B Sc STATISTICS

LOCF SYLLABUS 2025

Department of Statistics

School of Computing Sciences

St. Joseph's College (Autonomous)

Tiruchirappalli - 620002, Tamil Nadu, India

SCHOOLS OF EXCELLENCE WITH CHOICE BASED CREDIT SYSTEM (CBCS) UNDERGRADUATE 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 137 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.*

Skill Enhancement Course (SEC): *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 (AECC): *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 (DSE): *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 DSE, a minimum of two courses of equal importance/weightage is a must. A department with two sections must offer two courses to the students.

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

Self-Learning (SL): *A two-credit course designed to foster students' ability for independent and self-directed learning. There are* Four Self-Learning Courses:

- *Compulsory MOOC on NPTEL-SWAYAM in Semester I or II*
- 'Artificial Intelligence' *as a Self-Learning Course jointly offered by the Departments of CS, AI, IT and Data Science on JosTEL in Semester III*
- *A Department-Specific Self-Learning Course in Semester IV on JosTEL*
- *A Certificate Course in Semester V: Each department will offer ONE certificate Course (45 – 60 hours) that will be creditised in the curriculum.*

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. One of the Core Courses in Sem IV is offered as internship embedded course which contains content related to industry.*

Experiential Learning (EL): *In the sixth semester, students are required to undertake a one credit Project / Industrial visit / Field visit chosen by the department. This component is intended to foster learning by direct experience and application of acquired knowledge to practical settings.*

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:

25	**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
SEC - 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
SL - Self-Learning
OE - Open Elective
PW - Project and Viva Voce
CE - Comprehensive Examination
EL - Experiential Learning
OR - Outreach Programme

EVALUATION PATTERN (UG)

Continuous Internal Assessment

Sl No	Component	Marks Allotted
1	Mid Semester Test	30
2	End Semester Test	30
3	*Two Components (15 + 20)	35
4	Library Referencing	5
	Total	**100**

Passing minimum: 40 marks

* *The first component is a compulsory online test (JosTEL platform) for 15 marks comprising 7 questions (1 mark) at K1 level and 4 questions (2 marks) at K2 level;* The second component is decided by the course in-charge in accordance with the prescribed K levels.

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)*	Mid Sem				1(2)	1*		2 × 10 = 20
	End Sem				1*	1(2)		
							Total	**60**

***** *Compulsory*

Question Paper Blueprint for Semester Examination

Duration: 3 Hours						**Maximum Marks: 100**
Section	**K levels**					**Marks**
	K1	**K2**	**K3**	**K4**	**K5**	**K6**	
A *(compulsory)*	10						10 × 1 = 10
B *(compulsory)*		10					10 × 3 = 30
C *(either…or type)*			5				5 × 6 = 30
D *(3 out of 5)*				2(3)	1(2)		3 × 10 = 30
						Total	**100**

***** *Compulsory*

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

Title of the Course	**CIA**	**Semester Examination**	**Final**
• One credit Core Course (Sem 1) • Skill Enhancement Course (NCC and Department Specific)	25 + 25 = 50	50 *(Department)*	100
• Self - Learning Course (Dept Specific) • Comprehensive Examination	25 + 25 = 50	50 *(CoE)*	100
• Value Education • Environmental Studies	50	50 *(CoE)*	100
• Skill Enhancement Course: Soft Skills • Self - Learning Course (Common) • Self - Learning Online Course (NPTEL / SWAYAM) • Certificate Course • Internship	100	-	100
• Project / Industrial Visit / Field Visit	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 Outcomes (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.

B. Sc. Statistics					
Programme Structure					
Part	**Semester**	**Specification**	**No. of Courses**	**Hours**	**Credits**
1	1- 4	Languages (Tamil / Hindi / French / Sanskrit)	4	16	12
2	1 - 4	General English	4	20	12
3	1 - 6	Core Course	13	66	46
	1 - 6	Core Practical	3	16	9
	1 & 2	Allied Course	2	8	6
	1 & 2	Allied Practical	2	4	2
	3 & 4	Allied Optional	2	12	8
	3 & 4	Allied Optional Practical	-	-	-
	5 & 6	Discipline Specific Elective	4	16	12
	5	Internship	1	-	1
	6	Project / Industrial Visit / Field Visit	1	-	1
	6	Comprehensive Examination	1	-	2
4	1 - 4	Value Education	4	8	4
	1 & 2	Ability Enhancement Compulsory Course	2	2	3
	2 - 5	Self - Learning	4	-	8
	3 & 4	Skill Enhancement Course	2	4	2
	5 & 6	Open Elective	2	8	4
5	2 - 6	Outreach Programme (SHEPHERD)	-	-	4
	2 - 6	Co-curricular and Extracurricular Activities	-	-	1
	2 - 6	Extra Credit Courses (MOOC) / Certificate Courses	5	-	(15)
		Total	**56**	**180**	**137 (15)**

