B Sc STATISTICS

LOCF SYLLABUS 2023

Department of Statistics
School of Computing Sciences
St. Joseph's College (Autonomous)
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SCHOOLS OF EXCELLENCE WITH CHOICE BASED CREDIT SYSTEM (CBCS) POSTGRADUATE COURSES

St. Joseph's College (Autonomous), an esteemed institution in the realm of higher education in India, has embarked on a journey to uphold and perpetuate academic excellence. One of the pivotal initiatives in this pursuit is the establishment of five Schools of Excellence commencing from the academic year 2014-15. These schools are strategically designed to confront and surpass the challenges posed by the 21st century.

Each School amalgamates correlated disciplines under a unified umbrella, fostering synergy and coherence. This integrated approach fosters the optimal utilization of both human expertise and infrastructural assets. Moreover, it facilitates academic fluidity and augments employability by nurturing a dynamic environment conducive to learning and innovation. Importantly, while promoting collaboration and interdisciplinary study, the Schools of Excellence also uphold the individual identity, autonomy, and distinctiveness of every department within.

The overarching objectives of these five schools are as follows:

1. Optimal Resource Utilization: Ensuring the efficient use of both human and material resources to foster academic flexibility and attain excellence across disciplines.

2. Horizontal Mobility for Students: Providing students with the freedom to choose courses aligning with their interests and facilitating credit transfers, thereby enhancing their academic mobility and enriching their learning experience.

3. Credit-Transfer Across Disciplines (CTAD): The existing curricular structure, in accordance with regulations from entities such as TANSCHE and other higher educational institutions, facilitates seamless credit transfers across diverse disciplines. This underscores the adaptability and uniqueness of the choice-based credit system.

4. Promotion of Human Excellence: Nurturing excellence in specialized areas through focused attention and resources, thus empowering individuals to excel in their respective fields.

5. Emphasis on Internships and Projects: Encouraging students to engage in internships and projects, serving as stepping stones toward research endeavors, thereby fostering a culture of inquiry and innovation.

6. Addressing Stakeholder Needs: The multi-disciplinary nature of the School System is tailored to meet the requirements of various stakeholders, particularly employers, by equipping students with versatile skills and competencies essential for success in the contemporary professional landscape.

In essence, the Schools of Excellence at St. Joseph's College (Autonomous) epitomize a holistic approach towards education, aiming not only to impart knowledge but also to cultivate critical thinking, creativity, and adaptability – qualities indispensable for thriving in the dynamic global arena of the 21st century.

Credit system

The credit system at St. Joseph's College (Autonomous) assigns weightage to courses based on the hours allocated to each course. Typically, one credit is equivalent to one hour of instruction per week. However, credits are awarded regardless of actual teaching hours to ensure consistency and adherence to guidelines.

The credits and hours allotted to each course within a programme are detailed in the Programme Pattern table. While the table provides a framework, there may be some flexibility due to practical sessions, field visits, tutorials, and the nature of project work.

For undergraduate (UG) courses, students are required to accumulate a minimum of 133 credits, as stipulated in the programme pattern table. The total number of courses offered by the department is outlined in the Programme Structure.

OUTCOME-BASED EDUCATION (OBE)

OBE is an educational approach that revolves around clearly defined goals or outcomes for every aspect of the educational system. The primary aim is for each student to successfully achieve these predetermined outcomes by the culmination of their educational journey. Unlike traditional methods, OBE does not prescribe a singular teaching style or assessment format. Instead, classes, activities, and evaluations are structured to support students in attaining the specified outcomes effectively.

In OBE, the emphasis lies on measurable outcomes, allowing educational institutions to establish their own set of objectives tailored to their unique context and priorities. The overarching objective of OBE is to establish a direct link between education and employability, ensuring that students acquire the necessary skills and competencies sought after by employers.

OBE fosters a student-centric approach to teaching and learning, where the delivery of courses and assessments are meticulously planned to align with the predetermined objectives and outcomes. It places significant emphasis on evaluating student performance at various levels to gauge their progress and proficiency in meeting the desired outcomes.

Here are some key aspects of Outcome-Based Education:

Course: A course refers to a theory, practical, or a combination of both that is done within a semester.

Course Outcomes (COs): These are statements that delineate the significant and essential learning outcomes that learners should have achieved and can reliably demonstrate by the conclusion of a course. Typically, three or more course outcomes are specified for each course, depending on its importance.

Programme: This term pertains to the specialization or discipline of a degree programme.

Programme Outcomes (POs): POs are statements that articulate what students are expected to be capable of by the time they graduate. These outcomes are closely aligned with Graduate Attributes.

Programme Specific Outcomes (PSOs): PSOs outline the specific skills and abilities that students should possess upon graduation within a particular discipline or specialization.

Programme Educational Objectives (PEOs): PEOs encapsulate the expected accomplishments of graduates in their careers, particularly highlighting what they are expected to achieve and perform during the initial years postgraduation.

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

The Learning Outcomes-Centric Framework (LOCF) places the learning outcomes at the forefront of curriculum design and execution. It underscores the importance of ensuring that these outcomes are clear, measurable, and relevant. LOCF orchestrates teaching methodologies, evaluations, and activities in direct correlation with these outcomes. Furthermore, LOCF adopts a backward design approach, focusing on defining precise and attainable learning objectives. The goal is to create a cohesive framework where every educational element is in harmony with these outcomes.

Assessment practices within LOCF are intricately linked to the established learning objectives. Evaluations are crafted to gauge students' achievement of these outcomes accurately. Emphasis is often placed on employing authentic assessment methods, allowing students to showcase their learning in real-life scenarios. Additionally, LOCF frameworks emphasize flexibility and adaptability, enabling

educators to tailor curriculum and instructional approaches to suit the diverse needs of students while ensuring alignment with the defined learning outcomes.

Some Important Terminologies

Core Course (CC): *Core Courses represent obligatory elements within an academic programme, imparting fundamental knowledge within the primary discipline while ensuring consistency and acknowledgment.*

Allied Course (AC): *Allied Courses complement primary disciplines by furnishing supplementary knowledge, enriching students' understanding and skill repertoire within their academic pursuit.*

Foundation Course (FC): *Foundation Courses serve to bridge the gap in knowledge and skills between secondary education and college-level studies, facilitating a smoother transition for students entering higher education.*

Skill Enhancement Course (SE): *Skill Enhancement Courses aim to nurture students' abilities and competencies through practical training, open to students across disciplines but particularly advantageous for those in programme-related fields.*

Value Education (VE): *Value education encompasses the teaching of moral, ethical, and social values to students, aiming to foster their holistic development. It instills virtues such as empathy, integrity, and responsibility, guiding students towards becoming morally upright and socially responsible members of society.*

Ability Enhancement Compulsory Course (AE): *Ability Enhancement Compulsory Course is designed to enhance students' knowledge and skills; examples include Communicative English and Environmental Science. These courses are obligatory for all disciplines.*

AE-1: Communicative English: This three-credit mandatory course, offered by the Department of English during the first semester of the degree programme, is conducted outside regular class hours.

AE-2: Environmental Science: This one-credit compulsory course, offered during the second semester by the Department of Human Excellence, emphasizes environmental awareness and stewardship.

Allied Optional (AO): *Allied optional course are elective modules that complement the primary disciplines by providing additional knowledge and skills. These courses allow students to explore areas of interest outside their major field of study, broadening their understanding and enhancing their skill set.*

Discipline Specific Elective (ES): *These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature. Four courses are offered, two courses each in semester V and VI*

Note: To offer one ES, a minimum of two courses of equal importance/weightage is a must. A department with two sections must offer two courses to the students.

Generic Elective (EG): *A course chosen from a different discipline or subject area, typically to gain exposure. Students pursuing specific disciplines must select Generic Elective courses from the options available across departments as per the college's course offerings. The breadth of Generic Elective (GE) Courses is directly linked to the diversity of disciplines offered by the college. Two GE Courses are available, one in each semester V and VI, and are open to students from other departments.*

Self-paced Learning (SP): *It is a two-credit course designed to foster students' ability for independent and self-directed learning. With a syllabus structured to be completed within 45 hours, this course encourages learners to take control of their own educational journey. Notably, Self-paced Learning is conducted outside of regular class hours, emphasizing autonomy and self-motivation in students.*

Internship (IS): *Following the fourth semester, students are required to undertake an internship during the summer break. Subsequently, they must submit a comprehensive report detailing their internship experience along with requisite documentation. Additionally, students are expected to participate in a viva-voce examination during the fifth semester. Credits for the internship will be reflected in the mark statement for the fifth semester.*

Comprehensive Examination (CE): *A detailed syllabus consisting of five units to be chosen from the courses offered over the five semesters which are of immense importance and those portions which could not be accommodated in the regular syllabus.*

Extra Credit Courses: *To support students in acquiring knowledge and skills through online platforms such as Massive Open Online Courses (MOOCs), additional credits are granted upon verification of course completion. These extra credits can be availed across five semesters (2 - 6). In line with UGC guidelines, students are encouraged to enhance their learning by enrolling in MOOCs offered by portals like SWAYAM, NPTEL, and others. Additionally, certificate courses provided by the college also qualify for these extra credits.*

Outreach Programme (OR): *It is a compulsory course to create a sense of social concern among all the students and to inspire them to dedicated service to the needy.*

Course Coding

The following code system (11 alphanumeric characters) is adopted for Under Graduate courses:

23	**UXX**	**0**	**0**	**XX**	**00/X**
Year of Revision	UG Department Code	Semester Number	Part Specification	Course Specific Initials	Running Number/with Choice

Course Specific Initials

GL - Languages (Tamil / Hindi / French / Sanskrit)
GE - General English
CC - Core Theory; CP- Core Practical
AC - Allied Course
AP - Allied Practical
FC - Foundation Course
SE - Skill Enhancement Course
VE - Value Education
WS - Workshop
AE - Ability Enhancement Course
AO - Allied Optional
OP - Allied Optional Practical
ES - Discipline Specific Elective
IS - Internship
SP - Self-paced Learning
EG - Generic Elective
ES - Discipline Specific Elective
PW - Project and Viva Voce
CE - Comprehensive Examination
OR - Outreach Programme

EVALUATION PATTERN

Continuous Internal Assessment

Sl No	Component	Marks Alloted
1	Mid Semester Test	30
2	End Semester Test	30
3	*Three Components (15 + 10 + 10)	35
4	Library Referencing (30 hours)	5
	Total	**100**

Passing minimum: 40 marks

* *The first component is a compulsory online test (JosTEL platform) comprising 15 multiple choice questions (10 questions at K1 level and 5 questions at K2 level); The second and the third components are decided by the course in-charge.*

Question Paper Blueprint for Mid and End Semester Tests

Duration: 2 Hours								**Maximum Marks: 60**
Section		**K levels**						**Marks**
		K1	**K2**	**K3**	**K4**	**K5**	**K6**	
A *(compulsory)*		7						7 × 1 = 7
B *(compulsory)*			5					5 × 3 = 15
C *(either…or type)*				3				3 × 6 = 18
D *(2 out of 3)*	*For courses with K5 as the highest cognitive level, one K4 and one K5 question is compulsory. (Note: two questions on K4 and one question on K5)*				1	1*		2 × 10 = 20
	*For courses with K6 as the highest cognitive level: **Mid Sem:** two questions on K4 and one question on K5; **End Sem:** two questions on K5 and one question on K6)*				Mid Sem			
						End Sem		
					1	1	1*	
							Total	**60**

***** *Compulsory*

Question Paper Blueprint for Semester Examination

Duration: 3 Hours					**Maximum Marks: 100**
UNIT	**Section A** *(Compulsory)*	**Section B** *(Compulsory)*	**Section C** *(Either…or type)*	**Section D** *(3 out of 5)*	
	K1	**K2**	**K3**	**K4**	**K5**
UNIT I	2	2	2	3*	2*
UNIT II	2	2	2		
UNIT III	2	2	2		
UNIT IV	2	2	2		
UNIT V	2	2	2		
Marks	**10 × 1 = 10**	**10 × 3 = 30**	**5 × 6 = 30**	**3 × 10 = 30**	

* *For courses with K5 as the highest cognitive level wherein two K4 and one K5 questions are compulsory. (Note: three questions on K4 and two question on K5)*

Evaluation Pattern for Part IV and One/Two-credit Courses

Title of the Course	CIA	Semester Examination	Total Marks
• Skill Enhancement Course (Non Major Elective) • Foundation Course • Skill Enhancement Course (WS)	20 + 10 + 20 = 50	50 *(A member from the Department other than the course instructors)*	100
• Self-paced Learning • Comprehensive Examination	25 + 25 = 50	50 *(CoE)*	100
• Value Education • Environmental Studies	50	50 *(CoE)*	100
• Skill Enhancement Course: Soft Skills	100	-	100
• Generic Elective	100	100 *(CoE)*	100
• Project Work and Viva Voce	100	100	100

Grading System

The marks obtained in the CIA and semester for each course will be graded as per the scheme provided in Table - 1.

From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA), respectively. These two are calculated by the following formulae:

$$SGPA\ and\ CGPA = \frac{\sum_{i=1}^{n} C_i Gp_i}{\sum_{i=1}^{n} C_i}$$

$$WAM = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{i=1}^{n} C_i}$$

Where,

Ci - credit earned for the Course i
Gpi - Grade Point obtained for the Course i
Mi - Marks obtained for the Course i
*n - Number of Courses **passed** in that semester*
WAM - Weighted Average Marks

Classification of Final Results

- For each of the first three parts in the UG Programme, there shall be separate classification on the basis of CGPA, as indicated in Table - 2.
- For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in all the five Parts of the programme.
- Grade in Part IV and Part V shall be shown separately and it shall not be taken into account for classification.
- A pass in SHEPHERD will continue to be mandatory although the marks will not be counted for the calculation of the CGPA.
- Absence from an examination shall not be considered as an attempt.

Table - 1: Grading of the Courses

Mark Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above and below 90	9	A+
70 and above and below 80	8	A
60 and above and below 70	7	B+
50 and above and below 60	6	B
40 and above and below 50	5	C
Below 40	0	RA

Table - 2: Grading of the Final Performance

CGPA	Grade	Performance
9.00 and above	O	Outstanding*
8.00 to 8.99	A+	Excellent*
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re-appear

**The Candidates who have passed in the first appearance and within the prescribed duration of the UG programme are eligible. If the Candidates Grade is O/A+ with more than one attempt, the performance is considered "Very Good".*

Vision

Forming globally competent, committed, compassionate and holistic persons, to be men and women for others, promoting a just society.

Mission

- Fostering learning environment to students of diverse background, developing their inherent skills and competencies through reflection, creation of knowledge and service.
- Nurturing comprehensive learning and best practices through innovative and value- driven pedagogy.
- Contributing significantly to Higher Education through Teaching, Learning, Research and Extension.

Programme Educational Objectives (PEOs)

- Graduates will be able to accomplish professional standards in the global environment.
- Graduates will be able to uphold integrity and human values.
- Graduates will be able to appreciate and promote pluralism and multiculturalism in working environment.

Programme Outcomes (POs)

1. Graduates will be able to comprehend the concepts learnt and apply in real life situations with analytical skills.
2. Graduates with acquired skills and enhanced knowledge will be employable/ become entrepreneurs or will pursue higher Education.
3. Graduates with acquired knowledge of modern tools communicative skills and will be able to contribute effectively as team members.
4. Graduates are able to read the signs of the time analyze and provide practical solutions.
5. Graduates imbibed with ethical values and social concern will be able to understand and appreciate social harmony, cultural diversity ensure sustainable environment.

Programme Specific Objectives (PSOs)

1. Gain the knowledge of statistical concepts and apply them in any domain.
2. Create logical thinking and reasoning which enhance the capability of solving complex problems in Statistics to meet the opportunities of career development and higher studies
3. Recognize the importance of statistical modelling and computing, and mathematical approaches to analyze the real problems using various statistical tools.
4. Apply the knowledge of statistical software to solve real world problems.
5. Imbibe personal skills such as the ability to work both independently and in a group.

PROGRAMME STRUCTURE					
Part	**Semester**	**Specification**	**No. of Courses**	**Hours**	**Credits**
1	1- 4	Languages (Tamil / Hindi/ French/ Sanskrit)	4	17	12
2	1 - 4	General English	4	20	12
3	1 - 6	Core Course	12	67	51
	1 - 6	Core Practical	2	8	4
	1, 2	Allied Course	2	10	7
	3, 4	Allied Optional	2	12	8
	5, 6	Discipline Specific Elective	4	20	12
	5	Internship	1	-	1
	5	Self-paced Learning	1	-	2
	5	Project Work and Viva Voce	1	-	2
	5	Comprehensive Examination	1	-	2
4	1	Foundation Course	1	2	1
	1	Skill Enhancement Course (Non-Major Elective)	1	2	1
	5	Skill Enhancement Course (Soft Skills)	1	2	1
	6	Skill Enhancement Course (WS)	1	2	1
	1 - 4	Value Education	4	8	4
	1, 2	Ability Enhancement Compulsory Course	2	2(6)	4
	5, 6	Generic Elective	2	8	4
5	2 - 6	Outreach Programme (SHEPHERD)	-	-	4
	2 - 6	Extra Credit Courses (MOOC)/Certificate Courses	(5)	-	(15)
		Total	**46(5)**	**180(6)**	**133(15)**

PROGRAMME PATTERN								
Course Details						Scheme of Exams		
Sem	**Part**	**Course Code**	**Title of the Course**	**Hours**	**Credits**	**CIA**	**SE**	**Final**
1	1	23UTA11GL01A	General Tamil - 1	5	3	100	100	100
		23UFR11GL01	French - 1					
		23UHI11GL01	Hindi - 1					
		23USA11GL01	Sanskrit - 1					
	2	23UEN12GE01	General English - 1	5	3	100	100	100
	3	23UST13CC01	**Core Course - 1:** Descriptive Statistics	5	4	100	100	100
		23UST13CC02	**Core Course - 2:** Probability Theory	5	3	100	100	100
		23UST13AC01	**Allied Course - 1:** Mathematics for Statistics - 1	4	3	100	100	100
	4	23UST14FC01	**Foundation Course**: Statistics for Beginners	2	1	100	-	100
		-	**Skill Enhancement Course - 1:** **(Non Major Elective):** Refer ANNEXURE 1	2	1	100	-	100
		23UHE14VE01	**Value Education - 1**: Essentials of Humanity*	2	1	50	50	50
		23UEN14AE01	**Ability Enhancement Compulsory Course - 1:** Communicative English	(6)	3	100	-	100
			Total	**30(6)**	**22**			
2	1	23UTA21GL02	General Tamil - 2	4	3	100	100	100
		23UFR21GL02	French - 2					
		23UHI21GL02	Hindi - 2					
		23USA21GL02	Sanskrit - 2					
	2	23UEN22GE02	General English - 2	5	3	100	100	100
	3	23UST23CC03	**Core Course - 3:** Numerical Methods	5	4	100	100	100
		23UST23CC04	**Core Course - 4:** Time Series and Index Numbers	6	4	100	100	100
		23UST23AC02	**Allied Course - 2:** Mathematics for Statistics - 2	6	4	100	100	100
	4	23UHE24VE02	**Value Education - 2:** Fundamentals of Human Rights*	2	1	50	50	50
		23UHE24AE01	**Ability Enhancement Compulsory Course - 2:** Environmental Studies*	2	1	50	50	50
		-	Extra Credit Courses (MOOC/ Certificate Courses) -1	-	(3)			
			Total	**30**	**20(3)**			
3	1	23UTA31GL03	General Tamil -3	4	3	100	100	100
		23UFR31GL03	French - 3					
		23UHI31GL03	Hindi - 3					
		23USA31GL03	Sanskrit - 3					
	2	23UEN32GE03	General English - 3	5	3	100	100	100
	3	23UST33CC05	**Core Course - 5:** Discrete Probability Distributions	6	5	100	100	100
		23UST33CC06	**Core Course - 6:** Continuous Probability Distributions	7	5	100	100	100
		23UST33AO01A	**Allied Optional - 1:** Office Automation	6	4	100	100	100
		23UST33AO01B	**Allied Optional - 1:** Accounts - 1					
	4	23UHE34VE03A	**Value Education - 3:** Social Ethics - 1*	2	1	50	50	50
		23UHE34VE03B	**Value Education - 3:** Religious Doctrine - 1*					
		-	Extra Credit Courses (MOOC/ Certificate Courses) - 2	-	(3)			
			Total	**30**	**21(3)**			

	1	23UTA41GL04B	General Tamil – 4: *அறிவியல் தமிழ்* (Scientific Tamil)	4	3	100	100	100
		23UFR41GL04	French - 4					
		23UHI41GL04	Hindi - 4					
		23USA41GL04	Sanskrit - 4					
	2	23UEN42GE04	General English - 4	5	3	100	100	100
	3	23UST43CC07	**Core Course - 7:** Estimation Theory	6	5	100	100	100
		23UST43CC08	**Core Course - 8:** Testing of Hypothesis	7	5	100	100	100
		23UST43AO02A	**Allied Optional - 2:** C Programming	6	4	100	100	100
		23UST43AO02B	**Allied Optional - 2:** Accounts - 2					
	4	23UHE44VE04A	**Value Education - 4:** Social Ethics - 2*	2	1	50	50	50
		23UHE44VE04B	**Value Education - 4:** Religious Doctrine - 2*					
		-	Extra Credit Courses (MOOC/ Certificate Courses) - 3	-	(3)			
			Total	**30**	**21(3)**			
5	3	23UST53CC09	**Core Course - 9:** Sampling Theory	5	4	100	100	100
		23UST53CC10	**Core Course - 10:** Design of Experiments	5	4	100	100	100
		23UST53CP01	**Core Practical - 1**: Statistics for Data Analysis	4	2	100	100	100
		23UST53ES01A	**Discipline Specific Elective - 1:** Linear Models, Econometrics and Random Processes	5	3	100	100	100
		23UST53ES01B	**Discipline Specific Elective - 1:** Real Analysis					
		23UST53ES02A	**Discipline Specific Elective - 2:** Operations Research - 1	5	3	100	100	100
		23UST53ES02B	**Discipline Specific Elective - 2:** Stochastic Processes					
		23UST53IS01	Internship	-	1	100	-	100
		23UST53SP01	**Self-paced Learning:** Introduction to Data Mining*	-	2	50	50	50
	4	-	**Generic Elective - 1:** Refer ANNEXURE 2	4	2	100	100	100
		23USS54SE01	**Skill Enhancement Course - 2:** Soft Skills	2	1	100	-	100
		-	Extra Credit Courses (MOOC/ Certificate Courses) - 4	-	(3)			
			Total	**30**	**22(3)**			
6	3	23UST63CC11	**Core Course - 11:** Statistical Quality Control	6	5	100	100	100
		23UST63CC12	**Core Course - 12:** Statistical Analysis Based on R - Software	4	3	100	100	100
		23UST63CP02	**Core Practical - 2:** R-Software	4	2	100	100	100
		23UST63ES03A	**Discipline Specific Elective - 3:** Vital Statistics	5	3	100	100	100
		23UST63ES03B	**Discipline Specific Elective - 3:** Survival Analysis					
		23UST63ES04A	**Discipline Specific Elective - 4:** Operations Research - 2	5	3	100	100	100
		23UST63ES04B	**Discipline Specific Elective - 4:** Big-Data Analytics					
		23UST63PW01	Project Work and Viva Voce	-	2	100	100	100
		23UST63CE01	Comprehensive Examination *	-	2	50	50	50
	4	-	**Generic Elective - 2:** Refer ANNEXURE 3	4	2	100	100	100
		-	**Skill Enhancement Course - 3 (WS):** Refer ANNEXURE 4	2	1	100	-	100
		-	Extra Credit Courses (MOOC/ Certificate Courses) - 5	-	(3)			
			Total	**30**	**23(3)**			
2 - 6	5	23UCW65OR01	Outreach Programme (SHEPHERD)		4			
1 - 6			**Total (3 years)**	**180**	**133(15)**			

*- for grade calculation 50 marks are converted into 100 in the mark statements

Passed by	***Board of Studies held on 18.12.2023***
Approved by	***48th Academic Council Meeting held on 27.03.2024***

ANNEXURE 1
Skill Enhancement Course - 1: (Non-Major Elective)*

Department	Course Code	Title of the Course
Botany	23UBO14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Organic Farming
Computer Science	23UCS14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Office Automation
BCA	23UBC14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Fundamentals of Information Technology
Mathematics	23UMA14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Mathematics for Competitive Examinations
Vis Com	23UVC14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Digital Storytelling and Scriptwriting
English	23UEN14SE01	Skill Enhancement Course - 1: (Non-Major Elective): English for Communication
History	23UHS14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Introduction to Tourism
Tamil	23UTA14SE01	Skill Enhancement Course - 1: (Non-Major Elective): பேச்சுக்கலைத் திறன் (Oratory Skills)
BBA	23UBU14SE01A	Skill Enhancement Course - 1: (Non-Major Elective): Practical Advertising
	23UBU14SE01B	Skill Enhancement Course - 1: (Non-Major Elective): Digital Marketing
B. Com	23UCO14SE01A	Skill Enhancement Course - 1: (Non-Major Elective): Introduction to Accounting
	23UCO14SE01B	Skill Enhancement Course - 1: (Non-Major Elective): Consumer Protection and Rights
B. Com CA	23UCC14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Entrepreneurship Skills
Economics	23UEC14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Demography
Chemistry	23UCH14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Role of Chemistry in Daily Life
Electronics	23UEL14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Consumer Electronics
Physics	23UPH14SE01A	Skill Enhancement Course - 1: (Non-Major Elective): Physics for Everyday Life
	23UPH14SE01B	Skill Enhancement Course - 1: (Non-Major Elective): Home Electrical Installation

**Offered to students from other Departments*

ANNEXURE 2
Generic Elective - 1*

Department	Course Code	Title of the Course
Botany	23UBO54EG01	Generic Elective - 1: Landscape designing
Computer Science	23UCS54EG01	Generic Elective - 1: Ethical Hacking
BCA	23UBC54EG01	Generic Elective - 1: Fundamentals of Data Science
Mathematics	23UMA54EG01	Generic Elective - 1: Numerical Ability
Vis Com	23UVC54EG01	Generic Elective - 1: Media Education
English	23UEN54EG01	Generic Elective - 1: Film Studies
History	23UHS54EG01	Generic Elective-1: Tamil Heritage and Culture
Tamil	23UTA54EG01	Generic Elective - 1: தமிழிலக்கியத்தில் மனித உரிமைகள் (Human rights in Tamil literature)
BBA	23UBU54EG01A	Generic Elective - 1: Global Supply Chain Management
	23UBU54EG01B	Generic Elective - 1: Starts-ups and small Business Management
B.Com.	23UCO54EG01A	Generic Elective - 1: Computerised Accounting
	23UCO54EG01B	Generic Elective - 1: Basics of Excel
	23UCO54EG01C	Generic Elective - 1: Personal Investment Planning
B. Com CA	23UCC54EG01	Generic Elective - 1: E-commerce and E Business Management
Economics	23UEC54EG01	Generic Elective - 1: Principles of Economics
Chemistry	23UCH54EG01	Generic Elective - 1: Health Science
Electronics	23UEL54EG01A	Generic Elective - 1: Everyday Electronics
	23UEL54EG01B	Generic Elective - 1: Wireless Communication
Physics	23UPH54EG01A	Generic Elective-1: Everyday Physics
	23UPH54EG01B	Generic Elective-1: Renewable Energy Physics

**Offered to students from other Departments*

ANNEXURE 3
Generic Elective - 2*

Department	Course Code	Title of the Course
Botany	23UBO64EG02	Generic Elective - 2: Solid Waste Management
Computer Science	23UCS64EG02	Generic Elective - 2: 3D Printing and Design
BCA	23UBC64EG02	Generic Elective - 2: Industry 4.0
Mathematics	23UMA64EG02	Generic Elective - 2: Quantitative Techniques
Vis Com	23UVC64EG02	Generic Elective - 2: Digital Media Production
English	23UEN64EG02	Generic Elective - 2: English for the Media
History	23UHS64EG02	Generic Elective - 2: Intellectual Revivalism in Tamil Nadu
Tamil	23UTA64EG02	Generic Elective - 2: தமிழர் மருத்துவம் (Tamil Medicine)
BBA	23UBU64EG02A	Generic Elective - 2: Personality Development
	23UBU64EG02B	Generic Elective - 2: NGO Management
B. Com	23UCO64EG02A	Generic Elective - 2: Rural Marketing
	23UCO64EG02B	Generic Elective - 2: Entrepreneurship Development
	23UCO64EG02C	Generic Elective - 2: Digital Marketing
B. Com CA	23UCC64EG02	Generic Elective - 2: Total Quality Management
Economics	23UEC64EG02	Generic Elective - 2: Economics for Competitive Exams
Chemistry	23UCH64EG02	Generic Elective - 2: Solid Waste Management
Electronics	23UEL64EG02A	Generic Elective - 2: CCTV and Smart Security Systems
	23UEL64EG02B	Generic Elective - 2: Entrepreneurial Electronics
Physics	23UPH64EG02A	Generic Elective - 2: Laser Technology and its applications
	23UPH64EG02B	Generic Elective - 2: Physics of Earth

**Offered to students from other Departments*

ANNEXURE 4
Skill Enhancement Course - 3 (WS)*

School	Course Code	Title of the Course
SCS	23UCS64SE02	Skill Enhancement Course - 3 (WS): E-Services and Applications
	23UBC64SE02A	Skill Enhancement Course - 3(WS): Web Design
	23UBC64SE02B	Skill Enhancement Course - 3(WS): 3DAnimation
	23UMA64SE02	Skill Enhancement Course - 3 (WS): MATLAB
	23UST64SE02	Skill Enhancement Course - 3 (WS): Official Statistics
	23UVC64SE02	Skill Enhancement Course - 3 (WS): Event Management

**Offered to students from other Departments within School*

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UTA11GL01A	General Tamil - 1	5	3

கற்றலின் நோக்கங்கள்
தமிழ்ச் செவ்வியல் இலக்கியங்களையும் காப்பியங்களையும் மாணவர்கள் அறிந்துகொள்ளல்
தமிழர் பேணி வளர்த்த அறம்சார் விழுமியங்களை மாணவர்கள் தம் வாழ்வில் பின்பற்றுதல்
தமிழில் பக்திஇயக்கப் பங்களிப்பையும் பகுத்தறிவுச் சிந்தனை மரபையும் உணர்தல்
மாணவர்கள் தம் எழுத்தாற்றலையும் மொழிப்புலமையையும் வளர்த்தெடுத்தல்
போட்டித்தேர்வுகளை எதிர்கொள்ளும் வகையில் இலக்கணம், இலக்கியம் கற்றல்

அலகு - 1 தமிழ் இலக்கிய, இலக்கண வரலாறு அறிமுகம். **(10 மணி நேரம்)**

1. இலக்கணம் :

அ.தொல்காப்பியம், இறையனார் களவியல் உரை , நம்பியகப் பொருள், புறப்பொருள் வெண்பா மாலை, நன்னூல், தண்டியலங்காரம், யாப்பருங்கலக்காரிகை- நூல்கள்

ஆ.மொழிப் பயிற்சி- ஒற்றுப்பிழை தவிர்த்தல்

- வல்லினம் மிகும் இடங்கள்
- வல்லினம் மிகா இடங்கள்
- ஈரொற்று வரும் இடங்கள்
- ஒரு, ஓர் வரும் இடங்கள்
- அது, அஃது வரும் இடங்கள்
- தான், தாம் வரும் இடங்கள்

பயிற்சி : வல்லினம் மிகும் இடங்கள், மிகா இடங்கள் தவறாக வரும்வகையில் ஒரு பத்தி கொடுத்து ஒற்றுப் பிழை திருத்தி எழுதச் செய்தல்.

