UNDERGRADUATE DEGREE PROGRAMME

B.Sc., BIOCOMPUTING Three Years

/

B.Sc., (Hons) BIOCOMPUTING

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 Bioinformatics
School of Life Sciences

DEPARTMENT OF BIOINFORMATICS

VISION OF THE DEPARTMENT

The Vision of Department of Bioinformatics is to provide the best education and training for students to prepare them for professional research careers in biological sciences as well as software industry. The Department plans to produce eminent scientists in the field of Bioinformatics.

MISSION OF THE DEPARTMENT

To facilitate, conduct and organize research work by teams comprised of core groups leading to inventions and to cooperate to meet this end and also to work acquiring the patents of such inventions.

With its strong commitment to education, the department expects its graduates to have acquired solid subject knowledge and laboratory skills in the field of Bioinformatics upon their graduation. In addition, with our innovative curriculum, the graduates are also expected to possess all- round competence in IT technology, information gathering and synthesis, critical thinking, efficient oral and written communication, and teamwork spirit and capability so that their career prospects go beyond the field of life sciences.

PROGRAMME EDUCATIONAL OUTCOMES (PEO)	
PEO1	An ability to develop the practical knowledge related to Life science, Computer science and information technology in an interdisciplinary manner for providing innovative ideas to solve the biological problems and promote the research globally.
PEO2	The extraordinary skills to analyse the scientific big data, create a novel objective, implement methodology to derive a key finding and apply this knowledge for welfare of society. Students should be able to develop as computational expert and follow the ethical rules on areas related to Life sciences and Bioinformatics
PEO3	Develop as a resource person with interdisciplinary knowledge who can finish the advance tasks related to biology and computer science in a challenging scientific environment.
PEO4	Update knowledge on programming and database development on biological data and information and help the scientific research community.
PEO5	U.G. program and its knowledge give confidence to the students and shine in the booming bioinformatics careers related to academics, research and development and industry.

PROGRAMME OUTCOMES (PO)	
PO1	**Scientific knowledge**: Graduates will acquire bioinformatics specific knowledge including recent techniques in the respective fields coupled with hands-on skills and leadership skills for a successful career.
PO2	**Problem analysis**: Graduates will be able to analyse, solve and troubleshoot problems in implementation of bioinformatics protocols
PO3	**Design/development of solutions:** Graduates will develop creative thinking and cooperate with each other to solve problems in the field of bioinformatics.
PO4	**Conduct investigations of Practical problems:** Graduates will acquire practical skills – which help in planning and designing protocols to validate hypothesis.
PO5	**Conduct investigations of experimental problems:** Graduates will acquire execute experimental techniques independently as well as assimilate, analyse and interpret subsequent data.

PO6	**Modern tool usage and communication:** Graduates will effectively be able to manage resources and time using ICT and computer enabled devices and accomplish ability to understand and communicate all ideas effectively.
PO7	**Environment sustainability and Ethics:** Graduates will get adequate knowledge to use information and implement solutions for environmental protection and remediation.
PO8	**Role and responsibilities:** Graduates will be aware of their role and responsibility in handling and use of microbes including genetically modified microorganisms.
PO9	**Lifelong learning:** Graduates will carry on to learn and adapt in a world of constantly evolving technology.
PO10	**Application:** To gain a sound knowledge on the application of computer techniques in the field of chemistry, plants, etc.
PO11	**Analysis of biological data:** To be well versed in handling the biological data from the different database available online at present.
PO12	**Maintenance of biological database:** To implement the computer programming knowledge in the design and maintenance of database to utilize the complex form of biological data in a simpler format.

PROGRAMME SPECIFIC OUTCOMES (PSO)	
PSO1	The primary goal is to make the students to understand biological concepts.
PSO2	To acquire knowledge on the basics of computer and the principles of programming languages.
PSO3	To understand the levels of programming language and its application in various fields of biology.
PSO4	To obtain the knowledge on basics in designing the webpage for a database as well as online tools and software's.
PSO5	To utilize the bioinformatics skill to venture in development of fields like pharmaceutical and biotechnological concerns

BOARD OF STUDIES

List of Members

Department of Bioinformatics

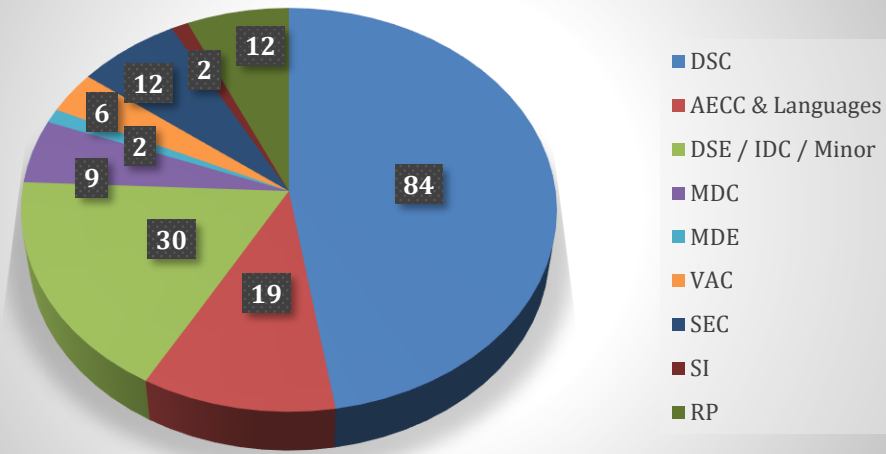| S. No	Name & Designation	Address	Role
1.	Dr. Radha Mahendran	Professor & Head, Department of Bioinformatics, VISTAS, Chennai	Chairman
2.	Dr. R. Priya	Assistant Professor, Department of / Bioinformatics, VISTAS, Chennai	Internal Member
3.	Dr. P.R. Kiresee Saghana	Assistant Professor, Department of / Bioinformatics, VISTAS, Chennai	Internal Member
4.	Dr. V. Umashankar	Scientist, Professor and Head, Bioinformatics Division, ICMR-National Institute for Research in Tuberculosis, Chennai	Academic Expert
5.	Dr. A. Jaya	Professor in Computer Applications, B.S. Abdur Rahman Crescent Institute of Science & Technology, Chennai.	Academic Expert
6.	Dr. M. Menaga	Managing Director, BioNeem Tech, Sipcot IT park, Siruseri Chennai.	Industrial Expert
7.	Ms. S. Dhananya	Bioinformatics Analyst, Theracues Innovations Pvt. Ltd, Sahakar Nagar, Bangalore.	Alumni

CREDIT DISTRIBUTION

B.Sc., Biocomputing Three Years
Minimum credits to be earned: 132
/
BSc., (Hons) Biocomputing Four Years
Minimum credits to be earned: 176

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

Legend:
- DSC
- AECC & Languages
- DSE / IDC / Minor
- MDC
- MDE
- VAC
- SEC
- SI
- RP

Values: 84, 19, 30, 9, 2, 6, 12, 2, 12

CREDIT PERCENTAGE DISTRIBUTION

Legend:
- DSC
- AECC & Languages
- DSE / IDC / Minor
- MDC
- MDE
- VAC
- SEC
- SI
- RP

Values: 47%, 11%, 18%, 5%, 1%, 3%, 7%, 1%, 7%
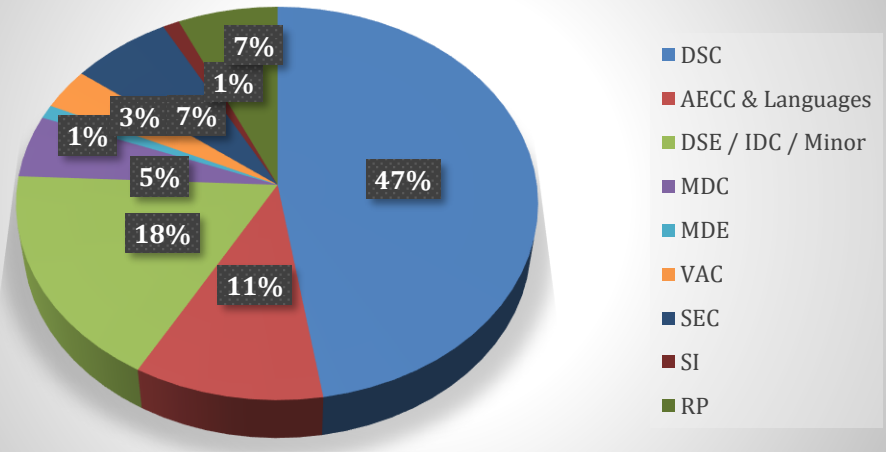
ABBREVIATIONS

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
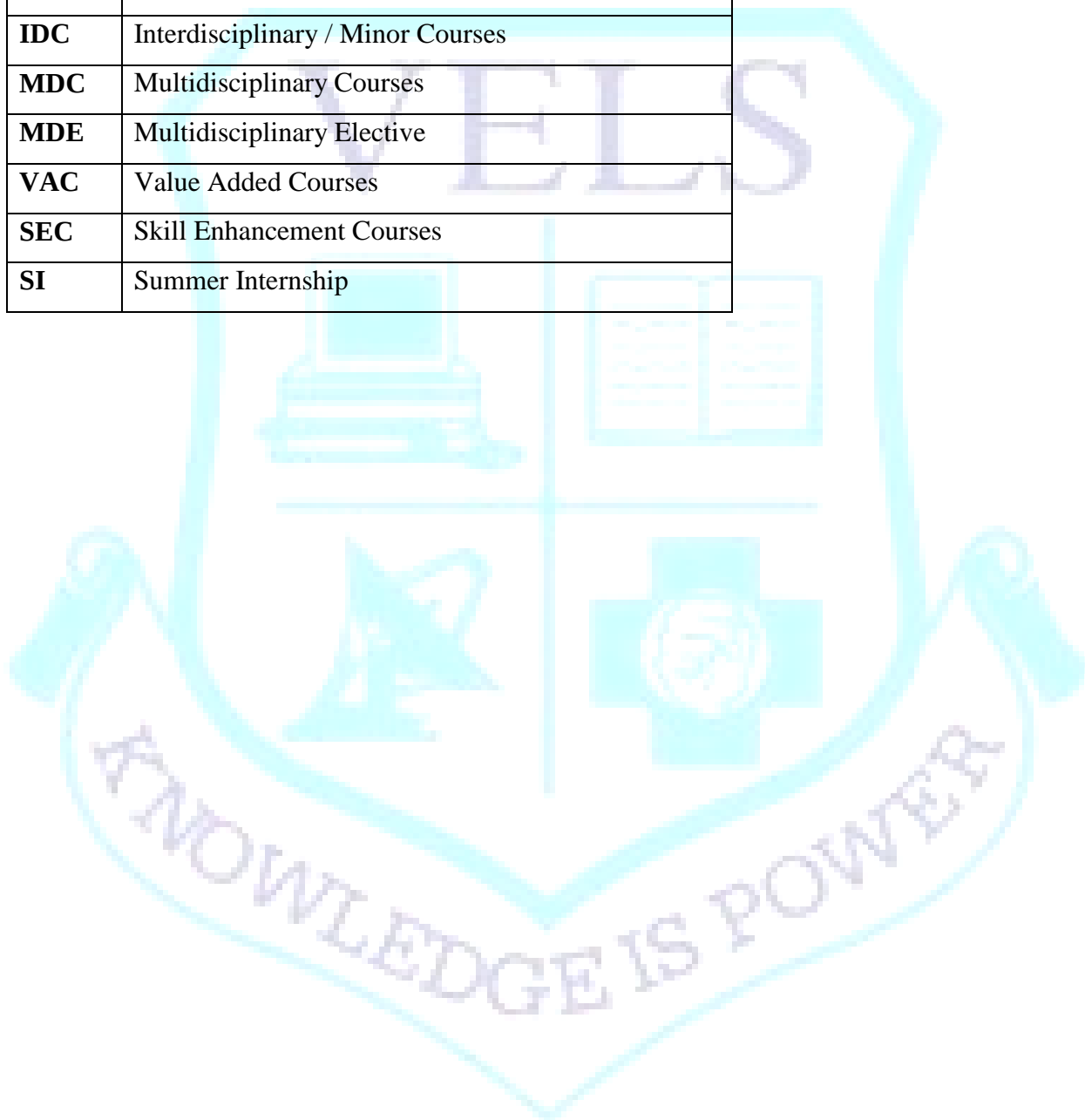
CURRICULUM STURCTURE

B.Sc., Biocomputing Three Years
/
BSc., (Hons) Biocomputing Four Years

Total number of Credits: 176

	B.Sc., (Hons) Biocomputing Minimum Credits to be earned :176									
	B.Sc., Biocomputing Minimum Credits to be earned: 132									
	SEMESTER I									
			Hours/Week					**Maximum Marks**		
Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
LANG 1	24LTAM11/ 24LHIN11/ 24LFRE11	Tamil I / Hindi I/ French I	2	0	0	1	2	40	60	100
ENG 1	24LENG11	English I	2	0	0	1	2	40	60	100
DSC 1	24CBCM11	Introduction to Bioinformatics	3	0	0	2	3	40	60	100
DSC 2	24CBCM12	Fundamentals of Computer	4	0	0	2	4	40	60	100
MDC 1	24MBCM11	Introduction to Cell Biology and Biomolecules	3	0	0	2	3	40	60	100
DSE 1	24DBCM1-	Discipline Specific Elective – I	4	0	0	2	4	40	60	100
DSC 1 (lab)	24PBCM11	Introduction to Bioinformatics Practical I	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 I	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

Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
		SEMESTER 2								
LANG 2	24LTAM21/ 24LHIN21/ 24LFRE21	Tamil II / Hindi II / French II	2	0	0	1	2	40	60	100
ENG 2	24LENG21	English II	2	0	0	1	2	40	60	100
DSC 3	24CBCM21	Programming in C++	3	0	0	2	3	40	60	100
DSC 4	24CBCM22	Biological Database and Sequence Analysis	3	0	0	2	3	40	60	100
MDC 2	24MBCM21	Immunology and Microbiology	3	0	0	2	3	40	60	100
DSE 2	24DBCM2-	Discipline Specific Elective - II	4	0	0	2	4	40	60	100
DSC 3 (lab)	24PBCM21	Programming in C++ Practical II	0	0	2	1	1	40	60	100
DSC 4 (lab)	24PBCM22	Biological Database and Sequence Analysis Practical III	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	Hours/Week					Maximum Marks		
			L	T	P	O	C	CIA	SEE	Total
LANG 3	24LTAM31/ 24LHIN31/ 24LFRE31	Tamil III / Hindi III / French III	2	0	0	1	2	40	60	100
ENG 3	24LENG31	English III	2	0	0	1	2	40	60	100
DSC 5	24CBCM31	Programming in Java	3	0	0	2	3	40	60	100
DSC 6	24CBCM32	Recombinant DNA Technology	3	0	0	2	3	40	60	100
MDC 3	24MBCM31	Enzyme and Metabolism	3	0	0	2	3	40	60	100
DSE 3	24DBCM3-	Discipline Specific Elective – III	3	0	0	2	3	40	60	100
DSC 5 (Lab)	24PBCM31	Programming in Java Practical IV	0	0	2	1	1	40	60	100
DSC 6 (Lab)	24PBCM32	Recombinant DNA Technology Practical IV	0	0	2	1	1	40	60	100
MDE 1	-	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	24IBCM31	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
			Hours/Week					**Maximum Marks**		
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
AECC 1	24EVS031	Environmental Studies	3	0	0	2	3	40	60	100
DSC 7	24CBCM41	Programming in Perl	3	0	0	2	3	40	60	100
DSC 8	24CBCM42	Plant Bioinformatics and Omics science	3	0	0	2	3	40	60	100
DSE 4	24DBCM4-	Discipline Specific Elective – IV	4	0	0	2	4	40	60	100
DSC 7 (Lab)	24PBCM41	Programming in Perl Practical V	0	0	2	1	1	40	60	100
DSC 8 (Lab)	24PBCM42	Plant Bioinformatics and Omics science Practical	0	0	2	1	1	40	60	100
SEC 5	24SBCM41	Industry Oriented Employability skills	1	0	2	1	2	40	60	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	CIA	SEE	Total
			Hours/Week					**Maximum Marks**		
DSC 9	24CBCM51	Programming in python	3	0	0	2	3	40	60	100
DSC 10	24CBCM52	Systems Biology	3	0	0	2	3	40	60	100
DSC 11	24CBCM53	Data science in Bioinformatics	4	0	0	2	4	40	60	100
DSE 5	24DBCM5-	Discipline Specific Elective – V	4	0	0	2	4	40	60	100
DSC 9 (Lab)	24PBCM51	Programming in python Practical VII	0	0	2	1	1	40	60	100
DSC 10 (Lab)	24PBCM52	Systems Biology Practical VIII	0	0	2	1	1	40	60	100
SEC 7	24SBCM51	Entrepreneurial Development	2	0	0	1	2	40	60	100
VAC 4	24DVAC51	Next Generation Sequencing	2	0	0	1	2	40	60	100
SI 2	24IBCM51	Internship II	0	0	2	1	1	-	100	100
SEC 8		Skill Enhancement Training / Student Club Activities/ Institution Innovation Council Activities	-	-	-	-	-	-	-	-
			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								
			Hours/Week					Maximum Marks			
Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
DSC 12	24CBCM61	Genome sequencing Technology	3	0	0	2	3	40	60	100
DSC 13	24CBCM62	Clinical Pharmacokinetics	4	0	0	2	4	40	60	100
DSC 14	24CBCM63	Artificial Intelligence and its Application in Bioinformatics	4	0	0	2	4	40	60	100
DSC 15	24CBCM64	R programming language and big data Analytics	4	0	0	2	4	40	60	100
DSE 6	24DBCM6-	Discipline Specific Elective – VI	3	0	0	2	3	40	60	100
DSC 12 (Lab)	24PBCM61	Genome sequencing technology practical IX	0	0	2	1	1	40	60	100
SEC 9	24SBCM61	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								
			Hours/Week					**Maximum Marks**		
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
DSC 16	24CBCM71	Computer Aided Drug Designing	3	0	0	2	3	40	60	100
DSC 17	24CBCM72	Advanced Bioinformatics Algorithms	4	0	0	2	4	40	60	100
DSC 18	24CBCM73	Structural Bioinformatics	4	0	0	2	4	40	60	100
DSE 7	24DBCM7-	Discipline Specific Elective – VII	4	0	0	2	4	40	60	100
DSC 16 (Lab)	24PBCM71	Computer Aided Drug Designing Practical X	0	0	2	1	1	40	60	100
RP 1	24RBCM71	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									
			Hours/Week					**Maximum Marks**			
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**	
DSC 19	24CBCM81	Database Management System	3	0	0	2	3	40	60	100	
DSC 20	24CBCM82	Molecular modelling and simulations	3	0	0	2	3	40	60	100	
DSC 21	24CBCM83	Datamining and Machine learning	4	0	0	2	4	40	60	100	
DSE 8	24DBCM8-	Discipline Specific Elective – VIII	4	0	0	2	4	40	60	100	
DSC 19 (Lab)	24PBCM81	Database Management System Practical XI	0	0	2	1	1	40	60	100	
DSC 20 (Lab)	24PBCM82	Molecular modelling and Simulations Practical XII	0	0	2	1	1	40	60	100	
RP 2	24RBCM81	Research Project II	0	0	12	4	6	-	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	24CBCM11	Introduction to Bioinformatics	3	0	0	2	3
DSC 2	24CBCM12	Fundamentals of Computer	4	0	0	2	4
DSC 1 (Lab)	24PBCM11	Introduction to Bioinformatics Practical I	0	0	2	1	1
DSC 3	24CBCM21	Programming in C++	3	0	0	2	3
DSC 4	24CBCM22	Biological Database and Sequence Analysis	3	0	0	2	3
DSC 3 (Lab)	24PBCM21	Programming in C++ Practical II	0	0	2	1	1
DSC 4 (Lab)	24PBCM22	Biological Database and Sequence Analysis Practical III	0	0	2	1	1
DSC 5	24CBCM31	Programming in Java	3	0	0	2	3
DSC 6	24CBCM32	Recombinant DNA Technology	3	0	0	2	3
DSC 5 (Lab)	24PBCM31	Programming in Java Practical IV	0	0	2	1	1
DSC 6 (Lab)	24PBCM32	Recombinant DNA Technology Practical IV	0	0	2	1	1
DSC 7	24CBCM41	Programming in Perl	3	0	0	2	3
DSC 8	24CBCM42	Plant Bioinformatics and Omics science	3	0	0	2	3
DSC 7 (Lab)	24PBCM41	Programming in Perl Practical V	0	0	2	1	1
DSC 8 (Lab)	24PBCM42	Plant Bioinformatics and Omics science Practical	0	0	2	1	1
DSC 9	24CBCM51	Programming in python	3	0	0	2	3
DSC 10	24CBCM52	Systems Biology	3	0	0	2	3
DSC 11	24CBCM53	Data science in Bioinformatics	4	0	0	2	4
DSC 9 (Lab)	24PBCM51	Programming in python Practical VII	0	0	2	1	1

DSC 10 (Lab)	24PBCM52	Systems Biology Practical VIII	0	0	2	1	1
DSC 12	24CBCM61	Genome sequencing Technology	3	0	0	2	3
DSC 13	24CBCM62	Clinical Pharmacokinetics	4	0	0	2	4
DSC 14	24CBCM63	Artificial Intelligence and its Application in Bioinformatics	4	0	0	2	4
DSC 15	24CBCM64	R programming language and big data Analytics	4	0	0	2	4
DSC 12 (Lab)	24PBCM61	Genome sequencing technology practical IX	0	0	2	1	1
DSC 16	24CBCM71	Computer Aided Drug Designing	3	0	0	2	3
DSC 17	24CBCM72	Advanced Bioinformatics Algorithms	4	0	0	2	4
DSC 18	24CBCM73	Structural Bioinformatics	4	0	0	2	4
DSC 16 (Lab)	24PBCM71	Computer Aided Drug Designing Practical X	0	0	2	1	1
DSC 19	24CBCM81	Database Management System	3	0	0	2	3
DSC 20	24CBCM82	Molecular modelling and simulations	3	0	0	2	3
DSC 21	24CBCM83	Datamining and Machine learning	4	0	0	2	4
DSC 19 (Lab)	24PBCM81	Database Management System Practical XI	0	0	2	1	1
DSC 20 (Lab)	24PBCM82	Molecular modelling and Simulations Practical XII	0	0	2	1	1

DISCIPLINE SPECIFIC ELECTIVE COURSES

Category	Code	Course	L	T	P	O	C
DSE 1	24DBCM11	Mathematics and Biostatistics	4	0	0	2	4
	24DBCM12	Biophysical Chemistry	4	0	0	2	4
DSE 2	24DBCM21	Molecular Biology	4	0	0	2	4
	24DBCM22	Web Programming	4	0	0	2	4
DSE 3	24DBCM31	Medical Coding and Transcription	3	0	0	2	3
	24DBCM32	Medicinal Chemistry	3	0	0	2	3
DSE 4	24DBCM41	Genomics and Proteomics	4	0	0	2	4
	24DBCM42	Molecular Microbial Pathogenesis	4	0	0	2	4
DSE 5	24DBCM51	Cancer Biology	4	0	0	2	4
	24DBCM52	UNIX Programming	4	0	0	2	4
DSE 6	24DBCM61	Biosafety, Bioethics and IPR	3	0	0	2	3
	24DBCM62	Medical Informatics	3	0	0	2	3
DSE 7	24DBCM71	Enzyme Engineering and Technology	4	0	0	2	4
	24DBCM72	Molecular Microbial Pathogenesis	4	0	0	2	4
DSE 8	24DBCM81	Bioinformatics in Immunology, Microbiology and Nanotechnology	4	0	0	2	4
	24DBCM82	Metabolomics and Metabolic Engineering	4	0	0	2	4

AECC & LANGUAGES

Category	Code	Course	L	T	P	O	C
LANG 1	24LTAM11/ 24LHIN11/ 24LFRE11	Tamil I / Hindi I/ French I	2	0	0	1	2
ENG 1	24LENG11	English I	2	0	0	1	2
LANG 2	24LTAM21/ 24LHIN21/ 24LFRE21	Tamil II / Hindi II / French II	2	0	0	1	2
ENG 2	24LENG21	English II	2	0	0	1	2
LANG 3	24LTAM31/ 24LHIN31/ 24LFRE31	Tamil III / Hindi III / French III	2	0	0	1	2
ENG 3	24LENG31	English III	2	0	0	1	2
LANG 4	24LTAM41/ 24LHIN41/ 24LFRE41	Tamil IV / Hindi IV / French IV	2	0	0	1	2
ENG 4	24LENG41	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	24MBCM11	Introduction to Cell Biology and Biomolecules	3	0	0	2	3
MDC 2	24MBCM21	Immunology and Microbiology	3	0	0	2	3
MDC 3	24MBCM31	Enzyme and Metabolism	3	0	0	2	3

MULTIDISCIPLINARY ELECTIVES

Category	Code	Course	L	T	P	O	C
MDE 1	-	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	24DAVC21	Communication Skills	2	0	0	1	2
VAC 3	24DVAC41	Yoga Education / NSS / NCC	0	0	2	1	1
VAC 4	24DVAC51	Next Generation Sequencing	2	0	0	1	2

SKILL ENHANCEMENT COURSES

Category	Code	Course	L	T	P	O	C
SEC 1	24SSKU11	Soft Skills I	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	24SBCM41	Industry Oriented Employability skills	1	0	2	1	2
SEC 6		In-plant Training/ Industrial Tour/ Summer Term	-	-	-	-	-
SEC 7	24SBCM51	Entrepreneurial Development	2	0	0	1	2
SEC 8		Skill Enhancement Training / Student Club Activities/ Institution Innovation Council Activities	-	-	-	-	-
SEC 9	24SBCM61	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	24IBCM31	Internship I	0	0	2	1	1
SI 2	24IBCM51	Internship II	0	0	2	1	1

RESEARCH PROJECT

Category	Code	Course	L	T	P	O	C
RP 1	24RBCM71	Research Project I	0	0	12	4	6
RP 2	24RBCM81	Research Project II	0	0	12	4	6
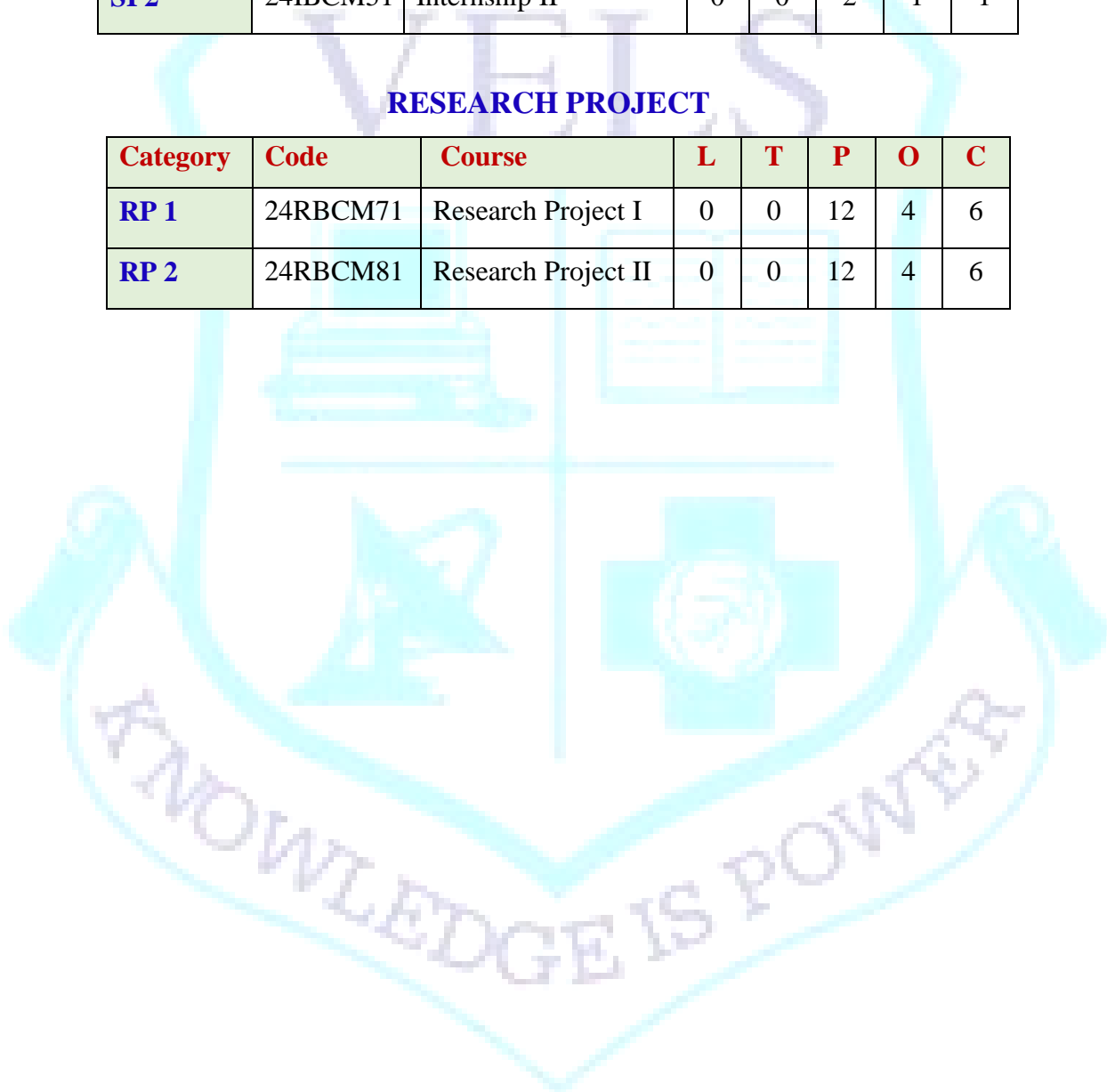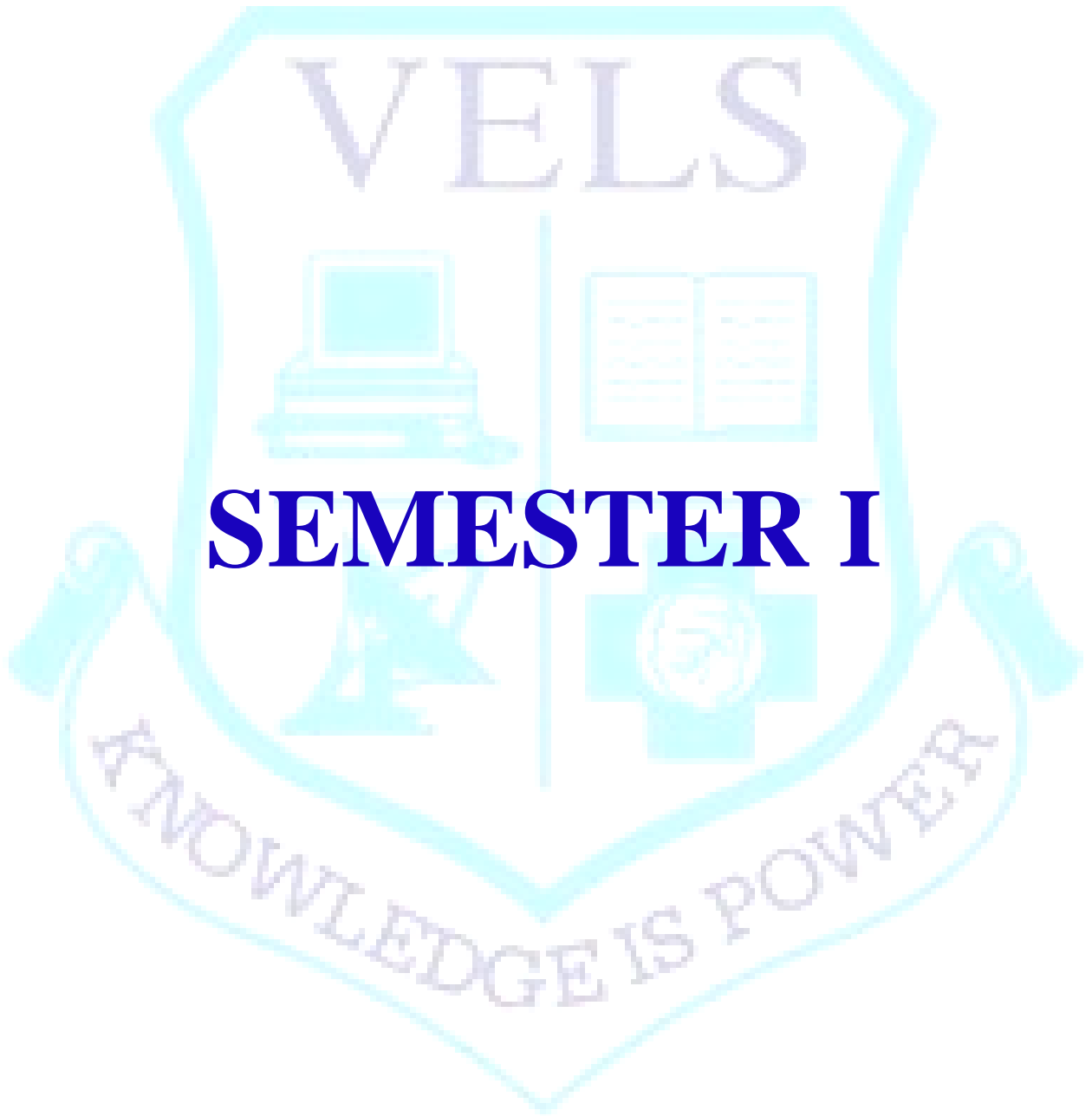
SEMESTER I

