%89%E0%AE%B0%E0%AF%88%E0%AE%A8%E0%AE%9F%E0%AF%88

பொருள் இலக்கணம்

அகம், புறம்

https://ninaivukurgatamil.blogspot.com/2021/09/porul-tamil-illakkanam.html?m=1

இலக்கிய வரலாறு

https://ta.m.wikipedia.org/wiki/%E0%AE%A4%E0%AE%AE%E0%AE%BF%E0%AE%B4%E0%AF%8D_%E0%AE%87%E0%AE%B2%E0%AE%95%E0%AF%8D%E0%AE%95%E0%AE%BF%E0%AE%AF%E0%AE%AE%E0%AF%8D

DEPARTMENT OF ENGLISH – UG – CBCS-LOCF
(For those who join in June 2022)

Title of the Course: English Language Proficiency – I **Semester: I**
Course Code: LUP2EN11 **Contact hours: 6hrs/w** **Credits: 3**

Course Learning Outcomes:

On completion of the course, the students are able to

- recognize their own ability to improve their own competence in using the language
- comprehend spoken form
- understand the importance of vocabulary in academic life
- write simple sentences without committing errors of spelling and grammar
- comprehend texts using the techniques such as skimming and scanning

Pre-required Knowledge:

- Skills of reading comprehension and interpretation
- Functional vocabulary
- Functional grammar

Unit I: Prose

1.Dand Miller Sadaker and Myra Pollack Sadaker **:**Multiple Intelligence and Emotional Intelligence

2. Swami Vivekananda : India's Message to the World
3. Robert Lynd : The Pleasures of Ignorance
4. Leo Tolstoy : The Three Questions

Unit II : Poetry

1. Rabindranath Tagore : Upagupta
2. Chinua Achebe : Refugee Mother and Child

3. D.H Lawrence : Don'ts
4. Seamus Heaney : Digging

Unit III : Short Stories

1. Ruskin Bond : The Eyes are not Here
2. H.G. Wells : The Empire of Ants
3. A.A Milne : Getting Married

Unit IV : Grammar

Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction, Interjection, Articles

Unit V : Conversation and Writing Skills

1. Every Day English Part – I
2. Paragraph Writing

Suggested Topics for Presentation:

- Importance of English in the wake of globalization
- Use of English in real life situations
- Objectives of reading short stories
- Presentation of memorable events in life
- Why should we read Prose text?
- Importance of grammar in the use of English
- Demonstration of situational conversation

Suggested Readings:

i)Text Book:

1. *Wealth of English* .Ed. Department of English, Saraswathi Narayanan College, Madurai. Harrows Publications, Madurai, 2022.

ii)Reference Books:

1. Radhakrisnapillai, G. *English Grammar and Composition*. Chennai: Emerald Publishers, 2002.
2. Murphy, Raymond. *Intermediate English Grammar*. New Delhi: Foundation Books, 2005.
3. Bose,M.N.K. Ed. *Better Communication in Writing*. Madras: New Century Book House (P) Ltd, 2004.

iii) Web Sources:

http://www.indiabix.com/verbal-ability/questionand-answers/

http://www.waylink-english.co.uk/?

https://www.englishclub.com/vocabulary/

https://biblonia.com/2019/12/28/reading-and-interpretation/

DEPARTMENT OF BOTANY – UG-CBCS- LOCF

Title of the Course: Algae and Bryophytes		**Semester: I**
Subject Code: LUBYCT11	**Contact hours: 4hrs/w**	**Credits:4**

Course Learning Outcomes:

On completion of the course, the students are able to

- remember the basic concepts of plant diversity
- recognize the major groups of non-vascular plants
- understand the diversity among the non-vascular plants
- understand useful and harmful activities of non-vascular plants
- create a protocol to assess the role of Thallophytes in industrial applications

Pre-required Knowledge:

- prokaryotic and eukaryotic cell structure
- concepts of cell theory
- major groups of plant kingdom

Unit I:General outline of plant kingdom:

Five kingdom classification- General characters of algae - Classification of algae by Fritsch- life cycle pattern – Haplontic, diplontic and haplodiplontic. Economic importance of algae. Algae as food, medicine, industrial and agricultural uses. Thallus organization in Algae.

Unit II: Algae:

Distribution, structure, reproduction and life history of the following algae:

(Need not study the development of sex organs)

a) Cyanophyceae - Nostoc

b) Chlorophyceae - Oedogonium

c) Xanthophyceae–Vaucheria

Unit III: Algae:

Distribution, structure, reproduction and life history of the following algae:

(Need not study the development of sex organs)

a) Bacillariophyceae - Diatoms

b) Phaeophyceae - Sargassum

c) Rhodophyceae - Polysiphonia

Unit IV: Bryophytes:

General characters of Bryophytes - Classification of Bryophytes by Rothmaler – Economic importance of Bryophytes - Distribution, structure, reproduction and life-history of the following types:(Need not study the development of sex organs)

a) Hepaticopsida -Marchantia

Unit V:Bryophytes:

Distribution, structure, reproduction and life-history of the following types:

(Need not study the development of sex organs)

a) Anthocerotopsida - Anthoceros

b) Bryopsida - Funaria

Suggested Topics for Seminar/Presentation/Group Discussion:

- Marine phytoplanktons and its ecological importance including oxygen evolution
- Origin of Bryophytes through: Algae vs. Pteridophytes
- Origin of Bryophytes: Monophyletic concepts vs. Polyphyletic
- Evolution of Gametophytes in Bryophytes: Retrogressive vs. Progressive

- Evolution of Sporophytes in Bryophytes: Progressive sterilization vs. Progressive simplification

Suggested Readings:

Text Books:

1. Pandey, B.P., College Botany- Algae, Fungi and Bryophytes. Vol-I S. Chand & Co. Ltd., New Delhi, 2002
2. Vashistha, B.R., Sinha, A. K. and Singh, V.P., Algae. S. Chand & Co. Ltd., New Delhi, 2002
3. Sharma OP., Textbook of Thallophytes, McGraw Hill Pub. Co. 1992.

Reference Books:

1. Fritsch, F. E., The structure and reproduction of Algae. Volumes I&II. Vikas Publications, New Delhi, 1965
2. Sharma, O.P., Text Book of Algae. Tata McGraw- Hill Publishing Co. Ltd., New Delhi, 1986.
3. Srivasthava, H.N., Bryophytes, Pradeep Publishing, Jalandar, 2000.

Web Sources:

1. https://macroalgae.org/portal/index.php
2. http://www.indiaenvironmentportal.org.in/category/198/thesaurus/blue-green-algae/
3. https://www.anbg.gov.au/bryophyte/
4. https://globaltcn.utk.edu/

DEPARTMENT OF BOTANY – UG-CBCS- LOCF
(For those who join in June 2022)

Title of the Course: Organic Farming		**Semester: I**
Subject Code: LUBYCT12	**Contact hours: 4hrs/w**	**Credits:4**

Course learning outcomes:

On completion of the course, the students are able to

- gather the knowledge about symbiotic N_2 fixing bacterium *Rhizobium* sp. and its importance.
- acquire the knowledge on various symbiotic and asymbiotic microbes for N_2 fixations.
- gather the information of root nodule
- getting more information on BGA for nitrogen fixation.
- understand the chemical fertilizers and its disadvantages as well as the importance of organic farming.

Pre-required knowledge:

- Diazotrophs
- N_2 fixation
- FYM

Unit I: Introduction to organic farming

Definition, Scope, importance and limitations of organic farming. Manures: Brief account on plant based manures, Farm Yard Manures (FYM) and animal manures.

Unit II: Soil

A brief account on physical and chemical properties. Brief account on soil profile. Plant nutrients: Macro and micro nutrients

Unit III: Biofertilizers

Definition, Kinds, Scope and importance. Mechanism of nitrogen fixation by microrganisms. Microbes as biofertilizers – symbiotic association: *Rhizobium* – characteristic features, mass cultivation, inoculum production and applications.

Unit IV: Associative and non-symbiotic bacteria

Azotobacter – characteristics, mass cultivation, maintenance – crop responses. Blue green algae (BGA) – types – mass production and application of *Nostoc* (Structure)

Unit V: Biopesticides

Definition, kinds; Bacterial pesticides: Bacillus thuringiensis - Characteristics- mechanism of action. Mycopesticides and viral pesticides – a brief study.

Suggested Topics for Seminar/Presentation/Group Discussion

- Microbial biofertilizers
- Crop rotation
- Legume plants
- Cyanobacteria
- Biopesticides

Suggested Readings

Text Books:

1. Subba Rao, N.S., 1977. Soil Microorganisms and Plant growth. Oxford and IBH Publishing Co, New Delhi.
2. Mahanta, K.C., 1974. Fundamentals of Agricultural Microbiology, Oxford and IBH Publishing Co., New Delhi.
3. Gupta, P.K., 1998. Elements of Biotechnology, Rastogi Publications, Meerut.

Reference Books:

1. Sprent, J.I., and Peter Sprent., 1990. Nitrogen Fixing Organisms: pure and applied aspects. Chapmen and Hall.
2. NIR Board (2012). The complete technology book on Biofertilizer and organic farming, 2nd Eddition, NIR, Project consultancy services.

Web Sources:

1. https://en.wikipedia.org/wiki/biofertilizer
2. https://www.krishisewa.com/organic-agriculture/115-biofertilizers.html.
3. https://www.forturejiornals.com/articles/sustainable-agriculture-biofertilizers-withstanting.
4. https://www.topr.com/guides/biology/microbes-in-human-welfare/biofertilizers

DEPARTMENT OF ZOOLOGY – UG – CBCS- LOCF

Title of the Course: Allied Zoology -I	**Semester: I**
Course Code: LUZOGE11 Contact Hours:4hrs / w	**Credits: 4**

Course Learning outcomes:

On completion of the course, the students are able to

1. recall the general characters and outline classification of an animalkingdom
2. apply the Knowledge to identify the invertebrate and chordates fauna based ontheir unique character
3. analyse the importance and adaptation of invertebrates and chordates in theirhabitat
4. evaluate the role of invertebrates and chordates in biological communities, ecological interactions and environmental challenges.
5. explore the biological importance of Pearl culture Apiculture**,** Pisciculture,Dairy farming.

Pre- required knowledge

- Systematic position of various organisms
- Taxonomical and characteristics of invertebrates and chordates
- Morphological and anatomical features of selected non chordates
- Harmful parasites and their economic importance of non chordates

Unit I: Outline classification of Invertebrates, Protozoa, Porifera and Coelenterata

1. Outline classification and general characters of Invertebrate with examples.
2. General characters of Phylum **Protozoa** with examples &

   Plasmodium: Life history, transmission, prevention and control.

1. General characters of Phylum **Porifera** and Canal system in Sponges.
2. General characters of Phylum **Coelenterata** with examples **&**

Corals: Types, Ecological and Economic importance.

Unit II**:** Platyhelminthes and Nematehelminthes, Annelida and Arthropoda:

1. General characters of Phylum **Platyhelminthes** with examples.

   Liver Fluke– *Fasciola hepatica*–Digestive and Excretory system.

2. General characters of Phylum **Nematehelminthes** with examples.

   Filarial Worm (***Wuchereria bancrofti)*** - Life history, transmission, Prevention & control.

3. General characters of phylum **Annelida** and Vermiculture.
4. General characters of phylum **Arthropoda** with examples.

   Arthropoda vector borne diseases - Chikungunya and Dengue

Unit III: **Mollusca and Echinodermata, Chordata and Pisces**

1. General characters of phylum **Mollusca** and **Echinodermata** with examples **Oyster culture**: Types of oyster culture in india and its food value.

2. General characters of phylum **Echinodermata** with examples **Star Fish-** Water vascular system.
3. General characters of Phylum Chordata and classification up to classes with examples
4. General characters of Pisces with examples
5. Identification features of local fresh water fishes - *Catla, Clarius* and *Ophiocephalus*

Unit IV:Amphibia, Reptilia, Aves and Mammals

1. General characters of Amphibia with examples and Parental care in Amphibia.
2. General characters of Reptilia and Identification of poisonous, non- poisonous snakes, biting mechanism, first-aid and treatment for snake bite.
3. General characters of Aves with examples. Migration of birds and Flight adaptationin birds
4. General characters of Mammals with examples & Adaptations of aquatic mammals.

Unit V: Economic importance of invertebrates and vertebrates

1. Pearl culture: Formation of pearl - types of Pearl culture in india.
2. Apiculture: Honey Bees Cast system, Newton's bee hive, Honey, Bee wax and Beevenom
3. Pisciculture (freshwater): Breeding and feeding techniques with reference to carps.
4. Dairy farming: Common breeds of India, nutritive value of milk – milk products.

Suggested Topics for Group Discussion / Presentation

1. Classification of phylum Invertebrates
2. Filarial Worm
3. Coral reefs and their role in ecosystem generation
4. Migration of birds
5. Dairy farming

Suggested Readings:

i) Text Books:

1. Nair N.C, Thangamani A, Leelavathy S, Prasanakumar S, Soundara Pandian N, Murugan T, Narayanan l. M and Arumugam N, 2017. *Animal diversity(Invertebrata & Chordata),* Saras Publication, Nagercoil.
2. Kotpal, R.L., 2017. Modern text book of Zoology- *Invertebrates*. RastogiPublications, Meerut
3. Arumugam N, 2019. *Animal Diversity*- Chordata, Volume – 2, Saras Publication

ii) Reference Books:

1. **Ekambaranatha Iyer, M and Anandhakrishnan, T.N. Vol.1. 1994.** A manual of Zoology. S.Viswanathan Pvt., Ltd., Chennai.
2. **Jordan, E.L. and Verma, P.S., 1995.** Invertebrate Zoology. S. Chand & Co., NewDelhi.
3. **Kotpal, R.L., 1995.** Modern text book of Zoology-Invertebrates. RastogiPublications, Meerut.
4. **Ramakrishna Iyer, T.V., 1992.**Hand book of Economic Entomology for South India,Narendra Publishing House.

iii) Web sources:

1. **HTTPS://SWAYAM.GOV.IN/COURSES/ANIMAL-DIVERSITY**
2. **HTTPS://EPGP.INFLIBNET.AC.IN/AHL.PHP?CSRN**
3. Animal Diversity (https://swayam.gov.in/courses/5686-animal-diversity)
4. Advances in Animal Diversity, Systematics and Evolution (https://swayam.gov.in/courses/5300- zoology)
5. https://www.khanacademy.org/science/biology/crash-course-bio-ecology/crash- coursebiologyscience/v/crash-course-biology-123

PART IV – ENVIRONMENTAL STUDIES – UG – CBCS - LOCF

(For those who join in June 2022)

Title of the Paper: Environmental Studies		**Semester: I**
Course Code: LUP4ES11	**Contact hours: 2hrs/w**	**Credit: 2**

Learning Objectives:

- ❖ To study the basic concepts of environmental science.
- ❖ To study plant succession, methods of vegetation analysis, structure and functions of ecosystems.
- ❖ To understand the causes and consequences of various pollutions and gives an idea to the control measures.
- ❖ To understand the importance of biodiversity and conservation

Unit I:

Environment - Definition - Components of environment and types. Ecosystem and its types.

Unit II:

Global warming - Causes and consequences of global warming - global warming in Indian Context - Earth summit. Green house of uses and its effects, ozone depletion.

Unit III:

Deforestation: causes and impacts - Tree saving movement in India - Chipko movement - Apico movement - Sunderlal Bohuguna – Methapatkar, Afforestation.

Unit IV:

Radioactive pollution - Hiroshima & Nagasaki, 1945 - Chernobyl episode of 1986. Effects and control measures of Air pollution - Bhopal gas tragedy 1984. Acid rain and its impacts.

Unit V:

Water and Noise Pollution-causes, effects & control measures. Water scarcity and solutions to overcome. Road safety – Rules, Traffic Signals, Conduct of road safety

awareness programme. Role of academic institutions and academicians and students in village adoption.

Learning Outcomes:

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

- ✓ **acquire knowledge on ecological factors and their interactions with ecosystem; types of soil erosion and methods of conservation.**
- ✓ **understand the series of events in the process of plant succession in wet and dry lands;**
- ✓ **recognize their significance of value of biodiversity and its conservation.**

Text Book:

1. Thangamani.I & Shymala - Thangamani, Environmental studies - Pranor Syndicate, Sivakasi, 2003.

Reference Books:

1. Subramanyam, N.S. and Sambamuthy, A.V.S.S. Ecology, Narosa Publishing House, New Delhi, 2000.
2. Krishnamoorthy, K.V. An advanced text book on Biodiversity. Oxford and IBH Publishing company Pvt, Ltd., New Delhi, 2004.
3. Rana, S.V.S. Essentials of Ecology and Environmental Science, Prentice Hall of India Pvt., Ltd., New Delhi, 2004.

DEPARTMENT OF TAMIL – UG – CBCS
PART I- TAMIL

Title Of The Course: காப்பிய இலக்கியமும் நாடகமும் Semester : II

Course Code : LUPITA21 Contact Hours : 6hrs/w Credit: 3

பாடத் திட்டத்தைக் கற்றுக் கொண்ட பின்பு மாணவர்கள் பெறும் பயன்கள்:-

1. காப்பிய இலக்கியம் படிக்கும்போது மாணவர்கள் தமிழப் பண்பாட்டைப் பற்றியும்,தமிழரின் வாழ்க்கை முறை பற்றியும் தெரிந்து கொள்கின்றனர்.
2. சமயம் பற்றிப் படிக்கும்போது ஆன்மீக ஈடுபாடும் ஆன்மீக அறிவும் வளர்கிறது.

3. நாடக நூல்களைப் படிப்பதனால் மாணவர்கள் பிரச்சனைகளை எதிர்கொள்ளும் திறனைப் பெறுகின்றனர்
4. மாணவர்கள் சொற்களை உருவாக்கி சிறந்த வாக்கியங்களைப் படைக்க இலக்கணம் துணை நிற்கின்றது.
5. இலக்கிய வரலாறு படிப்பதனால் மாணவர்கள் பாடத் திட்டத்தின் முழுமையான செய்திகளை அறிந்து கொள்ள உதவுகிறது.

பாடத்திட்டத்திற்குத் தேவையான முன் அறிவு:

- புராணம் மற்றும் காப்பியங்களின் தோற்றமும் வளர்ச்சியும் பற்றி அறிதல்
- நாடக இயலைப் பற்றி அறிந்து கொள்ளல்
- அடிப்படைத் தமிழ் இலக்கணத்தை அறிதல்

கூறு I: காப்பியம்

1. சிலப்பதிகாரம் - வழக்குரை காதை
2. மணிமேகலை - ஆபுத்திரன் திறன் அறிவித்த காதை
3. சீவகசிந்தாமணி- சுரமஞ்சரியார் இலம்பகம்

கூறு II: சமயக்காப்பியம்

1. பெரிய புராணம் - மெய்ப்பொருள் நாயனார்
2. கம்ப ராமாயணம் - வாலி வதைப் படலம்
3. இயேசு காவியம் - சீடர்களை அனுப்புகிறார், உவமை வழிச் செய்தி (கவியரசு கண்ணதாசன்)
4. சீறாப்புராணம் - நபி அவதாரப் படலம் (உமறுப்புலவர்)

கூறு III: நாடகம்

1. அழுக்குப் படாத அழகு - மா.கமலவேலன்

கூறு IV: இலக்கணம்

1. அணி - 10 வகைகள் உவமை அணி, உருவக அணி, உயர்வுநவிற்சி அணி, வேற்றுமை அணி, தற்குறிப்பேற்ற அணி,வஞ்சப் புகழ்ச்சி அணி, தீவக அணி, பாவிக அணி, இல்பொருள் உவமை அணி, எடுத்துக்காட்டு உவமை அணி,
2. பாவகைகள் - வெண்பா, ஆசிரியப்பா.

கூறு V: இலக்கிய வரலாறு

1. காப்பிய இலக்கிய வளர்ச்சி

2. சமயக்காப்பிய வளர்ச்சி

3. நாடக இலக்கிய வளர்ச்சி

1. பரிந்துரைக்கப்பட்ட நூல்கள்:

சரசுவதி (செய்யுள் தொகுப்பு)

சரசுவதி நாராயணன் கல்லூரி

நியூ செஞ்சுரி புக் ஹவுஸ் (பி) லிட்.அம்பத்தூர்

சென்னை - 600050

அழக்குப் படாத அழகு (செய்யுள் நாடகம்)

2. பார்வை நூல்கள் :

- சிலப்பதிகாரம் - அடியார்க்கு நல்லார் உரை
- சீவகசிந்தாமணி - நா.மாணிக்காவாசகன் உரை
- நற்றமிழ் - தொ.பரமசிவம்
- இரட்டை காப்பியங்கள் - வா.சுப.மாணிக்கம்
- பெரியபுராணம் - பி.ரா.நடராசன் உரை
- மணிமேகலை - புலியூர்க் கேசிகன் உரை
- நன்னூல் - வெள்ளை வாரணனார் உரை
- தமிழ் இலக்கிய வரலாறு - மு.வரதராசனார்
- தமிழ்இலக்கிய வரலாறு - சிற்பி, நீலபத்மநாபன்

3. இணைய ஆதாரங்கள்:

காப்பியம்

https://www.tamilvu.org/ta/courses-degree-a011-a0114-html-A0114111-5742

சமயக்காப்பியம்

http://www.tamilvu.org/courses/degree/a041/a0411/html/a04114l4.htm

அழுக்குப்படாத அழகு (செய்யுள் நாடகம்)

https://www.noolulagam.com/tamil-book/1496/alukku-padaatha-alagu-naadagam-book-type-iyalisai-nadakam-by-maa-kamalavelan/

இலக்கிய வரலாறு (நாடக வளர்ச்சி)

https://podhutamizh.blogspot.com/2017/09/normal-0-false-false-false-en-in-x-none.html?m=1

DEPARTMENT OF ENGLISH - UG – CBCS-LOCF

Title of the Course: English Language Proficiency II Semester: II

Course Code: LUP2EN21 Contact Hours:6hrs/w Credits: 3

Course Learning Outcomes:

On completion to the course the students are able to

- read and understand texts of different genres
- summarise a piece of prose and poetry
- achieve conversational skills through the study of plays
- cultivate creative skill in writing
- use language for speaking and writing with confidence in an intelligible and acceptable manner.

Pre-required Knowledge:

- ✓ Comprehend reading text and respond to tasks.
- ✓ Formation of new words.
- ✓ Functional Grammar

Unit: I-Prose

IssacBashevis Singer	-	Menasch's Dream
Mohandas K. Gandhi	-	What is Swaraj
Jesse Owens	-	My Greatest Olympic Prize
C.P. Snow	-	Hardy and Ramanujan

Unit: II-Poetry

Rudyard Kipling	-	If
DilipChitre	-	Father Returning Home
Robert Frost	-	Road not Taken
P.B. Shelley	-	Ozymandias

Unit: III-One Act Play and Excerpt from Play

Anton Chekhov	-	A Marriage Proposal
Eugene O'Neill	-	Before Break Fast

Shakespeare - The Trial scene from, The Merchant of Venice

Unit: IV-Grammar

Word Formation

Tenses

Question tags

Unit: V -Conversational and Writing Skills

Every day English Part - II

Report Writing

Letter Writing (Formal)

Suggested Topics for Presentation:

- ✓ Situational uses of present perfect tense
- ✓ Demonstrate conversations in official situations
- ✓ English for survival
- ✓ Importance of English speaking skill in everyday life
- ✓ Advantages of studying poetry

Suggested Readings:

i)Text Book:

1. Wealth of English..Ed. Department of English, Saraswathi Narayanan College. Harrows Publications, Madurai, 2022.

ii)Reference Books:

1. Kirshnamurthy C.N. &Ashwini Raman. *Advanced Grammar and Composition*. New Century Book House (P) Ltd, 2010.
2. BaskaranV.H.. *English Composition Made Easy*. Shakespeare Publication, 2013.
3. Raymond, Murphy.*Intermediate English Grammar*. New Delhi: Foundation Books, 2005

iii) Web Sources:

1. https://www.englishgrammar.org/word-formation-exercise/
2. Https://byjus.com/govt-exam/tenses-exercise-question-answers/
3. https://www.englishgrammar.org/question-tag-exercise-4/
4. https://www.learncbse.in/report-writing-class-12/
5. https://digiandme.com/formal-letter-writing-topics/

Title of the Course: Fungi, Lichens and Plant Pathology		**Semester: II**
Course Code: LUBYCT21	**Contact hours: 4hrs/w**	**Credit: 4**

Course Learning Outcomes:

On completion of the course, the students are able to

- ❖ understand the basic cellular organization and reproduction types of fungi
- ❖ arrange fungal organisms as per order of classification and appraise the importance of fungi to mankind.
- ❖ acquire knowledge on the structure and sequential events in the life cycle of fungi
- ❖ develop an understanding of microbes, fungi and lichens and appreciate theiradaptive strategies
- ❖ apply knowledge on types of plant diseases, identify the common plant diseases according to geographical locations and device control measures
- ❖ Pre-required knowledge:
- ❖ Fungal morphology
- ❖ Symbiosis
- ❖ Microbe & plant diseases

Unit I: Fungi and reproduction

Fungi:

General characters, habit, affinities with plants and animals, nutrition types, structure of hypha, mycelium –

septum and its modifications. Reproduction: Vegetative, asexual, sexual, and life cycles in fungi.Classification of fungi by Alexopoulos and Mims (1979).

Unit II: Oomycetes, Zygomycetes, Ascomycetes and Basidiomycetes

Economic importance of fungi:

Occurrence, morphology, anatomy, reproduction and life cycle of *Albugo* (Oomycetes), *Rhizopus* (Zygomycetes), *Aspergillus* (Ascomycetes) and *Puccinia* (Basidiomycetes). [Need not study developmental details].

Unit III: Lichens and reproduction

Lichens:

Morphology of the thallus - Crustose, Foliose and Fruticose – Mycobiont, Phycobiont and symbiosis.

Reproduction:

Vegetative reproduction: fragmentation, isidia and soredia – sexual reproduction: Apothecium. Life history of *Usnea*. Economic importance of lichens.

Unit IV: Plant pathology

Introduction - general symptoms of plant diseases: disease cycle – Host- parasite interaction – primary disease determinant and defense mechanism in plants – morphological and biochemical- phytoalexins.

Unit V: Plant diseases

Study of the etiology and control measures of Citrus canker (Bacterial disease), Bunchy top of Banana (Viral disease) and Paddy Blast & Tikka disease of Ground nut (Fungal disease)

Suggested Topics for Seminar / Presentation/ Group Discussion:

- Life cycle patterns in fungi
- Economic importance of fungi
- Types of spores in life cycle of *Puccinia sp*
- Biopotential of lichens
- Plant metabolites and disease resistance

Suggested Readings:

Text Books:

- Singh, V., Pande, P.C. and Jain, D.K. A Text Book of Botany. Rastogi Publications, Meerut. 2021
- Pandey.B.P. College Botany – Algae, Fungi and Bryophytes Vol.I. S.Chand& Co. Ltd. New Delhi, 2002.
- Vashistha.B. R, Sinha, A. K and Singh, V.P. Algae – S.Chand& Co. Ltd. New Delhi, 2002.

Reference Books:

1. Alexopoulos. J and Mims. W. Introductory Mycology, Wiley Eastern Limited. New Delhi,1985.
2. Rangaswamy, G and Mahadevan, A., Disease of crop plants in india. Prentice Hall of India PVT. Ltd. NewDelhi, 1999.
3. Hale, M.E. The Biology of Lichens: Edward Arnold. Mayland, 1983.
4. Singh, R.S. Introduction to principles of plant pathology. Oxford & IBH Publishing Co. L.td. New Delhi, 1988.
6. Agrios GN. 2005. Plant Pathology. 5th Ed. Academic Press, New York.
7. Heitefuss R & Williams PH. 1976. Physiological Plant Pathology. Springer Verlag, Berlin, New York.
8. Mehrotra RS & Aggarwal A. 2003. Plant Pathology. 2nd Ed. Oxford & IBH, New Delhi.
9. Singh RS. 2002. Introduction to Principles of Plant Pathology. Oxford & IBH, New Delhi.

Web Sources:

1. https://www.microscopemaster.com
2. https://www.britmycolsoc.org.uk
3. https://baynature.org
4. http://libgen.rs/search.php?req=fungi+&open=0&res=25&view=simple&phrase=1&column=def
5. https://www.britishlichensociety.org.uk/about-lichens/what-is-a-lichen.
6. https://www.anbg.gov.au/lichen/what-is-lichen.html
7. https://www.saferbrand.com/advice/plant-disease-library
8. https://www.proflowers.com/blog/plant-diseases

Title of the Course: Major practical Paper I: Semester: I & II
(Algae, Bryophytes, Fungi, Lichens and Plant pathology)
Course Code: LUBYCL21 Contact hours: 2+2hrs/w Credit: 2

Course Learning Outcomes:

On completion of the course, the students are able to

- understand the habit, cellular organization of specimens both externally and internally.
- realize the range of structural variations among all type specimens.
- apply knowledge on various diseases to recognize and diagnose different symptoms
- develop skill on geographical distribution of specimens in various habitats and to identify the individual species.
- develop skill on scientific reviewing and presenting the subject matter.
    - ❖ Pre-required knowledge:
    - ❖ Habitats and habits of organisms
    - ❖ Microscopy principle
    - ❖ Plant disease symptoms
    - ❖ List of experiments

To make suitable micro preparations and observation of permanent slides of the types prescribed in the syllabus.

Algae:

Nostoc (Cyanophyceae), Oedogonium (Chlorophyceae), Vaucheria (Xanthophyceae), Diatoms (Bacillariophyceae), Sargassum (Phaeophyceae) Polysiphonia (Rhodophyceae).

Bryophytes:

Marchantia (Hepaticopsida), Anthoceros (Anthocerotopsida), Funaria (Bryopsida).

Fungi:

Albugo (Oomycetes), Rhizopus (Zygomycetes), Aspergillus (Ascomycetes) and Puccinia (Basidiomycetes).

Lichens:

Morphology of the thallus - Crustose, Foliose and Fruticose. Usnea– Morphology of the habit and Apothecium.

Plant pathology:

To observe, identify at sight and make detailed studies of the diseases specified: Citrus canker (Bacterial disease), Bunchy top of Banana (Viral disease), Paddy Blast &Tikka disease of Ground nut (Fungal disease)Algal field trip (not exceeding two days) to study the habitat of both fresh and marine algal specimens and submission of five photographs of type specimens included in the syllabus (As a group activity).

Local field visit to observe the disease symptoms of crop plants in the nearby field and submission of field report. (Individual activity).

Observations note book to be maintained and submitted for valuation.

Suggested Reading:

1. Bendre, M. Ashok and Ashok Kumar, A Text Book of Practical Botany-1 (10th ed.). Rastogi Publications, Meerut. 2020.

Web Sources:

1. https://www.anbg.gov.au/bryophyte/
2. http://www.indiaenvironmentportal.org.in/category/198/thesaurus/blue-green-algae/
3. https://macroalgae.org/portal/index.php
4. https://globaltcn.utk.edu/
5. https://www.microscopemaster.com
6. https://www.britmycolsoc.org.uk
7. https://baynature.org
8. http://libgen.rs/search.php?req=fungi+&open=0&res=25&view=simple& phrase=1&column=def
9. https://www.britishlichensociety.org.uk/about-lichens/what-is-a-lichen.
10. https://www.anbg.gov.au/lichen/what-is-lichen.html
11. https://www.saferbrand.com/advice/plant-disease-library
12. https://www.proflowers.com/blog/plant-diseases

Title of the Course: Biomolecules and Cell Biology	Semester: II
Course Code:LUBYSE21 Contact hours: 2hrs/w	Credit:2

Course Learning outcomes:

On completion of the course, the students are able to

- develop understanding on structure and function of enzymes
- identify the concept that explains chemical composition and structure of cell wall and membrane
- understand structure and function of cell membrane
- compare the structure and function of cells & explain the development of cells
- describe the relationship between the structure and function of bio molecules.

❖ Pre-required Knowledge:
❖ Enzymes
❖ Cell structure and Components
❖ Cell Cycles

Unit I: Biomolecules

Definition and Scope, Basic concepts of atoms, molecules and types of bonding in bio-molecules. Brief study on biological micro and macromolecules. Definition, formation and types, assembly and their biological importance.

Unit II: Cell Structures and Components

Cell as a unit of structure and function; Characteristics of prokaryotic and eukaryotic cells; Plant and animal cells; Origin of eukaryotic cell (Endosymbiotic theory).

Unit III Cell membranes and Functions

Chemistry, structure and function of Plant cell wall. Overview of membrane function; fluid mosaic model.

Unit IV: Cell Organelles

Structural organization and Function of Chloroplast, mitochondria, Nucleus and Lysosomes.

Unit V: Cell cycles and Divisions

Phases of eukaryotic cell cycle, mitosis and meiosis; Regulation of cell cycle - checkpoints and regulation.