B. Sc. STATISTICS PROGRAMME PATTERN									
		Course Details					Scheme of Exams		
Sem.	Part	Course Code	Course Type	Title of the Course	Hours	Credits	CIA	SE	Final
1	I	25UTA11GL01	GL	General Tamil – 1	4	3	100	100	100
		25UFR11GL01		Language French – 1					
		25UHI11GL01		Language Hindi – 1					
		25USA11GL01		Language Sanskrit – 1					
	II	25UEN12GE01A	GE	**General English – 1:** Pre-Intermediate Stream	5	3	100	100	100
		25UEN12GE01B		**General English – 1:** Intermediate Stream					
	III	25UST13CC01	CC Major	**Core Courses - 1:** Descriptive Statistics	6	4	100	100	100
		25UST13CC02		**Core Courses - 2:** Time series and Index Numbers	5	4	100	100	100
		25UST13CC03		**Core Courses - 3:** Statistics for Beginners	2	1	100	-	100
		25UST13AC01	AC Minor	**Allied Course - 1:** Office Automation	4	3	100	100	100
		25UST13AP01		**Allied Practical - 1:** Office Automation Lab	2	1	100	100	100
	IV	25UHE14VE01	VE	**Value Education – 1:** Essentials of Humanity*	2	1	50	50	50
		25UEN14AE01	AECC	Communicative English	-	2	100	-	100
				Total	**30**	**22**			
2	I	25UTA21GL02	GL	General Tamil – 2	4	3	100	100	100
		25UFR21GL02		Language French – 2					
		25UHI21GL02		Language Hindi – 2					
		25USA21GL02		Language Sanskrit – 2					
	II	25UEN22GE02A	GE	**General English – 2:** Pre-Intermediate Stream	5	3	100	100	100
		25UEN22GE02B		**General English – 2:** Intermediate Stream					
	III	25UST23CC04	CC Major	**Core Courses – 4:** Probability Theory	6	4	100	100	100
		25UST23CC05		**Core Courses – 5:** Numerical Methods	5	4	100	100	100
		25UST23AC02	AC Minor	**Allied Course - 2:** C – Programming	4	3	100	100	100
		25UST23AP02		**Allied Practical – 2:** C Programming Lab	2	1	100	100	100
	IV	25UHE24AE02	AECC	Environmental Studies*	2	1	50	50	50
		25UHE24VE02	VE	**Value Education - 2:** Fundamentals of Human Rights*	2	1	50	50	50
		25UST24SL01	SL	Online Courses: (NPTEL / SWAYAM)	0	2	-	100	100
				Extra Credit Course	0	(3)			
				Total	**30**	**22 (3)**			
3	I	25UTA31GL03	GL	General Tamil – 3	4	3	100	100	100
		25UFR31GL03		Language French – 3					
		25UHI31GL03		Language Hindi – 3					
		25USA31GL03		Language Sanskrit – 3					
	II	25UEN32GE03B	GE	General English – 3: English for Science - 1	5	3	100	100	100
	III	25UST33CC06	CC Major	**Core Courses – 6:** Discrete Probability Distributions	5	4	100	100	100
		25UST33CC07		**Core Courses – 7:** Continuous Probability Distributions	6	4	100	100	100
		25UST33AO01A	AO Minor	**Allied optional - 1:** Mathematics for Statistics - 1	6	4	100	100	100
		25UST33AO01B		**Allied optional - 1:** Accounts – 1					
	IV	25UHE34VE03A	VE	**Value Education - 3:** Social Ethics – 1*	2	1	50	50	50
		25UHE34VE03B		**Value Education - 3:** Religious Doctrine – 1*					
		25UNC34SE01/ 25USS34SE01	SEC	**Skill Enhancement Course – 1:** Introduction to NCC / **Skill Enhancement Course – 1:** Soft Skills	2	1	100	-	100
		25UAI34SL02	SL	Artificial Intelligence (Online)	0	2	100	-	100
				Extra Credit Course	0	(3)			
				Total	**30**	**22 (3)**			
4	I	25UTA41GL04B	GL	General Tamil – 4 - Scientific Tamil (அறிவியல் தமிழ்)	4	3	100	100	100
		25UFR41GL04		Language French – 4					
		25UHI41GL04		Language Hindi – 4					
		25USA41GL04		Language Sanskrit – 4					
	II	25UEN42GE04B	GE	General English – 4: English for Science - 2	5	3	100	100	100
	III	25UST43CC08	CC Major	**Core Courses – 8:** Estimation Theory	5	4	100	100	100
		25UST43CC09		**Core Courses – 9:** Testing of Hypothesis (Internship Embedded course)	6	4	100	100	100

		25UST43AO02A	**AO Minor**	**Allied Optional - 2:** Mathematics for Statistics - 2	6	4	100	100	100
		25UST43AO02B		**Allied Optional - 2:** Accounts – 2					
	IV	25UHE44VE04A	**VE**	**Value Education – 4:** Social Ethics – 2 *	2	1	50	50	50
		25UHE44VE04B		**Value Education - 4:** Religious Doctrine – 2*					
		25UNC44SE02 / 25UST44SE02	**SEC**	**Skill Enhancement Course – 2:** NCC (Special Subject) / **Skill Enhancement Course – 2:** Statistics for Competitive Examinations	2	1	100	-	100
		25UST44SL03	**SL**	**Self Learning:** Introduction to Data Mining*	0	2	50	50	50
				Extra Credit Course	0	(3)			
				Total	**30**	**22 (3)**			
5	III	25UST53CC10	**CC Major**	**Core Courses - 10:** Sampling Theory	5	4	100	100	100
		25UST53CC11		**Core Courses - 11:** Design of Experiments	5	3	100	100	100
		25UST53CC12		**Core Courses - 12:** Data Exploration with R	4	2	100	100	100
		25UST53CP01		**Core Practical - 1:** R- Software Lab	4	2	100	100	100
		25UST53ES01A	**DSE**	**Discipline Specific Elective – 1:** Actuarial Statistics	4	3	100	100	100
		25UST53ES01B		**Discipline Specific Elective – 1:** Stochastic Processes					
		25UST53ES02A		**Discipline Specific Elective – 2:** Operations Research – 1	4	3	100	100	100
		25UST53ES02B		**Discipline Specific Elective – 2:** Linear Models, Econometrics and Random Processes					
		25UST53IS01	**IS**	Internship	0	1	100	-	100
	IV	25UST54OE01	**OE**	**Open Elective - 1 (WS):** Quality Management and Official Statistics	4	2	100	100	100
		25UST54SL04	**SL**	**Certificate Course:** Data Analysis and Visualization in JAMOVI	0	2	100	-	100
				Extra Credit Course	0	(3)			
				Total	**30**	**22 (3)**			
6	III	25UST63CC13	**CC Major**	**Core Courses - 13:** Statistical Quality Control	6	4	100	100	100
		25UST63CP02		**Core Practical – 2:** Computational Statistics	6	4	100	100	100
		25UST63CP03		**Core Practical – 3:** Data Analysis Using Python	6	3	100	100	100
		25UST63ES03A	**DSE**	**Discipline Specific Elective – 3:** Population Studies	4	3	100	100	100
		25UST63ES03B		**Discipline Specific Elective – 3:** Survival Analysis					
		25UST63ES04A		**Discipline Specific Elective – 4:** Operations Research – 2	4	3	100	100	100
		25UST63ES04B		**Discipline Specific Elective – 4:** Big-Data Analytics					
		25UST63EL01A	**EL**	**Project** /	0	1	100	-	100
		25UST63EL01B		Industrial Visit /					
		25UST63EL01C		Field Visit					
		25UST63CE01	**CE**	Comprehensive Examination*	0	2	50	50	50
	IV	25UST64OE02	**OE**	**Open Elective – 2:** Applied Statistics	4	2	100	100	100
				Extra Credit Course	0	(3)			
				Total	**30**	**22 (3)**			
2-6	V	25UCW 65OR01 25UCW 65EC01	**OR** **EC**	Outreach Programme Co - Curricular& Extra Curricular Activities	-	4 1			
1-6				**TOTAL (6 SEMESTERS)**	**180**	**137 (15)**			

***For Grade Calculation:** Marks obtained out of 50 will be converted into 100 in the mark statements.

Open Elective - 1 (WS): 5th Semester

School	Course Code	Title of the Course
SCS		
Artificial Intelligence and Machine Learning	25UAI54OE01	Cyber Security
BCA	25UBC54OE01	Digital Marketing
Computer Science	25UCS54OE01	Web User Interface Design
Mathematics	25UMA54OE01	Quantitative Aptitude
Statistics	25UST54OE01	Quality Management and Official Statistics