24LTAM11 மொழிவரலாறு - சங்க இலக்கியம் அறஇலக்கியம் மொழித்திறன்

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   **07 மணி நேரம்**

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

1. நாலடியார் - இரண்டு பாடல்கள். (2, 3)
2. மூதுரை - இரண்டு பாடல்கள். (2, 8)

அலகு 4 மொழி   **07 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

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

24LHIN11   # वर्ष I – सत्र I (गद्य, पत्र लेखन & व्यावहारिक हिन्दी)

L	T	P	O	C
2	0	0	1	2

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   6hrs.
Rahul Sanskrityayan.

UNIT IV: व्यावहारिक हिन्दी- पत्र लेखन में प्रयुक्त वाक्यांश, कौशल विकास
– भाव एक भाषा अनेक
6hrs.
Functional Hindi-Phrases used in Letter Writing.
Skill development - Bhav Ek Bhasha Anek

UNIT V: पत्र लेखन – परिचय व प्रकार, 3 अनोपचारिक पत्र
अलगी, अलगी + फ़ॉन्ट 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, Sahitya (1932), Sadan.

2. Sharad Joshi, Yatha Sambhav (2014), Bharatiya Gyanpeet.

3. Rahul Sanskrityayan, 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 Tankan Kala Evam Tankan Abhyas, Neelkanth Publishers Pvt. Ltd.

WEBLINKS:
1. Pandit Sriram Sharma ka kahani: https://www.evidyarthi.in
2. Harishankar parasayi ka Vyangy: http://gadyakosh.org
3. Rahul Sanskrityayan ka yatravruttant: https://www.hindwi.org
4. Prayojanmoolak Hindi:https://hi.mwikipedia.org
5. https://www.azhagi.com/hnd/helphtml/Introduction.html

24LFRE11	**FRENCH PAPER 1**	L	T	P	O	C
		2	0	0	1	2
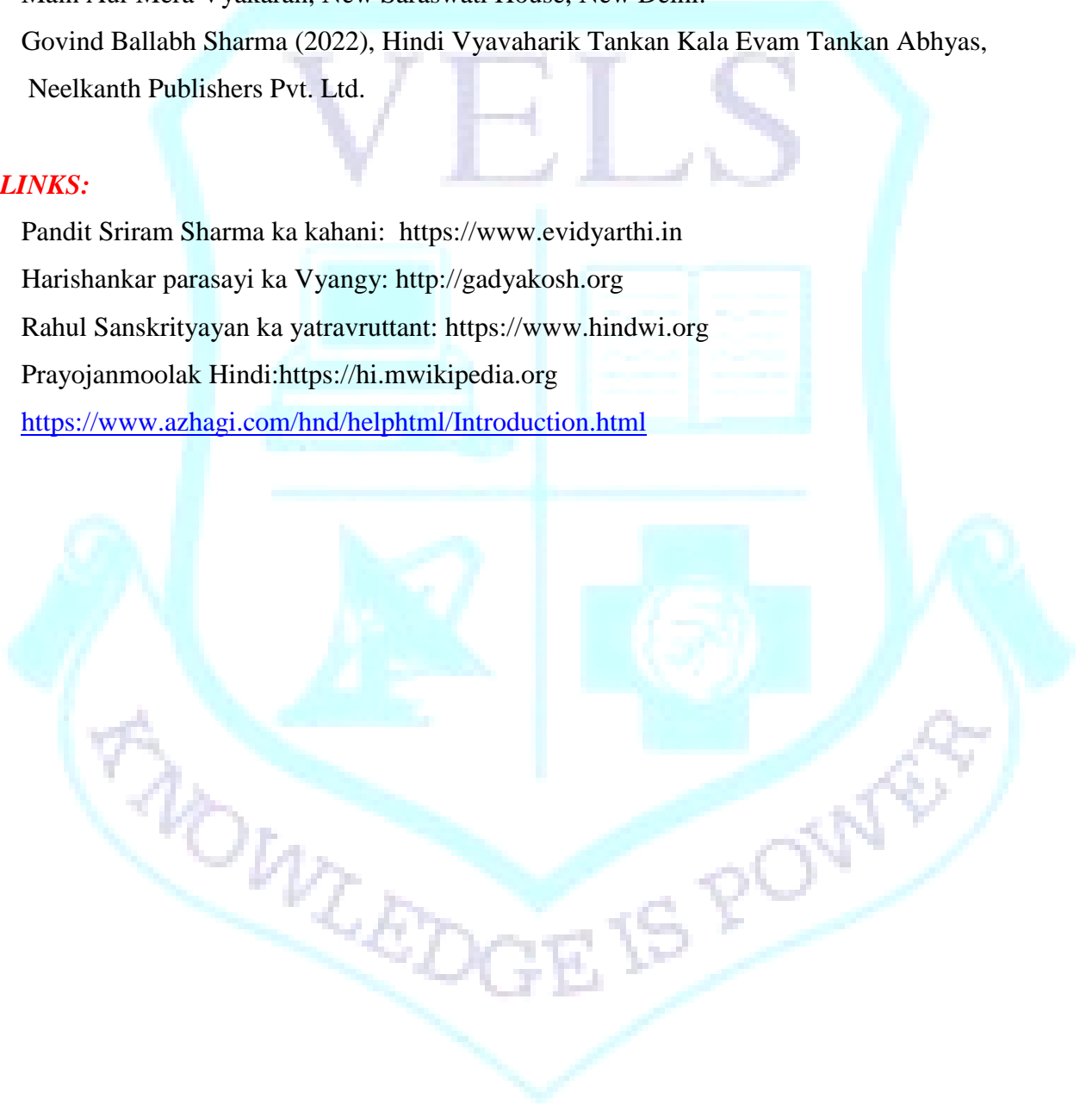
COURSE OBJECTIVES:

The lessons are being chosen:

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

UNIT 1 Salut   4 hours

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

UNIT 2 Enchanté   6 hours

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

UNIT 3 J'Adore   4 hours

La negation, l'adjectif possessif, le futur proche

UNIT 4 Tu veux bien   7 hours

Les articles de finis/indéfinis, Les pronoms après une préposition (avec lui, chez moi),

Le passé composé

UNIT 5 On se voit quand   5 hours

Les pronoms compléments directs me, te, nous, vous, L'interrogation avec est-ce que,

L'heure et

UNIT 6 Bonne idée   4 hours

Les articles partitifs, Le masculin et le féminin des adjectifs, Les pronoms

compléments directs le, la, les, La négation : ne… pas de.

Total hours - 30 hours

COURSE OUTCOME:

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

L	T	P	O	C
2	0	0	1	2

24LENG11   **ENGLISH - I**
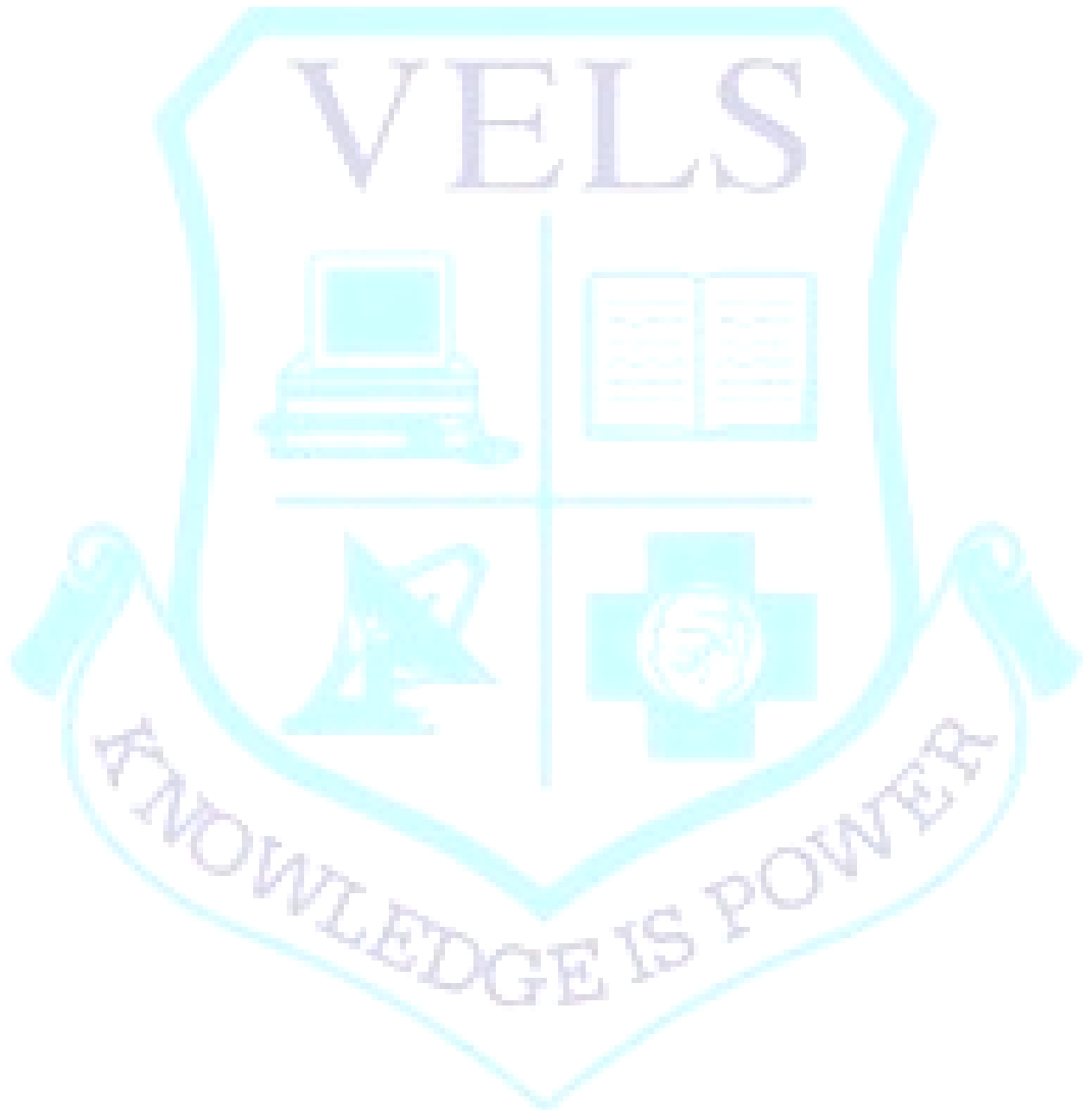
COURSE OBJECTIVES:

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.