2. சங்க இலக்கியம் - எட்டுத்தொகை, பத்துப்பாட்டு
3. அற இலக்கியம்-பதினெண்கீழ்கணக்கு நூல்கள்
4. காப்பிய இலக்கியம் - ஐம்பெருங் காப்பியங்கள், ஐஞ்சிறு காப்பியங்கள், சமயக் காப்பியங்கள்
5. பக்தி இலக்கியமும் (பன்னிரு திருமுறைகள், நாலாயிர திவ்வியப் பிரபந்தம் -- பகுத்தறிவு இலக்கியமும் (சித்தர் இலக்கியங்கள், புலவர் குழந்தையின் இராவண காவியம்)

அலகு - 2 சங்க இலக்கியம் **(15 மணி நேரம்)**

எட்டுத்தொகை :

6. நற்றிணை-முதல் பாடல் -நின்ற சொல்லர்
7. குறுந்தொகை 3 ஆம் பாடல் -நிலத்தினும் பெரிதே
8. ஐங்குறுநூறு –நெல் பல பொலிக! பொன் பெரிது சிறக்க!' (முதல் பாடல்)-வேட்கைப் பத்து
9. கலித்தொகை- 51 - சுடர்த்தொடீஇக் கேளாய் -குறிஞ்சிக் கலி
10. புறநானூறு -189 தெண்கடல் வளாகம் பொதுமையின்றி, நாடா கொன்றோ -187

பத்துப்பாட்டு:

முல்லைப்பாட்டு (முழுவதும்)

அலகு - 3 அற இலக்கியம் **(10 மணி நேரம்)**

12. திருக்குறள் -அறன் வலியுறுத்தல் அதிகாரம்
13. நாலடியார்-பாடல்: 131 (குஞ்சியழகும்)
14. நான்மணிக்கடிகை-நிலத்துக்கு அணியென்ப
15. பழமொழி நானூறு- தம் நடை நோக்கார்
16. இனியவை நாற்பது- 37. இளமையை மூப்பு என்று

அலகு - 4 காப்பிய இலக்கியம் **(20 மணி நேரம்)**

17. சிலப்பதிகாரம் – வழக்குரைகாதை

18. மணிமேகலை- பாத்திரம் பெற்ற காதை
19. பெரியபுராணம் - பூசலார் நாயனார்புராணம்
20. கம்பராமாயணம்- குகப் படலம்
21. சீறாப்புராணம் – மானுக்குப் பிணை நின்ற படலம்
22. இயேசு காவியம் -ஊதாரிப்பிள்ளை

அலகு - 5 பக்தி இலக்கியமும், பகுத்தறிவு இலக்கியமும் **(15 மணி நேரம்)**

23. **பக்தி இலக்கியம்:**

- திருநாவுக்கரசர் தேவாரம் - நாமார்க்கும் குடியல்லேம் எனத் தொடங்கும் பாடல் மட்டும்
- மாணிக்கவாசகர் திருவாசகம் - நமச்சிவாய வாஅழ்க நாதன்தாள் வாழ்க முதல் சிரம்குவிவார் ஓங்குவிக்கும் சீரோன் கழல் வெல்க வரை
- பொய்கையாழ்வார்-வையந் தகளியா வார்கடலே
- பூதத்தாழ்வார்-அன்பே தகளியா
- பேயாழ்வார்-திருக்கண்டேன் பொன்மேனி கண்டேன்
- ஆண்டாள் – திருப்பாவை மார்கழித் திங்கள் (முதல் பாடல்)

24. **பகுத்தறிவு இலக்கியம் :**

- திருமூலர் – திருமந்திரம் (270,271, 274, 275 285)
- பட்டினத்தார் -திருவிடை மருதூர் (காடே திரிந்து – எனத் தொடங்கும் பாடல்
- பா.எண்.279, 280)
- கடுவெளி சித்தர் - பாபஞ்செய் யாதிரு மனமே (பாடல் முழுவதும்)
- இராவண காவியம் – **தாய்மொழிப் படலம்** - 18. (ஏடுகை யில்லா ரில்லை முதல் - 22. செந்தமிழ் வளர்த்தார் வரை)

கற்பித்தல் முறை	**விரிவுரை** *(Lecture),* **காணொளிக் காட்சி** *(Videos),* **விளக்கக் காட்சி** *(PPT presentation)*

பாடநூல்

1. **பொதுத்தமிழ்**-*1 (* **தமிழ் இலக்கிய வரலாறு**-*1),* **தமிழாய்வுத்துறை**, **தூய வளனார் தன்னாட்சிக் கல்லூரி**, **திருச்சிராப்பள்ளி** – *620 002,* **முதற்பதிப்பு** - *2023*
2. **பார்வை நூல்கள்**
3. வரதராசன்.மு., தமிழ் இலக்கிய வரலாறு, சாகித்ய அக்காதெமி, புதுடெல்லி. *2021*
4. விமலானந்தன். மது. ச., தமிழ் இலக்கிய வரலாறு, முல்லை நிலையம், சென்னை, *2019*
5. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, பாரி நிலையம், சென்னை, *2022*
6. சிற்பி பாலசுப்பிரமணியன் & சேதுபதி.சொ., தமிழ் இலக்கிய வரலாறு, கவிதா வெளியீடு, சென்னை, *2015*
7. சிற்பி பாலசுப்ரமணியம், & பத்மநாபன். நீல., புதிய தமிழ் இலக்கிய வரலாறு *(3* தொகுதிகள்), சாகித்ய அக்காதெமி, புதுடெல்லி,*2013*
8. பெருமாள். அ.கா., தமிழ் இலக்கிய வரலாறு, சுதர்சன் புக்ஸ், நாகர்கோவில், *2014*
9. ஏசுதாசன். ப.ச., தமிழ் இலக்கிய வரலாறு, நியூ செஞ்சுரி புக் ஹவுஸ்,சென்னை, *2015*
10. ஸ்ரீகுமார். எஸ்., தமிழ் இலக்கிய வரலாறு, ஸ்ரீசெண்பகா பதிப்பகம், சென்னை, *2014*
11. பாக்கியமேரி எஃப்., வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, பூவேந்தன் பதிப்பகம், சென்னை,2022
12. சுப்புரெட்டியார்.ந., தமிழ் பயிற்றும் முறை, மணிவாசகர் நூலகம், சிதம்பரம், *1980*

Websites and eLearning Sources

1. https://www.chennailibrary.com/
2. https://www.sirukathaigal.com
3. https://www.tamilvirtualuniversity.org
4. https://www.noolulagam.com
5. https://www.katuraitamilblogspot.com

Course Outcomes		
CO No.	**CO-Statements** ***இப்பாடத்தின் நிறைவில் மாணவர்கள்***	**Cognitive Levels (K - Level)**
CO1	*சங்க இலக்கியங்கள்வழி பண்டைத்தமிழரின் வாழ்வியலையும் பண்பாட்டையும் அறிந்து கொள்வர்*	**K1**
CO2	*அற இலக்கியங்கள், காப்பியங்கள் வெளிப்படுத்தும் அறம்சார் விழுமியங்களைத் தம் வாழ்வில் பின்பற்றுவர்*	**K2**
CO3	*இலக்கணக் கோட்பாடுகளை இக்கால வாழ்வியலோடு பொருத்திப் பார்ப்பர்*	**K3**
CO4	*மொழியறிவோடு பெறுவர் திறன் பகுத்தாராயும் இலக்கியங்களைப்*	**K4**
CO5	*பக்தி இயக்கங்களின் செல்வாக்கையும், தமிழரின் பகுத்தறிவு மரபையும் மதிப்பிடுவர்*	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**23UTA11GL01A**			General Tamil - 1						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO 1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	2	3	2	2	3	3	2	2	2	**2.2**
CO2	2	2	3	2	2	2	3	2	3	2	**2.3**
CO3	1	2	2	3	2	2	2	3	3	3	**2.3**
CO4	2	2	3	2	2	3	2	3	3	2	**2.4**
CO5	3	1	2	2	2	2	3	2	3	3	**2.3**
Mean Overall Score											**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UFR11GL01	French - 1	5	3

Course Objectives
Identify the basic French sentence structure
Define and describe the various grammatical tenses and use them to communicate in French
Examine the various documents presented and discuss and reply to the questions asked on it
Analyze and interpret expressions used to convey the cause, the effect, the purpose, and the opposition in French
Evaluate the grammatical nature present in passages

UNIT I **(15 Hours)**

- Salut ! Enchanté

UNIT II **(15 Hours)**

- J'adore

UNIT III **(15 Hours)**

- Tu veux bien ?

UNIT IV **(15 Hours)**

- On se voit quand ?

UNIT V **(15 Hours)**

- Bonne idée

Teaching Methodology	Videos, Audios, PPT presentation, Role-play, Quiz

Book for Study

1. Mérieux, R. & Loiseau, Y. (2017). *Latitudes* -1- (A1 /A2), méthode de français, Didier. (Units 1 - 6 only)

Books for Reference

1. P.Dauda,L.Giachino and C.Baracco, *Generation A1*, Didier, Paris 2020.
2. J.Girardet and J.Pecheur, *Echo A1*, CLE International, 2^{e}edition ,2017
3. Isabelle Fournier, *Talk French*, Goyal Publishers, 2011

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1. https://www.wikihow.com/Pronounce-the-Letters-of-the-French-Alphabet
2. https://francais.lingolia.com/en/grammar/tenses/le-present
3. https://www.lawlessfrench.com/grammar/articles/
4. https://www.frenchpod101.com/french-vocabulary-lists/10-lines-you-need-for-introducing-yourself
5. https://www.tolearnfrench.com/exercises/exercise-french-2/exercise-french-3295.php

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	recall and remember the usage of grammatical tenses in constructing sentences in a dialogue.	**K1**
CO2	apply the learnt grammar rules in practice exercises to improve their understanding	**K2**
CO3	explain the nuances in the usage of various grammatical tenses and their aspects	**K3**
CO4	demonstrate knowledge of various expressions used to express opinions, emotions, cause, effect, purpose, and hypothesis in French	**K4**
CO5	communicate in French and summarize a given text	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
1	**23UFR11GL01**		French - 1						**5**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	1	3	1	3	3	2	3	2	**2.4**
CO2	2	3	3	2	1	3	3	3	3	2	**2.5**
CO3	1	3	2	1	2	2	2	2	3	2	**2.0**
CO4	3	3	3	3	3	3	3	2	3	2	**2.8**
CO5	3	3	3	3	2	3	3	3	3	2	**2.8**
Mean Overall Score											**2.5 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UHI11GL01	Hindi - 1	5	3

Course Objectives
To understand the basics of Hindi Language
To make the students to be familiar with the Hindi words
To enable the students to develop their effective communicative skills in Hindi.
To introduce the socially relevant subjects in Modern Hindu Literature
To empower the students with globally employable soft skills

UNIT I: Buniyadi Hindi **(15 Hours)**

- Swar
- Vyanjan
- Barah Khadi
- Shabd aur
- Vakya Rachna

UNIT II: Hindi Shabdavali **(15 Hours)**

- Rishto ke Naam
- Gharelu padartho ke Naam

UNIT III: Vyakaran **(15 Hours)**

- Sadharan Vakya aur Sangya
- Sarvanam
- Visheshan
- Kriya aadi shabdo ka prayog

UNIT IV: Chote Gadyansh ka pattan **(15 Hours)**

- Bacho ki Kahaniya
- Patra-Patrikao mein prakashit Gadyansho ka Pathan

UNIT V: Nibandh **(15 Hours)**

- Sant Tiruvalluvar
- E.V.R Thandai Periyar
- Naari Sashaktikaran
- Paryavaran Sanrakshan
- Vibhinna pratiyogi parikshao ke bare mein jaankari dena
- Pratiyogi priksha par adharit nibandho dwara bhasha ki kshamta badhane vale prashikshan kary.

Teaching Methodology	Videos, PPT, Quiz, Group Discussion, Project Work.

Books for Study

1. Gupth, M.K. (2020). *Hindi Vyakaran*, Anand Prakashan, Kolkatta.
2. Tripaty, V. (2018). *Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd, New Delhi.
3. Jain, S.K. (2019). *Anuwad: Siddhant Evam Vyavhar*, Kailash Pustak Sadan, Madhya Pradesh.

Books for Reference

1. Abdul Kalam, A. P.J. (2020). *Mere sapnom ka Bharath*, Prabath Prakashan, Noida.
2. Singh, L.P. (2017). *Kavya ke sopan*, Bharathy Bhavan Prakashan.
3. Kumar, A. (2019). *Sampoorna Hindi Vyakaran our Rachana*, Lucent publisher.
4. (2018). *Adhunik Hindi Vyakaran our Rachana*, Bharati Bhavan Publishers & distributors.

5. Shukla, A.R. (2022). *Hindi Sahitya Ka Itihas*, Prabhat Prakashan.

Websites and e-Learning Sources

1. https://learningmole.com/hindi-alphabet-letters-pronunciation-guide/
2. https://www.careerpower.in/hindi-alphabet-varnamala.html
3. https://www.youtube.com/watch?v=b0UvXnIC8qc
4. https://www.importanceoflanguages.com/learn-hindi-language-guide/
5. https://parikshapoint.com/hindi-sahitya/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of the course, the student will be able to	**Cognitive Levels (K - Level)**
CO1	Introduction to Hindi sounds	**K1**
CO2	Acquisition of Hindi Vocabulary	**K2**
CO3	Sentence formation in Hindi	**K3**
CO4	Reading of stories and other passages	**K4**
CO5	Modules to increase language ability through general essays based on competitive exams	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours**		**Credits**	
1	**23UHI11GL01**			Hindi - 1				**5**		**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	1	3	3	3	1	3	2	**2.3**
CO2	2	3	2	3	1	2	3	3	3	2	**2.4**
CO3	3	2	2	2	1	3	2	3	2	3	**2.3**
CO4	3	1	2	3	2	3	2	3	3	2	**2.4**
CO5	2	3	3	2	3	2	3	3	1	3	**2.5**
									Mean Overall Score		**2.38 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23USA11GL01	Sanskrit - 1	5	3

Course Objectives
To help the students learn the alphabets of Sanskrit.
To understand the Sanskrit grammar and sabdas.
To have an idea of the epics.
To closely understand the literary works in Sanskrit with special reference toPancamahakavyas.
To understand the Raghuvasa Mahakava and Kalidasa.

UNIT I **(15 Hours)**

Introduction to Sanskrit (Alphabets, Two letter words and three letter words)

Grammar:

akārāntaḥpuṁliṅgaḥśabda-s - 1. बाल (*Bāla*) and 2. देव (*Deva*) *ākārāntaḥstrīliṅgaḥśabda-s* - 1. बाला (*Bālā*) and 2. लता (*Latā*)*akārāntaḥnapuṁsakaliṅgaḥśabda-s* -

1. फल (*Phala*) and 2. वन (*Vana*)

UNIT II **(15 Hours)**

Introduction to *Rāmāyana,Kālidāsa* and his poetic works

Text: *Raghuvaṁśa* (Canto I) Verses 1-15

UNIT III **(15 Hours)**

Introduction to the works of *Bhāravi* -

Text: *Raghuvaṁśa* (canto I) Verses 16-30

UNIT IV **(15 Hours)**

Introduction to the works of *ŚrīHarṣha* -

Text: *Raghuvaṁśa* (Canto I) Verses 31-45

UNIT V **(15 Hours)**

Grammar:

Conjugations -*Laṭlakāra-s* – (Present tense)

(i) गच्छतत (*Gacchati*) (ii) ततष्ठतत (*Tiṣṭhati*) (iii) पठतत (*Paṭhati*)

(iv) नृत्यतत (*Nṛtyati*) (v) कु प्यतत (*Kupyati*) (vi) कथयतत (*Kathayati*)

(vii) गणयतत (*Gaṇayati*) (viii) अततत (*Asti*)

(ix) करोतत (*Karoti*) (x) शृणोतत (*Śṛṇoti*)

Indeclinables (Avyayaani) - अतप (*api*), कदा (*kadā*), च (*ca*), अद्य (*adya*), तवना (*vinā*),सह (*saha*), तत्र (*tatra*), ककम् (*kim*), यकद (*yadi*) - तर्ह (*tarhi*), यथा (*yathā*) - तथा (*tathā*) Prefixes (*Upasargas*) - आङ् (*āṅ*), तव (*vi*), परर (*pari*), अनु (*anu*),

अति (*adhi*), उत् (*ut*), प्रतत (*prati*), उप (*upa*), प्र (*pra*) तनर् (*nir*)

Teaching Methodology	Videos, PPT, demonstration.

Book for Study

1. Murugan, C., et al. (eds.). (2022). *Kalasala Samskrta Sukha Bodhini I* (for under graduate foundation course) Published by University of Madras.

Book for Reference

1. Vadhyar, R.S. (2017). *Shabdha manjari*, R.S. Vadyar & Sons, Palakkad.

Websites and e-Learning Sources

1. https://www.arlingtoncenter.org/Sanskrit%20Alphabet.pdf

2. https://courses.lumenlearning.com/suny-hccc-worldcivilization/chapter/sanskrit/
3. https://www.newworldencyclopedia.org/entry/Sanskrit_literature
4. https://archive.org/details/AShortHistoryOfsanskritLiterarure
5. https://archive.org/details/raghuvamsha_with_sanjivini_edited_by_mr_kale

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	remember the usage of grammatical tenses inconstructing sentences in dialogue.	**K1**
CO2	apply the rules of usage in practice exercises and identify errors	**K2**
CO3	explain the nuances in the usage of various grammatical tenses and aspects	**K3**
CO4	demonstrate knowledge of various expressions of opinion, emotions, cause, effect, purpose, and hypothesisin French	**K4**
CO5	communicate in French and summarize the given text	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**	**Credits**	
1	**23USA11GL01**			Sanskrit - 1					**5**	**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	3	2	3	1	3	2	3	2	2	**2.1**
CO2	2	3	2	3	1	2	2	3	2	3	**2.5**
CO3	3	2	2	2	2	2	3	2	3	2	**2.1**
CO4	3	2	3	2	2	3	3	2	3	2	**2.4**
CO5	3	2	3	3	2	2	3	2	3	3	**2.3**
									Mean Overall Score		**2.34 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UEN12GE01	General English - 1	5	3

Course Objectives
To enable learners to acquire self awareness and positive thinking required in various life situations
To help them acquire the attribute of empathy
To assist them in acquiring creative and critical thinking abilities
To enable them to learn the basic grammar
To assist them in developing LSRW skills

UNIT I: Self-awareness ELF-A (WHO) & Positive Thinking (UNICEF) (15 Hours)

Life Story

1. Chapter 1 from Malala Yousafzai, I am Malala
2. An Autobiography or The Story of My Experiments with Truth (Chapters 1, 2 & 3) M.K. Gandhi

Poem

3. Where the Mind is Without Fear – Gitanjali 35 – Rabindranath Tagore
4. Love Cycle – Chinua Achebe

UNIT II: Empathy (15 Hours)

Poem

5. Nine Gold Medals – David Roth
6. Alice Fell or poverty – William Wordsworth

Short Story

7. The School for Sympathy – E.V. Lucas
8. Barn Burning – William Faulkner

UNIT III: Parts of Speech (15 Hours)

9. Articles
10. Noun
11. Pronoun
12. Verb
13. Adverb
14. Adjective
15. Preposition

UNIT IV: Critical & Creative Thinking. (15 Hours)

Poem

16. The Things That Haven't Been Done Before – Edgar Guest
17. Stopping by the Woods on a Snowy Evening – Robert Frost

Readers Theatre

18. The Magic Brocade – A Tale of China
19. Stories on Stage – Aaron Shepard (Three Sideway Stories from Wayside School" by Louis Sachar)

Unit V: Paragraph and Essay Writing (15 Hours)

20. Descriptive
21. Expository
22. Persuasive
23. Narrative
24. Reading Comprehension

Teaching Methodology	Interactive methods, and multimedia presentations

Books for Study

1. Yousafzai, M. (2013). *I am Malala, Little.* Brown and Company.
2. Gandhi, M. K. (2011). *An Autobiography or The Story of My Experiments with Truth (Chapter - I).* Rupa Publications.
3. Tagore, R. (1913). *"Gitanjali 35" from Gitanjali (Song Offerings): A Collection of Prose Translations Made by the Author from the Original Bengali.* MacMillan.
4. Shepard, A. (2017). *Stories on Stage.* Shepard Publications.

Books for Reference

1. Krishnasamy. N. (1975). *Modern English: A Book of Grammar, Usage and Composition.* Macmillan.
2. Nesfield, J. C. (2019). *English Grammar Composition and Usage.* Macmillan.

Websites and eLearning Sources

1. https://archive.org/details/i-am-malala
2. https://www.indiastudychannel.com/resources/146521- Book-Review-An- Autobiography-or-The-story-of-my-experiments-with-Truth.aspx
3. https://www.poetryfoundation.org/poems/45668/gitanjali-35
4. https://amzn.eu/d/9rVzlNv
5. https://archive.org/details/in.ernet.dli.2015.44179

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	discover self awareness and positive thinking required in various life situations	**K1**
CO2	classify the attributes of empathy	**K2**
CO3	apply creative and critical thinking skills	**K3**
CO4	focus on grammar for functional purposes	**K4**
CO5	integrate the LSRW skills for effective communication	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**							**Hours**		**Credits**
1	**23UEN12GE01**	General English - 1							**5**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	3	3	3	3	3	3	**3**
CO2	2	3	3	3	2	3	3	3	3	3	**2.5**
CO3	3	3	3	2	3	3	3	3	3	2	**2.8**
CO4	3	3	3	3	3	3	3	3	3	3	**3**
CO5	3	2	3	3	3	3	3	3	3	3	**2.8**
										Mean Overall Score	**2.82 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UST13CC01	**Core Course - 1:** Descriptive Statistics	5	4

Course Objectives
It explains the important concepts of statistics and statistical data.
It provides to formulate the visualization of frequency distribution.
Also they measure the averages, dispersions, lack of symmetry, moments, relationship among variables.
Estimate and predict the unknown and future values.
Study of non-linear and consistency of the data.

UNIT I **(15 Hours)**

Statistics: Introduction - Definition-Functions - Applications - Limitations. Organizing a Statistical Survey: Planning the survey - Executing the survey-Collection of Data: Primary and secondary data - Methods of collecting primary data - Sources of secondary data. Sampling: Census and Sample methods. Classification-Types - Formation of frequency distribution-Tabulation - parts of a Table - Types. Diagrammatic representation-Types. Graphical representation - Graphs of frequency distributions. Merits and Limitations of diagrams and graphs.

UNIT II **(15 Hours)**

Measures of Central tendency: Introduction-Definitions-Types - Mean-Median- ModeGeometric mean-Harmonic Mean-Weighted mean - Merits and Demerits-Measures of Dispersion: Introduction-Definition-Types-Range - Quartile deviation - Mean deviation - Standard deviation - Co-efficient of variation-Lorenz curve - Merits and Demerits.

UNIT III **(15 Hours)**

Skewness: Introduction-Definition-Types-Karl Pearson's-Bowley's - Kelly's methods-Their merits and demerits. Kurtosis: Introduction-Definition-Types-Its merits and demerits. Moments: Introduction - Definition-Types - Raw, Central moments and their relations.

UNIT IV **(15 Hours)**

Correlation analysis: Introduction - Definition - Types-Ungrouped and Grouped data-Probable error-properties - Rank correlation-Partial and Multiple correlations - Regression analysis: Introduction - Definition-Regression Equations -Multiple regression.

UNIT V **(15 Hours)**

Theory of Attributes: Introduction-Definition-Classes and Class frequencies-Consistency of data-Independence of attributes-Association of attributes-Yule's coefficient and -Coefficient of Colligation.

Teaching Methodology	YouTube videos, PPT, Black Board teaching and Handouts.

Books for Study

1. Gupta, S. P. (2017). *Statistical methods,* (35th Rev. Ed.). Sultan Chand & Sons Pvt Ltd.
2. Gupta, S. C & Kapoor, V. K. (2002). *Fundamentals of mathematical statistics*. Sultan Chand & Sons Pvt. Ltd.

Books for Reference

1. Goon, A. M., Gupta, A. K. & Dasgupta, B. (1987). *Fundamental of Statistics.* (vol 2). World Press Pvt. Ltd.
2. Yule, G. U. & Kendall, M. G. (1956). *An introduction to the theory of statistics*. Charles Griffin.
3. Spiegel, M. R. (1961). *Theory and problems of statistics*. Schaum's outline series.
4. Anderson, T. W. & Sclove, SL. (1978). *An introduction to statistical analysis of data*. Houghton Miffin & co.
5. Pillai, R. S. & Bagavathi. (2003). *Statistics*. S. Chand and Company Ltd.

Websites and eLearning Sources

1. e-books, tutorials on MOOC/SWAYAM courses on the subject
2. https://en.wikipedia.org/wiki/Statistics
3. https://en.wikipedia.org/wiki/Descriptive_statistics
4. https://socialresearchmethods.net/kb/statdesc.php
5. http://onlinestatbook.com/2/introduction/descriptive.html 4

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	acquire the knowledge of Statistics and its scope and importance in various areas	**K1**
CO2	draw and explain the visual representation of the given set of data	**K2**
CO3	compute the various measures of averages, dispersions, lack of symmetry, moments and relationship among variables	**K3**
CO4	distinguish between different types and classification of data	**K4**
CO5	execute and analyse a sample survey.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
1	**23UST13CC01**			**Core Course - 1:** Descriptive Statistics					**5**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	2	3	3	2	1	1	**2.1**
CO2	3	2	3	3	1	2	2	2	2	2	**2.2**
CO3	3	3	2	3	1	2	3	3	3	2	**2.5**
CO4	3	2	3	3	2	3	2	3	2	2	**2.5**
CO5	3	3	3	3	3	3	3	3	3	3	**2.46**
Mean Overall Score											**2.46 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UST13CC02	**Core Course - 2**: Probability Theory	5	3

Course Objectives
To describe the importance and scope of probability theory and to predict the chance of an experimental outcomes.
Distinguish between discrete and continuous random variables.
Understand the joint probability mass function and joint density function with two dimensional random variables.
To learn and be able to apply the properties of mathematical expectation.
Compute the probability values for sum of random variables using central limit theorem

UNIT I **(15 Hours)**

Theory of Probability: Introduction-Basic terminology- Definition - Axiomatic approach-Types of Events - Conditional Probability - Addition and Multiplication theorems of Probability for 'two' and 'n' events (Statement and Proof) - Boole's inequality (Statement and Proof)- Bayes' theorem of Probability (Statement and Proof with numerical illustration very simple problems)

UNIT II **(15 Hours)**

Random variables and Distribution functions: Introduction - Discrete random variable: Probability mass function- Discrete distribution function, Properties. Continuous random variable : Probability density function and properties, measures of central tendency, dispersion, Skewness and kurtosis for continuous Probability distribution.

UNIT III **(15 Hours)**

Two dimensional random variables: Joint probability mass function- Marginal probability function, Conditional probability function. Two dimensional distribution functions-Marginal distribution functions - Joint density function-Marginal density function - Conditional distribution function - Conditional probability density function. Transformation of One - Dimensional and Two Dimensional random variable (concept only).

UNIT IV **(15 Hours)**

Mathematical Expectations: Introduction- Expected value of a random variable (Discrete and Continuous)-Expected value of function of a random variable - Properties of Expectation-Properties of variance- Covariance. Inequalities involving expectation: Cauchy Schwartz and Markov inequalities.

UNIT V **(15 Hours)**

Generating functions: M.G.F - Properties - Uniqueness theorem - C.G.F-Properties - P.G.F -Properties. Characteristic Function: Properties–Inversion theorems (Statement only) - Uniqueness theorem (Statement only). Chebychev's Inequality (Statement and Proof). Law of Large Numbers (L.L.N): Convergence in probability - Properties: Weak L.L.N - propertiesBernoulli's L.L.N (Statement and Proof) - Khinchin's theorems (Statement only).

Teaching Methodology	YouTube videos, PPT and Handouts.

Book for Study

1. Gupta, S. C. & Kapoor, V. K. (2015). *Fundamentals of mathematical statistics*. Sultan Chand & Sons.

Books for Reference

1. Rohatgi, V. K. (1984). *An introduction to probability theory and mathematical statistics.*
2. Hogg, R. V. & Craig, A. T. (1978). *Introduction to mathematical statistics.* McGrawHill Publishing Co. Inc.
3. Mood, A. M., Graybill, F. A. & Bose, D. C. (1974). *Introduction to the theory of Statistics.* McGraw Hill Publishing Co. Inc.
4. Arora, S. & Lal, B. (1989). *New mathematical statistics*. Satya Prakashan.