Suggested Topics for Seminar / Presentation/ Group Discussion:

- Concepts of atoms
- Cell wall function
- Membrane function
- Lysosomes
- Mitosis & Meiosis

Suggested Readings:

Text Books:

1. Berg, J.M., Tymoczko, J.L. and Stryer, L. (2011) Biochemistry, W.H.Freeman and Company.
2. Nelson, D.L. and Cox, M.M. (2008). Lehninger Principles of Biochemistry, 5th Edition., W.H. Freeman and Company.
3. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

Reference Books:

1. G.M. Cooper. (2015). The cell: A Molecular Approach. 7th Edition. Sinauer Associates.
2. Alberts, B., Johnson, A.D., Lewis, J., Morgan, D., Raff, M., Roberts, K., Walter, P. (2014). Molecular Biology of Cell. 6th Edition. WW. Norton & Co.
3. Campbell, M.K. (2012) Biochemistry, 7th ed., Published by Cengage Learning.
4. Campbell, P.N. and Smith, A.D. (2011). Biochemistry Illustrated, 4th ed., Published by Churchill Livingstone
5. Tymoczko, J.L., Berg, J.M. and Stryer, L. (2012). Biochemistry: A short course, 2nd ed., W.H.Freeman.
6. Karp, G. (2010). Cell Biology, John Wiley & Sons, U.S.A. 6th edition.

7. Hardin, J., Becker, G., Skliensmith, L.J. (2012). Becker's World of the Cell. 8th edition.Pearson Education Inc. U.S.A.
8. Cooper, G.M. and Hausman, R.E. (2009). The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.

Web Sources:

1. http://cellbiol.com
2. http://www.yk.rim.or.jp/~aisoai/soft.html
3. https://askabiologist.asu.edu/cell-division

Title of the Course: Global Climate Change **Semester: II**

Course Code: LUBYSE22 **Contact hours: 2hrs/w** **Credit: 2**

Course Learning Outcomes:

On completion of the course, the students are able to

- understand the concept and issues of global environmental change
- analyse the causes and effects of depletion of stratospheric ozone layer
- examine the climate change and its effect on living beings
- understand the physical basis of natural green gashouse effect on man and materials
- evaluate human influenced driver of our climate system and its applications

Pre-required knowledge:

- Environmental issues
- Ozone layer
- Greenhouse effect

Unit I: Environmental issues

Global Environmental change issues

Unit II: Ozone layer

Stratospheric ozone layer, Evolution of ozone layer; Causes of depletion and consequences; Effects of enhanced UV-B on plants; microbes, animals, human health and materials. Global efforts for mitigation ozone layer depletion.

Unit III:Greenhouse effects

Greenhouse effects, Causes, Greenhouse gases and their sources; Consequences on climate, oceans, agriculture, natural vegetation and humans; International efforts on climate change issues.

Unit IV:Atmospheric deposition

Past and present scenario; Causes and consequences of excessive atmospheric deposition of nutrients and trace elements; Eutrophication; Acid rain and its effects on plants, animals, microbes and ecosystems.

Unit V: Global warming

Global warning, ozone depletion and acid rain. Waste management – Solid and e-waste, recycling of wastes.

Suggested Topics for Seminar / Presentation/ Group Discussion:

Changing environment and its dangers.

Ozone layer depletion and its effects.

Effects of climate change.

Acid rain affect living organisms.

Waste recycling methods

Suggested Readings:

Text Books:

1. Adger, N. Brown, K. and Conway, D. (2012). Global Environmental Change: Understanding the Human Dimensions. The National Academic Press.
2. Turekian. K. K. (1996). Global Environmental Change-Past, Present, and Future. Prentice-Hall.

Reference Books:

1. Matthew. R. A. (2009). Jon Barnett, Bryan McDonald. Global Environmental Change and Human Security MIT Press., USA.
2. Hester, R.E. and Harrison, R.M. (2002). Global Environmental Change. Royal Society of Chemistry.

Web sources:

1. https://en.wikipedia.org/wiki/climate-change.
2. https://www.britannica.com/science/climate-change
3. https://vikaspedia.in/energy/environment/climate-change/climate-change
4. https://www.nonaa.gov/education/resource-collections/climate/climate-change-impacts

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Title of the Course: Microbial Technology **Semester: II**

Course Code :LUBYSE23 **Contact hours: 2hrs/w** **Credit: 2**

Course Learning Outcomes:

On completion of the course, the students are able to

- understand the structural features of bacteria and apply to classification of bacteria.
- perform basic lab techniques for cultivation of bacteria.
- recognize different forms of food spoilage and preservation.
- capitalize the knowledge on various milk products.
- realize and appreciate the application of microbes in the production of different industrial products.

Pre-required Knowledge:

- Microbes in human welfare
- Preservation of food
- Major Dairy products

Unit I: Morphology

Size and shape of bacteria-ultra structure of bacterial cell with special reference to cell wall and flagella only. Classification of bacteria on the basis of their morphology.

Unit II: Microbiological techniques

Basic microbiological techniques: Isolation of bacteria-Serial dilution technique, pure culture techniques and culturing of bacteria – growth media, preparation of media, sterilization, inoculation, preservation of bacterial culture.

Unit III: Food microbiology

Food microbiology- Role of microbes in food spoilage and preservation with reference to asepsis and canning

Unit IV: Dairy microbiology

Dairy microbiology- Role of microbes in the production of dairy products – cheese, yogurt. Pasteurization of milk (brief)

Unit V: Industrial microbiology

Industrial microbiology- Role of microbes in the production of ethanol, vinegar and penicillin.

Suggested Topics for Seminar / Presentation/ Group Discussion:

- Bacterial cell wall composition
- Edible mushrooms
- Food borne pathogens
- Dairy products
- Industrial Microbial products

Suggested Readings

Text Book:

1. Dubey, R. C. and D.K. Maheswari. Microbiology. S. Chand & Co. New Delhi. 2004
2. Ananthanarayan R and Jayaram Paniker's CK. 2020 Textbook of Microbiology, Eleventh Edition. Universities Press (India) Pvt. Ltd.
3. Subhash Chandra Parija. 2009. Textbook of Microbiology and Immunology. Elsevier India.

Reference Books:

1. Pelczar, M. J. et al. Microbiology. Tata Mc Graw Hill, New Delhi. 2005.
2. Prescott, L. M. et al. Microbiology. Tata Mc Graw Hill, New York. 2005

Web Sources:

1 https://microbenotes.com/

2 https://www.vedantu.com/biology/food-microbiology

3 https://bio.libretexts.org/Bookshelves/Microbiology /Book%3A_Microbiology_(Boundless)/17%3A_Industrial_ Microbiology

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Title of the Course: Fermentation technology **Semester: II**

Course Code : LUBYSE24 **Contact hours: 2hrs/w** **Credit: 2**

Course Learning Outcome:

On completion of the course, the students are able to

- understand the process for maintenance and preservation of microorganisms.
- analyze the various aspects of the fermentation technology and apply for fermentative production.
- demonstrate the experimental techniques for microbial production of enzymes: amylase and protease and bio product recover
- understand the information on fermentation products and its market values
- gain the information on enzymes produced by microbes

Pre required knowledge

- Media preparation
- Microbial growth
- Fermentation

Unit I : Media preparation

Preparation of microbial culture, Preparation and sterilization of fermentation media. Isolation and improvement of industrially important microorganisms.

Unit II :**Metabolites production and Microbial growth**

Maintenance and preservation of microorganisms, Metabolic regulations and overproduction of metabolites. Kinetics of microbial growth and product formation.

Unit III : Fermentation

Scope and opportunities of fermentation technology. Principles of fermentation: Submerged, solid state, batch, fed-batch and continuous culture.

Unit IV: Fermentative products

Fermentative production of vinegar, alcohol (ethanol, wine, beer), acids (citric acid and gluconic acid), amino acids (lysine and glutamic acid) and antibiotics (penicillin and streptomycin).

Unit V: Enzymes production

Microbial production of enzymes: Protease, Amylase and Cellulase. Bio-product recovery.

Suggested Topics for Seminar / Presentation/ Group Discussion:

- Industrial microorganisms and its growth factors
- Kinetics of microbial growth and its product formation
- Fermentation and its types
- Production of antibiotics using fermentation techniques
- Bio-product recovery

Suggested Readings:

Text Books:

1. Waites M.J. (2008). Industrial Microbiology: An Introduction, 7th Edition, Blackwell Science, London, UK.
2. Prescott S.C., Dunn C.G., Reed G. (1982). Prescott & Dunn's Industrial Microbiology, 4th Edition, AVI Pub. Co., USA.
3. Reed G. (2004). Prescott & Dunn's industrial microbiology, 4th Edition, AVI Pub. Co., USA.

Reference Books:

1. JR Casida L.E. (2015). Industrial Microbiology, 3rd Edition, New Age International (P) Limited Publishers, New Delhi, India.
2. Waites M.J., Morgan N.L., Rockey J.S. and Higton G. (2001) Industrial Microbiology: An Introduction. 1st Edition, Blackwell Science, London, UK.
3. Pelczar M.J., Chan E.C.S. and Krieg N.R. (2003) Microbiology. 5th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi.

Web Sources

1. https://www.biologydiscussion.com/fermentation/fermentation-technology-meaning-methodology-types-and-procedure/17492
2. https://en.wikipedia.org/wiki/Fermentation
3. https://www.britannica.com/science/fermentation.
4. https://orbitbiotech.com/fermentation-technology-fermentation-career-industrial-fermentation-microorganisms-course-work-scope/

Title of the Course: History of Indian Science **Semester: II**

Course Code: LUBYSC21 **Contact hours: -- Add.** **Credit: 2**

Course Learning Outcomes:

On completion of the course, the students are able to

- ❖ develop understanding of various branches of science during different eras

- ❖ appraise the contribution of different Indian scientists in science
- ❖ analyze the role played by different Indian organizations in science
- ❖ realize the scientific advancement of Indian scientific community
- ❖ perceive the scientific temper of Indian scientists

Pre-required knowledge:

- Solar system
- Science and Technology
- Research Organizations

Unit I: Science in Ancient and Medieval India

History of development in astronomy, mathematics, engineering and medicine subjects in Ancient India. Use of copper, bronze and iron in Ancient India. Influence of the Islamic world and Europe on developments in the fields of mathematics, chemistry, astronomy and medicine, innovations in the field of agriculture-new crop introduced new techniques of irrigation.

Unit II: Indian Science in before and after Independence

Introduction of different surveyors, botanists and doctors as early scientist in Colonial India. Indian perception and adoption for new scientific knowledge in Modern India. Establishment of premier research organizations-CSIR, DRDO and ICAR and ICMR. Establishment of Atomic Energy Commission, Launching of the space satellites and Botanical survey of India.

Unit III: Prominent Indian scientists of Ancient Time

Eminent scholars in mathematics and astronomy: Baudhayana, Aryabhtatta, Brahmgupta, Bhaskaracharya, Varahamihira, and Nagarjuna, Medical science of Ancient India (Ayurveda and Yoga): Susruta, Charak.

Unit IV: Prominent Indian Scientists of Modern Time

Scientists of Modern India: Srinivas Ramanujan, C.V. Raman, Jagdish Chandra Bose, Homi Jehangir Bhabha and Vikram Sarabhai.

Unit V: Prominent research in Plant Sciences in Republic of India

Green revolution in India: causes, details, and outcomes. History of plant tissue culture in India. Success story of India- Gene cloning in plants and genome sequencing. Premier Plant Research institutes and scientists in India. A brief account of GM Mustard.

Suggested Topics for Group Discussion/Presentation:

- Engineering technology on irrigation
- Botanical Survey of India and Plant resource Management
- Yoga for human well being
- Achievements of Indian scientists
- India as a global role player in genetic engineering technology

Suggested Readings:

Text Book:

1. Kuppuram, G. (1990). History of Science and Technology in India, South Asia Books.
2. Handa, O.C. (2014) Reflections on the history of Indian Science and Technology,Pentagon Press.
3. Subbarayappa, B.V. and Sharma, K.V. (1985). Indian Astronomy -– A Source Book,Bombay.
4. Bhardwaj, H. C. (2000). Metallurgy in Indian Archaeology. Tata Book Agency.

Reference Books:

1. Basu, A. (2006). Chemical Science in Colonial India: The Science in Social History, K.P. Bagchi& Co.
2. Habib, I. (2016.). A people's history of India 20: Technology in Medieval India, 5th Edition, Tulika Books.
3. Rahman, A. (1982). Science and Technology in Medieval India – A Bibliography of
4. Source Materials in Sanskrit, Arabic and Persian, New Delhi: Indian National Science Academy.

5. Srinivasan, S. and Ranganathan, S. (2013). Minerals and Metals heritage of India, National Institute of Advanced Studies.
6. Srinivasiengar, C. N. (1967). The History of Ancient Indian Mathematics, World Press Private Ltd. Calcutta.

Title of the Course: Personality Development **Semester: II**

Course Code :LUBYSC22 **Contact hours: -** **Credit: 2**

Course Learning Outcome:

After the completion of this course, the learner will be able to

- develop understanding of the concepts and principles of basic psychological skills
- apply techniques and methods to enhance productivity and time management
- develop critical thinking skills
- organize human resources with improved leadership qualities
- develop the Stress management

Pre required knowledge:

- Basic interview questions
- Time management
- Schedule preparation

Unit I: Basic Psychology Skills

Mental Heuristics and Priming, Cialdini's six psychological principles, Charisma and charisma enhancements, facing interviews.

Unit II: Time management

Productivity and Time Management Eisenhower Matrix, Pomodoro Technique, Dealing with Procrastination,

Unit III: **Dealing Negativity**

Work-life balance, stress management, coping with failures and depression

Unit IV: Scheduling Events

Journaling methods, Checklists, to-do lists and scheduling the events.

Unit V: Critical thinking

Critical Thinking and Human resources Logical fallacies, Cognitive biases, Mental Models, Critical Thinking. Evaluation and improvement; Leadership qualities.

Seminars suggestions:

- psychology skills
- Dealing procrastination
- Work life balance
- Schedule our work
- Critical thiking

Suggested Readings:

Text Books:

1. Bast, F. (2016). Crux of time management for students. Available at: https://www.ias.ac.in/article/fulltext/reso/021/01/0071-0088
2. Cialdini, R.B. (2001). Influence: The Psychology of Persuasion, Revised Edition. Harper Collius.

Reference Books:

1. Green, C.J. (2015). Leadership and soft skills for students: Empowered to succeed in High School, College and beyond. Dog Ear Publishing.
2. Velayudhan, A. and Amudhadevi, N. V. (2012). Personality Development for College Students. LAP Lambert Academic Publishing.

Web resources

1. https://www.artofliving.org/in-en/personality-development
2. https://www.healthofchildren.com/p/personality-Development-html.
3. https://www.managementstudyguid.com/important-of-personality-development.htm

4. https://en.wikipedia.org/wiki/personal-development
5. https://www.britanica.com/topic/personality

DEPARTMENT OF ZOOLOGY – UG – CBCS- LOCF
(For those who join in June 2022)

Title of the Course : Allied Zoology -II **Semester: II**
Course Code: LUZOGE21 Contact Hours: 4hrs / w **Credits: 4**

Course Learning Outcomes:

On completion of the course, the students are be able to

- gain knowledge on foodstuff groups and its function.
- understand the role of food and nutrients in health and disease.
- provide culturally competent nutrition services for diverse individuals.
- implement strategies for food access, procurement, preparation, and safety that are relevant for the culture, age, and socio-economic status of clients and groups.
- perform food system management and leadership functions that consider sustainability in business, healthcare, community, and institutional arenas.

Pre- required knowledge

- ✓ 1.Basic definitions related to nutrition Functions of foodand dietary nutrients
- ✓ 2. Sources of Macro & Micro Nutrients Relationship between Nutrition and HealthScope of Nutrition
- ✓ 3. Cold Preservation and freezers
- ✓ 4. Health problems related to nutrition

Unit 1: Nutrition and dietary nutrients

1. Classification of foods– sources of energy yielding, body building and protectivefoods
2. Vegetables & Fruits - Classification, composition, nutritive value

3. Cow Milk &Chick Egg - Composition, nutritive value
4. Beverages - Classification, milk based beverages& its economic importance

UNIT II :Macro nutrients and micronutrients

1. Carbohydrates, Proteins, Fats and their dietary source and role.
2. Fat-soluble vitamins- A, D, E and K and their sources and importance
3. Water soluble vitamins– riboflavin, vitamin B12 and Vitamin C,their sources andimportance
4. Minerals- Iron, Calcium, Phosphorus, Iodine, Selenium and Zinc: their biologicalfunctions.

UNIT III: Malnutrition and nutrient deficiency diseases

1 Balanced diet – Nutritional requirements of different age groups – Pre schoolers- schoolers – Adolescents – Pregnant, lactating women and aged people.

2 Protein Malnutrition– causes and prevention and dietary management of malnutrition Kwashiorkor and Marasmus and obesity.

3 Iodine Deficiency Disorders (IDD).Causes, symptoms, treatment and prevention

4 Protein Energy Malnutrition(PEM) Causes, symptoms, treatment and prevention

UNIT IV- Food and Water-borne infections

(Transmission, causative agent, sources of infection, symptoms and prevention).

1. Bacterial diseases. typhoid fever.
2. Viral diseases: Hepatitis andProtozoan diseases: amoebiasis.
3. Common food allergies, test for allergy.
4. Medical Nutrition Therapy (MNT)and dietary counselling in Metabolic Stress

UNIT V: Food Science and Certification

1. Food Preservation - Definition, General Principles and Methods
2. Food Fermentation - Process in production of cheese making, bread making
3. Microbial products – Primary and secondary metabolites, Vitamin B12, Citric Acid,Penicillin & alcohol
4. Role of Bureau of Indian Standards (BIS),AGMARK, Food Safety and StandardsAuthority of India (FSSAI)

Suggested Topics for Group Discussion / Presentation

1. Classification of foods
2. Fat-soluble vitamins
3. Protein Malnutrition
4. Medical Nutrition Therapy (MNT)
5. Bureau of Indian Standards (BIS),

Suggested Readings:

i) Text Books

1. Potter, N. and Hotchkiss, J.H (1998)Food Science, 5th Ed., CBS Publications and Distributors, Daryaganji, New Delhi.
2. Srilakshmi (2017) Nutrition science, New age international (P) limited, New Delhi
3. Swaminathan, M (1974). Essentials of Foods and Nutrition, Vols-1and II. Ganesh andCo. Madras.
4. K. Park, (2013) Park's Textbook of preventive and social medicine

ii) Reference Books

1. Antia FP (1987) Clinical Dietetics and Nutriton, Oxford University Press, New Delhi
2. Manay, M.S. and Shadaksharaswamy, M. (1998). Food-Facts and Principles; NewAgeInternational (P) Ltd.

3. Gibney, M.J. et al. (2004). Public Health Nutrition; Blackwell Publishing.
4. Robinson. C.H. Lawler, M.R. Chenoweth, W. L., and Garwick, A. E. (1986): Normal and Therapeutic Nutrition. 17th edition, MacMilian Publishing Co.
5. Bamrart George J, (1987)Basic food Microbiology, CBS Publication, New Delhi.

iii) WebSources

1. WHO Non-communicable diseases and risk factors. http://www.who.int/ncds/en/
2. National Nutrition Mission – ICDS. icds-wcd.nic.in
3. Ministry of Health & Family Welfare, www.mohfw.nic.inNational Institute of Science Communication and Information Resources (NISCAIR) (http://www.niscair.res.in/)
4. National Science Digital Library (NSDL)(www.nsdl.niscair.res.in).
5. National Digital Library of India (NDL India; https://ndl.iitkgp.ac.in/).

Title of the Course: Allied Zoology Practical-I		**Semester: I &II**
Course Code: LUZOGL21	**Contact Hours:4hrs/ w**	**Credits: 2**

Course Learning Outcomes

On completion of the practical, the students are able to

- identify with salient features and classify the specimens which are present thedepartmental museum.
- understand Chart- diagram of different systems of invertebrate and chordate animals such as cockroaches, Earthworm, Shark.
- perform food system management sustainability in business, healthcare, community.

I - List of spotters (morphological observations):Invertebrata:

1. **Protozoa:** *Amoeba*

2. **Porifera:** *Olynthes*

3. Coelenterata: *Obelia* – Colony

4. Platyhelminthes: Tape worm

5. Nematoda:*Ascaris* – Male and Female

6. Annelida: Leech

7. Arthropoda:

a) Honey bee – (i) Queen (ii) Drone iii) Worker

b) Insect pest of coconut (***Oryctes rhinoceros***)

8. Mollusca: Pearl oyster

9. Echinodermata: Starfish

Anatomical observations (through diagram)

1. **Earthworm:**Digestive system

2. **Cockroach:** Digestive system and Nervous system

II. Chordata:

1. **Prochordata:** Amphioxus
2. **Pisces:** Carp fish - Catla,Cat fish- Clarius
3. **Amphibia:** Salamander
4. **Reptilia:**Cobra
5. **Aves:** Barn Owl
6. **Mammals:**Bat

Anatomical observations (through diagram)

1. Pisces

a) Shark : Mounting of Placoid scale

b) Shark : Brain (Dorsal and Ventral view)

2. **Mammals:** Rabbit : Reproductive system (Male and Female)

II. List of spotters (morphological observations)

1. *Callosobruchus maculates*

2. BMR

3. Diet for anaemia

4. RDA Table
5. Gram's staining
6. Lactometer
7. HACCP
8. Determining adulterants in various foods

a) Coffee b) Turmeric c) Ghee d) Tea leaves and e) Turmeric.

9. Estimation of Lactose in milk.
10. Preparation of yoghurt
11. Preparation of buttermilk
12. Preparation of pickles

III) Field Visit: **Evaluation of fauna in and around the college campus.**

Web Sources:

1. Cockroach dissection- www.ento.vt.edu
2. Mammalian Physiology– www.biopac.com
3. National Nutrition Mission – ICDS. icds-wcd.nic.in

PART IV – VALUE EDUCATION – UG – CBCS - LOCF

Title of the Course: Value Education **Semester: II**

Subject Code: LUP4VE21 **Contact Hours: 2hrs/w** **Credit: 2**

Unit I: Education Theories

1. Gandhi
2. Tagore
3. Aristotle

Unit II: Values of Religion and Society

1. Religious Values and ideologies
2. Religious Values and Social functions
3. Impact of Religious values

Unit III: Professional Values and role of Social institutions in value formation

1. Meaning of Professional value
2. Basic concept of Values

3. Value formation through social institutions

Unit IV: Constitutional values and Fundamental Rights

1. Objectives of Constitution value
2. Significance of fundamental rights
3. Characteristics of Fundamental rights

Unit V: Directive Principles of State Policy and Fundamental Duties

1. Features and Directive Principles of State Policy
2. Classification of Directive Principles
3. Importance of Fundamental duties

Learning Outcomes:

On completion of this course, Students will be able to

- ✓ **know the educational theories of Gandhi, Tagore and Nehru.**
- ✓ **interpret the religious values**
- ✓ **understand the Professional values**
- ✓ **discuss the value of fundamental rights.**
- ✓ **explain the directions of constitution to state government.**

Suggested Topics:

1. Religious Values
2. Gandaian Principles
3. Professional Values
4. Constitutional Values
5. Directive Principles of State Policy

Text Books:

1. Subramanyan.K, Value Education, Ram Publication, Madurai (selected chapters) 1990.
2. Kapur. A,Cand Misra K.K, Select Constitutions, S. Chand and Co., New Delhi,1975.

Reference Books:

1. K.G.S. Ramanan, Value Education, New Century Book House, Chennai, 2016.
2. R.C.Agarwal, Constitutional Development and National Movement of India.

3. M. Laxmikanth, Indian Polity, Tata Mc Graw Hill, New Delhi, 2011.
Web Sources:
1. https://www.iberdrola.com
2. https://www.edb.gov.hk
3. ttps://www.index.com

DEPARTMENT OF NSS – PART – V

Title of Course: NSS – Ideals and Approaches		Semester: II
Course Code : LUP5NS21	Contact Hours: 1hrs/w	Credits: 1

Course Learning Outcomes:

On completion of the course, the students are able to

- understand the community in which they live.
- be confident of executing responsibilities for the betterment of the community.
- acquire leadership qualities and democratic attitude.
- develop capacity to meet emergencies and disasters.
- understand historical, geographical, and social significance of adopted village.

Pre-required Knowledge

- ✓ History and Growth of NSS
- ✓ Objective and role of NSS volunteers
- ✓ Social issues
- ✓ Disaster management

Unit I: Basic concepts of NSS

1. Aims and Objectives of NSS
2. History and Philosophy of NSS
3. Motto, Symbol, NSS song and Badge of NSS
4. Gandhian Principles.

Unit II: Administrative Structure of NSS and Volunteerism

1. Organizational structure of NSS at National Level, State Level
2. University Level, Institution Level and Unit Level

3. Enrolment of NSS Volunteers – Programme Officers
4. Role of NSS Volunteers in Swatch Bharat Abhiyan and Digital India

Unit III: Programmes and Regular Activities

Awareness programmes on AIDS/HIV, Legal awareness, First-aid, Career guidance, Cyber Crime and Anti-Ragging.

1. Concept of Regular Activities, Traffic regulation, Working with Police Commissioner's Office, Working with Corporation of Madurai, Working with Health Department, Blind assistance & Blood Donation
2. Personality Development (Leadership, Communication Skill, Interpersonal Relations, Cultural Performance)
3. Morality values and patriotism the citizen should possess

Unit IV: Community Development and Addressing the Social Issues

1. Women Empowerment, Human Right Education – Communal Harmony
2. Entrepreneurship development - Entrepreneurial skills-government self-employment schemes
3. Rainwater harvesting – Issues with plastics and Preserve natural resources
4. National Integration and RTI

Unit V: Village Adoption & Disasters Management

1. Planning and Preparation of Camping Activities, Conducting Survey
2. Medical and Veterinary Camp, Literacy Camp, Plantation and Immunisation
3. Introduction to Disasters Management, classification of Disasters
4. Role of Volunteers in Disasters Management

Suggested Topics for Group Discussion / Presentation

1. History and Growth of NSS
2. Role of NSS Volunteers

3. Blood Donation
4. RTI
5. Classification of Disasters

Suggested Readings:

i) Text Book

1. Training of Trainers in National Service Scheme Book, Dr. P. Ramachandra
2. Rao and R.D. Sampath Kumar.

ii) Reference Books:

1. Department of Youth affairs and Sports, Indian youth in perspective, Govt. of India, New Delhi.
2. NSS – Manuals and Reports.

iii) Web Sources:

1. http://nss.nic.in/speccamp.asp
2. ^ National Service Scheme—NIT Calicut Chapter Retrieved 2012-08-01.
3. ^ National Service Scheme — P.G.D.A.V College, University of Delhi NSS P.G.D.A.V College, University of Delhi,
4. http://www.thebetterindia.com/140national-service-scheme-nss/

DEPARTMENT OF PHYSICAL EDUCATION– UG – CBCS-LOCF
(For those who join in June 2022)
PART – V

Title of the Paper: Physical Education		**Semester: II**
Course Code : LUP5PE21	**Contact Hours: 1hrs/w**	**Credit : 1**

Course learning out comes:

On completion of the course, the students are able to:

- Value the knowledge to preserve community health and well being
- Compare the relationship between general education and physical education

- Lay -out and mark the dimensions of the play court
- Will develop skills to establish daily caloric requirement and to design the balance diet plan
- Understand and prepare weight management plans

Pre-Required knowledge:

- ✓ Basic rules of cricket game
- ✓ Definition and proper steps of Suriya Namaskar
- ✓ Health Awareness concept of present scenario

Unit 1:

Physical Education-Meaning and Definition, Basic Rules of Games- Football- Kabaddi – Volleyball

Unit II:

Organization and Administration of Intramurals-Tournament- Sports meet-Olympics

Unit III:

Yoga- Asanas- Pranayama- Meditation- Relaxation Techniques

Unit IV:

Food and Nutrition, Drug addiction, Alcoholism, Smoking-Cleanliness, Personal Hygiene.

Unit V:

First Aid, Life Style Disorders- Obesity, Diabetes, Body Mass Index

Suggested topics for Group Discussion / Presentation

1. Physical Education is Health Education
2. Recent inclusions in Olympics'
3. Yoga for Mental healthiness
4. Synthetic Protein supplements
5. RICE method of injuries

Text Books:

1. Dr.T..Krishnammal, Physical and Health Education.
2. Dr. K. Chandrasekar, Sound Health through Yoga.

Reference Books:

1. C. Sathiyanesan, Hand book of Physical Education.
2. R.G. Goel, Encyclopedia of sports and games.

3. Dr. T.Ravichandran, Practical Yoga.

Web Sources:

www.swayamprabha.gov.in
www.e-yantra.org
www.vlabs.co.in
www.fossee.in

Title of the paper: YOGA		**Semester: II**
Course Code : LUP4YA21	**Contact Hours: 1hrs/w**	**Credits : 1**

Course Learning Outcomes:

On completion of the course, the students are able to

- ✓ **spread the message of positive health as taught in Yoga to people in asystematic and scientific manner.**
- ✓ provide a proper perspective and insight into various aspects of Yoga education to the trainees.

Pre-Required Knowledge:

- ✓ Foundations of Yoga: History, Evolution of Yoga and Schools of Yoga
- ✓ Basic Yoga Texts: Principal Upanishads Bhagavad Gita, Yoga Vasishtha
- ✓ Patanjala Yoga Sutra
- ✓ Applications of Yoga

Unit-I: NEEDSOF YOGA

Yoga -need of the hour, concept of Yoga, Definition of Yoga, Basics of Yoga, Stress & yoga, yoga for emotion culture, the science of happiness. Yoga in education, Yoga & personality

UNIT:II YOGA AND HEALTH

Yoga and Health (Definition of Health, Guidelines for Health in Yoga) – Health Related Fitness and Yoga – Yoga and Aging - Yoga for Handicapped people – Yoga as a remedy for addictions – Yoga and Social problems

UNIT III: NUTRITION AND DIETETICS

Introduction to Nutrition and Dietetics – Diet and Digestion – Balanced Diet : Carbohydrates, fats, proteins, vitamins, and minerals. Yogic Diet :Sattvik, Rajasik, Tamasik. Diet and Diseases : Hypertension, Diabetes, Arthritis, Ulcerative, Colitis, Peptic Ulcer, Constipation, and Obesity.

Unit – IV: ASANAS

1. Ardha-Padmasana [virasana] 2. Ardha-Halasana 3. Pavana-Muktasana 4. Naukasana 5. Ardha-shalabhasana 6. Shalabhasana 7. Makarasana 8. Bhujangasana 9. Dhanurasana10.Vakrasana 11.Chakrasana 12.Paschimottanasana 13.Ugrasana 14.Gomukhasana 15.Padmasana 16.Siddhasana 17.Bhadrasana 18.Swastikkasana 19.Vajrasana 20.Supta-Vajrasana 21.Yoga-Mudra.

Unit – V: MUDRAS, PRANAYAMAS AND MEDITATION

(i) MUDRA

1.Brahma-Mudra 2.Simha-Mudra 3.Shanmugi Mudra 4. Viparithakarani-Mudra 5. Ashwsini-Mudra 6. Suriyanamaskar

(ii) PRANAYAMAS

1. Nadi-Shuddhi 2.Nadi-Shodhana 3.Suryabhadana 4. Ujjayi 5. Bhastrika Pranayama 6. Bhramari Pranayama 7. Sitkari 8. Sitali

(iii) MEDITATION

1. Silent Meditation 2. Mantra Meditation

Suggested Topics For Group Discussion / Presentations

Concept of Yoga
Yoga and Health
Introduction to Nutrition and Dietetics
Ardha-Padmasana [virasana],.Ardha-Halasana
Viparithakarani-Mudra

Suggested Readings:

Text Books:

1. Yoga Practice I - The World Community Service Centre - Vethathiri Publications, Erode, 1st Ed - 2009, 4 th Edition 2012
2. Mind, Vethathiri maharishi, Vethathiri publication, Erode, 1st Ed – 1999
3. Simplified Physical Exercises - Vethathiri Maharishi, 1st Edition, 1977, 44th Edition,2015, Vethathiri Publications.
4. Yoga for Modern Age - Vethathiri Maharishi, 1st Edition 1972, 19th Edition Oct. 2015 – Vethathiri Publications.
5. Body, Life - force and Mind :Vethathiri Maharishi - Ist Edition 2006, 2nd Edition May 2006 – Vethathiri publications.

References Books:

1. Asanas - Swami Kuvalayananda. Kaivalyadhama. Lonavla
2. Pranayama - Swami Kuvalayan and a Kaivalyadhama. Lonavla
3. Abstracts And Bibliography Of Articles On Yoga - Edited By
4. Dr.M.V.Bhole, From Kaivalyadhama Kaivalyadhama. Lonavla
5. Suiyanamaskar - By Dr. P. Mariayyah, Jaya Publishing House,
6. Perunthurai, Erode.
7. Sound Health Through Yoga – By Dr. K. Chandrasekaran , Prem
8. Kalyan Publications, Sedapatti, 1999.

Web Sources:

1. https://www.youtube.com/watch?v=RJ44oIxWiYI
2. https://www.youtube.com/watch?v=149Iac5fmoE
3. https://www.youtube.com/watch?v=149Iac5fmoE
4. https://www.youtube.com/watch?v=7ixtTgiVYzw

5. https://www.youtube.com/watch?v=IgzsuYggK5c
6. https://www.youtube.com/watch?v=nHnjxzMCMGg

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

Part – V

Title of the paper: Basics of Library and Information Science		**Semester: II**
Course code: LUP5LS21	**Contact Hours: 1hrs/w**	**Credit: 1**

Course Learning Outcomes:

On completion of the course, the students will be able to

- Trace the History of Libraries.
- Classify information Sources.
- Follow the modern trends in the field of library science.
- Appreciate the value of books and other reading materials.
- Understand the importance of libraries in the modern society.