Open Elective-2: 6th Semester
Offered to students from other Departments

Department	Course Code	Title of the Course
Artificial Intelligence and Machine Learning	25UAI64OE02	Gen AI tools
Botany	25UBO64OE02	Landscape Designing and Waste Management
Biotechnology	25UBT64OE02	Food Science and Technology
BBA	25UBU64OE02A	Practical Stock trading
	25UBU64OE02B	Export Management
B Com Business Analytics	25UCB64OE02	Personal Investment Planning
B Com Computer Application	25UCC64OE02A	Social Media Marketing
	25UCC64OE02B	Basics of Banking
B Com Strategic Finance	25UCF64OE02	Personal Financial Management
Chemistry	25UCH64OE02	Food & Nutrition
B Com	25UCO64OE02A	Digital Marketing
	25UCO64OE02B	Digital Banking
	25UCO64OE02C	Stock Trading
Computer Science	25UCS64OE02	Design Thinking
BCA	25UBC64OE02	Web Design
Economics	25UEC64OE02	Economics for Competitive Exams
Electronics	25UEL64OE02A	CCTV and Smart Security Systems
	25UEL64OE02B	Entrepreneurial Electronics
English	25UEN64OE02	English for Employability
History	25UHS64OE02	Intellectual Revivalism in Tamil Nadu
Mathematics	25UMA64OE02	Mathematics for Competitive Examinations
Physics	25UPH64OE02A	Laser Technology and its Application
	25UPH64OE02B	Physics of Earth
Statistics	25UST64OE02	Applied Statistics
Tamil	25UTA64OE02	படைப்பிலக்கியம் (Creative writing)
Visual Communication	25UVC64OE02	Digital Media and Production

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UTA11GL01	பொதுத்தமிழ் – 1: General Tamil - 1	4	3

கற்றலின் நோக்கங்கள் (Course Objectives)
புதிய இலக்கிய வடிவங்களை அறியும் திறனைப் பெறுதல்
எழுத்து சொல் இலக்கணக்கில் இன்றியமையாமையை உணர்தல்
புதுக்கவிதைகளின் கூறுகளை வரம்பியலோடு பொருத்திப் பார்த்தல்
தமிழ்க்கவிதைகளைப் பிறமொழிக் கவிதைகளோடு ஒப்பிட்டுப் பார்த்தல்
புதுக்கவிதைகளைப் படைக்கும் திறன் பெறுதல்

அலகு-1 ***(12 மணி நேரம்)***

பாரதியார் கவிதைகள் - பாஞ்சாலிசபதம்: சபதச் சுருக்கம்
பாரதிதாசன் கவிதைகள் - புரட்சிக்கவி : மன்னனின் சர்வாதிகாரம், கவிஞனின் எழுச்சியுரை, கவிஞனின் மொழிப்பற்று, மக்களாட்சி மலரும் விதம்
இலக்கிய வரலாறு - இருபதாம் நூற்றாண்டுத் தமிழ்க்கவிஞர்கள்
உரைநடை - முதல் மூன்று கட்டுரைகள்

அலகு-2 ***(12 மணி நேரம்)***

வெ.இராமலிங்கனார் - தமிழ், அரசியல்
முடியரசனார் - தொழிலாளி, துறைதோறும் தமிழே காண்பீர், மொழியுணர்ச்சி
பெருஞ்சித்திரனார் - என்னென்று சொல்வோம், இனியேனும் ஒன்றிணைவீர்
பட்டுக்கோட்டையார் - என் விருப்பம், ஏட்டில் படித்ததோடு இருந்து விடாதே, அன்னசத்திரம் இருப்பதெதனாலே?
இலக்கிய வரலாறு - புதுக்கவிதை வடிவங்கள்
இலக்கணம் - எழுத்து

அலகு-3 : சமூகக் கவிதைகள் ***(12 மணி நேரம்)***

சுரதா - நெஞ்சில் நிறுத்துங்கள், பூம்புகார்
மு. மேத்தா - உன்னுடைய கொடியை
கண்ணதாசன் - ஆணவம் அழியும்
அப்துல் ரகுமான் - பசி
தங்கம் மூர்த்தி - கூடு திரும்புதல் எளிதன்று
ஜெயபாஸ்கரன் - ஒற்றைக் கேள்வியுடன் ஒருவர்
இலக்கிய வரலாறு - சிறுகதை- உரைநடை
சிறுகதை - முதல் மூன்று கதைகள்

அலகு-4 : அரசியல் கவிதைகள் ***(12 மணி நேரம்)***

ஈரோடு தமிழன்பன் - எட்டாவது சீர்
யுகபாரதி - பழைய புத்தக வியாபாரி
கனிமொழி - கருவறை வாசனை
அ.வெண்ணிலா - நீரில் அலையும் முகம்
பெருமாள் முருகன் - குழந்தைகளைத் தண்டித்தல்
சீனு ராமசாமி - அகதி
கல்கி சுப்பிரமணியம் - விதியை எழுதினேன்
இலக்கணம் - சொல்

அலகு-5 : அயலகக் கவிதைகள் ***(12 மணி நேரம்)***

தஸ்லீமா நஸ்ரின் - கல் உடைக்கும் பெண்
மாயா ஏஞ்சலு - கைத்தட்டுங்கள் கொண்டாடுங்கள்
நானிலு கவிதைகள் - 10 கவிதைகள்
உரைநடை - நான்கு முதல் ஆறு வரை உள்ள கட்டுரைகள்
சிறுகதை - நான்கு முதல் ஆறு வரை உள்ள கதைகள்

கற்பித்தல் அணுகுமுறை ***Teaching Methodology***	விரிவுரை ***(Lecture),*** காணொளிக் காட்சி ***(Videos),*** விளக்கக் காட்சி ***(PPT presentation)***
மதிப்பீட்டு முறைகள் ***Assessment methods***	நூல் நோக்குத் தேர்வு ***(Open Book Test),*** இயங்கலைத்தேர்வு ***(****Online Test),*** ஒப்படைவு ***(Assignment),*** வினாடி வினா ***(Quiz),*** கருத்தரங்கு ***(Seminar)***

பாடநூல்:

பொதுத்தமிழ்-*1(2025),* தமிழாய்வுத்துறை, தூய வளனார் கல்லூரி

Websites and eLearning Sources:

- *https://www.tamilvu.org/library/nationalized/pdf/35-subbureddiyar/452-panjalisabatham.pdf*
- *https://www.annacentenarylibrary.org - https://shorturl.at/KWZx5*
- *https://eluthu.com/kavithai*
- *https://www.tamilvu.org/courses/degree/p103/p1032/html/p1032614.htm*
- *https://kavithaivaasal.blogspot.com/2017/11/blog-post.html*