Websites and eLearning Sources

1. e-books, tutorials on MOOC/SWAYAM courses on the subject
2. www.khanacademy.org/math/statistics-probability/random-variables-stats-library
3. https://ocw.mit.edu/courses/mathematics/18-440-probability-and-random-variablesspring-2014/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	match the real-life situations with probability concepts.	**K1**
CO2	understand the basic probability theorems and its properties.	**K2**
CO3	apply probability concepts into real life examples	**K3**
CO4	analyze discrete and continuous random variables	**K4**
CO5	evaluate the appropriate probability function, parameters, expectations and generating functions	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**23UST13CC02**			**Core Course - 2:** Probability Theory						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	1	1	3	2	3	2	1	**2.1**
CO2	2	3	3	2	3	3	3	2	3	2	**2.6**
CO3	2	3	3	2	3	3	3	2	3	2	**2.6**
CO4	3	1	1	3	3	1	2	1	3	3	**2.1**
CO5	3	1	1	3	3	1	2	1	3	3	**2.1**
									Mean Overall Score		**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UST13AC01	**Allied Course - 1:** Mathematics for Statistics -1	4	3

Course Objectives
The overall objective of the study is to create deep interest in learning mathematics which develop broad and balance knowledge and understanding definitions, concepts, principles and theorems
It helps the students to enhance the ability of learners to apply the knowledge and skill acquired by them to solve specific theoretical and applied problems in statistics
It also encourages the students to develop a range of generic skill helpful in employment, internships in social activities

UNIT I **(12 Hours)**

Rational fractions: Proper and improper rational fractions. Partial fractions: Forms of partial fractions.

UNIT II **(12 Hours)**

Series: Summation and approximations related to Binomial, Exponential and Logarithmic series - Taylor's series, Fourier series for even and odd functions.

UNIT III **(12 Hours)**

Theory of equations: Polynomial equations with real coefficients- imaginary and irrational roots-solving equations with related roots-equation with given numbers as roots-equation whose roots are symmetric functions of roots.

UNIT IV **(12 Hours)**

Differential calculus: Functions-Different types-simple valued and many valued-Implicit and Explicit functions, Odd and even functions, periodic functions, algebraic and transcendental functions. Inverse functions, Limit of a function-Some standard limit (without proof) Differentiation of standard functions-standard rules of differentiation Addition, subtraction, multiplication and quotient rules-function of function rule.

UNIT V **(12 Hours)**

Successive differentiation: Leibnitz's theorem, nth derivatives of standard functions-simple problems. Partial differentiation: Successive partial differentiation. Maxima and Minima for two variable functions. Homogenous function-Euler's theorem on homogenous function.

Teaching Methodology	Chalk and Talk, YouTube videos, PPT and Handouts.

Books for Study

1. Duraipandian, P. & Udayabaskaran, S. (2014). *Allied mathematics* (Vols.: 1-2). S. Chand & Company Pvt. Ltd.
2. Vittal, P. R. (2012). *Allied mathematics*. Margham Publications.
3. Narayanan, S. & Manickavachagam Pillai. (1993). *Ancillary mathematics* (Book II): (Containing Differential Calculus). S. Viswanathan Pvt, Ltd.

Books for Reference

1. Narayanan, S. & Manickavachagam Pillai. (1993). *Ancillary mathematics* (Vol.:2, Part I): (Containing Trignometry). S. Viswanathan Pvt. Ltd.
2. Narayanan, S. & Manickavachagam Pillai. (1993). *Ancillary mathematics* (Book I): (Containing Algebra). S. Viswanathan Pvt. Ltd.
3. Venkatesan, S. J. (2019). *Algebra.* Sri Krishna Publications.

Website and eLearning Source

1. e-books, tutorials on MOOC/SWAYAM courses on the subject

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	identify the types of fractions, series and roots.	**K1**
CO2	understand the basic concepts of functions, series, theory of equations, differential calculus and successive differentiation.	**K2**
CO3	apply the mathematical concepts in real life problems.	**K3**
CO4	analyze the importance of functions, series, equations and differential calculus.	**K4**
CO5	critical thinking of mathematical problems.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
1	**23UST13AC01**			**Allied Course - 1:** Mathematics for Statistics -1					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	2	3	3	1	2	**2.3**
CO2	2	3	3	2	2	1	2	3	3	2	**2.3**
CO3	2	3	2	2	3	2	1	3	2	3	**2.3**
CO4	3	1	2	2	3	3	1	1	2	3	**2.1**
CO5	3	2	3	2	3	3	2	2	1	3	**2.4**
										Mean Overall Score	**2.28 (High)**

Semester	Course Code	Title of the Course	Hours / Week	Credits
1	23UST14FC01	**Foundation Course:** Statistics for Beginners	2	1

Course Objectives
To understand the concept of set theory
To know the basics of functions and relations
Acquire the knowledge of sequence and series of Arithmetic and Geometric progression
Understand the basics of differentiation and integration
To know the difference between Permutation and Combination

UNIT I **(6 Hours)**

Set Theory-Subset, Types of sets, Relations, Functions-(Simple problems).

UNIT II **(6 Hours)**

Sequence and Series-Introduction of sequence and series-Arithmetic and Geometric progression (Simple problems)

UNIT III **(6 Hours)**

Basic principles of counting, Factorial, Permutations and Combinations - (Simple problems)

UNIT IV **(6 Hours)**

Differentiation and Integration - Introduction to differentiation-introduction to integration (Simple problems)

UNIT V **(6 Hours)**

Statistics-Importance of Statistics, Population, Sample-quantitative and qualitative data. Collection of primary and secondary data. Measurement Scales-Nominal, Ordinal, Interval and Ratio.

Teaching Methodology	PPT, Chalk and talk and Handouts.

Books for Study

1. Navaneetham, P. A. (2007). *Business mathematics and statistics*. Jai Publishers.
2. Aggarwal, R. S. (2018). *Quantitative aptitude*. S. Chand & Company PVT. Ltd.
3. Gupta, S. P. (2017). *Statistical methods* (35th Rev. ed.). Sultan Chand & Sons Pvt Ltd.

Books for Reference

1. Gupta, S. C. & Kapoor, V. K. (2002). *Fundamentals of mathematical statistics*. Sultan Chand & Sons Pvt. Ltd.
2. Pillai, R. S. & Bagavathi. (2003). *Statistics*. S. Chand and Company Ltd.

Websites and eLearning Sources

1. https://www.icai.org/post.html?post_id=17790
2. https://en.wikipedia.org/wiki/Statistics

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	acquire the knowledge of sets, sequence, permutation, combination, differential calculus, integral calculus, Statistics and its importance in various areas.	**K1**
CO2	understand the data and its relevance in business and develop an understanding of quantitative problems.	**K2**
CO3	apply the quantitative methods to solve the real life problems	**K3**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
1	**23UST14FC01**		**Foundation Course:** Statistics for Beginners							**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	1	3	3	2	1	2	**2.2**
CO2	2	3	2	3	2	2	3	2	2	3	**2.4**
CO3	3	2	3	2	2	3	2	1	3	2	**2.3**
Mean Overall Score											**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UHE14VE01	**Value Education - 1:** Essentials of Humanity	2	1

Course Objectives
To identify one's own potentials, strengths and weaknesses
To identify various challenges (physical, emotional, and social) in adolescence
To consciously overcome one's challenges and move towards self-esteem
To maximize one's own potential in enabling a holistic development
To assimilate human values comprehensively

UNIT I: Principles of Value Education **(6 Hours)**

Introduction to values - Characteristics and Roots of Values - Value Education & Value Clarification - Moral Characters - Kinds of Values - Objectives of Values

UNIT II: Development of Human Personality **(6 Hours)**

Personality: Introduction, Theories, Integration & Factors influencing the development of personality - SEL Series - Discovering self - Defence Mechanism Power of positive thinking - Why worry?

UNIT III: The Dimensions of Human Development **(6 Hours)**

Areas of Development: Physical, Intellectual, Emotional, Social Development, Moral & Spiritual development

UNIT IV: Responsible Parenthood **(6 Hours)**

Human Sexuality - Marriage and Family - Sex and Love - Characteristics of Responsible parent - Causes of Marriage disharmony - Art of wise parenting

UNIT V: Gender Equality and Empowerment **(6 Hours)**

Historical perspective - Women in Independence struggle - Women in Independent India - Education & Economic development - Crimens against Women - Women rights - Time-line of Women achievements in India

Teaching Methodology	Chalk and Talk, Power point

Book for Study

1. Department of Human Excellence. (2021). *Essentials of Humanity.* St. Joseph's College.

Books for Reference

1. Xavier, A. (2012). *You Shall Overcome,* (6th Ed.). ICRDE Publication.
2. Alex, K. (2009). *Soft Skills.* S. Chand.
3. Kalam, A.A. P. J. (2012). *You Are Unique.* Punya Publishing.

Websites and eLearning Sources

1. http://livingvalues.net. Accessed 05 March 2021.
2. http://www.apa.org/topics/personality#. Accessed 05 March 2021.
3. http://www.peacecorps.gov/educators/resources/global-issues-gender-equaligy-and-womens-empowerment/. Accessed 05 March 2021.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	recall the prescribed values and their dimensions.	**K1**
CO2	examine themselves by learning the developmental changes happening in the course of their lifetime.	**K2**
CO3	Apply the trained values in the day-to-day life.	**K3**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
1	**23UHE14VE01**	**Value Education - 1:** Essentials of Humanity								**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO 4**	**PSO5**	
CO1	3	3	3	3	2	3	3	2	3	3	**2.8**
CO2	3	2	2	3	3	2	3	3	2	2	**2.5**
CO3	2	3	3	3	2	3	3	3	3	3	**2.8**
										Mean Overall Score	**2.7 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UEN14AE01	**Ability Enhancement Compulsory Course - 1:** Communicative English	6	3

Course Objectives
To recognize and identify the components of a formal letter.
To summarize the main points of a given letter and identify the intended meaning.
To use appropriate grammatical structures in context within their own writing.
To compare and contrast the elements of successful and unsuccessful letters.
To create well-structured letters with clear purpose and effectively evaluate and revise their own writing.

Basic Level

UNIT I **(18 Hours)**

1) A letter to avail college hostel
2) A requisition letter to provide fee concession
3) A requisition letter to provide Bonafide certificate
4) A letter to avail resources in college library
5) An On Duty Permission Letter
6) Nouns
7) Pronouns
8) Adjectives
9) Verbs
10) Adverbs

UNIT II **(18 Hours)**

11) A letter to provide conduct certificate
12) A letter to provide new ID card
13) A Permission letter for Name Correction in Mark sheet
14) A permission letter for Sports Events
15) A letter to avail permission for the Shepherd programme
16) Prepositions
17) Conjunctions
18) Articles
19) Conjugation of present form ‘Be’ verbs
20) Conjugation of past form ‘Be’ verbs

UNIT III **(18 Hours)**

21) A letter to avail the College Hostel
22) A permission letter to join the sport team
23) A request letter to access college Wi-Fi
24) A letter to vice principal requesting to change Elective course
25) A permission letter for project extension
26) Conjugation of future form ‘Be’ verbs
27) Conjugation of present continuous ‘Be’ verbs
28) Conjugation of Past continuous ‘Be’ verbs
29) Conjugation of Future continuous ‘Be’ verbs
30) Conjugation of Present Perfect ‘Be’ verbs

UNIT IV **(18 Hours)**

31) An apology letter to Dean for using mobile phone
32) A request letter to repair fan and tube light
33) A letter to invite Chief guest for Bibliophile Club meeting

34) A requisition Letter to issue the Transfer certificate
35) A permission letter for group exam coaching class
36) Conjugation of Past Perfect 'Be' verbs
37) Conjugation of Future Perfect 'Be' verbs
38) Conjugation of Present Perfect Continuous 'Be' verbs
39) Conjugation of Past Perfect Continuous 'Be' verbs
40) Conjugation of Future Perfect Continuous 'Be' verbs

UNIT V **(18 Hours)**

41) A letter seeking help to find the missing laptop
42) A letter to the editor regarding frequent power cut
43) A medical leave letter
44) A requesting OD Letter to issue invitation to other colleges
45) A requisition letter to change Shift
46) Conjugation of present form 'Action' verbs
47) Conjugation of past form 'Action' verbs
48) Conjugation of Present form 'do verbs
49) Conjugation of Past form 'do' verbs
50) Conjugation of Future form 'have' verbs

Teaching Methodology	Chalk and Talk, discussion, Training

Book for Study

1. Jayapaul, V.L. (2023). *Begin to Learn English.* St. Joseph's College (Autonomous), Tiruchirappalli.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	compose various types of letters (request, permission, and apology) demonstrating clarity, coherence, and correctness.	**K1**
CO2	exhibit a sound understanding of nouns, pronouns, adjectives, verbs, and adverbs, utilizing them accurately in written and spoken English.	**K2**
CO3	apply language skills in real-life college scenarios, gaining confidence in communicating effectively with peers, faculty, and administrative staff.	**K3**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**						**Hours**			**Credits**
1	**23UEN14AE01**	**Ability Enhancement Compulsory Course - 1:** Communicative English						**6**			**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	**2.4**
CO2	2	2	3	2	3	3	2	3	2	2	**2.3**
CO3	2	3	2	3	2	2	3	2	3	2	**2.4**
									Mean Overall Score		**2.37 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UEN14AE01	**Ability Enhancement Compulsory Course - 1:** Communicative English	6	3

Course Objectives
To recognize and identify common punctuation marks and their usage in paragraphs.
To summarize the main topics introduced in a paragraph and demonstrate understanding.
To apply the learned concepts to construct paragraphs that convey ideas effectively.
To analyze paragraphs to identify the role of prefixes, suffixes, and noun types in enhancing meaning.
To synthesize information to create paragraphs, evaluate their own writing, and engage in role-playing scenarios to demonstrate understanding.

Intermediate Level

UNIT I **(18 Hours)**

1) Paragraph Punctuation
2) Introducing a Topic
3) Rhyming Words
4) Word Association
5) Going To
6) What Will Happen

UNIT II **(18 Hours)**

7) Every Drop Counts
8) Prefix
9) Suffix
10) Comprehending Characters
11) Complimenting & Thanking
12) Proper & Common Nouns

UNIT III **(18 Hours)**

13) Noun Substitution Table
14) A, Some
15) Visual Comprehension
16) Singular to Plural
17) Making & Responding
18) Pronoun Classification

UNIT IV **(18 Hours)**

19) Pronoun I, Me, He, Him, She, Her, We.
20) Singular to Plural
21) Responding
22) Pronoun Classification
23) Using Preposition of Movement
24) Preposition: Visual Talk

UNIT V **(18 Hours)**

25) Prepositional Phrases
26) Storytelling
27) Asking For Opinion
28) Using Things Creatively
29) Transition Sequencing
30) Role Play

Book for Study

1. Joy, J. L. (2020). *Learning to Communicate*. St. Joseph's College (Autonomous), Tiruchirappalli.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	demonstrate proficiency in paragraph construction, rhyming words, and the use of prefixes and suffixes.	**K1**
CO2	apply advanced grammar rules, including proper/common nouns and pronoun usage, in both written and spoken communication.	**K2**
CO3	express opinions, compliments, and gratitude effectively, showcasing an enhanced ability to articulate thoughts and emotions.	**K3**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
1	**23UEN14AE01**		**Ability Enhancement Compulsory Course - 1:** Communicative English						**6**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	**2.4**
CO2	2	2	3	2	3	3	2	3	2	2	**2.3**
CO3	2	3	2	3	2	2	3	2	3	2	**2.4**
									Mean Overall Score		**2.37 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UEN14AE01	**Ability Enhancement Compulsory Course - 1:** Communicative English	6	3

Course Objectives
To recognize and demonstrate basic self-introduction strategies.
To summarize information from listening and reading exercises, demonstrating understanding.
To apply learned concepts to construct essays, actively contribute to group discussions, and create coherent narratives.
To analyze reviews to understand how different elements contribute to a comprehensive evaluation.
To synthesize information to create compelling presentations, actively participate in debates, interviews, and assess their own communication proficiency.

Advance Level

UNIT I **(18 Hours)**

1) Self Introduction
2) Listening
3) Reading

UNIT II **(18 Hours)**

4) Essay Writing
5) Group Discussion
6) Story Building, Story Writing & Story Narration

UNIT III **(18 Hours)**

7) Book Review
8) Film Review

UNIT IV **(18 Hours)**

9) News Paper Reading and Analysis
10) Public speaking: Drafting and Speaking

UNIT V **(18 Hours)**

11) Debate
12) Interview Skills

Websites and eLearning Resources

1. https://ielts-up.com/listening/ielts-listening-practice.html
2. https://www.bestmytest.com/ielts/speaking
3. https://ielts-up.com/speaking/ielts-speaking-practice.html
4. https://learnenglishteens.britishcouncil.org/skills/writing/a2-writing/film-review

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	exhibit high-level language skills in self-introduction, listening, reading, and diverse writing tasks such as essay writing and storytelling.	**K1**
CO2	critically evaluate and analyze literature through book reviews, film reviews, and newspaper reading, demonstrating an ability to articulate informed opinions.	**K2**
CO3	showcase proficiency in public speaking, group discussions, debates, and interviews, reflecting a comprehensive mastery of advanced communication skills.	**K3**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
1	**23UEN14AE01**		**Ability Enhancement Compulsory Course - 1:** Communicative English						**6**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	**2.4**
CO2	2	2	3	2	3	3	2	3	2	2	**2.3**
CO3	2	3	2	3	2	2	3	2	3	2	**2.4**
Mean Overall Score											**2.37 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UTA21GL02	General Tamil - 2	4	3

கற்றலின் நோக்கங்கள்
தமிழ் இலக்கிய வரலாற்றை அறிதல்.
எழுத்து, சொல் இலக்கணங்களின் அடிப்படைகளைக் கண்டறிதல்.
அயலகக் கவிதை வடிவங்களை விளங்கிக் கொள்ளுதல்.
மொழிபெயர்ப்புக் கவிதைகளின் வாயிலாக மொழிபெயர்ப்புத் திறனை வளர்த்தெடுத்தல்.
போட்டித் தேர்வுகளை எதிர்கொள்வதற்கான இலக்கண அறிவு பெறுதல்.

அலகு – 1 ***(12 மணிநேரம்)***

பாரதியார் கவிதைகள் – குயில்பாட்டு (குயில் தன் பூர்வ ஜென்மக் கதை உரைத்தல்)
பாரதிதாசன் கவிதைகள் – சஞ்சீவி பர்வதத்தின் சாரல்
நற்றமிழ்க்கோவை – முதல் மூன்று கட்டுரைகள்

அலகு - 2 ***(12 மணிநேரம்)***

வெ.இராமலிங்கனார் – சொல், தமிழன் இதயம்
முடியரசனார் – உயிர் வெல்லமோ, மனத்தூய்மை
பெருஞ்சித்திரனார் – அஞ்சாதீர், மொழி,இனம்,நாடு
பட்டுக்கோட்டை கலியாண சுந்தரனார் – வருங்காலம் உண்டு, உழைக்காமல் சேர்க்கும் பணம்
இலக்கணம் – எழுத்து
இலக்கிய வரலாறு – புதுக்கவிதை, தமிழில் புதிய கவிதை வடிவங்கள்

அலகு–3 ***(12 மணி நேரம்)***

சுரதா - நல்ல தீர்ப்பு
கண்ணதாசன் - ஒரு பானையின் கதை
அப்துல் ரகுமான்- வீடு
மேத்தா - ஒரேகுரல்
இலக்கிய வரலாறு – தமிழ்ச்சிறுகதைகள், இருபதாம் நூற்றாண்டு உரைநடை வளர்ச்சி
சிறுகதை – முதல் மூன்று சிறுகதைகள்

அலகு – 4 ***(12 மணிநேரம்)***

அரசியல் கவிதைகள்
ஈரோடு தமிழன்பன்- அகல் விளக்காக இரு
ஆதவன் தீட்சண்யா– இன்னும் இருக்கும் சுவர்களின் பொருட்டு
சுகிர்தராணி– என் கண்மணியே இசைப்பிரியா
சக்தி ஜோதி – யுகாந்திர உறக்கம்
பழநி பாரதி- வெள்ளைக்காகிதம்
லிவிங்ஸ்மைல் வித்யா – நினைவில் பால்யம் அழுத்தம்
இலக்கணம் - சொல்

அலகு – 5 ***(12 மணிநேரம்)***

அயலகக் கவிதைகள்
ஓசேரிசால் (தமிழில் நெய்தல்)- விடைகொடு என்தாய் மண்ணே
ஹைபுன் கவிதைகள்
சிறுகதை – நான்கு முதல் ஆறு சிறுகதைகள்
நற்றமிழ்க் கோவை – நான்கு முதல்ஆறு கட்டுரைகள்

கற்பித்தல் முறை **(Teaching Methodology)**	***விரிவுரை*** (Lecture), ***காணொளிக் காட்சி*** (Videos), ***விளக்கக் காட்சி*** (PPT presentation)

பாடநூல்கள்

1. *தமிழாய்வுத்துறை* (2023). *பொதுத்தமிழ் -2, தூய வளனார் தன்னாட்சிக் கல்லூரி.*

2. தமிழாய்வுத்துறை (2021). நற்றமிழ்க் கோவை, தூய வளனார் தன்னாட்சிக் கல்லூரி.

Websites and eLearning Sources

1. https://www.chennailibrary.com/bharathiyar/kuyilpattu.html
2. www.tamildigitallibrary.in
3. https://eluthu.com/kavithai
4. https://podhutamizh.blogspot.com/2017/09/blog-post_42.html
5. https://thamizhsudar.com
6. https://ta.wikipedia.org/wiki

Course Outcomes		
CO No.	**CO-Statements** **இப்பாடத்தின் நிறைவில் மாணவர்கள்**	**Cognitive Levels (K - Level)**
CO1	**தமிழ் இலக்கிய நூல்கள் பற்றிய அறிவைப் பெறுவர்.**	**K1**
CO2	**தமிழ் இலக்கண வளர்ச்சியைப் புரிந்து கொள்வர்.**	**K2**
CO3	**பிழையின்றி எழுதும் திறன் பெறுவதோடு கற்றல் திறனையும் வளர்த்துக்கொள்வர்.**	**K3**
CO4	**பிற கவிதை வடிவங்களைக் கையாளும் திறன் பெறுவர்.**	**K4**
CO5	**போட்டித் தேர்வுகளை எதிர்கொள்ளும் திறனைப் பெறுவர்.**	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**23UTA21GL02**			General Tamil - 2						**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO 1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	2	2	3	3	3	2	3	2	**2.3**
CO2	2	1	2	2	2	3	2	2	2	2	**2.0**
CO3	2	1	2	2	3	3	3	2	3	2	**2.3**
CO4	1	2	1	2	2	3	2	2	3	2	**2.0**
CO5	1	1	2	2	3	3	3	2	3	2	**2.2**
										Mean Overall Score	**2.16 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UFR21GL02	French - 2	4	3

Course Objectives
To construct simple phrases with pronominal verbs
To apply the different types of articles
To understand the usage of pronouns
To analyse the French culture through French culinary art
To evaluate and compare the French fashion in current scenario

UNIT I **(12 Hours)**

- TITRE: Les Loisirs
- GRAMMAIRE : les adjectifs interrogatifs, les nombres ordinaux, les verbes pronominaux
- LEXIQUE : les différentes activités quotidiennes, les loisirs, les activités quotidiennes, les matières
- PRODUCTION ORALE : parler sur votre passe-temps
- PRODUCTION ECRITE : décrire sa journée

UNIT II **(12 Hours)**

- TITRE: La routine
- GRAMMAIRE : les pronoms personnels COD, les verbes du premier groupe en e/er/eler/eter, le verbe prendre
- LEXIQUE : exprimer ses goûts et ses préférences, le temps, l'heure, la fréquence
- PRODUCTION ORALE : savoir comment dire l'heure
- PRODUCTION ECRITE : écrire vos préférences en quelques lignes

UNIT III **(12 Hours)**

- TITRE: Où Faire Ses Courses?
- GRAMMAIRE : les articles partitifs, le pronom en (la quantité), très ou beaucoup
- LEXIQUE : inviter et répondre à une invitation, les commerces et les commerçants, demander et dire le prix, les quantités
- PRODUCTION ORALE : faire des courses pour une soirée
- PRODUCTION ECRITE : écrire un message en acceptant l'invitation

UNIT IV **(12 Hours)**

- TITRE: Découvrez et Dégustez
- GRAMMAIRE : l'impératif, il faut, les verbes devoir, pouvoir, savoir, vouloir
- LEXIQUE : Commander et commenter sur un plat de la carte, les aliments, les services, les moyens de paiement
- PRODUCTION ORALE : Jeu de rôle – au restaurant (entre vous et le garçon)
- PRODUCTION ECRITE : faire une comparaison avec la carte française et indienne

UNIT V **(12 Hours)**

- TITRE: Tout le monde s'amuse/ les ados au quotidien
- GRAMMAIRE : les adjectifs démonstratifs, le pronom indéfini on, le futur proche, le passé composé, les verbes en –yer, voir et sortir
- LEXIQUE : connaître les marques connues sur les vêtements, les sorties, situer dans le temps, les vêtements et les accessoires

- PRODUCTION ORALE : décrire une tenue
- PRODUCTION ECRITE : écrire une lettre amicale, une carte postale

Teaching Methodology	Chalk and talk, visual cues like flashcards, one to one conversation

Book for Study

1. Dauda, P., Giachino, L. & Baracco, C. (2016). *Generation A1*. Didier.

Books for Reference

1. Girardet, J. & Pecheur, J. (2017). *Echo A1*. CLE International, (2nd Ed.).
2. Mérieux, R. & Loiseau, Y. (2012). *Latitudes A1*. Didier.
3. Fournier, I. (2011). *Talk French.* Goyal Publishers.

Websites and eLearning Sources

1.https://www.frenchtoday.com/blog/french-verb-conjugation/french-reflexive-verbs-list- exercises/

2.https://www.fluentu.com/blog/french/french-subject-pronouns/

3.https://grammarist.com/french/french-partitive-article/

4.https://www.talkinfrench.com/guide-french-food-habits/

5.https://www.fluentu.com/blog/french/talking-about-clothes-in-french/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	relate pronominal verbs in expressing one's day today activity	**K1**
CO2	compare the different types of articles – article partitif and contracte	**K2**
CO3	construct texts using pronouns – passages and dialogues	**K3**
CO4	discover the food habits of the French culture	**K4**
CO5	appraise the French fashion	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
2	**23UFR21GL02**		French - 2						**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	1	3	1	2	2	2	**2.2**
CO2	2	1	2	3	2	3	1	2	2	2	**2.0**
CO3	3	2	3	2	2	3	3	1	3	2	**2.4**
CO4	3	2	2	1	3	3	3	1	1	3	**2.2**
CO5	2	1	2	2	3	3	3	2	2	2	**2.2**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UHI21GL02	Hindi - 2	4	3

Course Objectives
To understand the basics of Hindi Language
To make the students to be familiar with the Hindi words
To enable the students to develop their effective communicative skills in Hindi
To introduce the socially relevant subjects in Modern Hindi Literature
To empower the students with globally employable soft skills

UNIT I **(12 Hours)**

- Kafan
- Letter Writing - Chutti Patra
- Bakthikal - Namakarn
- Sarkari Kariyalayom Ka Naam

UNIT II **(12 Hours)**

- Baathcheeth - Dookan Mein
- Kriya
- Letter Writing - Rishthedarom Ko Patra
- Bakthikal - Samajik Paristhithiyam

UNIT III **(12 Hours)**

- Vah Thodthi Patthar
- Adverb
- Letter Writing - Naukari Keliye Avedan Patra
- Bakthikal - Sahithyik Paristhithiyam

UNIT IV **(12 Hours)**

- Mukthi
- Samas
- Letter Writing - Kitab Maangne Keliye Patra
- Bakthikal - Salient Features, Main Divisions

UNIT V **(12 Hours)**

- Anuvad
- Sandhi
- Letter Writing - Nagarpalika Ko Patra
- Bakthikal - Visheshathayem

Teaching Methodology	Peer Instruction Exercise, Videos, PPT, Quiz, Group Discussion

Books for Study

1. Viswanath Tripaty. (2018). *Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd.
2. Kamathaprasad Gupth, M. (2020). *Hindi Vyakaran*. Anand Prakashan.
3. Sadananth Bosalae. (2020). *kavya sarang*, Rajkamal Prakashan.

Books for Reference

1. Acharya Ramchandra Shukla. (2021). *Hindi Sahitya Ka Itihas*. Prabhat Prakashan.
2. Krishnakumar, G. (2016). *Anuvad vigyan ki Bhumika*. Rajkamal Prakashan.

3. Aravind Kumar. (2019). *Sampoorna Hindi Vyakaran our Rachana*, Lucent publisher.
4. Lakshman Prasad Singh. (2017). *Kavya ke sopan*. Bharathy Bhavan Prakashan.