Pre required knowledge:

- Interest Reading.
- Basic computer knowledge to access internet.
- Basic ideas of Purushartha

Unit I – Evolution of Libraries

Evolution of writing – (Cuneiform – Hieroglyphics – Indus scripts – Tamil scripts (Tamil- Grantham – Vatteluthu)) – Evolution of writing materials – (Stones – Clay Tablets – Papyrus – Birch bark – Palm leaves – Paper) – Evolution of Libraries - Ashurbanipal library (Clay Tablets) – Library of Alexandria (Papyrus) – Government oriental manuscript library, Chennai.

Unit II – Modern Library System:

Public Libraries Academic Libraries, (School, College, University) –Research Libraries – Information Sources (Primary, Secondary and Tertiary).

.**Unit III – Knowledge Organisation :**

Traditional Indian – Purushartha (Dharma, Artha, Kama and Moksha) – Modern Western – Dewey's Decimal classification – Modern Indian – Ranganathan's colon classification - Need for cataloging – OPAC.

Unit IV – Modern Trends:

Open Access – National Digital Library of India (NDL) – Open Library – Project Gutenberg – World Digital Library – Project Madurai – Google Books – Chennai Noolagam – Tamil Digital Library – DOAJ.

Unit V – Library and Society:

Library and Education (Formal and Non Formal) – Library legislation (Tamil Nadu Library act, Delivery of Books act) – Library and Democracy (Informed Citizens) – Connemara Public Library, Chennai - Saraswathi Mahal Library, Thanjavur.

Suggested Topic for Group Discussion and Presentation:

- Deciphering ancient scripts.
- Importance of School Libraries.
- Web – OPACs.
- Digitalizingrare Tamil Books.
- Impact of Social medias on reading habit.

Text book:

Ranganathan, S.R,Library manual, Asia Publishing house, New Delhi, 1964.

References Books:

1. Krishnakumar, Reference service, Vani educational books, New Delhi, 1978.
2. Krishnakumar, Theory of Classification, Vikas Publishing house, New Delhi, 1993

Websites and e-Learning Sources:

- IGNOU – CLIS –Study materials.
  http://www.ignouhelp.in/ignou-clis-study-material

- Manomaniam Sundaram University – CLIS – Study Materials.
  https://www.msuniv.ac.in/Download/pdf/4e55f868a24b4a7
- Wikipedia.
- Encyclopaedia Britannica.

DEPARTMENT OF NCC – UG - CBCS - LOCF
PART V

Title of the paper: NCC – PRACTICAL		Semester: II
Course code: LUP5NC21	Contact Hours: 1hrs/w	Credits: 1

On completion of the course, the students are able to

- perform food and arms drill
- recognize the type of rifle.
- utilize map for movements
- interpret distance and signals for mobility
- apply the skills for self defense

Pre-required Knowledge

- ✓ Drill and Weapon Training.
- ✓ Map reading and Judging distance.
- ✓ Self defense.

Unit – I Drill

Drill–Open drill and Close drill – Uses of drill words of command, Arms drill, Foot Drill

Unit – II Weapon Training

0.22 Rifle – Introduction, specification, ammunition and handling - 5.66 mm INSA Rifle: Specification, stripping, assembling and cleaning. 7.62 mm Rifle: Specification, ammunition.

Unit – III Map Reading

Map Reading – Finding own Position, Ground to Map and Map to Ground

Unit – IV Judging Distance

Judging Distance – methods, under or over estimation – (Short – Medium – Long Distance). Field Signal – methods, hand Signals, signals with weapons, signals with whistle.

Unit –V Self Defence

Self defence – meaning, types, uses, Principles, unarmed combat, vulnerable parts of the body; Types of attacks – Types of holds – Types of basic throws – Precautions in self defence.

Suggested Topics / Practical Exercises

- varies Drill operations
- handling stripping and assembling of .22 riffle
- methods of finding own position
- calculation of judging distance using appropriate method.
- finding any one self defence in a critical situation.

SUGGESTED READINGS:

i) Text Books:

1. Asthana A K, Brigadier (2015).Kamptee, Commandant, Precis.
2. Major Ramasamy.R. (2010). NCC Guide – Army Wing, Karur, Priya Publications.
3. Cadets hand book (2018). Kamptee, Common subjects for SD/SW, OTA Training Materials.

ii) Reference Books:

1. Specialized Subject Army (2018).New Delhi, Govt. Of India Press.
2. Precis, (2009). Kamptee, Published by Officer Training School.
3. Cadet's diary. (2000).Chennai, Published by cadets' center.
4. Gupta.R. (2015) Ramesh Publishing House, NCC: Handbook of NCC cadets.
5. Lt. Saravanamoorthy. S.N. (2015). A hand book of NCC-Army wing. Jayalakshmi publications.

iii) Web sources:

1. https://indiancc.nic.in/
2. https://play.google.com/store/apps/details?id=com.chl.ncc&hl=en_IN&gl=US
3. https://joinindianarmy.nic.in/default.aspx
4. https://www.joinindiannavy.gov.in/
5. https://indianairforce.nic.in/

DEPARTMENT OF TAMIL – UG – CBCS
PART I- TAMIL

Title of The Course: இடைக்கால இலக்கியமும் புதினமும்	**Semester : III**
Course Code : LUPITA31 Contact Hours : 6hrs/w	**Credit : 3**

பாடத் திட்டத்தைக் கற்றுக் கொண்ட பின்பு மாணவர்கள் பெறும் பயன்கள்: -

1. மாணவர்களைப் பண்படுத்துவதற்கு பக்தி நூல்கள் துணை செய்கின்றன.
2. மாணவர்கள் இயற்கை வளம் பற்றியும் தமிழின் பெருமை பற்றியும் அறிந்து கொள்ள நூல்கள் வழி வகுக்கின்றன.
3. புதினம் படிப்பதன் வாயிலாக மாணவர்கள் போட்டித் தேர்வுகளுக்கு தங்களைத் தயார்படுத்திக் கொள்ள முடிகிறது.
4. அரசுப் போட்டித் தேர்வுகளுக்கு மாணவர்களைத் தயார்படுத்த இலக்கணம் துணை புரிகின்றன.
5. படைப்பாற்றலை வளர்த்து கொள்ளும்விதத்தில் இலக்கிய வரலாறு மாணவர்களுக்கு அமைந்திருக்கிறது.

பாடத்திட்டத்திற்குத் தேவையான முன் அறிவு:

- அறுவகைச் சமயங்கள் பற்றி அறிந்து கொள்ளல்
- போட்டித் தேர்வில் வெற்றி பெறுவதற்கான உத்திகளைத் தெரிந்து கொள்ளல்
- படைப்பாற்றலை வளர்த்துக் கொள்ளல்

கூறு I: பக்தி இலக்கியங்கள்

1. திருஞானசம்பந்தர்- திருஆலவாய்ப் பதிகம் (முதல் 5 பாடல்கள்)
2. திருநாவுக்கரசர்-நமச்சிவாயப் பதிகம் (முதல்5 பாடல்கள்)
3. சுந்தரமூர்த்தி நாயனார்- திருப்புனவாயில் பதிகம் (முதல் 5 பாடல்கள்)

4. மாணிக்கவாசகர்-திருவெம்பாவை (முதல் 5 பாடல்கள்)

5. குலசேகர ஆழ்வார்-பெருமாள் திருமொழி (முதல்10 பாடல்கள்)

6. ஆண்டாள் - நாச்சியார் திருமொழி (திருப்பாவை முதல் 10 பாடல்கள்)

7. சித்தர் பாடல்கள்

(அ) திருமூலர் - மலமில்லை, மாசில்லை, பார்ப்பான் அகத்திலே, அன்பும், சிவமும்

(ஆ) பட்டினத்தார் - ஐயிரண்டு திங்களாய், ஒடாமல் பாழுக்கு, முதல் சங்கு அமுதூட்டும்

(இ) சிவவாக்கியார் - எங்குமுள்ள, ஒசையுள்ள, ஓடி ஓடி ஓடி ஓடி உட்கலந்த

கூறு II: சிற்றிலக்கியங்கள்

1. திருக்குற்றாலக் குறவஞ்சி- மலைவளம்
2. முக்கூடற் பள்ளு - நகர்வளம்
3. தமிழ் விடு தூது - சீர்கொண்டகூடற் சிவராசதானி முதல் - கல்லாதார் சிவலிங்கம் வரை 15 கண்ணிகள்

4. சேக்கிழார் பிள்ளைத்தமிழ் - அம்புலிப் பருவம் : முதல் 5 பாடல் பாடுமதியோன் - எம்மை இனிது ஆள்பவன்

கூறு III: புதினம்

1. திக்கற்ற பயணம் - ராமன் மதி

கூறு IV: இலக்கணம்

1. முதல் எழுத்து, சார்பெழுத்து
2. மொழி முதல், இறுதி எழுத்துக்கள்
3. வலி மிகும், வலிமிகா இடங்கள்
4. ஓர் எழுத்து ஒரு மொழி
5. மரபுப் பிழை நீக்கம்

கூறு V: இலக்கிய வரலாறு

1. பக்தி இலக்கிய வளர்ச்சி
2. சிற்றிலக்கிய வளர்ச்சி
3. புதின இலக்கிய வளர்ச்சி

II. எழுத்துப் பயிற்சி :

1. கட்டுரை எழுதுதல் (இலக்கியம், சமூகம், அறிவியல்)
2. விளம்பரம் (உபயோகப் பொருள், இயந்திர விளம்பரம்)
3. நூல் விமர்சனம் (புதினம்)
4. குறும்படம் அல்லது திரைப்பட விமர்சனம்

1. பரிந்துரைக்கப்பட்ட நூல்கள்:

சரசுவதி (செய்யுள் தொகுப்பு)
சரசுவதி நாராயணன் கல்லூரி
நியூ செஞ்சுரி புக் ஹவுஸ் (பி) லிட்.அம்பத்தூர்
சென்னை - 600050
திக்கற்ற பயணம் (புதினம்)
சரசுவதி நாராயணன் கல்லூரி
நியூ செஞ்சுரி புக் ஹவுஸ் (பி) லிட்.அம்பத்தூர்,
சென்னை – 600050

2. பார்வை நூல்:

- இந்திய தத்துவ ஞானம் - சி.லெட்சுமணன்
- திருமந்திரம் - நா.மாணிக்கவாசகன் உரை
- நாலாயிர திவ்யப் பிரபந்தம் - கமலக்கண்ணன்
- தமிழ் இலக்கிய வரலாறு - தமிழண்ணல்
- இலக்கிய வரலாறு - மு.அருணாச்சலம்
- சிற்றிலக்கிய வளர்ச்சி - நிர்மலா மோகன்
- நற்றிமிழ் இலக்கணம் - தொ.பரமசிவம்
- நன்னூல் - வெள்ளை வாரணனார் உரை

3. இணைய ஆதாரங்கள் :

தமிழ்விடு தூது

https://www.tamilvu.org/ta/courses-degree-p103-p1033-html-p103331-26009

முக்கூடற்பள்ளு

https://www.tamilvu.org/ta/courses-degree-c012-c0124-html-c01243l3-15342

குற்றாலக்குறவஞ்சி

https://www.tamilvu.org/ta/courses-degree-c012-c0123-html-c01233l2-15036

DEPARTMENT OF ENGLISH – UG – CBCS-LOCF

Title of the Course: English Language Proficiency –III	Semester: III
Course Code: LUP2EN31 Contact hours: 6hrs/w	Credits: 3

Course Learning Outcomes:

On completion of the course, the students are able to

- use English confidently for communication in day to day life.
- speak and write in academic English intelligibly.
- read and analyze texts in English.
- achieve the skill of writing creatively.
- acquire practical command of English in speaking, reading, and writing.

Pre-required Knowledge:

- ✓ Usage of Tense
- ✓ Active Vocabulary in frequent use
- ✓ Language and style of poetry

UNIT I-PROSE

O'Henry -The Gift of the Magi

Robert Lynd -On Forgetting

C.V.Raman -Water, The Elixir of Life

A.P.J.AbdulKalam -My Early Days from "Wings of Fire"

UNIT II -POETRY

Rabindranath Tagore -Leave This Chanting

LalDed -LalDed'sVakhs

William Wordsworth -The World is too much With Us

Walt Whitman -O Captain! My Captain!

UNIT III -NOVEL

Charles Dickens - Oliver Twist

UNIT IV- GRAMMAR

Voices

Transformation of Sentences

Idioms and Phrases

UNIT V COMPOSITION

Curriculum Vitae

Memoranda, Notices, Agenda & Minutes

E-Mail Writing

Suggested Topics for Presentation:

- ✓ Importance of English as an International Language.
- ✓ The pleasure of reading poetry
- ✓ Functional uses of Grammar
- ✓ Organizing data in CV
- ✓ Dickens as a social realist

Suggested Readings:

i)Text Book:

1. *Wealth of English.* Ed. Department of English, Saraswathi Narayanan College, Harrows Publications, Madurai, 2022.

ii)Reference Books:

1. Raman. C.V.A *Creative Mind Par Excellence*. *Hindustan Times*, 8th July 2014.
2. Sinha, Sasadhar.*Social Thinking of Rabindranath Tagore.*London,1962.

iii)Web Sources:

1.https://english.washington.edu

2.https://www.lavc.edu>writingcentre.

3.https://poligo.com>articles>writing

4.https://www.athena.edu>book-review

5.https://poemanalysis.com>ocaptain

Title of the Course: Pteridophytes, Gymnosperms and Paleobotany **Semester: III**

Course Code :LUBYCT31 **Contact hours: 4hrs/w** **Credit: 4**

Course learning outcomes:

On completion of the course, the students are able to

- interpret the complexity of Cryptogams & Paleobotany
- generalize the characters of Pteriodophytes and Gymnosperms.
- acquire knowledge on the classification of Pteriodophytes and Gymnosperms.
- understand the morphology, structure, reproduction and life cycle patterns of Pteridophytes and Gymnosperms.
- impart knowledge and develop skills on identification of fossil forms of *Lepidodendron* and *Williamsonia*.

Pre-required knowledge

- Plant evolution - transition to land habitat.
- Vascular plants - reproduction by spores - Cones.
- Morphology- anatomy - reproduction of Pteridophytes - Gymnosperms.

Unit I: Pteridophytes classification and Psilotum&Lycopodium

Pteridophytes - General characters, classification of Pteriodophytes as per G.M. Smith(1955). Origin of Pteridophytes. Structure (External & Internal) and life cycle: *Psilotum* and *Lycopodium* (need not study the development of sporangium and sex organs).

Unit II: *Selaginella*, *Marsilea* and stelar evolution

Structure (External & Internal) and life cycle: *Selaginella* and *Marsilea* (*need not study the development of sporangium and sex organs*). Stelar evolution.

Unit III: Gymnosperms classification and*Cycas*

Gymnosperms - General characteristics, Classification of Gymnosperms as per C.J. Chamberlin (1934). Structure(External & Internal) and life cycle:*Cycas* (*need not study the development of sporangium and sex organs*).

Unit IV: *Pinus* and *Gnetum*

Structure (External & Internal) and life cycle:*Pinus*and*Gnetum*(*need not study thedevelopment of sporangium and sex organs*). A brief account of economic importance of Gymnosperms.

Unit V: Paleobotany

Paleobotany - Geological time scale. Types of fossils: unaltered (coal, ice embedded fossils and embedded in Amber) and altered (compression, petrifactions, impressions, moulds and casts). A brief account on carbon dating&Indian fossil flora – Rajmahal hill flora. Structure and features of *Lepidodendron* and *Williamsonia*.

Suggested Topics for Seminar / Presentation/ Group Discussion:

- Pteridophytes - General characters
- *Psilotum, Lycopodium, Selaginella* and *Marsilea* - External & Internal structures
- Gymnosperms - General characteristics
- *Cycas, Pinus* and *Gnetum* - External & Internal structures
- Geological time scale

Suggested Readings

Text Books:

1. Pandy, B.P. 2002. College Botany, Vol II, S. Chand and Co. New Delhi.
2. Vasistha B.R, Sinha, A.K. and Singh, V.P. 2006, Pteridophyte, S. Chand & company Ltd. New Delhi.
3. Vasishta P.C., A.K. Sinha and Anil Kumar, 1999. Gymnosperms.S. Chand & company Ltd. New Delhi.

4. Johri R.M, Lata, Sneh, Sharma & Sandhya, 2012. A text book of Pteridophytes. Vedams eBooks. New Delhi.

Reference Books:

1. Rashid, A. 2000. An Introduction to Pteridophytes.II Edition, Vikas publishing house, New Delhi.
2. Sporne. K.R. 1985, The morphology of Pteridophytes. Hutchinson and Co., London.
3. Sporne. K.R. 1985, The morphology of Gymnosperms. Hutchinson and Co., London.
4. Arnold, C.R. 1979, An introduction to Paleobotany. McGraw Hill Publishing Company, New Delhi.
5. Chamberlain, C.J. 1863 Gymnosperms- Structure and Evölution. Univ. of Chicago Press.
6. Maheshwari, P &V. Vasil 1961 Gnetum. CSIR, New Delhi.
7. Stewart Wilson N, Rothwell G. W. 1993. Paleobotany and the Evolution of Plants. Cambridge University Press.
8. Bower, F.O. 1935. Primitive Plants, also known as the Archegoniatae. MacMillan, London.

Web sources:

Pteridophytes

1. http://www.bsienvis.nic.in/Database/Pteridophytes-in-India_23432.aspx
2. http://www.jnpg.org.in/WebDoc/EContent/science/General%20characters%20of%20Pteridophytes.pdf
3. https://www.uou.ac.in/sites/default/files/slm/BSCBO-103.pdf

Gymnosperms

1. https://www.conifers.org/zz/gymnosperms.php
2. https://www.uou.ac.in/lecturenotes/science/MSCBOT-17/Gymnosperm%20(BOT-503)%20by%20Dr.%20Prabha%20Dhondiyal-converted%20(1).pdf
3. https://courses.lumenlearning.com/wmopen-biology2/chapter/seed-plants/

Paleobotany

1. https://www.biodiversitylibrary.org/search?stype=F&searchTerm=Paleobotany#/titles
2. https://palaeobotany.org/

DEPARTMENT OF CHEMISTRY – UG –CBCS- LOCF
ALLIED CHEMISTRY FOR B.Sc. BOTANY

Title of the paper: Allied Chemistry – I **Semester: III**

(Organic, Inorganic and Physical Chemistry – I)

Course Code: LUCHGE31 **Contact Hours: 4hrs/w** **Credits: 4**

Course Learning outcomes

On completion of the course, the students are able to

- ❖ know about Hydrogen, Oxides and Water
- ❖ learn the basic principle in Organic Chemistry
- ❖ know about the types of reactions in organic chemistry
- ❖ study about carbohydrates and its classification
- ❖ learn about the chemistry of colloids

Pre-Required Knowledge

- ✓ Hardness of water
- ✓ Homolytic cleavage
- ✓ Introduction of colloids

Unit I: HYDROGEN, OXIDES, WATER AND HYDROGEN PEROXIDE

a) Hydrogen: Isotopes of hydrogen - preparation, properties and uses of heavy hydrogen - ortho and para hydrogen – hydrides – definition – classifications -examples.

b) Oxides :Definition – classification - examples.

c) Water: Hardness of water - types of hardness - removal of hardness – industrial implication of hardness in water - units of hardness of water.

d) Hydrogen peroxide: Manufacture, properties, structure and uses - strength of hydrogen peroxide.

Unit II: BASIC PRINCIPLES IN ORGANIC CHEMISTRY I

a) Detection and Estimation of nitrogen and halogens in organic compounds - empirical formula – molecular formula - structural formula - calculation of empirical formula and molecular formula from percentage composition.

b) Bond breaking and bond forming in organic reactions - homolytic cleavage-heterolytic cleavage – reaction intermediates – formation and stability of carbocation and free radicals.

Unit III: BASIC PRINCIPLES IN ORGANIC CHEMISTRY II

a) Nucleophiles – Electrophiles: Definition, types and examples - specific reactions involving these.

b) Types of reactions: Substitution – addition – elimination - rearrangement and polymerization - illustration with examples.

Unit IV: CARBOHYDRATE

1. Carbohydrate: Definition – classification – monosaccharides – properties and uses of glucose and fructose – configuration of glucose – conversion of glucose to fructose and vice versa.
2. Disaccharides: Sucrose – manufacture – properties, structure and uses.
3. Polysaccharides: Starch and cellulose (structure only) α–amylose - β-amylose – difference between these two.

Unit V: COLLOIDAL CHEMISTRY:

Colloidal state of matter – various types – classification.Sols – dialysis – electro-osmosis – electrophoresis – stability of colloids.Emulsion: Types of emulsion – emulsifier with examples.

Gels: Classification.Applications of colloids.

Suggested Topics for Group Discussion / Presentations

Isotopes of hydrogen

Homolytic cleavage

Rearrangement and polymerization

Starch and cellulose

Stability of colloids

Suggested Readings:

Text Books:

1. Pl. Soni. Text Book of Inorganic Chemistry. Sultan Chand & Sons, Reprint 2005
2. P.L.Soni, Organic Chemistry, Sultan Chand & Sons, 2005.
3. B.R. Puri, L.R. Sharma, M.S. Pathania, Principles of Physical Chemistry, V**ishal publishing Company, 2008**

References Books:

1. R.T.Morrison, R.N.Boyd and S.K.Bhattacharjee, Organic chemistry, 7edn, Pearson EducationAsia, 2010.
2. I.L.Finar, Organic Chemistry Vol - 1 & 2, 6 edn, Pearson Education Asia, 2004.

Web Sources:

1. https://www.youtube.com/hashtag/chemistryclass11jee
2. https://www.youtube.com/hashtag/waterhardness
3. https://www.youtube.com/hashtag/typesofcolloids
4. https://www.youtube.com/watch?v=7kvR2NdFD9k

DEPARTMENT OF ZOOLOGY – UG – CBCS-LOCF
(For those who join in June 2022)

Title of the Course: Allied Zoology - III		**Semester: III**
Course Code: LUZOGE31	**Contact Hours:4hrs/ w**	**Credits : 4**

Course Learning Outcome

On completion of the course, the students are able to

- summarize the structure and function of the different components and organelles ofthe cells
- perform monohybrid, dihybrid crosses, multiple alleles and sex-linkage
- understand the cloning, forensic and stem cells technology.
- identify the role of antigen presenting cells, lymphocytes, and phagocytic cells in immune

responses.

- understand different concepts related to ecological economics

Pre- required knowledge

- ✓ Various cell organelles
- ✓ Inheritance of traits and cancer
- ✓ Application of biotechnology
- ✓ Evolution and Immno-techniques

Unit I: Cell Biology:

1. Structure and functions of Plasma membrane, Mitochondria and Nucleus.
2. Chromosomes- Structure, types and functions.
3. Structure and functions of DNA
4. Cancer: Types, Causes, Diagnosis and Treatment.

Unit II: Genetics:

1. Mendelian principles – Mono and Dihybrid crosses.
2. Multiple Alleles - ABO Blood group, Rh factor.
3. Sex linked inheritance (eg. Colour blindness and Haemophilia) determination in Man (Chromosome and Barr body). And sex
4. Genetic counseling- eugenics, euthenics and euphenics

Unit III: Biotechnology:

1. rDNA technology application and Biotechniques (PAGE& PCR).
2. Hybridoma Technology.
3. DNA finger printing Technology.
4. Stem Cells - Properties, Types and application.

Unit IV: Immunology:

1. Types of Immunity (Innate and Acquired immunity).
2. Antigen: its properties and Antigen – Antibody reactions
3. Immunoglobulin – Types and structure.
4. Immuno-techniques- Western Blotting, ELISA,

Unit V: Bioeconomics

1. Ecosystem- Structure, food chain and Food web with reference to pond ecosystem.
2. Ecosystem Services. Categories of ecosystem services, Biodiversity and itsimportance, Eco-labelling
3. Economic value of the world's ecosystems and services, Millennium EcosystemAssessment
4. Wildlife conservation – Objectives and insitu & exsit methods

Suggested Topics For Group Discussion / Presentation

1. Mutations and cancer
2. Blood groups and their importance
3. Stem cell technology
4. Immunological techniques in disease diagnosis
5. Biodiversity hotspots

Suggested Readings:

i) Text Books

1. Meyyan R. P. 2005, Cell Biology, Saras Publication.
2. Gupta, P. K. 2010. Genetics, Rastogi Publication, New Delhi.
3. Dubey, R. C. 2004, Text Book of Biotechnology, S.Chand & Co
4. Verma,P.S and Agarwal,V.K.2012. Cell biology, Genetics and Evolution, S.Chand Publications.New Delhi

ii) Reference Books:

1. **Ambrose, E.J. and Dorothy, M.E.** Cell Biology. ELBS Calmet Press, Great Britain.
2. **De Robertis and De Robertis.** Cell and Molecular Biology. WB SaundersCo., Philadelphia.
3. **Dupraw, E.J.** Cell and Molecular Biology. Academic Press, New York.
4. **Gardener *et al*.,** Principles of Genetics, 3rd Edition. John Wiley & Sons Publication,New York, 1991.

5. **Sinnot Dunn and Dobzhansky.** Principles of Genetics. Tata-McGraw Hill IndiaReprint.
6. **Dubey, R.C.** Text Book of Biotechnology. S. Chand & Co., 1995.
7. **Dharmarajan, M.** Genetic Engineering. S. Viswanathan & Co. 1989.
8. **Primrose, S.B.** Modern Biotechnology. Blackwell Scientific Publication, London.1987.
9. Roitt, I.M. Essential Immunology. Blackwell Scientific Publishers. 2000.
10. Kuby, J. Immunology. W.H. Freeman and Company, New York. 1999.
11. Verma, P.S. and V.K.Agarwal. Cytology, S.Chand & Co. 1985.
12. Nagabushanam R. Animal Physiology. S. Chand & Co. 1991.
13. Odum, E.P., – Fundamentals of Ecology. W.B. Saunders Company, Philadelphia.1971.
14. Rastogi, V.B. and M.S. Jayaraj,– Animal Ecology and distribution of animals,Kedarnath Ramnath. 1989.
15. Mayumi, K., Martinez, J. (2012). The Origins of Ecological Economics: The Bioeconomics of Georgescu-Roegen .Routledge; 1 edition.

iii) Web sources

1. https://swayam.gov.in/course/150-cell-biology ·
2. https://swayam.gov.in/courses/5173-biochemistry-and-cell-biology
3. https://www.jove.com/science-education-library/9/cell-biology
4. https://www.khanacademy.org/science/biology
5. Coursera, https://www.coursera.org/courses?query=immunology

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Title of the Course: Practical II - Pteridophytes, Gymnosperms and Paleobotany & Plant Anatomy and Embryology **Semester: III & IV**

Course Code:LUBYCL41 Contact hours: 2+2hrs/w Credit: 2

Course learningoutcomes:

On completion of the course, the students are able to

- understand the theoretical knowledge of Pteridophytes, Gymnosperms.
- evaluate the various fossil genera representing different fossil groups.
- know the embryology of Angiospermic plants. Students understand the mechanism of embryo formation in Angiospermic plants properly.
- describe and to draw the anatomical structure of development of anther, development of male gametophyte, types of ovule, development of female gametophyte, pollination and fertilization and development of plant embryo.
- List of experiments:

Pteridophytes, Gymnosperms and Paleobotany

To make suitable micropreparation and study of the prescribed specimen in the syllabus. Observation of the permanent slides.

1) **Pteridophytes**: Morphological and anatomical studies of the genera *Psilotum, Lycopodium, Selaginella, Equisetum* and *Marsilea*. Variation in soral structure among ferns.
2) **Gymnosperms**: Morphological and anatomical studies of the genera mentioned for detailed study of *Cycas*, *Pinus* and *Gnetum*.
3) Study of economically important Pteridophytes and Gymnosperms and their products.
4) **Paleobotany**: Permanent slides of *Lepidodendron* and *Williamsonia*.

5) Field study to an out station floristic rich area is must for a period of two days to study the flora. Field trip to the National Fossil Park.

6) Submission of herbarium and photographs of at least 10 different Pteridophytes, Gymnosperms and fossils and maintenance of a field note book.

- Field visits (Minimum two days) and study of the techniques in Pteridophyte & Gymnosperm collection, preservation and identification: field visits to representative areas to study the taxonomy, distribution and ecology of Pteridophytes & Gymnosperm taxonomic description of collected specimens.

Plant Anatomy and Embryology

1) To prepare the onion root tip squash and identify different stages of mitosis.
2) To prepare smear of young another (*Tradescantia*) and identify different stages of meiosis
3) Epidermal peeling using nail polish and stomatal index calculation. Stomatal types - anomocytic, anisocytic, paracytic, diacytic and graminaceous.
4) Analysis of pollen tube growth using pollen grains in different sugar concentration.
5) Isolation and mounting of embryo - (i) Globular embryo (ii) Cordate embryo - *Tridax procumbens* flower. L. S. of monocot embryo (*Maize*).
6) Pollen viability test using acetocaramine (*Caesalpinia* / *Crinum*/ *Catharanthus*/ *Tradescantia*)
7) To study the tissue types supported by permanent slides.

To make suitable micro preparations of the following:

1. Dicot stem – *Phaseolus* sp. and Dicot root – *Phaseolus* sp.
2. Monocot stem – *Chloris barbata* and Monocot root – *Canna indica*
3. Anomolous secondary thickeining – *Boerhaavia* sp. and *Dracaena* sp.

4. *Datura* anther section to study structure of microsporangium. T.S of Anther at various stages of development. (Sporogenous, Tetrad and Mature).
5. Observation of simple (*Catharanthus*, *Hibiscus*, and Grass) and compound pollen grains (*Calotropis, and Acacia*). Structure of pollen grains using whole mounts (*Catharanthus*, *Hibiscus*, and *Acacia*).
6. Types of ovules - Permanent slides study - Orthotropous, Anatropous, Campylotropous, Hemianatropous and Amphitropous. (L.S of Ovule - Orthotropous and Anatropous)
7. A record should be maintained for internal and external valuation.

Suggested Readings

Reference Books:

1. Sundara S. Rajan (2002) Practical Manual of Pteridophyta. Anmol Publications Pvt Ltd
2. Sharma, O.P (2006) Text Book of Pteridophyta. New Delhi: Macmillan Publishers India Ltd.
3. Gangulee, H.R. and Ashok Kumar. 1989. College Botany. Vol. II. Revised edition, New Central Book Agency (P.) Ltd.
4. Sambamurthy, A.V.S.S. 2005. A Textbook of Bryophyta, Pteridophyta, Gymnosperms andPaleobotany. IK International Pvt., Ltd., New Delhi.
5. Chamberlain, C. J. 1935. Gymnosperms, structure and evolution. Chicago.
6. Bendre, A. and Kumar, A. 2009. A Textbook of Practical Botany. Vol. II. Rastogi Publications, Meerut (U.P.).
7. Cutler, D.F., Botha, T. and Stevenson, D.W. 2007. Plant Anatomy (an applied approach). Blackwell Publishing. N.Y.
8. Maheshwari, P. 1950. An Introduction to the Embryology of Angiosperms. McGraw-Hill Book Company, Inc. NY. USA.

9. Foster. A.S. (1949) Practical Plant Anatomy. D. Van Nostrand Company.

Title of the Course: Intellectual Property Rights (IPR) **Semester: III**

Course code:LUBYSC31 **Addnl.** **Credits: 2**

Course learning outcomes:

On completion of the course, the students are able to

- Understand the concept of IPR
- Differentiate between various agreements of IPR
- Compare copyrights, patents and Geographical Indicators
- Examine various legal issues related to IPR
- Relate to various cyber issues concerning IPR

Pre required Knowledge:

- Patent, Copyright, Trademark
- Royalty, mining royalty patent royalty
- Rent vs Royalty

Unit I:Intellectual Property Rights

Introduction to Intellectual Property Rights (IPR) Copyright Act and IPR, Economic importance. IPR in India and world: Genesis and scope, some important examples. IPR and WTO (TRIPS, WIPO). Objectives, Rights, Patent Act 1970 and its amendments.

Unit II:Patent and Copyright

Patents, Copyrights: Procedure of obtaining patents, working of patents. Infringement of patents Copyrights: work protected under copyright laws, Rights, Transfer of Copyright, and Infringement.

Unit III:Trademarks

Objectives of trademarks, Types, Rights, Protection of goodwill, Infringement, Passing off, Defenses, Domain name.

Unit IV:Traditional Knowledge

Protection of Traditional Knowledge and Plant Varieties: Objective, Concept of Traditional Knowledge, Holders, Issues concerning, Bioprospecting and Bio-piracy, Alternative ways,

Protectability, need for a Sui-Generis regime, Traditional Knowledge on the International Arena, at WTO, at National level, Plant varieties protection in India. Rights of farmers, National gene bank; Benefit sharing. Protection of Plant Varieties and Farmers' Rights Act, 2001.

Unit V:Patenting Biotech inventions

Patenting Biotech Inventions: Objective, Applications, Concept of Novelty; Concept of inventive step, Microorganisms, and Moral Issues in Patenting Biotechnological inventions.