UNIT I-PROSE   06

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

UNIT II -POETRY   06

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

UNIT III - SHORT STORY   06

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

UNIT IV -GRAMMAR   06

- Parts of speech, Articles

UNIT V -GRAMMAR   06

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

Total   30 hours

COURSE OUTCOMES:

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

CO1	understand the characteristic features of the language used in the text.
CO2	strengthen their knowledge of basic grammar
CO3	improve narrative skills after studying diverse prose and play.
CO4	understand to classify parts of speech and articles.
CO5	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.
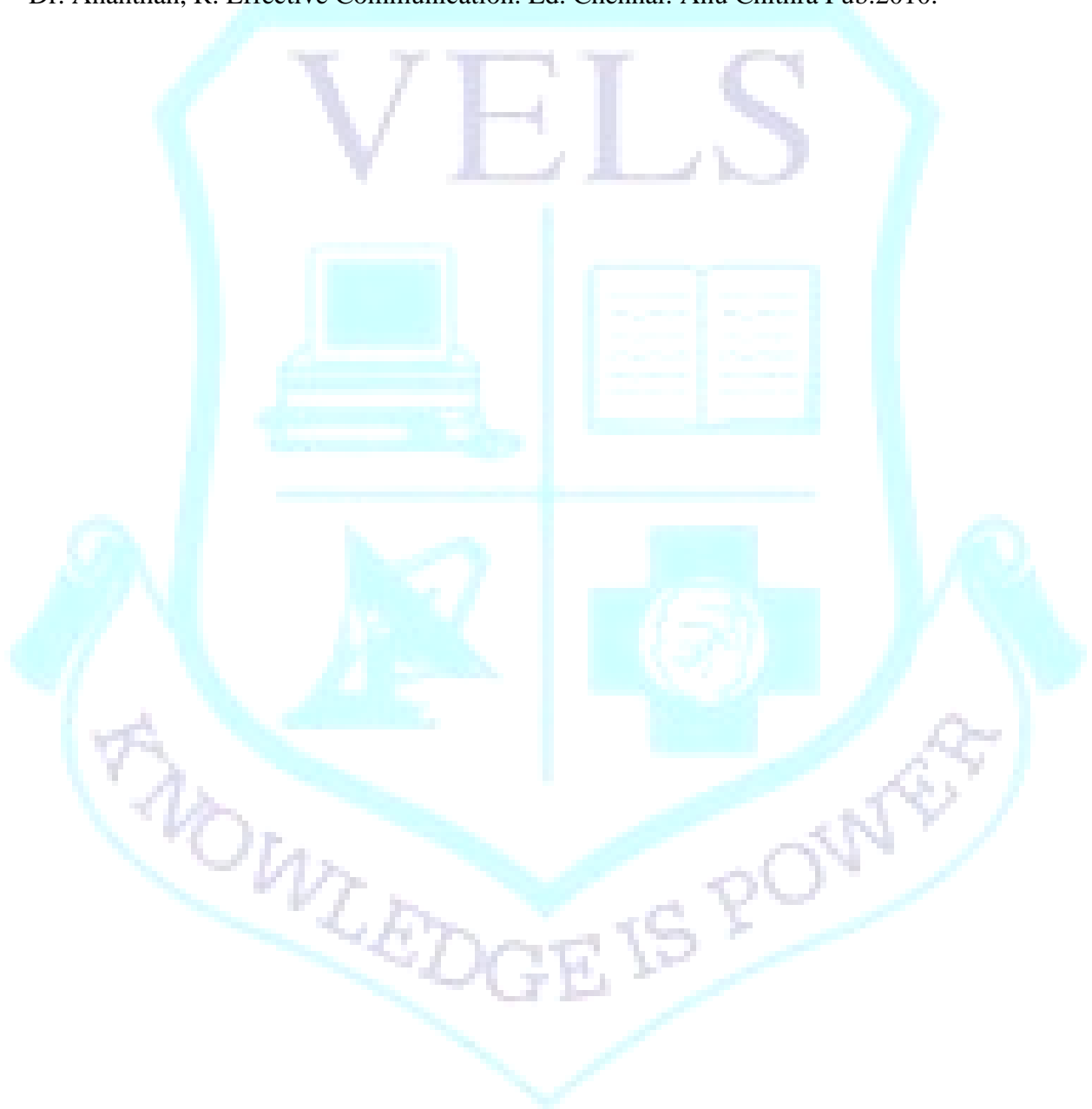
L	T	P	O	C
3	0	0	2	3

24CBCM11   INTRODUCTION TO BIOINFORMATICS

COURSE OBJECTIVES: This course will enable the students to understand the nature of biological data and need for biological databases and also to explore major biomolecular sequence databases (organization and contents); search and retrieve data from the databases using their respective search engines. To understand and appreciate the need and significance of sequence analysis and the bioinformatics approaches, algorithms for sequence analysis, the application of methods for analysis of the biomolecular sequence data.

UNIT I INTRODUCTION TO BIOINFORMATICS   09

Bioinformatics, Nature and scope of Bioinformatics, Branches of Bioinformatics, Introduction to DNA and Protein sequencing, Future of Bioinformatics, Human Genome Project (HGP), Bioinformatics Industry.

UNIT II BIOINFORMATICS DATABASES   09

Bioinformatics databases - Nucleotide sequence databases, Primary databases, Secondary databases; Protein databases- UniProt, Protein Data Bank

UNIT III SEQUENCE ANALYSIS   09

Sequence Analysis-Basic concepts, pair wise sequence - Homologous, Analogue, Orhtologous, paralogous, Xenologous (Need for sequence alignment, Local and Global alignment, Scoring matrices-PAM and BLOSUM matrices

UNIT IV PAIRWISE SEQUENCE ALIGNMENTS   09

Pairwise sequence alignments: BLAST, Multiple sequence alignments (MSA) BLAST: - Nucleotide BLAST, Protein BLAST, PSI-BLAST, Analysis of BLAST results, E Value, sensitivity and specificity of BLAST, FASTA, Structure analysis tools and software's.

UNIT V VISUALIZATION   09

Methods for presenting large quantities of biological data: sequence viewers (Artemis, SeqVISTA), 3D structure viewers (Rasmol, SPDBv, Chime, Cn3D, PyMol), Anatomical visualization.

Total: 45 Hours

COURSE OUTCOMES:

CO-1: To develop a fundamental knowledge of Bioinformatics and its applications.

CO-2: To analyze the biological data using bioinformatics databases.

CO-3: To analyze the sequence alignment of various sequences and its analogues.

CO-4: To evaluate the sensitivity and specificity of the sequence data.

CO-5: To visualize the anatomical position of the biological structure using software.

TEXT BOOKS:

1. Orpita Bosu, Simminder kaur Thukral. "Bioinformatics – Databases Tools and Algorithms", Oxford University Press, 2007.

REFERENCE BOOKS:

1. D. Higgins and W. Taylor. (2008), "Bioinformatics: Sequences, Structures and databanks", Oxford University Press. Oxford, UK,.

2. N. Gautham, (2006), "Bioinformatics", Narosa Publishing Company, New Delhi,.

3. V.R.Srinivas, (2005), "Bioinformatics: Sequences and genomics analysis", Cold Spring Harbor Laboratory press, Cold Spring harbor, USA,

WEB SOURCE LINK:

1. https://www.biostat.wisc.edu/bmi576/

2. https://www.ebi.ac.uk/training/online/courses/introductory-bioinformatics-pathway

	L	T	P	O	C
24CBCM12 **FUNDAMENTALS OF COMPUTER**	4	0	0	2	4

COURSE OBJECTIVES: To gain a fundamental understanding of the power and limits of basic models of computation, and to gain comfort with associated proof techniques. This course is designed to provide the non- science/ mathematics/ engineering/ business student an intense foundational introduction to the fundamental concepts in statistics. After completing the course, the student should be able to work basic problem and word problems in logic, set theory, counting methods, probability, and statistics.

UNIT I INTRODUCTION TO COMPUTERS   12

History of computer - Computer Generations, Types of computers, Computer components – CPU – I/P Devices and O/P devices, Functionalities of a Computer, Advantages and disadvantages, Applications of computer. Memory and memory types RAM and RAM types, ROM and ROM types, Mother Board, Memory Units, Ports.

UNIT II COMPUTER HARDWARE AND SOFTWARE   12

Hardware – Types – Working methods, Software – System software and application software (MS Word, Excel and PowerPoint), Operating system, Example of Operating System. Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Introduction to Internet, Working of Internet, Internet Services, Internet addressing, E-Mail Basics- Web Development Tools, Introduction TO HTML.

UNIT III OPERATING SYSTEMS   12

Introduction to operating Systems - Windows Commands, UNIX / Linux - basic commands - General purpose, file handling, vi editor & environment

UNIT IV VARIABLES AND ASSIGNMENT   12

Introduction of programming concepts-Input, process and output-Identifiers and Keywords, Constants and Variables, Operators: arithmetic, unary, relational, logical, assignment, conditional- Hierarchy of operators, Input and output statements.

Representing the Programming Logic Using Algorithm/Pseudocode-Problem Solving Using Pseudocode- Control Statements and Branching Statements, Modules, Types of modules -, Arrays and its types.

Total: 60 Hours

COURSE OUTCOMES:

CO-1: To Develop a fundamental understanding of the power and limits of basic models of computers.

CO-2: To Adapt the uses of Computer Hardware.

CO-3: To Demonstrate the knowledge in Operating system.

CO-4: To Elaborate the fundamental concepts of Variables and Assignments.

CO-5: To solve the given problem in systematic way.

TEXT BOOKS:

1. Anita Goel (2010) "Computer Fundamentals", Pearson Education India.
2. P.R.Vittal, (2012) "Mathematical Statistics", Margham Publication. 3rd Edition.

REFERENCE BOOKS:

1. Sanghera Kamaljeet (2007), "Fundamentals of Computing", Kendall Hunt Publishing Company. 2nd Edition.
2. Anurag Seetha (2011), "Introduction to Computers and Information Technology", Ram Prasad & Sons, McGraw Hill.
3. S. Parthasarathy (2011), Essentials of programming in C for Life Sciences, 2nd Edition., Ane Books India New Delhi.

WEB SOURCE LINK:

1. https://www.khanacademy.org/computing/computer-science/algorithms.

L	T	P	O	C
3	0	0	2	3

24MBCM11 INTRODUCTION TO CELL BIOLOGY AND BIOMOLECULES

COURSE OBJECTIVE: This course covers basic properties of cells and cell organelles. It also examines properties of differentiated cell systems and tissues. The principal aim of the course is to equip students with a basic knowledge of the structural and functional properties of cells and also understanding the biological principles, and the ability to make connections across different levels of biological organization, from molecules to cells, to whole organisms, populations and ecosystems.

UNIT I   CELL STRUCTURE AND FUNCTION   09

Cell as a basic unit of life. Cell theory, Protoplasm theory, Organismal theory, Prokaryotic and Eukaryotic cell- plant cell, animal cell, bacterial cell and viruses – Structure, organization, size and Shape.

UNIT II CELL MEMBRANE AND CELL ORGANELLES   09

Ultra structure of plasma membrane – fluid mosaic model, membrane fluidity, Transport across membranes - symport, antiport, uniport, active and passive transport, Structure & Functions of cell organelles: Structure of nucleus – nuclear membrane, nucleolus, chromatin, Chromatin – Types, Endoplasmic Reticulum (SER & RER), Golgi apparatus, lysosomes, microbodies (peroxysomes and glyoxysomes), ribosomes and its types, centrioles, basal bodies. Structure and functions of mitochondria, Structure and functions of Chloroplast.

UNIT III   CELL CYCLE AND REGULATION   09

Cell Cycle: Mitosis, Meiosis, Meiosis - Phases of Meiosis, Meiosis I, Meiosis II, regulations of cell cycle and check points and proteins involved in cell cycle check points. Basics in cell signaling-signaling molecules and receptors. Cell- Apoptosis and Necrosis.

UNIT IV MOLECULES OF LIFE: PROTEINS- AMINO ACIDS AND FATS   09

Protein: Definition, properties, occurrence and biological importance of protein, Different levels of organization-Primary, secondary tertiary and Quaternary structures. Amino acids: Definition, composition, structure, properties, stability and biological importance of Amino Acid. Fats- Definition-Classification of lipids based on backbone structure, Chemistry and Characterization of lipids.

UNIT V MOLECULES OF LIFE: CARBOHYDRATES AND NUCLEOTIDES   09

Introduction to carbohydrates-Monosaccharides and their derivatives, Disaccharides, Polysaccharides. Nucleic acids – Purines, pyrimidines, Nucleosides and Nucleotides. Types of Nucleic acids – DNA (deoxyribonucleic acid), RNA (Ribonucleic acid)

Total: 45 Hours

COURSE OUTCOMES:

CO-1: To explain the concept of cells and its types.

CO-2: To discuss about the cell organelles, its functions.

CO-3: To Elaborate the concept of Cell Cycle and Regulation cell Apoptosis and Necrosis.

CO-4: To Analyze the different structures of protein, amino acid and fat.

CO-5: To discuss about the molecules of life such as carbohydrates and DNA and its types.

TEXT BOOKS:

1. Channarayappa (2010), "Cell Biology", Universities Press.
2. P.S.Verma& V.K. Agarwal (2015), "Cell Biology (Cytology, Biomolecules and molecular biology" S. Chand Publishing.

REFERENCE BOOKS:

1. Lehninger, A. L, (1984), Principles of Biochemistry. CBS publishers and distributors, NewDelhi, India
2. Horton, Moran, Ochs, Rawn, Scrimgeour Principles of Biochemistry Prentice Hall Publishers.
3. David. E. Sadava, Cell Biology: Organelle Structure and Function Jones & Bartlett publishers.

WEB RESOURCE LINKS:

1. https://openstax.org/details/books/biology-2e/

24DBCM11   MATHEMATICS AND BIOSTATISTICS
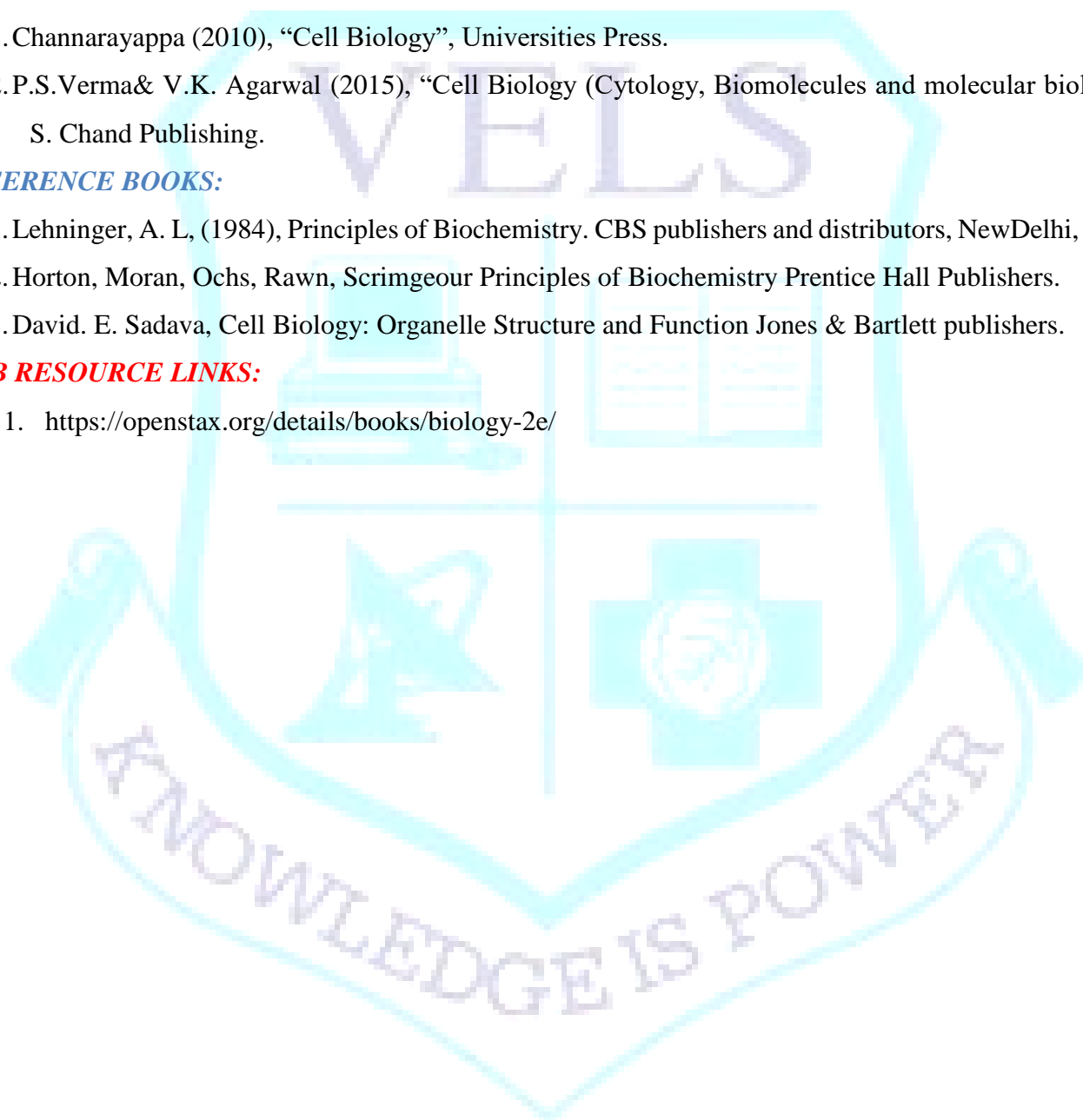
L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES: To understand the key concepts of biostatistics and mathematics and use them to analyze biological data and draw the inferences for analyzed data. Students will learn to collect, analyze and interpret quantitative data, enabling them to make informed decisions and contribute to evidence-based research. The curriculum covers a wide range of topics, including descriptive statistics, probability theory, inferential statistics, regression analysis, and the use of statistical software.