Websites and e-Learning Sources

1. https://hindigrammar.in/sandhi.html
2. https://www.successcds.net/class10/hindi/samas-in-hindi
3. https://mycoaching.in/kriya-ke-bhed-verb-in-hindi
4. https://namastesensei.in/adverb-in-hindi-examples/
5. https://viahindi.in/hindi-vyakaran/sandhi-paribhasha-prakar-or-udaharan

Course Outcomes		
CO No.	**CO-Statements** On successful completion of the course, the student will be able to	**Cognitive Levels (K - Level)**
CO1	Find out the Terms & Expressions related to letter writing.	**K1**
CO2	Explain the works of Hindi writers.	**K2**
CO3	Complete the sentences in Hindi using basic grammar.	**K3**
CO4	Analyze the social & political conditions of Devotional period in Hindi Literature.	**K4**
CO5	Justify the human values stressed on the works of the following authors “Premchand, Nirala, etc.”.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
2	**23UHI21GL02**			**HINDI - 2**					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	2	2	3	3	3	2	2	**2.5**
CO2	1	3	1	2	2	3	3	3	2	3	**2.3**
CO3	3	2	3	2	2	3	2	3	2	2	**2.4**
CO4	2	3	3	1	3	2	3	2	1	2	**2.2**
CO5	3	2	2	2	3	2	3	2	3	2	**2.4**
										Mean Overall Score	**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23USA21GL02	Sanskrit - 2	4	3

Course Objectives
To bring out the salient aspects of classical Sanskrit poetry
To introduce court epics in Sanskrit
To train students in declensions of pronouns in Sanskrit
To coach the students in the conjugation patterns of verbs in Sanskrit
To offer coaching in morpho-phonemic rules and their applications in Sanskrit

UNIT I **(12 Hours)**

Asmathi usmath tat kim (MFN) sarvanaam asabdaha

UNIT II **(12 Hours)**

Sandhi Niyamaah Abhyaash (Guna , Visarga , Dirgha , Vrddhi)

UNIT III **(12 Hours)**

Lang lakaarah Kriyapadaani Prayoga Vivaranam

UNIT IV **(12 Hours)**

Raguvamsaha Pratama sargaha (1 -15 slokas)

UNIT V **(12 Hours)**

Suvacanani Vakya Prayoga Vivaranam

Teaching Methodology	Videos, PPT, Blackboard, Demonstration, Exercises

Books for Study

1. Saralasamkritham Skisha. (2021).
2. Dhaatu Manjari. (2021).

Books for Reference

1. Paindrapuram Ashram, Srirangam. (2019).
2. Vadhyar, R. S., & Sons, Book - Seller and Publishers. (2021).
3. Kulapthy, K. M. (2018). *Saral Sanskrit Balabodh*. Bharathiys Vidya Bhavan.

Websites and eLearning Sources

1. https://www.meritnation.com
2. https://www.aplustopper.com
3. https://mycoaching.in/lang-lakar
4. https://sanskritdocuments.org/sites/giirvaani/giirvaani/rv/sargas/01_rv.htm
5. https://resanskrit.com/blogs/blog-post/sanskrit-shlok-popular-quotes-meaning-hindi-english

Course Outcomes		
CO No.	CO-Statements On successful completion of this course, students will be able to	Cognitive Levels (K - Level)
CO1	Remembering names of different objects, remembering different verbal forms and sandhi	K1
CO2	Contrast different verbal forms Explain good sayings, Relate good saying to life.	K2
CO3	Apply and build small sentences	K3
CO4	Analyze different forms of Verbs and nouns	K4
CO5	Appreciate subhashitas and Sanskrit poetry	K5

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**23USA21GL02**			Sanskrit - 2						**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	3	2	2	2	3	3	2	1	**2.1**
CO2	3	2	3	2	2	3	2	3	3	2	**2.5**
CO3	2	2	3	2	2	2	2	3	3	1	**2.1**
CO4	3	2	3	3	1	2	3	3	3	1	**2.4**
CO5	3	2	2	2	3	2	2	3	3	1	**2.3**
Mean Overall Score											**2.28 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UEN22GE02	General English - 2	5	3

Course Objectives
To develop an expanded and specialised vocabulary related to diverse themes such as education, entertainment, career, and society through activities like word grids, reading, and discussions.
To enhance problem-solving abilities through activities like debates, role-playing, and scenario analysis.
To enable students to express ideas with precision and clarity by practising different forms of expressing quality, comparison, and actions in various contexts.
To equip students with language skills relevant to professional settings.
To encourage students to explore language as a tool for creative expression and communication.

UNIT I **(15 Hours)**

01. Education Word Grid
02. Reading Problems and Solutions
03. Syllabification
04. Forms for Expressing Quality
05. Expressing Comparison
06. Monosyllabic Comparison
07. Di/polysyllabic Comparison
08. The Best Monosyllabic Comparison
09. The Best Di/Polysyllabic Comparison
10. Practising Quality Words

UNIT II **(15 Hours)**

11. Wh Words
12. Yes/No Recollection
13. Unscramble Wh Questions
14. Wh Practice
15. Education and the Poor
16. Controlled Role Play
17. Debate on Education
18. Education in the Future
19. Entertainment Word Grid
20. Classify Entertainment Wordlist
21. Guess the Missing Letter
22. Proverb-Visual Description
23. Supply Wh Words
24. Rearrange Questions
25. Information Gap Questions

UNIT III **(15 Hours)**

26. Asking Questions
27. More about Actions
28. More about Actions and Uses
29. Crime Puzzle
30. Possessive Quiz
31. Humourous News Report
32. Debate on Media and Politics
33. Best Entertainment Source

UNIT IV **(15 Hours)**

34. Career Word Grid
35. Job-Related Wordlist
36. Who's Who?
37. People at Work
38. Humour at Workplace
39. Profession in Context
40. Functions and Expressions
41. Transition Fill-in
42. Transition Word Selection
43. Professional Qualities
44. Job Procedures
45. Preparing a Resume
46. Interview Questions
47. Job Cover Letter Format
49. Emailing an Application
50. Mock Interview

UNIT V **(15 Hours)**

51. Society Word Grid
52. Classify Society Wordlist
53. Rearrange the Story
54. Storytelling
55. Story Cluster
56. Words Denoting Time
57. Expressing Time
58. What Can You Buy?
59. Noise Pollution
60. Positive News Headlines
61. Negative News Headlines
62. Matching Conditions
63. What Would You Do?
64. If I were the Prime Minister
65. My Dream Country

Teaching Methodology	Lecture Method, Use of ICT Tools and Interactive method

Book for Study

1. Joy, J.L. & Peter, F.M. (2014). *Let's Communicate 2*, Trinity Press.

Books for Reference

1. Ahrens, Sönke. (2017). *How to Take Smart Notes: One Simple Technique to Boost Writing, Learning and Thinking*. Create Space.
2. Aspinall, Tricia. (2002). *Test Your Listening.* Pearson.
3. Bailey, Stephen. (2004). *Academic Writing: A Practical Guide for Students*. Routledge.
4. Fitikides, T.J. (2002). *Common Mistakes in English,* (6th Ed.). Longman
5. Wainwright., Gordon. (2007). *How to Read Faster and Recall More: Learn the Art of Speed Reading with Maximum Recall,* (3rd Ed.). How to Books.

Websites and eLearning Sources

1. https://learnenglish.britishcouncil.org/
2. https://oneminuteenglish.org/en/best-websites-learn-english/
3. https://www.dailywritingtips.com/best-websites-to-learn-english/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	write paragraphs with apt punctuation marks	**K1**
CO2	discuss basic issues with friends, relatives and members of the family	**K2**
CO3	use polite expressions in appropriate ways	**K3**
CO4	evaluate the language and communication aspects of the topics	**K4**
CO5	create and produce various forms of communication, including professional documents like resumes and cover letters, debates	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
2	**23UEN22GE02**			General English - 2					**5**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	**2.4**
CO2	2	2	3	2	3	3	2	3	2	2	**2.3**
CO3	2	3	2	3	2	2	3	2	3	2	**2.4**
CO4	2	2	3	2	3	3	2	3	2	3	**2.5**
CO5	2	2	2	3	2	2	2	3	2	2	**2.2**
										Mean Overall Score	**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UST23CC03	**Core Course - 3:** Numerical Methods	5	4

Course Objectives
Understand the concept of interpolation in various fields
Know the different central difference formulae
Learn the numerical solution of ODE
Explain the solutions of algebraic equations using different methods
Know the numerical differentiation and integration for different interpolation techniques

UNIT I: System of equations: **(15 Hours)**

Bisection method - Regula Falsi method - Newton-Raphson method. Gauss elimination method and Gauss-Jordan method (Problems only).

UNIT II: Interpolation **(15 Hours)**

Introduction - Symbolic relations - Newton's Forward and Backward difference formulae, Newton's divided difference formula - Lagrange's formula (Problems only).

UNIT III: Central Difference Formulae **(15 Hours)**

Gauss forward and backward formula-Stirling's formula - Bessel's formula-Everett's formula-Appropriateness of formulae (Problems only).

UNIT IV: Numerical solution of ODE **(15 Hours)**

Taylor's series method - Euler's method, Modified Euler's method and Second and Fourth order Runge - Kutta method (Problems only).

UNIT V: **(15 Hours)**

Numerical differentiation Up to second order maxima and minima of a tabulated function.

Numerical integration: Trapezoidal rule - Simpson's 1/3rd and 3/8th rules-Weddle's rule (Problems only).

Teaching Methodology	YouTube videos, Chat and Talk, PPT and Handouts.

Book for Study

1. Kandasamy, P., Thilagavathy, K., and Gunavathi, K. (2008). *Numerical Methods.* S. Chand Company Ltd.

Books for Reference

1. Gerald, C.F. & Wheatley, P.O. (2007). *Applied Numerical Analysis*. Addison-Wesley.
2. Atkinson. K. (2003). *Elementary Numerical Analysis*. John Wiley & Sons.
3. Sastry, S.S. (2012). *Introductory Methods of Numerical Analysis.* PHI.

Website and eLearning Sources

1. https://atozmath.com/example/CONM/NumeInterPola.aspx?q=A&q1=E1
2. https://www.scribd.com/presentation/478879601/Gauss-forward-and-Backward-Interpolation
3. https://theengineeringmaths.com/wp-content/uploads/2017/11/num-ode.pdf
4. https://kanchiuniv.ac.in/coursematerials/Numerical%20-%20Algebraic%20equations.pdf
5. https://egyankosh.ac.in/bitstream/123456789/31292/1/UNIT 14.pdf

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	understand the of common numerical mathematics and how they are used	**K1**
CO2	explain the different formulae for numerical mathematics	**K2**
CO3	apply numerical methods to obtain approximate solutions of the real life problems	**K3**
CO4	effectively write mathematical solutions and their interpretation in a clear and concise manner.	**K4**
CO5	derive the interpolation formulae, numerical differentiation and integration for different interpolation techniques	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**	**Credits**	
2	**23UST23CC03**			**Core Course - 3:** Numerical Methods					**5**	**4**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	3	3	1	2	3	2	3	2	1	**2.1**
CO2	2	2	3	1	2	3	3	3	3	2	**2.4**
CO3	3	2	1	3	3	2	3	2	3	2	**2.4**
CO4	3	1	1	3	3	1	2	1	3	3	**2.1**
CO5	3	1	1	3	3	1	2	1	3	3	**2.1**
										Mean Overall Score	**2.2(High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UST23CC04	**Core Course - 4:** Time Series and Index Numbers	6	4

Course Objectives
Learn the basics of data analysis like Averages and forecasting techniques.
Make the students capable of interpreting and evaluating numerical and quantitative issues in business.
Exhibit the students' ability to use statistical, graphical and algebraic techniques wherever relevant.
Help students perceive Statistical applications of Time Series and Index Numbers.
Learn the uses of Time series and Index numbers in management decisions

UNIT I: Time Series **(18 Hours)**

Definition, uses, Additive Model, Multiplicative Models, Components - Secular Trend, Seasonal variation - Measurement of Trend: Graphical method, Method of Semi-Averages, Method of Moving Averages and Method of Least Squares.

UNIT II: Measurement of Seasonal Variations **(18 Hours)**

Method of Simple Averages, Ratio to Moving Average method, Ratio to Trend Method and Link Relative Method - Cyclic Variation and Irregular fluctuations.

UNIT III: Growth Curves **(18 Hours)**

Parabolic, Exponential, Modified Exponential Curve and its Fitting - Method of Three Selected Points - Method of Partial Sums - Fitting of Grompertz Curve - Logistic Curve. De - Seasonalisation of data - Measurement of Cyclic variations by residual approach.

UNIT IV: Index Numbers **(18 Hours)**

Definition, Uses, Types, Problems involved in the construction of Index Numbers - Construction of Index Numbers - Simple aggregate method and Simple average of Price relatives method. Weighted Index Numbers - Laspeyre's, Paasche's, Dorbish - Bowley's, Marshall Edge Worth's Index Numbers and Fisher's Ideal Index Number.

UNIT V: Tests for adequacy **(18 Hours)**

Time Reversal Test, Factor Reversal Test, Unit test and Cyclic test. Definition of Deflation, Splicing, Inflation, and Real wages. Construction of Weighted Average of Price relatives Index Numbers using A.M & G.M. Fixed Base Index Numbers and Chain Base Index Numbers.

Teaching Methodology	YouTube videos, PPT, Black Board teaching and Handouts.

Book for Study

1. Gupta, S.C. & Kapoor, V.K. (2019). *Fundamentals of Applied Statistics,* Sultan Chand & Co., (4th Ed.).

Books for Reference

1. Garret, H.E., (2005).*Education and Psychological Statistics,* Paragon International Publications.
2. Pillai RSN & Bagavathi V., (2010).*Statistics*, S. Chand & Co.
3. Box, G.E.P., Jenkins, G.M., Reinsel, G.C. & Ljung, G.M., (2015). *Time Series Analysis: Forecasting and Control,* (5th Ed.). John Wiley & sons, Inc.
4. Brockwell, P.J. & Davis, R.A. (2003). *Introduction to Time Series Analysis.* Springer.

Website and eLearning Sources

1. https://youtu.be/W7sMRIOL7LM

2. https://youtu.be/ivR_20rdhsM?list=PLqMl6r3x6BUSP2fYr2rd3NMRTT4_5uTvV
3. https://youtu.be/c_h2BE1NRQo?list=PLqMl6r3x6BUSP2fYr2rd3NMRTT4_5uTvV
4. https://youtu.be/SdxyWarJr44
5. https://youtu.be/tJhkbuFYPms

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K -Level)**
CO1	acquire the knowledge of time series, index numbers and its applications.	**K1**
CO2	outline the forecasting and its curve fitting.	**K2**
CO3	compute the different measurements and index numbers.	**K3**
CO4	analyze the importance of time series and index numbers.	**K4**
CO5	apply the time series data and index numbers in real life problems.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
2	**23UST23CC04**	**Core Course - 4:** Time Series and Index Numbers								**6**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	1	2	3	2	3	2	2	**2.3**
CO2	2	3	3	2	2	2	3	3	3	2	**2.5**
CO3	3	2	1	3	3	2	3	2	3	2	**2.4**
CO4	2	1	2	3	2	1	2	3	2	3	**2.1**
CO5	3	1	1	3	2	3	2	2	2	3	**2.2**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UST23AC02	**Allied Course - 2:** Mathematics for Statistics - 2	6	4

Course Objectives
Create deep interest in learning mathematics.
Develop broad and balanced knowledge and understanding of definitions, concepts, Principles and theorems.
Familiarize the students with suitable tools of mathematical analysis to handle issues and problems in mathematics and related sciences.
To apply the knowledge and skills acquired by them during the programme to solve specific theoretical and applied problems in mathematics.
The learners gain sufficient knowledge and skills enabling them to undertake further studies in mathematics and its allied areas on multiple disciplines concerned with mathematics

UNIT I: Integral calculus **(18 Hours)**

Integration by substitution types - Properties of definite integral and simple problems. Bernoulli's formula for integration by parts - Reduction formula.

UNIT II: Multiple integrals **(18 Hours)**

Double integral, Double integral in polar co-ordinates -Triple integrals, Simple applications related to area, Volume.

UNIT III: Ordinary differential equations **(18 Hours)**

First order and second order differential equations with constant coefficients e^{ax}, $\sin ax, \cos ax$, x^m, $e^{ax}V$.

UNIT IV: Partial differential equations **(18 Hours)**

Equations Formation - Complete integrals and general integrals, Four standard types - Lagrange's equations.

UNIT V: Sequence and series **(18 Hours)**

Convergence and divergence series - Test of comparison, Integral test and Cauchy's test - D'Alembert's ratio test - Alternating series - Leibnitz's test -Series of positive and negative terms - Absolute and conditional convergence.

Teaching Methodology	Chalk and Talk, YouTube videos, PPT and Handouts.

Books for Study

1. Vittal, P.R. (2012). *Allied Mathematics*, Margham Publications, (3rd Ed.).
2. Balaji, G. (2013). *Engineering Mathematics, Regulation* - Balaji publishers.

Books for Reference

1. Narayanan, S., & Manikkavasagam Pillai, T. K. (2009). Calculus Volume (I & II) S. Viswanathan printers and publishers.
2. Singaravelu, (2018). *Allied Mathematics*, ARS publications.

Website and eLearning Sources

1. Integration by Parts (mathsisfun.com)
2. Integration Using Bernoullis Formula (onlinemath4all.com)
3. Calculus II - Convergence/Divergence of Series (lamar.edu)

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K -Level)**
CO1	assimilate the notions of limit of a sequence and convergence of a series of real numbers.	**K1**
CO2	demonstrate educational skills in areas of analysis, differential etc	**K2**
CO3	apply knowledge, understanding and skills to identify the difficult/unsolved problems in mathematics and to collect the required information	**K3**
CO4	identify challenging problems in mathematics and obtain well-defined solutions.	**K4**
CO5	apply one's disciplinary knowledge and skills in mathematics in newer domains	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**23UST23AC02**			**Allied Course - 2:** Mathematics for Statistics - 2						**6**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	3	2	1	3	2	2	3	2	**2.2**
CO2	3	3	2	1	2	2	3	2	2	1	**2.1**
CO3	3	3	2	1	2	2	3	2	3	3	**2.4**
CO4	2	3	3	3	2	1	2	3	3	2	**2.4**
CO5	3	2	2	2	3	3	3	2	2	3	**2.5**
										Mean Overall Score	**2.32(High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UHE24VE02	**Value Education - 2:** Fundamentals of Human Rights	2	1

Course Objectives
To sensitize students about various human rights and their importance
To empower them with the right understanding of human rights
To enable them to understand the Fundamental rights and the duties in the constitution of India
To help them comprehend the background, principles and the articles of UDHR
To make them involved in activities to defend human rights

UNIT I: Human Rights - An Introduction **(6 Hours)**

Introduction- Classification of Human Rights- Scope of Human Rights-Characteristics of Human Rights - Challenges for Human Rights in the 21st Century.

UNIT II: Historical Development of Human Rights **(6 Hours)**

Human Rights in Pre-World War Era- Human Rights in Post-World War Era- Evolution of International Human Rights Law - the General Assembly Proclamation- Institution Building, Implementation and the Post- Cold War Period. The ICC.

UNIT III: India and Human Rights **(6 Hours)**

Introduction- Preamble to Indian Constitution - Classification of Fundamental Rights-Salient Features of Fundamental Rights-and Fundamental Duties.

UNIT IV: Human Rights of Women and Children **(6 Hours)**

Women's Human Rights- Issues related to women's rights - and Rights of Women's and Children

UNIT V: Human Rights Violations and Organizations **(6 Hours)**

Human Rights Violations - Human Rights Violations in India - the Human Rights Watch Report, January 2012- Human Rights Organizations - NHRC - SHRC.

Teaching Methodology	Chalk and Talk, Power point, Handouts and Group discussion

Book for Study

1. Department of Human Excellence, (2021). *Techniques of Social Analysis: Fundamentals of Human Rights.*

Books for Reference

1. Venkatachalem. (2005). *The Constitution of India, Giri Law House.*
2. Naik, V. & Shany, M. (2011). *Human rights education and training,* Crescent Publishing Corporation.
3. Neera, B. (2011). *Human Rights Content and Extent.* Swastika Publications.

Websites and eLearning Sources

1. https://www.un.org/en/universal-declaration-human-rights/
2. https://www.ilo.org/global/lang--en/
3. https://www.amnesty.org/en/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	Identify the importance and the values of human rights	**K1**
CO2	Understand the historical background and the development of Human Rights and the related organizations	**K2**
CO3	Apply the provisions of National and International human rights to themselves and the society	**K3**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**23UHE24VE02**			**Value Education - 2:** Fundamentals of Human Rights						**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO 2**	**PSO3**	**PSO 4**	**PSO5**	
CO1	3	2	1	2	2	3	2	2	2	2	**2.1**
CO2	3	2	1	2	2	3	2	2	2	2	**2.1**
CO3	3	2	2	2	2	2	3	2	1	2	**2.1**
Mean Overall Score											**2.1 (Medium)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UHE24AE01	**Ability Enhancement Compulsory Course - 2:** Environmental Studies	2	1

Course Objectives
To enable students connect themselves with nature
To Impart knowledge of the concept of Biodiversity
To create awareness of the causes and consequences of various pollution
To help them recognize the available natural resources and the need to sustain them
To enable them to Identify the environmental problems and offer alternatives by making interventions both individually and collectively

UNIT I: Introduction to Environmental Studies **(6 Hours)**

Introduction - Scope and Importance - Subsystems of Earth - Various recycling Methods - Environmental Movements in India - Eco- Feminism - Public awareness - Suggestions to conserve environment

UNIT II: Natural Resources **(6 Hours)**

Food Resources - Land Resources - Forest resources - Mineral Resources - Water Resources - Energy Resources

UNIT III: Ecosystems, Biodiversity and Conservation **(6 Hours)**

General structure of ecosystem - Functions of Ecosystem - Energy flow and Ecological pyramids - Levels of Biodiversity - Hot spots of Biodiversity - Endangered and Endemic Species - Value of Biodiversity - Threats to Biodiversity - Conservation of Biodiversity

UNIT IV: Environmental Pollution **(6 Hours)**

Air Pollution - Water Pollution - Oil Pollution - Soil Pollution - Marine Pollution - Noise Pollution - Thermal Pollution - Radiation Pollution

UNIT V: Environmental Organizations and Treatise **(6 Hours)**

United Nations Environment Program (UNEP) - International treaties on Environmental protection - Ministry of Environment, Forest and Climate Change - Important National Environmental Acts and rules- Environmental Impact assessment - Issues deals with Population growth.

Teaching Methodology	Chalk and Talk, Power point and Field visit

Book for Study

1. Department of Human Excellence, (2021). *Environmental Studies.*

Books for Reference

1. Rathor, V.S. & Rathor B. S. (2013). *Management of Natural Resources for Sustainable Development*. Daya Publishing House.
2. Sharma P.D. (2010). *Ecology and Environment*, (8th Ed.). Rastogi Publications.
3. Agrawal, A & Gibson, C.C. (2001). *Introduction: The Role of Community in Natural Resource Conservation.* Rutgers University Press.

Websites and eLearning Sources

1. https://www.unep.org/
2. http://moef.gov.in/en/
3. https://www.ipcc.ch/reports/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	Identify the concepts related to global ecology and the environment	**K1**
CO2	Comprehend the natural resources and environmental organizations	**K2**
CO3	Apply the acquired knowledge to sensitize individuals and public about the environmental crisis	**K3**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
2	**23UHE24AE01**		**Ability Enhancement Compulsory Course - 2:** Environmental Studies							**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO 4**	**PSO 5**	
CO1	3	2	1	2	2	3	2	2	2	2	**2.1**
CO2	3	2	1	2	2	3	2	2	2	2	**2.1**
CO3	3	2	2	2	2	2	3	2	1	2	**2.1**
Mean Overall Score											**2.1 (Medium)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UTA31GL03	General Tamil - 3	4	3

கற்றலின் நோக்கங்கள்
தனிப்பாடல்களின் பாடற்பொருளை அறிதல்
சிற்றிலக்கியங்களின் வகைகளையும் வகைமைகளையும் அறிதல்
இடைக்காலப் புலவர்களின் பங்களிப்பை உணர்தல்
சிற்றிலக்கியங்களின் பாடுபொருள், தனித்தன்மை, மரபு ஆகியவற்றை அறிதல்
சிற்றிலக்கியங்கள்வழி தமிழின் வளர்ச்சி நிலையை அறிதல்

அலகு – 1 ***(12 மணி நேரம்)***

ஔவையார்
காவிரியே தார்வேந்தன் (16) **கற்றது கைமண்ணளவு** *(39)* **மதியாதார் முற்றம்** *(42)*
இனியது கேட்கின் *(55)* **தாயொடு அறுசுவை** *(64)*
காளமேகப் புலவர் -
நஞ்சிருக்குத் தோலுரிக்கு நாதர்முடி*(4)* **ஓடுஞ் சுழிசுத்த முண்டமாகும்** *(16)*
அடிநந்தி சேர்தலால் ஆகம் *(22)* **செருப்புக்கு வீரரைச் சென்றுழக்கும்** *(52)*
துதிவாணி வீரம் *(80)*
இராமச்சந்திர கவிராயர் – **வஞ்சகர்பா னடந்தலைந்த** - *19*
பொற்களந்தைப் படிக்காசுத் தம்பிரான் – **குட்டுதற்கோபிள்ளைப் பாண்டிய** - *21*
தமிழ்விடுதூது,- கண்ணிகள் *19* **முதல்** *62* **வரை**
கலிங்கத்துப்பரணி -**தேவியைப் பரவியது, பாடல்** *121* **முதல்** *134* **வரை**

அலகு - 2 ***(12 மணி நேரம்)***

முக்கூடற்பள்ளு –நாட்டுப்படலம் பாடல்கள் *19* –முதல் *27* வரை
முத்துகுமாரசாமி பிள்ளைத்தமிழ் – அம்புலிப்பருவம் முதல் *5* பாடல்கள்
அறிஞர் அண்ணா – வேலைக்காரி நாடகம்

அலகு - 3 ***(12 மணி நேரம்)***

திருக்குற்றாலக்குறவஞ்சி – மலைவளம் *(6 பாடல்கள்)*
இலக்கியவரலாறு – சிற்றிலக்கியங்கள்
நற்றமிழ்க்கோவை கட்டுரைகள் *7, 8, 9*

அலகு - 4 ***(12 மணி நேரம்)***

தாயுமானவர் திருப்பாடல்கள் – பராபரக்கண்ணி *7* முதல் *30* வரை உள்ள கண்ணிகள்
இலக்கணம் – அணிகள்
குணங்குடி மஸ்தான் சாகிபு – குறை இரங்கி உரைத்தல் – *7* பாடல்கள்

அலகு – 5 ***(12 மணி நேரம்)***

திருவருட்பா – திருக்கதவம் திறத்தல்
இலக்கிய வரலாறு – இடைக்காலப் புலவர்கள், நாடகத்தமிழ்
நற்றமிழ்க்கோவை -கட்டுரைகள் – *10, 11, 12*

கற்பித்தல் முறை	**விரிவுரை** *(Lecture),* **காணொளிக் காட்சி** *(Videos),* **விளக்கக் காட்சி** *(PPT presentation)*

பாட நூல்கள்

1. தமிழாய்வுத்துறை *(2023),* பொதுத்தமிழ்-3, தூய வளனார் கல்லூரி
2. தமிழாய்வுத்துறை *(2021),* நற்றமிழ்க்கோவை, தூய வளனார் கல்லூரி

பார்வை நூல்கள்

1. செயராமன் ந.வீ. *(1967),*சிற்றிலக்கியச் செல்வம், மணிவாசகர் பதிப்பகம்
2. பொன்னுசாமி *(2023),* சிற்றிலக்கிய வரலாறு, இரண்டு தொகுதிகள்,பாரிநிலையம்
3. சண்முகம் பிள்ளை மு. *(2022),* சிற்றிலக்கிய வகைகள், மணிவாசகர் பதிப்பகம்

Websites and eLearning Sources

1. https://ta.wikipedia.org/wiki/
2. https://www.britannica.com/science/Siddha-medicine

3. https://nischennai.org/main/siddha-medicine/
4. https://tamil.hindustantimes.com/
5. https://www.tamiluniversity.ac.in/english/library2-/digital-library/
6. https://www.tamilelibrary.org/
7. www.projectmadurai.or
8. http://www.tamilvu.org/ta/library-libcontnt-273141
9. https://www.tamildigitallibrary.in/
10. https://noolaham.org/

Course Outcomes		
CO No.	**CO-Statements** ***இப்பாடத்தின் நிறைவில் மாணவர்கள்***	**Cognitive Levels (K - Level)**
CO1	***இடைக்காலப் புலவர்களின் பாட்டுதிதிறனை அறிந்து கொள்வர்***	**K1**
CO2	***சிற்றிலக்கிய வகைகளையும் வகைமைகளையும் அறிந்து கொள்வர்***	**K2**
CO3	***பள்ளு, பரணி, பிள்ளைத்தமிழ், குறவஞ்சி போன்ற இலக்கியங்கள் வழி வீரம், பக்தி, காதல் உணர்வை அறிந்து கொள்வர்***	**K3**
CO4	***சிற்றிலக்கியங்களின்அமைப்பு பாட்டு வடிவங்களை அறிந்து கொள்வர்***	**K4**
CO5	***இடைக்காலத் தமிழ் வளர்ச்சி நிலையை அறிந்து கொள்வர்***	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**	**Credits**	
3	**23UTA31GL03**			General Tamil - 3					**4**	**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	3	2	3	2	3	3	2	**2.5**
CO2	2	2	2	3	3	2	2	3	3	2	**2.4**
CO3	3	3	2	3	3	2	2	3	3	3	**2.7**
CO4	3	2	2	3	2	3	2	3	2	3	**2.5**
CO5	2	3	2	3	2	3	2	3	2	3	**2.5**
										Mean Overall Score	**2.52 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UFR31GL03	French - 3	4	3

Course Objectives
To analyse the French clothing with respect to its culture
To apply prepositions and understand its usages
To analyse a contemporary text in present tense
To evaluate the French festivals and compare with their own cultural context
To apply the past tense using simple conversation

UNIT I **(12 Hours)**

- TITRE: Vivre la ville
- GRAMMAIRE : la comparaison, les prépositions avec les noms géographiques, les pronoms personnels COI, le pronom y (le lieu)
- LEXIQUE : se repérer sur un plan de ville, la ville, les lieux de la ville
- PRODUCTION ORALE : demander et indiquer une direction dans un dialogue
- PRODUCTION ECRITE : décrire votre ville natale, créez les affiches en appréciant votre ville

UNIT II **(12 Hours)**

- TITRE: Visiter une ville
- GRAMMAIRE : la position des pronoms compléments, les verbes du premier groupe en – ger et – cer, les verbes ouvrir et accueillir
- LEXIQUE : dire les informations sur une ville de votre choix, les transports, les points cardinaux, les prépositions de lieu
- PRODUCTION ORALE : Indiquer le chemin
- PRODUCTION ECRITE : Demander des renseignements touristiques

UNIT III **(12 Hours)**

- TITRE: On vend ou on garde
- GRAMMAIRE : la formation du pluriel, les adjectifs de couleurs, l'adjectif beau, nouveau, vieux
- LEXIQUE : savoir comment s'habiller des grandes occasions, les couleurs, les formes, les matériaux
- PRODUCTION ORALE : comprendre une présentation de catalogues vestimentaires en France
- PRODUCTION ECRITE : adresser des souhaits à quelqu'un

UNIT IV **(12 Hours)**

- TITRE: Ventes d'autrefois, ventes d'aujourd'hui
- GRAMMAIRE : les pronoms relatifs qui et que, l'imparfait, les verbes connaître, écrire, mettre et vendre, la question avec inversion
- LEXIQUE : comprendre la description de personnes dans un extrait de roman, les mesures, l'informatique
- PRODUCTION ORALE : imaginez un dialogue avec un personnage célèbre. Utilisez l'inversion.
- PRODUCTION ECRITE : écrire une biographie en utilisant les pronoms relatifs

UNIT V **(12 Hours)**

- TITRE: Félicitations! / On voyage!
- GRAMMAIRE : les pronoms démonstratifs, les articles : particularités, les pronoms interrogatifs variables : lequel, les adverbes de manières, les verbes recevoir et conduire
- LEXIQUE : les moyens de transports, les voyages, les fêtes, l'aéroport et l'avion, la gare et le train, l'hôtel
- PRODUCTION ORALE : Présenter ses vœux–
- PRODUCTION ECRITE : Faire une réservation

Teaching Methodology	PPT Presentation, Seminar, Video Assignments

Book for Study

1. Dauda, P., Giachino, L., & Baracco, C. (2016). *Generation A1*. Didier.

Books for Reference

1. Girardet, J., & Pecheur, J. (2017). *Echo A1*. (2nd Ed.). CLE International.
2. Mérieux, R., & Loiseau, Y. (2012). *Latitudes A1*. Didier.
3. Fournier, I. (2011). *Talk French.* Goyal Publishers.