Suggested Topics for Seminar / Presentation/ Group Discussion:

- IPR in India and world Scenario
- Protocol for transfer of Copyright
- Objectives of Trademark
- Bio-prospecting and Bio-piracy
- Biotech inventions

Suggested Readings:

Text Books:

1. Gopalakrishnan, N.S. and Agitha, T.G. (2009). *Principles of Intellectual Property* Eastern Book Company, Lucknow.
2. Narayanan, P. (2010). *Law of Copyright and Industrial Designs*; Eastern law House, Delhi.

Reference Books:

1. David Kitchin Q.C., Llewelyn, D., Mellor, J., Meade, R., Thomas Moody-Stuart, and D. Keeling, Jacob, R. (2005). Kerly's*Law of Trade Marks and Trade Names* (14th Edition) Thomson, Sweet &Maxweel.
2. Parulekar, A. and D' Souza, S. (2006). *Indian Patents Law – Legal & Business Implications*; Macmillan India Ltd.
3. Wadehra, B.L. (2000). *Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications*; Universal law Publishing Pvt. Ltd., India.

Web sources:

1. https://www.researchgate.net/publication/274737730_Development_Trend_of_Global_Design_Patent_Research
2. https://www. Drishtiias.com/to-the-points/paper3/intellectual-property-rights
3. http://www.annauniv.edu/ipr

Title of the Paper : Economic Botany		Semester: III
Subject Code:LUBYSC32	Contact hours: -	Credits: 2

Course learning outcomes:

On completion of this course, the students will be able to:

- The students will be gathered the knowledge on botanical knowledge and their economic importance on cereals and millets
- Moreover, the students will be getting more information about the nuts and its products to make healthy environment.
- Likewise, the students will acquire the knowledge about botanical knowledge and it uses of fruits as well as vegetables.
- Simultaneously, the students will be acquired information on fibres, latex and oil.
- Finally, it also point out the spices, condiments, fumitories and mastigotories.

Pre-required knowledge:

- Commercial utilization of Cereals and millets,
- Bioactive substances
- Cash crop

Unit – I - Cereals and Millets

Rice, Wheat, Maize, Barley;

Sorghum and Oats.

Unit – II- Legumes

Green gram, Pea nuts, Soybean, Lentils and Black gram; Nuts: Coconut, Walnuts and Cashew nut.

Unit-III - Vegetables and Fruits

Tomato, Brinjal, Cabbage and Drumstick

Mango, Grapes and Banana

Unit – IV - Fibre, Latex and Oil yielding plants

Cotton, Hemp, Linum, Jute, Rubber and Eucalyptus oil.

Unit – V- Fumitories and Mastigatories

Tobacco and Areca nut.

Spices and Condiments: Cardamom and Pepper

Non-alcoholic beverages: Tea and Coffee.

Suggested Topics for Seminar/ Group Discussion

- Cereals and millets
- Legume plants
- Fibre yielding plants
- Latex and Oil yielding plants
- Spices and Condiments

References:

1. Pandey, B.P. (2000). Economic botany. S.Chand and Company Ltd., New Delhi.
2. Hill, A.F. (1952) Economic botany. Mc Graw Hill Book Co., New York.
3. Kochhar, S.L. (1981) Economic Botany in the Tropics. Mc Millan India Limited, New Delhi.

Web Resources:

1. https://www.scienceinda.in/home/view-artical/5q
2. https://en/wikipedia.org/wiki/uman-uses-of-plants
3. https://indieseducation.com/importance-of-plants/
4. https://www.biologydiscussion.com/plants/9-significant-uses-of-plants-esplantined/5520.

DEPARTMENT OF TAMIL – UG – CBCS
PART I- TAMIL

Title Of The Course: புனை கதை இலக்கியமும் சிறுகதையும் **Semester : IV**

Course Code : LUPITA41 Contact Hours : 6hrs/w **Credit: 3**

பாடத் திட்டத்தைக் கற்றுக் கொண்ட பின்பு மாணவர்கள் பெறும் பயன்கள்: -

1. மாணவர்கள் சிறந்த கவிஞர்கள் ஆவதற்கும், எழுத்தாளராக உருவாவதற்கும், இந்த பாடநூல்கள் வகை செய்கிறது.
2. நாட்டில் நடக்கும் அன்றாட நிகழ்வுகளை, சமூகச் செய்திகளைச் சுருங்கச் சொல்லி மாணவர்களுக்கு விளக்குவதாக ஹைக்கூ கவிதைகள் அமைகின்றன.
3. சமூகத்தில் நடக்கும் அவலங்களை மாணவர்களுக்கு எடுத்துக் காட்டுவனவாக இப்பாட நூல்கள் இருக்கின்றன.
4. தமிழில் சொற்கள் எவ்வாறு தோன்றுகின்றன என்பதை மாணவர்கள் இலக்கணம் வாயிலாக அறிய முடிகிறது.
5. மாணவர்கள் மரபுக் கவிதை பற்றியும் , புதுக் கவிதை பற்றியும் தெரிந்து கொள்ள இலக்கிய வரலாறு உதவுகின்றன.

பாடத்திட்டத்திற்கு தேவையான முன் அறிவு :

❖கவிதை படைப்பதை அறிந்து கொள்ளல்

❖உரைநடையின் தோற்றம், ஆசிரியர்கள் பற்றி தெரிந்து கொள்ளல்

❖படைப்பாற்றலை மேம்படுத்துதல்

கூறு I: கவிதை

1. பாரதியார் - நல்லதோர் வீணை செய்தே
2. பாரதிதாசன் - நீங்களே சொல்லுங்கள்
3. கவிமணி தேசியவிநாயகம் பிள்ளை - ஆசிய ஜோதி
4. முடியரசன் - கடவுளர் விரும்பும் மொழி
5. கண்ணதாசன் - கமலப்பூவே
6. வாலி - இலக்கிய நாயகன் இராமன்
7. அப்துல்ரகுமான் - உழவர்களைப் பாடுவோம்
8. மு.மேத்தா - தேசப்பிதாவுக்கு ஒரு தெருப்பாடகனின்அஞ்சலி
9. வைரமுத்து - இருபது கட்டளைகள்

10. நாட்டுப்புறப்பாடல் - உழவர்பாட்டு நா.வானமாமலை
11. மீரா - போலிகளை நம்புகிறாய்
12. சண்முகம் சரவணன் - துறவியின் இசைக் குறிப்புகள்

கூறு II: ஹைக்கூ கவிதைகள்

1. 40 கவிதைகள்

கூறு III: சிறுகதை

1. புதுமைப்பித்தன் - காலனும், கிழவியும்
2. கு.ப.ராஜகோபாலன் - விடியுமா?
3. ஜெயகாந்தன் - சுமைதாங்கி
4. நிர்மலா பெருமாள் - நிரந்தரமற்ற நிழல்
5. ராஜநாராயணன் - கதவு
6. பி.எஸ்.ராமையா - நட்சத்திரக் குழந்தைகள்
7. பிரபஞ்சன் - பிரும்மம்

கூறு IV: இலக்கணம்

1. நால்வகைச் சொற்கள் - பெயர், வினை, இடை, உரி

கூறு V: இலக்கிய வரலாறு

1. மரபுக் கவிதை, புதுக் கவிதை , ஹைக்கூ கவிதை, - தோற்றமும் வளர்ச்சியும்
2. சிறுகதையின் தோற்றமும் வளர்ச்சியும்

II. எழுத்துப் பயிற்சி :

1. கடிதம் எழுதுதல்
2. கவிதை எழுதுதல்
3. சிறுகதை எழுதுதல்
4. தன் விவரக் குறிப்பு எழுதுதல்

1. பரிந்துரைக்கப்பட்ட நூல் :

சரசுவதி (செய்யுள் தொகுப்பு)

சரசுவதி நாராயணன் கல்லூரி

நியூ செஞ்சுரி புக் ஹவுஸ் (பி) லிட்.அம்பத்தூர் ,

சென்னை – 600050

2. பார்வை நூல் :

- தமிழ் இலக்கிய வரலாறு - மு.வரதராசன் வகைமை நோக்கில்
- தமிழ் இலக்கிய வரலாறு - பாக்கிய மேரி
- நற்றமிழ் இலக்கணம் - தொ.பரமசிவம்
- வகைமை நோக்கில்
- தமிழ் இலக்கிய வரலாறு - ஈஸ்வரன்
- தாய் வழி இலக்கணம் - மீ.முத்துராணி
- நன்னூல் - வெள்ளை வாரணனார் உரை
- நவீன இலக்கியப் போக்குகள் - முருகேசப் பாண்டியன்
- தமிழில் சிறுகதை பிறக்கிறது - சி.சு.செல்லப்பா
- படைப்பாக்க உத்திகள் - சவரிமுத்து

3. இணைய ஆதாரங்கள்:

சிறுகதைகளின் தோற்றமும் வளர்ச்சியும்

https://podhutamizh.blogspot.com/2017/09/blog-post_42.html?m=1

புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்

http://www.tamilvu.org/library/nationalized/pdf/81-vallikannan/111-puthukkavithaiyinthottramumvalarchchiyum.pdf

மரபுக் கவிதையின் தோற்றமும் வளர்ச்சியும்

http://neelamegan.blogspot.com/2015/09/blog-post.html?m=1

DEPARTMENT OF ENGLISH – UG – CBCS-LOCF
(For those who join in June 2022)

Title of the Course: English Language Proficiency-IV		**Semester: IV**
Course Code:LUP2EN41	**Contact hours: 6hrs/w**	**Credits:3**

Course Learning Outcomes:

On Completion of the Course the students are able to

- speak and write clearly in fair English.

- listen and read carefully the various viewpoints of different writers and engage with them.
- understand the world with the help of English language.
- develop an awareness of the linguistic –cultural richness of India.
- practise language skills for successful communication

Pre-required Knowledge:

- ✓ Comfortability on language skills
- ✓ Functional Grammar competence
- ✓ Active vocabulary package

UNIT-I-PROSE

Martin Luther King : I Have a Dream
A.K.Ramanujan : Arts of Money
SunitiNamjoshi : Duty Distance
R.K.Lakshman :The Gold Frame

UNIT-II-POETRY

Alfred Lord Tennyson :The Brook
Henry Derozio :The Harp of India
William Blake : The Little Black Boy
D.H.Lawrence :Money Madness

UNIT-III-DRAMA

William Shakespeare : As You Like it

UNIT-IV-GRAMMAR

Direct and Indirect speech
Degrees of Comparison
One word substitution

UNIT-V-COMPOSITION

Interview Skills

Group Discussion

Meeting, Seminars and Conferences

Suggested Topics for Presentation:

- ✓ Martin Luther King and civil rights movement.
- ✓ A.K.Ramanujan's writing style.
- ✓ Money is a madness-How?
- ✓ Shakespeare and his major comedies.
- ✓ Grammar and Language competence

Suggested Readings:

i)Text Book:

1.*Wealth of English*. Ed. Department of English, Saraswathi Narayanan College. Harrows Publications, Madurai, 2022.

ii)Reference Books:

1.Plumge : Communication skills in English: Orient & Black Swan, 2021.

2.Glimpses of Infinity: Orient & Black Swan, 2021.

3.Literary Adventures: Orient & Black Swan, 2021.

iii)Web Sources:

1.https://www.inc.com

2.https://www.litbullseye.com

3.https://studentscantwait.edtrust.org/wpcontent/uploads/sites/2/2017/06/EnglishLanguageProficiency-1-1.pdf

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Title of the Course: Plant Anatomy and Embryology **Semester: IV**

Course Code:LUBYCT41 **Contact hours: 4hrs/w** **Credit: 4**

Course Learning outcomes:

On completion of the course, the students are able to

- understand the fundamental concepts of plant anatomy and embryology
- analyze and recognize the different organs of plant and secondary growth.
- evaluate the structural organization of flower and the process of pollination and fertilization.
- appreciate the importance of palynology.
- depict the fertilization and post-fertilization processes, development of fruit, seed, embryo and endosperm.

Pre-required knowledge:

- Tissues Organization - Meristems
- Growth stages - Primary & Secondary
- Reproduction pattern

Unit I: Plant Tissues

Meristems – classification, theories on shoot and root apices. Tissue types: Simple permanent: parenchyma, collenchyma, sclerenchyma, SCF – structure, composition and functions. Complex permanent: xylem, phloem and SCF – structure, composition and functions.

Unit II: Secondary Growth

Secondary thickening in dicot stem and dicot root - anomalous secondary thickening in stems of *Boerhaavia*. Nodal anatomy - unilacunar (*Justicia*), trilacunar (*Azadirachta*) and multilacunar (*Aralium*).Annual rings, heartwood and sapwood.

Unit III:Palynology

Introduction and scope of palynological science. Morphology of pollen – Polarity, symmetry, size and

shape, exine stratification and ornamentation of pollen wall. Palynology in relation to taxonomy.

Unit IV: Embryology

Structure and development of microsporangium, microsporogenesis, male gametophyte. Structure and development of megasporangium, megasporogenesis and female gametophyte (*Polygonum* and *Allium* types). Pollination - types and contrivances.

Unit V: Fertilization, Endosperm, and Embryo

Fertilization - Path of pollen tube, entry of pollen tube into ovule – double fertilization and triple fusion and post fertilization changes. Endosperm types (free Nuclear, Cellular and Helobial). Definition, types and practical applications of apomixes and polyembryony. Development of dicot embryo (*Capsella* type) and monocot embryo (*Luzula* type). A brief account on applications of Embryology.

Suggested Topics for Seminar / Presentation/ Group Discussion:

- Meristems and their classification
- Secondary growth of dicots and monocots
- Palynology in relation to taxonomy.
- Plant–pollinators interactions
- Practical applications of apomixes and polyembryony

Suggested Readings:

Text Books:

1. Bhojwani,S.S. and Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi.
2. Maheswari, P. (1985). An introduction to the Embryology of Angiosperms. Tata McGraw Hill Publishing Co., Ltd., New Delhi.
3. Fahn. A. (1989). Plant Anatomy. Pergomon Press, London.

4. Pandey, B.P. (2004). Plant anatomy, S.Chand& Co., New Delhi.
5. Esau, K. (1964). Anatomy of seed plants, John Wiley & Sons, N.Y.

Reference Books:

1. De Robertis and De Robertis. (1988). Cell and Molecular biology. B.I. Wavely Pvt. New Delhi,
2. Fosker, D.E. (1994). Plant Growth and Development. A Molecular Approach. Academic Press, San Diego, USA.
3. Davis, C.L. (1965). Systematic Embryology of Angiosperms. John Wiley.
4. Gupta, P.K. (1993). Cell and Molecular Biology, Rastogi Publications, Meerut.
5. Bhojwani, S.S. and S.P. Bhatnagar. (1999). The Embryology of Angiosperms. Vikas Publishing House PVT Ltd. New Delhi.
6. Bhojwani S.S. and Bhatnagar, S.S. (1974). The Embryology of Angiosperms. Vikas Publication, New Delhi.
7. Bhojwani, S.S. and Soh, W.Y. (2001). Current Trends in the embryology of Angiosperms. Kluwer Academic Publishers. The Netherlands.
8. Tayal. M.S. (2002). Plant anatomy, Rastogi Publications, Meerut.
9. Pullaiah, T., Lakshminarayanan, K. and B. Hanumantha Rao. (2001). Text book of embryology of Angiosperms, Regency Publications, New Delhi.
10. Shivanna, K.R. (2003). Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt., Ltd., New Delhi.

Web Sources:

1. https://faculty.etsu.edu/liuc/plant_anatomy_sites.html
2. http://aryacollegeludhiana.in/E_BOOK/Botany/plant_anatomy.pdf
3. https://www.uou.ac.in/sites/default/files/slm/BSCBO-202.pdf

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Title of the Course: Field Methods for Vegetation Mapping **Semester: IV**

Course code:LUBYSC41 **Contact hours: -** **Credits: 2**

Course Learning outcomes:

On completion of the course, the students are able to

- develop theoretical understanding of vegetation analysis
- understand the methods of mapping
- evaluate vegetation dynamics, variations and distribution of vegetation
- analyse the data reviews, and sampling approach
- mapping using modern tools

Pre-required knowledge:

- Diversity distribution patterns
- Sampling methods
- Mapping techniques

Unit I: Diversity analysis:

Field sampling methods- Quadrat, line transect, random spot method: Nature of vegetation, community vs. continuum, vegetation structure, parameters of vegetation description (Species occurrence, Frequency and Cover). Species area curve; Minimum quadrat cycles.

Unit II: Vegetation dynamics:

Spatial distribution of vegetation: Implications for sampling design, common sampling approaches (Sampling scale issue, ecological gradients, random vs. representative sampling, stratified random sampling, gradient oriented Transect (Gradsect) sampling).

Unit III: Classification and mapping:

Relationships between classification and mapping (Scale considerations), characteristics of a successful sampling approach (Flexibility, Replicability, Cost effectiveness, Integrated field methods to support multiple objectives). Evaluation of different indices of plant biodiversity.

Unit IV:Field methods:

Overview of planning process and field methods (Preliminary collection and review of existing information, Initial site visit, information gathering and team development, data review and Identification of experts,

Unit V: Sampling Pattern:

Determination of sampling approach, field data collection, GIS and GPS, Remote Sensing, management and analysis, Photo-interpretation and mapping, map validation accuracy assessment.

Suggested topics for seminar / group discussion:

1. Determination of size of Quadrat
2. Diversity analysis methods
3. Recent techniques of mapping
4. Remote Sensing management and analysis
5. Role of GIS and GPS

Suggested Readings:

Text Books:

1. Causton, D.R. (1988). An Introduction to Vegetational Analysis: Principles, Practice and Interpretation. Unwin Hyman, Boston.
2. Pearcy, R.W., Mooney, H.A., and Rundel, P.W. (2011). Plant Physiological Ecology: Field methods and instrumentation. Springer.
3. Ferretti, M., and Fischer, R. (2013). Forest Monitoring: Methods for Territorial investigations in Europe with an overview of North America and Asia. Elsevier.

Reference Books:

1. Brocklehurst, P., Lewis, D., Napier, D., and Lynch, D. (2007) Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping. Technical Report No. 02/2007D. Department of Natural Resources, Environment and the Arts, Palmerston, Northern Territory.

2. USGS/NPS Vegetation Mapping Program. (1994). Field Methods for Vegetation Mapping. Prepared by : The Nature Conservancy 1815 N. Lynn St. Arlington, Virginia 22209 USA Environmental Systems Research Institute, Inc. 380 New York Street Redlands, California 92373.
3. William G. Cochran. (2012). Sampling Techniques (3ed), Wiley.

Web sources

1. https://www.fs.fed.us/emc/rig/documents/protocols/vegClassMapInv/EVTG_v2-0_June2015.pdf
2. https://www.esri.com/en-us/home
3. https://map.sdsu.edu/gisbook/

Title of the Course: Traditional System of Indian Medicine **Semester: IV**
Course Code:LUBYSC42 **Contact hours: -** **Credit: 2**

Course Learning Outcomes:

On completion of the course, the students are able to

- understand the traditional system of medicine and basic medicinal plants
- basic knowledge of herbal medicine and idea for preparation of herbal medicine.
- learn important techniques of conservation and propagation of medicinal plants.
- study of virusesprocess of harvesting, drying and storage of medicinal herbs.
- the students will gain basic knowledge of ayush
- propose new strategies to enhance growth of medicinal herbs considering the practical issues pertinent to india

Pre-required Knowledge:

- Medicinal Plants
- Knowledge - AYUSH
- Herbal Medicine

Unit I: Traditional Medicine

Historical background of herbal medicine. Scope and importance of herbal medicine. A brief account of Siddha and Ayurveda.

Unit II: Formulation

Methods of preparation of the following herbal formulations: 1.Choornam, 2.Kashayam, 3.Thailam

Unit III: Cultivation and Collection

Cultivation of medicinal garden in India. Collection of crude drugs – Harvesting, Drying, Packing, Storage and Marketing. Drug adulterance.

Unit IV: Systematic position

Study of diagnostic features, systematic position and medicinal values of whole plant and plant parts of following:*Curcuma longa, Ocimum sanctum, Aloe vera, Allium cepa and Andrographis paniculata*

Unit V: Systematic position

Study of diagnostic features, systematic position and medicinal values of whole plant and plant parts of following:*Zingiber officinalis, Phyllanthusamarus, Azadirachta indica, Centella asiatica*and*Piper nigrum*

Suggested Topics for Seminar/Presentation/Group Discussion:

- Siddha
- Ayurveda
- Medicinal Plants
- Medicinal Garden
- Adultration

Suggested Readings:

Text Book:

1. Sambamoorthy, A.V.S.S. and Subramanyam., N.S. The Text Book of Economic Botany. WileyEastern Ltd., Chennai.

2. Bharti Chaudhry, 2018. A hand book of Common medicinal Plants used in Ayurveda.Siva Rami Reddy, E. 2020. Advances in AYUSH (Ayurveda, Yoga, Unani, Siddha and Homeopathy).AkiNik Publications.

Reference Books:

1. Kandasamy, P. 2000. History of Siddha Medicine. Government of Tamil Nadu. Phanda, H. 2007. Herb Cultivation and Medicinal Uses. NIIR Publications, New Delhi.Chopra, R.N. 2010. Indigenous Drugs of India. Academic Publishers, New elhi.

Web Sources:

1. **https://www.nhp.gov.in/ayush_ms**
2. **https://www.dabur.com/amp/in/en-us/about/science-of-ayurveda/herbal-medicinal-plants**
3. **https://www.alamy.com/stock-photo/ayurvedic-medicinal-plant.html**

DEPARTMENT OF ZOOLOGY – UG – CBCS- LOCF

Title of the Course: Allied Zoology –IV		**Semester: IV**
Course Code: LUZOGE41	**Contact Hours:4hrs / w**	**Credits: 4**

Course Learning Outcome

On completion of the course, the students are able to

- gain the knowledge on the structure and functions of important physiological systems andphysiology of digestion.
- understand the structure and function of carbohydrate, amino acids, proteins, and Lipidsand their catabolic metabolism
- analyze the sexual gametes, fertilization, Chromosomal syndromes, andpopulation control.
- trace the organization of various microorganisms and their diseases.
- explore the evolutionary concept and history of man

Pre- required knowledge

- ✓ Physiology of animals and internal organs
- ✓ Biochemical structure and metabolism of molecules
- ✓ Classification and microbial diseases
- ✓ Structure of sperm and ovum
- ✓ Evolution and fossil evidence

Unit I: Human Physiology:

1. Digestion and absorbtion of Carbohydrates, Proteins, and Lipids.
2. Transport of oxygen and carbondyoxide in blood.
3. Structure of Nephron and Formation of urine in man.
4. Structure and function of Neuron and conduction of nerve impulse through myelinated and non- myelinated nerve fibres.

Unit II: Biochemistry:

1. Classification and structure of Carbohydrates (Mono, Di, Polysaccharides with oneexample each).
2. Classification and structure of proteins with one example each (primary, secondary, tertiary and quaternary structure).
3. Classification with example of each and Structure of Lipids..
4. Metabolism: Glycolysis and Glycogenesis; Deamination and Transamination andBeta oxidation.

Unit III: Microbiology:

1. Microbial classification – Whitaker five Kingdom classifications.
2. General features and structure of Bacteria with reference to *E.coli*.
3. General features and structure of Virus with reference to T_4 Bacteriophage.

4. Microbial diseases – Cholera, COVID- 19 and AIDS – Causative agent, infection, symptoms, prevention and control and first aid.

Unit IV: Developmental Biology

1. Structure of sperm – Sperm abnormalities and their causes.
2. Structure of ovum – Menstrual cycle – fertilization
3. Syndromes: Down and Klinefelter's syndrome.
4. Test tube babies (IVF) and Birth control methods.

Unit V: Evolution

1. Evolution theories– Lamarckism, Darwinism and Modern synthetic theory.
2. Evidences for Evolution from morphology, Biochemical and Paleontology.
3. Speciation- Allopatric and Sympatric speciation
4. Study of human evolution from fossil evidences.

Suggested Topics for Group Discussion / Presentation

1. Neurodegenerative disorders
2. Important body lipids
3. Diseases caused by viruses
4. Diseases due to chromosomal anomalies
5. Evolution from fossil evidences.

Suggested Readings:

i) Text Books

1. Rastogi, S. C. 2007. Essential of Animal physiology. New age International Publishers

2. Ambika Shanmugam. Biochemistry. 10, II Cross Street, West C. I. T.Nagar, Chennai.

3. Baveja, C. P. 2017, Text book of Microbiology, Arya Publication.

4. Verma,P.S and Agarwal,V.K.2012. Cell biology, Genetics and Evolution, S.Chand Publications.New Delhi

ii) Reference Books:

1. **Gordon, S. and Maleon, *et al*.** Animal Function – Principles and Adaptations. TheMcMillan Company.
2. **Hoar, S. William.** General, comparative Physiology. Prentice Hall of Indian Pvt.Ltd., New Delhi.
3. **Bell, Davidson and Scarborough.** Text Book of Physiology and Biochemistry. ELBS & E & S – Livingstone.
4. **Ambika Shanmugam.** Biochemistry. 10, III Cross Street, West C.I.T. Nagar,Chennai – 600 035.
5. **Lehninger – 2008.** Principles of Biochemistry. Nelson & Co., CBS Publishers &Distributors, Delhi – 110 032.
6. **Chakraborty, P. 1995.** A text Book of Microbiology. New Central Book AgencyPvt. Ltd., Calcutta.
7. **Ananthanarayanan, R. and Jayaram Paniker, C.K.** 1994. Text Book of Microbiology – V Edition. Orient Longman.
8. **Verma, S. and Agrawal, V.K. 2000.** Chordate Embryology. S. Chand & Co., NewDelhi.
9. **Arumugam, N – 2014.** A Text Book of Embryology. Saras Publication, Kottar.
10. **Savage.** Evolution. Amerind Publishing Co., Pvt. Ltd., New Delhi.
11. **Moody, P.A.** An Introduction to Evolution. Kalyani Publishers, Ludhiana
12. **Dobzhansky.** Evolution, Genetics and Man. Oxford and IBH Publishing Co., New Delhi.

iii) Web Sources

1. https://swayam.gov.in/course/3712-animal-physiology
2. https://swayam.gov.in/courses/5366-jan-2019-biochemistry
3. https://swayam.gov.in/course/96-genetics

4. https://www.coursera.org/learn/genetics-evolution

DEPARTMENT OF ZOOLOGY – UG – CBCS- LOCF

Title of the Course: Allied Zoology Practical-II Semester: III & IV
Course code: LUZOGL41 Contact Hours: 2hrs/ w Credit: 2

Course Learning Outcome

On completion of the practical course, the students are able to

- develop observational skills in identifying, sketching and locating desired parts andinterpret them
- understand the test of Identification of carbohydrate Protein and Lipid, Ammonia, Urea
- and Uric acid.
- understand the structure of cell and arrangement of different stages of cell division.
- understand the mendelian principle and genetic variability.
- understand the method of preparation of buccal smear.

List of Practicals:

1. Mitotic preparation of Onion root tip squash – Mitotic stages
2. Buccal smear preparation in Man – Squmous epithelium
3. Mendelian Monohybrid ratio with color beads.
4. Study of simple Mendelian traits in class population – Homozygous & Heterozygous
5. Qualitative test for Ammonia, Urea and Uric acid
6. Qualitative test for Carbohydrate, Protein and Lipid.

List of Spotters: (Identification, Sketching, Explanation and Evaluation)

1. DNA
2. tRNA
3. ABO Blood group – Landsteiner model

4. Rh Blood group.
5. Cloning technology – Flow chart
6. Plasmid Vector pBR $_{322}$
7. Primary Lymphoid Organ – Thymus
8. Secondary Lymphoid Organ – Lymph node
9. IUCN
10. UNDP
11. Neuron
12. Nephron
13. Monosaccharide- D- Glucose structure
14. Disaccharide – Sucrose structure
15. Bacteria- *E. coli*
16 Virus- Bacteriophage
17. Human sperm
18. Human egg
19 Vestigial organ: Nictitating membrane
20. Vestigial organ: Vermiform appendix.

DEPARTMENT OF CHEMISTRY – UG –CBCS- LOCF
ALLIED CHEMISTRY FOR B.Sc. BOTANY

Title of the paper: Allied Chemistry – II (Organic and Inorganic Chemistry)	**Semester: IV**
Course Code: LUCHGE41 Contact Hours: 4hrs/w	**Credits: 4**

Course Learning outcomes

On completion of the course, the students are able to

- ❖ learn about the mechanisms of aliphatic substitution reaction
- ❖ know about the aromatic halogen compounds and organometallic compounds

- ❖ acquire knowledge about aminoacids, proteins and vitamins
- ❖ know about IUPAC nomenclature and theories of coordination compounds
- ❖ gain knowledge about pollution and its types.

Pre-Required Knowledge

- ✓ Chloroform
- ✓ Chlorotoluene
- ✓ Green house effect.
- ✓ Acid rain

Unit I: ALIPHATIC HALOGEN COMPOUNDS

1. Preparation, properties and uses of Ethyl iodide, Chloroform, and Carbon tetrachloride.
2. Mechanism of aliphatic substitution: SN^1, SN^2 – illustration with examples - differences

Unit II: AROMATIC HALOGEN COMPOUNDS AND ORGANOMETALLIC COMPOUNDS

Preparation, properties and uses of Chlorobenzene, hexachlorobenzene – benzoyl chloride, chloro toluene – DDT.Definition – preparation – synthetic application of Grignard reagent.

Unit III: AMINO ACIDS, PROTEINS AND VITAMINS

1. Classification — properties of aminoacids (Grabielpthalimide synthesis) polypeptides – proteins – classification and biological functions.
2. Vitamins and Antibiotics:

a) Classification and biological functions of vitamins A, B_6, B_{12}, C, D, E and K (structural elucidation not required)

b) Classification and biological functions of antibiotics – pencillin, chloroamphenicol, streptomycin and tetracyclines.

Unit IV: COORDINATION CHEMISTRY

Definition of various terms like central metal ion, ligand, coordination number and coordination sphere – IUPAC nomenclature of simple coordination compounds – Werner's theory - EAN rule – VB theory (outline only) – Chelates and its applications.

Unit V: POLLUTION

a) Air pollution: Definition, composition of air – sources of air pollution – classification and effect of air pollutants – effect of fluorocarbons – ozone layer – composition – depletion – green house effect. Acid rain – formation and control - methods to control air pollution.

b) Water pollution: Types - sources – water sewages – industrial effluents – inorganic pollutants – organic pollutants - water pollution control and treatment (reverse osmosis only).

Suggested Topics For Group Discussion / Presentations
Carbon tetrachloride and Chlorobenzene

Isoelectric point and its structure

Water pollution

Applications of coordination compounds

Preparation, properties and uses of DDT

Classification and properties of aminoacids

Air pollution

Text Books:

1. PL. Soni, Text Book of Inorganic Chemistry, Sultan Chand & Son, Reprint 2005.
2. M.K.Jain and S.C. Sharma, Modern Organic Chemistry, Vishal Publishing Co., 2009.
3. Arun Bahl and B.S.Bahl, A Text Book of Organic Chemistry, 22nd edition S. Chand & Company, 2016.

References Books:

1. R.D.Madan, Modern Inorganic Chemistry, 3 edn, S.Chand& Company Ltd.,Reprint, 2014.
2. Satya Prakash et al., Advanced Inorganic chemistry, S. Chands & Co, Pvt.Ltd.,New Delhi, 2016.

Web Sources:

1. https://www.youtube.com/watch?v=mDZk3C577K4
2. https://www.youtube.com/watch?v=eB5NVPzBCzM
3. https://www.youtube.com/watch?v=1Qh11NsSmGc

4. https://www.toppr.com/guides/chemistry/coordination-compounds/introduction-and-werners- theory-of-coordination-compounds/
5. https://climatekids.nasa.gov/air-pollution/

DEPARTMENT OF CHEMISTRY – UG –CBCS- LOCF
ALLIED CHEMISTRY FOR B.Sc. BOTANY

Title of the paper: Allied Chemistry Practical –I (Qualitative Analysis) **Semester:III & IV**

Course code: LUCHGL41 **Contact Hours: 2hrs/w** **Credits: 2**

Learning outcomes

On completion of the course the students are able to

- ❖ identify the cations and anions
- ❖ know group separation of cations
- ❖ knowledge on conditions of precipitations
- ❖ knowabout solutions, identification of specific colors of ions
- ❖ to know about interfering radicals

Pre-Required Knowledge

- ✓ Procedures for basic test for important anions
- ✓ Laboratory Safety precautions
- ✓ To know the tests and spot tests for cations

Analysis of a simple salt (by macro or semi micro method)

Cations: Lead, bismuth, copper, cadmium, iron, aluminium, chromium, zinc. Manganese, cobalt, nickel, calcium, barium, strontium, magnesium and ammonium.

Anions: carbonate, halides, nitrate, oxalate, borate, phosphate, chromate and sulphate.

Web Sources:

1. https://youtu.be/49EyanHRdAA
2. https://youtu.be/EmrQcCC8A-8

3. https://youtu.be/LA6jbPHj9aw
4. https://youtu.be/q9zWUO2ettk
5. https://youtu.be/GwUCibuaj8s

Title of the course:	**Plant Morphology and Taxonomy of Angiosperms**	**Semester: V**
Course code :LUBYCT51	**Contact hours: 3hrs/w**	**Credit: 3**

Course Learning outcomes

On completion of the course, the students are able to

- understand plant morphological terminology and use it accurately in the description and identification of plant species.
- interpret the rules of ICN in botanical nomenclature
- assess terms and concepts related to Phylogenetic systematic.
- generalize the characters of the families according to Bentham & Hooker's system of classification.
- identify the Angiosperms families with specific key characters.