UNITI NUMERICAL DESCRIPTIVE TECHNIQUES   12 hrs

Numerical descriptive techniques: Measures of central tendency-mean, median, mode, Measure of dispersion-range and standard deviation

UNITII CORRELATION AND REGRESSION   12 hrs

Correlation and Regression: correlation, correlation coefficient, properties of correlation coefficient, regression, properties of linear regression, rank correlation.

UNIT III PROBABILITYTHEORY   12 hrs

Probability Theory: Classical and modern definition of probability, Sample space and events, independent events, mutually exclusive events, axioms of probability, conditional probability, additional and multiplication theorem of probability, Baye's theorem and related problems.

UNIT IV SAMPLING THEORY   12 hrs

Sampling Theory: Objective of sampling, Sampling error, Methods of sampling, Sampling distribution, Sampling distribution of sample mean and sample proportion, Standard error.

UNITV PROBABILITY DISTRIBUTION   12 hrs

Probability Distribution: Bernoulli's trial, Binomial distribution, Poisson distribution, Normal and Standard normal distribution, Uniform distribution

Total: 60 Hours

COURSE OUTCOMES:

CO1: To understand basic statistical concepts and their applications in biological research.

CO-2: To analyze and interpret data using descriptive and inferential statistical methods.

CO-3: To apply probability theory to assess risk and uncertainty in biological studies.

CO-4: Utilize statistical software to perform complex data analysis and modeling.

CO-5: Communicate statistical findings effectively to both Scientific and non-scientific audiences.

TEXT BOOK:

1. S.P. Gupta (2014), Statistical Methods, 44th Edition, Sultan Chand & Sons.

REFERENCE BOOKS:

1. P.R. Vittal and V. Malini (2007), Statistical and Numerical Methods, Margham Publications, Ist Edition.
2. S.C. Gupta and V.K. Kapoor (2001), Fundamentals of Applied Statistics, Sultan Chand & Sons, 3rd Edition.
3. Beri G (2009), Business Statistics, Tata McGraw Hill Publishing Company Limited.

WEB RESOURCE LINKS:

1. https://www.khanacademy.org/math/statistics-probability
2. http://www.DukeBiostatisticsResourcesforNon-Statisticians.com
3. https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/resources/lecture-notes

L	T	P	O	C
4	0	0	2	4

24DBCM12   **BIOPHYSICAL CHEMISTRY**

COURSE OBJECTIVE: The primary objectives are to explore the physical principles governing biological systems, understand the interactions between molecules at the molecular level, and apply quantitative methods to analyze biological processes. Through theoretical concepts and practical applications, students will delve into the thermodynamics, kinetics, and spectroscopic techniques relevant to biological macromolecules.

UNIT I WATER, ACIDS & BASES   12

Molecular structure, Association of Water molecules through H- bonding, Nature of hydrophobic interactions, Physico Chemical properties of Water, State of Water in biostructures & its significance. Acids and Bases, Mole & Normality, Weak acids, Amphoteric electrolytes, pH, Calculation of pH from H & OH Concentration, measurements of pH, Henderson Hasel batch equation, Titration curve & pK values, Buffers & Stability of their pH, Numerical problems.

UNIT II PROTEINS   12

Structural level of proteins & stabilizing forces, Conformational properties of polypeptides, Ramchandran plot, Helical parameters & Conformation, organization & interaction of angles, Conformational structure of alphakeratin, Silk fibrin, Collagen, Actin, Myosin, Folded conformation of globular proteins (e.g.- Haemoglobin, Myoglobin, Lysozyme, Cytrochromes) mechanism & side chain conformation, Classification & role of Betabends & bulges, Super secondary structure, Domain & motiffs, Proteins in solution & protein sequencing, Concept of protein evolution, Cytochrome & Haemoglobin evolutionary studies.

UNIT III NUCLEIC ACIDS   12

Double helical structure of DNA, Conformational parameters of Nucleic acids & their constituents, Chargff's rule, DNA polymorphism, DNA supercoiling, Hyperchromicity, Circular DNA, Types & structure of RNA, mRNA, rRNA, tRNA & modified nucleotides, nucleic acid sequencing.

UNIT IV OTHER BIOLOGICAL POLYMERS   12

Structure and conformation of polysaccharide cellulose, Amylase, Chitin, Carbohydrate conjugates, Classification & biological role of vitamins & hormones.

UNIT V MACROMOLECULAR INTERACTIONS   **12**

Ligand interaction at equilibrium, Identical independent sites, Scatchard plot, Multiple classes of independent sites, Interaction between binding sites, Allosterism, MWC model, Sequential model, Oxygen Hemoglobin binding, Binding of two different ligands, Energetics and dynamics of binding, Structures of protein- ligand complexes, Relationship between protein conformations and binding, Binding of Immunoglobulins and DNA binding proteins, Free radicals in biology and medicine.

Total: 60 Hours

COURSE OUTCOMES:

CO-1: Understand the fundamental principles of physical chemistry as applied to biological systems.

CO-2: Analyze the thermodynamic properties of biomolecules and their interactions.

CO-3: Apply kinetic and spectroscopic methods to investigate the dynamics and structure of biological macromolecules.

CO-4: Interpret experimental data and mathematical models to elucidate the behavior of biological systems.

CO-5: Demonstrate proficiency in utilizing biophysical techniques for studying complex biochemical processes.

TEXT BOOKS:

1. Charles R. Cantor and Paul R. Schimmel (2000), Biophysical Chemistry, 1st edition.
2. Kensal E. van Holde, W. Curtis Johnson, and P. Shing Ho (2018), Principles of Physical Biochemistry, 2nd edition.

REFERENCE BOOKS:

1. Ignacio Tinoco Jr., Kenneth Sauer, James C. Wang, and Joseph D. Puglisi (2013), Physical Chemistry: Principles and Applications in Biological Sciences, 5th edition.
2. Thomas E. Creighton (1992), Biophysical Chemistry: Part I: The Conformation of Biological Macromolecules, 1st edition

WEB RESOURCE LINKS:

1. https://www.springer.com/gp/chemistry/physical+chemistry?disciplineId=biophysical-chemistry&facet-content-type=books

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES: To understand various computational techniques employed to analyze biological data with the use of sequence information. Finally acquire skills to use different approaches for prediction of protein structure. This course also aims to provide students with a practical and hands-on experience with common bioinformatics tools and databases. Students will be trained in the basic theory and application of programs used for database searching, protein and DNA sequence analysis.

1.	Retrieval of DNA Sequence using Sequence Databases: NCBI	03
2.	Retrieval of DNA Sequence using Sequence Databases: DDBJ	03
3.	Retrieval of DNA Sequence using Sequence Databases: EMBL.	03
4.	Gene prediction using GenScan tool.	03
5.	Retrieval of Protein Sequence using Sequence Databases: UNIPROT	03
6.	Retrieval of 3D Protein Structure Using Protein Data Bank.	03
7.	Sequence similarity searching (BLAST).	03
8.	Sequence similarity searching (FASTA).	03
9.	Pairwise alignment – Global and Local Alignment	03
10.	3D structure Visualization tool (Rasmol)	03

Total: 30 Hours

COURSE OUTCOMES:

CO-1: To learn how to retrieve the biological data from NCBI, DDBJ and EMBL databases.

CO-2: To analyze the genes coding and non-coding regions of sequence using Gene prediction tools.

CO-3: To acquire the knowledge of protein sequence and structure using databases.

CO-4: To learn the sequence similarity between the sequences and their alignment.

CO-5: To analyze 3D structure and their amino acids sequence using visualization tools.

TEXT BOOKS:

1. D. Higgins and W. Taylor, (Eds), (2008), 'Bioinformatics: Sequences, Structures and databanks 'oxford University Press, Oxford, UK.

2. V. R. Srinivas (2005), "Bioinformatics: Sequences and genomics analysis" cold Spring Harbor Laboratory press, Cold Spring harbor, USA.

REFERENCE BOOKS:

1. N. Gautham (2006), "Bioinformatics", Narosa Publishing Company, New Delhi.

2. D. Higgins and W. Taylor (2008), "Bioinformatics: Sequences, Structures and databanks",Oxford University Press, Oxford, UK.

WEB RESOURCE LINKS

1. Interdisciplinary Tutorial Resources

L	T	P	O	C
1	0	0	1	1

24DVAC11   UNIVERSAL HUMAN VALUES
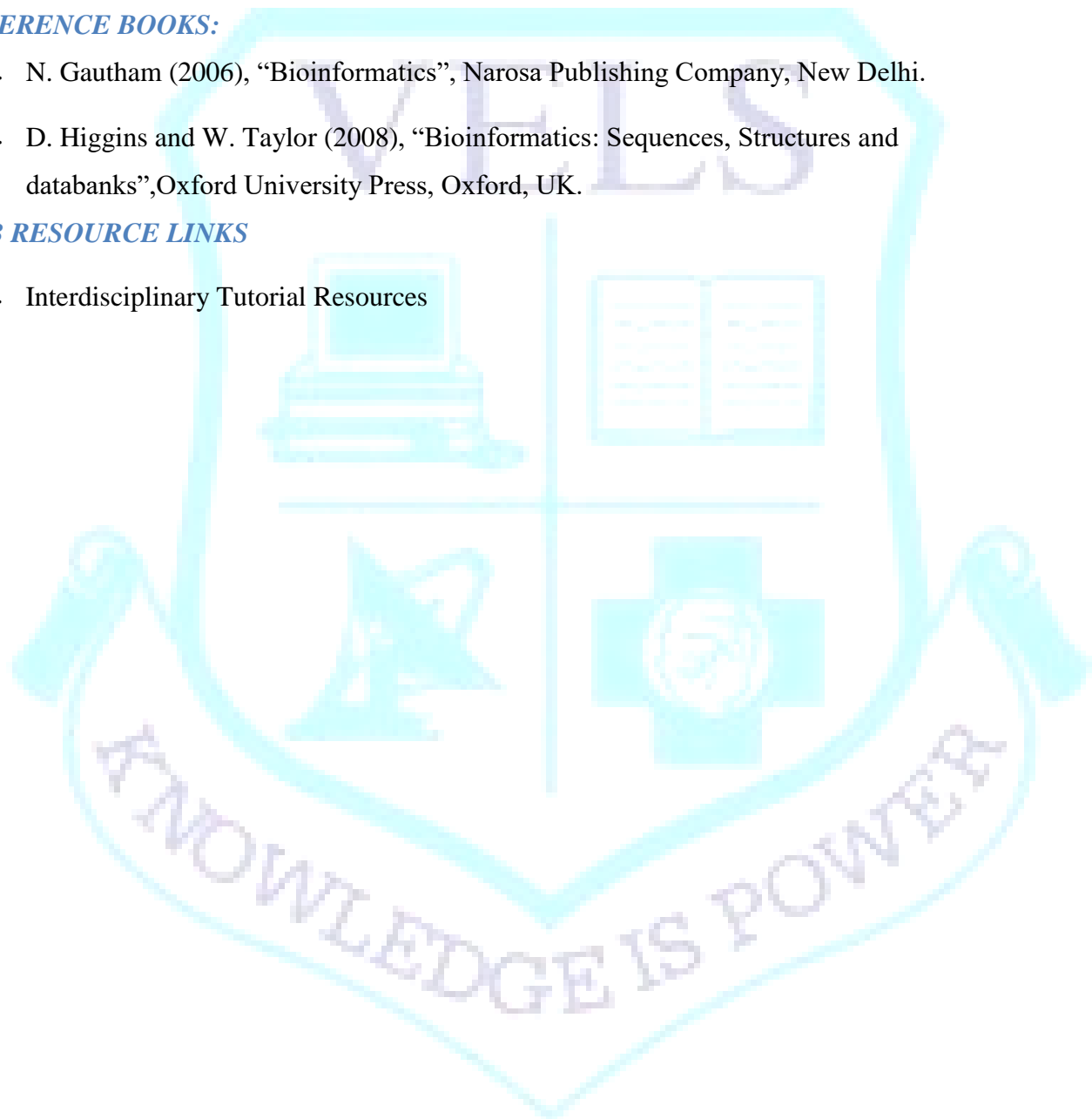
COURSE OBJECTIVE:

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.
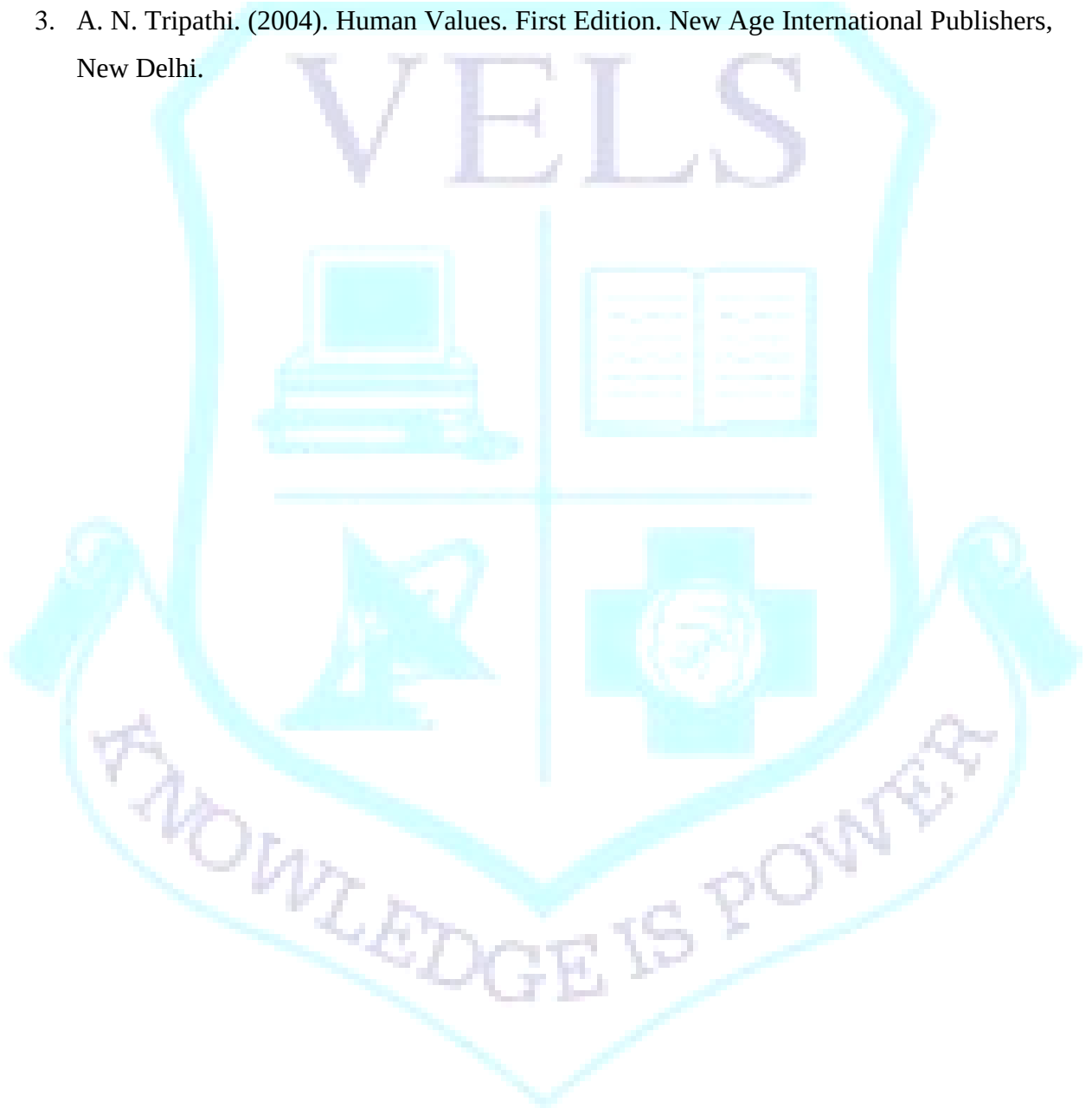
24SSKU11   **SOFT SKILLS I**

L	T	P	O	C
2	0	0	1	2

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 rapidlychanging 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

- CO1: demonstrate basic etiquette in various personal and professional settings.
- CO2: effectively manage stress using learned techniques.
- CO3: show increased self-awareness and make informed decisions.
- CO4: understand and articulate key 21st-century skills.
- CO5: apply creativity and critical thinking to solve problems innovatively.

REFERENCES:

- Alex, Dr. K. (2014), 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 Publication India.
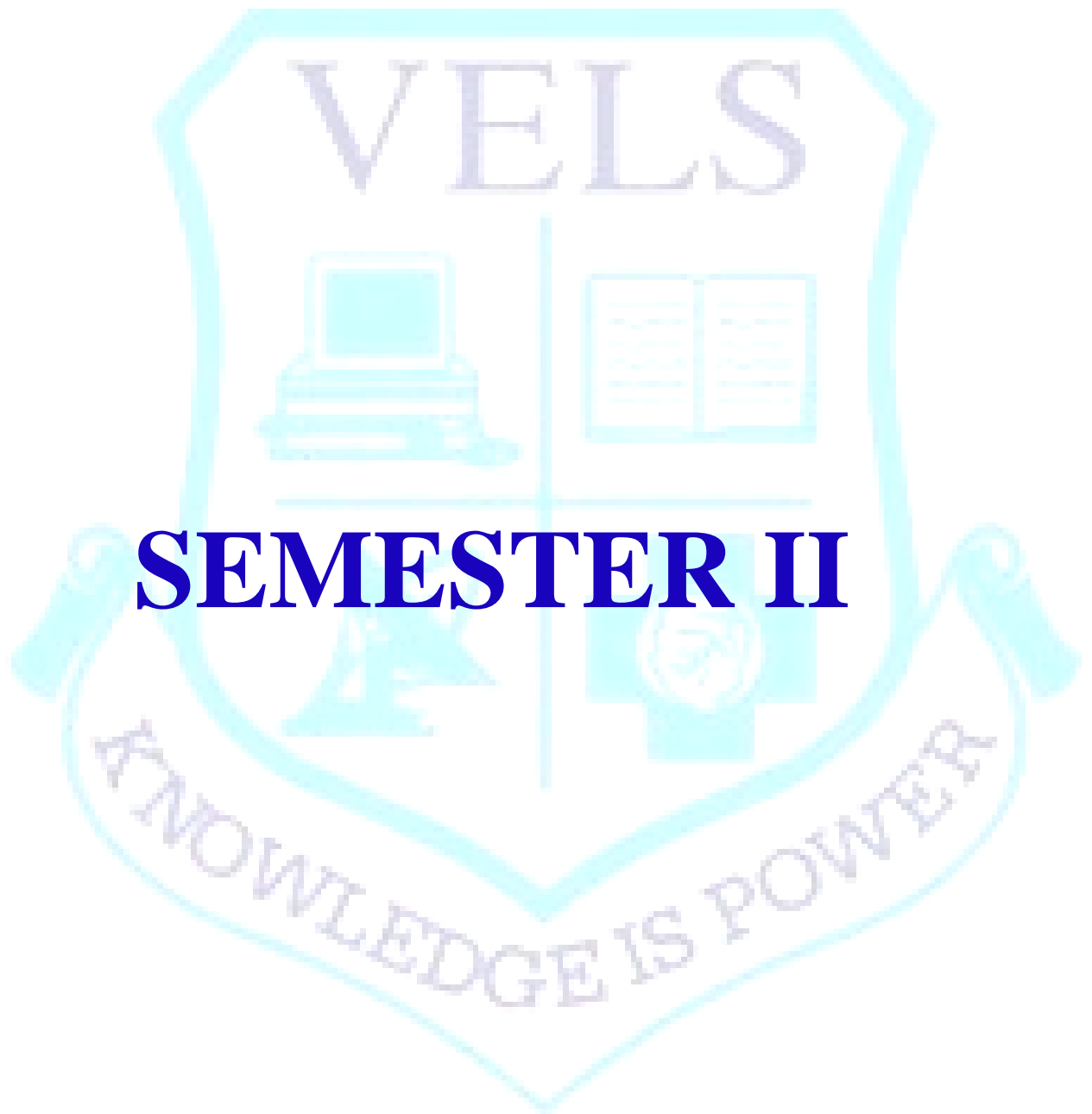
SEMESTER II

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

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 (திருப்புலம்பல்)

2.   ஆண்டாள் - திருப்பாவை – மூன்று பாடல்கள் (1, 3, 4)
- மார்கழித் திங்கள் ... (பாசுரம் 1)
- ஓங்கி உலகளந்த... (பாசுரம் 3)
- ஆழிமழைக் கண்ணா... (பாசுரம் 4)

3.   வீரமாமுனிவர் - தேம்பாவணி – வளன் சென்த்தப் படலம்

4.   சீறாப்புராணம்- 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 அக்காதெம,.
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/

24LHIN21   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 'बूढी 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   6hrs.
  Harishankar Parsayi,

UNIT IV: व्यावहारिक हिन्दी 1 – 50 – तकनीकि शब्द, 50 – पदनाम व विभागीय नाम, भाव एक भाषा अनेक
                                                                6hrs.
  Functional Hindi 1 - 50-Technical Words, 50-Designation &
  Department Names, Bhav Ek Bhasha Anek

UNIT V: व्यावहारिक हिन्दी 2 – पत्र लेखन – 3 औपचारिक पत्र, इन्स्क्रिए कीबोर्ड का परिचय
                                                                6hrs.
  Functional Hindi 2 -Letter Writing- 3 Official Letters.
  Introduction to Inscript Keyboard

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 hard work in human life

CO4 Journalise in Functional Hindi

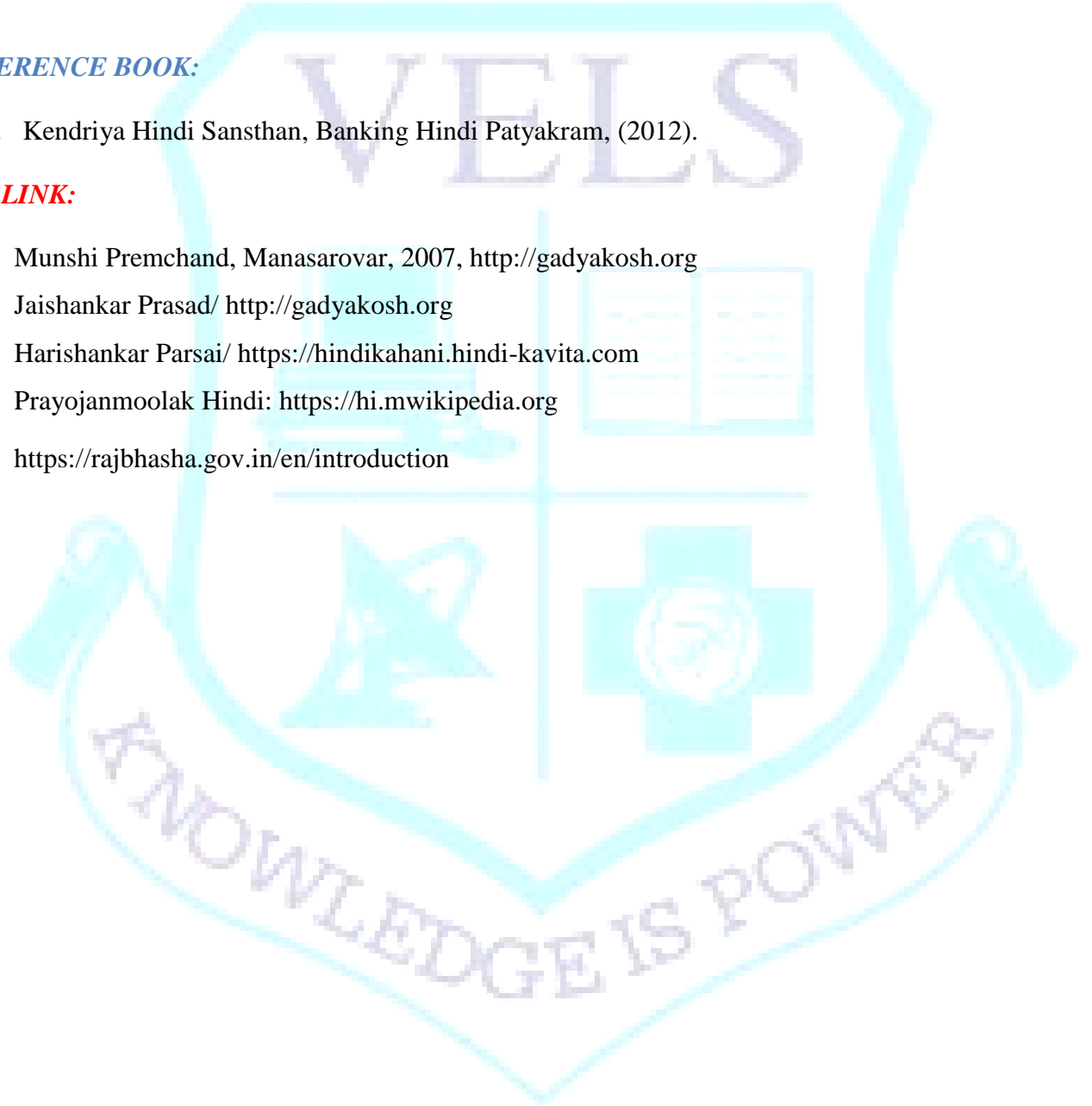CO5 Use inscript keyboard

TEXT BOOK:

1. Ed. Subhash chandar, Boodi Kaki by Premchand (2012), Natioonal Book Trust.

2. Jaishankar Prasad, Pratinidhi Kahaniyan, Raj Kamal Prakashan (2015).

3. Harishankar Parsai, Pratinidhi vyangy, Rajkamal, (2007).

4. Kendriya Hindi Prashikshan Sansthan, Parangat, Bharat Sarkar (2015).

REFERENCE BOOK:

1. Kendriya Hindi Sansthan, Banking Hindi Patyakram, (2012).

WEBLINK:

1. Munshi Premchand, Manasarovar, 2007, http://gadyakosh.org

2. Jaishankar Prasad/ http://gadyakosh.org

3. Harishankar Parsai/ https://hindikahani.hindi-kavita.com

4. Prayojanmoolak Hindi: https://hi.mwikipedia.org

5. https://rajbhasha.gov.in/en/introduction

24LFRE21   **FRENCH PAPER II**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

The lessons are being chosen:

- to express his / her where abouts and to ask seek direction

- to express obligation and restriction

- to describe a place

- to narrate and to question

- to describe someone

- to express his desire and to speak about the futur

UNITS:

UNIT 1 C'est où   5 hours

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

UNIT 2 N'oubliez pas   5 hours

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

UNIT 3Belle vue sur la mer --

Les adjectifs démonstratifs, Y- pronom complément.   4 hours

UNIT 4 Quel beau voyage!

Les verbes pronominaux, En- pronom complément.   4 hours

UNIT 5joli

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

UNIT 6 Et après?