Websites and eLearning Sources

1. https://francais.lingolia.com/en/grammar/prepositions
2. https://www.lawlessfrench.com/grammar/present-tense/
3. https://www.thoughtco.com/textures-french-adjectives-and-expressions-1368980
4. https://study.com/academy/lesson/past-tense-in-french.html
5. https://absolutely-french.eu/french-celebrations/?lang=en

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Relate colours, materials and shapes to the french clothing.	**K1**
CO2	Select appropriate prepositions in giving directions.	**K2**
CO3	construct a text in present tense using different verbs.	**K3**
CO4	examine the travel manners and celebrations of the French.	**K4**
CO5	justify the usage of past tense in a biography.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**							**Hours**		**Credits**
3	**23UFR31GL03**	French - 3							**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	2	2	3	2	3	1	2	3	**2.1**
CO2	3	2	3	3	1	2	1	2	2	3	**2.2**
CO3	2	1	3	2	2	3	1	3	2	2	**2.1**
CO4	3	1	3	2	3	3	3	1	2	3	**2.4**
CO5	3	2	3	2	2	3	3	2	2	1	**2.3**
										Mean Overall Score	**2.22 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UHI31GL03	Hindi - 3	4	3

Course Objectives
To appreciate the features of Modern Hindi Prose
To understand the Hindi literature in association with the contemporary requirements
To enable the students to develop their effective communicative skills in Hindi
To strengthen the language competence among the students
To empower the students with globally employable soft skills

UNIT I **(12 Hours)**

- Tera Sneh Na Khooon
- Samband Bodak
- Reethikal - Namakarn
- Tense

UNIT II **(12 Hours)**

- Himadri Thung Sring Se
- Paribakshik Shabdavali
- Smuchaya Bodak
- Reethikal - Samajik Paristhithiyam

UNIT III **(12 Hours)**

- Insan Our Kuthae
- Vismayadi Bodak
- Reethikal - Sahithyik Paristhithiyam
- Reethikal - Salient Features

UNIT IV **(12 Hours)**

- Shokgeeth
- Avikary Shabdh
- Reethikal - Main Divisions
- Social Media and Modern World

UNIT V **(12 Hours)**

- Reethikal - Visheshathayem
- Anuvad
- Bahoo Ki Vidha (One Act Play)

Teaching Methodology	Videos, PPT, Quiz, Group Discussion, Case Based Problem Solving

Books for Study

1. Jain, S.K. (2019). *Anuwad: Siddhant Evam Vyavhar*. Kailash Pustak Sadan.
2. Gupth, K. M. (2020). *Hindi Vyakaran*, Anand Prakashan.
3. Bosalae, S. (2020). *kavya sarang*. Rajkamal Prakashan.

Books for Reference

1. Ramdev. (2016). *Vyakaran Pradeep*. Hindi Bhavan.

2. Singh, L.P. (2017). *Kavya Ke Sopan*. Bharathy Bhavan Prakashan.
3. Shukla, A.R. (2021). *Hindi Sahitya Ka Itihas*, Prabhat Prakashan.
4. Gosamy, K. (2016). *Anuvad vigyan ki Bhumika*. Rajkamal Prakashan.

Websites and eLearning Sources

1. https://www.hindwi.org/poets/jaishankar-prasad/all
2. https://youtu.be/e9wK-pYfVPc
3. https://www.amarujala.com/kavya/sahitya/sumitranandan-pant-best-hindi-poems
4. https://mycoaching.in/samuchchay-bodhak-kya-hai
5. https://www.subhshiv.in/2021/06/avikari-shabd.html

Course Outcomes		
CO No.	**CO-Statements** On successful completion of the course, the student will able to	**Cognitive Levels (K - Level)**
CO1	find out the dialects of Hindi language.	**K1**
CO2	compare the poems of Sumithra Nandanpanth, Prasad & Bachan in Context with their experience of life.	**K2**
CO3	illustrate the importance given to family ethics by the youth in the modern period according to “Bahoo Ki vidha” One Act play.	**K3**
CO4	categorize the poetics in some selective poems.	**K4**
CO5	justify the social & political conditions of Devotional period in Hindi Literature.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours**			**Credits**
3	**23UHI31GL03**			Hindi - 3				**4**			**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	3	2	3	2	1	3	2	**2.4**
CO2	3	2	3	2	2	3	2	3	2	3	**2.5**
CO3	3	2	2	3	1	3	2	3	2	3	**2.4**
CO4	2	3	3	2	3	2	3	3	2	1	**2.4**
CO5	3	2	2	3	3	2	1	3	2	3	**2.4**
									Mean Overall Score		**2.42 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23USA31GL03	Sanskrit - 3	4	3

Course Objectives
To introduce simple poetry in Sanskrit
To give an exposure to the Vedas and Vedangas
To acquaint students with epics and puranas
To train students in conjugation of verbs in future tense
To introduce Upasarga-s and their role in verb formations

UNIT I **(12 Hours)**

Ramodantam , Balakandam (1-15 verses)

UNIT II **(12 Hours)**

Ramodantam, Balakandam (15-30 verses)

UNIT III **(12 Hours)**

Vedas - Vedangas vivaranam

UNIT IV **(12 Hours)**

Asta dasha Purana and Dashopanishads

UNIT V **(12 Hours)**

Upasargas and Bhavishyat Kaalah Vakya Prayoga

Teaching Methodology	Videos, PPT, Blackboard, Demonstration, Exercises

Books for Study

1. Vedic literature
2. Ramodantam

Books for Reference

1. Parameshwara. (2018). *Ramodantam*. LIFCO Chennai.
2. Vadhyar, R. S., & Sons. (2019). *History of Sanskrit Literature,* Book - sellers and publishers , Kalpathu ,Palghat, Kerala , south India.
3. Kulapathy, K.M Saral *Sanskrit Balabodh, Bharathita vidya bhavan,* Munshimarg.

Websites and eLearning Sources

1. https://www.scribd.com/doc/210917188/Sri-Ramodantam-Sanskrit-Text-With-English-Translation
2. http://www.sushmajee.com/ms-ppp/text/ved-notes.pdf
3. https://occr.org.in/publication/Vedanga.pdf
4. https://www.forgottenbooks.com/en/download/TheThirteenPrincipalUpanishadsTranslatedFromtheSanskrit_10017247.pdf
5. https://www.learnsanskrit.org/guide/uninflected-words/the-upasarga/

Course Outcomes		
CO No.	CO-Statements On successful completion of this course, students will be able to	Cognitive Levels (K - Level)
CO1	Remember Characters and events of Ramayana	K1
CO2	Understand social ethics and moral duties.	K2
CO3	Apply the values learnt, in day to day life	K3
CO4	Appreciate the Vedic Philosophy	K4
CO5	Evaluate and create new words with upasargas	K5

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
3	**23USA31GL03**		Sanskrit - 3						**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	2	2	3	3	3	3	3	2	1	2.3
CO2	3	3	2	3	3	2	2	3	3	3	2.7
CO3	3	3	1	3	3	1	1	3	3	3	2.4
CO4	2	2	1	2	3	2	2	3	2	1	2.0
CO5	3	3	2	3	2	2	3	3	3	2	2.6
										Mean Overall Score	**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UEN32GE03	General English - 3	5	3

Course Objectives
To develop strategies to enhance reading skills through teacher-led practices, promoting comprehension, critical analysis, and creative engagement with various genres.
To strengthen informal and formal letter writing skills.
To analyze and appreciate different literary forms, including anecdotes, biographies, poems, and prose, fostering critical thinking and creative expression.
To practice applying grammatical structures, including the simple future and future continuous tenses, in writing tasks.
To engage in critical discussions through reading and writing about societal issues.

UNIT I: Suggestions to Develop Your Reading Habit **(13 Hours)**

1.0 Introduction
1.1 Objectives
1.2 Listening and Reading Skills through Teacher-led Reading Practice
1.3 Glossary
1.3.1 Words
1.3.2 Phrases
1.4 Reading Comprehension
1.5 Critical Analysis
1.6 Creative Task
1.7 General Writing Skill: Letter Writing: Informal
1.8 Grammar: Simple Present Tense

UNIT II: The Secret of Success: An Anecdote **(13 Hours)**

1.9 Introduction
2.0 Objectives
2.1 Listening and Reading Skills through Teacher-led Reading Practice
2.2 Glossary
2.3.1 Words
2.3.2 Phrases
2.4 Reading Comprehension
2.5 Critical Analysis
2.6 Creative Task
2.7 General Writing Skills: Letter Writing: Formal
2.8 Grammar: Present Continuous Tense

UNIT III: The Impact of Liquor Consumption on the Society **(13 Hours)**

2.9 Introduction
3.0 Objectives
3.1 Listening and Reading Skills through Teacher-led Reading Practice
3.2 Glossary
3.3.1 Words
3.3.2 Phrases
3.4 Reading Comprehension
3.5 Critical Analysis
3.6 Creative Task
3.7 General Writing Skills: Letter to Newspaper
3.8 Grammar: Simple Past Tense

UNIT IV: Dr. A.P.J. Abdul Kalam: A Short Biography **(12 Hours)**

3.9 Introduction
4.0 Objectives
4.1 Listening and Reading Skills through Teacher-led Reading Practice
4.2 Glossary
4.3.1 Words
4.3.2 Phrases
4.4 Reading Comprehension
4.5 Critical Analysis
4.6 Creative Task
4.7 General Writing Skill: Write a letter applying for a job
4.8 Grammar: Past Continuous Tense

UNIT V: Golden Rule: A Poem **(12 Hours)**

4.9 Introduction
5.0 Objectives
5.1 Listening and Reading Skills through Teacher-led Reading Practice
5.2 Glossary
5.3.1 Words
5.3.2 Phrases
5.4 Reading Comprehension
5.5 Critical Analysis
5.6 Creative Task
5.7 Grammar: Simple Future Tense
5.8 General Writing Skill: Circular-Writing

UNIT VI: Hygiene **(12 Hours)**

5.9 Introduction
6.0 Objectives
6.1 Listening and Reading Skills through Teacher-led Reading Practice
6.2 Glossary
6.3.1 Words
6.3.2 Phrases
6.4 Reading Comprehension
6.5 Critical Analysis
6.6 Creative Task
6.7 General Writing Skill: Writing an Agenda for a Meeting
6.8 Grammar: Future Continuous Tense

Teaching Methodology	Lecture Method, Use of ICT Tools and Interactive method

Book for Study

1. Jayraj., & Arul, S.J. et al. (2016). *Trend-Setter*: *An Interactive General English Textbook for Undergraduate Students*. Trinity.

Course Outcomes		
CO No.	**CO-Statements** On completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	recall and explain the fundamental components of English language and grammar.	**K1**
CO2	demonstrate their understanding of various texts by summarizing, paraphrasing, and interpreting the contents.	**K2**
CO3	apply their language and comprehension skills to create written communication.	**K3**
CO4	critically analyze the texts presented in the course.	**K4**
CO5	synthesize the language and grammar knowledge to compose creative tasks	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**23UEN32GE03**			General English - 3						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	**2.4**
CO2	2	2	3	2	3	3	2	3	2	2	**2.3**
CO3	2	3	2	3	2	2	3	2	3	2	**2.4**
CO4	2	2	3	2	3	3	2	3	2	3	**2.5**
CO5	2	2	2	3	2	2	2	3	2	2	**2.2**
										Mean Overall Score	**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UST33CC05	**Core Course - 5:** Discrete Probability Distributions	6	5

Course Objectives
Learn the basic concept of probability distribution of a discrete random variable.
Learn the concepts of the mean, variance, MGF and how to compute them.
Impart the knowledge of discrete probability distributions.
Know moments of discrete probability distributions.
Learn various characteristic functions of discrete probability distributions.

UNIT I **(18 Hours)**

Binomial Distribution: Introduction-Bernoulli's Distribution - Moments - Recurrence relation for the moments - Mean deviation about mean - Mode-Moment Generating Function - Additive property-Cumulants - Recurrence relation for cumulants - Fitting of Binomial Distribution.

UNIT II **(18 Hours)**

Poisson Distribution: Introduction-Moments-Mode - Recurrence relation for the moments-Moment Generating Function - Characteristic function-Cumulants - Additive property - Fitting of Poisson Distribution.

UNIT III **(18 Hours)**

Negative Binomial Distribution: Introduction - Moment Generating Function - Cumulants-Poisson as a limiting case of Negative Binomial Distribution.

UNIT IV **(18 Hours)**

Geometric Distribution: Introduction - Lack of memory concept-MGF - Moments. **Hyper geometric Distribution**: Introduction - Mean and Variance. Approximation to Binomial Distribution.

UNIT V **(18 Hours)**

Multinomial Distribution: Introduction, Moments. **Power Series distribution**: M.G.F Recurrence relation for cumulants. Particular case of General Power Series distribution.

Teaching Methodology	YouTube videos, PPT, Black Board teaching and Handouts.

Book for Study

1. Gupta, S.P. & Kapoor, V.K. (2000). *Fundamentals of Mathematical Statistics*, (12th Ed.). Sultan Chand & Sons.

Books for Reference

1. Johnson, N. L. & Kotz, S. (1969). *Discrete Distributions*. John Wiley and sons.
2. Johnson, N. L. & Kotz, S. (1970). *Continuous univariate Distribution.* Vol.I &Vol.II, John Wiley and sons.
3. N. Balakrishnan & V. B. Nevzorov. (2005). *A primer on Statistical Distributions.* John Wiley & Sons.

Websites and eLearning Sources

1. https://youtu.be/TvkdX6Dw994
2. https://youtu.be/aK_RZxARlYo

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	match the discrete probability distributions with real life situations	**K1**
CO2	obtain the moments of discrete probability distributions using recurrence relations.	**K2**
CO3	use probability distributions for discrete random variables to estimate probabilities and identify unusual events.	**K3**
CO4	build the discrete probability distributions using recurrence probabilities.	**K4**
CO5	derive the moment generating functions of the discrete probability distributions	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**23UST33CC05**			**Core Course - 5:** Discrete Probability Distributions						**6**	**5**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	1	2	3	1	3	2	3	2	1	**2.1**
CO2	2	3	3	2	1	3	3	3	2	1	**2.3**
CO3	3	2	2	2	3	2	3	2	3	2	**2.4**
CO4	2	3	3	2	1	2	3	1	3	1	**2.1**
CO5	3	2	2	3	2	3	2	3	2	1	**2.3**
									Mean Overall Score		**2.24(High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UST33CC06	**Core Course - 6:** Continuous Probability Distributions	7	5

Course Objectives
Learn the characteristics of Normal distributions
Learn the relationship between beta and gamma distribution
Know the memory less property of exponential distribution
Find the mean and variance of standard Laplace distribution and Weibul distribution
Understand the relationship between t and F distributions

UNIT I **(21 Hours)**

Normal Distribution: Introduction, Limiting form of Binomial Distribution, Chief characteristics and its curve- Mean, Median, Mode, M.G.F, Moments and Cumulants - Importance of Normal Distribution - Fitting of Normal distribution. Concept of Bivariate and Multivariate Normal distribution (Concept only).

UNIT II **(21 Hours)**

Rectangular Distribution: Introduction, M.G.F, Moments, Mean deviation about mean. **Beta Distributions of I and II kind:** M.G.F, Mean, Harmonic mean, Moments. **Gamma Distribution**: M.G.F, Mean, Moments, Relationship between Beta and Gamma Distributions.

UNIT III **(21 Hours)**

Exponential Distribution: Definition, MGF-Mean - Variance-Characteristic function -Lack of Memory property. **Cauchy's distribution**: Characteristic function, Additive property and Moments. **Lognormal distribution:** Moments

UNIT IV **(21 Hours)**

Standard Laplace distribution: Characteristic function - Mean - Variance. **Weibul distribution**: M.G.F, Mean, Variance (simple problems only).

UNIT V **(21 Hours)**

Sampling distributions: t distribution: Derivations of Constants and Limiting form. **χ^2-distribution:** Derivation of pdf, Constant, MGF and additive property. **Non Central χ^2:** Concept only. **F distribution:** Derivations of Constants and MGF-Relationship between t and F and F and χ^2.

Teaching Methodology	YouTube videos, Chat and Talk, PPT and Handouts.

Book for Study

1. Gupta, S. P. & Kapoor, V. K. (2020). *Fundamentals of Mathematical Statistics*, (12th Ed.). Sultan Chand & Sons.

Books for Reference

2. Johnson, N. L. & Kotz, S (1969). *Discrete Distributions.* John Wiley and Sons.
3. Johnson, N. L. & Kotz, S. (1970). *Continuous univariate Distributions.* (Vol. I & Vol. II). John Wiley and Sons.

Websites and eLearning Sources

1. https://statisticsbyjim.com/basics/normal-distribution/
2. https://statproofbook.github.io/P/beta-var.html
3. https://www.itl.nist.gov/div898/handbook/eda/section3/eda3663.htm
4. https://math.stackexchange.com/questions/902568/mean-and-variance-of-the-weibull-distribution
5. https://gargicollege.in/wp-content/uploads/2020/03/Statistical-Distributions-Normal-T-Chi-F-distribution.pdf

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	acquire the knowledge of continuous probability distributions with real life situations	**K1**
CO2	explain the moments, MGF, mean and variance of different continuous distributions	**K2**
CO3	use a probability distribution for a continuous random variable to estimate probabilities	**K3**
CO4	apply various distributions to solve real life problems.	**K4**
CO5	perform probability calculations relating to probability density functions for continuous random variables.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**23UST33CC06**			**Core Course - 6:** Continuous Probability Distributions						**7**	**5**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	3	3	1	2	3	2	3	2	1	**2.1**
CO2	2	2	3	1	2	3	3	3	3	2	**2.4**
CO3	3	2	1	3	3	2	3	2	3	2	**2.4**
CO4	3	1	1	3	3	1	2	1	3	3	**2.1**
CO5	3	1	1	3	3	1	2	1	3	3	**2.1**
									Mean Overall Score		**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UST33AO01A	**Allied Optional - 1:** Office Automation	6	4

Course Objectives
Make students familiar with general purpose office automation tools.
Familiarize the students in preparation of documents and presentations with office automation tools.
Train the students to get acquainted with the essential features of constituents of MS
Impart knowledge about the Internet, web surfing and E
Train the students in Microsoft Office has different components like MS- Word, MS Excel and Power point.

UNIT I **(18 Hours)**

Windows OS: Installing MS office 2010-File tab, Title bar, Status bar, Quick access toolbar, Windows Explorer-My Computer - My Documents - Folder Creation-Creating, Copying, Editing and Deleting a File-Find and Replace Facility-Desktop Configuration-File Compression and extraction.

UNIT II **(18 Hours)**

MS Word: Basics - Creating, saving, Previewing and Printing a Word document - Editing: cut, copy, paste, find, replace, undo, redo, and book working-Applying Basic formatting: changing font and font size-bold, italic and under line features - color selection-alignment-Bullet and Numbered Lists.

UNIT III **(18 Hours)**

MS Word: Designing and reviewing - Adding a Table to a document-deleting, merging and splitting cells-Adding and deleting columns and rows. Inserting a Picture-clip Art, Shape and Smart Art, Capturing a screenshot, Compressing and Cropping an image, Removing background from an image-Designing and reviewing a word document-Headers and Footers-Page margins, page orientation, page breaks-Performing Spelling and grammar checks.

UNIT IV **(18 Hours)**

MS Excel Worksheet Basics & Statistical Applications: Data Entry on the Worksheet-Built-in functions-Operations on Table-printing the data and results. Construction of Line charts, Bar charts, Pie charts and scatter diagrams, Summary Statistics (Measures of central Tendency, Variation, Skewness and kurtosis)-Correlation and Regression Analysis. Descriptive Statistics-Data Analysis PAK in Excel –Frequency Distribution, Histogram, Cross Tabulation and Pivot Tables.

UNIT V **(18 Hours)**

MS PowerPoint: Introduction to MS-Power point, changing the layout of slides, Applying themes to a presentation, organization charts, graphs-working with slides, slide show and printing presentation.

Teaching Methodology	YouTube videos, PPT, Black Board teaching and Handouts.

Book for Study

1. Office 2010 in simple steps. Kogent solutions Team. Dream Tech.

Books for Reference

1. K. V. S. Sharma. (2006). *Statistics made simple*. PHI.

2. Peter Weverka. (2016). *Microsoft Office All-In-One for Dummies*. John Wiley and Sons.

Website and eLearning Source

1. https://www.udemy.com/course/ms-office-2010-complete-training/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	acquire the knowledge on Design text, pictures with MS-word, Ms-Excel and PowerPoint	**K1**
CO2	understand the Windows Operating system	**K2**
CO3	compute various statistical measures	**K3**
CO4	draw the statistical diagrams and analyse the data using Excel function	**K4**
CO5	to perform documentation · to perform accounting operations to perform presentation skills	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
3	**23UST33AO01A**			**Allied Optional - 1:** Office Automation					**6**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	3	2	3	3	2	2	2	2	**2.3**
CO2	1	3	2	3	2	2	3	2	1	3	**2.2**
CO3	3	2	3	2	2	3	2	2	3	3	**2.5**
CO4	2	3	2	3	2	2	2	3	3	2	**2.4**
CO5	3	2	2	2	3	2	2	3	2	3	**2.4**
										Mean Overall Score	**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UST33AO01B	**Allied Optional - 1:** Accounts - 1	6	4

Course Objectives
To facilitate the students to understand systematic and scientific methods of Book keeping
To provide the practical knowledge about the preparation of financial statements such as Income statements and balance sheet
To give practical understanding regarding the process of preparation of final accounts of Non trading organisations
To make the students to understand the concept of single-entry system of book keeping and its conversion into double entry system of book keeping
To offer clear insight about the process of rectification of errors and preparation of Banking reconciliation statement

UNIT I: Introduction of Financial Accounting **(18 Hours)**

Accounting- Different types - Financial accounting - Book Keeping -Meaning - objectives - Principles, Concepts and Conventions - Type of accounts - Golden rules of recording - Journal Subsidiary Books (purchase book, sales book, purchase return book, sale return book & Cash book -Ledger.

UNIT II: Accounts for Sole Trader **(18 Hours)**

Trial balance - Trading, Profit and Loss Accounts, Balance Sheet of Sole Trader (closing stock, outstanding expenses, prepaid expenses, income receivable, income received in advance, depreciation and provision for bad debts.

UNIT III: Accounts for Non-trading Concerns **(18 Hours)**

Accounts for Non-trading concerns - Receipts and payment account Vs Income and Expenditure account - Preparation of Income and Expenditure Account from Receipts and Payment Accounts (simple adjustments).

UNIT IV: Single Entry System **(18 Hours)**

Single Entry system - Defects of single - entry system - Double entry system Vs single entry system - Calculation of profit/loss - net worth method conversion method

UNIT V: Rectification of Errors **(18 Hours)**

Errors - Classification - Rectification - Suspense Account - Preparation of Bank Reconciliation Statement.

Teaching Methodology	Chalk & Talk, Videos, PPTs, Demonstration and Creation of Models

Book for Study

1. Gupta, R.L., & Radhaswamy, M. (2017). *Financial Accounting*. Sultan Chand & Sons.

Books for Reference

1. Jain, S. P., & Narang, K.L. (2015). *Advanced Accountancy*, Volume I. Kalyani Publishers.
2. Reddy, T.S., & Murthy. (2020). *Financial Accounting.* Margham Publications.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	describe the accounting concepts, conventions and rules used in journalizing business transactions	**K1**
CO2	prepare Trial Balance, Final Accounts and Bank Reconciliation Statement	**K2**
CO3	calculate surplus / deficit of Non-Profit Organizations through Income and Expenditure Account	**K3**
CO4	differentiate Single Entry from Double Entry system of Accounting	**K4**
CO5	classify and rectify errors by applying accounting rules	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
3	**23UST33AO01B**			**Allied Optional - 1:** Accounts - 1					**6**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	3	2	2	2	2	2	2	**2.2**
CO2	3	2	2	2	2	2	3	2	3	3	**2.4**
CO3	2	3	2	3	2	3	2	3	3	3	**2.6**
CO4	2	2	2	1	2	2	2	1	2	2	**1.8**
CO5	3	2	3	3	1	3	1	3	2	1	**2.2**
Mean Overall Score											**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UHE34VE03A	**Value Education - 3:** Social Ethics - 1	2	1

Course Objectives
To gain a comprehensive understanding of the principles advocated in social ethics.
To examine the different types of political systems in a thorough manner.
To comprehend the role and obligations of the educated youth.
To evaluate the conduct of the elected representatives in a detailed manner.
To thoughtfully analyze the various forms of cyber crime.

UNIT I: Introduction to Social Ethics **(6 Hours)**

Social ethics, social ethics and social responsibility, social ethics play an important role on the areas, religion influences social changes and vice versa, secularism. Social ethics and corporate dynamics, forms of social ethics.

UNIT II: The Economic and Political System of Today **(6 Hours)**

Planned economy and communism - market economy and capitalism- socialism - mixed economy -the emerging market economy - political system- totalitarian system- oligarchic system.

UNIT III: Integrity in Public Life National Integration **(6 Hours)**

What is Integrity, Public Life, Integrity and Public Life, Integrity in a Democratic State, India as Democratic State, Behavior of a elected representative of India, Noticeable degradation acts of elected Representatives, Suggestions to stem this rot, Types of integrity, Transparency can be a guarantee for integrity.

UNIT IV: Cyber Crime **(6 Hours)**

Business Ethics, Business ethics permeates the whole organization, Measuring business ethics , The Vital factors highlighting the importance of business ethics , Cyber crime, Strategies in committing Cyber Crimes, Factors aiding Cyber Crime, computer Hacking, Cyber Bullying, Telecommunications piracy, Counter Measures to Cyber Crime, Ethical Hacking.

UNIT V: Social Integration **(6 Hours)**

Global challenges, The future is with the Educational Youth, Cost of the Sacrifice, Crusaders against corruption, Responsibility of the Educated Youth, Positive Global Scenario, Right to Education, Eradicating gender inequality, Sustainable Human Development , Social Integration, Elimination Crime, Integration with Global Market

Book for Study

1. Department of Human Excellence. (2021). *Formation of Youth*, St Joseph's College (Autonomous), Tiruchirappalli.

Books for Reference

1. Arora, R.K. (2014). *Ethics, Integrity and Values*. Public Service Paperback.
2. Cunningham, D. (2004). *There's something happening here: The new left, the Klan, and FBI counterintelligence*. Berkeley: University of California Press.
3. Mali, P. (2017). *Cyber law & Cyber Crimes simplified*. Cyber Info media Paperback.
4. Richardson, M. (2019). *Cyber Crime: Law and Practice Hardcover - Import*.

Websites and eLearning Sources

1. https://cybercrime.gov.in/
2. https://open.lib.umn.edu/sociology/chapter/14-2-types-of-political-systems/

3. https://www.esv.org/resources/esv-global-study-bible/social-ethics/
4. https://en.wikipedia.org/wiki/Political_system

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	know the responsibility of the educated youth.	**K1**
CO2	understand the values prescribed under social ethics.	**K2**
CO3	apply their minds critically to the various types of cyber crime.	**K3**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
3	**23UHE34VE03A**	**Value Education - 3:** Social Ethics - 1								**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	2	2	3	3	**2.7**
CO2	3	2	2	2	3	2	2	3	2	2	**2.3**
CO3	2	3	3	3	2	3	3	3	3	3	**2.8**
										Mean Overall Score	**2.6 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UHE34VE03B	**Value Education - 3:** Religious Doctrine - 1	2	1

Course Objectives
To impart knowledge to students about Salvation History
To familiarize students with the life and mission of Jesus Christ
To help Students understand the Holy Spirit
To empower students on Gospel Values
To equip the students about Mother Mary

UNIT I: God of salvation **(6 Hours)**

UNIT II: Life & Mission of Jesus Christ **(6 Hours)**

UNIT III: The Holy Spirit **(6 Hours)**

UNIT IV: Gospel Values **(6 Hours)**

UNIT V: Mary, the Mother of God **(6 Hours)**

Teaching Methodology	Chalk and Talk, Power point, Assignment and Group discussion

Books for Study

1. Department of Human Excellence. (2022). *Fullness of Life.* St. Joseph's College, Tiruchirappalli.

Books for Reference

1. (1994). *Compendium: Catechism of the Catholic Church.* Bengaluru: Theological Publications in India.
2. Holy Bible (NRSV).

