



VELS



INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)

(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)

PALLAVARAM - CHENNAI

ACCREDITED BY **NAAC** WITH '**A**' GRADE

Marching Beyond 30 Years Successfully

INSTITUTION WITH **UGC 12B** STATUS

UNDERGRADUATE DEGREE PROGRAMME

B.Sc., Biochemistry

Three Years

/

B.Sc., (Hons) Biochemistry

Four Years

CURRICULUM & SYLLABUS

REGULATION 2024

Choice Based Credit System (CBCS)

&

Learning Outcomes based Curriculum Framework (LOCF)

Effective from the Academic year

2024-2025

Department of Biochemistry

School of Life Sciences



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INSTITUTION WITH **UGC 12B** STATUS

DEPARTMENT OF BIOCHEMISTRY

VISION OF THE DEPARTMENT

1. To gain global recognition within the scientific community, distinguished by expertise and excellence in the field of Biochemistry.
2. To foster an environment conducive to critical thinking, enabling the discernment and interconnectedness of diverse branches such as cell biology, intermediary metabolism, clinical biochemistry, immunology, enzymology, and endocrinology.

MISSION OF THE DEPARTMENT

M1	To achieve proficiency in the fundamental concepts and principles of Biochemistry
M2	To recognize issues within research protocols in key areas, where the expertise of a biochemist is indispensable.
M3	To acquaint students with research domains and advanced instrumentation techniques.
M4	To explore the correlation between human-induced environmental factors and biochemical alterations in biological organisms, and their implications for human health.
M5	To grasp scientific learning concepts for experimentation and hypothesis validation processes.
M6	To cultivate a robust understanding of practical biochemistry and its societal applications for the greater good.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

PEO-1:	To adeptly integrate foundational knowledge from various scientific disciplines in an interdisciplinary fashion, fostering the generation of innovative solutions to globally impactful challenges.
PEO-2:	To proficiently evaluate scientific information, discerning objective insights, and employing this understanding for the betterment of humanity. Students should demonstrate both expertise and ethical awareness in Biochemistry-related domains.
PEO-3:	Upon program completion, students will be well-equipped to pursue diverse career paths in academia, research, and industry, particularly within pharmaceutical and biotechnology sectors.
PEO-4:	To instill a commitment to lifelong learning, enabling the continual development and application of scientific skills for personal and professional growth, including their practical application in everyday life.
PEO-5:	To foster a comprehensive understanding and disciplinary expertise in Biochemistry, encompassing the structures, functions, and mechanisms of biological molecules.

PROGRAM OUTCOME (PO)

PO-1	Scientific Intellect: Graduates will attain specialized knowledge in biochemistry, biotechnology, bioinformatics, or microbiology, including proficiency in contemporary techniques within their respective fields, alongside hands-on and leadership capabilities essential for career success.
PO-2	Problem Solving: Graduates will demonstrate the ability to analyze, resolve, and troubleshoot challenges encountered during the implementation of biochemistry, biotechnology, or microbiological protocols.
PO-3	Solution Design and Development: Graduates will cultivate creative thinking and collaborative skills to address issues within the realms of biochemistry, biotechnology, bioinformatics, or microbiology.
PO-4	Complex Problem Investigation: Graduates will develop practical competencies, enabling them to plan and devise protocols for hypothesis validation, independently execute experimental techniques, and effectively assimilate, analyze, and interpret resultant data.
PO-5	Utilization of Modern Tools and Communication: Graduates will proficiently utilize information and communication technologies (ICT) and computer-enabled devices to manage resources and time efficiently, while also possessing the ability to comprehensively understand and communicate ideas.

PO-6	Environmental Sustainability and Ethical Awareness: Graduates will acquire sufficient knowledge to implement solutions for environmental protection and remediation, with an understanding of their roles and responsibilities in the handling and utilization of microbes, including genetically modified microorganisms
PO-7	Commitment to Lifelong Learning: Graduates will exhibit a continuous learning mindset, adapting to the ever-evolving landscape of technology and knowledge.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1:	To develop a profound understanding of both theoretical and practical aspects of Biochemistry, enabling the application of this knowledge to devise cost-effective solutions within the field.
PSO2:	To comprehend the technical intricacies of current technologies essential for tackling the biological and medical hurdles encountered by humanity.
PSO3:	To utilize Biochemistry knowledge effectively in addressing environmental, intellectual, societal, and ethical concerns, as demonstrated through class-presented case studies.

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BOARD OF STUDIES

List of Members

Department of Biochemistry

S. No.	Name & Designation	Address	Role
1	Dr.B.Usharani	Associate Professor and Head i/c, Department of Biochemistry, VISTAS, Chennai	Chair person
2	Dr. V. Anuradha	Associate Professor and Head, Department of Biochemistry, Mohamed Sathak College of Arts and Science, Chennai	External expert- Academic
3	Dr. Savitri Shivkumar	Managing director, Aaranya Biosciences, Women's Biotech Park, Siruseri, Chennai	External expert- Industry
4	Dr. R. Padmini	Associate Professor, Department of Biochemistry, VISTAS, Chennai	Internal Member
5	Dr. C. Shobana	Associate Professor, Department of Biochemistry, VISTAS, Chennai	Internal Member
6	Dr. R. Vidya	Assistant Professor, Department of Biochemistry, VISTAS, Chennai	Internal Member
7	Dr. P. Amudha	Assistant Professor, Department of Biochemistry, VISTAS, Chennai	Internal Member
8	Ms. Aarthi	Assistant Professor, Arcot Sri Mahalakshmi Arts and Science College, Villapakkam, Ranipet district	Alumni (MSc Biochemistry- 2019-2021 batch)

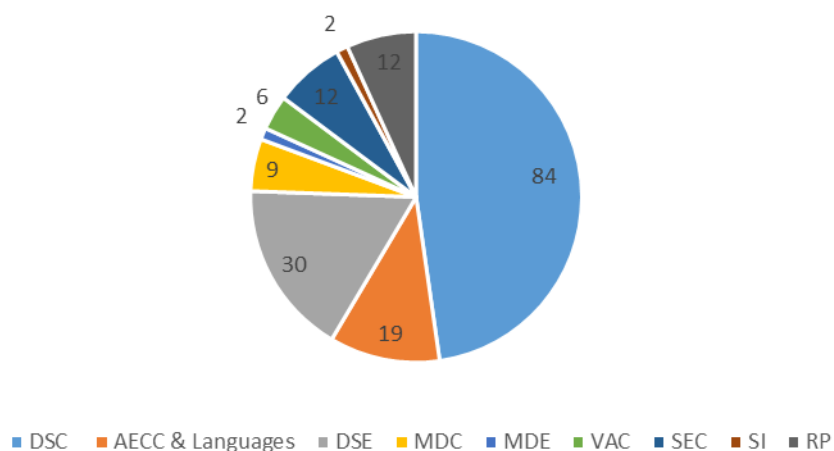
CREDIT DISTRIBUTION

B.Sc., (Hons) in Biochemistry
Maximum credits to be earned: 176

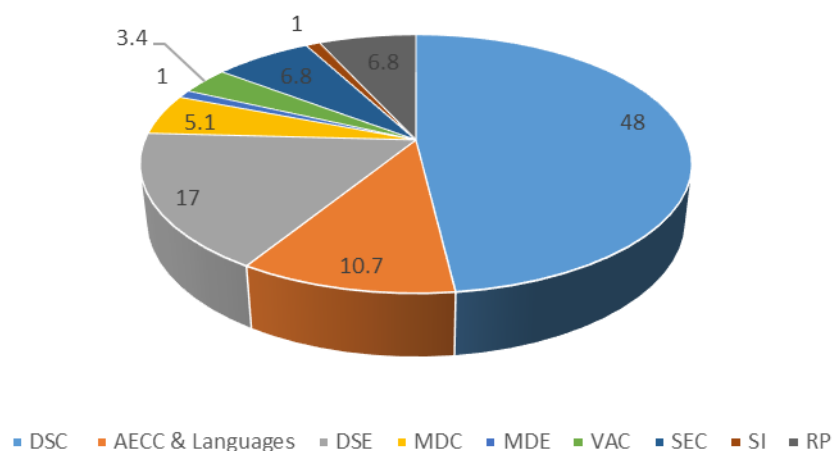
B.Sc., Biochemistry
Minimum credits to be earned: 132

Component	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	3 Yrs. Total Credits	VII Sem	VIII Sem	4 Yrs. Total Credits
DSC	8	8	8	8	12	16	60	12	12	84
AECC & Languages	4	4	4	7	-	-	19	-	-	19
DSE / IDC / Minor	4	4	3	4	4	3	22	4	4	30
MDC	3	3	3	-	-	-	9	-	-	9
MDE	-	-	2	-	-	-	2	-	-	2
VAC	1	2	-	1	2	-	6	-	-	6
SEC	2	2	2	2	2	2	12	-	-	12
SI	-	-	1	-	1	-	2	-	-	2
RP	-	-	-	-	-	-	-	6	6	12
Total Credits	22	23	23	22	21	21	132	22	22	176

CREDIT DISTRIBUTION



Credit Percentage Distribution



ABBREVIATIONS

DSC	Disciplinary Specific Core
AECC	Ability Enhancement Compulsory Courses
DSE	Disciplinary Specific Elective
IDC	Interdisciplinary / Minor Courses
MDC	Multidisciplinary Courses
MDE	Multidisciplinary Elective
VAC	Value Added Courses
SEC	Skill Enhancement Courses
SI	Summer Internship
RP	Research Project

CURRICULUM STRUCTURE

B.Sc., (Hons) in Biochemistry Three Years

B.Sc., Biochemistry Four Years

Total number of Credits: 176

B.Sc Biochemistry Hons Maximum Credits to be earned :176

B.Sc., Biochemistry Minimum Credits to be earned: 132

SEMESTER 1

			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
LANG 1	24LTAM11/	Tamil I /								
	24LHIN11/	Hindi I/	2	0	0	1	2	40	60	100
	24LFRE11	French I								
ENG 1	24LENG11	English I	2	0	0	1	2	40	60	100
DSC 1	24CBBC11	Introduction to Biomolecules	3	0	0	2	3	40	60	100
DSC 2	24CBBC12	Human Physiology	4	0	0	2	4	40	60	100
MDC 1	24MBBC11	Basic concepts in Nutrition	3	0	0	2	3	40	60	100
DSE 1 / IDC 1 / Minor 1	24DBBC1-	Discipline Specific Elective-I	4	0	0	2	4	40	60	100
DSC 1 (Lab)	24PBBC11	Practical I Qualitative analysis of Biomolecules	0	0	2	1	1	40	60	100
VAC 1	24DVAC11	Universal Human Values	1	0	0	1	1	-	100	100
SEC 1	24SSKU11	Soft Skills 1	2	0	0	1	2	40	60	100
SEC 2		Orientation Programme / Industrial Visit	-	-	-	-	-	-	-	-
			21	-	2	-	22	-	-	-

CIA - Continuous Internal Assessment

SEE - Semester End Examination

*L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study, *C-Credits

SEMESTER 2

Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
LANG 2	24LTAM21/	Tamil II /								
	24LHIN21/	Hindi II /	2	0	0	1	2	40	60	100
	24LFRE21	French II								
ENG 2	24LENG21	English II	2	0	0	1	2	40	60	100
DSC 3	24CBBC21	Analytical Techniques	3	0	0	2	3	40	60	100
DSC 4	24CBBC22	Enzymology	3	0	0	2	3	40	60	100
MDC 2	24MBBC21	Hospital Management	3	0	0	2	3	40	60	100
DSE 2 / IDC 2 / Minor 2	24DBBC2-	Discipline Specific Elective-II	4	0	0	2	4	40	60	100
DSC 3 (Lab)	24PBBC21	Practical II Analytical biochemistry	0	0	2	1	1	40	60	100
DSC 4 (Lab)	24PBBC22	Practical III Enzymology	0	0	2	1	1	40	60	100
VAC 2	24DVAC21	Communication Skills	2	0	0	1	2	40	60	100
SEC 3	24SSKU21	Soft Skills II	2	0	0	1	2	40	60	100
			21	-	4	-	23	-	-	-

CIA - Continuous Internal Assessment

SEE - Semester End Examination

*L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study, *C-Credits

SEMESTER 3										
Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
LANG 3	24LTAM31/	Tamil III /	2	0	0	1	2	40	60	100
	24LHIN31/	Hindi III /								
	24LFRE31	French III								
ENG 3	24LENG31	English III	2	0	0	1	2	40	60	100
DSC 5	24CBBC31	Hematology	3	0	0	2	3	40	60	100
DSC 6	24CBBC32	Clinical Biochemistry	3	0	0	2	3	40	60	100
MDC 3	24MBBC31	Pathology	3	0	0	2	3	40	60	100
DSE 3 / IDC 3 / Minor 3	24DBBC3-	Discipline Specific Elective-III	3	0	0	2	3	40	60	100
DSC 5 (Lab)	24PBBC31	Practical IV Hematology	0	0	2	1	1	40	60	100
DSC 6 (Lab)	24PBBC32	Practical V Clinical Biochemistry	0	0	2	1	1	40	60	100
MDE		Indian Knowledge system	1	1	0	1	2	40	60	100
SEC 4	24SSKU31	Soft Skills III	2	0	0	1	2	40	60	100
SI 1	24IBBC31	Internship I	0	0	2	1	1	-	100	100
			19	1	6	-	23	-	-	-

CIA - Continuous Internal Assessment

SEE - Semester End Examination

*L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study, *C-Credits

SEMESTER 4										
Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
LANG 4	24LTAM41/ 24LHIN41/ 24LFRE41	Tamil IV / Hindi IV / French IV	2	0	0	1	2	40	60	100
ENG 4	24LENG41	English IV	2	0	0	1	2	40	60	100
AECC1	24EVS031	Environmental Studies	3	0	0	2	3	40	60	100
DSC 7	24CBBC41	Cell Biology	3	0	0	2	3	40	60	100
DSC 8	24CBBC42	Immunology	3	0	0	2	3	40	60	100
DSE 4 / IDC 4 / Minor 4	24DBBC4-	Discipline Specific Elective- IV	4	0	0	2	4	40	60	100
DSC 7 (Lab)	24PBBC41	Practical VI Methods in Cell Biology	0	0	2	1	1	40	60	100
DSC 8 (Lab)	24PBBC42	Practical VII Immunology	0	0	2	1	1	40	60	100
SEC 5	24SBBC41	Industry Oriented Employability skills	1	0	2	1	2	-	100	100
VAC 3	24DVAC41	Yoga Education / NSS / NCC	0	0	2	1	1	-	100	100
SEC 6		In-plant Training/ Industrial Tour/ Summer Term	-	-	-	-	-	-	-	-
			18	-	8	-	22	-	-	-

CIA - Continuous Internal Assessment

SEE - Semester End Examination

*L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study, *C-Credits

SEMESTER 5										
Category	Code	Course	L	T	P	O	C	CA	SEE	Total
DSC 9	24CBBC51	Molecular Biology	3	0	0	2	3	40	60	100
DSC 10	24CBBC52	Intermediary Metabolism	3	0	0	2	3	40	60	100
DSC 11	24CBBC53	Plant Biochemistry	4	0	0	2	4	40	60	100
DSE 5 / IDC 5 / Minor 5	24DBBC5-	Discipline Specific Elective-V	4	0	0	2	4	40	60	100
DSC 9 (Lab)	24PBBC51	Practical VIII Molecular Biology	0	0	2	1	1	40	60	100
DSC 10 (Lab)	24PBBC52	Practical IX Plant Biochemistry	0	0	2	1	1	40	60	100
SEC 7	24SBBC51	Entrepreneurial Development	2	0	0	1	2	40	60	100
VAC 4	24DVAC51	Medical Coding	2	0	0	1	2	40	60	100
SI 2	24IBBC51	Internship II	0	0	2	1	1	-	100	100
SEC 8		Skill Enhancement Training / Student Club Activities/ Institution Innovation Council (IIC)Activities	-	-	-	-	-	-	100	100
			18	-	6	-	21	-	-	-

CIA - Continuous Internal Assessment

SEE - Semester End Examination

*L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study, *C-Credits

SEMESTER 6										
Category	Code	Course	L	T	P	O	C	CA	SEE	Total
DSC 12	24CBBC61	Tissue culture	3	0	0	2	3	40	60	100
DSC 13	24CBBC62	Pharmaceutical Biochemistry	4	0	0	2	4	40	60	100
DSC 14	24CBBC63	Ecology & Environmental Toxicology	4	0	0	2	4	40	60	100
DSC 15	24CBBC64	Forensic Science	4	0	0	2	4	40	60	100
DSE 6 / IDC 6 / Minor 6	24DBBC6-	Discipline Specific Elective-VI	3	0	0	2	3	40	60	100
DSC 12 (Lab)	24PBBC61	Practical X Cell Culture Techniques	0	0	2	1	1	40	60	100
SEC 9	24SBBC61	Mini Project	0	0	4	1	2	-	100	100
SEC 10		On Job Training / Apprenticeship / Startup	-	-	-	-	-	-	-	-
			18	-	6	-	21	-	-	-