Le futur simple, Le subjonctif présent.   7 hours

Total hours- 30 hours

COURSE OUTCOME

- The students would be able to express his/her where about and to ask direction

- The students would be able to express obligation and restriction

- The students would be able to describe a place

- The students would be able to narrate and to question

- The students would be able to describe someone

- 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

24LENG21   ENGLISH – II
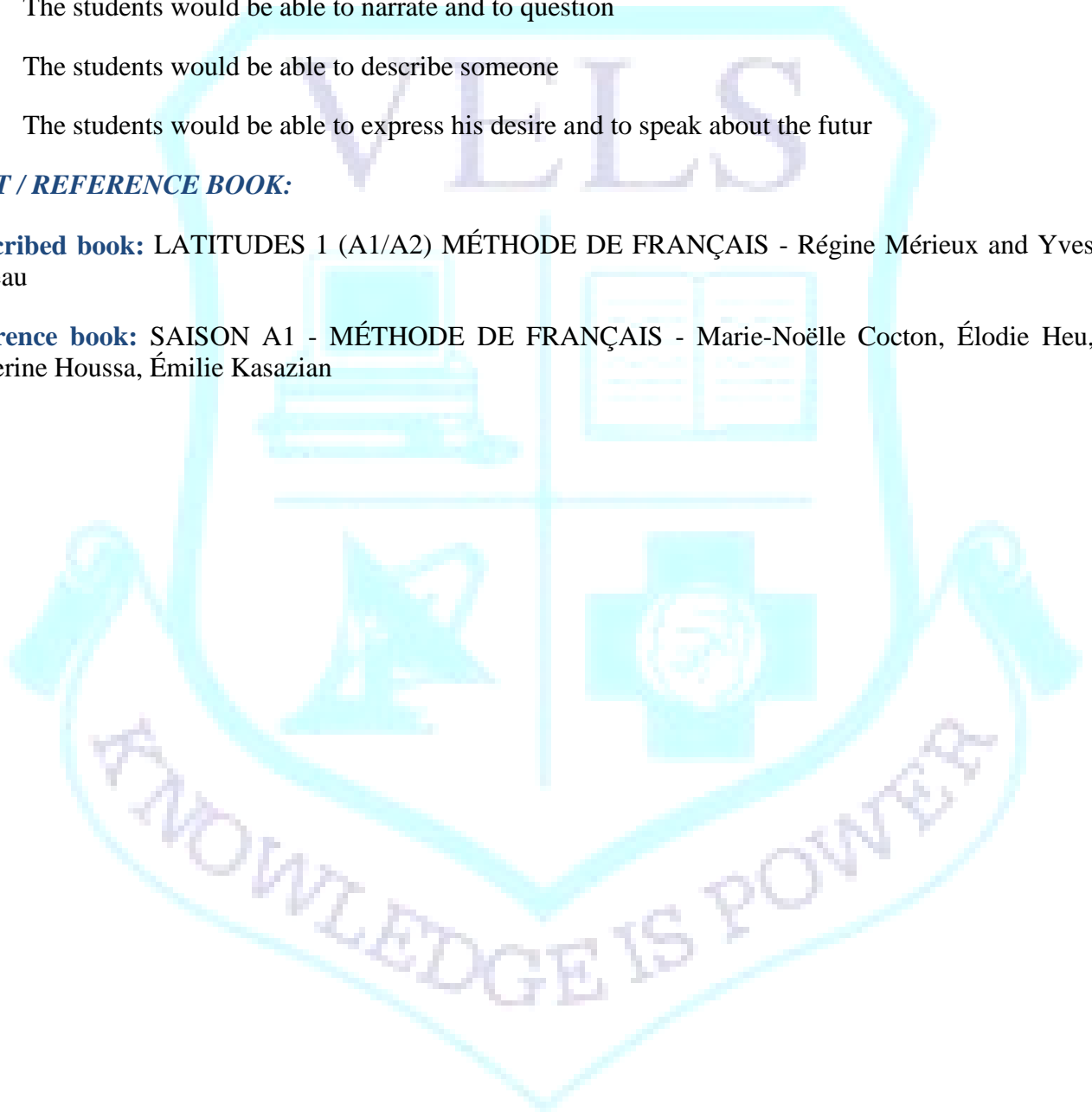
L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

CO1: To read and understand different types of prose, poetry, and fiction.

CO2: To think critically about texts and express ideas clearly.

CO3: To recognize and discuss key themes and styles in literary works.

CO4: To learn and use grammar rules correctly in writing and speaking.

CO5: To write more effectively by applying grammar and literary techniques.

Credit Hours

UNIT I -PROSE   12
- If you are wrong, admit it- Dale Garnegie
- Words of Wisdom- Chetan Bhaghat

UNIT II - POETRY   12
- La Belle Dame Sans Merci - John Keats
- Ozymandias- P.B.Shelley

UNIT III – FICTION   12
- The School for Empathy - E.V. Lucas
- The Lamb to the Slaughter-Roald Dahl

UNIT IV – GRAMMAR   12
- Types of sentences, Concord

UNIT V – GRAMMAR   12
- Tenses, Voices

Total 60 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 (June 2012) Anu's Current English for Communication (Anu Chitra)..
- V.Rajagopalan (2010), General English for competitive examinations, Mcgraw Hill Education.

\

L	T	P	O	C
3	0	0	2	3

24CBCM21   **PROGRAMMING IN C++**
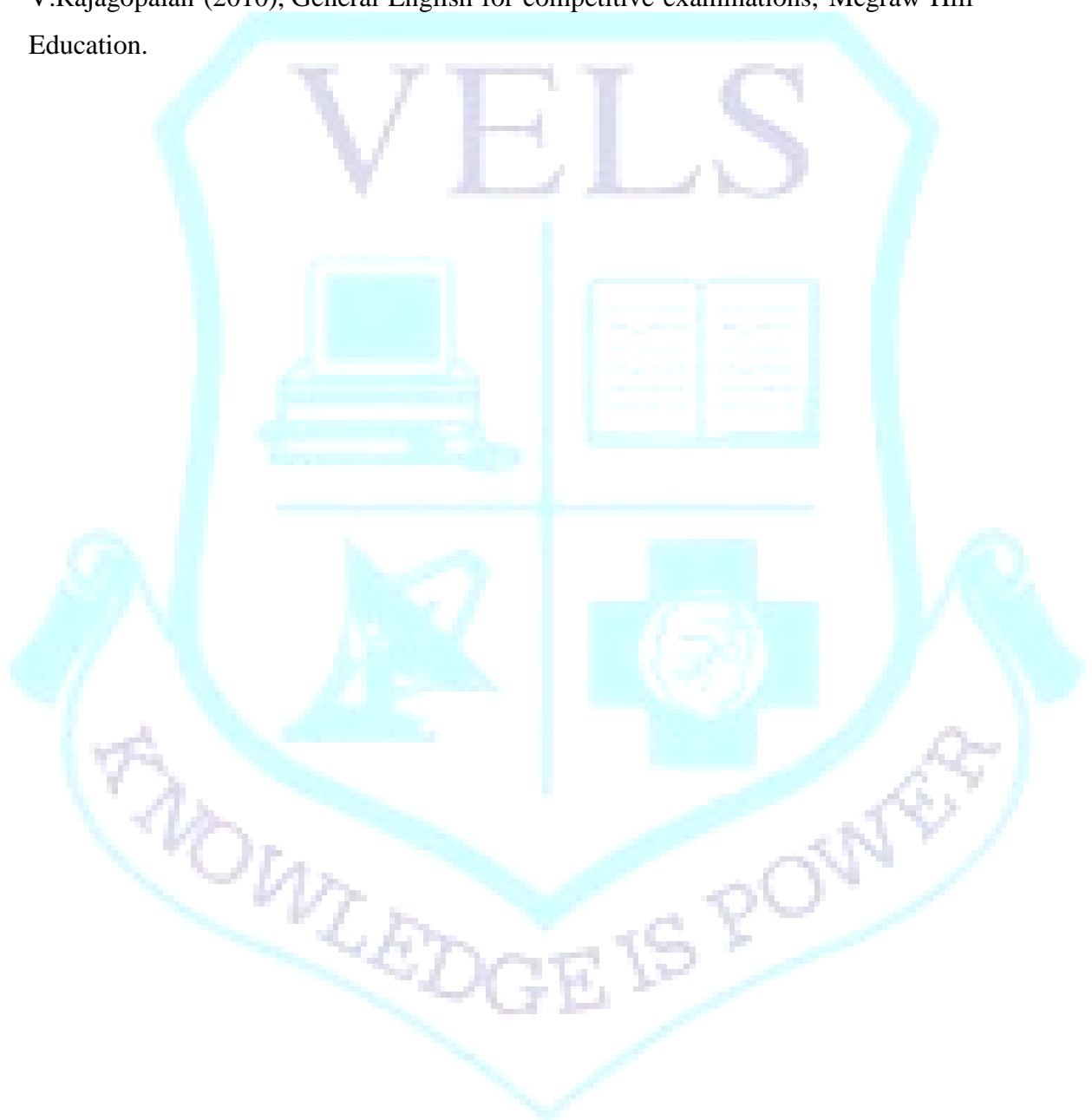
COURSE OBJECTIVES: To provide the clear concepts on programming methodology. To make the students understand the various programming concepts in C language and to make clear understanding on C applications and make use of C programming for various calculation methods.

UNIT I PRINCIPLES OF C++   09

Object Oriented Programming (OOP) – Introduction – Basic concepts – Classes, Objects, Data abstraction and encapsulation – Inheritance – Polymorphism – Dynamic Binding and Message Passing – Object oriented Languages – Applications.

UNIT II INTRODUCTION TO C++   09

Introduction to C++ – History – Applications – Procedure-Oriented Programming – Object Oriented Programming versus Procedure-Oriented Programming – Structure of C++ Program – Comparison between C and C++.

UNIT III BASICS OF C++   09

Tokens, expressions, keywords, Identifiers, constants, Operators, Data types – Standard input and output statements – Use of << and >> operators – Declaration of variables – Sample Programs – C++ programs to compute Temperature conversion, pH, BMI, RCF, rpm and Average Mol. Wt of DNA.

UNIT IV CONTROL STATEMENTS AND FUNCTIONS   09

Branching statements – if and switch statements– looping statements – while, do-while and for statements – goto statement – sample programs – Functions, Function prototype – Inline Functions – Default arguments – Function overloading – Sample Programs.

UNIT V CLASSES AND OBJECTS   09

Creating a class – Defining member functions – Creating objects – Accessing class member Arrays within a class – Arrays of objects – Friend function – Local classes – Sample Programs.

Total: 45 Hours

COURSE OUTCOMES:

CO-1: To adapt the fundamentals of C++ programming

CO-2: To utilize the concepts of operators and in build functions in C++ programming

CO-3: To utilize the C++ programming control structures and decision-making concepts

CO-4: To design the array, structure and unions in the programming

CO-5: To design the pointers and files in the programming

TEXT BOOKS:

1. E. Balagurusamy (2015), Programming in ANSI C, 6th Edition, Tata Mc-Graw Hill.

REFERENCE BOOKS:

2. Kanetkar Y (1999), Let us C, BPB Publication, New Delhi.
3. H. Schildt, C (2000), The Complete Reference, 4th Edition, TMH Edition.
4. Ashok N. Kamthane (2006), Programming with ANSI and Turbo C, Pearson Education.

WEB RESOURCE LINKS:

1. LearnCpp.com
2. freeCodeCamp.com

24CBCM22   BIOLOGICAL DATABASES AND SEQUENCE ANALYSIS

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES: To understand and appreciate the need and significance of sequence analysis and the bioinformatics approaches, algorithms for sequence analysis, the application of methods for analysis of the biomolecular sequence data.

UNIT I BIOINFORMATICS AND DATABASES   09

Introduction to data types and Source. Population and sample, Classification and Presentationof Data. Quality of data, private and public data sources. General Introduction of Biological Databases and its classification. Types of databases, Data source, Data Access, navigating databases, Information Retrieval system, storage system of Database.

UNIT II SEQUENCES DATABASES AND STRUCTURAL DATABASE   09

Sequences Databases: Nucleotide Sequence databases, Secondary Nucleotide databases, Protein databases, secondary and specialized protein sequence database, Information Retrieval System: Entrez and SRS. Structural Database: Structural File format, Protein structural database collaboration.

UNIT III DATA SUBMISSION TOOL AND ANALYSIS TOOLS   09

Data Submission Tool: Nucleotide sequence submission tools, Protein submission tools, command line tools for Genbank. Sequence Analysis Tools: Tools for Nucleotide sequence analysis, Tools for Protein sequence analysis.

UNIT IV PREDICTION TOOLS AND MODELLING TOOLS   09

Prediction Tools: Phylogenetic Trees and phylogenetic analysis - Phylip, Phyml. Gene Prediction – Genscan, GrailEXP. Protein structure and Function Prediction – Prosite, 3DPSSM. Modelling Tools: Tools for 2D protein modelling –Tools for 3D protein modelling Deep Viewer.

UNIT V MOTIF AND DOMAIN: 09

Motif and Domain: Motif databases and analysis tools. Domain databases (CDD, SMART, ProDom) and Analysis tools, Multiple alignment (Clustal W, Clustal Omega, T-Coffee,Muscle)

Total: 45 Hours

COURSE OUTCOMES:

CO-1: To adapt the fundamentals of Bioinformatics databases and information retrieval systems.

CO-2: To acquire the concepts of sequence databases and structure databases.

CO-3: To learn how to submit the biological data to the sequence databases.

CO-4: To design the evolutionary relationship using trees and Functional prediction of protein structures

CO-5: To Examine the motif and domain regions in the protein sequence using databases.

TEXT BOOKS:

1. Orpita Bosu, Simminder kaur Thukral (2007), "Bioinformatics-Databases Tools and Algorithms", Oxford University Press.

REFERENCE BOOKS:

1. D. Higgins and W. Taylor. (Eds) (2008), "Bioinformatics: Sequences, Structures and databanks", Oxford University Press, Oxford, UK.
2. N. Gautham (2006), "Bioinformatics", Narosa Publishing Company, New Delhi.
3. V.R. Srinivas (2005), "Bioinformatics: Sequences and genomics analysis", Cold SpringHarbor Laboratory press, Cold Spring harbor, USA.

WEB RESOURCE LINKS:

1. https://www.ncbi.nlm.nih.gov/guide/all/

24MBCM21   **IMMUNOLOGY AND MICROBIOLOGY**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES: To find the mechanisms of immune response, pathogen-host interactions, and the role of microbes in health and disease. The course will emphasize both theoretical knowledge and practical skills, enabling students to perform essential laboratory techniques and critically analyze scientific literature.

UNIT I INTRODUCTION TO MICROBIOLOGY AND MICROSCOPY   09

Definition-History and scope of microbiology. Study of Microbial structure-Cell cycle and reproduction of bacteria. Microscopy–principles of microscopy-bright-field microscopy–Simple microscope, Compound microscope, Microscopy–principles of microscopy-bright-field microscopy–Simple microscope, Compound microscope.

UNIT II STERILIZATION AND STAINING TECHNIQUES   09

sterilization – dry and moist heat - pasteurization – tyndallization – radiation – ultrasonication, filtration-membrane filters, depth filters; centrifugation; radiation. Physical and Chemical method of Sterilization. Definition-Staining-– Classification of stains-Types of Staining-simple staining- Differential Staining-Mechanism of gram staining – acid fast staining, negative staining, capsule staining, flagella staining, endospore staining

UNIT III ORGANS AND CELLS OF IMMUNE SYSTEM   09

Immune Cells – Stem cell, T cell, B cell, NK cell, Macrophage, Neutrophil, Eosinophil, Basophil, Mast cell, Dendritic Cell-Primary lymphoid organs-Secondary lymphoid organs and Immune Organs – Bone Marrow, Thymus, Lymph Node, Spleen, GALT, MALT, CALT. Differentiation and maturation of T cell and B cell, Immune Responses-Innate and Acquired immunity- Humoral and Cell mediated Immunities- Primary and Secondary Immune responses.

UNIT IV ANTIGEN, ANTIBODIES AND MHC MOLECULES   09

Characteristics of an antigen (Foreignness, Molecular size and Heterogeneity); Haptens; Epitopes (T & B cell epitopes); T-dependent and T-independent antigens; Adjuvants, TCR and BCR, Structure, Types, Functions and Properties of Immunoglobulins; Antigenic determinants on antibodies (Isotypic, allotypic, idiotypic); VDJ rearrangements; Monoclonal and Chimeric antibodies. MHC- Class I and Class II MHC molecule- Antigen processing and presentation.