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	understand the Salvation History	**K1**
CO2	grasp to the life and purpose of Jesus Christ	**K2**
CO3	live out the teachings of the Gospel	**K3**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**23UHE34VE03B**			**Value Education - 3:** Religious Doctrine - 1						**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	2	2	3	3	**2.7**
CO2	3	2	2	2	3	3	3	3	2	2	**2.5**
CO3	2	2	3	3	2	2	3	3	3	3	**2.6**
										Mean Overall Score	**2.6 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UTA41GL04B	General Tamil - 4: அறிவியல் தமிழ் (Scientific Tamil)	4	3

கற்றலின் நோக்கங்கள்
அன்றாட வாழ்வில் அறிவியலின் செல்வாக்கை அறிந்துகொள்ளுதல்
பண்டைத்தமிழர் வாழ்வில் இடம்பெற்ற அறிவியல்கூறுகளைக் கண்டறிதல்
அறிவியலின் வளர்நிலைகளையும் வகைப்பாடுகளையும் கண்டுணர்தல்
பண்டைத்தமிழரின் பல்துறைச் சிந்தனைகள்வழி தமிழர் தம் பண்பாட்டு மேன்மையை உணர்தல்
படைப்பாற்றல் திறனைக் கண்டறிந்து வளர்த்தெடுத்தல்

அலகு 1 **(12 மணி நேரம்)**

தொல்காப்பியம்: நிலம் தீ நீர் வளி விசும்போடு (தொல். பொருள் 635)

ஒன்றறிவதுவே (தொல். பொருள் 571)

புறநானூறு

மண் திணித்த நிலனும் (புறம் 2 1- 6) செஞ்ஞா யிற்றுச் செலவும் (புறம் 30 1- 7)

அகநானூறு

அம்ம வாழி, தோழி (அகம் 141: 1-11) செஞ்ஞா யிற்றுச் செலவும் (புறம் 30 1-7)

பதிற்றுப்பத்து

நிலம் நீர் வளி விசும்பு என்ற நான்கின் (பதிற்று 14:1-4)

நெடுவயின் ஒளிறு மின்னுப் பரந்தாங்கு (பதிற்று 24:1-26)

உரைநடைக்கட்டுரை: வியக்க வைக்கும் தமிழரின் அறிவியல்

அலகு 2 **(12 மணி நேரம்)**

சித்தர் பாடல்கள்

பதார்த்த சிந்தாமணி

குளத்து சலந்தானே கொடிதான (27) ஏரிசலம் வாதமிகு மதுவே (31)

அருவிநீர் மேக மகற்றுங் (39) மேவிய சீவன் வடிவது சொல்லிடில் (திருமூலர்)

அணுவில் அணுவினை ஆதிபிரானை (திருமூலர்)

நட்டகல்லைத் தெய்வமென்று (சிவவாக்கியர்)

உரைநடைக்கட்டுரை: தமிழர்களின் மருத்துவ அறிவியல்

அலகு 3 **(12 மணி நேரம்)**

திருக்குறள் (2 அதிகாரங்கள்)

வான் சிறப்பு, மருந்து வலைப்பூக்கள் உருவாக்கல், பராமரித்தல் புதிய அறிவியல் கலைச்சொல்லாக்கங்களை உருவாக்குதல்

உரைநடைக்கட்டுரை: தமிழ் இலக்கியங்களில் வெளிப்படும் நீர் மேலாண்மையியல்

அலகு 4 **(12 மணி நேரம்)**

புதினம்: சொர்க்கத்தீவு - சுஜாதா நூல் - திறனாய்வு அறிவியல் புனைவு

ஆவணப்படம், திரைப்படம் - திறனாய்வு

உரைநடைக்கட்டுரை: தமிழில் அறிவியல் புனைவுகள்

அலகு 5 **(12 மணி நேரம்)**

அறிவியல்; கலைச்சொற்கள் அன்றாட வாழ்வில் அறிவியல் பழமொழிகளைத் தொகுத்தல் மூலிகைகள், கீரைகள் ஆகியவற்றின் முக்கியத்துவத்தைக் காட்சிப்படுத்துதல். தமிழர் அறிவியல் கண்காட்சி நடத்துதல்

உரைநடைக்கட்டுரை: அறிவியல் தமிழின் வளர்ச்சி நிலைகள்;

கற்பித்தல் முறை	**விரிவுரை (Lecture), காணொளிக் காட்சி (Videos), விளக்கக் காட்சி (PPT presentation)**

பாட நூல்கள்

1. தமிழாய்வுத்துறை (2021), அறிவியல் தமிழ் , தூய வளனார் தன்னாட்சிக் கல்லூரி
2. சுஜாதா (2009), சொர்க்கத்தீவு, லிசா பப்ளிகேஷன்ஸ்,

3. மூர்த்தி அ.கி.(2001) , அறிவியல் கலைச்சொல் அகராதி, மணிவாசகர் பதிப்பகம்.

பார்வை நூல்கள்

1. நெடுஞ்செழியன்(2017), இன்னும் மீதமிருக்கிறது நம்பிக்கை, பூவுலகின் நண்பர்கள் வெளியீடு
2. குழந்தைசாமி.வா.செ., (2001), அறிவியல்தமிழ், பாரதி பதிப்பகம்

Websites and eLearning Sources

1. www.tamilvu.org
2. www.tamildigitallibrary.in
3. https://www.tamiluniversity.ac.in/english/library2-/digital-library/
4. https://www.tamilelibrary.org/

Course Outcomes		
CO No.	**CO-Statements** ***இப்பாடத்தின் நிறைவில் மாணவர்கள்***	**Cognitive Levels (K - Level)**
CO1	பண்டைய தமிழர்களின்; அறிவியல் அறிவை அறிந்து கொள்வர்.	**K1**
CO2	பண்டைய தமிழ் இலக்கியங்களுள் காணாலும் அறிவியல் சிந்தனைகளைப் புரிந்துகொள்வர்.	**K2**
CO3	தமிழரின் அறிவியல் மருத்துவத்தையும், நீர் மேலாண்;மை அறிவையும் அறிந்து கொள்வர்.	**K3**
CO4	இக்கால இலக்கியங்களுள் அறிவியல்துறை பெற்றுள்ள இடத்தை அறிந்து கொள்வர்.	**K4**
CO5	அறிவியல் கலைச்சொற்களைத் தமிழில் கற்றுக் கொண்டு அறிவியல்தமிழ் வளரத் துணைபுரிவர்.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**23UTA41GL04B**			**General Tamil - 4: *அறிவியல் தமிழ்* (Scientific Tamil)**					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	2	3	2	2	3	3	2	2	2	**2.2**
CO2	2	2	3	2	2	2	3	2	3	2	**2.3**
CO3	1	2	2	3	2	2	2	3	3	3	**2.3**
CO4	2	2	3	2	2	3	2	3	3	2	**2.4**
CO5	3	1	2	2	2	2	3	2	3	3	**2.3**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UFR41GL04	French - 4	4	3

Course Objectives
To analyse the French clothing with respect to its culture
To apply prepositions and understand its usages
To analyse a contemporary text in present tense
To evaluate the French festivals and compare with their own cultural context
To apply the past tense using simple conversation

UNIT I **(12 Hours)**

- TITRE: On fait le mélange!
- GRAMMAIRE : le présent progressif, les pronoms possessifs, la phrase négative
- LEXIQUE : décrire les étapes d'une action, la maison, les taches ménagères
- PRODUCTION ORALE : comprendre le récit d'un voyage
- PRODUCTION ECRITE : raconter ses actions quotidiennes

UNIT II **(12 Hours)**

- TITRE: à propos de logement
- GRAMMAIRE : quelques adjectifs et pronoms indéfinis, les verbes lire, rompre et se plaindre
- LEXIQUE : la localisation et le logement, les pièces, meubles et équipement
- PRODUCTION ORALE : jeu de rôle –votre ami et vous s'installe dans un nouveau meuble
- PRODUCTION ECRITE : décrire votre maison/appartement

UNIT III **(12 Hours)**

- TITRE: Tous en forme!
- GRAMMAIRE : le passé composé et l'imparfait, le passé récent, l'expression de la durée
- LEXIQUE : un souvenir et les événements du passées, le corps humain : extérieur, le corps humain : intérieur
- PRODUCTION ORALE : échanger sur ses projets de vacances
- PRODUCTION ECRITE : raconter un souvenir

UNIT IV **(12 Hours)**

- TITRE: Accidents et catastrophes
- GRAMMAIRE : les adjectifs et les pronoms indéfinis : rien/ personne/aucun, les verbes dire, courir et mourir
- LEXIQUE : savoir les mots et les expressions des catastrophes naturelles, les maladies et les remédies, les accidents, les catastrophes naturelles
- PRODUCTION ORALE : comprendre des personnes qui expriment leur accord ou leur désaccord selon un thème donné
- PRODUCTION ECRITE : écrivez sur une catastrophe naturelle en articulant la cause et la conséquence

UNIT V **(12 Hours)**

- TITRE: Faire ses études a l'étranger/ bon voyage/ la météo
- GRAMMAIRE : les pronoms démonstratifs neutres, le futur simple, situer dans le temps, moi aussi/non-plus – moi non/si, les verbes impersonnels, les verbes croire, suivre et pleuvoir

- LEXIQUE : savoir vivre en France, le système scolaire, les formalités pour partir à l'étranger, la météo
- PRODUCTION ORALE : exprimer son opinion sur la météo/parler de l'avenir
- PRODUCTION ECRITE: comparer le système scolaire français et indien

Teaching Methodology	Workshop, group activity, Sharing contemporary french cultural videos

Book for Study

1. Dauda, P., Giachino, L., & Baracco, C. (2016). *Generation A1*. Didier.

Books for Reference

1. Girardet, J., & Pecheur, J. (2017). *Echo A1*. (2nd Ed.). CLE International.
2. Mérieux, R., & Loiseau, Y. (2012). *Latitudes A1*. Didier.
3. Fournier, I. (2011). *Talk French.* Goyal Publishers.

Websites and eLearning Sources

1. https://www.frenchcourses-paris.com/french-travel-journal/
2. http://www.saberfrances.com.ar/vocabulary/house.html
3. https://www.thoughtco.com/different-past-tenses-in-french-1368902
4. https://www.youtube.com/watch?v=JZdwJM7sEY8
5. https://www.scholaro.com/pro/Countries/France/Education-System

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	recall the vocabulary pertaining to dwelling place.	**K1**
CO2	outline crisis management in France.	**K2**
CO3	develop a travel diary of your own.	**K3**
CO4	simplify the French education system.	**K4**
CO5	interpret past tenses in a text.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
4	**23UFR41GL04**		French - 4						**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	1	3	2	2	3	2	1	2	2	**2.1**
CO2	3	1	2	3	3	3	2	1	3	1	**2.2**
CO3	3	2	3	2	2	3	2	1	3	2	**2.3**
CO4	3	1	2	2	3	3	3	1	3	3	**2.4**
CO5	2	2	3	3	1	3	1	2	3	2	**2.2**
										Mean Overall Score	**2.24 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UHI41GL04	Hindi - 4	4	3

Course Objectives
To strengthen the language competence among the students
To equip students with cinematic perspective by comparative studies of Hindi literature
To enable the students to develop their effective communicative skills in Hindi
To strengthen the language competence among the students
To incept research-oriented aspirations among students

UNIT I **(12 Hours)**

- Computer Ka Yug
- Prathyay
- Adhunik Kal – Namakarn
- Namakaran

UNIT II **(12 Hours)**

- Vigyan Hani/Labh
- Paryayvachy Shabdh
- Adhunik Kal - Samajik Paristhithiyam
- Samanarthy Shabdh

UNIT III **(12 Hours)**

- Nari Shiksha
- Upasarg
- Adhunik Kal – Sahithyik Paristhithiyam
- Adhunik Kal – Salient Features

UNIT IV **(12 Hours)**

- Review- Book/Film
- Paryavaran Pradookshan
- Adhunik Kal - Main Divisions
- Adhunik Kal - Visheshathayem

UNIT V **(12 Hours)**

- Sapnom Kee Home Delivery (Novel)
- Anuvad

Teaching Methodology	Debate Participation, Videos, PPT, Quiz, Project Work

Books for Study

1. Bosalae, S. (2020). *kavya sarang*. Rajkamal Prakashan.
2. Gupth, M. K. (2020). *Hindi Vyakaran*. Anand Prakashan.
3. Jain, S.K. (2019). *Anuwad: Siddhant Evam Vyavhar*. Kailash Pustak Sadan.

Books for Reference

1. Chaturvedi, R.P. (2015). *Hindi vyakarana*. Upakar Prakashan.
2. Ramdev. (2016). *Vyakaran Pradeep*. Hindi Bhavan.
3. Gosamy, K. (2016). *Anuvad vigyan ki Bhumika*. Rajkamal Prakashan.
4. Shukla, A. R (2021). *Hindi Sahitya Ka Itihas*, Prabhat Prakashan.

Websites and eLearning Sources

1. https://youtu.be/xmr-DaQ3LhA
2. https://mycoaching.in/adhunik-kaal
3. https://m.sahityakunj.net/entries/view/bhartiya-sahitya-mein-anuvad-kee-bhoomika
4. https://mycoaching.in/upsarg-in-hindi
5. https://kalingaliteraryfestival.com/speakers/mamta-kalia/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of the course, the student will able to	**Cognitive Levels (K - Level)**
CO1	list out the social conditions prevailed in Modern Period which are depicted in Hindi Literature.	**K1**
CO2	discuss the dialects of Hindi language.	**K2**
CO3	illustrate the works of some eminent Hindi Writers related to society.	**K3**
CO4	analyze the human values expressed in life and literature of Hindi Novelist “Mamatha Kaliyah”.	**K4**
CO5	evaluate the film & Literary works in Hindi.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours**		**Credits**	
4	**23UHI41GL04**			Hindi - 4				**4**		**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	3	3	2	3	2	3	1	2.4
CO2	3	2	3	3	2	3	2	3	1	2	2.4
CO3	3	2	2	3	2	2	1	3	2	3	2.3
CO4	3	2	3	1	3	3	2	3	3	2	2.5
CO5	3	2	2	3	3	2	3	2	3	3	2.6
										Mean Overall Score	**2.44 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23USA41GL04	Sanskrit - 4	4	3

Course Objectives
To give an exposure to Sanskrit drama in general
To showcase the structure of pre-kalidasan plays in Sanskrit
To coach students in Sanskrit morphology
To acquaint students with the structures of Sanskrit syntax
To impart communicative skills in Sanskrit by training in the functional aspects of the language

UNIT I **(12 Hours)**

Samskrita Vyavahara sahasri vakiya Prayogaha

UNIT II **(12 Hours)**

Lot Lakaarah, Prayaogh Kartari Vaakyaani

UNIT III **(12 Hours)**

Naatakasya Itihaasah Vivaranam, Thuva and Tum Suffixs

UNIT IV **(12 Hours)**

Karnabhaaram , Naatakasya Visistyam

UNIT V **(12 Hours)**

Samskrita Racanani Vubhavoga

Teaching Methodology	Videos, PPt, Blackboard, Demonstration, Exercises

Books for Study

1. *Karnabhavam & Literature Language*
2. *Dhaatu Manjari*
3. Samskrita Vyavahara Sahasri (*A Collection of One Thousand Sentances*), Samskrita Bharati, Delhi.

Books for Reference

1. Vadhyar, R.S. & Sons. (2019). *History of Sanskrit Literature.* Book - sellers and publishers , Kalpathu ,Palghat, Kerala, south India,
2. Kulapathy, Saral, K.M. (2018). *Sanskrit Balabodh , Bharathita vidya bhavan* , Munshimarg.
3. Bharathi. (2019). *Vadatu sanskritam - Samaskara Binduhu.* S. Aksharam 8th cross, 2nd phase Giri nagar Bangalore.

Websites and eLearning Sources

1. https://sanskritdocuments.org/doc_z_misc_major_works/daily.pdf
2. https://www.learnsanskrit.org/guide/verbs-1/karmani-and-bhave-prayoga/
3. https://ia902903.us.archive.org/7/items/in.ernet.dli.2015.102820/2015.102820.The-Sanskrit-Drama-In-Its-Origin-Development-Theory-And-Practice.pdf
4. https://archive.org/details/oafI_karna-bharam-karnas-burden-of-bhasa-with-dr.-sudhakar-malaviya-gokuldas-sanskrit
5. https://sanskritwisdom.com/composition/essays/sanskrit-language/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	understand human behaviors by studying dramas	**K1**
CO2	remember and identifying Mahabharata characters and events	**K2**
CO3	apply the morals learnt in day to day life	**K3**
CO4	appreciate ancient Sanskrit dramas	**K4**
CO5	create new conversational sentences and to Improve self-character (Personality Development)	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**23USA41GL04**			Sanskrit - 4					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	2	3	3	3	3	3	2	**2.4**
CO2	2	2	3	3	2	3	2	3	3	2	**2.5**
CO3	3	3	2	3	2	1	1	3	3	3	**2.4**
CO4	2	2	3	2	3	3	3	3	2	3	**2.6**
CO5	2	3	3	3	2	1	3	3	3	2	**2.5**
										Mean Overall Score	**2.48 (High)**

Semester	Course Code	Title of the Course	Hours/week	Credits
4	23UEN42GE04	General English - 4	5	3

Course Objectives
To develop and enhance language proficiency in listening, reading, and writing skills through teacher-led reading practice, and comprehension exercises.
To encourage creative thinking through creative tasks and essay writing.
To foster effective communication skills by engaging in tasks that require note-taking, note-making, précis writing, paragraph writing, and the synthesis of information from different sources.
To strengthen grammatical skills by focusing on the application of different tenses and to emphasise grammatical accuracy in various writing tasks.
To encourage students to critically engage with media content and evaluate information.

UNIT I: Women Through the Eyes of Media **(13 Hours)**

1.0 Introduction
1.1 Objectives
1.2 Listening and Reading Skills through Teacher-led Reading Practice
1.3 Glossary
1.3.1 Words
1.3.2 Phrases
1.4 Reading Comprehension
1.5 Critical Analysis
1.6 Creative Task
1.7 General Writing Skill: Writing Minutes of a Meeting
1.8 Grammar: Present Perfect Tense

UNIT II: Effects of Tobacco Smoking **(13 Hours)**

1.9 Introduction
2.0 Objectives
2.1 Listening and Reading Skills through Teacher-led Reading Practice
2.2 Glossary
2.3.1 Words
2.3.2 Phrases
2.4 Reading Comprehension
2.5 Critical Analysis
2.6 Creative Task
2.7 General Writing Skill: Note-Taking
2.8 Grammar: Present Perfect Continuous Tense

UNIT III: Short Message Service (SMS) **(13 Hours)**

2.9 Introduction
3.0 Objectives
3.1 Listening and Reading Skills through Teacher-led Reading Practice
3.2 Glossary
3.3.1 Words
3.3.2 Phrases
3.4 Reading Comprehension
3.5 Critical Analysis
3.6 Creative Task
3.7 General Writing Skill: Note-Making
3.8 Grammar: Past Perfect Tense

UNIT IV: An Engineer Kills Self as Crow Sat on his Head: A Newspaper Report **(12 Hours)**

3.9 Introduction
4.0 Objectives
4.1 Listening and Reading Skills through Teacher-led Reading Practice
4.2 Glossary
4.3.1 Words
4.3.2 Phrases
4.4 Reading Comprehension
4.5. Critical Analysis
4.6. Creative Task
4.7 General Writing Skill: Précis Writing
4.8 Grammar: Past Perfect Continuous Tense

UNIT V: Traffic Rules **(12 Hours)**

4.9 Introduction
5.0 Objectives
5.1 Listening and Reading Skills through Teacher-led Reading Practice
5.2 Glossary
5.3.1 Words
5.3.2 Phrases
5.4 Reading Comprehension
5.5 Critical Analysis
5.6 Creative Task
5.7 General Writing Skill: Paragraph Writing
5.8 Grammar: Future Perfect Tense

UNIT VI: A Handful of Answers: A Zen Tale **(12 Hours)**

5.9 Introduction
6.0 Objectives
6.1 Listening and Reading Skills through Teacher-led Reading Practice
6.2 Glossary
6.3.1 Words
6.3.2 Phrases
6.4 Reading Comprehension
6.5 Critical Analysis
6.6 Creative Task
6.7 General Writing Skill: Writing Short Essays on Current Issues/General Topics
6.8 Grammar: Future Perfect Continuous Tense

Teaching Methodology	Lecture Method, Use of ICT Tools and Interactive method

Book for Study

1. Jayraj., & Arul, S.J. et al. (2016). *Trend-Setter: An Interactive General English Textbook for Under Graduate Students*. Trinity.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	identify and explain key concepts and topics discussed in the course.	**K1**
CO2	understand the content by summarising, paraphrasing, and interpreting the materials presented.	**K2**
CO3	apply their knowledge to create various forms of written communication, such as meeting minutes, notes, précis, paragraphs, and essays.	**K3**
CO4	analyse the application of different tenses in various texts.	**K4**
CO5	synthesise their knowledge by creating creative tasks, including short essays on current issues and general topics	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**23UEN42GE04**			General English - 4					**5**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	**2.4**
CO2	2	2	3	2	3	3	2	3	2	2	**2.3**
CO3	2	3	2	3	2	2	3	2	3	2	**2.4**
CO4	2	2	3	2	3	3	2	3	2	3	**2.5**
CO5	2	2	2	3	2	2	2	3	2	2	**2.2**
										Mean Overall Score	**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UST43CC07	**Core Course - 7:** Estimation Theory	6	5

Course Objectives
Draw inference about unknown population parameters based on random samples
Know the importance of Estimation theory.
Understand the types of estimation.
Explain the methods of obtaining likelihood estimation.
Learn the importance of Baye's estimation

UNIT I **(18 Hours)**

Estimation: Parametric Estimation: Estimator - Characteristics of an Estimator - Consistency and Unbiasedness of an Estimator-Cramer - Rao Inequality. Efficiency - Asymptotic efficiency of an Estimator - Estimators based on Sufficient Statistics - Neyman's Factorization Theorem (without proof) - Rao - Blackwell Theorem.

UNIT II **(18 Hours)**

Methods of point estimation - I : Method of Maximum Likelihood Estimator (MLE) - Properties of MLEs (without proof)-Problems based on MLEs.

UNIT III **(18 Hours)**

Methods of point estimation-II: Method of Moments-Problems-Method of Least Squares - Method of Minimum Chi-square - Method of Minimum Variance - Minimum Variance Unbiased Estimation (MVUE) - Problems based on MVUE.

UNIT IV **(18 Hours)**

Interval estimation: Concept - Interval estimation in case of large samples - Confidence interval for proportions, means and variances based on Normal distribution - Confidence interval for means and variances based on Students - t distribution. Confidence interval for Correlation Coefficient.

UNIT V **(18 Hours)**

Bayes Estimation: Elements of Baye's estimation-Loss Functions, Bayes' Risk, Prior and Posterior distributions-Examples.

Teaching Methodology	Chalk and Talk, YouTube videos, PPT and Handouts.

Books for Study

1. Gupta, S. P. & Kapoor, V. K. (2020). *Fundamentals of Mathematical Statistics*, (12th Ed.). Sultan Chand & Sons.
2. Dr. D. P. Gupta, & Dr. Vishal Sharma. (2019). *Mathematical Statistics*, (Revised Ed.). Mohan Print Media (P) Ltd
3. S. K. Sinha. (1998). *Bayes Estimation*. New Age International (P) Limited.

Books for Reference

1. Kendall, M. & Stuart, A. (2010). *The advanced theory of Statistics*. Vol. II. Charles Griffin.
2. Rohatgi, V. K. (1984). *An Introduction to Probability Theory and Mathematical Statistics*. Wiley Eastern.
3. Alexander, M. M., Franklin, A. G. & Duane, C. B. (1974). *An Introduction to the Theory of Statistics*, (3rd Ed.). McGraw Hill.

Websites and eLearning Sources

1. Point Estimation in Statistics - Methods, Properties and Formulas (vedantu.com)
2. S1B-17-06-bayesian.pdf (cam.ac.uk)
3. Interval Estimation - Formula, Prediction, Methods and Examples (vedantu.com)

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	acquire the knowledge of estimation	**K1**
CO2	understand the types of estimation	**K2**
CO3	solve the problems using estimation techniques such as maximum - likelihood, least squares, minimum variance unbiased estimator (MVUE) estimators, and Bayesian estimation	**K3**
CO4	apply estimation methods to real life problems.	**K4**
CO5	illustrate the importance of point and interval estimation.	**K5**

Relationship Matrix											
Semester	**Course code**		**Title of the Course**						**Hours**		**Credits**
4	**23UST43CC07**		**Core Course - 7:** Estimation Theory						**6**		**5**
Course Outcomes	**Programme Outcomes(POs)**					**Programme SpecificOutcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	3	2	3	3	2	1	3	2	2	**2.2**
CO2	2	2	3	1	2	3	3	2	2	1	**2.1**
CO3	3	2	2	1	2	3	2	1	2	1	**1.9**
CO4	2	3	2	2	3	3	1	1	2	3	**2.2**
CO5	2	3	1	2	2	1	2	3	2	3	**2.1**
										Mean Overall Score	**2.1 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UST43CC08	**Core Course - 8:** Testing of Hypothesis	7	5

Course Objectives
Draw inference about unknown population parameters based on random samples
Impart knowledge on statistical hypothesis
Understand Neyman-Pearson fundamental lemma for testing statistical hypothesis
Understand the test procedures MPT, UMPT and LRT
Inculcate various parametric and non-parametric, test procedures

UNIT I **(21 Hours)**

Basic Terms: Population, Sample, Parameter, Statistic, Sampling distribution, Standard error, Test Statistic - Statistical Hypothesis - Simple and composite hypotheses, Null and Alternative hypothesis - Two kinds of errors, level of significance, Critical value, Size and Power of a test, Procedure for testing of hypothesis.

UNIT II **(21 Hours)**

Optimum Tests: Most powerful test - Uniformly most powerful tests - Neyman - Pearson lemma - Examples - Unbiased tests based on normal Likelihood ratio test (without proof) and its properties. Application of LR test for single mean.

UNIT III **(21 Hours)**

Large Sample Tests: Test of significance for large samples, Tests for Single proportion, Difference of proportions, Single mean, Difference of means, Difference of standard deviations -Problems.

UNIT IV **(21 Hours)**

Small Sample Tests: t-tests: Assumptions, Test for single mean, Two means, Paired sample test, Correlation coefficient, Regression coefficient. Chi-square tests: Uses, Tests for independence of attributes and Goodness of fit. F-test for equality of two variances.

UNIT V **(21 Hours)**

Non-parametric tests: Kolmogorov - Smirnov test - Sign test-Wald- Wolfowitz run test, run test for randomness, median test, Wilcoxon test and Wilcoxon-Mann-Whitney U test.

Teaching Methodology	Chalk and Talk, YouTube videos, PPT and Handouts.

Books for Study

1. Gupta, S. P. & Kapoor, V. K. (2020). *Fundamentals of Mathematical Statistics*, (12th Ed.). Sultan Chand & Sons.
2. P. N. Arora (Author), S. Arora (2006). *Statistics for Management*, (3rd Ed.). Sultan Chand & Sons.

Books for Reference

1. Kendall, M. & Stuart, A. (1961). *The advanced theory of Statistics.* Vol. II. Charles Griffin.
2. Rohatgi, V. K. (2003). *Statistical Inference*. John Wiley and Sons.
3. Hogg, R.V., Craig, A. T. & Tannis. (1995). *Introduction to Mathematical Statistics.* Prentice Hall.
2. Dudewicz, E. J. & Mishra, S. N. (1988). *Modern Mathematical Statistics.* John Wiley and Sons.

Websites and eLearning Sources

1. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=34 Paper: P-04. Statistical Inference I, P-05. Statistical Inference II
2. https://nptel.ac.in/courses/103/106/103106120/ Introduction to Statistical Hypothesis Testing-IIT Madras

Course Outcomes		
CO No.	**CO-statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	identify both the parameter and statistic in the hypothetical study	**K1**
CO2	summarize the results of small and large sample tests	**K2**
CO3	sketch the required statistical tests with interpretation	**K3**
CO4	distinguish between the parametric and non-parametric tests events	**K4**
CO5	provide the significance evidence with the likelihood of the hypothetical	**K5**

Relationship Matrix											
Semester	**Course code**			**Title of the Course**					**Hours**		**Credits**
4	**23UST43CC08**			**Core Course - 8:** Testing of Hypothesis					**7**		**5**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	3	3	1	2	3	2	3	2	1	**2.1**
CO2	2	3	3	2	3	3	3	2	3	2	**2.6**
CO3	2	3	2	2	2	3	3	2	3	2	**2.4**
CO4	3	2	1	3	3	1	3	1	3	3	**2.3**
CO5	3	1	1	3	3	1	2	1	2	3	**2.0**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UST43AO02A	**Allied Optional - 2:** C Programming	6	4

Course Objectives
Understand the basics computer architectures and programming fundamentals of C language.
Classify the decision making-looping and control statements.
Recognize the effective usage of arrays, string handling functions.
Exemplify the dynamics of memory through pointers and functions.
Categorize the records with sequential and random operations.

UNIT I **(18 Hours)**

Basics of Computer Architecture: Processor, Memory, Input & Output devices - High level and low-level languages - Flow Chart, Algorithms, Pseudo code; Introduction to C: General structure, C-tokens: Keywords, Identifiers and Constants-Variable Declaration and Initialization, Data types and Conversions-Operators and Expressions - Library routines.

UNIT II **(18 Hours)**

Simple Statements: GETC (), PUTC (), GETS (), PUTS (), SCANF (), PRINTF () - Control Flow Statements: IF, SWITCH Statements; Unconditional Branching: GOTO statement, WHILE LOOP, DO WHILE, FOR LOOP, BREAK and CONTINUE statements - Simple programs covering control flow.

UNIT III **(18 Hours)**

Arrays: Definition, Declaration, Initialization and Dimensions; String processing: String handling functions (STRLEN, STRCPY, STRCAT and STRCMP, PUTS, GETS) - Linear search program, bubble sort program - Simple programs covering Arrays and Strings.