CIA - Continuous Internal Assessment

SEE - Semester End Examination

*L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study, *C-Credits

SEMESTER 7										
Category	Code	Course	L	T	P	O	C	CA	SEE	Total
DSC 16	24CBBC71	Genetics	3	0	0	2	3	40	60	100
DSC 17	24CBBC72	Molecular Developmental Biology	4	0	0	2	4	40	60	100
DSC 18	24CBBC73	Biochemistry of Cell Signaling	4	0	0	2	4	40	60	100
DSE 7 / IDC 7 / Minor 7	24DBBC7-	Discipline Specific Elective-VII	4	0	0	2	4	40	60	100
DSC 16 (Lab)	24PBBC71	PracticaXI Genetics	0	0	2	1	1	40	60	100
RP 1	24RBBC71	Research Project I	0	0	12	4	6	40	60	100
			15	-	14	-	22	-	-	-

CIA - Continuous Internal Assessment

SEE - Semester End Examination

*L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study, *C-Credits

SEMESTER 8										
Category	Code	Course	L	T	P	O	C	CA	SEE	Total
DSC 19	24CBBC81	Molecular Basis of Infectious Disease	3	0	0	2	3	40	60	100
DSC 20	24CBBC82	Omics Technology	3	0	0	2	3	40	60	100
DSC 21	24CBBC83	Applied Biotechnology	4	0	0	2	4	40	60	100
DSE 8 / IDC 8 / Minor 8	24DBBC8-	Discipline Specific Elective-VIII	4	0	0	2	4	40	60	100
DSC 19 (Lab)	24PBBC81	Practical XII – Infectious Biology	0	0	2	1	1	40	60	100
DSC 20 (Lab)	24PBBC82	Practical XIII- Bioinformatics	0	0	2	1	1	40	60	100
RP 2	24RBBC81	Research Project II	0	0	12	4	6	40	60	100
			14	-	16	-	22	-	-	-

CIA - Continuous Internal Assessment

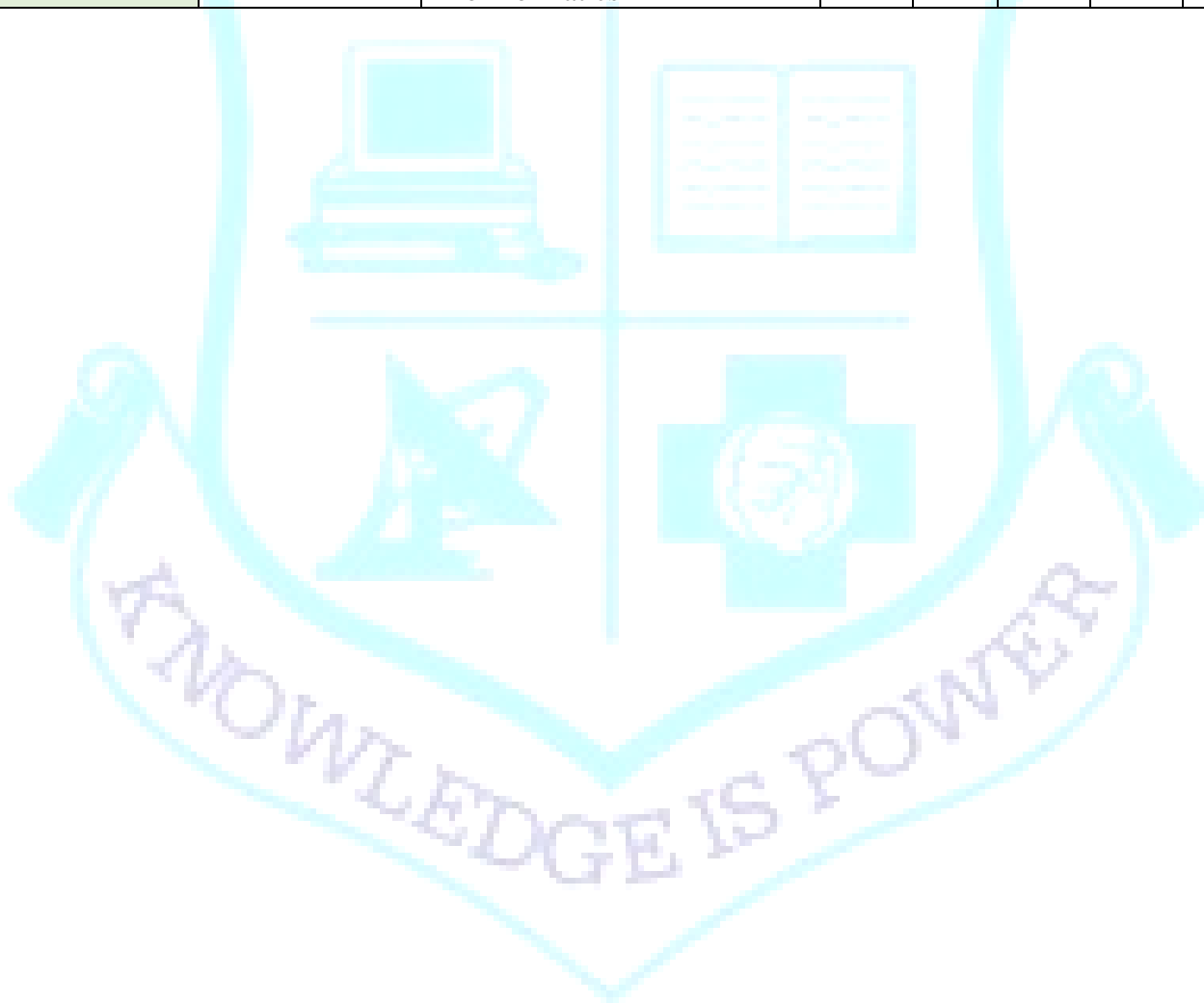
SEE - Semester End Examination

*L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study, *C-Credits

DISCIPLINE SPECIFIC CORE COURSES

Category	Code	Course	L	T	P	O	C
DSC 1	24CBBC11	Introduction to Biomolecules	3	0	0	2	3
DSC 2	24CBBC12	Human Physiology	4	0	0	2	4
DSC 1 (Lab)	24PBBC11	Practical I Qualitative analysis of Biomolecules	0	0	2	1	1
DSC 3	24CBBC21	Analytical Techniques	3	0	0	2	3
DSC 4	24CBBC22	Enzymology	3	0	0	2	3
DSC 3 (Lab)	24PBBC21	Practical II Analytical Biochemistry	0	0	2	1	1
DSC 4 (Lab)	24PBBC22	Practical III Enzymology	0	0	2	1	1
DSC 5	24CBBC31	Hematology	3	0	0	2	3
DSC 6	24CBBC32	Clinical Biochemistry	3	0	0	2	3
DSC 5 (Lab)	24PBBC31	Practical IV Hematology	0	0	2	1	1
DSC 6 (Lab)	24PBBC32	Practical V Clinical Biochemistry	0	0	2	1	1
DSC 7	24CBBC41	Cell Biology	3	0	0	2	3
DSC 8	24CBBC42	Immunology	3	0	0	2	3
DSC 7 (Lab)	24PBBC41	Practical VI Methods in Cell Biology	0	0	2	1	1
DSC 8 (Lab)	24PBBC42	Practical VII Immunology	0	0	2	1	1
DSC 9	24CBBC51	Molecular Biology	3	0	0	2	3
DSC 10	24CBBC52	Intermediary Metabolism	3	0	0	2	3
DSC 11	24CBBC53	Plant Biochemistry	4	0	0	2	4
DSC 9 (Lab)	24PBBC51	Practical VIII Molecular Biology	0	0	2	1	1
DSC 10 (Lab)	24PBBC52	Practical IX Plant Biochemistry	0	0	2	1	1
DSC 12	24CBBC61	Tissue culture	3	0	0	2	3
DSC 13	24CBBC62	Pharmaceutical Biochemistry	4	0	0	2	4
DSC 14	24CBBC63	Ecology & Environmental Toxicology	4	0	0	2	4
DSC 15	24CBBC64	Forensic Science	4	0	0	2	4
DSC 12 (Lab)	24PBBC61	Practical X Cell Culture Techniques	0	0	2	1	1
DSC 16	24CBBC71	Genetics	3	0	0	2	3
DSC 17	24CBBC72	Molecular Developmental	4	0	0	2	4

		Biology					
DSC 18	24CBBC73	Biochemistry of Cell Signaling	4	0	0	2	4
DSC 16 (Lab)	24PBBC71	Practical XI Genetics	0	0	2	1	1
DSC 19	24CBBC81	Molecular Basis of Infectious Disease	3	0	0	2	3
DSC 20	24CBBC82	Omics Technology	3	0	0	2	3
DSC 21	24CBBC83	Applied Biotechnology	4	0	0	2	4
DSC 19 (Lab)	24PBBC81	Practical XII – Infectious Biology	0	0	2	1	1
DSC 20 (Lab)	24PBBC82	Practical XIII- Bioinformatics	0	0	2	1	1



DISCIPLINE SPECIFIC ELECTIVE COURSES

Category	Code	Course	L	T	P	O	C
DSE 1	24DBBC11	LIFESTYLE DISEASES	4	0	0	2	4
	24DBBC12	STEM CELL BIOLOGY	4	0	0	2	4
DSE 2	24DBBC21	BIOENERGETICS AND MEMBRANE BIOLOGY	4	0	0	2	4
	24DBBC22	MOLECULAR EVOLUTION	4	0	0	2	4
DSE 3	24DBBC31	PATHOLOGY	3	0	0	2	3
	24DBBC32	CANCER BIOLOGY	3	0	0	2	3
DSE 4	24DBBC41	ENDOCRINOLOGY	4	0	0	2	4
	24DBBC42	NEUROBIOLOGY	4	0	0	2	4
DSE 5	24DBBC51	APPLIED MICROBIOLOGY	4	0	0	2	4
	24DBBC52	SKILLS IN BIOCHEMISTRY	4	0	0	2	4
DSE 6	24DBBC61	BIOINFORMATICS	3	0	0	2	3
	24DBBC62	DRUG DESIGNING	3	0	0	2	3
DSE 7	24DBBC71	RESEARCH METHODOLOGY	4	0	0	2	4
	24DBBC72	CLINICAL RESEARCH	4	0	0	2	4
DSE 8	24DBBC81	TISSUE ENGINEERING AND REGENERATIVE MEDICINE	4	0	0	2	4
	24DBBC82	ENTREPRENEURSHIP DEVELOPMENT IN BIOCHEMISTRY	4	0	0	2	4

AECC & LANGUAGES

Category	Code	Course	L	T	P	O	C
LANG 1	24LTAM11/	Tamil I /					
	24LHIN11/	Hindi I/	2	0	0	1	2
	24LFRE11	French I					
ENG 1	24LENG11	English I	2	0	0	1	2
LANG 2	24LTAM21/	Tamil II /					
	24LHIN21/	Hindi II /	2	0	0	1	2
	24LFRE21	French II					
ENG 2	24LENG21	English II	2	0	0	1	2
LANG 3	24LTAM31/	Tamil III /					
	24LHIN31/	Hindi III /	2	0	0	1	2
	24LFRE31	French III					
ENG 3	24LENG31	English III	2	0	0	1	2
LANG 4	24LTAM41/	Tamil IV /					
	24LHIN41/	Hindi IV /	2	0	0	1	2
	24LFRE41	French IV					
ENG 4	24LENG31	English IV	2	0	0	1	2
AECC 1	24EVS031	Environmental Studies	3	0	0	2	3

MULTIDISCIPLINARY COURSES

Category	Code	Course	L	T	P	O	C
MDC 1	24MBBC11	Basic concepts in Nutrition	3	0	0	2	3
MDC 2	24MBBC21	Hospital Management	3	0	0	2	3
MDC 3	24MBBC31	Pathology	3	0	0	2	3

MULTIDISCIPLINARY ELECTIVE

Category	Code	Course	L	T	P	O	C
MDE1		Indian Knowledge System	1	1	0	1	2

VALUE ADDED COURSES

Category	Code	Course	L	T	P	O	C
VAC 1	24DVAC11	Universal Human Values	1	0	0	1	1
VAC 2	24DVAC21	Communication Skills	2	0	0	1	2
VAC 3	24DVAC41	Yoga Education / NSS / NCC	0	0	2	1	1
VAC 4	24DVAC51	Medical Coding	2	0	0	1	2

SKILL ENHANCEMENT COURSES

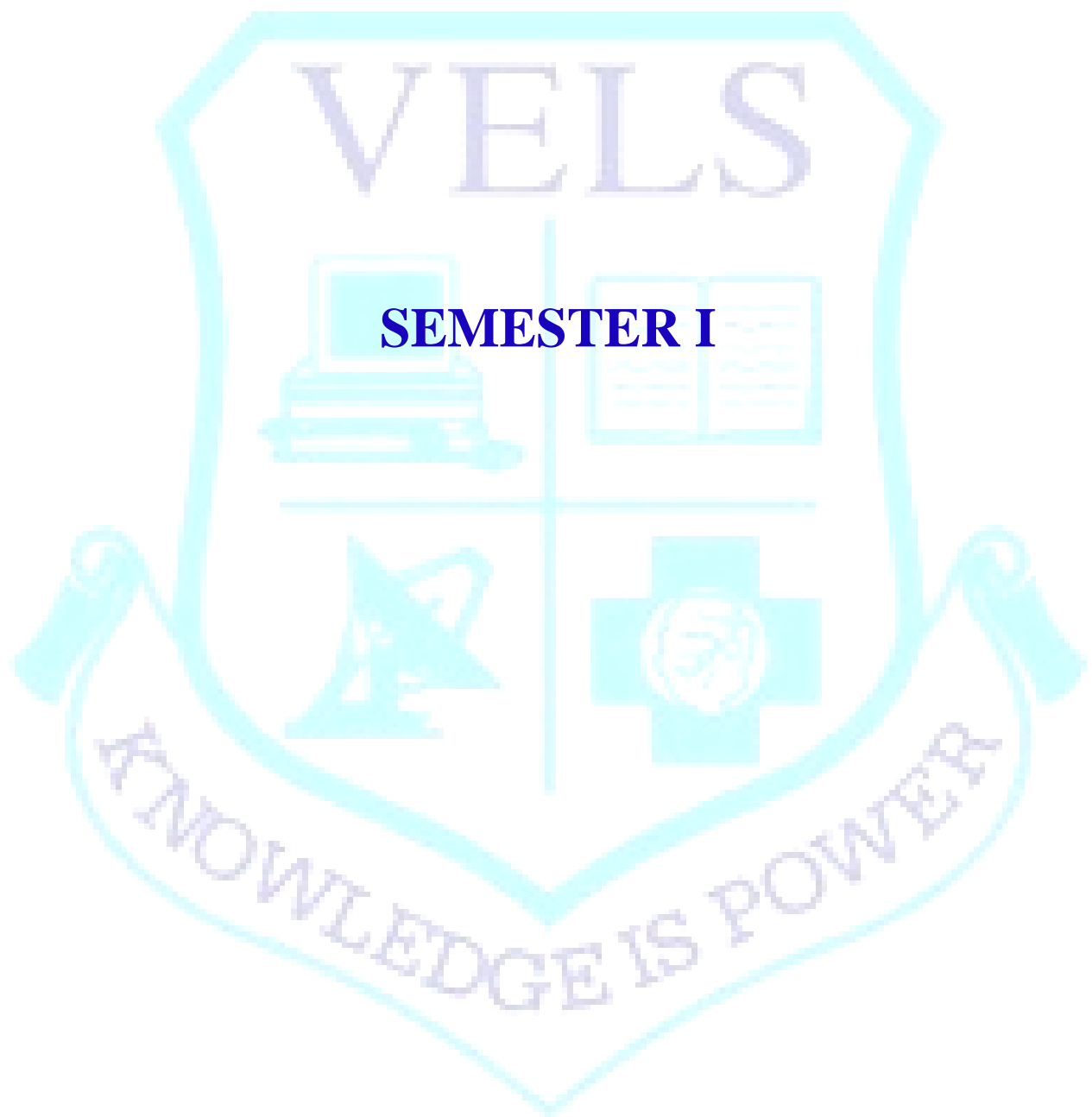
Category	Code	Course	L	T	P	O	C
SEC 1	24SSKU11	Soft Skills 1	2	0	0	1	2
SEC 2		Orientation Programme / Industrial Visit	-	-	-	-	-
SEC 3	24SSKU21	Soft Skills II	2	0	0	1	2
SEC 4	24SSKU31	Soft Skills III	2	0	0	1	2
SEC 5	24SBBC41	Industry Oriented Employability skills	1	0	2	1	2
SEC 6		In-plant Training/ Industrial Tour/ Summer Term	-	-	-	-	-
SEC 7	24SBBC51	Entrepreneurial Development	2	0	0	1	2
SEC 8		Skill Enhancement Training / Student Club Activities/ Institution Innovation Council Activities	-	-	-	-	-
SEC 9	24SBBC61	Mini Project	0	0	4	1	2
SEC 10		On Job Training / Apprenticeship / Startup	-	-	-	-	-

SUMMER INTERNSHIP

Category	Code	Course	L	T	P	O	C
SI 1	24IBBC31	Internship I	0	0	2	1	1
SI 2	24IBBC51	Internship II	0	0	2	1	1

RESEARCH PROJECT

Category	Code	Course	L	T	P	O	C
RP 1	24RBBC71	Research Project I	0	0	12	4	6
RP 2	24RBBC81	Research Project II	0	0	12	4	6



24LTAM11 மொழிவரலாறு - சங்க இலக்கியம் - அற இலக்கியம் -

மொழித்திறன்

L	T	P	O	C
2	0	0	1	2

பருவம்-1, தமிழ்மொழிப்பாடம்-1, பகுதி-1, தகுதிப்புள்ளி: 2, வாரப் பாட நேரம்: 2.