Course Outcomes

CO No.	***CO-Statements*** **இப்பாடத்தின் நிறைவில் மாணவர்கள்**	***Cognitive Levels (K –Levels)***
CO–1	இக்கால இலக்கிய வகைகளைக் கண்டறிவர்	***K1***
CO–2	எழுத்து, சொல்லிலக்கணங்களின் அடிப்படைகளை வகைப்படுத்தி அறிவர்	***K2***
CO–3	அயலகக் கவிதை வடிவங்கள் குறித்த தெளிவான விளக்கங்களைப் பெறுவர்	***K3***
CO–4	மொழிபெயர்ப்புக் கவிதைகளைக் கற்பதன் வாயிலாகத் திறனாய்வு செய்யும் திறனை வளர்க்கெடுப்பர்	***K4***
CO–5	புதுக்கவிதை வாயிலாக வெளிப்படும் சமூக, அரசியல் விழுமியங்களை மதிப்பிடுவர்	***K5***

Relationship Matrix											
Semester	***Course Code***			***Title of the Course***						***Hours***	***Credits***
1	***25UTA11GL01***			பொதுத்தமிழ் – *1: General Tamil - 1*						***4***	***3***
Course Outcomes↓	***Programme Outcomes (PO)***					***Programme Specific Outcomes (PSO)***					***Mean Scores of COs***
	PO1	***PO2***	***PO3***	***PO4***	***PO5***	***PSO1***	***PSO2***	***PSO3***	***PSO4***	***PSO5***	
CO-1	*3*	*3*	*2*	*2*	*3*	*3*	*3*	*2*	*3*	*3*	*2.7*
CO-2	*2*	*2*	*3*	*2*	*2*	*3*	*2*	*3*	*2*	*3*	*2.4*
CO-3	*3*	*2*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*2*	*2.8*
CO-4	*2*	*2*	*2*	*2*	*1*	*2*	*2*	*3*	*2*	*2*	*2.0*
CO-5	*3*	*2*	*3*	*2*	*2*	*3*	*2*	*2*	*3*	*3*	*2.5*
										Mean Overall Score	***2.48 (High)***

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	**25UFR11GL01**	Language French – 1	**4**	**3**

Course Objectives
Familiarize students with the French language through an exploration of francophone culture, traditions, and civilization.
Build fundamental knowledge in listening, speaking, reading, and writing (LSRW) as outlined by the Common European Framework of Reference for Languages (CEFR).
Enable students to understand and use basic grammatical structures and essential vocabulary in context.
Equip students with the skills needed to engage in simple, real-life conversations and interactions in French.
Foster a deeper connection to the language by integrating cultural elements, enhancing motivation and intercultural awareness.

UNIT I **(12 Hours)**

1. Titre - Je Suis
2. Lexique - L'alphabet, les salutations, les loisirs, les nombres
3. Grammaire - Les pronoms personnels sujets, les articles définis et indéfinis, les verbes auxiliaires, les adjectifs de nationalité, l'adjectif interrogatif 'quel'
4. Production orale- se présenter
5. Production écrite - Donner des informations personnelles

UNIT II **(12 Hours)**

6. Titre - Près de moi
7. Lexique – Les lieux, la famille, la situation familiale, les professions
8. Grammaire – les verbes en 'er'au présent, le masculin et le féminin des professions, les adjectifs possessifs
9. Production orale- Demander et dire le lieu d'habitation
10. Production écrite - Présenter et parler de sa famille

UNIT III **(12 Hours)**

11. Titre - Qu'est-ce qu'on mange ?
12. Lexique – les commerces, les commerçants, les aliments, les moyens de paiement
13. Grammaire – le singulier et le pluriel des noms, les prépositions de lieu, les verbes en 'ir'
14. Production orale- faire des courses alimentaires, demander et dire le prix
15. Production écrite - Donner une appréciation, commander au restaurant, créer un menu

UNIT IV **(12 Hours)**

16. Titre - C'est où
17. Lexique – la ville, les monuments, les transports
18. Grammaire – la fréquence, l'impératif, les connecteurs
19. Production orale- demander et indiquer le chemin, se déplacer des transports en commun
20. Production écrite - présenter une ville ou un quartier, créer un guide pour un monument

UNIT V **(12 Hours)**

21. Titre - C'est tendance
22. Lexique – les vêtements, les couleurs, les matières, les objets technologiques, la météo
23. Grammaire – le genre et le nombre des adjectifs, le futur proche, la place des adjectifs, l'adjectif démonstratif
24. Production orale- demander et dire l'utilité d'un produit, parler de la météo
25. Production écrite - Donner une appréciation sur un vêtement, décrire un objet
26. Indian knowledge system- Incorporating hand gestures and expressions to reinforce non-verbal communication in French and assimilating traditional Indian culinary knowledge while learning French food cultures (5%)

Teaching Methodology	Kinesthetic & Multi-Sensory Learning, Rhythm-Based Learning – ex.comptines, Deductive & Explicit Learning- structural approach, oral approach, blended learning, media integration
Assessment Methods	*Oral assessment:* Introduce Oneself – (Rubric –assessed on correct usage of vocabulary, personal pronouns and basic verbs) *TPR activity:* Evaluate comprehension of oral commands like action words. (Rubric –assessed on comprehension, response and reaction time) *Reading comprehension:* Read a simple passage like a personal description, and answer questions. (Rubric –assessed on accuracy of response) *Written assessment:* Write simple structured texts on short personal introduction. (Rubric –Graded on correct grammar, sentence structure, and vocabulary usage)

Books for Study:

1. Mensdorff-Pouilly, L., Opatski, S., Petitmengin, V., Pons, S., Sperandio, C., Djimli, H., &Veldeman-Abry, J. (2022). *Édito A1: Méthode de français* (2nd ed.). Didier FLE, Hatier. (P.1-P.86)

Books for Reference:

1. Dauda, P., Giachino, L., &Baracco, C. (2020). *Génération A1*. Didier.
2. Mérieux, R., &Loiseau, Y. (2012). *Latitudes A1*. Didier.