Pre-required knowledge:

- Morphology – modified forms
- Classification – nomenclature
- Herbarium – identification tools

Unit I: Plant morphology and Plant systematic

Modification of root and stem – Leafphyllotaxy and stipules; inflorescence types; technical terms to flowers and floral parts; types of fruits. Systematics: Introduction, and history, Modern trends in Taxonomy – Cytotaxonomy, chemotaxonomy and numerical taxonomy, molecular taxonomy, and DNA Bar coding.

Unit II: Classification and Botanical nomenclature

Classification: Artificial (Carolus Linnaeus), Natural (Bentham & Hooker), and Phylogenetic (Engler and Prantl's and APG system IV (2016)) - Merits and demerits. Principles

and rules (ICN), Phylocode. Ranks and names, Typification, author citation, valid publication, rejection of names, principle of priority and its limitations.

Unit III: Herbarium, Dichotomous keys and Polypetalae families

Field inventory; Herbarium techniques, Virtual herbaria, Keys: intended (yoked) and bracketed keys. Institute of Taxonomic research (BSI, IFGTB, & JNTBGRI).

Study of Vegetative, floral characters and systematic affinities with economic importance: Nymphaeaceae, Rutaceae, Meliaceae, Leguminosae, Myrtaceae and Cucurbitaceae.

Unit IV: Gamopetalae

Study of vegetative, floral characters and systematic affinities with economic importance: Rubiaceae, Apocyanaceae, Asclepiadaceae, Convolvulaceae, Acanthaceae and Verbenaceae.

Unit V: Monochlamydae and Monocot

Study of vegetative, floral characters and systematic affinities with economic importance: Amaranthaceae, Euphorbiaceae, Orchidaceae, Lilliaceae, Arecaceae and Poaceae.

Suggested Topics for Seminar/Presentation/Group Discussion:

- Floral anatomy in relation to taxonomy.
- Palynology in relation to the taxonomy.
- Construction of Dichotomous keys.
- Phylogentic classifications.
- Field identification of families.

Suggested Readings:

Text Books:

1. Sharma, O.P. (2013). Plant Taxonomy. McGraw Hill Education Pvt. Ltd. New Delhi.

2. Rendle, A.B. (1970). The classification of flowering plants. Vikasa Pub, New Delhi,
3. Lawrence H.M. (1986). Taxonomy of Vascular Plants, Oxford and IBH Publications, New Delhi.
4. Pullaiah, T and S. Karuppusamy. (2018). Taxonomy of Angiosperms. 4th Edition, Regency Publication, New Delhi.
5. Jeffery. C. (1982). An Introduction of Plant Taxonomy, Allied pub., Bombay.

Reference Books:

1. Samuel, B.J. Luchsinger, (1987). Plant Systematics, Mc Graw Hill International Publ. New York.
2. Michael G. Simpson. (2019). Plant Systematics, 3rd ed., Academic Press, London,UK.
3. Sharma O.P. (1996). Plant Taxonomy, Tata Mc Graw Hill Pub., New Delhi.
4. Vasishta, B.R. (1989). Taxonomy of Angiosperms. S. Chand and Co. New Delhi.
5. Pandey, B.P. (2007). Taxonomy of Angiosperms. S. Chand and Co. New Delhi.
6. Pullaiah, T. (2007). Taxonomy of Angiosperms. 3rd Edition, Regency Publication, New Delhi.
7. Anonymous (Angiosperm Phylogeny Group (APG)). (2016). An update of the Angiosperm Phylogeny Group Classification for the orders and families of flowering plants: APG IV. Botanical Journal of the Linnaean Society 181: 1-20.

Web Sources:

1. https://www.itis.gov/
2. http://sweetgum.nybg.org/science/collections/
3. https://www.kew.org/science/collections-and-resources/data-and-digital/see-all-kew-data-resources
4. https://www.ipni.org/

Title of the Course: Plant Physiology **Semester: V**
Course code:LUBYCT52 **Contact hours: 3hrs/w** **Credit: 3**

Course Learning Outcomes:

On completion of the course, the students are able to

- this course provides an overview of the functional aspects of plants.
- understand water relation of plants with respect to various physiological processes
- classify aerobic and anaerobic respiration
- explain the significance of photosynthesis and respiration
- assess dormancy and germination in plants

Pre-required Knowledge:

- Water relation of plants
- Photosynthesis
- Growth hormones

Unit I: Physico – Chemical phenomena

Physico – chemical phenomena – diffusion, osmosis and plasmolysis – imbibitions – water potential, osmotic potential and pressure potential.Mechanism of absorption of water – passive and active absorption. Ascent of sap – pathway, theories explaining the mechanism.

Unit II: Mineral nutrition and Transpiration

Essential elements: Macro and Micro: Absorption of minerals. Mass carrier concept - Munch mass flow hypothesis. Transpiration – types; mechanism of stomatal movement – significance of transpiration – guttation.

Unit III: Photosynthesis

Photosynthesis – a brief idea of the pigments involved – photosynthetic unit – two photosystems – photolysis of water – red drop and Emersion enhancement effect – electron transport and photophosphorylation – non – cyclic and cyclic,

C3 and C4 cycles. Translocation of organic solutes – pathway – mechanism - a critical account of mass flow hypothesis.

Unit IV: Respiration

Respiration – aerobic and anaerobic – mechanism of aerobic respiration – glycolysis, Krebs cycle and electron transport – energetics of respiration – fermentation. Nitrogen metabolism – sources of nitrogen – molecular nitrogen fixation – symbiotic and asymbiotic nitrate reduction – incorporation of ammonia into amino acids- nitrogen cycle.

Unit V: Growth Hormones

Growth – different phases of the growth curve of a plant. A brief account of photoperiodism and vernalization. Physiological effects of auxins, gibberellins, cytokinins and ethylene. Seed dormancy – causes and breaking methods.

Suggested Topics for Seminar/Presentation/Group Discussion:

- Ascent of sap
- Photosynthesis
- Plant Growth Hormones
- Nitrogen metabolism
- Seed dormancy causes and breaking methods

Suggested readings:

Text Books:

1. Salisbury, F.B and Ross, C.W. Plant Physiology. Thomas Wadsworth U.K. & U.S.,1992
2. Jain, V.K. Fundamentals of Plant Physiology, S.Chand& Co., New Delhi, 1974.Verma, V.K Text Book of Plant Physiology, Anes Book India, New Delhi. 2007.

Reference Books:

1. Salil Bose, Elementary Biophysics, 1982.Devlin, R.M. and Witham, F.H. Plant Physiology, C.B.S. Publishers and Distributors, New Delhi, 1983.

2. Noggle, G.R. and Fritz, G.J. Introduction of Plant Physiology. Prentice Hall of India Pvt. Ltd., New Delhi. 2002.
3. Bidwell, R.G.S. Plant physiology, Macmillan Publishing Co. 1974.
4. Taiz, L. and Zeiger, E. Plant Physiology, Panima Publishing corporation, New Delhi.2003.

Web Sources:

1. https://microbenotes.com/photosynthesis/
2. https://byjus.com/biology/plant-physiology/
3. https://www.easybiologyclass.com/plant-physiology-free-lecture-notes-online-tutorials-lecture-notes-ppts-mcqs/

Title of the Course: Plant Biochemistry		**Semester: V**
Course code:LUBYCT53	**Contact hours: 3hrs/w**	**Credit: 3**

Course learning Objectives:

On completion of the course, the students are able to

- obtain the knowledge on scope and importance of biochemistry
- gain the information on carbohydrates and their properties
- acquire the knowledge on proteins and amino acids
- gather information about lipid and vitamins.
- understand the information about biomolecules
  - ❖ Pre required Knowledge:
  - ❖ Atoms
  - ❖ Amino acid, proteins
  - ❖ Enzymes, vitamins

Unit I: Introduction

Laws of thermodynamics – enthalpy – entropy – concept of free energy – ATP as a high energy compound – bioenergetics of chloroplasts and mitochondria – light – characteristics, absorption and emission - fluorescence, phosphorescence and bioluminescence.

Unit II: Carbohydrates:

Nomenclature, definition, classification, structure (monosaccharides only) and properties.

Lipids: Classification – structure and properties. Fatty acids: Saturated and unsaturated. Lipoproteins: Classification, metabolism and its functions.

Unit III: Amino acids& Proteins:

Amino acids; Classification, structure and properties of amino acids. Proteins: Classification based on composition, solubility, shape and function. Structure - Primary, secondary, tertiary and quaternary structures. Physical and chemical properties of proteins.

Unit IV: Enzymes:

Nomenclature, classification and properties – mechanism of enzyme action (lock and Key – Induced fit model), factors affecting enzyme activity. Inhibition of enzyme action. Enzyme kinetics. Immobilization techniques for the production of enzymes and its industrial applications.

Unit V:Vitamins

Vitamins; Structure, importance, source, deficiency symptoms and types. Trace elements: Functions and deficiency of zinc, copper, iodine, manganese, cobalt, molybdenum, chromium, fluoride and selenium.

Suggested Topics for Seminar/Presentation/Group Discussion:

Isomerism – types, structural, stereo and optical isomerism

Physical and chemical properties of proteins

Mechanism of enzyme action

Functions and deficiency of zinc, copper

Secondary metabolites

Suggested Readings:

Text Books:

1. Jain, J.L. Fundamentals of Biochemistry, S.Chand& Co., New Delhi, 1979.

2. Jayaraman, J.Laboratory manual in Biochemistry,ml Wiley Eastern Ltd., Chennai, 1981.
3. Veerakumari, L.Biochemistry, MJP Publishers, Chennai, 2004.

Reference Books:

1. Conn, E.E. and P.K. Stumpf. Outlines of Biochemistry, Willey Eastern Ltd., Chennai, 1972.
2. Lehninger, A.L. Biochemistry, Kalyani Publishers, New Delhi, 1978.
3. LubertStryer, Biochemistry, CBS Publishers, New Delhi, 1986.
4. Keith Wilson and Kenneth H.Goldzg, Principles of Techniques of practical Biochemistry, Cambridge University Press, Foundation Books, 1993.

Web Sources

1. https://bmb.natsci.msu.edu/research/plant-biochemistry/
2. https://www.britannica.com/science/biochemistry
3. https://www.vedantu.com/chemistry/biochemistry
4. https://en.wikipedia.org/wiki/Biochemistry

Title of the course: Practical - Plant Morphology and Taxonomy of Angiosperms	**Semester: V**
Coursecode:LUBYCL51 Contact hours: 5hrs/w	**Credit:3**

Course Learning Outcomes:

On completion of the course, the students are able to

- understand plant morphological terminology and use it accurately in the description and identification of plant species.
- evaluate and discuss groups of plants in terms of their diversity and describe their evolution, phylogeny.
- acquire practical knowledge on identification of various groups of plants
- generalize the characters of the families according to Bentham &Hooker's system of classification.

- develop skill on geographical distribution of plants in various habitats and to identify the individual species.

List of experiments:

1. Morphology of vegetative and reproductive characteristics.
2. Demonstration of floras and manuals for plant identifications.
3. Study of Salient features, vegetative and sexual characters of the following families (Description, V.S. flower, section of ovary, floral diagrams, floral formulae and systematic position according to Bentham & Hooker's system of classification):

- **Polypetalaefamilies:** Nymphaeaceae, Brassicaceae, Mimosaceae, Annonanceae, Rutaceae, Meliaceae, Caesalpinanceae, Myrtaceae, and Cucurbitaceae
- **Gamopetalaefamilies:** Rubiaceae, Solanaceae, Apocyanaceae, Asclepiadaceae, Convolvulaceae, Acanthaceae, Lamiaceae and Verbenaceae.
- **Monochlamydeaefamilies:** Aristolochiaceae, Amaranthaceae, and Euphorbiaceae
- **Monocotyledons:** Orchidaceae, Lilliaceae, Arecaceae, Poaceae, and Cyperaceae.
- Preparation of artificial keys for the Polypetalae, Gamopetalae, monochlamydae and Monocot families studied.

4. Preparation and submission of thirty wild plants herbarium sheets, photo plates (related to morphology) and field note book.
5. Each student has to plant and maintain minimum of one plant from above studied family in the department garden.
6. Taxonomic field trips for a minimum of four days.
7. A record should be maintained for external and internal valuation.

Reference books:

1. Bendre, A. M. and Ashok Kumar, (2009). A Text book of Practical Botany Vol. I & II. Rastogi Publications, Meerut. 9th edition.
2. Singh, V., Pande, P. C., and Jain. D. K. (2015). A Text book of botany. Rastogi publications, Meerut, New Delhi. 4th edition.

Title of the Course: Practical - Plant Biochemistry and Physiology		Semester: V
Course Code:LUBYCL52	Contact hours: 3hrs/w	Credit: 3

Course learning Objectives:

On completion of the course, the students are able to

- acquire knowledge about phytoconstituents in plants
- they explain the different mechanisms in plants used for water transport.
- explain assimilation of different mineral nutrients in plants.
- understand the relations between secondary metabolites and plant defense.
- explain the roles of light in plant development

List of experiments:

Biochemistry:

1. Determination of complementary colors
2. Verification of Beer's law
3. Estimation of starch from potato tubers
4. Estimation of sugars from fruit samples
5. Estimation of starch by gravimetric methods
6. Estimation catalase enzyme
7. Estimation of chlorophyll a and b.
8. Separation of amino acids by ascending paper chromatographic method
9. Qualitative tests for carbohydrate, protein and amino acids

10. Preparation of buffer.

Plant Physiology:

1. Determination of osmotic potential by plasmolytic method
2. Determination of water potential by falling drop method
3. Determination of water potential by gravimetric method
4. Determination of rate of imbibitions
5. Effect of $NaHCO_3$ on photosynthetic rate
6. Effect of monochromatic light on photosynthesis.

Demonstration set up:

1. Kuhne's fermentation tube
2. Farmer's potometer
3. Ganong'spotometer
4. Arc Auxanometer
5. Transpiration pull
6. Respiroscope
7. Phototrophic chamber

Reference Books:

1. Bendre, A.M. and Ashok Kumar, 2009. A text book of practical Botany. Vol. I & II. Rastogi Publication. Meerut. 9thEdituion.
2. Manju Bala, Sunita Gupta, Gupta NK. 2012. Practicals in Plant Physiology and Biochemistry. Scientific Publisher.
3. Dubey RC. And Maheshwari DK. 2020. Practical Botany. S. Chand Publication.

Title of the Course: Molecular Biology and Biostatistics		**Semester: V**
Course Code:LUBYDS51	**Contact hours: 3hrs/w**	**Credit: 3**

Course learning Objectives:

On completion of the course, the students are able to

- ❖ understand the molecular basis of life in the field of biology.
- ❖ analyse the genetic materials and its forms.
- ❖ gain information on DNA replication, genetic code, gene expression etc.

- ❖ acquired the basic knowledge of statistics in biology.
- ❖ understand the genetically recombination
- ❖ Pre required Knowledge:
- ❖ Genetic code
- ❖ DNA replication.
- ❖ Data analysis

Unit I: Genomics

Gene - fine structure: Concept of genome- Gene as functional unit -Comparative analysis of genomics in prokaryotes and eukaryotes.

Unit II: DNA replication

DNA replication – mechanism of replication – rolling circle method – enzymes involved and accessory proteins in DNA replication – C value Paradox.

Unit III: Genetic material

The central dogma – genetic material – properties of the genetic material –Forms of DNA and RNA – Super coiling and topoisomerases. Genetic code – characteristic features – molecular events of transcription and translation.

Unit IV: Genetic Recombination

Regulation of gene expression – operon concept with reference to lac operon. Genetic recombination – transformation, transduction and conjugation

Unit V: Data analysis

Data collection – sampling methods – presentation of data – tables and graphs – measures of central tendency – arithmatic mean, median, mode – measures of dispersion – Standard deviation.

Suggested Topics for Seminar/Presentation/Group Discussion:

- ➢ Comparative analysis of prokaryotes and eukaryotes.
- ➢ Operon concept
- ➢ Molecular events of transcription and translation.

- Regulation of gene expression (operon concept)
- Measures of central tendency (mean, median, mode)

Suggested Readings:

Text Books:

1. Freifelder, D.2006. Molecular biology, Narosa Publishing House, New Delhi.
2. Brown, T.A. 1999. Genomics, John Wiley & sons, New York.
3. Gardner, E.J. Simmons, M.J., and Snustad, D.P. 2006, Principles of Genetics, John Wiley & Sons, New York.

Reference Books:

1. Strickberger,M.W. 2001. Genetics, Prentice Hall of India Pvt. ltd., New Delhi.
2. Lewin, B.1998 Genes VI. Oxford University Press, New Delhi.
3. Palanichamy, S. and Manoharan, M.1994, Statistical methods for biologist. Paramount Publications, Palani.

Web Sources:

1. http://microbenotes.com/category/molecularbiology
2. http://www.evolution.textbook.org/cotent/free
3. http://www.pac.ksu.edu. sa/sites/default/files/introductionstobiostatistics-106,pdf.

Title of the Course: Aquatic Botany		**Semester: V**
Course Code:LUBYDS52	**Contact hours: 3hrs/w**	**Credit: 3**

Course learning Objectives:

On completion of the course, the students are able to

- remember the basic concepts of marine diversity
- recognize the major groups of algae
- understanding on commonly occurring marine and limnetic algae of indian coasts along with the current understanding of its biology

- analyze the properties of seagrasses, mangroves, other aquatic angiosperms and microalgae
- reflect upon the values and uses of aquatic plants

Pre-required Knowledge:

- Marine biodiversity
- Hydrophytes and Halophytes
- Microalgae

Unit I: Marine and Limnetic Macro Algae

Common seaweeds of Indian subcontinent: *Ulva, Caulerpa, Gracillaria, Sargassum* and *Cladophora*. Life cycle, ecology and species identification features. Common terrestrial algae including cyanobacteria and lichen photobionts of Indian subcontinent and its lifecycle, ecology and taxonomy: *Chlorella*, *Trebouxia*, *Trentepohlia*

Unit II: Seagrasses and Mangroves

Common seagrasses of Indian subcontinent: *Cymodaceae, Halophila, Thalassia, Halodule and Syringodium.* Life cycle of Seagrass and Ecological significance of Seagrasses.Famous mangrove forests of India including Sundarbans, Pichavaram, Kerala Mangroves, Rathnagiri mangroves. Common species of mangroves and mangrove associated plants, including *Avicennia, Rhizophora, Laguncularia, Sonneria, Acanthus and Aegiceras*. Ecological significance of mangroves.

Unit III: Phytoplanktons, Cyanobacteria, Dinoflagellates and Diatoms

Common marine microalgae of India including phytoplanktons and picoplanktons, Common diatoms and dinoflagellates of Indian Ocean, Common limnetic and terrestrial cyanobacteria of India.

Unit IV: Aquatic Angiosperms

Common aquatic angiosperms of India (including Lotus, water lilly and Water hyacinth). Ecology, lifecycle, taxonomy and economic importance of aquatic angiosperms.

Unit IV: Values and uses of aquatic plants:

Economic importance of aquatic plants, Ecosystem services of aquatic plants including biogeochemical cycles, oxygen production and carbon sequestration, biodiesel and so on, seaweed-based industries in India and abroad, edible seaweed and algal resources of India, aesthetic, cultural, spiritual importance of aquatic plants.

Suggested Topics for Seminar/Presentation/Group Discussion:

- Hydrophytes, and Halophytes
- Seaweeds cultivations
- Mangrove forests
- Seagrass ecosystem
- Economic importance of algae

Suggested Readings:

Text Books:

1. Sambamurty A.V.S.S. 2019. A Textbook of Algae. Dreamatech press Publisher.
2. Subramanian D. 2021. Flowering plants of Tamil Nadu Mangrove Associates. MJP Publisher.
3. Wile, J.M, Sherwood, L.M. and Woolverton, C.J. (2013). Prescott's Microbiology. 9th Edition. McGrawHillInternational.

Reference Books:

1. Joseph Callrey, Philip R.F.Banet, Mana Teresa Fenaria. Biology, Ecology and Management of Aquatic Plants. Springer.
2. Gopal, B. 2020. Ecology and Management of Aquatic Vegetation in the Indian Subcontinent. Springer.
3. Lee, R.E. (2008). Phycology. 4th edition. Cambridge University Press, Cambridge.
4. Kumar,H.D.(1999).IntroductoryPhycology.AffiliatedEast-WestPress,Delhi

5. Hoek, C. Van, D. (1999) An Introduction to Phycology. Cambridge University Press.

Web resources:

1. http://www.mesa.edu.au/marine_algae/algae03.asp
2. https://ocean.si.edu/ocean-life/plants-algae/seagrass-and-seagrass-beds
3. http://tnbb.tn.gov.in/images/pdf/MSSRF-MANGROVES-IN-TAMILNADU.pdf
4. https://plantlet.org/aquatic-angiosperm-water-finery/

DEPARTMENT OF CHEMISTRY – UG –CBCS- LOCF
ALLIED CHEMISTRY FOR B.Sc. BOTANY

Title of the paper:	**Allied chemistry III**		**Semester: V**
	(Organic, Inorganic and Physical Chemistry-II) Course		
Code:	**LUCHGE51**	**Contact Hours: 4hrs/w**	**Credits: 4**

Learning Outcomes

On completion of the course, the students are able to

- ❖ understand the fundamental idea about organic, Inorganic and physical chemistry
- ❖ gain knowledge on adsorption & catalysis and thermodynamic process
- ❖ understand the preparation of various polymers
- ❖ know about Nuclear Chemistry, amino acids, proteins and dyes

Pre-Required Knowledge

- ✓ Terms used in thermodynamics
- ✓ Adsorption and Absorption process
- ✓ Mass defect and binding energy

Unit I: ADSORPTION AND CATALYSIS

a) Adsorption – definition– adsorbate, adsorbent- physical adsorption – chemical adsorption – differences between these two types – factors influencing adsorption –

adsorption isotherms (Fruendlich and Langmuir Isotherm (no derivation, statement only)).

b) Catalysis – definition- different types of catalysis – acid-base catalysis – surface catalytic reactions – definition and examples – auto catalyst – catalytic poisoning – promotors – enzyme catalysis – characteristics.

Unit II: THERMODYNAMICS

Importance of thermodynamics – open and closed systems, state functions and path functions, extensive and intensive properties, reversible and irreversible processes, statement and mathematical form of first law of thermodynamics – heat capacity at constant volume and pressure, relation between Cp and Cv. Statement of II law of thermodynamics – entropy – physical significance of entropy-Gibb's free energy and its significance.

Unit III: POLYMER CHEMISTRY

Definition – classification of polymers – properties of polymers – addition and condensation polymerization reactions with suitable examples – natural rubber – isoprene unit – vulcanization of rubber – preparation and applications of polystyrene, urea – formaldehyde resin, Teflon and Buna –S-rubber.

Unit IV: NUCLEAR CHEMISTRY

Constitution of the nuclei – stable and unstable nuclei – their relationship to n-p ratio – magic number –packing fraction. Natural radioactivity– Soddy's group displacement law – Law of radioactive disintegration. Nuclear fission and Fusion: Theories of fission – applications of fission and Principles of atom bomb – Nuclear fusion – emission energy – Stellar energy and Hydrogen atom. Applications of Radioactivity: Applications in Medicine – Agriculture – Industry.

Unit V: NUCLEIC ACIDS AND DYES

Nucleic acids – Nucleotides, Nucleosides, DNA and RNA (structure only).

Dyes: Definition – theory of colour and constitution – classification based on structure and applications – preparation of methyl orange, Bismark brown, Malachite green and Indigo.

Suggested Topics For Group Discussion/Presentations

Adsorption- physical adsorption and chemical adsorption

Extensive and intensive properties, reversible and irreversible processes

Classification of polymers – properties of polymers

Theories of fission

Dyes classification based on structure and its applications.

Suggested readings:

Text Books:

1. B.R. Puri, L.K. Sharma and M.S. Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2004
2. Arun Bahl and B.S.Bahl, A Text Book of Organic Chemistry, 22nd edition S. Chand & Company, 2016.

Reference Books:

1. B.R. Puri, L.K. Sharma and K.C. Kalia, Principles of Inorganic chemistry, Milestone, 2012.
2. M.K.Jain and S.C. Sharma, Modern Organic Chemistry, Vishal Publishing Co., 2009.

Web Sources:

1. https://www.youtube.com/watch?v=6QXtnmB1vqk
2. https://nptel.ac.in/courses/104/101/104101121/
3. https://youtu.be/hI4v7v8AdfI
4. https://www.khanacademy.org/science/chemistry /chem-kinetics/arrhenius-equation/a/types-of- catalysts

Title of the Course: Communicative English-I		Semester: V
Course Code: LUENNM51	Contact Hours: 2hrs/w	Credits: 2

Course Learning Outcomes:

On completion of the course, the students are able to

- understand the role of communication in personal and professional success
- have comprehensive application- knowledge of appropriate communication strategies
- apply appropriate communications skills across settings and purposes
- respond effectively to various communicative demands
- build and maintain effective relationship by demonstrating appropriate, professional and ethical behaviour

Pre-required Knowledge:

- Functional grammatical knowledge
- Spoken idioms
- Working knowledge of language skills

Unit I: Listening

Introducing oneself, At a Bank-II, At a Hotel Reception Hall, Helping a friend obtain a Rental Flat-I, At the Restaurant, Visiting a Doctor with One's Parent, Attending an Interview, Visiting a Friend in the Hospital-I, Present water Crisis in Chennai, Attending a career Guidance Fair-I.

Unit II: Speaking I

Greeting, Introducing, Inviting someone, Making requests, Offering help, Seeking permission, Asking for advice, Expressing gratitude, Asking about remembering.

Unit III: Speaking II

Persuading, Complimenting/Congratulating, Expressing Sympathy, Complaining, Apologizing, Making suggestions, Warning someone.

Unit IV: Writing

Writing Paragraphs, Writing Telegrams, Writing Letters, Writing Short Notices and Notes, Précis Writing and Note-making.

Unit V: Career Skills

Preparing Curriculum Vitae and Cover letters, Facing an Interview, Presentation Skills and Persuasion Skills

Suggested Topics for Presentation:

- Introduce yourself in bank and hotel
- Invite your friends for your birthday party.
- Congratulate your sister on her passing IAS exam.
- Ways, means and methods of professional writings.
- Prepare a CV for the post of Teacher in educational institution.
- Mock interview and mock presentation.

Suggested Readings:

i) Text Books:

1. Adair, John. *Effective Communication*. London: Pan Macmillan Ltd., 2003.
2. Balan, Jayashree. Ed. *Spoken English*. Chennai: Vijay Nicole Imprints Pvt.Ltd., 2006.

ii) Reference Books:

1. Bose,M.N.K. Ed. *Better Communication in Writing*. Madras: New Century Book House (P) Ltd, 2004.
2. Pillai G. Radhakrishna and Rajeevan. Ed. *Spoken English For You*. Chennai: Emerald Publishers, 2002.
3. Ramani, S. Ed. Write English without formal grammar.

iii) Web Sources:

1. https://www.careertipstogo.com/career-basics/
2. http://mystarjob.com/articles/story.aspx?file=/2013/6/22/mystarjob_careerguide/13226186&sec=mystarjob_caree
3. https://www.indeed.com/career-advice/interviewing/prepare-for-a-mock-__interview

DEPARTMENT OF HISTORY - UG

Course Title: Working of Indian Constitution		Semester: V
Course Code: LUHSNM51	Contact Hours: 2hr	Credit: 2

Course learning outcomes:

On completion of the course students are able to

- Understand the stages of framing of Indian Constitution
- Describe the classification of Constitution.
- Analyse the powers and functions of the Indian President
- Asses the function of Legislature in India
- Evaluate the powers of Judiciary in India.

Unit I : Framing of Indian constitution

Drafting committee – Dr. B.R. Ambedkar- Various stages

Unit II: Basic concepts

Classification of constitution – Forms of Government.

Unit III: Legislature

The Parliament – The LokSabha – The RajyaSabha – Composition and Election procedure

Unit IV: Executive

The President – Qualification – Election procedure – Powers –The Prime Minister and Cabinet.

Unit V: Judiciary

Supreme Court - High Court – Jurisdiction – appointment of Judges – their qualifications.

Suggested topics for group discussion/ presentation

- Dr. B.R. Ambedkar
- Merits of classification of constitution
- The functions of Legislature
- The structure of Executive
- Judicial review of Supreme court

Suggested Readings.

Text Books:

- PonThangamani, Indian Constitutional History – A.D.1773 to 1950, PonnaiahPathipagam, Chennai, 2001.
- Ebi James, Working of Indian constitution,Tensy Publications,Sivakasi,2018

Reference Books:

- C.N. Joshi,The Constitution of India, Macmillan India Limited, Madras, 1983.
- Acharya Durga Das Basu, Introduction to the Constitution of India, Prentice Hall of India Private Limited, Delhi, 1997.
- Graville Austin, The Indian Constitution, Oxford University Press, Madras, 1966.
- M.V. Pylee, India's Constitution, S. Chand & Company Ltd., Delhi, 2011.
- VidyaDhar Mahajan Select Modern Governments, S.Chand&Co.Pvt Ltd,New Delhi,1975.

Web Sources

https://academic.oup.com
https://blog.ipleaders.in
https://legilative .gov.in

Title of the Paper: Fundamentals of Accounting		**Semester: V**
Course Code: LUCONM51	**Contact Hours: 2hrs/w**	**Credit: 2**

Course Learning Outcomes:

On completion of the course, the students are able to

- understand the use accounting rules.
- record business transactions in Journal and Ledger.
- prepare Subsidiary books.
- drawing up a trial balance.
- prepare the Final Accounts and Balance Sheet of Sole Traders

Pre required Knowledge:

1. Transactions and Golden Rules of Accounting
2. Book Keeping
3. Final Accounts

Unit- I:Accounting and Book-Keeping

Definition of Accounting and Book – Keeping- Double Entry System - Advantages and disadvantages - Types of Accounts -Rules of Accounting.

Unit-II : **Journal**-

Simple and Compound entries (Simple transactions only) -Ledger.

Unit-III: Subsidiary Books

Purchase Book, Purchase Returns Book, Sales Book, Sales Returns Book and Cash Book (Single Column Only – Simple Problems).

Unit- IV: Trial Balance

Meaning – Objectives – Methods – Format - Drawing up a Trial Balance (Simple Problems Only).

Unit- V: Final Accounts

Trading Account – Profit and Loss Account – Balance Sheet - Simple Adjustments (Closing Stock, Depreciation, Bad Debts, Outstanding Expenses and Prepaid Expenses – Simple Problem Only)

Suggested Topics/Practical Exercises:

The Learners are required to

- ✓ classify the types of accounts using golden rules of accounting.
- ✓ prepare Journal with imaginary values.
- ✓ list the various subsidiary books in small organization.
- ✓ draw a Trial Balance with imaginary figures of a sole trader.
- ✓ prepare the financial statements using any three adjustments.

Suggested Readings:

(i) Text Books

1. Dr.Peer Mohammed (2020). Financial Accounting –I. Madurai: PASS Publications.
2. P.C.Tulsian (2018). Financial Accounting.NewDelhi: Pearson Education Publisher.

(ii) Reference Books:

1. Arulanandam.M.A. & Raman K.S. (2018) Advanced Accountancy (Part – I),Mumbai:Himalaya Publishing House.
2. Dr. Maheshwari.S.N. (2019). Advanced Accountancy (Vol–I). New Delhi:Vikas Publishing House Private Limited.
3. Jain.S.Pand Narang.K.L. (2020).Advanced Accountancy. (Vol–I), New Delhi:Kalyani Publishers.
4. Reddy.T.S. &Murthy.A (2020). Financial Accounting. Chennai:Margham Publications.
5. Gupta R.L.&Radhaswamy.M. (2019). Advanced Accountancy. (Vol-I).New Delhi: Sultan Chand & Sons.

(iii) Web-Sources:

1. www.icai.ac.in
2. www.financial accounting.ac.in
3. wwwicwai.ac.in

Note: The questions be asked in the ratio of **70%** for problems and **30%** for theory.

NON MAJOR ELECTIVE
DEPARTMENT OF MATHEMATICS – UG – CBCS - LOCF

Title of the paper: Mathematical Skills for Competitive Examinations- I		**Semester: V**
Course code: LUMSNM51	**Contact Hours: 2hrs/w**	**Credits: 2**

Course Learning Outcomes:

On completion of the course, the students are able to

- Provide the students with an overview of Aptitude view in Mathematics.
- Learn about topics such as logic and proofs and easy calculations ways.
- Give clear idea about competitive exams.
- Develop various Mathematical skills to solve the problems.
- Evaluate various real life situations by resorting to analyse of key issues and factors.

Pre Required Knowledge:

- ✓ Understand the foundation of mathematics.
- ✓ Problem solving skills.
- ✓ Basic knowledge of mathematics ideas.

Unit I:Problems on Numbers.

Problems on Numbers.

Unit II: Ratio and Proportions

Ratio and Proportions.

Unit III:Time and work

Time and work.

Unit IV: Time and Distance

Time and Distance.

Unit V: Problems on Trains

Problems on Trains.