தாள்-1

பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய நாட்டத்தை மேம்படுத்துதல், தற்கால தமிழ் இலக்கிய வகைமைகளான மரபுக்கவிதை, புதுக்கவிதை, உரைநடை ஆகியவற்றை அறிமுகப்படுத்துதல், தமிழர்தம் வாழ்வியல் நெறிகளையும் பண்பாட்டுச் செழுமைகளையும் இன்றைய தலைமுறையினர் அறியச் செய்தல், மாணவர்களுக்குத் தமிழைத் தவறின்றி எழுதுவதற்குத் தேவையான பயிற்சி அளித்து அவர்களின் மொழித்திறனை மேம்படுத்துதல், செய்யுளின் நலத்தைப் பாராட்டும் முறைமையை அறியச் செய்து அதன்வழி சிந்தனை வளத்தைப் பெருகச் செய்தல் என்பனவும் மேற்கண்டவழி மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்து அவர்களுக்கு வேலைவாய்ப்பை உருவாக்குவதும் இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு - 1: தமிழ் மொழி வரலாறு

8மணி நேரம்

மொழிக்குடும்பம் - இந்திய மொழிக்குடும்பங்கள் - இந்திய ஆட்சி மொழிகள் - திராவிட மொழிக்குடும்பங்கள் - திராவிட மொழிகளின் வகைகள் - திராவிட மொழிகளின் சிறப்புகள் - திராவிட மொழிகளின் வழங்கிடங்கள் - திராவிட மொழிகளுள் தமிழின் இடம் - தமிழ்மொழியின் சிறப்புகள் - தமிழ் பிறமொழித் தொடர்புகள்.

அலகு - 2

8 மணி நேரம்

புறநானூறு- பாடல் எண்: , 182, 183, - இரண்டு பாடல்கள்.

குறுந்தொகை- பாடல் எண்: 2, 167, - இரண்டு பாடல்கள்

பரிபாடல் - முருகன். வையை - இரண்டு பாடல்கள்

அலகு - 3 அற இலக்கியங்கள்

திருக்குறள்- வான்சிறப்பு (அறம்), பெருமை (பொருள்), பிரிவாற்றாமை (இன்பம்), மூன்று அதிகாரங்கள் முழுமையும்

நாலடியார் - இரண்டு பாடல்கள். (2, 3)

முதுரை - இரண்டு பாடல்கள். (2, 8)

அலகு 4 மொழி

7 மணி நேரம்

பிழை நீக்கி எழுதுதல் - ஒற்றுப்பிழை நீக்கி எழுதுதல் - தொடர்பிழை நீக்கி எழுதுதல் - ஒற்று மிகும் இடங்கள் - ஒற்று மிகா இடங்கள் - பிற மொழிச் சொற்களை நீக்கி எழுதுதல் - பயிற்சிகள்.

மொத்தம்: 30 மணி நேரம்

பார்வை நூல்கள்

தமிழர் நாகரிகமும் பண்பாடும், டாக்டர் அ. தட்சிணாமூர்த்தி, ஐந்திணைப் பதிப்பகம், 2001.

தவறின்றித் தமிழ் எழுதுவோம், மா. நன்னன், ஏகம் பதிப்பகம், 1999.

தவறின்றித் தமிழ் எழுத - மருதூர் அரங்கராசன், ஐந்திணைப் பதிப்பகம், 2003.

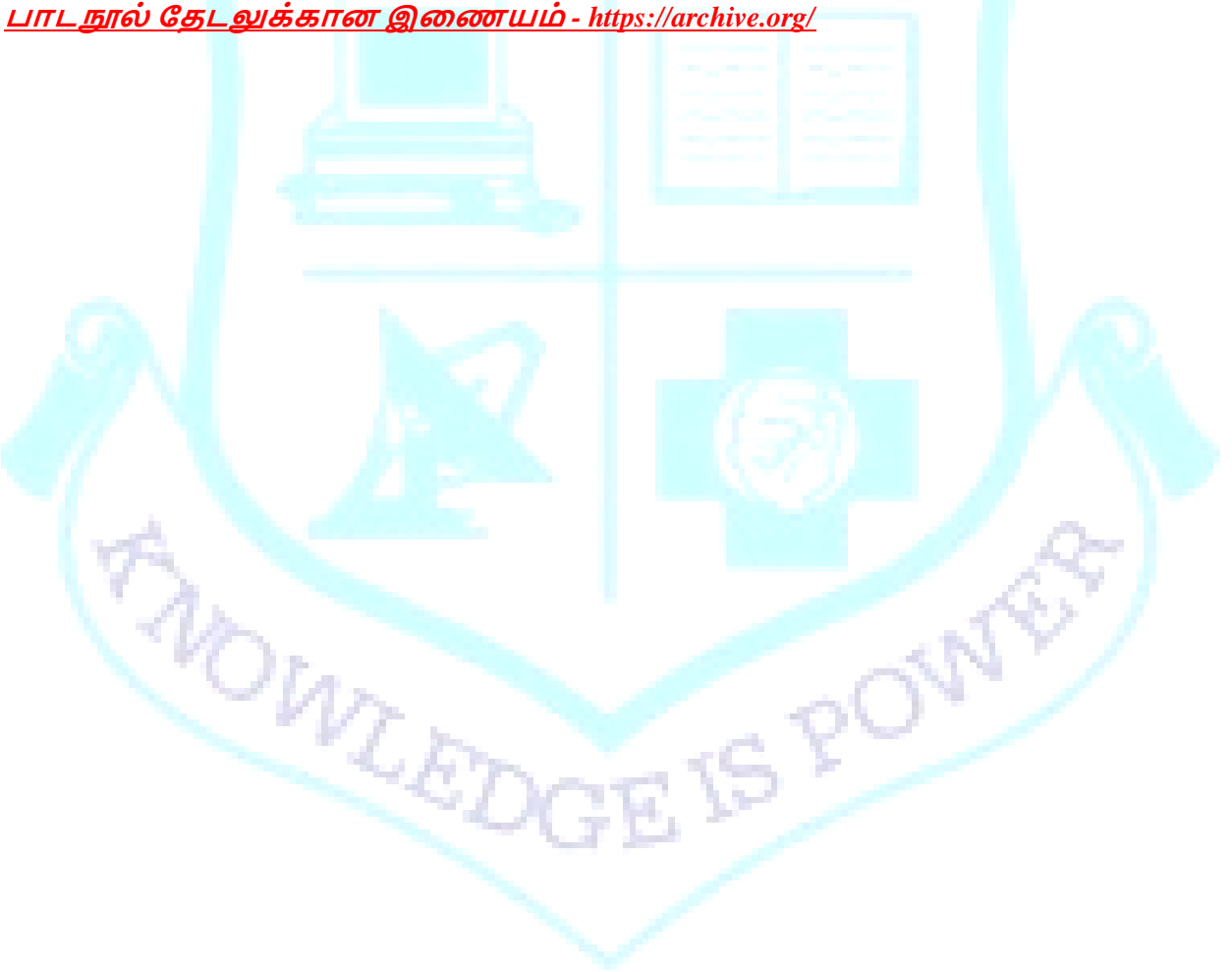
தமிழ் இலக்கிய வரலாறு, வரதராசன், மு., புது தில்லி : சாகித்திய அக்காடெமி, 2002.

புதிய தமிழ் இலக்கிய வரலாறு, நீல. பத்மநாபன், சிற்பி பாலசுப்ரமணியம், சாகித்திய அகாடெமி, 2007.

செம்மொழி தமிழின் சிறப்பியல்புகள் - முனைவர் மறைமலை இலக்குவனார்;

<https://www.youtube.com/watch?v=HHZnmJb4jSY>

பாடநூல் தேடலுக்கான இணையம் - <https://archive.org/>



L	T	P	O	C
2	0	0	1	2

वर्ष I – सत्र I (गद्य, पत्र लेखन & व्यावहारिक हिन्दी)

I Year-Sem I (Prose, Letter Writing & Functional Words)

Course Objectives :

- To understand the rural life style, social responsibilities and social values
- To create awareness about the importance of varied culture
- To enable the students to develop communication skill in Hindi and to use Azhagi, Azhagi+ fonts

- UNIT I :** पं.श्रीराम शर्मा कृत 'स्मृति' (कहानी)
'Smruti' (Kahani) by Pandit Sriram Sharma. 6hrs.
- UNIT II :** शरद जोशी कृत 'अतिथि तुम कब जावोगे' (व्यंग्य)
'Athiti tum kab jaaoge' (Vyangy) by Sharad Joshi. 6hrs.
- UNIT III:** राहुल सांस्कृतयायन कृत 'अथातो घुमक्कड़ जिज्ञासा' (यात्रा वृत्तान्त)
'Atatho Ghumakkad Jigyasa' (Yatra Vruthanth) by
Rahul Sanskritayan. 6hrs.
- UNIT IV:** व्यावहारिक हिन्दी- पत्र लेखन में प्रयुक्त वाक्यांश, कौशल विकास
– भाव एक भाषा अनेक
Functional Hindi-Phrases used in Letter Writing.
Skill development - Bhav Ek Bhasha Anek 6hrs.
- UNIT V :** पत्र लेखन – परिचय व प्रकार, 3 अनौपचारिक पत्र
अलगी, अलगी + फ्रॉन्ट का परिचय
Letter Writing- Intro. & Types & 3 Personal Letters 6hrs.
Introduction to Azhagi, Azhagi + fonts

Total: 30hrs.

Course Outcome:

At the end of this course Students will be able to

- CO1 Gain knowledge about the rural life style
- CO2 Understand social values
- CO3 Understand importance of varied culture
- CO4 Journalise in Functional Hindi
- CO5 Use Azhagi, Azhagi+ fonts

Text Books:

1. Pandit Shriram Sharma, Shikaar, (1932) Sahitya Sadan.
2. Sharad Joshi, Yatha Sambhav, (2014) Bharatiya Gyanpeet.
3. Rahul Sanskritayan, Ghumakkad Shastra, (1949) Rajkamal Prakashan.

Reference Book:

1. Kendriya Hindi Sansthan, (2012) Banking Hindi Patyakram.
2. NCERT, Sparsh, Class 9.
3. Main Aur Mera Vyakaran, New Saraswati House, New Delhi.
4. Govind Ballabh Sharma, (2022) Hindi Vyavaharik Tanka Kala Evam Tanka Abhyas, Neelkanth Publishers Pvt. Ltd.,

Weblinks :

Pandit Sriram Sharma ka kahani: <https://www.evidyarthi.in>

Harishankar parasayi ka Vyangy: <http://gadyakosh.org>

Rahul Sanskritayan ka yatravrutant: <https://www.hindwi.org>

Prayojanmoolak Hindi: <https://hi.m.wikipedia.org>

<https://www.azhagi.com/hnd/helphtml/Introduction.html>



24LFRE11**FRENCH**

L	T	P	O	C
2	0	0	1	2

Course Objectives :

The lessons are being chosen:

- 1) to greet, to express excuse and to introduce oneself
- 2) to introduce another person
- 3) to express his/her ideas, opinions and weekend projects
- 4) to request someone to do something, polite manners
- 5) to accept, refuse, enquire and indicate the time and date
- 6) to express himself / herself in positive and negative manner

UNITS:

- 1) Salut

les nombres, Les jours de la semaine et du mois, La nationalité 4 hours

- 2) Enchanté

Les verbes Etre, Avoir, Aller, Regular ER verbes, Present tense. 6 hours

- 3) J'Adore

La negation, l'adjectif possessif, le futur proche 4 hours

- 4) Tu veux bien

Les articles de finis/indéfinis, Les pronoms après une préposition (avec lui, chez moi), Le passé Compose 7 hours

- 5) On se voit quand

Les pronoms compléments directs me, te, nous, vous, L'interrogation avec est-ce que, L'heure et la date. 5 hours

- 6) Bonne idée

Les articles partitifs, Le masculin et le féminin des adjectifs, Les pronoms compléments directs le, la, les, La négation : ne... pas de. 4 hours

Total no. of hours - 30 hours

Course Outcome :

- 1) The students would be able to greet, to excuse and to introduce himself
- 2) The students would be able to introduce someone
- 3) The students would be able to express his ideas, opinions and weekend projects
- 4) The students would be able to ask someone to do something, polite manner
- 5) The students would be able to accept, refuse enquire and indicate the time and date
- 6) The students would be able to express himself in positive and negative manner

Text / Reference Book:

Prescribed book: LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau

Reference book:

SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

- CO1:** To enable students to develop their communication skills effectively. **CO2:** To make students familiar with usage skills in the English Language. **CO3:** To enrich their vocabulary in English. **CO4:** To develop communicative competence.

Credit Hours
06

Unit I- Prose

- Dangers of drug abuse - Hardin B.Jones
- Tight corners - E.V.Lucas

Unit II -Poetry

- Ecology - A.K.Ramanujan
- The owl and the chimpanzee - Jo Camacho

Unit III - Short story

- The Dear Departed - Stanley Houghton
- The Fool's Paradise- Isaac Bashevis Singer

Unit IV -Grammar

- Parts of speech, Articles

Unit V -Grammar

- One-word substitution, prefix, suffix, synonym, antonym.

Total 30 hours

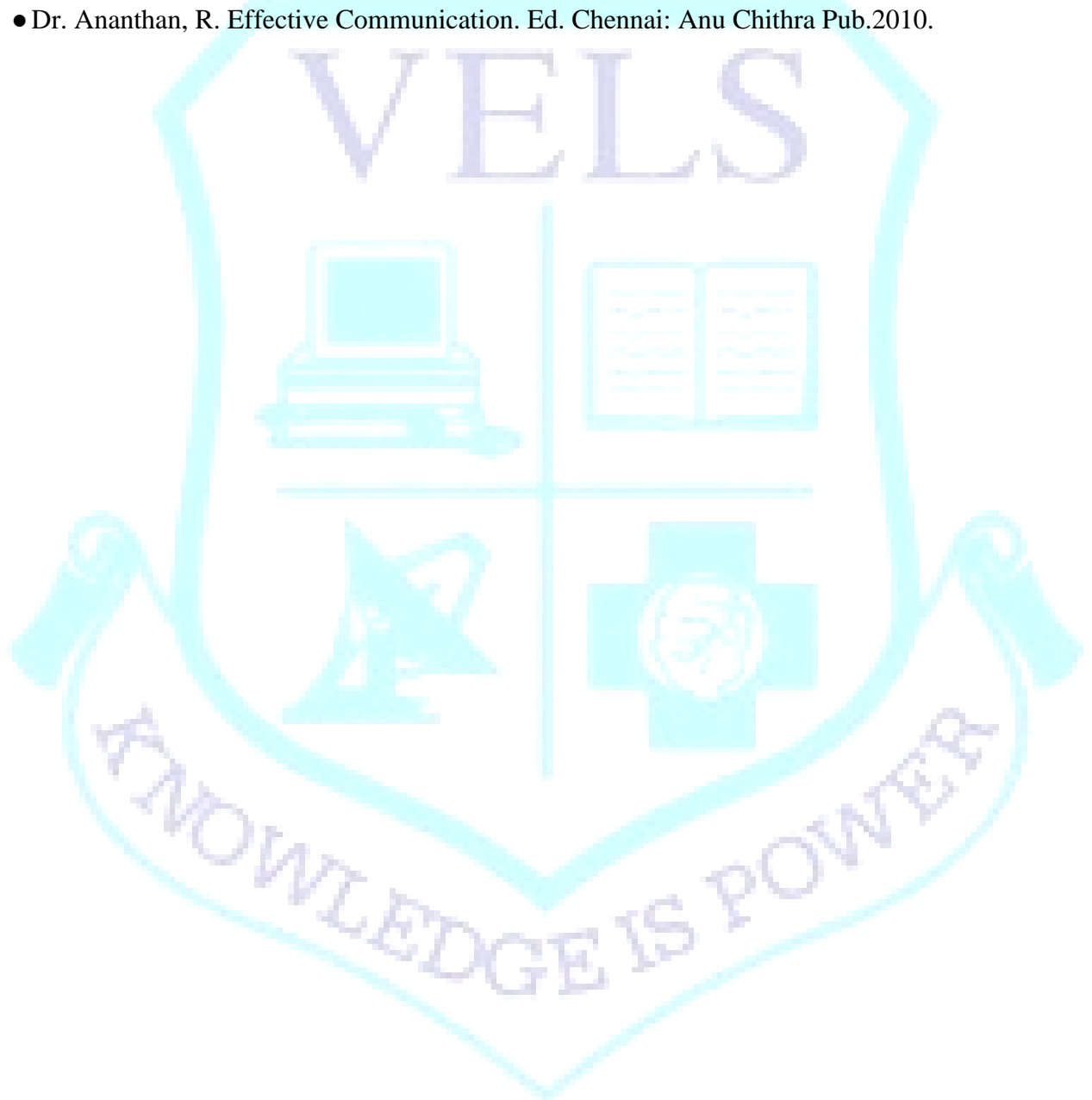
Course Outcomes:

At the end of this course, the students would have learnt to

- COC1** understand the characteristic features of the language used in the text.
- COC2** strengthen their knowledge of basic grammar
- COC3** improve narrative skills after studying diverse prose and play.
- COC4** understand to classify parts of speech and articles.
- COC5** develop critical writing skills in the textual content of the syllabus.