Production of Monoclonal and Polyclonal Antibodies-Active and Passive Immunization, Vaccines-Killed-Attenuated and Recombinant Vaccine, Immunotechniques- Antigen-Antibody Reaction, Precipitation Reaction-Immunodiffusion, Immunoelectrophoresis, Agglutination Reaction- Blood grouping, Haemagglutination, Assay- ELISA, Radioimmunoassay, Immunoblotting.

Total: 45 Hours

COURSE OUTCOMES:

CO-1: To Understand fundamental principles of immunology, including the structure and functions

CO-2: To Identify and classify various microorganisms, understanding their physiology, genetics.

CO-3: To Develop proficiency in laboratory techniques used in immunology and microbiology.

CO-4: To Research studies in immunology and microbiology, synthesizing information to understand and discover current trends and advancements in the field.

CO-5: To Apply knowledge of immunology and microbiology in clinical, research, and public health contexts.

TEXT BOOKS:

1. Jenni Punt, Sharon Stranford, Patricia Jones, Judith A. Owen, Kuby (1998), Immunology, 8th Edition.

REFERENCE BOOKS:

2. Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M. Roitt. Roitt's (2017) Essential Immunology, 13th Edition.

24DBCM21   **MOLECULAR BIOLOGY**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

The course on Molecular Biology aims to provide a comprehensive understanding of the molecular mechanisms that govern cellular processes and genetic information flow. Students will explore the structure and function of nucleic acids and proteins, delving into the principles of DNA replication, transcription, and translation.

UNIT I NUCLEIC ACIDS – AN INTRODUCTION   12

Evolution of genetic material – Identification of genetic material – Chemistry of nucleic acids – Structure – types of DNA and RNA, Organization –prokaryotic and eukaryotic DNA, Mitochondrial and Chloroplast DNA Griffith, Avery and Hershey and Chase experiments.

UNIT II DNA REPLICATION AND REPAIR   12

DNA replication: Meselson –Stahl experiment, Molecular mechanisms of DNA Replication – bidirectional and rolling circle replication – Differences in prokaryotic and eukaryotic replication, Enzymes of DNA replication, DNA repair – mechanism of excision repair, SOS repair and mismatch repair.

UNIT III TRANSCRIPTION   12

Transcription process – Prokaryotic and Eukaryotic, Regulatory signal elements – features of promoters and enhancers, transcription factors, ribozymes – Post transcriptional modification of RNAs

UNIT IV TRANSLATION   12

Genetic Code – Wobble hypothesis – Translation – ribosomes and tRNAs, Mechanism and regulation of protein synthesis – Post Translational modification of proteins.

UNIT V GENE REGULATION   12

Concept of gene: Genetic fine structure – cistron, muton and recon – exons and introns, Gene Regulation in Prokaryotes: Types of gene regulation, Operon concept – Lac and Trp operons – Gene regulation in eukaryotes – Downstream regulation.

                                        Total: 60 Hours

COURSE OUTCOMES:

CO-1: Identification of DNA as the genetic material, including the contributions of scientists such as Griffith, Avery, Hershey, and Chase.

CO-2: Explain the various DNA repair mechanisms such as mismatch repair, nucleotide excision repair, and base excision repair.

CO-3: Understand the details of the prokaryotic transcription process

CO-4: Comprehend the mechanism of the translational process.

CO-5: Explain in detail the trp operon and its regulation by attenuation.

TEXT BOOKS:

1. Freifelder. D (1998), Essentials of Molecular Biology, 3rd Edition, Jones and Bartlett Publications Inc., London.
2. Lewin Benjamin (2004), Gene VIII, Pearson Education, New Jersey.

REFERENCE BOOKS:

1. Watson. J.D (2004), Molecular Biology of the Gene, 5th Edition, Pearson Education, New Jersey.

WEB RESOURCE LINKS

1. http://www.cellbiol.com/education.php

2. http://www.cellbiol.com/sequence_tools.php/#basic-tools

3. http://www.cellbiol.com/sequence_tools.php/#basic-tools

L	T	P	O	C
4	0	0	2	4

24DBCM22   **WEB PROGRAMMING**

COURSE OBJECTIVES: The World Wide Web continues to provide a foundation for the development of a broad range of increasingly influential and strategic technologies, supporting a large variety of applications and services, both in the private and public sectors. There is a growing need for management and decision makers to gain a clearer understanding of the application development process, from planning through to deployment and maintenance.

UNIT I   INTRODUCTION TO PHP AND BASIC CONCEPTS   12

Introduction to PHP, variables, data types, arrays, strings, operations, expressions, control structures, functions, reading data from web form controls like Text Boxes, radio buttons, lists etc., File Uploads, connecting to database, executing queries, handling results, Handling sessions and cookies. File Handling in PHP, listing directories.

UNIT II JAVASCRIPT BASICS AND INTRODUCTION TO AJAX   12

Introduction to JavaScript, JavaScript language –syntax, declaring variables, scope of variables functions, event handlers, Document Object Model, Form validations. Simple AJAX applications.

UNIT III XML AND DATA PARSING IN JAVA   12

Introduction to XML, Defining XML tags, tree, attributes and values, Document type definition, XML Schemas, Document Object model, XHTML Parsing XML Data - DOM and SAX parsers in java

UNIT IV SERVLETS AND WEB PROGRAMMING   12

Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, reading initialization parameters, Handling Http Request & Responses, Using Cookies and sessions, connecting to a database using JDBC.

UNIT V JSP ESSENTIALS: BASICS TO DATABASE CONNECTIVITY   12

Introduction to JSP, The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and
 session tracking, connecting to database in JSP.

Total: 60 Hours

COURSE OUTCOMES:

CO-1: Create web pages using PHP

CO-2: Identify the difference between the HTML PHP and XML documents. CO-3: Identify the engineering structural design of XML and parse tree

CO-4: Analyse the difference between and PHP and XML. CO-5: Understand the concept of JAVA SCRIPTS.

TEXT BOOKS:

1. Web, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill

REFERENCE BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech
2. Java Server Pages – Hans Bergsten, SPD O'Reilly
3. Java Script, D. Flanagan, O'Reilly, SPD.
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming world wide web, R.W. Sebesta. Fourth Edition, Pearson.
6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

WEB RESOURCE LINK:

1. https://developer.mozilla.org/en-US/docs/Web
2. https://www.gutenberg.org/

L	T	P	O	C
0	0	2	1	1

24PBCM21   **PROGRAMMING IN C++ PRACTICAL II**

COURSE OBJECTIVES: To provide the clear concepts on programming methodology. To make the students to understand the various programming concepts in C language and to make clearly understand on C applications and make use of c programming for various calculation methods.

1. a) Covert Centigrade scale to Fahrenheit scale.   03

    b) Convert Fahrenheit Scale to Centigrade scale.

2. Calculate Body Mass Index (BMI) value.   03

3. Calculate Average Molecular Weight of DNA.   03

4. Calculate Average of Two Numbers.   03

 a) Find the biggest of three given numbers using if-else statement.
 b) Compute the nature of the solution based on the pH value using switch–case statement

5. a) Find the sum of n natural numbers using while.   03

    b) Find the sum of n natural numbers using for statement.

6. Compute multiplication & Division of two numbers using inline functions.   03

7. Compute Simple Interest using Default Arguments.   03

8. Compute Volume of Cube, Cylinder & Rectangular Box using function overloading.   03

9. Display the Item Number and Cost using Classes & Objects.   03

10. Compute the Mean Value using friend function.   03

Total: 30 Hours

COURSE OUTCOMES:

CO-1: To adapt the fundamentals of C programming using simple programs.

CO-2: To acquire the knowledge of if and nested if control loops.

CO-3: To utilize the control structures and decision-making concepts

CO-4: To design the array, structure and unions in the programming

CO-5: To study the arithmetic operations using pointers and file handling.

TEXT BOOKS:

1. E. Balagurusamy (2015), Programming in ANSI C, 6th Edition, Tata Mc-Graw Hill.

REFERENCE BOOKS:

1. Kanetkar (1999), Let us C, BPB Publication, New Delhi.

2. H. Schildt, C (2000), The Complete Reference, 4th Edition, TMH Edition

3. Ashok N. Kamthane (2006), Programming with ANSI and Turbo C, Pearson Education.

WEB RESOURCE LINKS:

1. https://www.tutorialspoint.com/cplusplus/index.html.

L	T	P	O	C
0	0	2	1	1

24PBCM22   BIOLOGICAL DATABASES AND SEQUENCE ANALYSIS-PRACTICAL III

COURSE OBJECTIVES: To understand various computational techniques employed to analyze biological data with the use of sequence information. Finally acquire skills to use different approachesfor prediction of protein structure. This course also aims to provide students with a practical and hands-on experience with common bioinformatics tools and databases.

1.	Retrieval of Protein Structural information using SCOP & CATH.	03
2.	Protein sequence analysis - Prosite	03
3.	Protein sequence analysis - Pfam	03
4.	Protein sequence analysis - SOPMA	03
5.	Protein sequence analysis - PROTPARAM	03
6.	Multiple sequence alignment (Clustal W, Clustal Omega).	03
7.	Multiple sequence alignment (T-Coffee, Muscles).	03
8.	Phylogenetic analysis (Rooted tree and Unrooted Tree)	03
9.	Predicting Active site in 3D structure (CASTP)	03
10.	Tool for 3D protein modelling - DeepViewer.	03

Total: 30 Hours

COURSE OUTCOMES:

CO-1: To learn how to retrieve the protein structure information from the biological databases.

CO-2: To analyze the protein sequence parameters and functions using protein sequence databases.

CO-3: To learn the sequence similarity with different sequences and their alignment.

CO-4: To discuss the active site and catalytic activity of the protein using software.

CO-5: To analyse 3D structure and their amino acids sequence using protein modelling tool.

TEXT BOOKS:

1. D. Higgins and W. Taylor, (Eds) (. 2008), 'Bioinformatics: Sequences, Structures and databanks 'oxford University Press, Oxford, UK.

2. V. R. Srinivas, (2005) "Bioinformatics: Sequences and genomics analysis" cold Spring Harbor Laboratory press, Cold Spring harbor, USA.

REFERENCE BOOKS:

1. N. Gautham (2006), "Bioinformatics", Narosa Publishing Company, New Delhi.

2. D.Higgins and W. Taylor (2008), "Bioinformatics: Sequences, Structures and data banks",Oxford University Press, Oxford, UK.

WEB RESOURCE LINKS:

1. https://www.wbnsou.ac.in/library_services/ebooks.shtml#:~:text=

2. https://www.springer.com/series/7899
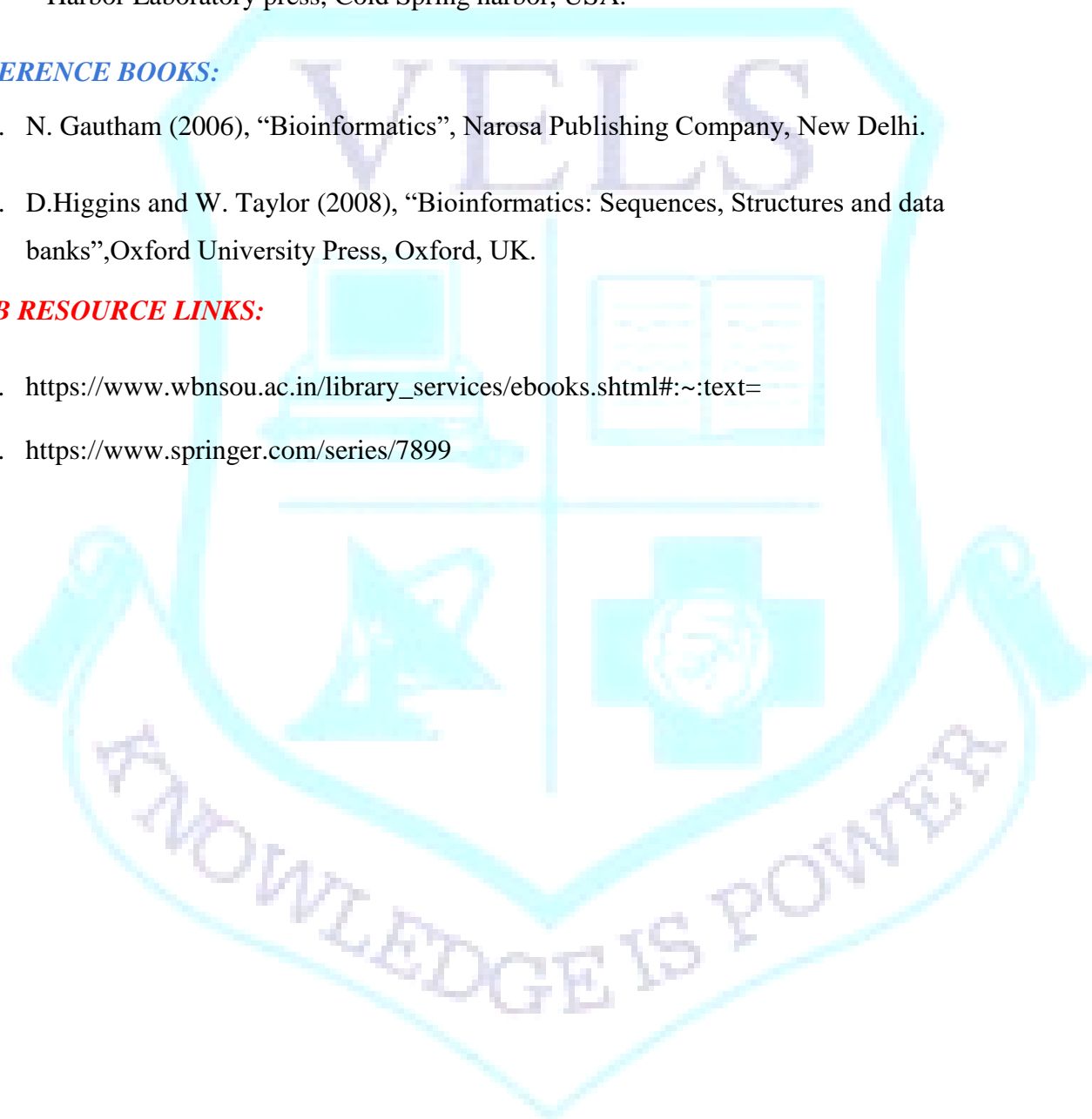
24DVAC21   COMMUNICATION SKILLS

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

CO1	enhance participants' business communication skills
CO2	enhance LSRW Skills (LSRW – Listening, Speaking, Reading & Writing)
CO3	express opinions at free will in social/ personal gathering
CO4	impact leadership qualities among participants
CO5	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

L	T	P	O	C
2	0	0	1	2

24SSKU21   **SOFT SKILLS II**

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

- CO1: understand the principles of effective team building and apply strategies to foster team bonding and cohesion in professional settings.
- CO2: become self-confident individuals by mastering interpersonal skills, team management skills and leadership skills.
- CO3: practice techniques for effective communication in telephone conversations.
- CO4: evaluate decision-making processes and their implications in professional settings.
- CO5: 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.