UNIT IV **(18 Hours)**

Importance of Functions in C: Declaration-Usage - Argument passing methods; Storage classes; Pointers: Importance, Declaration - Pointer Arithmetic - Pointer Expression - Passing of Pointers - Pointers with Arrays - Pointers to Pointers - Structures and Unions (concept only) - Simple programs covering Functions and Pointers.

UNIT V **(18 Hours)**

File Handling: File processing and organizations - Accessing methods - File processing statements - Simple Applications - Creation, Processing and Updating of files - Simple programs using Sequential and Random file processing.

Teaching Methodology	Lecture - based learning, Technology - based learning and Demonstration

Books for Study

1. Balagurusamy, E. (2016). *Programming in ANSI C,* (7th Ed.). Tata McGraw - Hill publishing Company Ltd.
2. Byron, S. G. (2017). *Theory and problems of programming with C,* (3rd Ed.). Schaum Outline Series. International Editions.

Books for Reference

1. Mike McGrath. (2018).*C Programming in easy steps,* (5th Ed.). In Easy Steps Limited.
2. Kernighan & Ritchie. (2000). *C Programming Language*. Prentice Hall of India Pvt. Ltd.
3. Herbert Schildt. (2017). *C - The Complete Reference*, (4th Ed.). McGraw Hill Education.

Website and eLearning Source

1. https://www.programiz.com/c-programming

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	recognize the basic concepts of procedural programming paradigm	**K1**
CO2	exemplify the C code with its proper syntax	**K2**
CO3	utilize programming skills to write, compile, and debug	**K3**
CO4	draw inferences using structural programming	**K4**
CO5	choose the key statements for improving dynamic memory and decreasing execution time.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
4	**23UST43AO02A**		**Allied Optional - 2:** C Programming						**6**		**4**
Course Outcomes	**Programme Outcomes(POs)**					**Programme SpecificOutcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	3	3	1	2	3	3	3	1	1	**2.1**
CO2	2	3	2	2	2	3	3	3	3	2	**2.5**
CO3	2	2	2	3	2	2	2	2	3	3	**2.3**
CO4	3	2	1	3	3	2	2	1	3	3	**2.3**
CO5	3	1	1	3	3	2	1	1	3	3	**2.1**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/ Week	Credits
4	23UST43AO02B	**Allied Optional - 2:** Accounts - 2	6	4

Course Objectives
To familiarise the students with the theoretical concepts of various elements of cost and preparation of cost sheet
To give basic idea about the process of managerial decision making
To highlight various tools and techniques available for managerial decision making
To give practical understanding of application of ratio analysis and cash flow analysis,
To make to understand the application and uses of budgeting control and marginal costing techniques

UNIT I: Introduction to Cost Accounting **(18 Hours)**

Cost Accounting - Components of cost - Methods and techniques of Costing -Preparation of cost sheet - various stages in cost sheet -WIP - valuation of closing stock of finished goods - tender & quotation.

UNIT II: Cash flow Statement **(18 Hours)**

Cash flow Statement - meaning - cash flow from operating activities, investment activities and financing activities - preparation of cash flow statement As per AS3 (simple problems)

UNIT III: Working Capital Management **(18 Hours)**

Working capital management- meaning- Types of working capital - components of working capital - Calculation of working capital

UNIT IV: Marginal Costing **(18 Hours)**

Marginal costing - Marginal cost- Contribution - PV Ratio - BEP - Margin of safety - CVP - decision making (simple problems)

UNIT V: Budgeting Control **(18 hours)**

Budgeting control- preparation of cash budget- sales budget- production budget- production cost budget- flexible budget

Teaching Methodology	Chalk & Talk, Videos, PPTs, Demonstration and Creation of Models

Books for Study

1. Reddy, T.S., & Murthy, A. (2012). *Cost Accounting.* Margham Publications. (Unit-I).
2. Reddy, T.S., & Murthy, A. (2012). *Management Accounting*. Margham Publications. (Unit-II, III, IV & V)

Books for References

1. Maheswari, S. N. (2017). *Cost Accounting*. S. Chand & Co.
2. Jain, S.P., & Narang, K.L. (2018). *Cost Accounting Principles and Practice.* Kalyani Publishers.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	Remember and recall the various concepts of cost accounting	**K1**
CO2	Demonstrate the preparation of cash flow statements.	**K2**
CO3	Analyse the various valuation methods of working capital management.	**K3**
CO4	Examine the different methods of calculating marginal costing.	**K4**
CO5	Critically evaluate the budgeting control techniques.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**23UST43AO02B**			**Allied Optional - 2:** Accounts - 2					**6**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	3	2	2	2	2	2	2	**2.2**
CO2	3	2	2	2	2	2	3	2	3	3	**2.4**
CO3	2	3	2	3	2	3	2	3	3	3	**2.6**
CO4	2	2	2	1	2	2	2	1	2	2	**1.8**
CO5	3	2	3	3	1	3	1	3	2	1	**2.2**
Mean Overall Score											**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UHE44VE04A	**Value Education - 4:** Social Ethics - 2	2	1

Course Objectives
To understand the significance of natural resources and strive to coexist harmoniously with nature.
To implement strategies for disaster management within the community.
To evaluate the significance and distinctions between science and religion.
To recognize the importance of maintaining a healthy lifestyle.
To utilize counseling techniques to address and resolve individuals' issues.

UNIT I: Harmony with Nature **(6 Hours)**

What is environment, Why should we think of harmony, Longing for human well-being, Principles to conserve environmental resources, Causes of disharmony, The fruits of harmony with nature, Forest resources, Water resources, Mineral resources, Food resources, Fruits of disharmony, Economic values and growth, Environmental Ethics, Guidelines to live in harmony with nature, Towards life-centered system for better quality of life. Harmony with animal kingdom.

UNIT II: Issues Dealing with Science and Religion **(6 Hours)**

What is Science, Science and Religion, Social Relevance of Science and Technology, Science and technology for social justice, Difference caused by Science and Technology, Need for indigenous technology, Science, Technology and Innovation Policy of India.

UNIT III: Public Health **(6 Hours)**

Health related issues, Health Care in India vs Developed Countries, Health and Heredity, Public Health - The Indian Scenario, Objectives of public health in India, Public Health System in India, Failure on the public health front, Role of the central government, Hospitals Services in India, Health and Abortion, Health and Drug Addiction, Drug abuse.

UNIT IV: Disaster Management **(6 Hours)**

Disaster Management, Types of disaster, Plans of disaster management, Technology to manage natural disasters and catastrophes, Disaster Management, Rehabilitation and Reconstruction, Human-induced disaster, First Aid, The importance of First-aid, Disaster Declaration and Response.

UNIT V: Counselling for Adolescents **(6 Hours)**

High Risk Behaviours, Developmental Changes in Adolescents, Key Issues of the Adolescents, Need for Counselling, Nature of Counselling, Counselling Goals, Does helping help? The Good and the Bad news. Importance of Career Guidance Counselling.

Books for Study

1. Department of Human Excellence. (2021). *Formation of Youth*, St Joseph's College (Autonomous), Tiruchirappalli.

Books for Reference

1. Albert, D., & Steinberg, L. *Judgment and decision making in adolescence*: Journal of Research on Adolescence, page no: 211-224 (2011).
2. Larry, R. C. (2000). *Disaster Management and Preparedness,* Lewis Publications.
3. Hurlock, E.B. (2001). *Developmental Psychology: A: Life-Span Approach*. (5th Ed.). Tata McGraw-Hill.
4. Sangha., & Kamaljit. (2015). *Ways to Live in Harmony with Nature: Living Sustainably and Working with Passion.* Australia, Woodslane Pty Limited.

Websites and eLearning Sources

1. https://en.wikipedia.org/wiki/Disaster_management_in_India
2. https://ndma.gov.in/
3. https://talkitover.in/services/child-adolescent-counselling/
4. https://www.nipccd.nic.in/schemes/adolescent-guidance-centre-19#gsc.tab=0

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Know the value of natural recourses and to live in a harmony with nature.	**K1**
CO2	Apply the plans of disaster management in the society.	**K2**
CO3	Analyse the importance and differences of science and religion.	**K3**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
4	**23UHE44VE04A**	**Value Education - 4:** Social Ethics - 2								**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	3	2	3	3	**2.8**
CO2	3	2	2	3	3	2	3	3	2	2	**2.5**
CO3	2	3	3	3	2	3	3	3	3	3	**2.8**
										Mean Overall Score	**2.7 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UHE44VE04B	**Value Education - 4:** Religious Doctrine - 2	2	1

Course Objectives
To explore the rich historical background of the Catholic Church
To explore and comprehend the Sacraments practiced by the Catholic Church
To incorporate Christian Prayer into daily routines
To reflect on personal growth through the lens of Sacraments and Christian Prayer
To promote unity by embracing universal values from various religions

UNIT I The Catholic Church **(6 Hours)**

UNIT II Sacraments of Initiation **(6 Hours)**

UNIT III Sacraments of Healing & at the Service of Community **(6 Hours)**

UNIT IV The Christian Prayer **(6 Hours)**

UNIT V Harmony of Religions **(6 Hours)**

Teaching Methodology	Chalk and Talk, Power point, assignment and Group discussion

Book for Study

1. Department of Human Excellence (2022). Fullness of Life, St Joseph's College (Autonomous), Tiruchirappalli.

Book for Reference

1. (1994). *Compendium: Catechism of the Catholic Church.* Bengaluru: Theological Publications in India.
2. Holy Bible (NRSV).

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	understand the history of the Catholic Church	**K1**
CO2	examine and grasp the Sacraments of the Catholic Church	**K2**
CO3	apply the Christian Prayer to their everyday life	**K3**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
4	**23UHE44VE04B**		**Value Education - 4:** Religious Doctrine - 2							**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	2	2	3	3	**2.7**
CO2	3	2	2	2	3	3	3	3	2	2	**2.5**
CO3	2	2	3	3	2	2	3	3	3	3	**2.6**
										Mean Overall Score	**2.6 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UST53CC09	**Core Course - 9:** Sampling Theory	5	4

Course Objectives
Impart the significance of theory and applications of sampling
Explain the method of designing, organizing and executing a sample survey.
Enhance the ability of deriving the properties of methods of drawing samples
Comprehend the concepts of sampling for effective application for designing sample surveys
Explain suitable sampling methods for given situations

UNIT I **(15 Hours)**

Sample Survey: Basic concepts of population and statistics, Complete enumeration Vs Sampling-Need and limitations of sampling design –Organization and Execution of Sample Surveys-Essential aspects of Sample Survey - Pilot Survey-Sources of Errors in a survey. Sampling and non-sampling errors.

UNIT II **(15 Hours)**

Probabilistic Sampling Methods: Introduction - Advantages and Disadvantages - Simple random sampling (WR and WOR) - Random numbers tables and their uses. Methods of selecting simple random sample - Lottery method - Method based on random numbers. Estimation of population total, population mean and their variances - Sampling for attributes - Size of simple random sampling for specified precision.

UNIT III **(15 Hours)**

Stratified Random Sampling: Properties- Estimation of population mean and its variance - Proportional and Optimum Allocations-Neyman's Allocation-Comparison of Stratified and Simple Random Sampling methods.

UNIT IV **(15 Hours)**

Systematic Sampling: Procedure - Estimation of population mean and its variance-Comparison of Simple, Stratified and Systematic Sampling-Population with Linear Trend - Circular Systematic Sampling.

UNIT V **(15 Hours)**

Non-Probabilistic Sampling Methods: Introduction - Advantages and disadvantages of non-Probabilistic Sampling Methods, Convenience Sampling, Judgmental sampling and its types, Modal Instance Sampling, Quota Sampling, Non-proportional quota sampling, Heterogeneity Sampling, Snowball Sampling, Sequential sampling.

Teaching Methodology	Chalk and Talk, YouTube videos, PPT and Handouts.

Books for Study

1. Gupta, S. C., & Kapoor, V. K. (2019). *Fundamentals of Applied Statistics,* (4th Ed.). Sultan Chand & Co.
2. William, G. C. (1999). *Sampling Techniques*. John Wiley Sons.
3. Priest, H. S. (1995). *An Introduction to Sampling Techniques*. Sage Publications.
   Non - Probability sampling.

Book for Reference

1. Daroga Singh & Choudary, F. S. (1987). *Theory and Analysis of Sample Survey Designs.* New age international publishers.

Websites and eLearning Sources

1. http://dissertation.laerd.com/non-probability-sampling.php.
2. https://nptel.ac.in/courses/111/104/111104073/
3. https://nptel.ac.in/content/storage2/courses/111104073/Module14/Lecture42.pdf
4. https://www.mooc-list.com/tags/sampling-method

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	acquire the knowledge of conducting sample survey	**K1**
CO2	interpret the notations and terminologies	**K2**
CO3	choose appropriate sampling techniques	**K3**
CO4	compare various sampling techniques	**K4**
CO5	explain the concept of sampling and non-random sampling techniques	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
5	**23UST53CC09**		**Core Course - 9:** Sampling Theory						**5**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	3	2	2	2	2	3	2	2	**2.2**
CO2	2	2	3	2	2	2	2	3	2	2	**2.2**
CO3	2	3	2	2	3	2	3	2	2	3	**2.4**
CO4	3	2	2	2	2	3	2	2	3	2	**2.3**
CO5	2	2	1	3	2	3	2	2	3	2	**2.2**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UST53CC10	**Core Course - 10:** Design of Experiments	5	4

Course Objectives
Impart the knowledge in Statistical Design of Experiments and analysis of variance.
Learn to calculate a factor level that optimizes the outcome of an experiment.
Develop analytical thinking in problem solving skills.
Learn the factorial design of experiments.
Learn various incomplete block designs

UNIT I **(15 Hours)**

Basics of design of experiments: Introduction-Terminology-Fundamental principles of experimental designs: Randomization, Replication and Local control techniques. Uniformity trials-Transformation of data and its uses.

UNIT II **(15 Hours)**

Analysis of Variance: Assumptions-One way classification-Lay out-Analysis –Two way classification-Lay out-Analysis. Completely randomized Design (CRD).

UNIT III **(15 Hours)**

Basic Designs: Randomized block designs (RBD)-Latin square designs (LSD)-Missing plot techniques CRD and RBD-efficiency of CRD, RBD and LSD. **Analysis of Covariance:** one way layout and two-way layout with one concomitant variable

UNIT IV **(15 Hours)**

Factorial Experiments: Introduction - 2^2, 2^3 and 3^2 factorial designs-Confounding in 2^2 experiments.

UNIT V **(15 Hours)**

Balanced incomplete block design (BIBD): Introduction-Intra block analysis of BIBD-Parametric relationships of BIBD. Incidence matrix and its properties, Symmetric BIBD, Resolvable BIBD.

Teaching Methodology	YouTube videos, PPT, Black Board teaching and Handouts.

Book for Study

1. Gupta, S. C. & Kapoor, V. K. (2019). *Fundamentals of Applied Statistics*, (4th Ed.). Sultan Chand & Co.

Books for Reference

1. Das, M. N. & Giri, N. C. (1987). *Design and analysis of Experiments*, (2nd Ed.). New age International Publication.
2. Doughlas, C. M. (2013). *Design and analysis of Experiments*, (8th Ed). John Wiley & Sons.
3. Oscar Kempthrone, (1952). *Design and analysis of experiments*. John Wiley and Sons.

Websites and eLearning Sources

1. https://youtu.be/AuDgWSx7gMo
2. https://youtu.be/jLg0PUD0LL4?list=PLqMl6r3x6BUQvUoLYgmf3XmFW8LSEyXlo
3. https://youtu.be/EFq9msF2WM8?list=PLqMl6r3x6BUQvUoLYgmf3XmFW8LSEyXlo
4. https://youtu.be/596peJnDhXU?list=PLqMl6r3x6BUQvUoLYgmf3XmFW8LSEyXlo
5. https://youtu.be/_PzuP1bOgpM?list=PLqMl6r3x6BUQvUoLYgmf3XmFW8LSEyXlo

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	acquire the knowledge about the importance of design of experiments.	**K1**
CO2	understand the basic concepts and determine the most important factor in design of experiments.	**K2**
CO3	carry out the Analysis of Variance in design of experiments.	**K3**
CO4	use appropriate experimental designs and analyse the experimental data	**K4**
CO5	give statistical interpretation of the experimental results obtained	**K5**

Relationship matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
5	**23UST53CC10**			**Core Course - 10:** Design of Experiments					**5**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	1	2	3	2	3	2	2	**2.3**
CO2	2	3	2	2	3	2	2	2	2	3	**2.3**
CO3	3	2	1	3	2	1	3	2	3	2	**2.2**
CO4	2	3	2	3	1	2	2	3	2	3	**2.3**
CO5	2	2	3	2	3	2	3	2	3	2	**2.4**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UST53CP01	**Core Practical - 1:** Statistics for Data Analysis	4	2

Course Objectives
Build a strong understanding on the Basics of Microsoft Excel and C Programming
Recognize the significance of statistical computations
Explore and understand the data crunching and data presentation
Learn the basic functions in Excel and C language
Study and practice statistical tools using the computer software and language

List of Experiments:

Excel:

1. Descriptive Statistics
2. Draw a Simple bar diagram
3. Draw a Pie diagram
4. Draw a Histogram
5. Fitting Linear trend line
6. Fitting Exponential curve
7. Fitting Logarithmic curve
8. Paired t test
9. One-way ANOVA
10. Two-way ANOVA

C Program:

11. Matrix Addition
12. Matrix Multiplication
13. Sorting the numbers by Ascending and Descending order
14. Generating the random numbers.
15. Finding factorial and combination.
16. Find the Roots of Quadratic Equations
17. Find Mean, Variance and Standard Deviation.
18. Compute Mean Deviation about mean.
19. Computation of Correlation and Regression Coefficients.
20. Create and updating an Inventory file.

Teaching Methodology	Demonstration, Technology-based learning, Hands-on training and Project-based learning

Website and e-learning Source

1. https://sfc.ac.in/pdf/syllabus/sciences/statistics/statistics_sem%20iii%20GE.pdf

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	learn how to do statistical analyses in Excel and C programming	**K1**
CO2	understand the basic data structures and develop logics in Well-structured programs	**K2**
CO3	apply proper statistical tools to interpret the data	**K3**
CO4	analyze the data through language and package	**K4**
CO5	construct the coding and computing the statistical measures	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
5	**23UST53CP01**		**Core Practical - 1:** Statistics for Data Analysis						**4**		**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	3	3	3	3	3	2	2	**2.7**
CO2	2	3	3	2	3	3	2	3	2	3	**2.6**
CO3	3	2	3	3	3	1	2	2	3	3	**2.5**
CO4	3	2	1	3	3	2	2	2	3	3	**2.4**
CO5	3	2	3	3	3	2	3	2	3	3	**2.7**
Mean Overall Score											**2.6 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UST53ES01A	**Discipline Specific Elective - 1:** Linear Models, Econometrics and Random Processes	5	3

Course Objectives
Formulation and specification of econometric models
Estimation and testing of models
To understand some standard distributions and apply to some problems.
Learn concepts of random process, stationery and autocorrelation functions.
Explain the markov process and markov chain and related concepts

UNIT I **(15 Hours)**

General Linear Model: General Linear hypothesis model of full rank-point estimation under normal and non-normal cases-Gauss Markov theorem.

UNIT II **(15 Hours)**

Econometrics: Definition-Scope-Objective-Limitations-Divisions of Econometrics-Auto Correlation-Multicollinearity - Heteroscedasticity

UNIT III **(15 Hours)**

Classification Of Random Processes: Definition and examples - first order, second order, strictly stationary, wide-sense stationary and ergodic processes

UNIT IV **(15 Hours)**

Markov Process: - Binomial, Poisson and Normal processes - Sine wave process-Random telegraph process.

UNIT V **(15 Hours)**

Auto Correlation: Spectral Densities - Cross correlation - Properties

Teaching Methodology	Chalk and Talk, YouTube videos, PPT and Handouts.

Books for Study

1. Graybill, F. A. (1961). *An Introduction to linear Statistical Models.* Vol. I. McGraw Hill.
2. Singh, S. P., Parashar, K. & Singh, H. P. (1980). *Econometrics*. (Units IV & V) Sultan Chand & Co.
3. Ross, S. (2002). *A First Course in Probability*, (6th Ed.). Pearson Education.
4. Peebles, Jr. P. Z. (2002). *Probability Random Variables and Random Signal Principles,* (4th Ed.). Tata McGraw-Hill Publishers.

Books for Reference

1. Henry Stark & John, W. W. (2002). *Probability and Random Processes with Applications to Signal Processing*, (3rd Ed.). Pearson Education.
2. Veerarajan. T. (2002). *Probability Statistics and Random process*, (2nd Ed.). Tata McGraw-Hill Publications.
3. Ochi, M. K. (1990). *Applied Probability and Stochastic Process.* John Wiley & Sons.

Websites and eLearning Sources

1. Chapter1-Econometrics-IntroductionToEconometrics.pdf (iitk.ac.in)
2. Linear Models — scikit-learn 1.3.1 documentation
3. lect07-2.pdf (stanford.edu)

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	explain the underlying assumptions for GLMs and perform diagnostic checks while identifying potential problems.	**K1**
CO2	understand the basic concepts of linear models, stochastic processes and the stationarity	**K2**
CO3	use the concept of some economic and linear models and special processes	**K3**
CO4	ability to perform analyses of economic, stochastic process and spectral densities.	**K4**
CO5	gain knowledge about Linear models, Econometrics and random Process	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
5	**23UST53ES01A**			**Discipline Specific Elective - 1:** Linear Models, Econometrics and Random Processes					**5**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	1	3	2	3	2	**2.3**
CO2	2	3	2	3	3	2	3	3	2	2	**2.5**
CO3	3	3	2	1	2	2	3	3	3	2	**2.4**
CO4	2	2	3	3	2	1	1	2	2	1	**1.9**
CO5	3	2	1	1	2	2	3	2	3	3	**2.2**
										Mean Overall Score	**2.26 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UST53ES01B	**Discipline Specific Elective - 1:** Real Analysis	5	3

Course Objectives
Learn the fundamental properties of real analysis.
Impart the knowledge of sequences and series, continuity, differentiation and integration.
Learn series and its convergence.
Learn the limits, continuity and derivative of real valued functions.
Know and to apply the Riemann integration

UNIT I **(15 Hours)**

Fundamental concepts: Definition of a sequence- Real sequence, limit of a sequence-convergence and divergence of sequence - Bounded sequence-monotone sequence - Operations on convergent and divergent sequences. Limit superior and Limit inferior Cauchy's general principle of convergence squeeze theorem, monotone sequences (monotone convergence theorem without proof). (Statement only).

UNIT II **(15 Hours)**

Series: sequence of partial sums - Convergence and divergence of infinite series of positive real numbers. A necessary condition for convergence of a series with non-negative terms-Tests for the convergence of series: Direct comparison test, Comparison test by limits, p test, D' Alembert's ratio test and Cauchy's root test. Alternating series: Leibnitz test for-conditional convergence and absolute convergence, Rearrangement of series and Riemann's theorem.-Simple problems.

UNIT III **(15 Hours)**

Differential Calculus: Concept of Derivatives-Algebra of derivatives-Rolle's theorem-Mean value theorem - Caughy's formula-Taylor's series and Maclaurin's series of functions of one variable. Simple problems (e^x, log(1+x), cosx, sinx).

UNIT IV **(15 Hours)**

Integral Calculus: Definition of Riemann Integral-Necessary and Sufficient condition for Riemann integral. Darboux theorem-Fundamental theorems of Integral calculus-First mean value theorem, Bonnet and Weierstrass forms of second mean value theorem.

UNIT V **(15 Hours)**

Improper Integrals: First kind and Second kind of Beta integral - Gamma integral and their properties-Dirichlet test and Abel's test for improper integrals - Simple problems.

Teaching Methods	YouTube videos, PPT, Black Board teaching and Handouts.

Books for Study

1. Goldberg, R. R. (2017). *Methods of Real Analysis*. Oxford & IBH.
2. Ranjit Singh & Arora. (1974). *First course in Real Analysis*. Sultan Chand.
3. Narayanan & Manicka vasagampillai. (2009). *Ancillary Mathematics*.

Books for Reference

1. Tom Apostol. (1994). *Mathematical Analysis*, (2nd Ed.). Narosa Publishing House.
2. Malik, S. C. (2017). *Mathematical Analysis*. Wiley Eastern.

Websites and eLearning Sources

1. https://youtu.be/a6vO7BZye0o
2. https://youtu.be/j6C9Jl3KkBA
3. http://www.math.louisville.edu/~lee/RealAnalysis/
4. https://artofproblemsolving.com/community/c7t430f7_real_analysis_theorems
5. http://ramanujan.math.trinity.edu/wtrench/texts/TRENCH_REAL_ANALYSIS.PDF

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	demonstrate knowledge and critical understanding of the well-established principles within mathematical analysis.	**K1**
CO2	understand and perform simple proofs	**K2**
CO3	solve problems in uniform continuity of functions, sequences of functions, uniform convergences, series, Riemann integration, functions of several variables,	**K3**
CO4	apply the concepts and principles in mathematical analysis in well-defined contexts.	**K4**
CO5	evaluate critically the appropriateness of different tools and techniques.	**K5**

Relationship matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
5	**23UST53ES01B**		**Discipline Specific Elective - 1:** Real Analysis						**5**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	3	3	2	2	3	2	3	1	2	**2.2**
CO2	2	3	2	1	2	3	2	3	2	2	**2.2**
CO3	2	2	2	2	3	1	2	2	2	3	**2.1**
CO4	2	2	3	3	1	2	3	2	3	2	**2.3**
CO5	3	3	2	2	3	2	2	2	2	2	**2.3**
										Mean Overall Score	**2.22 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UST53ES02A	**Discipline Specific Elective - 2:** Operations Research - 1	5	3

Course Objectives
Formulate Linear Programming models for service and manufacturing systems
Apply operations research techniques & algorithms to solve the Linear programming problems
Interpret minimum cost of transporting item from source and destination
Create an interest to solve the assignment problems with its physical significance.
Decide an optimal replacement period/policy for a given item/equipment/machine.

UNIT I **(15 Hours)**

Operations Research (OR): Nature and features of OR-Modelling in OR-Classification of models - General Solutions - methods for OR models - Methodology of OR.

Linear programming problem–I: Definition - Formulation of LPP - Graphical method and Simplex method.

UNIT II **(15 Hours)**

Linear programming problem-II: Big-M method-General Primal–Dual Pair –Formulating a Dual problem-Duality and simplex method-Dual simplex method (Algorithms and Simple Problems only).

UNIT III **(15 Hours)**

Transportation problem: General Transportation problem - Linear programming formulation - Finding an Initial basic feasible solution by Northwest corner rule –Least Cost method - Vogel's Approximation method - Test for Optimality - MODI method- Degeneracy.

UNIT IV **(15 Hours)**

Assignment problem: Mathematical model, balanced and unbalanced problem-Solution by Koney method (Hungarian) -Travelling Salesmen Problem.

UNIT V **(15 Hours)**

Replacement Problem: Replacement of equipment that deteriorates gradually: Replacement policy when value of money does not change with time-Replacement policy when value of money changes with time. Replacement of equipment that fails suddenly: Individual and group replacement.

Teaching Methodology	Lecture-based learning and Problem solving

Book for Study

1. Swarup, K., Gupta, P. K., & Man Mohan. (2019). *Operations Research*, (13th Ed.). Sultan Chand & Sons.

Books for Reference

1. Philips, D. T., Ravindran, A., & Solberg, J. J. (2007). *Operations Research Principle and Practice*.
2. Taha, H. A. (2014). *Operations Research-An Introduction*. PHI.

Website and e-learning Source

1. https://www.studocu.com/in/document/kenya-methodist-university/business-information-technology/operations-research-notes/7381343

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	identify the best approach using limited resources	**K1**
CO2	describe the nature and role of operation functions	**K2**
CO3	construct the LPP and using the finest tools for getting feasible and optimum solutions	**K3**
CO4	analyze complex real-life situations with the goal of increasing performance	**K4**
CO5	determine the value of decision variables that optimize the given objective function by use of various mathematical techniques	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
5	**23UST53ES02A**		**Discipline Specific Elective - 2:** Operations Research - 1						**5**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	3	3	1	2	3	2	3	2	1	**2.1**
CO2	2	3	3	2	3	2	3	2	3	2	**2.5**
CO3	3	2	2	3	3	2	2	2	3	3	**2.5**
CO4	3	1	1	3	2	1	1	2	3	3	**2.0**
CO5	3	1	1	3	2	2	1	1	3	3	**2.0**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UST53ES02B	**Discipline Specific Elective - 2:** Stochastic Processes	5	3

Course Objectives
Carry out derivations involving conditional probability distributions and conditional expectations.
Define basic concepts from the theory of Markov chains and present proofs for the most important theorems.
Compute probabilities of transition between states and return to the initial state after long time intervals in Markov chains.
Identify classes of states in Markov chains and characterize the classes.
Determine limit probabilities in Markov chains after an infinitely long period.

UNIT I **(15 Hours)**

Stochastic Processes: Some notions-Specification of Stochastic processes-Stationary processes – Stationarity-Gaussian Processes - Martingales-Martingales convergence theorem

UNIT II **(15 Hours)**

Markov chains: Definition and examples of Markov chain, Transition Probability Matrix, Order of a Markov chain-Higher transition probabilities

UNIT III **(15 Hours)**

Types of Markov states: Classification of states and chains –Communication Relations-Class property –Classification of chains-Transient and persistent States- Determination of Higher transition probabilities-problems

UNIT IV **(15 Hours)**

Poisson process: Markov Processes with Discrete state space-Poisson process-Postulates of Poisson processes –problems-Properties of Poisson process –Poisson process and related distributions-Theorems.

UNIT V **(15 Hours)**

Branching process: Properties of Generating functions –Theorems-Probability of extinction-Distribution of the total number of progeny –Conditional limit laws –Critical processes-Sub critical Processes.

Teaching Methodology	Chalk and Talk, YouTube videos, PPT and Handouts.