References:

- English for Communication Enrichment: by Jeya Santhi June 2015.
- Dr. M. Narayana Rao and Dr. B. G.Barki–Anu’s Current English for Communication (AnuChitra) June 2012.
- Dr. Ananthan, R. Effective Communication. Ed. Chennai: Anu Chithra Pub.2010.



L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES

To inculcate the knowledge on different types of carbohydrates and their structure. To instill the knowledge on the structure and types of amino acids, proteins and their organization. To impart the fundamental knowledge about lipids and their types. To understand the structural and functional aspects of compound and derived lipids. To provide knowledge on the structure and function of DNA and RNA.

UNIT – I CARBOHYDRATES

(9)

Classification of carbohydrates. Occurrence, structure and biological importance of monosaccharide, disaccharide and polysaccharides. Structure, function and biological importance of important carbohydrate derivatives-chitin, pectin, heparin, proteoglycans, sialic acids, blood group polysaccharides.

UNIT – II AMINO ACIDS

(9)

Classification and structures of amino acids. Physical and chemical properties of amino acids. Essential and non-essential amino acids. Protein Structure-Primary, Secondary, Tertiary and Quaternary Non protein amino acids. Proteins-Classification based on solubility, shape, composition and function. Denaturation and renaturation of proteins.

UNIT – III LIPIDS

(9)

Definition and classification of lipids. Fatty acids - classification, nomenclature, structure and properties. Classification, structure and function of prostaglandins, triacylglycerols. Chemical properties of fats - iodine value, Sap value, acid number, Rancidity, Rm value.

UNIT – IV NUCLEIC ACIDS

(9)

Nature of genetic material. Isolation of RNA and DNA. Composition of RNA and DNA. Structure of purine and pyrimidines, nucleosides and nucleotides. Size and structure of different types of DNA-A, B, Z types of DNA. Structure and role of different types of RNA.

UNIT – V BIOLOGICALLY IMPORTANT COMPOUNDS

(9)

Hetero cyclic rings of biologically important compounds. Structure and biological importance of pyridine, pyrrole, pyrimidine, purine, thiazole, imidazole and indole ring containing compounds. Porphyrin - structure and biologically important compounds containing porphyrin ring, bile pigments - structure and biological importance.

Total Hours: 45

Course Outcome:

- CO 1** Understand biochemistry at the atomic level.
- CO 2** Easily Understand on role of biological biomolecules and their functions
- CO 3** Demonstrate a broad knowledge of the fundamental concepts of chemistry, biology and physics
- CO 4** Identify the different classes of polymeric biomolecules and their monomeric building blocks
- CO 5** Analyse and study the chemical and biochemical properties of biomolecules and also Understand the relationships between biological molecules and human health

Text Books:

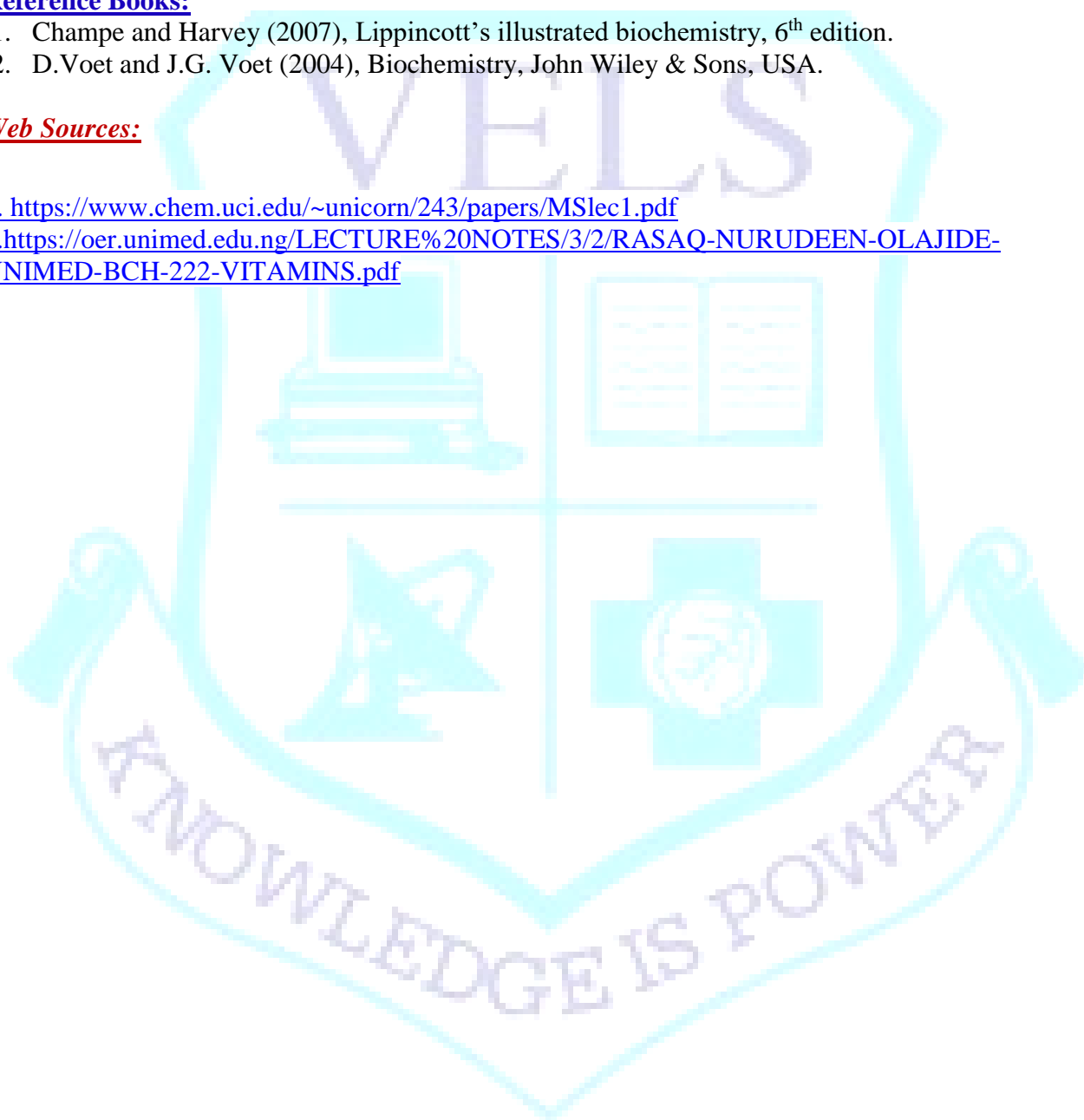
1. J. L. Jain et al. (1994), Fundamentals of Biochemistry, S. Chand and Company, 4th edition.
2. M.N.Chatterjea and Ranashinde (2005), Text book of Medical biochemistry, 6th edition, Jaypee Brothers Medical Publisher (P) Ltd.

Reference Books:

1. Champe and Harvey (2007), Lippincott's illustrated biochemistry, 6th edition.
2. D.Voet and J.G. Voet (2004), Biochemistry, John Wiley & Sons, USA.

Web Sources:

1. <https://www.chem.uci.edu/~unicorn/243/papers/MSlec1.pdf>
2. <https://oer.unimed.edu.ng/LECTURE%20NOTES/3/2/RASAQ-NURUDEEN-OLAJIDE-UNIMED-BCH-222-VITAMINS.pdf>



L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES

The objective is to impart knowledge and understanding of the human body. To understand the inter relationships within and between anatomical and physiological systems of the human body.

UNIT 1 BLOOD AND CIRCULATORY SYSTEM (12)

Blood: Composition and function. Types and function of blood cells. Erythropoiesis. Blood grouping- ABO, Rhesus system and Bombay blood group system. Blood coagulation. Intrinsic and extrinsic pathways. Structure and function— Spleen and lymphatic System. Circulatory system and Heart - Structure and functions of heart and associated blood vessels, Cardiac cycle.

UNIT 2 DIGESTIVE SYSTEM & RESPIRATORY SYSTEM (12)

General structure of digestive system – Digestion and absorption of food in the mouth, stomach and intestines. Various movements of digestive system. Pancreas and Liver – structure and function. Defecation. Outline of various components of respiratory system. Mechanism and chemistry of respiration. Mechanism and chemistry of respiration - considerations, transport of gases, exchange of gases. Bohr effect and role of 2,4 DPG.

UNIT 3 REPRODUCTIVE SYSTEM (12)

Structure and functions of male and female reproductive system: Ovulation, menstrual cycle. Spermatogenesis and factors influencing sperm count and viability. Biochemistry of fertilization. Physiological changes during pregnancy, parturition and lactation.

UNIT 4 EXCRETORY SYSTEM (12)

Structure and role of kidney, nephrons. Mechanism of urine formation- Glomerular filtration, tubular secretion and reabsorption

UNIT 5 NERVOUS SYSTEM (12)

Brief outline of nervous system- types of nerve cells and nerve fibres, brain, spinal cord. Communication: Electrical and chemical communications - Transmission of nerve impulse, neurotransmitters and synapse.

Total Hours: 60

Course outcome:

- CO 1** Discuss in-depth the structure and physiology of major human organs and explain their role in the maintenance of healthy individuals.
- CO 2** Discuss in detail how the activities of organs are regulated for maximum efficiency.
- CO 3** Explain in-depth the interplay between different organ systems and how organs and cells interact to maintain biological equilibrium in the face of a variable and changing environment.
- CO 4** Identify how changes in normal physiology lead to disease.
- CO 5** Implement the knowledge of human physiology in clinical biochemistry to predict and understand the disease.

Text Books

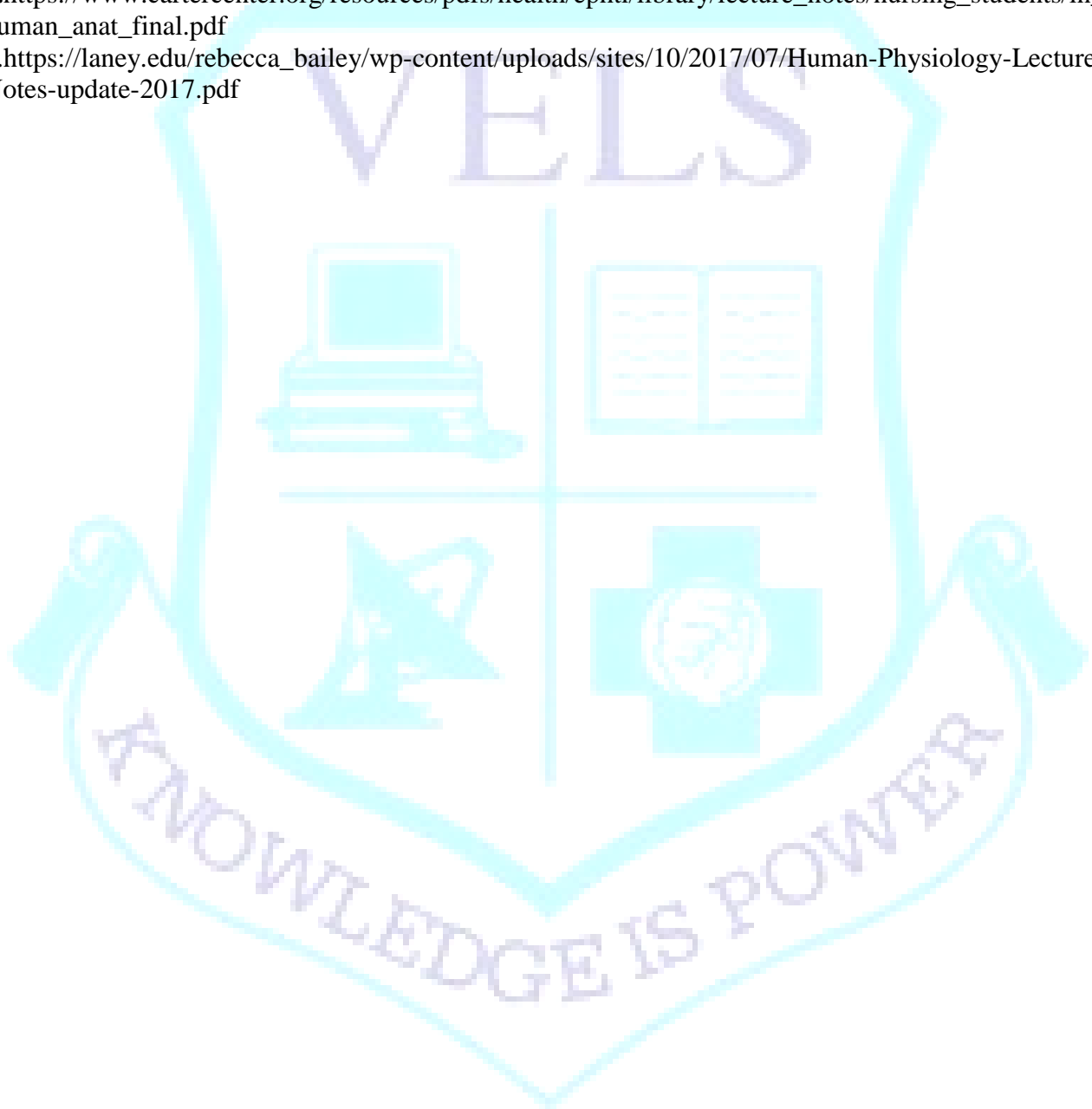
1. Guyton AC (1991), Text book of Medical Physiology, 8th Edition, TATA McGraw-hill publishing Company, Prism books (pvt), Bangalore, India.
2. C.C. Chatterjee (1985), Human Physiology (Vol. I & Vol. II), 11th Edition, Medical Allied Agency, Calcutta.

Reference Books

1. Ganong (Williams) (2015), Review of medical physiology, 25th edition, McGraw-Hill.
2. Ross and Wilson (2014), Anatomy and physiology In health and illness, 12th edition, Elsevier.

Web Sources:

1. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/nursing_students/ln_human_anat_final.pdf
2. https://laney.edu/rebecca_bailey/wp-content/uploads/sites/10/2017/07/Human-Physiology-Lecture-Notes-update-2017.pdf



L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVE

To obtain the knowledge of macronutrients, micronutrients, food, diet, energy and nutrition pattern for normal persons, patients and special cases. Students should also aware about the categories and significance of various forms of foods and to be being healthy.

UNIT I BASIC CONCEPTS IN NUTRITION

(9)

History of Nutrition. Definition of nutrition – Under nutrition, over nutrition and Malnutrition. Nutrition: Nutrients-essential, non-essential-General functions of nutrients. Methods of assessing nutritional status, Anthropometric measurements and indices – linear measurement, height, weight, head, chest and mid upper arm circumference.

UNIT II MACRONUTRIENTS

(9)

Carbohydrates – sources, requirements, dietary fibre. Proteins- sources, requirements, nutritional classification of amino acids, nutritional value of proteins, effect of protein deficiency and Protein Energy Malnutrition (PEM)- Kwashiorkor and Marasmus, dietary management. Lipids- Food sources, requirements, nutritional classification of fats, effect of fat deficiency and excess of fat in the diet.

UNIT III FOOD

(9)

Food group- Definition and physiological functions of foods, food pyramid. ICMR committee percent calories supplied by carbohydrates, fats and proteins in average Indian diets – food and energy requirements for different age groups. RDA.

UNIT IV ENERGY

(9)

Energy units – Kilo calories, Mega joules. Bomb calorimeter. Determination of energy requirements, Indirect calorimetry, Benedict Roth basal metabolism apparatus, factors affecting BMR, determination of energy metabolism during work, energy requirements for various types of activities, factorial methods for calculation of the daily energy requirements for an adult for varying degrees of physical activity-recommended allowances for calories.

UNIT V MICRONUTRIENTS

(9)

Cell death and regeneration. Concept of regeneration; cell cycle, programmed cell death; aging and senescence. Basics of cancer development.

Total: 45 Hours

Course Outcome:

At the end of this course students will be able to,

CO1: Understand biochemistry at the atomic level.

CO2: Easily understand on role of biological biomolecules and their functions

CO3: Demonstrate a broad knowledge of the fundamental concepts of Chemistry and Biology

CO4: Identify the different classes of polymeric biomolecules and their monomeric building blocks

CO5: Analyse and study the chemical and biochemical properties of biomolecules

Text Books:

1. J. L. Jain et al. (1994), Fundamentals of Biochemistry, S. Chand and Company, 4th edition.
2. M.N.Chatterjea and Ranashinde (2005), Text book of Medical biochemistry, 6th edition, Jaypee Brothers Medical Publisher (P) Ltd.

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2. <https://oer.unimed.edu.ng/LECTURE%20NOTES/3/2/RASDAQ-NURUDEEN-OLAJIDE- UNIMED-BCH-222-VITAMINS.pd>

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVE:

The objective is to make a connection between knowledge of anatomy and physiology and real-world situations, including healthy lifestyle decisions and homeostatic imbalances.

UNIT I MODERN LIFESTYLES AND HABITS**12**

Modern lifestyles - Sedentary habits, Junk food, Polluted environment, Sleeping habits, Smoking, Alcoholism, Drugs, Stress.