Websites and e-learning Sources:

1. https://apprendre.tv5monde.com/en
2. https://www.thefrenchexperiment.com
3. https://www.iletaitunehistoire.com
4. https://www.francaisfacile.com
5. https://www.francaisauthentique.com

	Course Outcomes	
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
CO1	Recognize and use fundamental vocabulary including greetings, while constructing simple sentences with personal pronouns and basic verbs.	**K1**
CO2	Introduce themselves, ask and answer questions about personal details, express preferences, and engage in role-play conversations related to daily life	**K2**
CO3	Differentiate between definite and indefinite articles, form plural and singular nouns, conjugate regular verbs in the present tense, and use adjectives correctly	**K3**
CO4	Ask for and give directions, order food, discuss weather conditions, describe clothing and objects, and create simple structured texts such as menus, guides, and personal descriptions.	**K4**
CO5	Demonstrate awareness of Francophone culture through language use in real-world scenarios, such as public transport, shopping, dining, and professional settings.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
1	**25UFR11GL01**			Language French – 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	2	2	2	1	3	2	1	1	2	3	1.9
CO2	3	2	3	3	1	3	2	3	3	3	2.6
CO3	2	2	2	2	2	2	1	2	2	2	1.9
CO4	3	3	3	3	2	3	2	2	2	3	2.6
CO5	3	2	2	3	3	3	3	2	3	3	2.7
Mean Overall Score											**2.34 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	**25UHI11GL01**	Language Hindi - 1	**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)**

1. Swar
2. Vyanjan
3. Barah Khadi
4. Shabd aur Vakya

UNIT II **(12 Hours)**

5. Rishtom ke Naam
6. Gharelu Padartho ke Naam
7. Sangya
8. Hindi Ginthi

UNIT III **(12 Hours)**

9. Sapthah ke Din
10. Sarvanam
11. Vilom Shabd
12. Dr. Abdul Kalam

UNIT IV **(12 Hours)**

13. Sal ke Maheene
14. Shareer ke Ang
15. Visheshan
16. Batcheeth - Dookan mein

UNIT V **(12 Hours)**

17. Janvarom ke Naam
18. Rang
19. Dishayem
20. Adhikal (Introduction)

Teaching Methodology	Peer Instruction Exercise, Videos, PPT, Quiz, Group Discussion
Assessment Methods	Seminar, Quiz, Assignment

Books for Study:

1. *Prathamic Patya Pusthak*, Dakshina Bharath Hindi Prachara Sabha, Thiagaraya Nagar, Chennai, 2022.
2. M. Ravi Chandran, *Concise Trilingual Dictionary*, Lotus Publications, Madurai, 2021.
3. M. kamathaprasad Gupth, *Hindi Vyakaran*, Anand Prakashan, Kolkatta, 2020.
4. *Madyama Patya Pusthak*, Dakshina Bharath Hindi Prachara Sabha, Thiagaraya Nagar, Chennai, 2022.

Books for Reference:

1. Dr. A. P. J. Abdul Kalam, *Mere sapnom ka Bharath*, Prabath Prakashan, Noida, 2020,
2. *Meri Pratham Hindi Sulekh Shabd Gyaan*, Wonder House Books, Noida, 2022.
3. Aravind Kumar, *Sampoorna Hindi Vyakaran our Rachana*, Lucent publisher, 2022.
4. *Adhunik Hindi Vyakaran our Rachana*, Bharati Bhavan Publishers & distributors, 2024.
5. Acharya Ramchandra Shukla, *Hindi Sahitya Ka Itihas*, Prabhat Prakashan, 2023.

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**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO1	Introduction to Hindi sounds.	**K1**
CO2	Acquisition of Hindi Vocabulary.	**K2**
CO3	Sentence formation in Hindi.	**K3**
CO4	Practical application of grammar.	**K4**
CO5	Justify the social & political conditions of Aadhi Kaal in Hindi Literature.	**K5**

Relationship Matrix											
Semester	**Course code**			**Title of the Course**				**Hours/week**			**Credits**
1	**25UHI11GL01**			Language Hindi - 1				**4**			**3**
Course Outcomes (COs)	**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	**25USA11GL01**	Language Sanskrit - I	**4**	**3**

Course Objectives
To improve knowledge in Sanskrit
To train students in reading Sanskrit words
To introduce the fundamental grammar
To coach ethics and improve self-confident
To train the students to use the tenses in Sanskrit

UNIT I (**12 Hours)**

Introduction to Sanskrit

UNIT II (**12 Hours)**

Subhandha shabda vicaraha (akaara, aakaara, ikaara, iikaara)

UNIT III (**12 Hours)**

Vartamankala lat lakaara vakya prayogaha

UNIT IV (**12 Hours)**

Samskrita sharala vakya paricayaha

UNIT V (**12 Hours)**

Selected verses from good saying in Sanskrit

Teaching Methodology	Videos, PPT, Blackboard, Demonstration, Exercises
Assessment Methods	Seminar, Quiz, Group Discussion.

Books for Study:

Shadhamanjari

Books for Reference:

1. Kulapathy, K.M., Sarala Samkrit Balabodh, Bharatiya Vidya Bhavan, Munushimarg Mumbai – 4000 007 2021
2. R.S. Vadhyar & Sons, Book – Sellers and publishers, Kalpathi. Palagahat 678003, Kerala, South Inida, Shabdha Manjari 2022
3. Balasubramaniam R, Samskrita Akshatra Siksha, Vangals Publications, 14th Main road, JP Nagar, Bangalore – 78 2020

Websites and e-Learning Sources:

1. https://www.learnsanskrit.org/static/pdf/vyakarana.pdf
2. https://archive.org/details/in.ernet.dli.2015.382597
3. https://openpathshala.com/sanskrit-grammar-basic/3

Course Outcomes		
CO No.	**CO–Statements**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO–1	Remember and Recall words relating to objects.	**K1**
CO–2	Understand classified vocabulary.	**K2**
CO–3	Apply nouns and verbs	**K3**
CO–4	Analyze different forms of names and verbs	**K4**
CO–5	Appreciate the good saying of Sanskrit Improve the self-values.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**25USA11GL01**			Language Sanskrit - I						**4**	**3**
Course Outcomes↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PS02**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	1	1	3	2	3	2	3	2	2	2.2
CO-2	2	2	3	3	1	2	2	3	3	2	2.3
CO-3	3	2	2	2	2	2	2	3	3	2	2.3
CO-4	3	2	2	3	2	3	3	3	2	2	2.3
CO-5	3	2	3	2	3	2	2	3	3	3	2.6
Mean Overall Score											**2.34 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UEN12GE01A	**General English – 1:** Pre-Intermediate Stream	5	3

Course Objectives (CO)
To develop basic listening, speaking, reading, and writing skills
To improve comprehension and fluency in both oral and written communication
To learn language rules to create meaningful written and spoken communication
To learn and integrate new vocabulary to expand language proficiency
To construct grammatically correct sentences and engage in simple conversations