Book for Study

1. Medhi, J. (2020). *Stochastic Processes*, (5th Ed.). New Age International (p) Ltd.

Books for Reference

1. Karlin, S. & Taylor, H. M. (1975). *A first course in Stochastic processes*. Academic press.
2. Hoel, P. M. G., Port, S. C. & Stone, C. J. (1991). *Introduction to Stochastic processes*. Universal Book Stall.
3. Parzen, E. (1962). *Stochastic processes*. Holden-Day.
4. Cinlar, B. (1975). *Introduction to Stochastic processes*. Prentice Hall.
5. Adke, S. R. & Manjunath, S. M. (1984). *An introduction to Finite Markov Processes*. Wiley Eastern.

Websites and eLearning Sources

1. Stochastic Process - What Is It, Types, Applications, Examples (wallstreetmojo.com)
2. notes1.pdf (kent.ac.uk)
3. Markov process | Stochastic Process, Probability Theory & Random Walks | Britannica

Course Outcomes		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	acquire the knowledge of Markov chains in discrete and continuous time	**K1**
CO2	distinguish the types of process.	**K2**
CO3	explain the theory of stochastic processes, especially for Markov processes	**K3**
CO4	derive differential equations for time continuous Markov processes with a discrete state space.	**K4**
CO5	criticize differential equations for distributions and expectations in time continuous processes and determine corresponding limit distributions.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**23UST53ES02B**			**Discipline Specific Elective - 2:** Stochastic Processes						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	2	2	3	2	3	3	2	2	**2.2**
CO2	2	2	3	2	3	2	2	3	3	3	**2.5**
CO3	3	3	2	2	1	2	3	3	3	2	**2.4**
CO4	3	2	1	1	2	3	2	2	2	1	**1.9**
CO5	2	3	1	2	3	2	3	2	2	2	**2.2**
										Mean Overall Score	**2.24 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UST53SP01	**Self-paced Learning:** Introduction to Data Mining	-	2

Course Objectives
Understand the role of separate database for decision making.
Learn the core ideas of data mining techniques in different case studies.
Make use of Statistical tests in data mining.

UNIT I

Data mining: Introduction-Challenges-Other issues. Data: Types of data-Data quality-Data pre-processing.

UNIT II

Classification: Problem definition-General approach-Decision tree induction-Rule based classifiers-Nearest neighbour classifiers-Bayesian classifiers-Artificial neural networks-Support vector machine-Ensemble methods-Model evaluation.

UNIT III

Association analysis: Problem definition-Frequent item set generation-Rule generation-Challenges-Interestingness measures-Generalization of association patterns.

UNIT IV

Cluster analysis: Introduction-Similarity and distance-Density-Characteristics of clustering algorithms-Center based clustering techniques-Hierarchical clustering-Density based clustering-Other clustering techniques-Scalable clustering algorithms-Cluster evaluation.

UNIT V

Visualization: Introduction-General concepts-Visualization techniques-bar diagram, pie diagram, scatter plot.

Teaching Methodology	JosTel Platform

Book for Study

1. Pang-Ning Tan, Michael Steinbach, & Vipin Kumar. (2005). *Introduction to Data Mining*. (Introduction to Data Mining (umn.edu))

Book for Reference

2. Han, J., & Kamber, M. (2000). *Data Mining - Concepts and Techniques*.

Websites and eLearning Sources

1. **UNIT I:** Data Mining Tutorial: What is | Process | Techniques & Examples (guru99.com) ch4.pdf (umn.edu)
2. **UNIT II:** ch4.pdf (umn.edu)
3. **UNIT III:** ch6.pdf (umn.edu)
4. **UNIT IV:** ch8.pdf (umn.edu)
5. **UNIT V:** Data Visualization - A Complete Introduction | OmniSci

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	understand the necessity of data mining	**K1**
CO2	rephrase basic concepts, methods, and applications of cluster analysis	**K2**
CO3	select various types of visualization techniques	**K3**
CO4	classify the different patterns in association	**K4**
CO5	decide the given data set for analysis	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
5	**23UST53SP01**		**Self-paced Learning:** Introduction to Data Mining						**-**		**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	1	1	3	3	3	3	1	**2.4**
CO2	2	2	2	3	1	2	3	2	3	3	**2.3**
CO3	3	2	2	3	1	3	3	2	3	3	**2.2**
CO4	3	2	2	3	1	3	3	2	3	3	**2.5**
CO5	3	2	3	2	1	3	2	3	2	1	**2.2**
Mean Overall Score											**2.32 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23USS54SE01	**Skill Enhancement Course - 2:** Soft Skills	2	1

Course Objectives
To help students understand, practice, and improve their communication skills
To enable students with effective presentation skills
To help students attend interviews confidently and participate effectively in group discussions
To make students realise their potential and excel on personal as well as professional grounds
To develop the thinking skills of students for better performance in competitive exams, interviews and group discussions

UNIT I: Communication Skills

Basics of Communication: Importance of Good Communication Skills, Types of Communication Skills, Verbal Communication, Non-verbal Communication, Tips for Improving Nonverbal Communication, Communication Styles, Barriers to Communication, Ways To Improve Communication Skills, Practicum

Professional Grooming: How to Create the Impact for that First Impression, Presentation Skills, Developing Handouts, Developing Notes, Adding Visual and Audio Effects, Practicum

UNIT II: Resume Writing & Interview Skills

*Resume Writing***:** The Purpose of a Resume, Finding a Job & Making a Career, Length of Resume, Order of Resume, Tailoring the Resume, What your Resume should include, Some Tips for Listing a Bachelor's degree on Your Resume, What NOT to put on your Resume, Formatting Resume, Difference between Resume, Biodata and Curriculum Vitae, Preparation of a Resume

*Interview Skills***:** Meaning of Interview, Types of Interviews, How to get ready for the big day?, Appropriate Attire, Etiquette, Mastering the Art of Meet and Greet, Resume – Points to Remember, Practicum

Group Discussion: Why is GD Essential?, Factors that influence GD, Outcome of GD, Tips for participation in a GD, Useful phrases for GD, Success Tips in GD, Practicum

UNIT III: Personal Effectiveness

Self-Discovery: Characteristics of Personality, Kinds of Self, Who am I?, Personality Inventory Table

Goal Setting: Why do Goal Setting?, Goal Setting Process, Smart Goals

UNIT IV: Numerical Ability

Average, Simple Interest, Compound Interest, Profit and Loss, Area, Volume and Surface Area

UNIT V: **Test of Reasoning**

*Verbal Reasoning***:** Series Completion, Analogy. *Non-Verbal Reasoning*

Book for Study

1. Balaiah, J., & Joy, J. L. (2024). *Straight from the Traits: Securing Soft Skills,* (Revised 3rd Ed.). St. Joseph's College, Tiruchirappalli.

Books for Reference

1. Aggarwal, R.S. (2010). *A Modern Approach to Verbal and Non-Verbal Reasoning*, S. Chand.
2. Balaiah, J. & Joy, J. L. (2018). *Winners in the Making: A primer on soft skills*. St. Joseph's College, Tiruchirappalli.
3. Covey S. R. (2004). *The 7 Habits of Highly Effective People: Restoring the Character Ethic* (Rev. ed.). Free Press.
4. Egan, G. (1994). *The Skilled Helper* (5th Ed.). Pacific Grove, Brooks/Cole.

5. Khera, S. (2014). *You Can Win*. Macmillan Books.
6. Martin, Y. (2005). *Hiring the Best: A Manager's Guide to Effective Interviewing and Recruiting*, (5th Ed.). Adams Media.
7. Sankaran, K., & Kumar, M. (2010). *Group Discussion and Public Speaking*, (5th Ed.). M.I. Publishers.
8. Trishna. (2012). *How to do well in GDs & Interviews*, (3rd Ed.). Pearson Education.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	analyse problems directed at testing their cognitive abilities	**K3**
CO2	present the best of themselves as job seekers and communicate effectively in all contexts	**K4**
CO3	assess themselves, set goals, and manage conflicts that are expected of a good leader	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
5	**23USS54SE01**			**Skill Enhancement Course - 2:** Soft Skills					**2**		**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	2	2	2	2	3	2	3	**2.5**
CO2	2	3	3	2	3	3	2	3	2	2	**2.5**
CO3	2	2	3	3	2	3	3	3	2	2	**2.5**
										Mean Overall Score	**2.5 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UST63CC11	**Core Course - 11:** Statistical Quality Control	6	5

Course Objectives
Understand the application of statistics in industrial environment.
Acquire knowhow on manufacturing process changes and process variability.
Attain proficiency in process capability analysis,
Instruct theory and practice of product control methodology.
Comprehend the importance of reliability theory in industries

UNIT I **(18 Hours)**

Introduction to Statistical Quality Control: Meaning-benefits, basis of Statistical quality control-Causes of variation-difference of causes of variation, process control and Product control-Process capability-Control limits, specification limits and Statistical tolerance.

UNIT II **(18 Hours)**

Process Control - I: Control Charts-Major parts of control chart, Control chart for variables-Mean, R, s charts, Run charts, Revised control charts.

UNIT III **(18 Hours)**

Process Control-II: Control charts for attributes-p, np, c charts-CUSUM control charts.

UNIT IV **(18 Hours)**

Product Control: Principle of acceptance sampling plans. Producer's risk and Consumer's risk. Single sampling plan, Double sampling plan and their OC, ASN, ATI, AOQ, AOQL functions. Concept-Published Sampling Plans MIL STD 105E.

UNIT V **(18 Hours)**

Reliability: Concept, measures, components and systems, coherent systems, reliability of systems-serial and parallel systems-Accelerated life testing, reliability estimate based on failure times and stress strength analysis.

Teaching Methodology	Chalk and Talk, YouTube videos, PPT and Handouts.

Books for Study

1. Gupta, S. C., & Kapoor, V. K. (2019). *Fundamentals of Applied Statistics*, (4th Ed.). Sultan Chand & Co.
2. Montgomery, D. C. (2019). *Introduction to Statistical Quality Control*, (8th Ed.). John Wiley and Sons.
3. Mahajan. (2016). *Statistical Quality Control*. Dhanpatrai & Sons.
4. ISO 9000 standards: Issued by Bureau of India.

Books for Reference

1. Mann, S., & Singpurwarla. (1974). *Methods for Statistical Analysis of Reliability & life data*. John Wiley & sons.
2. Feigunbaum, A.V (1991). *Total Quality Control*, (3rd Ed.). McGraw Hill.
3. Juran, J. M. (1998). *Quality Control Handbook*. McGraw Hill.

Websites and eLearning Sources

1. http://bmepedia.weebly.com/uploads/2/6/6/8/26683759/unit_4_quality_control.pdf
2. http://www2.ing.unipi.it/lanzetta/stat/Chapter20.pdf
3. https://www.win.tue.nl/~adibucch/2WS10/SPClecturenotes.pdf
4. https://wps.prenhall.com/wps/media/objects/7117/7288732/65767_28_SuppG.pdf
5. https://www.cs.odu.edu/~zeil/cs795SR/Papers/TextBook/Appendix_B.pdf
6. https://nptel.ac.in/courses/116/102/116102019/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	identify and solve engineering problems	**K1**
CO2	understand the basic concepts of quality control and quality management	**K2**
CO3	adopt appropriate sampling inspection plans for given condition	**K3**
CO4	effectively interpret the results from the control charts	**K4**
CO5	find failure rate, identify failure rate distributions, compute reliability of components and system	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**23UST63CC11**			**Core Course - 11:** Statistical Quality Control						**6**	**5**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	3	1	2	3	2	1	2	2	**2.0**
CO2	2	3	2	2	3	2	2	2	2	3	**2.3**
CO3	2	3	2	2	3	2	2	2	2	3	**2.3**
CO4	3	2	2	2	2	1	3	2	3	2	**2.2**
CO5	2	2	2	3	2	2	2	3	2	2	**2.2**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UST63CC12	**Core Course - 12:** Statistical Analysis Based on R - Software	4	3

Course Objectives
Perform basic operations and functions in R Programming
Execute code for statistical methods using build-in functions
Write customized program for mathematical and statistical problems
Provide intensive training in statistical computation using R
Impart knowledge in handling statistical data for analysis

UNIT I **(12 Hours)**

Data Handling: Data Collection, Entry and Classification on the aspect of Raw, Discrete and Continuous data - Univariate, Bivariate and Multivariate frequency distributions.

UNIT II **(12 Hours)**

Diagrammatic representation: Plotting an appropriate graph for the given data viz. pie chart, Histograms (equal class intervals and unequal class intervals), Box and Whisker plot, stem and leaf plot, frequency polygon, Ogives with graphical summaries of data.

UNIT III **(12 Hours)**

Analysis: Descriptive Statistics -measures, correlation and lines of regression.

UNIT IV **(12 Hours)**

Probability and distributions: Random number generation and sampling procedures. Fitting of polynomials and exponential curves. Fitting of suitable distribution for real life problems. Normal probability plot.

UNIT V **(12 Hours)**

Statistical Inference: Hypothesis testing and computation of p-values and Confidence intervals.

Teaching Methodology	Seminar, YouTube videos, PPT and Handouts.

Book for Study

1. Sudha, G. P., Sharad, D. G., & Shailaja, R. D. (2019). *Statistics Using R*, (2nd Ed.). Narosa. Publishing House Pvt. Ltd.

Books for Reference

1. Donald, J.M., & Braun, J. (2010). *Data Analysis and Graphics Using R*. Cambridge University Press.
2. Everitt, B., & Hothorn, T. A. (2009). *Handbook of Statistical Analyses Using R*. Chapman & Hall/CRC.
3. Moore, D. S., McCabe, G. P., & Craig, B. A. (2014). *Introduction to the Practice of Statistics*. W.H. Freeman

Websites and eLearning Sources

1. https://swayam.gov.in/nd1_noc19_ma33/preview
2. https://swayam.gov.in/nd2_aic20_sp35/preview
3. https://nptel.ac.in/courses/111/104/111104100

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	acquire the knowledge on the data classification	**K1**
CO2	explain graphical summaries of data	**K2**
CO3	utilize statistical hypothesis testing to draw inferences	**K3**
CO4	analyze univariate and bivariate data	**K4**
CO5	categorize the probability distributions for real life problems	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
6	**23UST63CC12**		**Core Course - 12:** Statistical Analysis Based on R - Software						**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	1	2	3	1	3	3	2	3	1	**2.2**
CO2	2	3	3	2	1	3	3	3	2	1	**2.3**
CO3	3	2	2	2	1	3	3	3	3	2	**2.4**
CO4	3	2	2	3	1	3	3	3	3	2	**2.6**
CO5	2	3	3	2	2	3	3	3	3	2	**2.5**
										Mean Overall Score	**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UST63CP02	**Core Practical - 2:** R-Software	4	2

Course Objectives
Master the use of the R and R-Studio interactive environment
Explore and understand how to use the R documentation
Learn the basics of functions in R and implement with experiments
Study and practice of graphical interpretation and data analysis using R
Discover the power of R integrated in a Big Data environment

List of Experiments:

1. Formation of discrete frequency distributions
2. Formation of continuous frequency distributions
3. Draw a Simple bar plot
4. Draw a bar plot for frequencies, proportions and percentage bar plot
5. Draw a sub-divided bar plot
6. Draw a Multiple bar plot
7. Draw a Pie diagram
8. Draw a Histogram
9. Draw a Frequency Polygon
10. Draw a Ogive diagram
11. Mean, Median, and Mode-Discrete series
12. Mean, Median, and Mode-Continuous series
13. Box plot
14. Measures of Dispersion-Raw series
15. Measures of Dispersion-Discrete series
16. Measures of Dispersion-Continuous series
17. Correlation Coefficient with Scatter diagram
18. Karl Pearson’s and Spearman’s Correlation coefficients
19. Regression Analysis
20. Polynomial curve estimation
21. Exponential curve fitting
22. One–sample t–test
23. Independent samples t–test
24. Paired t–test
25. F–test
26. One–way ANOVA
27. Chi–Square Goodness of Fit
28. Wilcoxon Signed rank test
29. Kruskal Wallis test
30. Mann–Whitney test

Teaching Methodology	Demonstration, Technology-based learning, Hands-on training and Project-based learning

Website and e-learning Source

1. https://www.codecademy.com/learn/learn-statistics-with-r

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	acquire the knowledge learn how to do statistical analyses in R	**K1**
CO2	understand the basic concepts in R and the applications of database systems	**K2**
CO3	apply various concepts to write programs in R	**K3**
CO4	analyze data and generate reports based on the data	**K4**
CO5	measure essentials data structure in R	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**	**Credits**	
6	**23UST63CP02**			**Core Practical - 2:** R-Software					**4**	**2**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	2	3	3	3	3	2	2	**2.6**
CO2	2	3	3	2	3	3	3	3	2	2	**2.6**
CO3	3	2	2	3	3	2	3	2	3	3	**2.6**
CO4	3	2	1	3	3	1	2	2	3	3	**2.3**
CO5	3	1	2	3	3	1	3	2	3	3	**2.4**
										Mean Overall Score	**2.5 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UST63ES03A	**Discipline Specific Elective - 3:** Vital Statistics	5	3

Course Objectives
Identify appropriate sources of data with basic vital statistics analyses
Relate the population with standardized death rates
Utilize the mortality table to find the survival and death rates
Analyze the birth rate used to describe fertility in the populations
Distinguish between incidence and prevalence rates

UNIT I **(15 Hours)**

Vital Statistics: Definition, Nature, Scope and Methods of vital statistics data - Measurement of Population-Development of Population Studies in India.

UNIT II **(15 Hours)**

Risk Measures: Ratios, Proportions, and Rates-its properties, uses and simple problems; Morbidity Rates: Incidence proportions, Incidence rates, Prevalence rates-Definition, properties, uses and simple problems.

UNIT III **(15 Hours)**

Mortality Rates: Crude Death Rate-Specific death rates by Age-Sex-Causes of Death-Marital Status and other Characteristics-Infant Mortality Rate-Standardization of Death Rates (Direct and Indirect methods)-Theory and Problems.

UNIT IV **(15 Hours)**

Life Tables: Meaning-Uses-Expectation of life-Stationary and Stable Population-Assumptions, Description of columns and Construction of life tables-Problems on Life tables. Lotka-Dublin's Model (concept only)-Central Mortality Rate, Force of Mortality.

UNIT V **(15 Hours)**

Fertility Rates: Crude Birth Rate-General Fertility Rate-Age Specific Fertility Rate-Total Fertility Rate-Gross Reproduction Rate (GRR)-Net Reproduction Rate (NRR)-Replacement level Fertility-Birth order statistics-Child Women ratio-Order Specific Fertility Measures-Theory and Problems.

Teaching Methodology	Lecture-based learning, Technology-based learning and Inquiry-based learning

Book for Study

1. Gupta, S. P., & Kapoor, V.K. (2019). Fundamentals of Applied Statistics. Sultan Chand & Sons.

Books for Reference

1. Peter, R C. (1979). *Demography*, (5th Ed.). Vikas Publishing House.
2. Agarwal, S. N. (1981). *India`s Population Problems*. Tata McGraw Hill.
3. Srinivasan, K. (1998). *Basic Demographic Techniques and Applications*. Sage Publications.

Website and e-learning Source

1. https://www.cdc.gov/csels/dsepd/ss1978/lesson3/section1.html

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	identify appropriate sources of data with basic vital statistics analyses	**K1**
CO2	understand the basic components of population	**K2**
CO3	apply demographic concepts and population theories to explain past and present population characteristics	**K3**
CO4	relate the facts impacting the link between mortality and fertility	**K4**
CO5	assess the relationship between demographic change and policy	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**23UST63ES03A**			**Discipline Specific Elective - 3:** Vital Statistics						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	3	3	1	3	2	3	3	1	**2.3**
CO2	3	3	2	1	3	2	3	3	2	1	**2.3**
CO3	3	2	1	3	3	1	2	3	3	3	**2.4**
CO4	3	2	2	3	2	1	2	2	3	3	**2.3**
CO5	3	1	1	3	2	1	2	1	3	3	**2.0**
Mean Overall Score											**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UST63ES03B	**Discipline Specific Elective - 3:** Survival Analysis	5	3

Course Objectives
Recognize the characteristics of survival data, e.g. censoring and truncation.
Determine the proper method to be used in analyzing time-to-event data
Understand the assumptions for the method chosen to analyze the data.
Apply mathematical and graphical methods to check goodness of fit.
Perform survival analysis using a computer statistical software package.

UNIT I **(15 Hours)**

Introduction to Survival Concepts: Survival functions and Hazard rates–Types of censoring –Type II censoring-Random censoring-other types of censoring.

UNIT II **(15 Hours)**

Parametric Models: Weibull distribution, Raleigh distribution, lognormal distribution, Pareto distribution-Increasing failure rate (IFR) –increasing failure rate average (IFRA) Maximum likelihood estimation

UNIT III **(15 Hours)**

One Sample Non-parametric method: Life tables –Actuarial method-Types of life tables –Product –limit (Kaplan-Meier) Estimator –Redistribute to the Right Algorithms-Self –Consistency-Generalized Maximum likelihood estimator

UNIT IV **(15 Hours)**

Two Samples Non-parametric Methods: Gehan test-mean and variance of u –Mantel Haenszel test-sequence of 2 x 2 tables-Asymptotic Normality-Tarone-ware class of tests.

UNIT V **(15 Hours)**

k sample non-parametric methods: Generalized Gehan test-Test for trend-Generalized Mantel-Haenszel test–Non parametric methods Regression-conditional likelihood analysis-justification of the conditional likelihood.

Teaching Methodology	Chalk and Talk, YouTube videos, PPT and Handouts.

Book for Study

1. Rupert, G. M. JR. (2014). *Survival Analysis*. Willey CBS Publishers & Distributors PVT Ltd.

Book for Reference

1. *Survival models and Data Analysis*. Elandt-Johnson-John Wiley and sons.

Website and eLearning Source

1. https://onlinepubs.trb.org/onlinepubs/nchrp/cd-22/manual/v2chapter6.pdf
2. https://grodri.github.io/glms/notes/c7.pdf

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	select appropriate research designs to meet the needs of various survival modelling.	**K1**
CO2	identify appropriate statistical tools to address specific scientific questions	**K2**
CO3	discover excellent presentation skills and the ability to explain statistical concepts.	**K3**
CO4	categorize skills in data management to handle a variety of practical problems in data format and structure	**K4**
CO5	develop advanced working skills in application of computer systems and appropriate statistical Software	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
6	**23UST63ES03B**		**Discipline Specific Elective - 3:** Survival Analysis							**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	3	2	1	2	3	3	2	**2.4**
CO2	2	3	2	2	3	3	2	1	2	3	**2.3**
CO3	3	2	3	2	3	2	2	23	3	3	**2.6**
CO4	2	2	3	3	2	3	3	2	3	3	**2.6**
CO5	3	3	2	2	1	2	3	2	1	3	**2.2**
Mean Overall Score											**2.42 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UST63ES04A	**Discipline Specific Elective - 4:** Operations Research - 2	5	3

Course Objectives
Impart knowledge of various optimization techniques that makes use of statistical concepts abundantly.
Make the student to equip him to use the resources such as capitals, materials, productions, controlling, directing, staffing, and machines more effectively.
Make the students to understand and analyze managerial and engineering problems.
Learn the operations research techniques and algorithms to solve the real-life problems.
Learn model competitive real-world phenomena using concepts from game theory.

UNIT I **(15 Hours)**

Sequencing problem: Basic terms used in Sequencing-Processing of n-jobs through two machines-Processing of n-jobs through three machines-Processing of 2 jobs through k machines.

UNIT II **(15 Hours)**

Theory of games: Two-person zero sum Games –Games without saddle points-Graphical solution of 2 x n and m x 2 Games-Dominance property-General solution of m x n games by Linear programming method.

UNIT III **(15 Hours)**

Network scheduling: Network and its basic components-Logical sequencing-Rules for Network construction-Critical Path Method (CPM)-Program Evaluation Review Technique (PERT).

UNIT IV **(15 Hours)**

Queueing theory: Queueing system-Elements of a Queueing system-Operating characteristics of Queueing systems-Classification of Queueing models-Poisson Queueing systems- $\{(M/M/1):(\infty/FIFO)\}$- problems

UNIT V **(15 Hours)**

Inventory models: The inventory decisions-Costs associated with Inventories-Factors affecting Inventory control-Economic order quantity-Deterministic Inventory problems with no shortages –EOQ problems with finite Replenishment-problems.

Teaching Methodology	YouTube videos, PPT, Black Board teaching and Handouts.

Book for Study

1. Swarup, K., Gupta, P. K., & Mohan, M. (2014). *Operations Research*, (13th Ed). Sultan Chand & Sons.

Books for Reference

1. Philips, D. T., Ravindran, A., & Solberg, J. J. (2007). *Operations Research Principle and Practice*.
2. Taha, H. A. (2014). *Operations Research*. An Introduction. PHI.

Websites and eLearning Sources

1. https://youtu.be/nLjopro7H7k
2. https://youtu.be/66aKgySf9vo

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	identify the characteristics for different types of decision-making environments.	**K1**
CO2	understand the appropriate decision-making approaches and tools to be used in each type.	**K2**
CO3	utilize the applications of sequencing problem, game theory, Network analysis, Queuing theory and Inventory models in real life situations.	**K3**
CO4	design new models, develop critical thinking and objective analysis of decision problems.	**K4**
CO5	know Implement of practical cases in optimization technique.	**K5**

Relationship matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
6	**23UST63ES04A**		**Discipline Specific Elective - 4:** Operations Research - 2							**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	2	3	1	2	3	2	2	**2.4**
CO2	1	2	2	3	3	2	3	2	2	3	**2.3**
CO3	2	1	2	1	2	3	2	3	3	2	**2.1**
CO4	3	3	3	2	3	2	3	1	2	2	**2.4**
CO5	3	2	2	3	2	3	2	2	1	3	**2.3**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UST63ES04B	**Discipline Specific Elective - 4:** Big-Data Analytics	5	3

Course Outcomes
1. Make students understand the concept of machine learning
2. Know the terminologies used Big data environments
3. Impart the knowledge NoSQL databases
4. Make the students learn MangoDB
5. Develop Big Data Solutions using Hadoop Eco System

UNIT I **(15 Hours)**

Machine Learning: Introduction-Machine Learning Algorithms-Regression Model-Clustering-Collaborative Filtering-Association Rule Mining-Decision Tree.

UNIT II **(15 Hours)**

Introduction: Big data-Characteristics of data-Evolution of big data-Definition of Big data-Challenges of big data-Classification of Analytics-Challenges in collecting and validating big data-Terminologies used in Big data environments.

UNIT III **(15 Hours)**

Interacting with Hadoop ecosystem-NoSQL: Uses-Types of NoSQL Databases-Advantages of NoSQL-Use of NoSQL in industry-NoSQL vendors, SQL versus NoSQL-NewSQL-Comparison of SQL, NoSQL and NewSQL.

UNIT IV **(15 Hours)**

Mango DB: Introduction-Using Java Script Object Notation-Creating a Unique key-Support for Dynamic Queries-Storing Binary data-Replication-Sharding-Updating Information In-Place.

UNIT V **(15 Hours)**

Hadoop-Hadoop ecosystem for processing big data-HDFS (Hadoop Distributed File System)-Processing data with Hadoop.

Teaching Methodology	YouTube videos, Chat and Talk, PPT and Handouts.

Book for Study

1. Acharya, S., & Subhashini, C. (2018). *Big Data and Analytics.* Bhushan Print line.

Books for Reference

1. Multiple Authors. (2011). *Big data analysis for Dummies*. Dummies Press.
2. Anurag Srivatsava. (2014). *Hadoop Blueprints*, PACKT.
3. Dipayan, De. (2015). *DL with Hadoop*. PACKT.
4. Multiple Authors. (2012). *Hadoop Fundamentals*. Packet Publications.

Websites and eLearning Sources

1. https://mrcet.com/downloads/digital_notes/CSE/IV%20Year/MACHINE%20LEARNING(R17A0534).pdf
2. https://onlinecourses.nptel.ac.in/noc20_cs92/preview
3. https://www.guru99.com/nosql-tutorial.html
4. https://www.codecademy.com/learn/learn-mongodb
5. https://www.geeksforgeeks.org/hadoop-ecosystem/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	acquire the knowledge about few features of MangoDB	**K1**
CO2	understand big data using Statistics	**K2**
CO3	explain the role of NoSQL databases provide optimal solutions for most Big data requirements	**K3**
CO4	analyzethe machine learning algorithms	**K4**
CO5	evaluate the usage of Hadoop ecosystem in Big data analysis	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**23UST63ES04B**			**Discipline Specific Elective - 4:** Big-Data Analytics						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	1	2	3	3	1	2	1	3	3	**2.2**
CO2	2	2	3	1	2	3	3	3	3	2	**2.4**
CO3	3	2	2	3	3	2	3	2	3	3	**2.6**
CO4	1	3	3	1	2	3	2	3	2	1	**2.1**
CO5	3	1	2	3	3	1	2	1	3	3	**2.2**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UST63PW01	Project Work and Viva Voce	-	2

GROUP PROJECT

Objective:

To enable the students to apply the statistical techniques for solving real-life problems.

A good project goes a long way in providing practical training to the students. They get an opportunity through the project to apply some of the vital theoretical concepts and techniques that had learnt in the previous semesters.

On most of the occasions, socio-economic survey and market research surveys are periodically conducted by government agencies, NGO's and private organizations. So, it is proposed to offer good project topics to the students in these practical areas. The students will be thoroughly trained through the project not only in scientific selection of sample for data collection, but also in identifying and applying appropriate statistical techniques in their projects.

The board evaluation strategy of the project will entitle the allocation of appropriate marks to the project report preparation and the remaining marks to the project viva-voce, as indicated below:

Project report evaluation: 60 Marks. Project Viva-voce: 40 Marks.

Students are trained to answer the MCQs related to the Core Courses mentioned below. The first five courses are covered for Test I (40 MCQs) and the remaining for Test II (40 MCQs). For the Semester Exam 60 MCQs from entire portion.

1. Descriptive Statistics
2. Probability and Random variables
3. Discrete Probability Distribution
4. Continuous Probability Distribution
5. Sampling Theory
6. Estimation Theory
7. Testing of Hypothesis
8. Optimization techniques
9. Statistical Quality Control
10. Design of Experiments