UNIT II FOOD**12**

Elementary knowledge of balanced food. Obesity, Acidity, Dieting, Anorexia, Food poisoning. Deficiency of nutrients- Vitamins, Minerals, Beverages- hot and cold.

UNIT III CARDIOVASCULAR COMPLICATIONS**12**

Elementary knowledge of cardiovascular system: Atherosclerosis, Ischemia, Myocardial infarction (Heart attack), Hypertension.

UNIT IV DISEASES OF THE DIGESTIVE SYSTEM**12**

Elementary knowledge of digestive system and liver- Hepatitis, Fatty liver, Cirrhosis, Gallstones. Stomach- Gastritis, Acidity, Ulcer, Amoebiasis, Constipation, Piles.

UNIT V DISEASES OF THE RESPIRATORY AND EXCRETORY SYSTEM**12**

Elementary knowledge of Respiratory system- Common cold, Asthma, Wheezing, Allergic sinusitis. Elementary knowledge of excretory system, Hypertension, Uncontrolled Diabetes, Kidney Stones.

Total: 60 Hours**Course Outcome:**

At the end of this course students will be able to,

CO1: Understanding the basics about the human anatomy and physiology.

CO2: Describe the effects of current lifestyle as a consequence of industrialization.

CO3: Understand global scenario on sedentary lifestyle nutrition.

CO4: Understand Basics of nutrition, RDA, balanced diet and BMR.

CO5: Describe about cardiovascular system, respiratory system, digestive system, excretory system and associated disorders.

Text Books:

1. Carl A. Burtis and Edward R. Ashwood. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 5th edition, 2012. Saunders Publication.
2. M N Chatterjee and Rana shinde. Textbook of Medical Biochemistry-,8th edition, 2011. Jaypee Publishers.

Reference Books:

1. Thomas M. Devlin. Biochemistry with Clinical Correlation, 7th edition, John Wiley & Sons. 2004.
2. Harold Varley, Practical Clinical Biochemistry, fourth edition, 2005. CBS Publisher

Web Sources:

1. Chromeextension://efaidnbmnnnibpcajpcglclefindmkaj/https://saudijournals.com/media/articles/SJMPS_74_179-184.pdf
2. chromeextension://efaidnbmnnnibpcajpcglclefindmkaj/https://drsudhirbhandari.co.in/wp-content/uploads/2021/07/LIFESTYLE-COFFEE-BOOK-by-Dr-Sudhir-Bhandari.pdf

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COURSE OBJECTIVES:

This paper aims to provide thorough information on the basic properties of stem cells and the regulation at molecular level. It also describes the application of stem cell technology in the therapy of different diseases.

UNIT 1 INTRODUCTION TO STEM CELLS (12)

Definition, Classification and Sources. Embryonic Stem Cells. Adult, hematopoietic, fetal, cord blood, placenta, bone marrow, primordial germ cells, cancer stem cells, induced pluripotent stem cells.

UNIT 2 STEM CELL CHARACTERIZATIONS (12)

Isolation & characterizations, markers & their identification, growth factor requirements and their maintenance in culture. Feeder and feeder free cultures. Cell cycle regulators in stem cells. Molecular basis of stem cell renewal and differentiation, Metaplasia and trans differentiation. Molecular basis of pluripotency and stem cell niche.

UNIT 3 GENETIC AND EPIGENETIC GENE REGULATION IN STEM CELLS (12)

Chromatin modification and transcriptional regulation, chromatin modifying factors, epigenetic regulation – expression of receptors, chromosomal inactivation, imprinting mechanism in Drosophila, C. elegans and mammals. Hypoxic condition and gene expression (pre implantation stage), stem cell communications – gap junctions, cell fusion, HOX genes, upstream transcriptional factors, embryonic genes.

UNIT 4 APPLICATION OF STEM CELLS (12)

Overview of embryonic and adult stem cells for therapy neurodegenerative diseases; Parkinson's, Alzheimer, Spinal Cord Injuries and other brain Syndromes; Tissue system Failures; Diabetes; Cardiomyopathy; Kidney failure; Liver failure; Cancer; Hemophilia etc.

UNIT 5 REGULATIONS AND ETHICS (12)

Human Embryonic Stem Cells and Society, Human stem cells research: Ethical consideration; Stem cell religion consideration; Stem cell-based therapies: Pre clinical regulatory consideration and Patient advocacy.

COURSE OUTCOMES:

- CO 1 Understand the inter relationships of stem cells.
- CO 2 Describe the structure of stem cells and their characterization.
- CO3 Explain the interplay between genetic and epigenetic gene regulation.
- CO4 Describe the applications of stem cells.
- CO5 List the regulations and ethics of stem cell in the society.

Text Books

1. Kiessling, A.A. Human Embryonic Stem cells. Jones & Barlett Publishers. (2nd Ed.) 2006
2. Lanza, R. Essentials of Stem Cell Biology. Academic Press. (1st Ed.) 2005.

Reference Books

1. Turksen, K. Adult Stem Cells. Humana Press, Inc., 1st Ed, 2004
2. Thomson, J et al. Handbook of Stem Cells: Embryonic/ Adult and Fetal Stem cells (Vol. 1 & 2). Academic Press, 1st Ed, 2004.

Web sources

1. <https://microbenotes.com/stem-cells/>
2. https://www.law.berkeley.edu/files/stem_cell_day1_part2_shelanski.pdf

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COURSE OBJECTIVE

This course is concerned with basic lab skills. These skills include the accurate use of pipettes, making solutions, and safety measurements along with the identification of biomolecules such as carbohydrates, proteins and amino acids by suitable tests.

LIST OF EXPERIMENTS

1. Qualitative analysis of monosaccharides – aldoses
2. Qualitative analysis of monosaccharides – ketoses
3. Qualitative analysis of reducing disaccharides
4. Qualitative analysis of non-reducing disaccharides
5. Qualitative analysis of polysaccharides
6. Qualitative analysis of pentoses
7. Qualitative analysis of aromatic amino acids
8. Qualitative analysis of Sulphur containing amino acids
9. Qualitative analysis of basic amino acids
10. General color reactions of protein
11. Denaturation and precipitation of proteins
12. Hydrolysis of proteins and color reactions of hydrolysate

Course Outcome:

At the end of this course students will be able to,

CO1: Describe the instrumentation required for the various separation techniques and their associated operating principles. Understand the significance, quality, and limitations of the results produced by the various separation techniques.

CO2: Select the operating conditions (mobile phase, temperature, flow rate, program rate, etc.) for the various separation techniques. Gain Knowledge of phase equilibria in two-component and multi-component systems.

CO3: Analyze the separation system for multi-component mixtures. Get the Ability to design separation system for the effective solution of intended

CO4: Acquire the Ability to select appropriate separation technique.

CO5: Chose the operating conditions (mobile phase, temperature, flow rate, program rate, etc.

Text Books:

1. J. Jayaraman (2011), Laboratory Manual in Biochemistry, New Age International Publishers.
2. S. Sadasivam, A. Manickam (2009), Biochemical Methods, New age publishers.

Reference Books:

1. Harold Varley (2006), Practical Clinical Biochemistry, 6 edition, CBS.
2. S. K. Sawhney, Randhir Singh (2005), Introductory Practical Biochemistry, 2nd edition, Alpha Science International, Ltd.

Web Sources:

1. <https://unacademy.com/lesson/biochemical-separation-techniques-a-brief-overview/NV7POVI5>
2. <https://www.studocu.com/enau/document/universityoftechnologysybiochemistrynotes/14979547>

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COURSE OBJECTIVE:

The candidates will be able to appreciate the complementarity between the values and skills for sustained happiness and prosperity. To influence the students to approach the life and profession with a holistic perspective towards a value-based living in a natural way. To highlight plausible implications of holistic understanding of ethical human conduct.

UNIT-I INTRODUCTION TO VALUE EDUCATION**5**

Living a fulfilling life. Value education. Skill education. Complementarity of Values and Skills. Development of a holistic perspective. Right understanding, relationship and physical facility. Understanding the happiness and prosperity.

UNIT-II HARMONY AT MULTIPLE LEVELS**5**

Human being as co-existence of the self and the human body. Understanding harmony in the self. Harmony in the family and understanding values in human-human relationships. Harmony in the society and understanding universal human order. Harmony in nature and understanding the interconnectedness, self-regulation and mutual fulfillment. Harmony in existence and understanding co-existence at various levels.

UNIT-III IMPLICATIONS OF THE RIGHT UNDERSTANDING**5**

Ethical human conduct. Implications of value-based living. Right understanding of professional ethics. Humanistic education. Holistic technologies, production systems and management models. Strategies for transition towards value-based life and profession.

Total: 15 Hours**Course Outcome:**

At the end of the course learners will be able to:

CO1: Develop qualities like responsibility and the ability to handle problems with sustainable solutions.

CO2: Appraise human values and the harmony at various levels.

CO3: Perceive a better critical ability.

CO4: Develop qualities pertaining to value-based living.

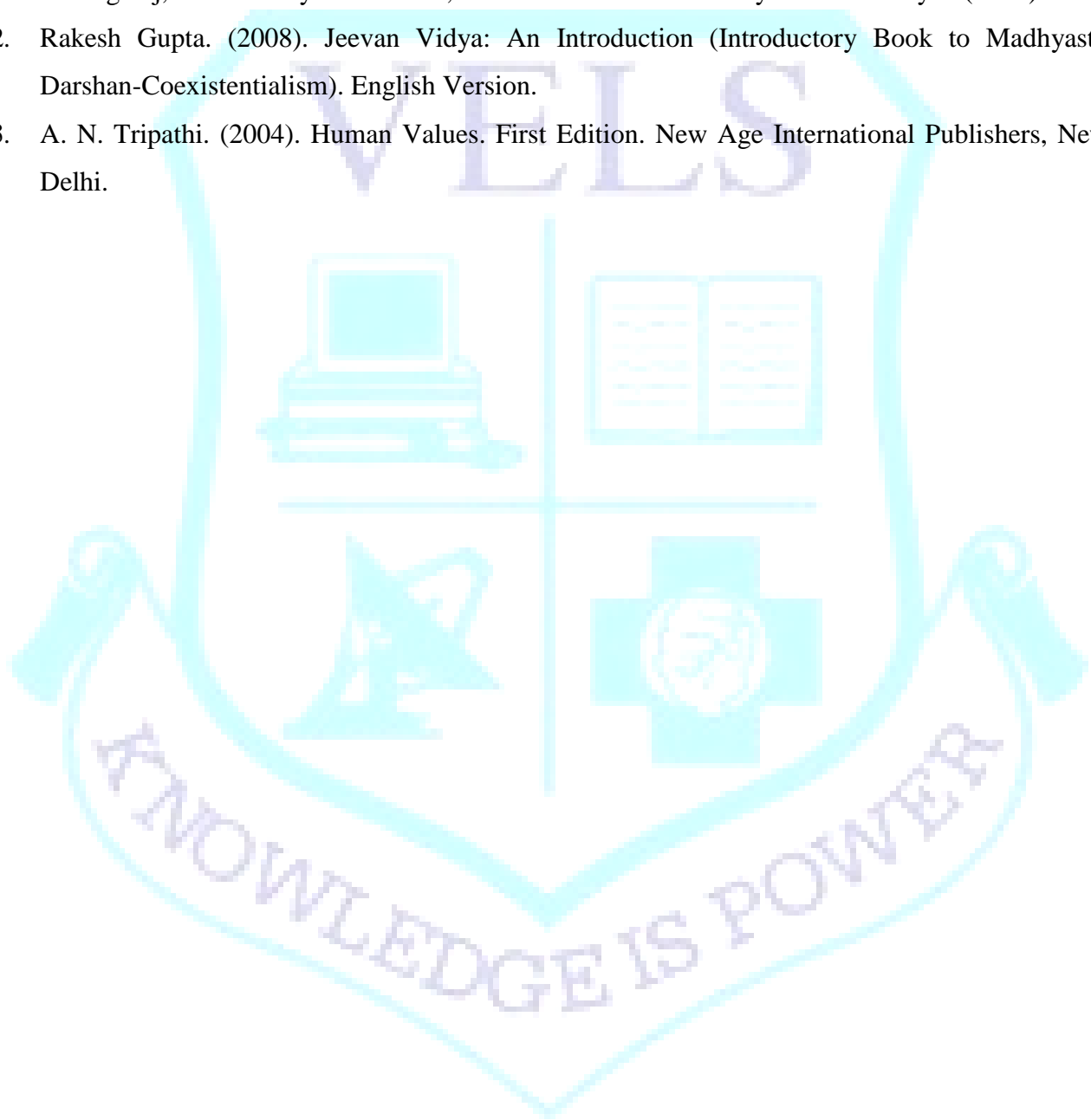
CO5: Apply what they have learnt to their own self in real life settings.

Text Books:

1. R.R. Gaur, R. Asthana, G.P. Bagaria. (2023). A Foundation Course in Human Values and Professional Ethics. 3rd Revised Edition. Excel Books, New Delhi.

Reference Books:

1. A. Nagaraj, Jeevan Vidya Prakashan, Amar Kantak. Jeevan Vidya: Ek Parichaya . (1999).
2. Rakesh Gupta. (2008). Jeevan Vidya: An Introduction (Introductory Book to Madhyasth Darshan-Coexistentialism). English Version.
3. A. N. Tripathi. (2004). Human Values. First Edition. New Age International Publishers, New Delhi.



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COURSE OBJECTIVES:

CO1:To learn and apply basic etiquette for personal and professional interactions.

CO2:To develop effective stress management techniques for maintaining mental and emotional well-being.

CO3:To enhance self-awareness for personal growth and informed decision-making.

CO4:To gain an overview of essential 21st-century skills necessary for success in a rapidly changing world.

CO5:To foster creativity and critical thinking skills for innovative problem-solving and adaptability.

Credit Hours**UNIT I INTRODUCTION TO SOFT SKILLS****6**

- Soft Skills vs Hard Skills
- 15 important Soft Skills
- Communication Skills, Time Management, Leadership Skills

UNIT II - OVERVIEW OF 21ST CENTURY SKILLS.**6**

- Lateral Thinking – Left Brain/Right Brain Functionality
- Problem solving skills

UNIT III - SELF AWARENESS**6**

- Human Values
- Mindfulness
- SWOT Analysis
- PDCA Approach

UNIT IV - CREATIVITY/CRITICAL THINKING**6**

- Six Thinking Traits
- Creative writing exercises
- Open mindedness

UNIT V - PERSONAL HYGIENE AND STRESS MANAGEMENT**6**

- Basic Etiquettes
- Health and Personal Grooming
- Stress-meaning and nature, Eustress, Distress
- Stress management strategies

Total Hours**30**

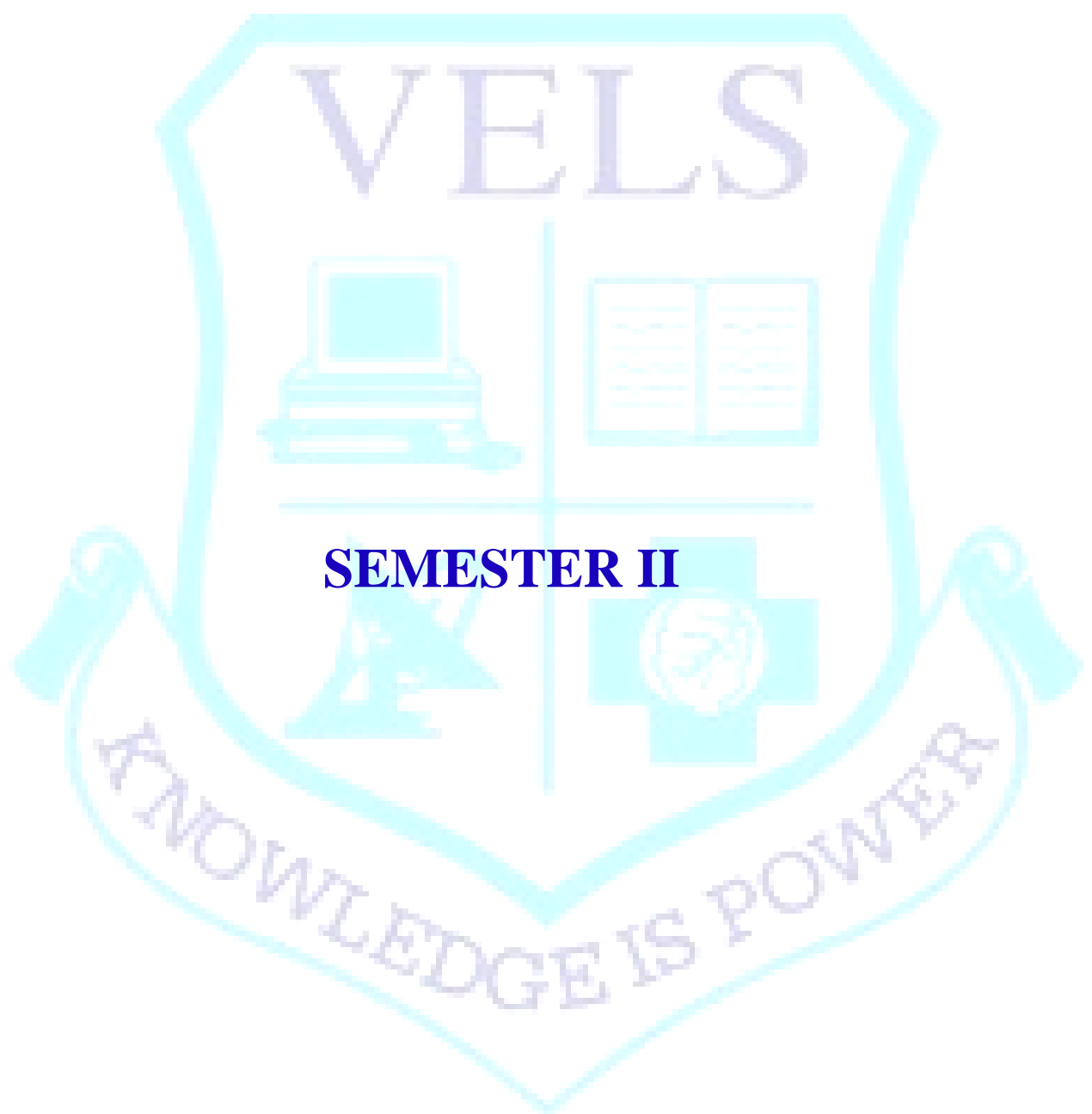
COURSE OUTCOMES:

At the end of this course, the students would have learnt to

- COC1** demonstrate basic etiquette in various personal and professional settings.
- COC2** effectively manage stress using learned techniques.
- COC3** show increased self-awareness and make informed decisions.
- COC4** understand and articulate key 21st-century skills.
- COC5** apply creativity and critical thinking to solve problems innovatively.