UNIT I: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening for familiar words in stories
	(Practice)	**:**	"The City Mouse and the Country Mouse"
Reading:	**(Skill)**	**:**	Reading aloud
	(Practice)	**:**	"The Peacock and the Crane" "The Curious Monkey"
Grammar:	**(Practice)**	**:**	Nouns: Types; Gender
Vocabulary:	**(Practice)**	**:**	Kinship terms
Speaking:	**(Skill)**	**:**	Repetition of Minimal Pairs
	(Practice)	**:**	Pronunciation of words
Writing:	**(Skill)**	**:**	Using capital letters correctly in names, the pronoun 'I,' days, months, languages, nationalities, sentence beginnings, and book titles
	(Practice)	**:**	Capitalisation

UNIT II: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening to identify phrases and sentences
	(Practice)	**:**	"How to Be Happy in Every Situation"
Reading:	**(Skill)**	**:**	Reading for main ideas
	(Practice)	**:**	"The World is a Mirror"
Grammar:	**(Practice)**	**:**	Countable and Uncountable Nouns; Singular and Plural Nouns; Pronouns
Vocabulary:	**(Practice)**	**:**	Human body vocabulary
Speaking:	**(Skill)**	**:**	Responding to basic questions
	(Practice)	**:**	Simple conversations
Writing:	**(Skill)**	**:**	Writing personal and academic information with correct spelling
	(Practice)	**:**	Using Correct Spelling in Writing

UNIT III: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening for main ideas
	(Practice)	**:**	"Magic Pot"
Reading:	**(Skill)**	**:**	Identifying the message of the story
	(Practice)	**:**	Zen story: "Carry On" Zen story: "Harmony"
Grammar:	**(Practice)**	**:**	Adjectives, Articles and Verbs
Vocabulary:	**(Practice)**		Vegetables and Fruits
Speaking:	**(Skill)**		Using 'be' verbs and adjectives to describe people, things and pictures
	(Practice)		Describing People, Things and Pictures
Writing:	**(Skill)**	**:**	Practising correct punctuation in writing
	(Practice)	**:**	Punctuation

UNIT IV: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening for the main ideas in the story and expressing one's views about them
	(Practice)	**:**	"A Glass of Milk"
Reading:	**(Skill)**	**:**	Understanding the central idea of the story and sharing personal views

	(Practice)	**:**	"Birbal: The Wise Man"
Grammar:	**(Practice)**	**:**	Simple Present Tense
Vocabulary:	**(Practice)**	**:**	Plants, Trees and Flowers
Speaking:	**(Skill)**	**:**	Describing daily routines using the simple present tense
	(Practice)	**:**	Describing one's own routine and a friend's routine
Writing:	**(Skill)**	**:**	**Writing simple sentences in response to questions and on a given topic**
	(Practice)	**:**	Writing Simple Sentences

UNIT V: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening to understand the sequence of ideas
	(Practice)	**:**	A Father and His Son
Reading:	**(Skill)**	**:**	Identifying the implicit idea of the story
	(Practice)	**:**	"The Stone Cutter"
Grammar:	**(Practice)**	**:**	Simple Past Tense
Vocabulary:	**(Practice)**	**:**	Birds, Animals and Insects
Speaking:	**(Skill)**	**:**	Narrating stories, events, or experiences using the simple past tense
	(Practice)	**:**	Narrating a Familiar Story or Past Events
Writing:	**(Skill)**	**:**	Writing a paragraph using a picture by answering questions or describing it.
	(Practice)	**:**	Picture Composition

Teaching Methodology	Lectures, task-based activities, audio-visual listening tasks, guided reading and writing exercises, discussions
Assessment Method	Listening and reading comprehension exercises, verbal presentations, role plays and conversations, writing tasks

Books for Study:
Seeds of English Skills by Dr. M. John Britto, Dr. B. Sam Jerome Sharone, and Dr. S. Sajeev.

	Course Outcomes	
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
CO-1	Recognize basic sounds, words, and simple ideas through listening practice.	**K1**
CO-2	Understand and engage in simple conversations, improving fluency in both oral and written communication.	**K2**
CO-3	Apply grammatical rules to construct meaningful sentences in spoken and written forms.	**K3**
CO-4	Integrate new vocabulary into everyday communication to expand language proficiency.	**K4**
CO-5	Construct grammatically correct sentences and engage in simple conversations, expressing personal experiences and opinions.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**25UEN12GE01A**			**General English – 1:** Pre-Intermediate Stream						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PS02**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	3	2	3	2	3	2	2	**2.4**
CO2	3	2	2	3	2	3	2	3	2	3	**2.5**
CO3	3	2	2	2	3	2	2	3	2	2	**2.3**
CO4	3	2	2	2	2	2	2	2	2	3	**2.2**
CO5	3	2	3	2	3	2	3	2	3	2	**2.5**
Mean Overall Score											**2.38 (High)**

Semester	Course Code	Title of the Course	Hours/ Week	Credits
1	25UEN12GE01B	**General English – 1:** Intermediate Stream	5	3

Course Objectives
To improve students' ability to listen, speak, read, and write in English through interactive and meaningful activities tailored to real-life contexts.
To enable students to use appropriate vocabulary, grammar, and pronunciation to introduce themselves, express opinions, describe people and places, and engage in conversations.
To equip students with reading strategies to comprehend texts, and apply structured writing methods to express ideas coherently.
To develop students' ability to use common grammar structures accurately and expand their vocabulary through word formation techniques.
To help students apply effective learning strategies to enhance their academic and professional success.

Unit 1: What's in a Name? (15 Hours)

1. Listening:	**(Skill)**	Listening for gist
	(Practice)	"Not Good with Names" by Cynthia Win (a TED talk)
2. Reading:	**(Skill)**	Skimming
	(Practice)	"Eli, the Equation"
3. Grammar:	**(Practice)**	Nouns
4. Vocabulary:	**(Practice)**	Forming compound nouns
5. Study Skill:		Using online dictionaries
6. Speaking:	**(Skill)**	Initiating conversations (Greeting – Starting a conversation with new people – Introducing and answering an introduction)
	(Practice)	Introducing oneself and others in conversations
7. Writing:	**(Skill)**	Narrating a personal anecdote – Using capitals and end mark punctuations in sentences
	(Practice)	Guided Composition: The story of my name

Unit 2: Family is Forever! (15 Hours)

1. Listening:	**(Skill)**	Predicting topics
	(Practice)	"Tracing Roots, Telling Stories"
2. Reading:	**(Skill)**	Scanning
	(Practice)	"Home Lost, Family Found"
3. Grammar:	**(Practice)**	Pronouns
4. Vocabulary:	**(Practice)**	Words related to family and relationships
5. Study Skill:		Recognising your learning style
6. Speaking:	**(Skill)**	Talking about your family (family members and relationships, their personalities and your attachment, family routines, and challenges)
	(Practice)	Talking about your family (in conversations)
7. Writing:	**(Skill)**	Narrating events in chronological order – Using punctuations in numbers
	(Practice)	Controlled Composition: My family history