Suggested Topics for Group Discussion/ Presentation

1. Formation of equations
2. Problems on Proportion

3. Important facts and Formulae on time and work
4. Important facts and Formulae on time and distance
5. Problems on Trains

Suggested Readings:

(i)Text Books:

R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, Revised and Enlarged edition. S.Chand Publications, New Delhi, Reprint 2011.

Unit I: Chapter 7
Unit I: Chapter 12
Unit III: Chapter 15
Unit IV: Chapter 17
Unit V: Chapter 18

(ii)Reference Books:

R. Gupta, Quantitative aptitude, unique Publishers Pvt. Ltd, 2013.

1. G. K. Ranganath, C. S. Sampangiram and Y. Rajaram, A text book of business Mathematics, 2008, Himalaya Publishing House.
2. R.V. Praveen, Quantitative Aptitude and Reasoning by, 2nd revised edition, 2013, Prentice – Hall of India Pvt. Ltd.

(iii)Web Resources:

1. https://affairscloud.com/aptitude-questions/age.html
2. https://affairscloud.com/aptitude-questions-profit-and-loss-set-23.html
3. https://www.youtube.com/watch?v=0Hqd1M0UuAQ
4. https://www.bankexamstoday.com/2013/10/time-and-distance-problems-solutions.html
5. https://www.bankexamstoday.com/2015/07/simple-interest-and-compound-interest.html

Title of the paper: Chemistry in everyday life		Semester: V
Course code: LUCHNM51	Contact Hours: 2hrs/w	Credits: 2

Course Learning outcomes

On completion of the course, the students are able to

- ✓ know the Basic components of food and their compositions
- ✓ understand the Chemistry of vitamins
- ✓ learn about types of fuels
- ✓ know about chemistry of soaps and detergents
- ✓ know the chemistry of chemotherapy

Pre-Required Knowlwdge

- ✓ Food adulteration and precautions
- ✓ Sources and functions of vitamin
- ✓ Types of fuels

Unit I: FOOD:

Basic components of food - carbohydrates – proteins – fats as energy giving molecules. Biochemical process – effect of cooking on proteins. synthetic and natural foods – food additives – preservatives – greed of man – adulteration – modes of adulteration – detection – effects of adulteration- ill effects of Chunk foods – Milk: Denaturation and pasteurization

Unit II: VITAMINS

Definition, types of vitamins - sources of vitamins - biological functions and theuraptic uses of vitamins - diseasesdue to deficiency.

Unit III: FUELS

Definition - properties of ideal fuels - Types of fuels - Natural and Artificial fuels - composition and uses of coal gas, producr gas, water gas, hydrogen gas, LPG and Natural gas and bio gas. Advantage and disadvantage Introduction – physical of solid, liquid and gaseous fuels.

Unit IV: SOAPS AND DETERGENTS

Raw materials for soap and detergent - making of soap and detergents - classification of detergents - cleansing action of soaps and detergents - Applications of detergents.

Unit V: THERAPEUTIC DRUGS

Introduction – chemotherapy – classification of drugs – antipyretics – antacids - analgesics – antibiotics – transqyilliezers (definition with examples) – treatment of cancer.

Suggested Topics for Group Discussion / Presentations

Milk: Denaturation and pasteurization

Diseasesdue to deficiency of vitamins.

Natural and Artificial fuels.

Making of soap and detergents.

Classification of drugs.

Suggested Readings:

Text Book:

Sumati R. Mudambi and Shalini Rao, Food Science, Wiley Eastern Limited., 1990.

Reference Books:

1. Harry H Sisler and Calvin A. Vanderwerf, Food chemistry, Reinhold Publishing Corporation, New York, 1966.
2. P.L. Soni, H.M.Chawla, 29th Edition, Text book of Organic chemistry, Sultan Chand &Sons, Delhi., 2012.
3. B.K. Sharma, Industrial chemistry Goel Publishing House, Meerut,2011.
4. amboss.com/US/knowledge/vitamins.

Web Sources:

1. https://byjus.com/biology/food-adulteration/
2. https://www.youtube.com/watch?v=vppFkXW7Dt8
3. https://www.youtube.com/watch?v=ub86Dhg67tM
4. https://www.youtube.com/watch?v=OO9wEw5CfNM
5. https://youtu.be/OJhdag89Pq4

Title of the Course: Fundamentals of Physics – I		Semester: V
Course Code: LUPHNM51	Contact Hours: 2hrs/w	Credits:2

Course Learning Outcomes:

On completion of the course, the students are able to

- understand the fundamental of SI units
- describe the states of matter in day-to-day life
- identify the various forms of energy in nature
- obtain the knowledge of renewable and non-renewable energy sources and its uses
- understand the concept of reflection and refraction in optics

Pre-Required Knowledge:

- Fundamental knowledge on FPS, CGS, MKS system
- Understand the role of materials in this electronic Era
- Perspectives of green energy for next generation.

Unit I: Units and Measurements

S.I. Units – measurements of length, mass, time and other physical quantities- Dimensional formula for area, volume, density and force – Uses of dimension.

Unit II: States of Matter

Matter- Solid, Liquid, Gas and Plasma – Application of Plasma – application of Plasma – change of state – specific heat Capacity – specific latent heat of ice and stream.

Unit III: Types of Energy

Kind of energy- Mechanical energy, Thermal energy, Optical energy, Sound energy, Electrical energy, Atomic and Nuclear energy (Examples) – Conservation of energy.

Unit IV: Renewable and Non-renewable Energy

Renewable and non- renewable energy – Fossil fuel – coal Oil –Solar – Wind – Biomass – OTEC.

Unit V: Reflection and Refraction

Mirror – Laws of reflection – Image formation (Concave and Convex mirror) - Lens – Law's of refraction – Image formation (Concave and Convex lens) – Defects of eye and rectification.

Suggested Topics for Group Discussion/Presentation

- Units, Dimensions
- Application of Plasma
- Kind of energy
- Solar Energy
- Concave and Convex lens

Suggested Readings:

i) Text Books:

1. Sukhame S.P, Solar Energy – Principles of thermal collection and storage, Tata McGraw- Hil publishing company Ltd (1996).
2. Narayan Rao, B.V. First Year B.Sc. Physics, New Age International (P) Ltd, (1998).

ii) Reference Books:

1. Abbasi and Nasema Abbasi,S.A. Renewable Energy sources and their environmental impact, PHI Learning Pvt. Ltd., New Delhi(2008).
2. Rai G.D, Non-conventional Energy Sources, Khanna publishers, (2010).

iii) Web Sources:

1. https://www.learncbse.in
2. https://www.livescience.com
3. https://byjus.com

DEPARTMENT OF NCC – UG - CBCS - LOCF
PART IV - NON MAJOR ELECTIVE

Title of the paper: NCC - 1		**Semester: V**
Course code: LUNCNM51	**Contact Hours: 2hrs/w**	**Credits : 2**

Course Learning Outcomes

On Completion of this Course, the students are able to

- outline the organizational structure and dynamics of NCC
- elaborate various aspects of National Integration
- admire the braveness of Indian war heroes
- illustrate the functioning of Civil defense
- apply the principles of First Aid during emergencies

Pre–required Knowledge:

- ✓ Understanding aboutNCC organization.
- ✓ Understanding theMilitary History and Civil Defence.
- ✓ Skills in Disaster Management, First Aid and to inculcate Patriotism through national Integration.

Unit – I: NCC-Overview

NCC Organization – Levels (From Company to Directorate), History of NCC Organization, Role of NCC in India, Division of NCC, Motto and Cardinal Points – NCC Song.

Unit – II: National Integration

National Integration – Meaning – Motto – Importance – Components – Factors affecting National Integration - Religion, Culture and Heritage of India – Challenges and threats to National Integration – Contribution of NCC to National Integration.

Unit – III: Military History

Military History – Basic Organization of Indian Armed Forces – Biographies of Renowned Generals (in brief) – Field Marshal K M Cariappa, Field Marshal SHFJ Maneksha,

Marshal of the Air Force Arjun Singh – Famous Battles / Wars of India – Indo-Pak war 1971 &Kargil war 1999.

Unit – IV: Civil Defense and Disaster Management

Civil Defense and Disaster Management – Civil defenseOrganization and its duties – Aid to Civil authorities – Organization of Home guard – Types of emergencies / Natural disasters – Fire Services and Firefighting – Traffic Control during disaster under police supervision – Assistance during Natural Calamities: Flood/Cyclone/Earth Quake/Accident etc. – Collection and Distribution of Aid Materials.

Unit –V: First Aid

First Aid – Structure and Functioning of a human body – Hygiene and Sanitation – Physical and Mental health – Infectious, Contagious diseases and its prevention Wounds and Fractures.

Suggested Topics/ Practical Exercises

- knowing higher officials of NCC in National and State level.
- applying knowledge on National Integration in challenges.
- recognise the techniques in wars like Indo-Pakistan war and Kagil war etc.,
- apply the role of NCC in disasters.
- finding the right First Aid treatment in accidents.

SUGGESTED READINGS:

i) Text Books:

1. Asthana A K, Brigadier (2015), Commandant, Precis – Kamptee.
2. NCC Guide – Army Wing, (2010). Major R. Ramasamy, Karur, Priya Publications.
3. Cadets hand book (2018) -Common subjects for SD/SW, OTA Training Materials, Kamptee.

ii) Reference Books:

1. Specialized Subject Army (2018). Govt. Of India Press, New Delhi.

2. Precis, (2009). Published by Officer Training School, Kamptee
3. Cadet's diary, Published by cadets' center, Chennai, 2000.
4. NCC: Handbook of NCC cadets,(2015). R. Gupta, Ramesh Publishing House
5. Lt. Saravanamoorthy. S.N,A hand book of NCC-Army wing (2015), Jayalakshmi publications.

iii) Web sources

1. https://indiancc.nic.in/
2. https://play.google.com/store/apps/details?id=com.chl.ncc&hl=en_IN&gl=US
3. https://joinindianarmy.nic.in/default.aspx
4. https://www.joinindiannavy.gov.in/
5. https://indianairforce.nic.in/

DEPARTMENT OF BOTANY – UG-CBCS- LOCF

Title of the Course: Bioanalytical Techniques		**Semester: V**
Subject Code:LUBYSE51	**Contact hours: 2hrs/w**	**Credits: 2**

Course learning outcomes:

On completion of the course, the students are able to

- bridge the gap between academics, research and industry.
- Students will have knowledge on various biological techniques and their applications in identification, isolation of different biological molecules.
- understand the strengths, limitations and creative use of techniques for problem-solving.
- Students will be able to make a strategy on molecular techniques for the improvement in any trait or its well-being based on the techniques learned during this course.
- This course can use the knowledge for designing a project for research and execute it.

Pre-required Knowledge:

- Basic knowledge about light and its properties
- Methods of bio-analytical validation
- Basic units and conversion

Unit I: Microscopic techniques

Visualization of cells and sub-cellular components by light microscopy and fluorescent microscope, Resolving powers of different microscopes, Electron microscope, Scanning and transmission microscopes.

Unit II: Spectroscopic techniques

Laws of absorption of light, Beer-Lambert's Law, Absorption spectra, Ultraviolet-visible absorption spectroscopy: Principle and application, Fluorescence spectrophotometry: Principle and application, Mass spectroscopy: Principle and application.

Unit III: Centrifugation techniques

Basic principles of sedimentation, Types of centrifuges, Types of rotors, Preparative centrifugation (Differential & density gradient), ultracentrifugation.

Unit IV:Chromatographic techniques

Principles of chromatography (Adsorption and Partition chromatography), Planar chromatography (Paper and Thin-layer chromatography), Column chromatography,Gas chromatography, HPLC

Unit V: Electrophoretic techniques

General principles, Electrophoresis of nucleic acids (Agarose gel),Electrophoresis of proteins (SDS-PAGE), Blotting techniques-Southern, Northern,Western blotting.

Suggested Topics for Seminar/Presentation/Group Discussion:

- Current Developments in Techniques.
- Basic Research into Products
- Characterization of biological molecules
- Paper and Thin-layer chromatography
- Blotting techniques-Southern, northern, Western blotting.

Suggested Readings:

Text Books:

1. Keith Wilson and John Walker. (2009).Principles and techniques of biochemistry and molecular biology.7th Edition, Cambridge University Press, Cambridge, UK.
2. R. Katoch. (2011). Analytical techniques in biochemistry and molecular biology, Springer, New York.
3. Donald Voet and Judith Voet. Biochemistry, 4th Edition. (2010). John Wiley and Sons. New Jersey, USA

Reference Books:

1. Rodney F Boyer(2012) Biochemistry laboratory: modern theory and techniques.2nd Edition, Pearson Prentice Hall, Boston, USA.
2. D. L. Spector, R. D. Goldman. (2006). Basic methods in microscopy: protocols and concepts from cells: a laboratory manual. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.

Web Sources:

1. https://nptel.ac.in/courses/102/107/102107028/
2. https://nptel.ac.in/courses/102/103/102103044/
3. http://courseware.cutm.ac.in/courses/bioanalytical-techniques/

DEPARTMENT OF BOTANY – UG-CBCS- LOCF
(For those who join in June 2022)

Title of the Course: Environmental Impact Analysis **Semester: V**
Subject Code: LUBYSE52 **Contact hours:** 2hrs/w Credits: 2

Course learning outcomes:

On completion of the course, the students are able to

- understand the fundamental of environmental impact
- learn important steps of EIA process
- interpret the environmental appraisal and procedures in India.

- understand the fundamental concepts of environmental monitoring and management
- gain basic knowledge of various pollution sources and their impacts
- valuate the status of environmental education and public awareness along with their implications

Pre-required Knowledge:

- Knowledge on Environmental
- Comprehend knowledge on Pollution
- Basic concepts and terminologies in EIA

Unit I: Origin and Development

Introduction: Classification of Pollution and Pollutants, – Evolution of EIA (Global and Indian Scenario) - Elements of EIA - Screening – Scoping - Public Consultation - Environmental Clearance process in India - Key Elements in 2006 EIA (Govt. of India) Notification Scope of EIA in Project planning and Implementation.

Unit II: EIA Process

Components of EIA, EIA Methodology- Screening, Scoping, Baseline data, Impact Identification, Prediction, Evaluation and Mitigation, Appendices and Forms of Application, Techniques of Assessment-Cost-benefit Analysis, Matrices, Check list, Overlays, Impact on Environmental component: air, noise, water, land, biological, social and environmental factors.

Unit III: Air and Water Pollution

Air Pollution: Primary and Secondary Types of Pollutants, sulfur dioxide- nitrogen dioxide, carbon monoxide, Water Pollution: Point and Non-point Source of Pollution, Major Pollutants of Water, Impact of pollutants

Unit IV: Solid and Noise Pollution

Solid Waste: Classification and sources of Solid Waste, Characteristics, effects, e waste, Effects of urbanization on land degradation, pesticide pollution Noise Pollution: Sources of Noise, Effects of Noise Control measures

Unit V: Impact of pollution

Impacts of pollutants, types, scale of impact-Global, local pollutants. Climate change, Ozone layer depletion, Deforestation, land degradation, Impact of development on vegetation and wild life. Socio-economic impacts - Impact assessment Methodologies Overlays, Checklist, Matrices, Fault Tree Analysis, Event Tree Analysis- Role of an Environmental Engineer- Public Participation Standards for Water, Air and Noise Quality.

Suggested Topics for Seminar / Presentation / Group Discussion:

- Air Pollution
- Water pollution
- Noise Pollution
- Impacts of pollutants

Suggested readings:

Text Books:

1. R.R.Barthwal, 2012. Environmental Impact Assessment, New Age International publishers.
2. Kulkarni, V. and Ramachandra, T.V. (2006). Environmental Management, Capital Pub. Co. NewDelhi.
3. Petts, J. (2005). Handbook of Environmental Impact Assessment- Volume 1 and 2. Blackwell Publishers,UK.
4. Glasson, J. Therivel, R. and Chadwick. (2006). A. Introduction to Environmental Impact Assessment. Routledge,London.
5. Morris, P. and Therivel, R. (1995). Methods of Environmental Impact Assessment, UCL Press,London.

Reference Books:

1. Vanclay, F. and Bronstein, D. A. (1995). Environmental and Social Impact Assessment, Wiley &Sons, Chichester.

2. A K Srivastava, Environment impact Assessment, APH Publishing, 2014.
3. John Glasson, RikiTherivel& S Andrew Chadwick "Introduction to EIA" University College London Press Limited, 2011.
4. Ministry of Environment & Forests, Govt. of India 2006 EIA Notification.
5. Rau G J and Wooten C.D "EIA Analysis Hand Book" McGraw Hill.

Web Sources:

1. https://byjus.com/free-ias-prep/eia/
2. http://www.mbaexamnotes.com/environment-impact-analysis.html
3. https://byjus.com/biology/types-of-pollution/
4. https://www.open.edu/openlearncreate/mod/oucontent/view.php?id=79946&printable=1

Title of the Course: Forensic Botany **Semester: V**

Course Code :LUBYSC51 **Addl.** **Credit: 2**

Course Learning outcomes:

On completion of the course, the students are able to

- conceptualize classification of plants from forensic point of view.
- understand forensic importance of different parts of plants.
- collect and preserve botanical evidences of crime and analyze classic and DNA based forensic botany cases**.**
- learn various advanced tools to study DNA.
- identify various types of poisonous samples.
  - ❖ Pre-required Knowledge:
  - ❖ Plant systematics plants
  - ❖ Types of plants yielding drugs
  - ❖ DNA Analysis

Unit I: Introduction to Forensic Botany

Sub specialization of forensic botany- plant morphology, plant anatomy, plant systematic, polynology, plant ecology, limnology, Plant architecture- roots, stems, flowers, leaves. Practical plant classification schemes: - vegetables and herbs, fruits bearing trees and plants, landscaping plants: trees, shrubs and vines, grasses.

Unit II: Types of Wood and Forensic Aspects of Fibre Examination

Various types of woods, timbers, seeds and leaves and their forensic importance, Identification and matching of various types of wood, timber varieties, seeds and leaves. Types of fibers – forensic aspects of fiber examinations, Identification and comparison of man–made and natural fibres. Various types of Planktons and diatoms and their forensic importance, Study and identification of pollen grains, Identification of starch grains, powderand stains of spices etc. Paper and Paper Pulp identification

Unit III: Classification of Poisonous Plants

Various types of poisonous plants-*Abrusprecatorius*, *Aconitum*, *Anacardium occidentale*, *Argemone mexicana*, *Calotropis*, *Cannabis sativa*, *Claviceps purpuria*, *Cinchona*, *Atropa belladonna*, *Erythroxylum coco*, *Gloriosa superba*, *Jatropha curcas*, *Lathyrussativus*, *Manihot utilissima*, *Nerium indicum*, *Nicotiana tabacum*, *Plumbago*, *Ricinuscommunis*, *Semicarpus anacardium*, *Strychnosnux vomica*, *Thevetianerifolia*,

Unit IV: Drug Yielding Plants

Types of plants yielding drugs of abuse – Opium*, Cannabis, Coco, Tobacco, Dhatura,Psilocybin* mushrooms.

Unit V: Collection and Analysing of DNA Molecule

Collection and preservation of botanical evidences: Botanical samples, outdoor crime scene consideration, Analysis of samples, DNA analysis, plant DNA typing, Classic forensic botany cases: Case histories by using Plant anatomy

and systematic, Palynology, Plant ecology, Limnology, Plant Molecular Biology and DNA, Drug enforcement and DNA.

Suggested Topics for Seminar/ Presentation / Group Discussion:

1. Plant Classification
2. Types of Woods
3. List out the various types of poisonous plants.
4. Various types of Drug yielding plants.
5. DNA Sampling &Analysing

Suggested Readings:

Text Books:

1. James S.H., Nordby J.J., Bell S. (2015). Forensic Science: An Introduction to Scientific and Investigative Techniques. CRC Press; 4 edition.
2. Bock J H and Nrris D O (2016) Forensic Plant Science, Academic Press.

Reference Books:

1. Coyle H M (2004) Forensic Botany: Principles and Applications to Criminal Casework. CRC Press.
2. Hall D W and Byrd J (2012) Forensic Botany: a practical guide. Wiley Blackwell, 1edition.
3. Matthew A Gietzendanner (2012) Forensic Botany. A Practical guide (pp.93-106)

Web Sources:

1. http://scitechconnect.elsevier.com/forensic-botany-underutilized-resource/
2. http://www.theplantlist.org/
3. http://oishimaya.blogspot.com/2015/12/8-poisonous-plants-in-india-that-can.html
4. http://medbox.iiab.me/kiwix/wikipedia_en_medicine_2019-12/A/Poly_drug_use

Title of the Course: Ethnomedicobotany	Semester: V
Course Code:LUBYSC52	Credit: 2

Course Learning Outcomes:

On completion of the course, the students are able to

- ❖ appreciate the need to conserve floristic and cultural diversity of the region.
- ❖ rescue and document Ethnobotanicals for sustainable use of plant resources.
- ❖ understand the need for development of new drugs for safe and more rational use of herbal preparations.
- ❖ recognition of intellectual property rights and its benefit to people and society who share their knowledge and wisdom.
- ❖ develop laboratory skill in testing of herbal drugs and new commercial products.

Pre-required Knowledge:

- ➢ Ethnobotancial Knowledge
- ➢ Ethnobotanical data
- ➢ Antioxidant activity

Unit I: Ethnobotanical Research Institutes

Introduction, relevance, scope and status. Centres of Ethno botanical studies in India, AICRPE-All India Coordinated Research Project on Ethno biology, FRLHT-Foundation for the Revitalisation of Local Health Traditions. Contributions of AICRPE and FRLHT to ethno biology of India. Role of ethnomedicine and its scope in modern times. Role of Ethnobotany in conservation and sustainable development.

Unit II: Ethnobotanical Data Collection

Methods and techniques used in Ethnobotany-Field level activities for data collection- Authentication of plant species (Field Book, Herbarium) Field and Lab Procedures, Preparation of Data Sheet and Data Base. People's biodiversity Register (PBR). Impact of Ethnobotany in herbal-medicine industry, land-use development, agriculture, forestry,

betterment of rural livelihoods and education. Biodiversity and conservation of some useful medicinal plants.

Unit III: Phytochemistry

Introduction, scope and relevance. Brief account of Phytochemistry, pharmacodynamics and pharmacokinetics. Difference between herbal/botanicals and pharmaceutical medicine. Classification and sources of crude drugs. Quality, safety and efficacy of herbal medicines/ neutraceuticals. Role of ethnopharmacology in drug development.

Unit IV: Biopiracy & Intellectual Property Rights

Basic definition and types of toxicology, Regulatory guidelines for conducting toxicity studies as per OECD, Alternative methods to animal toxicity testing. Biopiracy, Intellectual Property Rights(IPR).

Unit V:Indigenous/Traditional Knowledge

Plants used by ethnic groups as food, medicines (Ethnomedicine), beverages, fodder, fibre, resins, oils, fragrances and other uses. NWFP(Non-Wood Forest Produces), animal products, minerals, artefacts, and rituals, used by Tribal and Folk Communities of Tamil Nadu. Traditional/indegenous knowledge and its importance.

Suggested Readings:

Text Books:

1. Jain, S. K., Mudgal, V., Banerjee, D. K., Guha, A., Pal, D. C. and Das, D. (1984). Bibliography of Ethnobotany. Botanical Survey of India, Howrah
2. Shashi, S. S.(1995). Tribes of Kerala (Encyclopedia of Indian tribes Series-8). Ammol Publication Pvt. Ltd. Ansari Road, Daryagang, New Delhi

References Books:

1. Traditional plant medicines as sources of new drugs. P J Houghton in Pharmacognosy Trease and Evan's.16 Ed .2009.

2. Cunningham, A. B. (2001). Applied Ethnobotany. Earthscan publishers Ltd. London & Sterling, VA, USA Cotton, C.M. (1996).
3. Ethnobotany-Principles and application. John Wiley& Sons Ltd., West Sussex, England
4. In vivo and in vitro assays Glimpses of ethnopharmacology 1994 Eds. P Pushpangadan,V George and U.Nyman .
5. Faulks, P.J. (1958). An introduction to Ethnobotany, Moredale Publ. London.
6. Jain, S. K. (1981). Glimpses of Indian Ethnobotany. Oxford & IBH publishing Co. Pvt. Ltd., New Delhi .
7. Jain, S. K. (1989). Methods and approaches in Ethnobotany. Society of Ethnobotanists, Lucknow
8. Jain, S. K. (1995). A manual of Ethnobotany. Scientific Publishers, Jodhpur.
9. Jain S.K.(1997). Contribution to Indian Ethnobotany, Sci. Publ. Jodhpur.
10. Jose Boban K. (1998). Tribal Ethnomedicine: Continuity and change. APH publishing
11. corporation 5, Ansari Road, Darya Ganj, New Delhi.
12. Phytochemical Methods. Harborne JB. 1984 .Chapman and Hall , London.
13. Mathur, P. R. G. (1977). Tribal situation in Kerala. Kerala Historical Society, Trivandrum.
14. Snehalatha and Jain, S. K. (1998). Historical Archive in Ethnobotany. Institute of Ethnobotany, NBRI, Lucknow.
15. Medical Pharmacology, Padmaja Udaykumar. Sixth Edition, CBS Publishers & Distributors Pvt Ltd.

Web Sources:

1. http://www.worldcat.org/identities/lccn-n85-4353/
2. http://www.frlht.org/

3. http://www.pharmatips.in/Articles/Pharmaceutics/Parenteral/Pharmacokinetic-And- Pharmacodynamic-Characteristics-Of-The-Drug.aspx

DEPARTMENT OF BOTANY – UG – CBCS-LOCF

Course Title : Plant Biotechnology		**Semester: VI**
Course Code: LUBYCT61	**Contact hours:3hrs/w**	**Credit: 3**

Course Learning Outcomes:

On completion of the course, the students are able to

- Understand the core concepts and fundamentals of plant biotechnology and genetic
- engineering
- Develop their competency on different types of plant tissue culture
- Analyze the enzymes and vectors for genetic manipulations
- Examine gene cloning and evaluate different methods of gene transfer
- Critically analyze the major concerns and applications of transgenic technology

Pre-required Knowledge:

- Fundamentals of plant cell and its types
- Basic knowledge of plant growth and development
- Basic concepts of gene and its expression

Unit I: Basics of Plant Tissue Culture

Introduction to plant tissue culture, totipotency of plant cells (Dedifferentiation, redifferentiation, regeneration of whole plant)

Nutritional requirements for plant tissue culture: nutrient media – macronutrients andmicronutrients, media additives (carbon source, vitamins, amino acids)

Plant growth regulators (cytokinins, auxins, gibberellins).

Preparation of media, selection and surface sterilization of explants, inoculation, incubation(temperature and light regime), regeneration of plants.

Unit II:Plant Tissue Culture Techniques

Initiation of callus cultures and cell suspension cultures, Regeneration of plants (Organogenesis and embryogenesis).Embryo culture and embryo rescue; Protoplast culture and fusion, Development of somatic hybrids and cybrids and their applications.

Unit III: Methods of gene transfer

Agrobacterium-mediated Transformation protocols, direct gene transfer method by Electroporation, Microinjection, Microprojectile bombardment;Selection of transgenics–selectable marker and reporter genes (Luciferase,GUS, GFP).

Unit IV:Applications of Transgenic Technology

Applications as Pest resistant (Bt-cotton);herbicide resistant plants (RoundUp Ready soybean); Transgenic crops with improved qualitytraits in major crops (FlavrSavr tomato, Golden rice); Improved horticultural varieties (Moondust carnations); rDNA technology-Goals, tools and applications.

Unit V:Major Concerns of Transgenic Technology

Transgenic plants as Bioreactor: Antibody production in plants, Biodegradable plastics. Biosafety concerns with transgenictechnology, History of transgenic development across the world, Major concerns with implementation of transgenic technology in India.

Suggested Topics for Seminar/Presentation/Group Discussion:

- RNA interference
- Gene editing
- Plant based drugs
- DNA barcoding
- Biodegradable plastics

Suggested Readings:

Text Books:

1. Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
2. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.
3. Slater, N.W. Scott and M.R. Fowler (2008). Plant Biotechnology. Second Edition.Oxford.

Reference Books:

1. Plant Tissue Culture and its Biotechnological Applications By W. Barz, E. Reinhard, M.H.Zenk
2. Plant Tissue Culture By Akio Fujiwara, Frontiers of Plant Tissue Culture By Trevor A. Thorpe
3. In vitro Haploid Production in Higher Plants by S. Mohan Jain, S.K. Sopory, R.E. Veilleux
4. Plant Tissue Culture : Theory and Practice By S.S. Bhojwani and A. Razdan
5. Plant Cell, Tissue and Organ Culture, Applied and Fundamental Aspects By Y.P.S. Bajaj andA. Reinhard

Web Sources:

1. http://courseware.cutm.ac.in/courses/bioanalytical-techniques/
2. https://nptel.ac.in/courses/102/107/102107028/
3. https://nptel.ac.in/courses/102/103/102103044/

Title of the Course: Plant Ecology and Biodiversity	**Semester: VI**
Course Code: LUBYCT62 Contact hours: 3hrs/w	**Credit: 3**

Course Learning outcomes:

On completion of the course, the students are able to

- acquire knowledge onbasic concepts of environmental science.

- ecological factors and their interactions with ecosystem;
- understand the series of events in the process of plant succession in wet and dry lands.
- gain knowledge on soil formation, erosion and conservation.
- understand various adaptive features in different forms of plants with reference to their habitats;
- understand and apply knowledge on pollutants and control of pollution.
- understand the status and importance of biodiversity and its conservation.

Pre-required Knowledge :

- Ecosystem, Energyflow
- Water Plants, Desert Plants
- Insitu - Exsitu Conservation

Unit I: Introduction and Scope

Introduction – definition, scope, objective and subdivisions of ecology. Ecological factors – Biotic and Abiotic factors (Light & Temperature) and their importance – Positive interactions – Mutualism and Commensalism and Negative interactions – Predation and Competitions.

Unit II: Plant succession

Plant succession: Stages of Hydrosere and Xerosere – Ecological tools and techniques; Quantitative analysis – quadrat method, transect method and point frame method.

Unit III: Ecosystem

Ecosystem: Definition, kinds of ecosystem – structure and components of ecosystem – Ecological pyramids, Food chain and food web. Energy flow in ecosystem.

Unit IV: Plant Adaptations

Study of the following groups with special reference to their morphological, anatomical and physiological adaptations.

a) Hydrophytes; b) Xerophytes; c) Halophytes

Unit V: Conservation

Origin of earth, continental drift, Soil formation, Soil erosion and conservation, Biodiversity: Definition, values, levels and types of biodiversity, threats to biodiversity and conservation of biodiversity. Organizations associated with biodiversity management, IUCN, UNEP, WWF, UNESCO, NBPGR; Methodology for execution; Biodiversity legislation; Information management and communication.

Suggested Topics for Seminar/Presentation/Group Discussion:

- Ecological factors
- Plant succession
- Ecosystem
- Plant Adaptations
- Conservation

Suggested Readings:

Text Books:

1. Verma, P.S. and Agarwal, V.K.. Environmental Biology, S.Chand& Co., New Delhi, 2004.
2. Sharma, P.D. Ecology and Environment, Rastogi Publications, Meerut. 2002.
3. Shukla, R.S. and Chandel. P.S. The text book of Plant Ecology, S.Chand& Co., New Delhi, 2006.
4. Kumaresan, V and Arumugam, N. Plant Ecology and Phytogeography, Saras Publication. Pvt., Ltd., Nagercoil. (2016).

Reference Books:

1. Odum, E.P. Fundamentals of plant Ecology, Nataraj Publishers, New Delhi, 1996.
2. Subramanyam, N.S. and Sambamuthy, A.V.S.S. Ecology, Narosa Publishing House, New Delhi, 2000.
3. Krishnamoorthy, K.V. An advanced text book on Biodiversity. Oxford and IBH Publishing company Pvt, Ltd., New Delhi, 2004.

4. Rana, S.V.S. Essentials of Ecology and Environmental Science, Prentice Hall of India Pvt., Ltd., New Delhi, 2004.

Web Sources:

1. https://www.biologydiscussion.com/ecology/ecology-useful-notes-on-ecology/6610
2. https://byjus.com/biology/ecology/
3. https://www.vedantu.com/biology/conservation-of-plants-and-animals

Title of the Course: Genetics		**Semester: VI**
Course Code: LUBYCT63	**Contact hours: 4hrs/w**	**Credit: 3**

Course Learning outcomes:

On completion of the course, the students are able to:

- understand the fundamental genetic principles
- explain the key concepts in heritability and genetic variations
- appreciate the importance of genetics as a foundation of other fields of life sciences especially in plant breeding
- comprehend the effect of chromosomal abnormalities in numerical as well as structural changes leading to genetic disorders.
- analyze the effect of crossing over on variation and recombination.

Pre-required Knowledge:

- Knowledge on DNA structure
- Comprehend knowledge on central dogma
- Basic concepts and terminologies in genetics

Unit I:Biology of Inheritance:

DNA as the genetic material: Griffith's and Avery's transformation experiment, Hershey – Chase bacteriophage experiment. Chromosome structure, nucleosome and solenoid model. Cell divisions – mitosis and meiosis. Cell cycle.

Unit II: Principles of genetics:

Mendal's law of heredity – segregation and independent assortment – monohybrid cross and dihybrid cross – test cross and back cross – incomplete dominance – multiple alleles – blood groups in man. Interaction of genes – dominant epistasis (12:3:1) recessive epistasis (9:3:4) and complementary genes (9:7).