References:

- K. Alex (2014). Soft Skills (1st edition) S Chand & Company
- Taylor. (2005) Grant English Conversation Practice. Tata McGraw Hill Education Pvt. Ltd
- Tiko, Champa& Jaya Sasikumar. (1979) Writing with a purpose. OUP New Delhi
- Nelson-Jones, R. (1992). Life skills, a handbook, Trowbridge, Wilts: Detesios Ltd.
- Tuhovsky, Ian (2019). Communication Skills Training (2nd edition) Rupa PublicationIndia.



24LTAM21 காப்பியம், பக்தி இலக்கியம், கலைகள், நாகரிகம்-பண்பாடு

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பருவம்-2, தமிழ்மொழிப்பாடம்-2, பகுதி-1, தகுதிப்புள்ளி: 2, வாரப் பாட நேரம்: 2. தாள்-2

பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய நாட்டத்தை மேம்படுத்துதல், அற இலக்கியங்கள், சிற்றிலக்கியம், சிறுகதை ஆகியவற்றை அறிமுகப்படுத்துதல், தற்காலப் பேச்சுத் தமிழ் எழுத்துத்தமிழ் ஆகியவற்றின் வளர்நிலைகளை மாணவர்களை அறியச் செய்தல், அதன்வழி சிந்தனை வளத்தைப் பெருகச் செய்தல் என்பனவும் மேற்கண்டவழி மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்து அவர்களின் மொழித் திறனை மேம்படுத்த அவர்களுக்குக் கடிதம் எழுதும் கலையைக் கற்றுக்கொடுத்தல், அணி இலக்கணத்தை அறியச் செய்தல் என்பன இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு 1 காப்பியங்கள்

8மணி நேரம்

சிலப்பதிகாரம்- கனாத்திறம் உரைத்தக் காதை முழுவதும்.

மணிமேகலை- மலர்வனம் புக்க காதை முழுவதும்.

கம்பராமாயணம் - குகப் படலம் (தேர்ந்தெடுக்கப்பட்ட ஒன்பது பாடல்கள்)

அலகு 2: பக்தி இலக்கியம்

8 மணி நேரம்

1. மாணிக்கவாசகர் - திருவாசகம் - மூன்று பாடல்கள்
 - ✓ புல்லாகி பூடாகி (சிவபுராணம்)
 - ✓ எல்லாப் பிறப்பும் (சிவபுராணம்)
 - ✓ உற்றாரை யான் வேண்டேன் (திருப்புவம்பல்)
2. ஆண்டாள் - திருப்பாவை - மூன்று பாடல்கள் (1, 3, 4)
 - ✓ மார்கழித் திங்கள் ... (பாசரம் 1)
 - ✓ ஓங்கி உலகளந்த... (பாசரம் 3)
 - ✓ ஆழிமழைக் கண்ணா... (பாசரம் 4)
3. வீரமாமுனிவர் - தேம்பாவணி - வளன் செனித்தப் படலம்
4. சீராப்புராணம்- மானுக்கு பிணை நின்ற படலம்

அலகு 3 கலைகள்

7 மணி நேரம்

சிற்பம் - ஓவியம் - இசை - கூத்து - ஒப்பனை - ஆடை அணிகலன்கள்.

அலகு 4 நாகரிகம், பண்பாடு

7மணி நேரம்

சொற்பொருள் விளக்கம் - பண்டைத் தமிழர் வாழ்வியல் - அகம் - களவு - கற்பு - குடும்பம் - விருந்தோம்பல் - உறவு முறைகள் - சடங்குகள் -

நம்பிக்கைகள் - பொழுதுபோக்கு - புறம் - போர் முறைகள் - நடுகல் வழிபாடு
- கொடைப்பண்பு.

மொத்தம்: 30 மணி நேரம்

பார்வை நூல்கள்

1. டாக்டர் அ. தட்சிணாமூர்த்தி (2001), **தமிழர் நாகரிகமும் பண்பாடும்**, ஐந்திணைப் பதிப்பகம்,.
2. மா. நன்னன் (1999), **தவறின்றித் தமிழ் எழுதுவோம்**, ஏகம் பதிப்பகம்,.
3. மருதூர் அரங்கராசன் (2003), **தவறின்றித் தமிழ் எழுத -**, ஐந்திணைப் பதிப்பகம்.
4. வரதராசன், மு (2002), **தமிழ் இலக்கிய வரலாறு** புது தில்லி : சாகித்திய அக்காதெம்,.
5. நீல. பத்மநாபன், சிற்பி பாலசுப்ரமணியம் (2007), **புதிய தமிழ் இலக்கிய வரலாறு**, சாகித்திய அகாடெமி, .
6. முனைவர் மறைமலை இலக்குவனார், **செம்மொழி தமிழின் சிறப்பியல்புகள் -**; <https://www.youtube.com/watch?v=HHZnmJb4jSY>
7. பாடநூல் தேடலுக்கான இணையம் - <https://archive.org/>

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वर्ष I – सत्र II (गद्य, पत्र लेखन & व्यावहारिक हिन्दी)

I Year-Sem II (Prose, Official Letter Writing & Functional Hindi)

Course Objectives :

- To inculcate the human values, importance of patriotism and hard work
- To train students in functional Hindi
- To introduce the usage of Inscript keyboard

UNIT I :	मुंशी प्रेमचंद कृत 'बूढ़ी काकी' (कहानी) 'Boodee kaki" (Kahani) by Munshi Premchand	6hrs.
UNIT II :	जयशंकर प्रसाद कृत 'पुरस्कार' (कहानी) 'Puraskar' (Kahani) by Jaishankar Prasad	6hrs.
UNIT III:	हरिशंकर परसाई कृत 'मैं नरक से बोल रहा हूँ' (व्यंग्य) 'Main Narak Se Bhol Raha Hun' (Vyangy) by Harishankar Parsayi,	6hrs.
UNIT IV:	व्यावहारिक हिन्दी 1 – 50 – तकनीकी शब्द, 50 – पदनाम व विभागीय नाम, भाव एक भाषा अनेक Functional Hindi 1 - 50-Technical Words, 50-Designation & Department Names, Bhav Ek Bhasha Anek	6hrs.
UNIT V :	व्यावहारिक हिन्दी 2 – पत्र लेखन – 3 औपचारिक पत्र, इन्स्क्रिप्ट कीबोर्ड का परिचय Functional Hindi 2 -Letter Writing- 3 Official Letters. Introduction to Inscript Keyboard	6hrs.

Total: 30hrs

Course Outcome:

At the end of this course Students will be able to

CO1 Know to the human values

CO2 Know the importance of patriotism

CO3 Know the value of hardwork in human life

CO4 Journalise in Functional Hindi

CO5 Use inscript keyboard

Text Book:

Ed. Subhash chandar, Boodi Kaki by Premchand (2012) Natioonal Book Trust,
Jaishankar Prasad, Pratinidhi Kahaniyan, (2015) Raj Kamal Prakashan,
Harishankar Parsai, Pratinidhi vyangy, (2007) Rajkamal.
Kendriya Hindi Prashikshan Sansthan, Parangat, (2015) Bharat Sarkar.

Reference book:

Kendriya Hindi Sansthan, (2012) Banking Hindi Patyakram,

Weblink:

Munshi Premchand, Manasarovar, 2007, <http://gadyakosh.org>

Jaishankar Prasad/ <http://gadyakosh.org>

Harishankar Parsai/ <https://hindikahani.hindi-kavita.com>

Prayojanmoolak Hindi:<https://hi.m.wikipedia.org>

<https://rajbhasha.gov.in/en/introduction>

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Course Objectives:

The lessons are being chosen:

- 1) to express his / her whereabouts and to ask seek direction
- 2) to express obligation and restriction
- 3) to describe a place
- 4) to narrate and to question
- 5) to describe someone
- 6) to express his desire and to speak about the future

Units:

1. C'est où

L'impératif, Les articles contractés au, à la..., Le passé composé et l'accord du participe passé avec être. 5 hours

2. N'oubliez pas

Le pronom relatif Qui, que, où, Les pronoms compléments indirects (me, te, lui, leur) 5 hours

3. Belle vue sur la mer --

Les adjectifs démonstratifs, Y- pronom complément. 4 hours

4. Quel beau voyage!

Les verbes pronominaux, En- pronom complément. 4 hours

5. Oh ! joli

L'imparfait, L'imparfait ou le passé composé. 5 hours

6. Et après ?

Le futur simple, Le subjonctif présent. 7 hours

Total no. of hours - 30 hours

Course Outcome:

- 1) The students would be able to express his/her whereabouts and to ask direction
- 2) The students would be able to express obligation and restriction
- 3) The students would be able to describe a place
- 4) The students would be able to narrate and to question

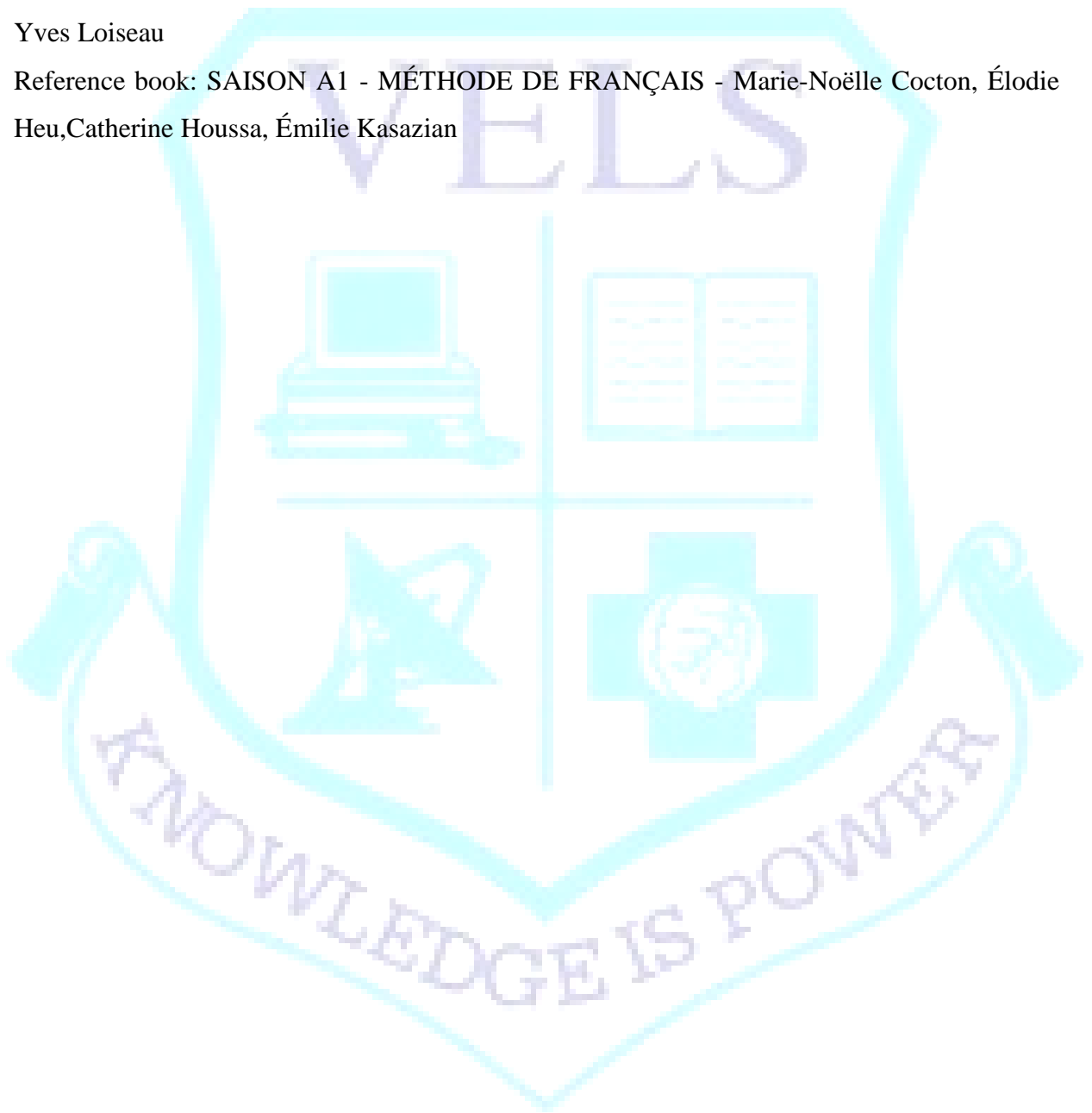
5) The students would be able to describe someone

6) The students would be able to express his desire and to speak about the futur

Text / Reference Book:

Prescribed book: LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau

Reference book: SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian



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Course Objectives:

- To read and understand different types of prose, poetry, and fiction.
- To think critically about texts and express ideas clearly.
- To recognize and discuss key themes and styles in literary works.
- To learn and use grammar rules correctly in writing and speaking.
- To write more effectively by applying grammar and literary techniques.

Credit Hours

Unit I -Prose**06**

- If you are wrong, admit it- Dale Carnegie
- Words of Wisdom- Chetan Bhaghat

Unit II - Poetry**06**

- La Belle Dame Sans Merci - John Keats
- Ozymandias- P.B.Shelley

Unit III - Fiction**06**

- The School for Empathy - E.V. Lucas
- The Lamb to the Slaughter-Roald Dahl

Unit IV - Grammar**06**

- Types of sentences, Concord

Unit V - Grammar**06**

- Tenses, Voices

Total- 30 hours**Course Outcomes:**

At the end of this course, the students would have learnt to

- CO1** Identify poetic expressions in the course of daily speech
- CO2** Students will develop skills that enable them to communicate effectively in writing.
- CO3** Students will develop skills that enable them to communicate effectively in writing.
- CO4** Discriminate against different sensibilities in approaching life.
- CO5** Strengthen the ability to solve life's problems, as highlighted in the selections.

References:

- Dr. M. Narayana Rao and Dr. B. G. Barki-Anu's (2012). Current English for Communication (AnuChitra).
- V.Rajagopalan (2010).General English for competitive examinations by (Mcgraw Hill Education)



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3	0	0	2	3

COURSE OBJECTIVES

Analytical techniques focuses on the techniques relevant to modern day molecular biology and biochemistry research. To understand the theoretical principles involved and the technical details in Bioinstrumentation. The techniques may be used for the determination of nutrients, major ions and trace elements, biological samples together with the analytical techniques.

UNIT 1 HOMOGENIZATION AND CENTRIFUGATION (9)

Buffers, pH, pOH. Methods of cell disruption and tissue homogenization: mechanical (homogenizer, sonicator, French press) and non-mechanical methods (physical, chemical and enzymatic methods). Centrifugation: Basic Principles of Centrifugation. Differential and Density Gradient Centrifugation, Analytical Ultracentrifugation – ultra centrifuge, applications.

UNIT 2 CHROMATOGRAPHY (9)

Chromatographic - Introduction, types and modes of separation. Principles and applications of Paper, Thin layer & HPTLC, Gas-liquid, Liquid chromatography, HPLC and FPLC

UNIT 3 ELECTROPHORESIS (9)

Paper and gel electrophoresis, Agarose gel electrophoresis, Different variants of polyacrylamide gel electrophoresis (PAGE) like native and SDS-PAGE, 2D-PAGE, Isoelectric Focusing, capillary electrophoresis.

UNIT 4 SPECTROSCOPY (9)

Spectroscopy: Basic Principles of Electromagnetic Radiation, Beer-Lambert's Law. Principle, instrumentation and applications of Colorimetry, UV-Visible, IR, Raman, NMR and ESR and X-Ray spectroscopy, Spectrofluorimetry, Flame Photometry, AAS, X-Ray Diffraction, Mass spectrometry, Fluorescence spectroscopy.

UNIT 5 RADIOACTIVITY (9)

Concept of radioactivity, concept of α , β and γ emitters. Applications of radioactive tracers in biology, principles and applications of phosphor imager. Detection and measurements - GM counter, Scintillation counter. γ - Biological applications: radio dating and autoradiography.