Unit 3: Nothing is Better than a Good Friend (15 Hours)

1. Listening:	**(Skill)**	Listening for main idea
	(Practice)	"Nothing is better than a good friend"
2. Reading:	**(Skill)**	Predicting
	(Practice)	(Jigsaw reading) Fables about friends: (a) "The Hare with Many Friends" – (b) "The Two Fellows and the Bear" – (c) "The Fox and the Stork" – (d) "The Four Friends and a Hunter"
3. Grammar:	**(Practice)**	Adjectives
4. Vocabulary:	**(Practice)**	Forming nouns, adjectives, verbs and adverbs using suffixes
5. Study skill:		Setting and prioritising language learning goals
6. Speaking:	**(Skill)**	Talking about people (Describing people's appearance and their mannerism – Giving your opinion about people – Expressing what you like and dislike in a person)

	(Practice)	Delivering a short talk about one's best friend
7. Writing:	**(Skill)**	Describing people (What they wear, how they move and seem to feel, and where they are) Using comma in sentences.
	(Practice)	Controlled composition: Describing people in given pictures

Unit 4: The Inner Me **(15 Hours)**

1. Listening:	**(Skill)**	Listening to understand pronunciation
	(Practice)	"The bare necessities" from *The Jungle Book*
2. Reading:	**(Skill)**	Previewing a text
	(Practice)	"The Surprising Benefits of Being an Introvert"
3. Grammar:	**(Practice)**	Articles and Quantifiers
4. Vocabulary:	**(Practice)**	Forming words with different meanings using prefixes
5. Study skill:		Planning a study schedule
6. Speaking:	**(Skill)**	Asking about feelings – Expressing one's feelings
	(Practice)	Talking about feelings in different situations
7. Writing:	**(Skill)**	Describing character traits (Writing about what characters would say or do) Using quotation marks and apostrophes in sentences
	(Practice)	Controlled Composition: Cruel Cinderella

Unit 5: Hometown Appetite **(15 Hours)**

1. Listening:	**(Skill)**	Listening for supporting details
	(Practice)	"The Village that Raised Me"
2. Reading:	**(Skill)**	Questioning circles for active reading
	(Practice)	"Homecoming"
3. Grammar:	**(Practice)**	Prepositions of time, place and movement
4. Vocabulary:	**(Practice)**	Changing words from one class to another
5. Study skill:		Tracking progress in learning
6. Speaking:	**(Skill)**	Describing a place
	(Practice)	Talking about your hometown
7. Writing:	**(Skill)**	Describing objects – Using colon in sentences
	(Practice)	Controlled Composition: Writing posts for social media, describing your college campus and classroom

Teaching Methodology	Lectures, Demonstrations, Discussions, Peer-Review Tasks, Role-plays, Pair and group activities
Assessment Tools	Listening and reading comprehension tasks, Individual talks, Role plays, Controlled and guided compositions

Books for Study:

M.S. Xavier Pradheep Singh, J. Amalaveenus, and A. Napoleon. *English and Me* by Viva Books, 2025.

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Identify and recall common grammar structures, vocabulary, and pronunciation patterns used in everyday communication.	**K1**
CO2	Demonstrate comprehension of spoken and written texts by summarising key ideas, identifying main points, and making inferences.	**K2**
CO3	Use appropriate vocabulary, grammar, and pronunciation to introduce themselves, express opinions, describe people and places, and engage in meaningful conversations.	**K3**
CO4	Differentiate between various reading and writing strategies, such as skimming, scanning, and structured writing, to effectively interpret and construct texts.	**K4**
CO5	Critically review written and spoken texts for clarity, coherence, and correctness, providing constructive feedback for improvement.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**							**Hours**		**Credits**
1	**25UEN12GE01B**	**General English – 1:** Intermediate Stream							**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	2.5	3	3	2.5	3	3	2.5	2.5	3	2.8
CO2	2.5	3	2.5	2.5	2.5	3	3	2.5	2.5	3	2.7
CO3	3	2.5	2.5	3	3	2.5	2.5	2.5	3	2.5	2.7
CO4	2.5	2.5	2.5	3	2.5	2.5	2.5	3	2.5	2.5	2.6
CO5	3	2.5	2.5	2.5	3	2.5	2.5	2.5	3	2.5	2.65
Mean Overall Score											**2.69 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UST13CC01	**Core Course - 1:** Descriptive Statistics	6	4

Course Objectives
To understand the Fundamentals of Statistics.
To explore statistical survey techniques and data collection.
To grasp data classification, tabulation, and representation methods.
To understand various measures of central tendency and dispersion.
To Estimate and predict the unknown and future values.

Unit - I **(18 Hours)**

Statistics: Introduction - Definition – Functions - Applications - Limitations. Organizing, planning and Executinga Statistical Survey-Collection of Data: Primary and secondary data - Methods of collecting primary data - Sources of secondary data. Sampling: Census and Sample methods.

Unit - II **(18 Hours)**

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. Introduction to Statistics in Indian Context.

Unit - III **(18 Hours)**

Measures of Central tendency: Introduction-Definitions-Types - Mean-Median-Mode-Geometric 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. Central Tendency and Measures of Dispersion in IKS:

Unit - IV **(18 Hours)**

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

Unit - V **(18 Hours)**

Correlation analysis: Introduction - Definition - Types – Ungrouped and Grouped data – Probable error – properties - Rank correlation – Partial and Multiple correlations(concept) - Regression analysis: Introduction - Definition – Regression Equations - Principle of least squares for first degree, Second degree, Exponential and Power curves - Regression Analysis

Teaching Methods	YouTube videos, PPT and Handouts
Assessment Methods	Seminar, Snap Test, MCQ and Mini project

Books for Study:

1. Gupta, S.P. (2021). *Statistical Methods*, (46th Revised Ed) Sultan Chand & Sons Pvt Ltd, New Delhi.
2. Gupta S.C. and Kapoor, V.K. (2020). *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons Pvt. Ltd., New Delhi

Books for Reference:

1. Goon A.M. Gupta. A.K. and Das Gupta, B (2017). *Fundamental of Statistics*, (9th Revised Ed), vol.2 World Press Pvt. Ltd., Kolkatta.
2. G. U. Yule and M.G. Kendall (2000). *An introduction to the theory of Statistics*, (14th Ed) Charles Griffin.
3. M.R. Spiegel (2007). *Theory and problems of Statistics*, (4th Ed) Schaum's outline series.
4. Anderson, T.W. and Sclove SL. (1978). *An introduction to statistical analysis of data*, Houghton Miffin&co.
5. Pillai, R.S., and Bagavathi (2019). *Statistics*, S. Chand and Company Ltd., New Delhi.