Unit III: Concept of sex determination:

Sex determinations – common types – sex chromosomes and sex determination in Melandrium album. Sex linked inheritance – Haemophilia and colour blindness. Inheritance of quantitative characters – skin colour in human beings and ear length in maize.

Unit IV:Extra-nuclear Inheritance:

Extra chromosomal inheritance involving chloroplast and mitochondria. Chloroplast mutation/Variegation in Four o' clock plant and Chlymodomonas, Mitochondrial mutations in Neurospora and yeast, Infective heredity- Kappa particles in Paramecium.

Unit V: Linkage and crossing over:

Linkage and crossing over – linkage groups – mechanism of crossing over and significance of crossing over.

Suggested Topics for Seminar/Presentation/Group Discussion:

- Genetic Factors for Human Type 1 Diabetes (C-Y Wang et al.)
- Genetic Susceptibility to Human Obesity (Y-J Liu & H-W Deng)
- Hereditary Breast and Ovarian Cancers (W-T Yang et al.)

Suggested Readings:

Text Books:

1. Stickberger, M.W. Genetics, Prentice – Hall of India Pvt. Ltd., New Delhi, 2001.
2. Gardner, E.J.Simmon. M.J and Snustad, D.P. Principles of Genetics, John Wiley & Sons, Inc. New York, 2006.

3. Verma, P.S. and Agawal, V.K. Genetics, S.Chand& Co., New Delhi, 1991.
4. Snustad, D.P., Simmons, M.J. Principles of Genetics. V Edition. John Wiley and Sons Inc. 2009

Reference Books:

1. Burns, G.W. The Science of Genetics Collier Mac Millian, New York, 1980.
2. Chaudari, R.K. Elementary Principles of Plant Breeding, Oxford and IBH publishing Company, New Delhi, 1976.
3. Poehlman, J.M. Breeding Field Crops, 3rd Edition, AVI Publishing Company Inc. West Post, 1987.
4. Chowdhary, R.C. Introduction to plant Breeding, Oxford and IBH Publishing company, New Delhi, 1982.
5. Klug, W.S., Cummings, M.R., Spencer, C.A. Concepts of Genetics. XI Edition.Benjamin Cummings. 2009.
6. Russell, P. J. iGenetics- A Molecular Approach. III Edition. Benjamin Cummings. 2009.

Web Resources

1. http://www.mendelweb.org/
2. http://www.sci.sdsu.edu/~smaloy/MicrobialGenetics/problems/
3. http://www.ornl.gov/TechResources/Human_Genome/genetics.html

Title of the Course: Practical - Genetics and Plant Breeding Semester: VI
Course Code:LUBYCL61 Contact hours: 4hrs/w Credit: 4

Course Learning outcomes:

On completion of the course, the students are able to

- understand the fundamental genetic principles through simple problems
- explain the key concepts in heritability and genetic variations
- appreciate the importance of genetics as a foundation of other fields of life sciences especially in plant breeding

- acquire knowledge in methods of plant breeding especially emasculation technique

List of experiments:

- To work out simple problems in genetics in the following aspects:
- Monohybrid crossMultiple alleles
- Gene interactionDihybrid cross
- Test cross and back crossIncomplete dominance
- To study the probability by coin tossing
- To study genetic variation between any two varieties/ species
- Demonstration of emasculation techniqueSeed viability test
- Observations note book to be maintained and submitted for valuation

Reference books:

1. Bendre, A. M. and Ashok Kumar, (2009) A Text book of Practical Botany Vol. I & II. Rastogi Publications, Meerut. 9th edition.
2. Singh, V., Pande, P. C., and Jain. D. K. (2015). A Text book of botany. Rastogi publications, Meerut, New Delhi. 4th edition.

Title of the Course: Project		**Semester: VI**
Course Code:LUBYPJ61	**Contact hours: 3hrs/w**	**Credit: 3**

Learning Outcomes:

On the completion of the course, the students are able to

- familiarise with research activities
- understand the value of research in higher education
- know the recent innovative techniques in research
- exposure to various academic institutions for collection of literature survey.

- orient the students on the style of research writing

1. Each student will be allotted a Project Guide from the faculty of the Department concerned.
2. After the completion of the project work, the student has to submit four copies of Dissertation with report carrying his/her project report.
3. Project work will be evaluated by both the external and the internal (Project Guide) examiners for the maximum of 100 marks in total on the scale of the maximum of 50 marks for the internal and the external each.
4. Viva-voce will be conducted by the panel comprising HOD, External examiner and Project Guide for the maximum of 100 marks in total on the scale of the maximum of 50 marks for the internal and the external each.

Title of the Course: Botany for Competitive Examinations		**Semester: VI**
Course Code:LUBYDS61	**Contact hours: 3hrs/w**	**Credit: 2**

Course Learning Outcomes:

On completion of the course, the students are able to

- ❖ understand the basic and applied aspects of subject matter of botany
- ❖ categories subject areas on the basis of weightage of contents
- ❖ strengthen subject knowledge and equip themselves to prepare for various competitive examinations
- ❖ critically analyze the concepts and apply knowledge to evolve better solutions to questions
- ❖ focus upon employability after graduation
- ❖ Pre-required knowledge:
- ❖ General characters of diversified plants
- ❖ Fertilization
- ❖ Mendel's principles

Unit I: Diversity of Plants

Phycology: Pigmentation - Thallus organization - Life cycles patterns of Algae - Evolutionary trends in the Sexuality of Algae – Cultivation of *Spirulina.*

Mycology: Structure, reproduction and economic importance of fungi.

Lichenology: Structure, reproduction and economic importance of lichens.

Bryophytes: General characteristics, structure; reproduction and alternation of genrations.

Pteridophytes: General characteristics, Stelar organization - origin of heterospory and seed habit.

Gymnosperm: Structure of wood in Gymnosperm - Economic importance of Gymnosperms

Paleobotany: Geological Time Scale - Fossilization methods - Fossil types.

Unit II: Morphology, Anatomy and Embryology

Morphology: Root and Stem modification in relation to habitat. Inflorescence: Raceme, Cyme and Special types

Types of classification: Artificial – natural – phylogenetic. Biosystematics – binomial nomenclature – herbarium and its uses. Bentham and Hooker's classification of plants –

Anatomy: Meristems and types. Permanent tissues, Simple and Complex tissues - Normal and Abnormal secondary thickening.

Embryology: Microsporogenesis, Megasporogenesis - types of embryo sacs (Mono-bi-and tetrasporic). Double fertilization and Triple fusion, Types of Endosperm - Embryo development in Dicots and Monocots. Apomixis and Polyembryony Culture techniques - anther and embryo.

Unit III: Physiology, Biochemistry and Biophysics

Physiology: Photosynthesis, Photochemical reactions and carbon fixation pathways – **Respiratory metabolism:** aerobic and anaerobic respiration.

Enzymes: Role as biocatalysts - Nitrogen Metabolism: Nitrogen cycle - Nitrogen fixation - Nitrate reduction.

Plant growth substances: chemical nature and physiological functions of auxins, gibberellins, cytokinin, ethylene, abscisic acid and Brassinosteroids. Structure and Properties of macromolecules: Carbohydrates, Lipids, Proteins and Nucleic acids.

Thermodynamics: Definition of energy - structure and role of ATP.

Unit IV: Cytology, Genetics and Evolution

Cytology: Organization of Prokaryotic and Eukaryotic cells. Cell organelles - structure and function. Chromosomes: morphology structure and their role. Cell division: Mitosis and Meiosis.

Genetics: Mendelism - Interaction factors - linkage and crossing over, multiple, alleles, mutation, structure, replication and role of nucleic acids.

Evolution: Origin of life: Theories of evolution Darwin, Lamarck and De Vries.

Unit V: Ecology and Biodiversity Conservation

Ecology: Ecosystem concept - Plant communities: Hydrophytes, Xerophytes, Mangroves. Plant succession primary and secondary - Climax formation.

Ecosystem: Components and functions – Global warming, Greenhouse effect, Ozone Layer Depletion. Pollution and their types

Conservation Biology: Conservation methods and role of agencies

Suggested Readings:

Text Books:

1. Singh, V., Pande, P.C. and Jain, D.K. A Text Book of Botany. Rastogi Publications, Meerut. 2021
2. Pandey.B.P. College Botany – Algae, Fungi and Bryophytes Vol.I. & Vol II S.Chand& Co. Ltd. New Delhi, 2002.

3. Vashistha.B. R, Sinha, A. K and Singh, V.P. Algae – S.Chand& Co. Ltd. New Delhi, 2002 .

Reference Books:

1. Alexopoulos. J and Mims. W. Introductory Mycology, Wiley Eastern Limited. New Delhi, 1985.
2. Rangaswamy, G and Mahadevan, A., Disease of crop plants in India. Prentice Hall of India PVT. Ltd. NewDelhi, 1999.
3. Hale, M.E. The Biology of Lichens: Edward Arnold. Maryland, 1983.
4. Singh, R.S. Introduction to principles of plant pathology. Oxford & IBH Publishing Co. L.td. New Delhi, 1988.

Web Sources:

1. https://www.microscopemaster.com
2. https://www.britmycolsoc.org.uk
3. https://baynature.org
4. http://libgen.rs/search.php?req=fungi+&open=0&res=25&view=simple& phrase=1&column=def
5. https://www.britishlichensociety.org.uk/about-lichens/what-is-a-lichen.
6. https://www.anbg.gov.au/lichen/what-is-lichen.html
7. https://www.saferbrand.com/advice/plant-disease-library
8. https://www.proflowers.com/blog/plant-diseases

Title of the Course: Medicinal and Aromatic Plants		**Semester: VI**
Course Code:LUBYDS62	**Contact hours: 3hrs/w**	**Credit: 2**

Course Learning Outcomes:

On completion of the course, the students are able to

- remember the basic concepts of Medicinal and Aromatic Plants (MAP)
- recognize their major industrial scale usage and their constraints

- understand their organizational initiatives like National Medicinal Board and State medicinal Board and other promotional activities
- estimate their demand and supply of medicinal plants and herbal industries
- understand useful and important medicinal and aromatic plants with their systematics

Pre-required Knowledge:

- Ethnobotanical Knowledge
- Aromatic Plant Resource
- Central Institute of Medicinal and Aromatic Plants

Unit I: History of Medicinal Plant

MAPs: definition, history, importance and future prospects. Medicinal Plants – past and present status in world and India. MAPs as industrial crops – constraints and remedial measures. Medicinal plant diversity & local healthcare. Medicinal plant conservation – issues and approaches. Medicinal plant conservation areas (MPCA), Non-timber forest products (NTFP), Good Agriculture Practices (GAP). Indian Himalayan region (IHR).

Unit II: National Medicinal Plant Board

Promotion of medicinal plant sector ant national level. National Medicinal Plant Board and State Medicinal Plants Boards – objectives and functions. Other organizational initiatives for promotion of MAPs at National and International levels. Demand and supply of medicinal plants. Herbal industries.

Unit III: Important Indian Medicinal Plants

Important medicinal plants of India with their systematic, geographical distribution and uses. *Acorus calamus, Adhtodavasica, Abrusprescatorius* Aloe vera, Phyllanthus amarus, Stevia rebaudiana, Belladona and Cinchona.

Unit IV: Historical Backround

Important aromatic plants of India with their systematic, geographical distribution and uses. Introduction and historical

background of aromatic plants. Aromatic and cosmetic products. Raw material for perfumes etc. Cosmetic Industries. Major minor and less known aromatic plants of India.

Unit V: Aromatic Plants

Taxonomic descriptions and used of important aromatic plants – Citronella, Davana, Damask rose, Geranium, Khus grass, Large cardamom, Lavender, Lemon grass, Mentha, Holy basil, Patchouli, Rosemary Palmarosa, Vetiver, Artemisia, Eucalyptus, Thyme, Marjoram and Oreganum. Aromatic spices – clove, Cinnamon, Nutmeg, Ajwain, Dill, Celery, Tamarind, Garcinia, Curryleaf and Saffron.

Suggested Topics for Seminar/Presentation/Group Discussion:

1. History of Medicinal Plants
2. MAP at National and world
3. Important Indian Medicinal Plants
4. Historical backround of Aromatic Plants
5. Selection of Aromatic Plants

Suggested Readings:

Text Books:

1. Indian Medicinal Plants by P.C. Trivedi (2009).
2. Medicinal Plants of Indian Himalaya by S.S. Samant and U. Dhar.

Reference Books:

1. Medicinal Plants of Uttarakhand by C.P. Kala (2010). Syllabus – M.Sc. Medicinal and Aromatic Plants.
2. Hand Book of Aromatic Plants by S.K. Bhattacharjee (2004).
3. Handbook of MAPs by S.K. Bhattacharjee (2009).

Web Sources:

1. https://www.agritech.tanau.ac.in/gap_glp/gap_about.html
2. https:14.143.90.243/nmpb/content/contact-us

3. http:/indiaenvironmental portal.org.in/conten/254134/nationa-research-centre-for-medicinal and –aromatic-plants

DEPARTMENT OF CHEMISTRY – UG –CBCS- LOCF

ALLIED CHEMISTRY FOR B.Sc. BOTANY

Title of the paper: Allied chemistry IV (Organic and Physical Chemistry)		Semester: VI
Course Code:LUCHGE61	Contact Hours: 4hrs/w	Credits: 4

Course Learning Outcomes

On completion of the course, the students are able to

- ❖ understand the fundamentals of heterocyclic compounds.
- ❖ gain knowledge on chromatographic techniques and chemical kinetics process
- ❖ understand basic concepts in Electrochemistry
- ❖ know about the photochemical reactions

Pre-Required Knowledge

- ✓ Chromatography and partition chromatography
- ✓ Comparison of thermal and photochemical reactions
- ✓ Basic concepts of electrochemistry - specific and equivalent conductance

Unit I: HETEROCYCLIC COMPOUNDS & ALKALOIDS

Heterocyclic compounds - preparation and reactions of pyrrole, furan, pyridine, quinoline and isoquinoline.Alkaloids - pharmacological properties and importance of the following alkaloids - nicotine, quinine, piperine and cocaine (structural elucidation not necessary).

Unit II: CHROMATOGRAPHY

Chromatographic techniques – principle and applications – gas chromatography – thin layer chromatography – column chromatography – paper chromatography – gas- solid and gas-liquid chromatography.

Unit III: CHEMICAL KINETICS

Chemical Kinetics; Reaction rate – order and molecularity of a reaction – zero order- first order. First order rate equation and half life period – derivation. Examples of first order reaction – second order reaction – examples – enzyme catalysis- Michaelis and Menton mechanism – significance of Km.

Unit IV: ELECTROCHEMISTRY

Faraday's law's of electrolysis – electrochemical cell – Nernst equation – convention regarding the sign of EMF of a cell – electrodes – reference electrodes hydrogen and calomel electrodes – types of electrodes – metal – metal ion electrodes – metal – metal insoluble salt electrode – glass and ion selective electrodes – pH measurement using glass electrode.

UNIT V: PHOTOCHEMISTRY

Photochemical reactions – laws of photochemistry – Grotthus – Draper law – Einstein law – quantum efficiency – reasons for low and high quantum yield with examples consequence of light absorption by atoms and molecules – Jablonski diagram-Fluorescence – phosphorescence – photosensitization – chemiluminescence –biolumiminesence

Suggested Topics For Group Discussion / Presentations

- ✓ Preparation and reactions of pyrrole, furan
- ✓ Chromatographic techniques – principle and applications
- ✓ Electrochemical cell – Nernst equation
- ✓ Reaction rate – order and molecularity of a reaction
- ✓ Jablonski diagram-Fluorescence – phosphorescence

Suggested readings:

Text Books:

1. M.K.Jain and S.C. Sharma, Modern Organic Chemistry, Vishal Publishing Co., 2009.
2. B.R. Puri, L.K. Sharma and M.S. Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2004

Reference Books:

1. R.T. Morisson and R.W. Boyd S. K. Bhattacharjee, Organic Chemistry, PearsonPrentice Hall, 7th Edition., 2012.
2. Bahl and Arun Bahl, Advanced Organic Chemistry, S. Chand Limited, 1987.

Web Sources:

1. https://www.organic-chemistry.org/synthesis/heterocycles/pyrroles.shtm
2. https://www.slideshare.net/shivadheeraj/alkaloids-14662161
3. https://microbenotes.com/chromatography-principle-types-and-applications/
4. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5206469/
5. https://www.youtube.com/watch?v=qLIPvlIrNyo

DEPARTMENT OF CHEMISTRY – UG –CBCS- LOCF (AIDED & SF)

ALLIED CHEMISTRY FOR B.Sc. BOTANY

Title of the paper: Allied Chemistry Practical –II **Semester: V & VI**

Volumetric Analysis

Course Code: LUCHGL61 **Contact Hours: 2hrs/w** **Credits: 1**

Learning Outcomes

On completion of the course, the students are able to

- ✓ determine the concentration of solution in various units
- ✓ able to prepare the standard solution and making up the solution

Pre-Required Knowledge

- ✓ Basic formula of molarity and molaltiy and volumetric law
- ✓ Idea about primary and secondary standard
- ✓ Laboratory Safety precautions

List of Experiments

A double titration involving the making up of the solution to be estimated.

I ACIDIMETRY AND ALKALIMETRY

1. Estimation of Na2CO3.
2. Estimation of NaOH / KOH.
3. Estimation of Oxalic acid.

II REDOX TITRATIONS

Permanganometry

1) Estimation of ferrous ion.
2) Estimation of oxalic acid.

III IODOMETRY AND IODIMETRY

1. Estimation of potassium dichromate.
2. Estimation of potassium permanganate.

Web Sources:

1. https://slidetodoc.com/4-3-volumetric-analysis-learning-outcomes-tounderstand/
2. https://edu.rsc.org/experiments/titrating-sodium-hydroxide-with-hydrochloric acid/697.article
3. https://www.youtube.com/watch?v=gSauVhYtVIU

Title of the Course: Elements of Plant Breeding		**Semester: VI**
Course Code:LUBYSE61	**Contact hours: 2hrs/w**	**Credit: 2**

Course Learning Outcomes:

On completion of the course, the students are able to

- develop conceptual understanding of plant genetic resources, plant breeding, genebank and gene pool.
- familiarize with genetic basis of heterosis.
- classify sexual and asexual modes of reproduction.
- explain monogenic and polygenic inheritance
- reflect upon the role of various non- conventional methods used in crop improvement.

Pre-required Knowledge:

- Reproduction in plants
- Pollination mechanisms
- Basis of inheritance

Unit I: Introduction to Plant Breeding

Introduction and objectives of Plant Breeding,Major International and National Plant Breeding Institutes, Some reputed Indian and International Plant Breeders, Significant achievements of plant breeding (Semi-dwarf wheat and rice,Hybrid Millets, Hybrid Cotton), Undesirable consequences of Plant Breeding (Genetic erosion, NarrowGenetic base, Increased susceptibility to minor diseases).

Unit II:Reproduction

Modes of Reproduction (vegetative, asexual, apomixes, sexual), Pollination and mating systems, Self-Incompatibility: Homo- and hetero-morphic systems, Mechanism of self-incompatibility andits overcoming and utilization in plant breeding; Male Sterility: Genetic, Cytoplasmic and Genetic male sterility, Chemically induced male sterility, its utilization andlimitations;

Unit III:Methods of Plant Breeding

Introduction, Acclimatization; Domestication; Selection methods for : Self-pollinated, Cross-pollinated and vegetative and clonal propagation;

Unit IV: Hybridization and Mutations

Hybridization: For self, cross and vegetatively propagated plants – Basics of Procedure, advantages and limitations; Mutations: Spontaneous and Induced Mutations; Artificial Induction of Mutations, Role of mutations in Plant breeding;

Unit V:Polyploidy

Autopolyploidy and Allopolyploidy and their role in Evolution and crop improvement, Induction of Polyploidy, Applications and limitations of polyploidy in crop improvement.

Suggested Topics for Seminar/Presentation/Group Discussion:

- Achievements of plant breeding
- Chemically induced male sterility
- Selection methods
- Role of mutations in Plant breeding
- Applications and limitations of polyploidy in crop improvement

Suggested Readings:

Text Books:

1. Chaudhari, H.K. (1984). Elementary Principles of Plant Breeding. Oxford – IBH. 2ndedition.
2. Das, L.D. Vijendra. (2006). Plant Breeding. New Age International Publishers, New Delhi.

Reference Books:

1. Sharma, J.R.(1994). Principles and practices of Plant Breeding. Tata McGraw-Hill Publishing Company Ltd. , New Delhi
2. Singh, B.D. (2012). Plant Breeding: Principles and Methods. Kalyani Publishers. 9thedition.
3. Singh, Phundan (1996). Essentials of Plant Breeding. Kalyani Publishers, New Delhi-2.

Web Sources

1. https://www.plantbreeding.org/content/plant-breeding-research
2. https://www.britannica.com/science/plant-breeding/Evaluation-of-plants#ref67739
3. https://www.crops.org/about-crops/breeding/

Title of the Course:Bioresources Management		Semester: VI
Course Code :LUBYSE62	Contact hours: 2hrs/w	Credit: 2

Course learning outcomes:

On completion of the course, the students are able to

- understand the concept of different natural resources and their utilization.
- critically analyze the sustainable utilization land, water, forest and energy resources.
- evaluate the management strategies of different natural resources.
- reflect upon the different national and international efforts in resource management and their conservation.
- enlighten the dynamics of intellectual property rights and legal protection.

Pre-required knowledge

- Integrate basic environmental science concepts - traditional - modern resource
- laboratory use - field instrumentation - collect data
- Analyze - interpret environmental data

Unit I: Natural Resources and Sustainable Utilization

Natural Resources and Sustainable Utilization - Definition and types, concept, approaches (economic, ecological and socio-cultural) for sustainable utilization.

Unit II: Land, Water and Biological Resources

Utilization (agricultural, horticultural, silvicultural); Soil degradation and management. Fresh water (rivers, lakes, groundwater); Threats and management strategies.

Unit III: Forests products

Definition, Cover and its significance (with special reference to India); Major and minor forest products; Depletion; Management. Renewable and non-renewable sources of energy

Unit IV: Contemporary Practices in Resource Management

Ecological Footprint with emphasis on carbon footprint, Waste management. National and international efforts in resource management and conservation

Unit V: Legal policy in Natural Resource Management

National Forest Policy of 1988. Forest Protection Act of 1980, Biological Diversity Act of 2002 and Rule 2004, Forest Rights Act of 2006.

Suggested Topics for Seminar/Presentation/Group Discussion:

- Natural Resources
- Biological Resources
- Major and minor forest products
- Contemporary Practices in Resource Management
- Legal policy in Natural Resource Management

Suggested Readings:

Text Books:

1. Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.
2. Rathor, V.S. and Rathor B. S. (2013) Management of Natural Resource for Sustainable Development. Daya Publishing House, New Delhi.
3. Prasenjit Mondal, Ajay K. Dalai (2020) Sustainable Utilization of Natural Resources. CRC Press Publishers.

Reference Books:

1. Vasudevan, N. (2006). Essentials of Environmental Science. Narosa Publishing House, New Delhi.
2. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications, New Delhi.
3. Francois Ramade 1984. Ecology of Natural Resources. John Wiley & Sons Ltd.

4. Heal, Geoffrey. 2000. Nature and the Marketplace: Capturing The Value of Ecosystem Services. Island Press
5. Knight, Richard L., et al. 1995. A New Century for Natural Resources Management. Island Press.
6. Vitousek, P.M. (1994) Global Change and Natural Resource Management. Beyond global warming: Ecology and global change. Ecology 75, 1861-1876.

Web Sources:

1. Emilie Lindkvist, ÖrjanEkeberg and Jon Norberg. (2017) Strategies for sustainable management of renewable resources during environmental change. https://doi.org/10.1098/rspb.2016.2762 Proceedings of The Royal Society B. Biological Sciences. Royal Society Publishers.
2. Diane Boudreau et al., (26 Aug, 2011) Conserving the Earth. https://www.nationalgeographic.org/article/conserving-earth/*National Geographic Society Publisher*.
3. ENVIS RP on Forestry and Forest Related Livelihoods. (2018). Environmental Information system. Minor Forest Products. http://www.frienvis.nic.in/Database/Minor-Forest-Products_2428.aspx
4. Forest Products. UNECE/FAO Forest Products Annual Market Review 2014-2015. https://unece.org/fileadmin/DAM/timber/publications/2015-FPAMR-E.pdf
5. Nautiyal, S. and Kaul, A.K. (2003). Eds. Non-timber forest products of India. Dehradun, Jyoti Publishers.

DEPARTMENT OF ENGLISH – UG – CBCS-LOCF

Title of the Course: Communicative English –II		**Semester: VI**
Course Code: LUENNM61	**Contact Hours: 2hrs/w**	**Credits: 2**

Course Learning Outcomes:

On completion of the course, the students are able to

- understand the role of communication in personal and professional success

- have comprehensive application- knowledge of appropriate communication strategies
- apply appropriate communications skills across settings and purposes
- respond effectively to various communicative demands
- build and maintain healthy and effective relations by demonstrating appropriate and professional ethical behavior.

Pre-required Knowledge:

- Fundamental Grammatical Competence
- Working Vocabulary and Spoken idioms
- Different strategies and barriers of effective communication

Unit I: Listening

A Discussion between two friends, Booking accommodation at an outstation Hotel, Enquiring about Flight, Getting an appointment for interview over phone, At the Library, Between a brother and sister, Attending a career guidance Fair – About Medical Transcription, About call Centre, Option in Higher Education.

Unit II: Speaking- I

Asking for information, Asking for someone's opinion, Asking if someone is sure, Asking someone to say something again, Checking that you have understood, Asking whether someone knows, Asking about Starting conversation with a Stanger.

Unit III: Speaking –II

Leaving someone for a short time, Ending a conversation, Asking possibility, Asking about preference , Asking if someone is about to do something , Asking if someone agrees, Asking if you are obliged to do something, Describing something , Some useful expressions.

Unit IV: Writing

Writing Essays, Writing Advertisements and posters, Writing Reports, Summarizing and Outlining, Information Transfer Exercise, Dialogue Writing.

Unit V: Professional Skills

Negotiating, Body Language, Group Discussion, Seminar and Public Speaking.

Suggested Topics for Presentation:

- Difference between acceptable and unacceptable sentences in English.
- Appropriateness, grammaticality and acceptability of the English language.
- To assist the students in learning the concepts of register, style and jargon as well as the various varieties of English.
- Application and use various kinds of jargons and register as per context.
- Preparing situational dialogues

Suggested Readings:

i)Text Books:

1. JayashreeBalan, *Spoken English*.Vijay Nicole Imprints Pvt. Ltd, Chennai , 2006.
2. G.Radhakrishnan Pillai and K. Rajeevan.*Spoken English For You*. Emerald Publishers, Chennai ,2002.

ii)Reference Books:

1. M.N.K.Bose. *Better Communication in Writing,* New Century Book House (P) Ltd, Madras, 2004.
2. T. M. Farhathullah. *Communication Skills for Under Graduates.* R.B.A. Publications, Chennai.

iii)Web Sources:

1. https:// www.nyp.org/blog/2012/11/28/11-great-free-websites-practice-English
2. https:// www.Spoken English practice.com/ learn-english-speaking-online

3. https://global-exam.com/blog/en/general-english-what-are-best-websites-tolearn-english/

DEPARTMENT OF HISTORY – UG

Course Title :Indian National Movement		Semester: VI
Course Code: LUHSNM61	Contact Hours: 2	Credits: 2

Course learning outcomes:

On completion of the course students are able to

- Acquire knowledge about the early rebellions
- Describe the birth of Congress
- Understand the impact of Jallianwallabag tragedy
- Asses the causes for the Non-Co-operation movement.
- Evaluate the role of Gandhi in freedom movement.

Unit I: Early uprisings

South Indian Rebellion 1800- 1801- Vellore Mutiny of 1806, causes and results - Sepoy Multiny 1857.

Unit II: Indian National Congress

Birth of Congress– Moderates - Surat split 1907 – Extremist Movement.

Unit III: Reunion of Congress

Moderates and Extremists 1916 - Home Rule Movement 1916, Jalianwallabagh tragedy 1919.

Unit IV: Gandian era – phase I

Champron Satyagraha - Non Co-operation Movement - Chauri Chaura incident 1922.

Unit V: Gandian era – phase II

Civil Disobedience Movement - Dandi March 1930 - Gandhi - Irwin pact - Quit India Movement 1942 – Mountbatten Plan – dawn of independence.

Suggested topics for group discussion/ presentation

Causes and results of Sepoy Multiny 1857.

Surat split

Home Rule Movement

Chauri Chaura incident

Suggested Readings.

Text Books:

1. G .Thangavelu, History of India 3 Vols, Govt. of Tamilnadu Publications G.Venkatesan History of Freedom Struggle in India, V C Publications, Rajapalayam

Reference Books:

1. B. R. Tomilinzon, The Indian National Congress and the Raj, (1929 – 1942), The Macmillan, New York, 1976.
2. Tara Chand, History of the Freedom Movement in India Vol.I., Gowardha Kapur and Sons, New Delhi, 1970.
3. B. Shiva Rao, Indian Freedom Movement, Orient Longman Limited., New Delhi, 1972.
4. H. N. Pandit, Fragments of History, Sterling Publishers, New Delhi, 1982.
5. 1.V.D. Mahajain, British Rule in India and After, S. Chand and Co., Ltd., New Delhi, 1972.

Web Sources

https:// www.clearias.com

https:// www.toppr.com

https:// www.mapsofindia.com

DEPARTMENT OF COMMERCE – UG – CBCS - LOCF

Title of the Paper: Practical Banking		**Semester: VI**
Course Code: LUCONM61	**Contact Hours: 2hrs/w**	**Credits: 2**

Course Learning Outcomes:

On completion of the course, the students able to

- explain the banking systems in India;
- analyse the different schemes of commercial banks in India;
- illustrate the bank lending procedures;

- evaluate the credit appraisal system and explain the Management of NPA;
- apply the recent trends in Banking system;

Pre-required Knowledge:

- ✓ Origin of Indian banking system in India
- ✓ Negotiable Instruments
- ✓ Latest technology in banking system

Unit- I:Introduction

Banking - Definition – Functions – Reserve Bank of India – Introduction - Functions.

Unit- II: Relationship

Banker and Customer Relationship – General relationship only – Types of customers.

Unit- III: Deposits

Types of Deposit Accounts – Features of deposit accounts – Account opening procedure.

Unit- IV: Cheques

Meaning – Advantages - Crossing – Types of crossing- Endorsement.

Unit- V: Resent Development

Recent Developments in Banking system – ATM – Debit Card - Credit Card –Services available under Core Banking System.

Suggested topics / Practical Exercise:

The learners are required to:

- ✓ critically evaluate the functions of RBI
- ✓ discuss the special relationship between banker and customer
- ✓ show the different methods of crossing of cheque
- ✓ list the t benefits you enjoyed from debit and credit cards.
- ✓ fill cheque, chellan using specimen forms

Suggested Readings:

i) Text Books:

1. Gorden& Natarajan. (2018). Banking theory Law and practice. Bangalore: Himalaya Publishing House.
2. Sundharam& Varshney. (2019). Banking theory, law and practice. New Delhi: Sulthan Chand & Son**s.**

ii) Reference Books:

1. Radhaswamy, M.(2018). A Text Book of Banking. Delhi: S. Chand & Co.
2. Shekar & Lakshmi Shekar. (2019). Banking Law and Practice. UP: Vikas Publishing.
3. Santhanam.B. (2018).Banking and Finance System, Chennai: Margham Publication.

iii) Web-Sources:

1. https://library.um.edu.mo/ebooks/b33294872.pdf
2. http://dspace.gipe.ac.in/xmlui/bitstream/handle/10973/23714/GIPE-008631-Contents.pdf?sequence=2&isAllowed=y
3. https://www.amazon.in/Practical-Banking-India-Gupta-H/dp/8178358999
4. https://www.freebookcentre.net/Business/Banks-and-Banking-Books.html

DEPARTMENT OF PHYSICS – UG – CBCS - LOCF

Title of the Paper: Fundamentals of Physics – II	**Semester: VI**
Course Code: LUPHNM61 Contact Hours: 2hrs/w	**Credits: 2**

Course Learning Outcomes:

On completion of the course, the students are able to

- understand the fundamentals of Ohm's law and Kirchhoff's law in electric circuit
- describe the functions of various cells
- understand about AC power generations
- know about measuring electric power

- understand the concept of RLC circuits

Pre-Required knowledge:

- Fundamental knowledge on electric circuits,
- Applications of various cells in various fields
- Need of power generation for future world.

Unit 1: Electric circuits

Electric current- voltage and resistance- Ohm's law- Kirchhoff's law- Resistances in series and in parallel.

Unit II: DC sources

DC Source – Primary cells – Leclanche and Daniel cell – Secondary cells – Lead Acid Accumulator – DC generator.

Unit III: AC sources

Alternating current generation by hydro, thermal and atomic power stations– RMS value – Peak value (Quantitative) – AC generator – no derivation.

Unit IV: Electric Power

Measurement of Electric power by Wattmeter- simple calculations- Induction coil- Wattless current- Power factor.

Unit V: Rectifiers

Simple electrical circuits – resistor, capacitor and inductor connected to AC source (independently) – Relationship between emf and current in each case. Diode – Bridge Rectifier.