Total Hours: 45

Course outcome

- CO 1** Construct broad knowledge in modern analytical instrumentation with deep knowledge its core concepts and its applications.
- CO 2** Assess and understand the principle, Instrumentation of different types of analytical technologies in biological field.
- CO 3** Discriminate and acquire knowledge about the different detection counters in radioactivity and biosensor
- CO 4** Collaborate and understand basics and latest developments in the instrumentation techniques for sedimentation
- CO 5** Acquire cognitive, technical and creative skills which enables students to gain an established knowledge and practice concerning modern analytical instrumentation and measurement techniques.

Text Books

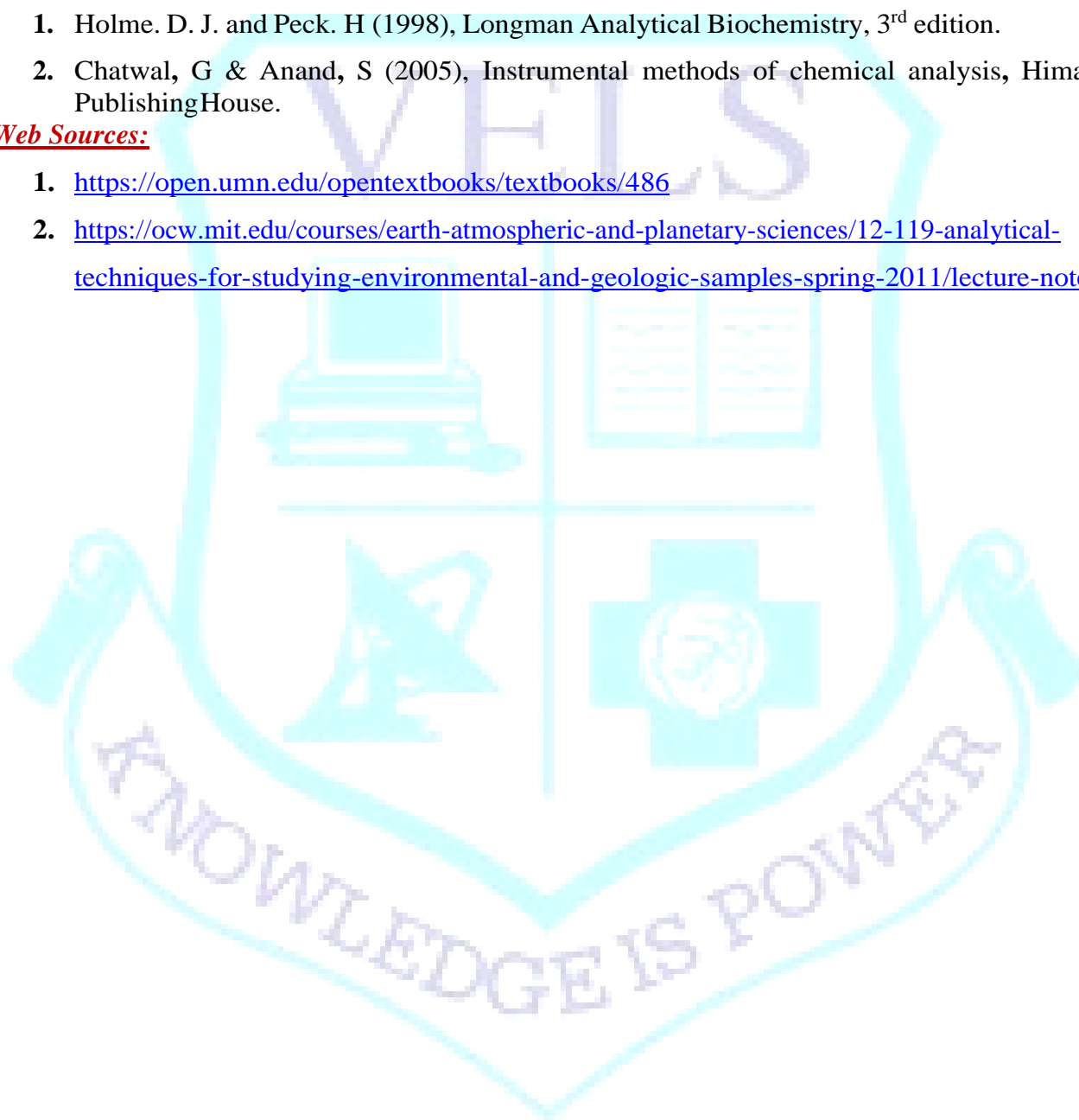
1. Keith Wilson and John Walker (2010), Principles and techniques of Practical Biochemistry, Seventh edition, Cambridge University Press.
2. Asokan PA (2009), Analytical Biochemistry, Chinna publication.

Reference Books

1. Holme. D. J. and Peck. H (1998), Longman Analytical Biochemistry, 3rd edition.
2. Chatwal, G & Anand, S (2005), Instrumental methods of chemical analysis, Himalaya Publishing House.

Web Sources:

1. <https://open.umn.edu/opentextbooks/textbooks/486>
2. <https://ocw.mit.edu/courses/earth-atmospheric-and-planetary-sciences/12-119-analytical-techniques-for-studying-environmental-and-geologic-samples-spring-2011/lecture-notes/>



L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To acquire fundamental knowledge on enzymes and their importance in biological reactions. To understand ability to difference between a chemical catalyst and biocatalyst. Exposure to the nature of non-protein enzymes such as ribozymes. Understanding the role of enzymes in clinical diagnosis and industries.

UNIT I INTRODUCTION TO ENZYMES**(9)**

Introduction - Definition, Enzyme units, Functions of enzymes. Nomenclature of enzymes, Classification of enzymes. Coenzymes, Isoenzymes, Abzymes, metalloenzymes. Enzyme specificity, Active site, Mode of Enzyme action - Lock and key theory and induced fit theory, Factors affecting enzyme activity - pH, temperature, enzyme concentration and substrate concentration.

UNIT II ENZYME KINETICS**(9)**

Derivation of Michaelis - Menton Equation. Enzyme inhibition - Competitive, non- competitive and uncompetitive inhibitions (with reference to Example and graphical representation)

UNIT III ENZYME REGULATION**(9)**

Enzyme regulation: General mechanism of enzyme regulation, feedback inhibition and feed forward stimulation. Covalent modification of enzymes. Allosteric enzymes. Regulation of enzymic activity by products and substrates.

UNIT IV APPLICATIONS OF ENZYMES**(9)**

Industrial uses of enzymes - sources of industrial enzymes, thermophilic enzymes, amylases, glucose isomerases, cellulose degrading enzymes, lipases, proteolytic enzymes in meat and leather industry, detergents and cheese production. Immobilization of enzymes and their applications. A brief account of non-protein enzymes - ribozymes and DNA enzymes. To visit an Enzyme production Industry.

UNIT V BIOSENSORS**(9)**

Biosensors - Introduction to Biosensors: Concepts and applications. Principle, types and components of Colorimetric, potentiometric and optical immune sensors, artificial enzymes: abzymes, synzymes and ribozymes.

Total Hours: 45**COURSE OUTCOME**

- CO 1** This course will provide fundamental knowledge on enzymes and their importance in biological reactions.
- CO 2** Students will understand the difference between a chemical catalyst and biocatalyst and understand activation energy.
- CO 3** Explain how enzyme activity is (a) regulated, and (b) affected by temperature, pH, and concentration.
- CO 4** They will study non-protein enzymes such as ribozymes and will be exposed to the Industrial and biomedical applications of enzymes.
- CO 5** Analyze options for applying enzymes and their inhibitors in medicine and industries.

Text Books:

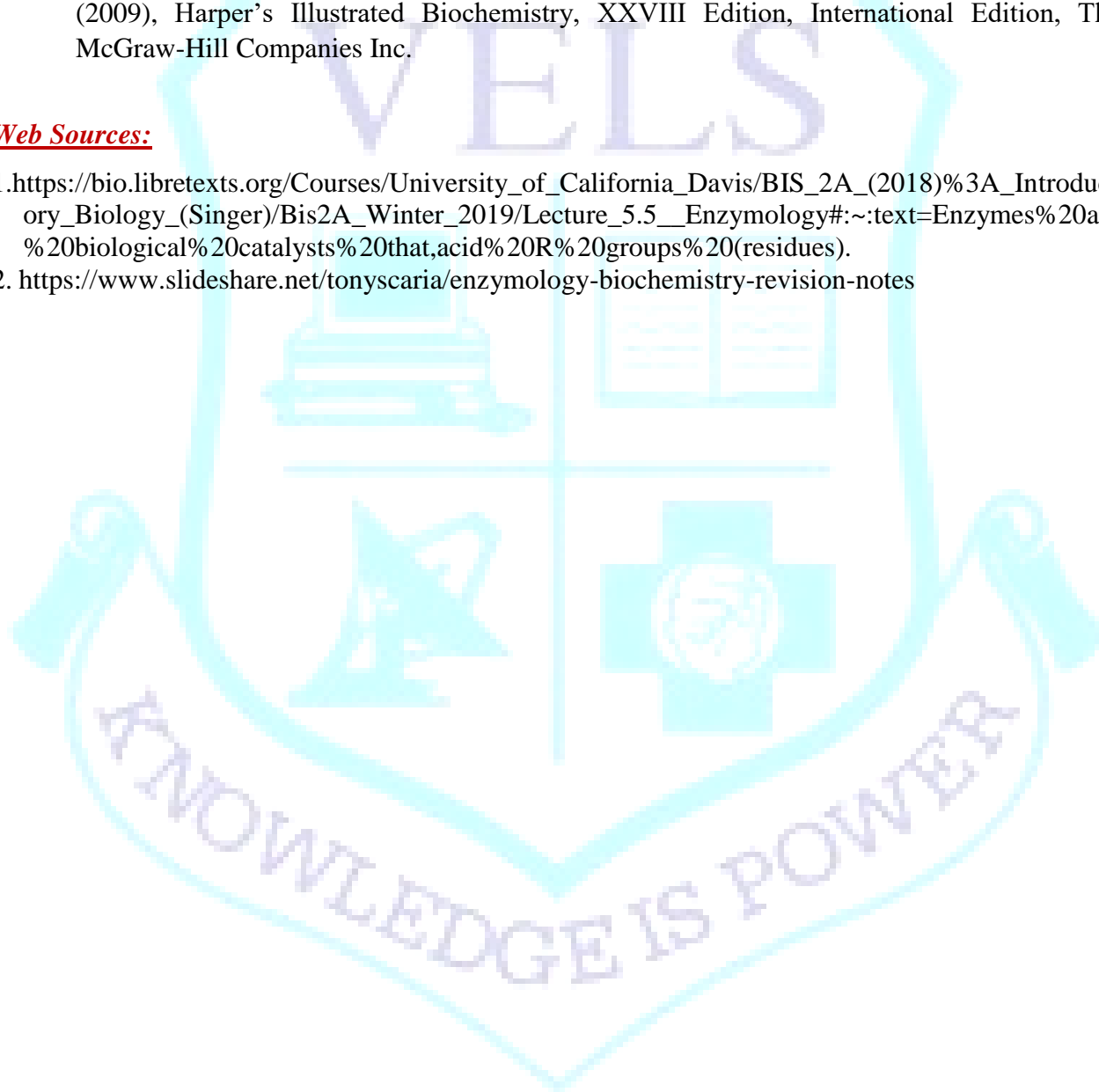
1. Cox, M.M and Nelson, D.L. (2008). Lehninger Principles of Biochemistry, V Edition, W.H. Freeman and Co., New York.
2. Nicholas C. Price, Lewis Stevens, and Lewis Stevens, Fundamentals of Enzymology: The cell and molecular Biology of Catalytic Proteins, Oxford University Press, USA.

Reference Books:

1. Voet D and Voet J (2012), Biochemistry, Fifth edition, Wiley.
2. Murray, R.K., Bender, D.A., Botham, K.M., Kennelly, P.J., Rodwell, V.W. and Well, P.A. (2009), Harper's Illustrated Biochemistry, XXVIII Edition, International Edition, The McGraw-Hill Companies Inc.

Web Sources:

1. [https://bio.libretexts.org/Courses/University_of_California_Davis/BIS_2A_\(2018\)%3A_Introductory_Biology_\(Singer\)/Bis2A_Winter_2019/Lecture_5.5__Enzymology#:~:text=Enzymes%20are%20biological%20catalysts%20that,acid%20R%20groups%20\(residues\).](https://bio.libretexts.org/Courses/University_of_California_Davis/BIS_2A_(2018)%3A_Introductory_Biology_(Singer)/Bis2A_Winter_2019/Lecture_5.5__Enzymology#:~:text=Enzymes%20are%20biological%20catalysts%20that,acid%20R%20groups%20(residues).)
2. <https://www.slideshare.net/tonyscaria/enzymology-biochemistry-revision-notes>



L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVE

1. To understand the role of administration in patient care, planning and management
2. To understand the importance of information system in hospitals
3. To understand the policy and procedures in clinical services
4. To understand the legal and safety aspects in health care services
5. To understand the aspects of counselling and its importance in hospital management

UNIT I DEPARTMENTS IN HOSPITAL**(9)**

General features of a hospital, various departments –Outpatient department, Casualty and Emergency services, General surgery department, ICU, Obstetrics department, Clinical laboratory. Supportive services- Admission department, medical records department, Pharmacy, Food services Housekeeping department, Volunteer department.

UNIT II HOSPITAL INFORMATION**(9)**

Information system in hospital: Communication, Delegation, Decision making, Monitoring, Evaluation, Meetings and Negotiations; Quality assurance

UNIT III BIOMEDICAL RESEARCH**(9)**

Biomedical research: Ethics; consent, nature of consent. Ethics pertaining to blood transfusion, transplantation-Donor categories, confirmation of brain death, live donation, bio medical waste management.

UNIT IV HOSPITAL ADMINISTRATION**(9)**

Hospital Administration, Hospital ethics, Challenges in hospital administration, Legal aspects, working conditions, Environmental Safety, Health services, National Health Policy

UNIT V COUNSELLING**(9)**

Counselling- Types, Techniques, Function, Development of counselling services, Duties of a counsellor

Total: 45 Hours

Course Outcome:

At the end of this course students will be able to,

CO1: Analyze the importance and role of various departments, support services in hospitals

CO2: Discuss about information system in hospitals and Quality assurance

CO3: Communicate about Ethics governing various clinical aspects like blood transfusion, transplantation

CO4: Aware of various legal and safety aspects in hospital administration

CO5: Discuss about counselling and analyze the role of counsellors in Hospital management

Text Books:

1. K.J.Kunders (2008), J Hospitals-Facilities Planning and Management, Tata Mc graw Hill, New Delhi.
2. R.C.Goyal (2005), Hospital Administration and Human Resource Management, 4th Edition, Prentice Hall of India Pvt Ltd.

Reference Books:

1. R. Kumar S.L. Goel (2009), Hospital Administration and Management: Theory and Practice; Joydeep Das Gupta (2009), Hospital Administration and Management: A Comprehensive Guide, Jaypee Brothers, Medical Publishers Pvt. Limited.
2. BM Sakharkar (2008), Principles of Hospital Administration and Planning, Jaypee brothers, Medical Publishers Pvt. Limited.

Web Sources:

1. <https://www.scribd.com/document/332414371/BM-Sakharkar-Principles-of-Hospital-Administration-and-Planning-2nd-Edition-pdf>
2. <https://www.pdfdrive.com/hospital-administration-books.html>

24DBBC21 BIOENERGETICS AND MEMBRANE BIOLOGY

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVE:

The course provides the basic concepts of bioenergetics, mechanisms of oxidative phosphorylation and photophosphorylation and also imparts the knowledge about the composition and structure of bio membranes, transport mechanisms across biological membranes.

UNIT I INTRODUCTION TO BIOENERGETICS

12

Bioenergetics: Definition. Entropy, enthalpy and standard free energy; First and second laws of thermodynamics, standard reduction potentials, membrane potential. Coupled reactions, ATP cycle, phosphorylation potential. Standard energy of hydrolysis of ATP, PEP, 1,3 BPG and thioesters. Redox reactions and Nernst equation. Universal electron carriers.

UNIT II BIO MEMBRANES

12

Historical background, Types of membrane models. Functions of cell membrane. Composition of bio membranes: Lipids - Phospholipids, Glycolipids, sterols; Proteins- Peripheral Proteins, Integral Membrane Proteins and Lipid-Anchored proteins, and carbohydrates. Comparison of the composition of various cellular and subcellular membranes. Role of Flippase, Floppase and Scramblase.

UNIT III MEMBRANE DYNAMICS

12

Membrane fluidity: Definition, Rotational motion, Lateral diffusion and transverse diffusion of lipids. Membrane rafts and caveolins. Factors affecting membrane fluidity: Lipid Composition and Degree of Unsaturation, Cholesterol. Cytoskeleton: Structure and functions of microfilaments, microtubules and intermediate filaments. Techniques to study membrane dynamics: FRAP and TNBS.

UNIT IV TRANSPORT ACROSS MEMBRANES

12

Plasma membrane: composition and function. Transport mechanisms: simple diffusion, osmosis, facilitated diffusion, uniport, antiport, symport and bulk transport (ion channels,

exocytosis, endocytosis, pinocytosis and phagocytosis). Movement of Water (Structure & Function of Aquaporins)

UNIT V PHOSPHORYLATION

12

Oxidative phosphorylation: Mechanism of oxidative phosphorylation. The electron transport chain - its organization and function. Sequence of electron transport, Peter Mitchell's chemiosmotic theory and Proton gradient. Mechanism of ATP synthesis. Photophosphorylation, Hill reaction. Cyclic and non-cyclic photophosphorylation and its significance.

Total: 60 Hours

Course Outcome:

At the end of this course students will be able to,

CO1: Explain the basic concepts of Bioenergetics and thermodynamics.

CO2: Develop an understanding of the fundamental aspects of composition and functioning of biological membranes.

CO3: Compare the techniques to study membrane dynamics that are used for studies of membrane proteins.

CO4: Summarize the transport mechanisms across biological membranes.

CO5: Develop a knowledge and understanding of the possibilities to apply bioenergetics to solve fundamental problems in biomedicine and to use for the applied research in biotechnology.

Text Books:

1. Lehninger: Principles of Biochemistry (2013) 6th edition., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13:978-1-4641-0962-1 ISBN: 10:1-4641- 0962-1.
2. Molecular Cell Biology (2013) 7th edition., Lodish, H., Berk, A., Kaiser, C.A., Krieger, M., Bretscher, A., Ploegh, H., Amon, A. and Scott, M.P. W.H. Freeman & Company (New York), ISBN:13:978-1-4641-0981-2.

Reference Books:

1. Principles of Biochemistry (2008) 3rd edition., Voet, D.J., Voet, J.G. and Pratt, C.W., John Wiley & Sons, Inc. (New York), ISBN:13: 978-0470-23396-2.
2. Biochemistry (2010) 4th Edition., Garret, R. H. and Grisham, C.M., Cengage Learning (Boston), ISBN-13:978-0-495-11464-2.

Web Sources:

1. https://www.nmr.sinica.edu.tw/~thh/lectures/Biophysics/Chap_3Bioenergetics.pdf
2. <https://egyankosh.ac.in/bitstream/123456789/74983/1/Unit-3.pdf>



L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVE

The course integrates the descriptive, experimental and biochemical approaches into a conceptual framework for the analysis of development. The course deals with key steps in the transformation of the single-celled zygote into the complex, multicellular, adult organisms and links genetics with embryology.

UNIT-I EVOLUTION AND FERTILIZATION

(12)

Introduction, history and evolution – an overview. Development among unicellular eukaryotes *Acetabularia*, *Nigeria*. The origins of sexual reproduction. Fertilization: structure of gametes, recognition of sperm and egg –action at distance and contact of gametes. Cleavage: Patterns of embryonic cleavage, radial holoblastic cleavage, spiral holoblastic cleavage, mechanisms of cleavage –regulation of cleavage cycles.

UNIT II MODEL ORGANISMS

(12)

Major model organisms. Availability/ culture and cost; access and micromanipulation. Examples: *Drosophila*, zebrafish, *Caenorhabditis elegans*, chicks

UNIT III EMBRYONIC DEVELOPMENT IN ANIMALS

(12)

Early Embryonic Development, morphogenesis and organogenesis in animals: Blastula formation, Types of Cleavage, Gastrulation and formation of germ layers in animals. Cell aggregation and differentiation in *Dictyostelium*; axes and pattern formation in *Drosophila*, organogenesis –vulva formation in *Caenorhabditis elegans*; eye lens induction, limb development in vertebrates, neuron differentiation, larval formation, metamorphosis; environmental regulation of normal development.

UNIT IV EARLY EMBRYONIC DEVELOPMENT IN PLANTS

(12)

Early Embryonic Development in plants: Gametogenesis, Fertilization, Embryo sac development and double fertilization in plants.

UNIT V REGENERATION AND APOPTOSIS

(12)

Cell death and regeneration. Concept of regeneration; cell cycle, programmed cell death; aging and senescence. Basics of cancer development

Total: 60 Hours

Course Outcome:

At the end of this course students will be able to,

CO1: Develop knowledge and understand the biological process increases by using a historical approach to science.

CO2: Explain the molecular mechanisms that underlie animal development

CO3: Explain underlying developmental biology processes during tissue development and organogenesis

CO4: Develop an understanding about the basic concepts of developmental biology

CO5: Compare and contrast the different process of differentiation to many different types of cells and tissues.

Text Books:

1. T. Subramoniam, Molecular developmental biology. 2nd Edition, 2011.
2. Manju Yadav, Molecular Developmental Biology. Discovery Publishing Pvt. Ltd. 2008.

Reference Books:

1. Scott F. Gilbert, Susan Singer, Developmental Biology. Sinauer Associates Inc.; 8th ed, 2006.
2. Jonathan M. W. Slack, Essential Developmental Biology. Wiley-Blackwell. 3rd Edition, 2012.

Web Sources:

1. <https://plato.stanford.edu/entries/biology-developmental/>
2. https://edisciplinas.usp.br/pluginfile.php/4481131/mod_resource/content/1/Princeton%20Encyclopedia%20verbete%20de%20evolu%C3%A7%C3%A3o%20molecular.pdf

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES

To isolate and separation of biomolecules from various sources, analyze the presence of specific molecules in isolated sample by different qualitative tests and estimate those molecules in each source

LIST OF EXPERIMENTS

1. Separation of sugars by ascending paper chromatography.
2. Separation of sugars by descending paper chromatography.
3. Separation of amino acids by ascending paper chromatography
4. Separation of amino acids by descending paper chromatography.
5. Separation of amino acids by two dimensional chromatography.
6. Separation of amino acids by radial paper chromatography.
7. Separation of sugars by thin layer chromatography.
8. Separation of amino acids by thin layer chromatography.
9. Separation of lipids by thin layer chromatography.
10. Separation of plant pigments by column chromatography.
11. Separation of proteins by Gel Filtration Chromatography. (Demonstration)
12. Separation of lipoproteins by electrophoresis (Demonstration)

Course Outcomes:

At the end of this course students will be able to,

CO1: Describe the instrumentation required for the various separation techniques and their associated operating principles. Understand the significance, quality, and limitations of the results produced by the various separation techniques.

CO2: Select the operating conditions (mobile phase, temperature, flow rate, program rate, etc.) for the various separation techniques. Gain Knowledge of phase equilibria in two-component and multi-component systems.

CO3: Analyze the separation system for multi-component mixtures. Get the Ability to design separation system for the effective solution of intended

CO4: Acquire the Ability to select appropriate separation technique.

CO5: Chose the operating conditions (mobile phase, temperature, flow rate, program rate, etc.

Text Books

1. J. Jayaraman (2011) (paperback), Laboratory Manual in Biochemistry, New Age International Pvt Ltd Publishers.
2. S. Sadasivam, A. Manickam (2009) (paperback), Biochemical Methods, New age publishers.

Reference Books

1. Harold Varley (2006), Practical Clinical Biochemistry, 6 edition, CBS.
2. S. K. Sawhney, Randhir Singh (2005), Introductory Practical Biochemistry, 2nd edition, Alpha Science International, Ltd.

Web Sources:

1. <https://unacademy.com/lesson/biochemical-separation-techniques-a-brief-overview/NV7POVI5>
2. <https://www.studocu.com/en-au/document/university-of-technology-sydney/haematology-1/analytical-biochemistry-notes/14979547>

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVE

The aim of the laboratory practices is to acquire knowledge about determination of enzyme activities. A part of the practices is optimization of conditions for enzymes isolation, inhibition of enzyme reactions, study of factors that influence enzyme activity and study of enzyme kinetics. During the course of the practices, students are directed to master practical enzyme assays and immobilization techniques.

LIST OF EXPERIMENTS

1. Purification of an enzyme from any natural resource
2. Quantitative estimation of proteins by Bradford/Lowry's method.
3. Calculation of kinetic parameters such as K_m , V_{max} , K_{cat}
4. Determination of Optimum pH of Acid Phosphatase
5. Determination of Optimum temperature of Acid Phosphatase.
6. Determination of specific activity of Acid Phosphatase.
7. Determination of Optimum pH of Alkaline Phosphatase
8. Determination of specific activity of Alkaline Phosphatase
9. Determination of Optimum pH of Salivary Amylase.
10. Determination of specific activity of Salivary Amylase.
11. Isoenzyme Separation - Lactate Dehydrogenase
12. Activity Staining - SOD

Course Outcome:

At the end of this course students will be able to,

CO1: Acquire knowledge in the qualitative estimation of biological biomolecules

CO2: Understand the different chemical reaction & principles of biomolecules

CO3: Identify the given solution as carbohydrate or amino acid/protein

CO4: Understand the different chemical preparation of biomolecules

CO5: Learn safety and precautionary measures for working in a laboratory and learn the handling of microscope and other laboratory instruments individually.

Text Books:

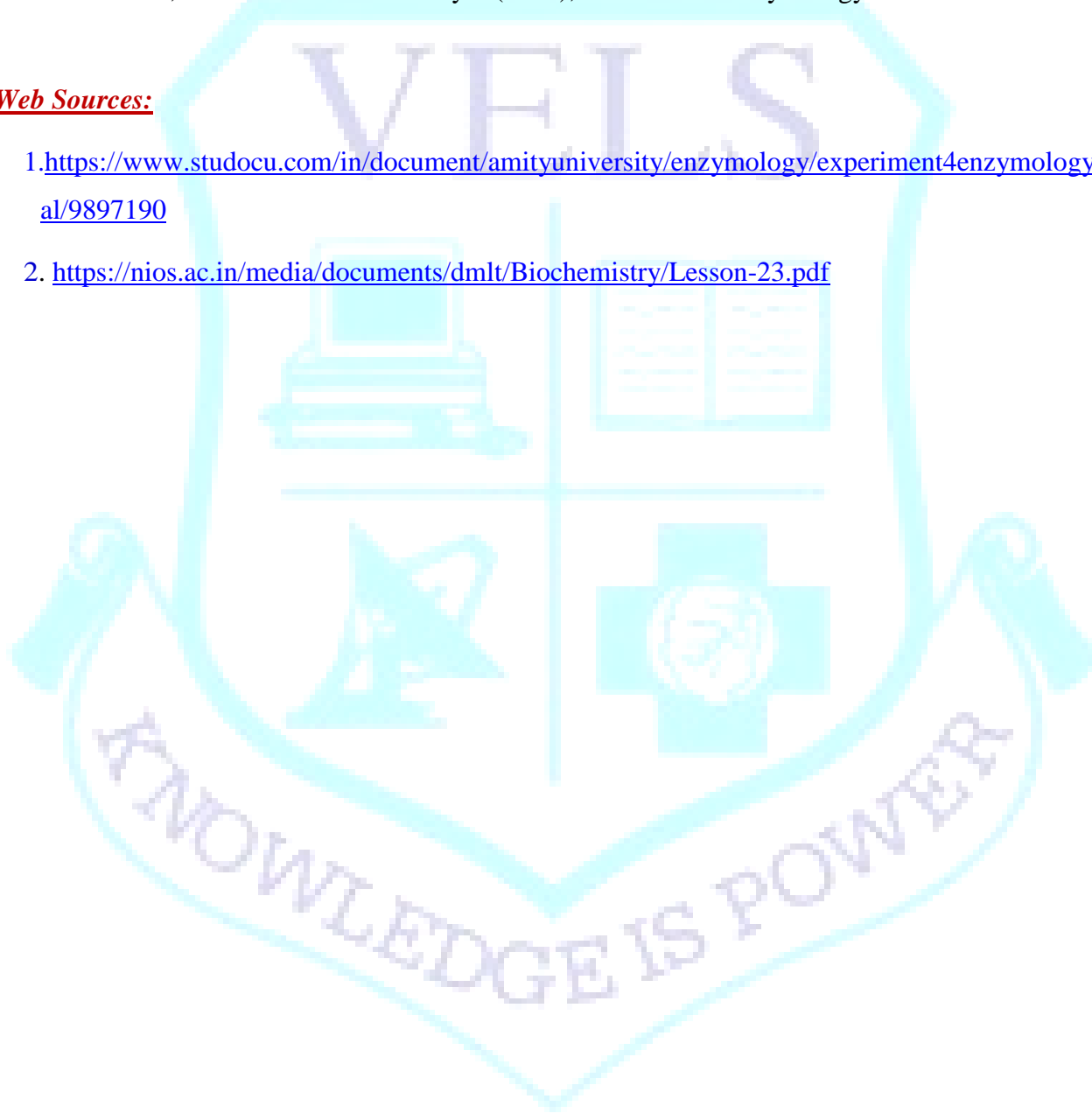
1. Sawhney, S. K., and Randhir Singh (2000), Introductory practical biochemistry, Alpha Science Int'l Ltd.

Reference Books:

1. Bisswanger, Hans (2013), Practical enzymology. John Wiley & Sons.
2. Wilchek, Meir and Edward A. Bayer (1990), "Methods in enzymology."

Web Sources:

1. <https://www.studocu.com/in/document/amityuniversity/enzymology/experiment4enzymologypractical/9897190>
2. <https://nios.ac.in/media/documents/dmlt/Biochemistry/Lesson-23.pdf>



L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

CO1: To develop effective verbal and non-verbal communication techniques for various contexts.

CO2: To enhance listening skills for better comprehension and engagement in conversations.

CO3: To improve written communication abilities, focusing on clarity, coherence, and style.

CO4: To build confidence in public speaking through practice and constructive feedback.

CO5: To cultivate interpersonal skills for successful collaboration and professional interactions.

Credit Hours**UNIT I –INTRODUCTION TO COMMUNICATION SKILLS****6**

- Fundamentals of Communications
- Elements of Communication, Types of Communication

UNIT II - PRACTICAL ENGLISH**6**

- Importance of the language - Word Usage and Jargon
- Tenses and the effectiveness - Basics of grammar (Noun/Verb/Adverb/Conjunction)

UNIT III - EFFECTIVE COMMUNICATION**6**

- LSRW (Listening, Speaking, Reading & Writing)
- Pronunciation - Vocabulary Building
- Intonations & its importance

UNIT IV - WORKPLACE COMMUNICATION**6**

- Basics of telephone etiquette
- E-Mail writing
- Presentation Skills
- Interpersonal Skills
- Business English

UNIT V - QUANTITATIVE ABILITY**6**

- Verbal Ability - Verbal Analogy
- Debating Skills - Public Speaking

Total 30 Hours

COURSE OUTCOMES:

At the end of this course, the students would have learnt to

COC1 enhance participants' business communication skills

COC2 enhance LSRW Skills (LSRW – Listening, Speaking, Reading & Writing)

COC3 express opinions at free will in social/ personal gathering

COC4 impact leadership qualities among participants

COC5 engage in conversation with others to exchange ideas

REFERENCES:

1. Andreja. J. Ruther Ford (2011), Basic communication skills for Technology, 2nd Edition, Pearson Education,
2. Barun K Mitra Elizabeth Harren (2023), 7 April 2022, last updated: 16 November,
3. Kerry Patterson, Joseph Grenny, Ron McMillan, Al Switzler (McGraw-Hill)
4. Ethan Beute and Stephen Pacinelli (Greenleaf)
5. Francis Peters SJ (2011), Soft skills and professional communication, 1st Edition, McGraw Hill Education
6. Soft skills and professional communication, Francis Peters SJ, 1stEdition, McGraw Hill Education, 2011

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES

CO1: To develop strategies to enhance teamwork and collaboration in professional settings.

CO2: To cultivate a positive attitude and mindset to foster constructive relationships and productivity.

CO3: To impact leadership, Decision-making, Behaviour and team bonding skills

Credit Hours

UNIT I - PROFESSIONAL BEHAVIOUR

6

- Team Building – Team Bonding
- Inter-Personal Relationship– Intra-Personal Relationship

UNIT II - PERSONALITY DEVELOPMENT

6

- Types of Personality
- Self-Confidence - Confidence Building
- Attitude (Positive/Negative)

UNIT III - TELEPHONE ETIQUETTE

6

- Basics of telephone etiquette
- Giving clear and concise information
- Tone & rate of speech
- Intonations & its Importance
- Whatsapp Communications

UNIT IV - DECISION MAKING

6

- Types of Decisions – planned-unplanned, individual-group, major-minor
- Types of Leadership styles – Autocratic, democratic, lesse-faire, participative, bureaucratic.

UNIT V - PROFESSIONAL ETIQUETTE

6

- Respect – Salutations
- Official Behaviour

Total 30 Hours

COURSE OUTCOMES:

At the end of this course, the students would have learnt to

- COC1: understand the principles of effective team building and apply strategies to foster team bonding and cohesion in professional settings.
- COC2: become self-confident individuals by mastering interpersonal skills, team management skills, and leadership skills.
- COC3: practice techniques for effective communication in telephone conversations.
- COC4: evaluate decision-making processes and their implications in professional settings.
- COC5: exhibit professional conduct and demeanor in various professional situations.

REFERENCES:

- Language Service, University at Oberta de Catalunya
- Taylor. Grant (2005), English Conversation Practice. Tata McGraw Hill Education Pvt. Ltd
- Tiko, Champa & Jaya Sasikumar (1979) Writing with a purpose. OUP New Delhi.
- Alex, Dr. K. (2014). Soft Skills (1st edition) S Chand & Company.
- Nelson-Jones, R. (1992). Life skills, a handbook, Trowbridge, Wilts: Detesios Ltd.