Suggested Topics for Group Discussion/Presentation

- Ohm's law
- DC sources
- AC Sources
- Induction coil
- RLC circuit

Suggested Readings:

i) Text Books:

1. Murugesan. R, Electricity and Magnetism, S. Chand & Co (2004).
2. Mahajan A.S, Electricity and Magnetism, Tata McGraw Hill Publisher, (1988).

ii) Reference Books:

1. Narayan Rao.BV, First Year B.Sc. Physics, New Age International (P) Ltd, (1998).
2. Rai G.D, Non-conventional Energy Sources, Khanna publishers, (2010).

iii) Web Sources:

1. https://courses.lumenlearning.com
2. https://www.electrical4u.com
3. https://www.carritech.com

DEPARTMENT OF CHEMISTRY – UG –CBCS- LOCF

Title of the paper: Chemistry for Competitive Examinations Semester: VI

Course code:LUCHNM61 Contact Hours: 2hrs/w Credits: 2

Course Learning outcomes

On completion of the course, the students are able to

- ✓ understand basic chemistry involving types of elements and chemical reactions.
- ✓ understand the different concepts of acids and bases, water types, various chemical processes.
- ✓ study the knowledge on fertilizers, role of fertilizer in plant growth and fertilizer industry
- ✓ gain knowledge on Inorganic and organic pesticides, Fungicides and repellants

Pre-Required Knowledge

- ✓ Basic Mathematical Concepts
- ✓ Basic Concepts in Organic Chemistry-EDG, EWG-o, p and m and m directors
- ✓ Periodic Table: Periodic classification of elements

Unit I: Basic Chemistry – I

Elements – atoms and molecules – Chemical formulae and symbols – Important basic terms such as pressure, volume, atomic mass, molecular mass, temperature, atomic number, mass number- Radioactivity and Isotopes- periodic classification of elements – Group and period (elementary idea)- Metals and nonmetal – metaolloid, alloy, ore and minerals.

Unit II: Basic Chemistry – II

State of matter (Solid, liquid, gas and plasma)-ideal and real gases - Important laws of Chemistry (Boyle's law, Charle'slaw,Hess's law, Grahams law of diffusion, Beer's law, Henry's law, Faraday's law, Law of conservation of matter or energy)- Types of chemical reactions (exothermic and endothermic, Physical and chemical changes, oxidation and reduction)

Unit III: Basic Chemistry – III

Different concepts of Acids and Bases (Arrhenius, Bronsted and Lewis) – pH concept (no calculation) – Water – Hard and soft water - Solutions and their types (True, Colloidal and suspension) – uses of colloidal solution – Buffer solution –Definitions of some important chemical processes (Haber's, Contact's, Ostwald's, Process)

Unit IV: Agricultural Chemistry

Fertilizer: Definition-nutrients for plants-role of various elements in plant growth – natural and chemical fertilizer – Classification of chemical fertilizer – fertilizer industry in India.

Unit V: Insecticides and Pesticide

Definition- classification – Inorganic and organic pesticides (lead arsenate, lime, sulphur, DDT and gammaxane) – Fungicides and repellants

Suggested Readings:

Text books:

1. Sharma B.K. Industrial chemistry, Krishna Prakashan Media (p) Ltd., 2011.
2. Puri, Sharma and Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2004
3. Puri, Sharma and Pathania, Principles of Inorganic Chemistry, Vishal Publishing Co., 2004

Reference Books:

1. A.Bahl and B.S.Bahl, Advanced Organic Chemistry, S.Chand& Company, New Delhi,2012.
2. A.S.Negi and S.C.Anand, A text book of Physical Chemistry, New Age International publishers,3rd Edition,2022.
3. J. D. Lee, Concise Inorganic Chemistry, 5th ed., Blackwell Science, London, 1996.
4. Jain, P. C. and Jain, M. Engineering chemistry, 10th ed.; Dhanpat rai and sons: delhi, 1993

Web Sources:

1. https://careerendeavour.com/net-question-paper/
2. https://ifasonline.com/csir-net-chemical-science/previous-year-question-papers.jsp
3. https://examprep.vpmclasses.com/
4. https://scoop.eduncle.com/csir-net-question-paper-free-download
5. https://career.aglasem.com/csir-ugc-net-question-paper-chemical-science/

NON MAJOR ELECTIVE
DEPARTMENT OF MATHEMATICS – UG – CBCS - LOCF

Title of the paper: Mathematical Skills for Competitive Examinations- II **Semester: VI**
Course code:LUMSNM61 **Contact Hours: 2hrs/w** **Credits: 2**

Course Learning Outcomes:

On completion of the course, the students are able to

- enable the students to have fundamental formulae and fast solving technique of quantitative aptitude for the purpose of preparing for competitive examination.
- pioneer the strong foundation of Mathematics for competitive examination.
- develop the skill of arithmetical ability for quantitative aptitude.
- enhance creative thinking and presence of mind to answer the questions of any competitive examination.
- develop various mathematical skills to solve the problems

Pre Required Knowledge:

- ✓ Basic concept of simple interest and compound interest.
- ✓ Problem solving skills.
- ✓ Knowledge of reading comprehension.

Unit I: Simple interest.

Simple interest.

Unit II: Compound Interest

Compound interest.

Unit III: Calendar and Clocks

Calendar and Clocks.

Unit IV: Verbal Reasoning

Verbal Reasoning – Mathematical operations, Inserting the missing character.

Unit V: Non Verbal Reasoning

Non-Verbal Reasoning- Analytical Reasoning, completion of incomplete pattern.

Suggested Topics for Group Discussion/ Presentation

1. Important Facts and Formulae on Simple interest
2. Important Facts and Formulae on Compound interest
3. Problems on Calendar
4. Mathematical operations
5. Analytical Reasoning

Suggested Readings:

(i)Text Books:

1. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, Revised and

Enlarged edition. S.Chand Publications, New Delhi, Reprint 2011.

Unit I:Chapter 21

Unit I:Chapter 22

Unit III:Chapter 27, 28

2. R.S. Agarwal, Verbal and Non-Verbal reasoning S.Chand Publications, New Delhi,

Reprint 2009.

Unit IV: Chapter 21,

Unit V: Chapter 22.

(ii) Reference Books:

1. R. Gupta, Quantitative aptitude, unique Publishers Pvt. Ltd, 2013.

2. R.V. Praveen, Quantitative Aptitude and Reasoning by, 2nd revised edition, 2013,

Prentice – Hall of India Pvt. Ltd.

(iii) Web Resources:

1. https://www.youtube.com/playlist?list=PLXjJ5c4vskp6yidDJs-NttEQwng8tu6Lo
2. https://www.careerbless.com/aptitude/qa/home.php
3. https://www.indiabix.com/aptitude/questions-and-answers/

DEPARTMENT OF NCC – UG - CBCS - LOCF
PART IV - NON MAJOR ELECTIVE

Title of the paper: NCC - II	**Semester: VI**
Course code : LUNCNM61 Contact Hours: 2hrs/w	**Credits : 2**

Course Learning Outcomes

On Completion of this Course, the students are able to

- demonstrate leadership skills
- analyze their strengths, weakness, opportunities and threats
- explain the basics of map reading
- adapt the techniques on field
- formulate strategies in battle ground

Pre–required Knowledge:

- ✓ Basics of Field Craft and Battle Craft.
- ✓ Skills in Leadership and Personality Development.
- ✓ Basics of Map reading and Grid Reference

Unit – I: Leadership Development

Leadership traits – Indicators of leadership - Types of Leaders - Autocratic and Democratic – Attitude – positive, negative and neutral – Assertiveness and negotiation. Case study of: A.P.J. Abdul Kalam, Ratan Tata and Kiran Mazumdar Shaw.

Unit – II: Personality Development

Definition and Factors influencing personality – SWOT analysis-Inter-personal relationship-Soft skills.

Unit – III: Map reading

Introduction –Service protractor- Conventional Signs – Prismatic compass- the Grid system and Grid reference.

Unit – IV: Field Craft

– Introduction – Description of Grounds – Observation – and Concealment Judging distance – Methods – under or over estimation – Description and Indication of targets – Methods.

Unit –V: Battle Craft

Field Signal – Section Formation – Fire Control orders – Types and Conduct of Patrols.

Suggested Topics/Practical Exercises

- finding the leadership quality of leaders A.P.J Abdul Kalam, Raten TATA and Kiran Mazumdar
- recognise our own SWOT Analysis
- finding the role of Conventional Signs in Map reading.
- identify types of grounds and Targets.
- apply the knowledge on Section Formation in a battle.

SUGGESTED READINGS:

i) Text books:

1. Asthana A K. Brigadier (2015), Commandant, Precis – Kamptee.
2. NCC Guide – Army Wing, (2010). Major R. Ramasamy, Karur, Priya Publications.
3. Cadets Hand Book (2018). Common subjects for SD/SW, OTA Training Materials, Kamptee.

ii) Reference books:

1. Specialized Subject Army (2018), Govt. Of India Press, New Delhi.
2. Precis, (2009). Published by Officer Training School, Kamptee,

3. Cadet's diary, Published by cadets' center, Chennai, 2000.
4. NCC: Handbook of NCC cadets,(2015), R. Gupta, Ramesh Publishing House,
5. Lt. Saravanamoorthy,S. N. A Hand Book of NCC-Army Wing (2015), Jayalakshmi publications.

iii) Web sources

1. https://indiancc.nic.in/
2. https://play.google.com/store/apps/details?id=com.chl.ncc&hl=en_IN&gl=US
3. https://joinindianarmy.nic.in/default.aspx
4. https://www.joinindiannavy.gov.in/
5. https://indianairforce.nic.in/

DEPARTMENT OF BOTANY – UG – CBCS ADD-ON PROGRAMMES CERTIFICATE COURSE IN FOOD PROCESSING TECHNOLOGY

Title of the paper: Food Processing Technology **Semester: II**
Course Code: EADCBYR **Total Contact Hours: 40**

Learning Objectives:

To enable the students to

- ❖ know commercially valuable foods and food products.
- ❖ understand the significance of food processing.
- ❖ study the different types of industrial food processing methods.

Practical Experiments:

1. Basics in food processing laboratory
2. Fruits – types – orange, mango, pineapple, grapes
3. Food preservation methods
4.. Drying and dehydration – enzyme inactivation – Sun drying – grapes and dates, dehydration of vegetables and fruits

5. Quality analysis of foods – sterilization and cleaning of work space and machinery – microbial (bacterial and fungal) limitation – testing browning reaction.
6. Determination of moisture (hot air oven method)
7. Determination of acidity and pH
8. Estimation of Vitamin-C, tannin and reducing sugar (colorimetric)
9. Preparation of fruit jam, squashes
10. Preparation various pickles –lemon – addition of additives and their uses
11. Preparation of milk products – Cheese
12. Mushroom – soup, salad, curry preparations

Learning Outcomes:

- ✓ Upon the completion of this certificate course, the students will able to
- ✓ It provides self employment opportunities
- ✓ Students will familiarize with value added products
- ✓ Understand the protocol for preparation of Mushroom recopies
- ✓ Understand the methods of quality analysis of perishable foods.

DEPARTMENT OF BOTANY – UG – CBCS ADD-ON PROGRMMES
DIPLOMA COURSE IN HERBAL TECHNOLOGY

Title of the paper: Pharmaceutical Values of Medicinal and Aromatic Plants **Semester: III & IV**
Course Code: EADDBY1R **Contact Hours: 40**

Learning Objectives:

To enable the students to

- ❖ focus resources of medicinally valuable plants
- ❖ study the significance of herbal medicines
- ❖ understand the phytocompounds and their pharmaceutical applications

Unit I:

Herbal medicine – Historical background, scope and importance. Classification of medicinal plants: resources of medicinal and aromatic plants: A brief account on health cares systems in Ayurveda, Sidha, Unani and Homoeopathy.

Unit II:

Traditional medicines (juice, infusion, tonic, decoction). Herbals in cosmetic industry and commercial products – face creams, oral cares (mouth wash and tooth paste) perfumes.

Unit III:

Single and polyherbal formulations of drugs – for common ailments (skin diseases, diabetics, laxatives, fever, cold and cough)

Unit IV:

Herbal aromatic compounds and oil in medicines – Introduction and significance. Extraction procedure of aroma or essential oil from plants – distillation types and methods.

Unit V:

Extraction procedure of – Eucalyptus oil, sandal wood oil and lemon grass oil

Learning Outcomes:

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

- ✓ **classify the different medicinal plants**
- ✓ **prepare different traditional medicines**
- ✓ **classify human diseases and prepare formation of drugs**
- ✓ **be expert in extracting drugs from medicinal plants**
- ✓ **be capable to extracting different oils**

Text Books:

1. Bhattacharjee, S.K. 2004. Handbook on medicinal plants. Pointer Publishers, Jaipur.
2. Srivastava, A.K. 2006. Medicinal plants, International Book Distributors, Dehradun. Yognarasimhan, S.N. 2000. Medicinal Plants of India, vol.2. Tamil Nadu. Interline Publishing Private Ltd., Bangalore.

Reference Books:

1. Farooqi A.A. & Sreeramu, B.S. 2001. Cultivation of Medicinal and Aromatic crops, University Press
2. Joshi.S.G. 2000. Medicinal plants. Oxford and IBH company private Ltd., New Delhi.

DEPARTMENT OF BOTANY – UG – CBCS ADD-ON PROGRAMMES
DIPLOMA COURSE IN HERBAL TECHNOLOGY

Title of the paper: Herbal Technology – Practical **Semester: III & IV**
Course Code: EADDBY2R **Total Contact Hours: 40**

Learning Objectives:

To enable the students

- ❖ focus resources of medicinally valuable compounds
- ❖ study the identification of various important medicinal plants
- ❖ give practical exposure of analyzing various Phyto-compounds

Practical Experiments:

1. Collection of Herbal Parts – leaf, root, stem & bark
2. Seed collection and storage. Brief note on sustainable harvesting methods
3. Quality control of herbal raw materials – Pharmacognosy and phytochemistry – estimation of moisture, active principle and additives – microbial contaminations.
4. Herbal industrial process – grinding, formulation, mixing, capsulation and packing

5. National rules and regulation on herbal products – Drug certification bodies.
6. Cultivation of medicinal plants – *Gymnema sp., - Cassia sp., - Aloe vera – Zinger*
7. Identification of important medicinal plants of Tamilnadu
8. Killing and fixing of tissues, tissue dehydration, paraffin infiltration, mounting
9. Anatomical study of selected plants: *Andrographis paniculata, Ocimum sanctum and Azadirachta indica*
10. Tests for identifying various plant components – starch – protein – tannin - chlorophyll
11. Estimation of ascorbic acid from gooseberry
12. TLC finger printing of bioactive molecules
13. Tissue culture of plant materials – explants selection – media preparation – techniques of regeneration of plants
14. Antimicrobial assay – Agar disc diffusion method.

DEPARTMENT OF PHYSICAL EDUCATION – UG – CBCS
ADD-ON COURSES

DIPLOMA COURSE IN HOLISTIC HEALTH

Title of the paper: Yoga, Meditation and Holistic Health-Practical **Semester: V & VI**

Course Code: EADDPE2 **Total Contact Hours: 40**

1. Physical exercises for whole body
2. Productive and creative manual work (cleaning, kitchen, garden, art work etc.)

1. Breathing exercises (10 type)
2. Relaxation techniques (4 types)
3. Music and movement therapy
4. Basic Yogasanas (20 types)
5. Mutras (10 types - energy)
6. Physical exercises (5 types)
7. Meditation skills (5 types)
8. Healing techniques (5 types)
9. Field visit, to understand human
10. Body, visit to Government Medical College Hospital
11. Visit to a reputed Yoga Centre (Encounter with Yoga experts)

RULES AND REGULATIONS FOR THE PROJECT / DISSERTATION WORK (UG, PG AND M.PHIL)

- Research supervisors will be allotted to the students / scholars by the respective Department.
- Research topic shall be chosen by the student / scholar in consultation with his/ her research supervisor.
- Every department has to maintain the year-wise list of project works carried out by the students. Research works done by the students / scholars of the previous batches should not be repeated by the students / scholars of the current academic year.

- The general structure of the project report is given below.

  Title page with college emblem

  Research supervisor's certificate

  Student's declaration counter signed by Research Supervisor and the HOD

  Student's Acknowledgement

  Contents

  List of Tables if any

  Introduction

  Review of Literature

  Materials and Methods

  Results and Discussion

  Summary of Findings and Conclusion

  Bibliography

  Annexure

  - Four copies of the project repot should be submitted, typed in A4 Paper in Times New Roman with the font size of 12 and 1.5 line spacing.

SARASWATHI NARAYANAN COLLEGE

(Autonomous Institution – Affiliated to Madurai Kamaraj University)

(Reaccredited with $B^{(2.78)}$ Grade by NAAC in the second cycle)

MADURAI -22

EVALUATION METHOD UNDER CBCS- LOCF

CONTINUOUS INTERNAL ASSESSMENT (CIA)

Internal assessment is based on the continuous evaluation of performance of the students in each semester. Internal mark is awarded to each course in accordance with the following guidelines.

UNDER GRADUATE, POST GRADUATE AND M.PHIL:

1. Internal test will be conducted for the maximum of 60 marks and converted to 15 marks.
2. Two internal tests will be conducted and the average of marks secured in the two tests will be taken as the Final Internal Test mark.
3. The distribution of Internal Assessment marks is given below.

	THEORY		**PRACTICAL**	
Test -	15	Record Note	-	10
Seminar -	5	CIA	-	15
Quiz -	5	Model Exam	-	15
	---			---
Internal Maximum -	25	Internal Maximum -		40

1. There is no Cumulative Internal Assessment (CIA) for Self Learning Courses, Add on Certificate / Diploma Programmes and Part-1 subjects other than Tamil.

2. Internal marks for those UG, PG and M.Phil. students who have to Repeat the Semester (RS) for want of attendance should be marked “AA” in the foil card.
3. There is no minimum mark for Internal assessments marks for all the UG, PG and M.Phil. Programmes.
4. Internal test for improvement of marks is not allowed under any circumstances
5. Special Internal Assessment tests for the absentees may be conducted on genuine reasons with the prior approval of HOD, Dean and Principal. Such tests may be conducted before the commencement of the Summative Examinations.

SUMMATIVE EXAMINATIONS (SE)

1. Summative Examinations for all the UG, PG and M.Phil. Programmes are conducted in November and April for the Odd and the Even semesters respectively.
2. Question paper setting along with the scheme of valuation is purely external for all the UG, PG and M.Phil. Programmes.
3. The office of the CEO is conferred with the right of choosing the Question Paper Setters and the External Examiners from the Panels suggested by the Boards of Studies of Programmes offered by the respective Department and approved by the Academic Council of the College. The question papers set for the Summative Examinations will be finalised by the Scrutiny Committee constituted by the office of the COE.
4. Practical Examinations will be conducted by the External Examiner and the course teacher, who will act as the Internal Examiner. In the absence of course teacher / External Examiner, HOD will act as the Internal Examiner / External Examiner.
5. The marks scored by the students in the External Examinations in Self Learning Courses and Add – on Courses will be converted to 100 for each course.
6. The theses submitted by the M.Phil. scholars after the conduct of Awards Committee meeting can be valued and the Viva-Voce Examinations can be conducted. The Principal is empowered to declare the results and it can be ratified in the next Awards Committee meeting.

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S. No	Level	Parameter Description	Description
1	K1	Remembering	Remembering It is the ability to remember the previously learned
2	K2	Understanding	The learner explains ideas or Concepts
3	K3	Applying	The learner uses information in a new way
4	K4	Analysing	The learner distinguishes among different parts
5	K5	Evaluating	The learner justifies a stand or decision
6	K6	Creating	The learner creates a new product or point of view

WEIGHTAGE OF K–LEVELS IN QUESTION PAPER

K-LEVELS (Cognitive Level)						Total
	K1	K2	K3	K4	K5/ K6	
summative examinations– 75 marks pattern	21	30	18	18	13	100
summative examinations–50 marks pattern	24.5	24.5	17	17	17	100
continuous internal assessment(cia)	24	26	14	25	11	100

QUESTION PATTERN FOR SUMMATIVE EXAMINATIONS For those who join in June 2022 UG and PG (Language Courses, Core Courses, Discipline Specific Electives, Generic Elective Courses, Non-Major Electives (PG))	
	TOTAL MARKS **75**
SECTION–A (Answer all questions) **I. Choose the correct answer (FIVE questions –ONE question from each unit) (5 x 1 = 5)** (Q.No.1-5) - All questions are at K2 level **II. Fill in the blanks (FIVE questions - ONE question from each unit) (5x1=5)** (Q.No.6-10)-All questions are at K1 level	**10**
SECTION-B **Answer all questions not exceeding 50 words each.** **ONE set of questions from each unit** **Q. No. : 11 to 15 (5x2=10)** K2 level – 2 Questions K3 level – 1 Question K4 level –1 Question K5/K6 level – 1 Question	**10**
SECTION-C-Either/or type **Answer all questions not exceeding 200 words each.** **ONE set of questions from each unit.** **Q. No. : 16 to 20 (5 x5=25)** K1 level – 1 Question K2 level – 2 Questions K3 level – 1 Question K4 level – 1 Question	**25**
SECTION-D-Answer any THREE questions not exceeding 400 words each. **ONE question from each unit.** **Q. No. : 21 to 25 (3 x 10 =30)** K1 level – 1 Question K2 level – 1 Questions K3 level – 1 Question K4 level – 1 Question K5/K6 level – 1 Question	**30**
Total	**75**

QUESTION PATTERN FOR SUMMATIVE EXAMINATIONS For those who join in June 2022 UG and PG (Skill Enhancement Courses, Self Learning Courses, Non Major Electives (UG)and Part V Courses (except NCC))	
	TOTAL MARKS 50
SECTION–A(Answer all questions) **I. Choose the correct answer (FIVE questions–ONE question from each unit)** (Q.No.1-5) - All questions are at K2 level **II. Fill in the blanks (FIVE questions – ONE question from each unit) (5x1=5)** (Q.No.6-10) - All questions are at K1 level	**10**
SECTION-B **Answer all questions not exceeding 50 words each.** **ONE set of question from each unit** **Q. No. : 11 to 15 (5x2=10)** K1 level – 1 Question K2 level – 1 Question K3 level – 1 Question K4 level – 1 Question K5/K6 level – 1 Question	**10**
SECTION-C **Answer any THREE questions not exceeding 400 words each.** **ONE question from each unit** **Q. No. : 16 to 20 (3x10=30)** K1 level – 1 Question K2 level – 1 Question K3 level – 1 Question K4 level – 1 Question K5/K6 level – 1 Question	**30**
Total	**50**

QUESTION PATTERN FOR INTERNAL ASSESSMENT (CIA) For those who join in June 2022 UG and PG	
	TOTAL MARKS 60
SECTION–A(Answer all questions) **I. Choose the correct answer** (5 x 1 = 5) (Q.No.1-5)-All questions are at K2 level **II. Fill in the blanks (5x1=5)** (Q.No.6-10)-All questions are at K1 level	**10**
SECTION-B **Answer all questions not exceeding 50 words each.** **ONE set of question from each unit** (4 x 2 = 8) Q.No. 11 – K2 level Q.No. 12 – K3 level Q.No. 13 – K3 level Q.No. 14 – K5/ K6 level	**8**
SECTION-C-Either/or type (**Answer all questions not exceeding 200 words each**. (3 x 6 = 18) Q.No. 15 – K3 level Q.No. 16 – K4 level Q.No. 17 – K5/K6 level	**18**
SECTION-D **Answer any TWO questions not exceeding 400 words each. (2 x 12 = 24)** Q.No. 18 – K1 level Q.No. 19 – K2 level Q.No. 20 – K4 level	**24**
Total	**60**

QUESTION PATTERN FOR SUMMATIVE EXAMINATIONS

For those who join in June 2022

UG and PG

(Language Courses, Core Courses, Discipline Specific Electives, Generic Elective Courses, Non-Major Electives(PG))

DURATION:3HRS			**MAXMARKS:75**			
K-LEVELS / SECTIONS	**K1**	**K2**	**K3**	**K4**	**K5/K6**	**TOTAL MARKS**
SECTION A (Answer all questions, each question carries One Mark)	5	5				**10**
SECTION B (Answer all questions, each question carries TWO Marks, ONE question from Each unit)		4	2	2	2	**10**
SECTION C (Answer all questions-Either/or type-ONE Question from each unit)	5	10	5	5		**25**
SECTION D (Answer any THREE questions, ONE question from each unit, each question carries TEN Marks)	10	10	10	10	10	**30**
TOTAL	20	29	17	17	12	**75**

QUESTION PATTERN FOR SUMMATIVE EXAMINATIONS For those who join in June 2022 UG and PG (Skill Enhancement Courses, Self Learning Courses, Non Major Electives (UG) and Part V Courses (except NCC))						
DURATION:2HRS			**MAX MARKS:50**			
K-LEVELS SECTIONS	**K1**	**K2**	**K3**	**K4**	**K5/ K6**	**TOTAL MARKS**
SECTION A (Answer all questions, each question carries One Mark)	5	5				**10**
SECTION B (Answer all questions, each question carries TWO Marks, ONE question from Each unit)	2	2	2	2	2	**10**
SECTION C (Answer any THREE questions, ONE question from each unit, each question carries TEN Marks)	10	10	10	10	10	**30**
TOTAL	17	17	12	12	12	**50**

BLUE PRINT OF QUESTION PAPER FOR INTERNAL ASSESSMENT (CIA)						
DURATION:2HRS			**MAX MARKS:60**			
K-LEVELS / SECTIONS	**K1**	**K2**	**K3**	**K4**	**K5/K6**	**TOTAL MARKS**
SECTION A (Answer all question. Each question Carries **ONE** Mark)	5	5				**10**
SECTION B (Answer all questions. Each question carries **TWO** Marks)		2	4		2	**8**
SECTION C (Answer all questions- Either/or type -Each question carries **SIX** Marks)			6	6	6	**18**
SECTION D (Answer any TWO questions. Each question carries **TWELVE** Marks)	12	12		12		**24**
TOTAL	17	19	10	18	8	**60**

QUESTION PATTERN

FOR PART IV ENVIRONMENTAL STUDIES, VALUE EDUCATION YOGA and Course for Competitive Examinations – UG

(For those who joined in June 2022)

Blue print for External

Max. Marks: 75

I. Answer All Questions

Choose the Correct answer (Objective type pattern)

ADD-ON PROGRAMMES

- Add on Programmes have been in practice for all the UG students since the academic year 2014-2015. Each department has to conduct one Certificate Programme in the Second Semester with the duration of 40 hrs and a Diploma Programme in the Third and the Fourth Semesters with the duration of 40 hrs each.
- The certificate Programme consists of only one course (theory / practical) while the Diploma Programme consists of two courses (theory / practical).
- There is no Continuous Internal Assessment (CIA) for Add-on Programmes. Only Summative Examinations will be conducted and the valuation will be done only by External Examiners.
- Summative Examinations for the Add-On Certificate and Diploma Programmes will be conducted at the end of every semester for UG Arts and Mathematics Programmes. Whereas the same will be conducted at the end of the respective academic year for the science UG Programmes in science subjects except Mathematics.

COMMON QUESTION PATTERN FOR ADD – ON PROGRAMMES

(for those who joined in June 2020 and afterwards)

Blue print for External

Max. Marks: 50 **Duration: 2 hrs**

SECTION – A

1. Answer All Questions (No Choice) 10 x 1 = 10 Marks

Choose the correct answer (Objective patter)

(Two Questions from each unit)

SECTION – B

2. Short type questions 5 x 4 = 20 Marks

Answer any Five questions (5/8)

(Choosing atleast one question from each unit and not exceeding two questions)

SECTION - C

3. Essay type questions 2 x 10 = 20 Marks

Answer any Five questions (2/5)

(One question from each unit)

QUESTION PAPER PATTERN FOR M.Phil. COURSES

SECTION A

Answer All Questions

1. Either or Pattern (one set from each unit) 5 x 6 = 30 Marks

SECTION B

Answer any three questions out of 5 questions

1. One question from each unit3 x 15 = 45 Marks

QUESTION PATTERN FOR M.Phil. CHEMISTRY FOR ONLY INDEPTH PAPER
(Course Code No. DMPCHE11)

Answer any Five Questions out of Eight Questions

One question from each published literature.

(Each answer should not exceed five pages)

VALUATION

1. Central valuation system is adopted.
2. Single Valuation system is followed for UG, PG and M.Phil. theory examinations. The valuation is done by the external examiners only.
3. UG and PG Practical Examinations are valued by both Internal and External Examiners.
4. Any discrepancy in the question paper should be brought to the notice of the Controller of Examinations by the respective Course Teacher through the Head of the Department within five days from the date of examination.

DECLARATION OF RESULTS

1. The total credit should not exceed 140 for UG Programmes and 90 for PG Programmes, excluding the credits earned for additional credit courses. This is applicable to the students migrating from other colleges also.
2. The students migrating from other colleges have to appear for the Summative Examinations conducted by the college for non-equivalent theory and practical courses. Mark scored by such a student in the Summative Examinations conducted by the previous college shall be converted to 100 if it is less than 100 for any equivalent course.
3. The students who repeat the semester have to appear not only for Summative Examinations but also for internal tests. The Internal marks scored by such students in their previous attempts shall stand invalid.

4. Results will be published within 20 days from the date of completion of all the Examinations.
5. Results will be declared as per the norms given in the following table in consultation with the Awards Committee.

Maximum and Passing Minimum Marks

Course	External Exam (SE)		Aggregate Marks (CIA + SE)	
	Passing Minimum	**Maximum Mark**	**Passing Minimum**	**Maximum Mark**
UG (Theory)	27	75	40	100
UG – NME / SEC / Part V (except NCC)	18	50 (converted to 75 marks)	40	100
UG – SLC	20	50	40	100
UG (Practicals)	21	60	40	100
UG Project	18	50	40	100
PG (Theory)	34	75	50	100
PG (Practicals)	27	60	50	100
PG (Project)	23	50	50	100
M.Phil. (Theory)	34	75	50	100
M.Phil. Project				
1. Dissertation	50	**100** (Internal 50 + External 50)	-	-
2. Viva – Voce	50	**100** (Internal 50 + External 50)	-	-

REVALUATION AND SUPPLEMENTARY EXAMINATIONS

1. Students can apply for Revaluation within 10 days from the date of the publication of the results.
2. Final year students of UG and PG Programmes can appear for Supplementary Examinations for the arrear papers of only the V and VI Semesters of UG Programmes and III and IV Semesters of PG Programmes. Students having the maximum of three arrear papers alone are eligible for Supplementary Examinations.
3. Absentees in the Summative Examinations are not eligible to apply for the Supplementary Examinations.
4. Supplementary Examinations will be conducted every year in the month of July.

ATTENDANCE

1. Students with the minimum of 75% of attendance (68 days out of 90 days) in a semester are permitted to appear for the summative examinations.
2. Students who do not have the minimum attendance should go for condonation.
3. Students who do not have the minimum attendance of 20 hrs for Certificate Programme and the minimum attendance of 20 hrs for each course in Diploma Programme will not be permitted to appear for the summative examinations.

The following are the regulations for grant of condonation.

Attendance	Condonation Fee	Authority to Consider	Nature of Penalty
65% - 74% (59-67 days)	Rs.500/-	Head of the Department	As decided by the HOD
50% - 64% (58-45 days)	Rs.1000/-	Principal and the Examination Committee	Application for exemption to be made on prescribed form with the specified remarks of the Principal
< 50% (Below 45 days)	To repeat the whole semester	-----	-----

EXAMINATION RULES AND REGULATIONS

1. Students without hall ticket and identity card are not permitted to appear for the examinations.
2. Possession of materials in any form for copying is strictly prohibited in the examination hall.
3. Students indulging in any form of malpractices in the examination are liable for severe punishment.
4. Students are not allowed into the examination hall after 30 minutes of the commencement of the examination.
5. Students should not write their names or any other identification marking except their register number in the answer scripts.
6. Students who have discontinued the Degree Programme are not permitted to write the summative examinations.
7. Students who have not completed the theory and practical courses during the Programme of their study are allowed to appear for the Summative Examinations in the same

syllabi up to a period of three years from the year of the completion of Programme. However, after the completion of three years, they have to appear for the summative examinations for the equivalent course in the current syllabi only. The equivalence of a course is to be decided by the respective HOD, Dean, the Controller of Examinations and the Principal. This is also applicable to those students who repeat the semester.

PENAL ACTIONS FOR VARIOUS FORMS OF MALPRACTICES IN THE SUMMATIVE EXAMINATIONS

Sl. No.	Malpractice	Penal Action
1	In Possession of Materials relevant to the examination concerned	Cancellation of that particular paper.
2	Copied from materials in his/her possession	Cancellation of all papers of that semester
3	Copied from neighbours	Cancellation of all papers including arrear papers of that semester Cancellation of that particular paper of the candidate who helped for copying
4	Copied by exchanging answer script between neighbours	Cancellation of all papers of the candidates who exchanged their answer scripts

5	Misbehaviour in the examination hall	Cancellation of that particular paper
6	Copying and Misbehaviour in the examination hall	Cancellation of all papers of that semester and debarring the candidate from appearing for the next semester examination.
7	Insertion of answer sheets which were previously stolen and written	Cancellation of all papers of that semester and debarring the candidate from appearing for the next semester examination.
8	Impersonation in the examination	Cancellation of all papers of that semester and recommending dismissal from the college.