Websites and e-learning 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
3. http://onlinestatbook.com/2/introduction/descriptive.html
4. IJRR29.pdf

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the 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	Computethe 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	**25UST13CC01**			**Core Course - 1:** Descriptive Statistics						**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	3	3	2	2	2	3	3	3	2	2	**2.5**
CO2	2	2	3	3	2	3	3	3	3	3	**2.7**
CO3	3	2	3	2	2	3	3	3	3	2	**2.6**
CO4	2	2	2	3	2	3	3	2	2	3	**2.4**
CO5	3	3	2	2	3	3	2	2	2	3	**2.5**
										Mean Overall Score	**2.52 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
1	25UST13CC02	**Core Course - 2:** Time Series and Index Numbers	5	4

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

Unit-I **(15 Hours)**

Time Series: 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 **(15 Hours)**

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

Unit – III **(15 Hours)**

Growth Curves: Parabolic, exponential, Modified Exponential Curve and its Fitting – Method of Three Selected Points – Method of Partial Sums – Fitting of Gompertz Curve – Logistic Curve.
De - Seasonalisation of data.

Unit-IV **(15 Hours)**

Index Numbers: Definition, Uses, Types, Problems involved in the construction of Index Numbers – Construction of Index Numbers – Simple aggregate method and Simple average of Price relative's 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 **(15 Hours)**

Tests for adequacy: Time Reversal Test, Factor Reversal Test, Unit test and Cyclic test. Construction of Weighted Average of Price relatives Index Numbers using A.M & G.M. Fixed Base Index Numbers and Chain Base Index Numbers. Definitions of Splicing, Inflation, Base shifting and Real wages.

Teaching Methodology	Chalk and talk, PPT, Online tutorials and video demonstrations
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. Gupta S.P. &Kapoor V.K. (2019) *Fundamentals of Applied Statistics*, (12th Ed). Sultan Chand & Sons.

Books for Reference:

1. Garret, H.E. (2005). *Education and Psychological Statistics*. Paragan International Publications.
2. Pillai, R.S.N., & 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 Resources:

1. Khan Academy – Time Series Analysis – https://www.khanacademy.org/
2. Statistics How To – Seasonal Variation – https://www.statisticshowto.com/
3. NPTEL – Time Series Analysis and Forecasting – https://nptel.ac.in/courses/
4. Investopedia – Index Numbers – https://www.investopedia.com/
5. Coursera – Economic Indicators and Index Numbers – https://www.coursera.org/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO-1	Acquire the knowledge of time series, index numbers and its applications.	**K1**
CO-2	Outline the forecasting and its curve fitting.	**K2**
CO-3	Compute the different measurements and index numbers.	**K3**
CO-4	Analyze the importance of time series and index numbers.	**K4**
CO-5	Apply the time series data and index numbers in real life problems.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
1	**25UST13CC02**			**Core Course - 2:** Time Series and Index Numbers					**5**		**4**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PS-4**	**PSO5**	
CO-1	2	3	3	1	2	3	2	3	2	2	2.3
CO-2	2	3	3	2	2	2	3	3	3	2	2.5
CO-3	3	2	1	3	3	2	3	2	3	2	2.4
CO-4	2	1	2	3	2	1	2	3	2	3	2.1
CO-5	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
1	25UST13CC03	**Core Course – 3:** Statistics for Beginners	2	1

Course Objectives
To understand set theory and its application
To learn sequence and series
To recall Basic Counting Principles
To develop Basic Differentiation and Integration Skills
To familiarize Students with Statistical Concepts and Methods

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 Methods	PPT, Chalk and talk and Hand outs
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. Navaneetham, P. A. (2019). *Business mathematics and statistics*. Jai Publishers.
2. Aggarwal, R. S. (2023). *Quantitative aptitude* (31st Ed). S. Chand & Company Pvt. Ltd.
3. Gupta, S.P. (2021). *Statistical Methods*, (46th Revised Ed). Sultan Chand & Sons Pvt Ltd, New Delhi.

Books for Reference:

1. Gupta, S. C., & Kapoor, V. K. (2020). *Fundamentals of mathematical statistics* (12th Ed.). Sultan Chand & Sons.
2. Pillai, R. S. N., & Bagavathi. (2019). *Statistics: Theory and practice* (1st Ed.). S. Chand Publishing.

Website and eLearning Sources:

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

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Acquire the knowledge of sets, sequence, permutation, combination, differential calculus, integral calculus, Statistics and its importance in various areas.	**K1**
CO2	Apply the quantitative methods to solve the real life problems	**K2**
CO3	Identify statistical problems and use appropriate statistical methods	**K3**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**25UST13CC03**			**Core Course - 3:** 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	3	2	1	**2.3**
CO2	3	3	3	3	2	3	3	3	3	2	**2.6**
CO3	3	3	3	2	2	3	3	3	3	2	**2.6**
										Mean Overall Score	**2.5 (High)**

Semester	Course Code	Title of the Course	Hours/ Weeks	Credits
1	25UST13AC01	**Allied Course - 1:** Office Automation	4	3

Course Objectives
To understand the role of digital tools in managing, organizing, and automating data efficiently.
To develop skills in word processing for document creation, formatting, and data reporting using MS Word.
To apply spreadsheet tools for data entry, calculations, visualization, and analysis using MS Excel.
To create professional presentations using MS PowerPoint for effective data communication.
To integrate digital tools for automating repetitive tasks, collaborating online, and ensuring secure data management.

UNIT I **(12 Hours)**

Introduction to Windows and File Management: Basics of Windows OS - File Management: Creating, Copying, Editing, and Deleting files - Desktop Configuration & File Compression - Internet Basics: Web Browsing, Email Management, and Online Collaboration (Google Drive, OneDrive)

UNIT II **(12 Hours)**

Word Processing with MS Word: Creating and Formatting a Word Document - Editing: Cut, Copy, Paste, Find, Replace - Page Layout: Margins, Orientation, Page Breaks - Tables, Images, and Smart Art - Spelling and Grammar Check

UNIT III **(12 Hours)**

Spreadsheet Basics with MS Excel: Data Entry, Formatting, and Basic Formulas - Creating and Managing Tables - Chart Creation: Line, Bar, Pie Charts - Basic Statistical Functions (SUM, AVERAGE, MAX, MIN) - Introduction to Pivot Tables – Data Analysis ToolPak (Descriptive, Correlation, Regression)

UNIT IV **(12 Hours)**

Presentation Skills with MS PowerPoint: Creating and Managing Slides - Applying Themes, Animations, and Transitions - Inserting Media: Images, Videos, Charts - Slide Show and Printing Options - Effective Presentation Techniques

UNIT V **(12 Hours)**

Office Automation and Integration: Mail Merge in MS Word - Importing and Exporting Data between Word, Excel, and PowerPoint - Automating Repetitive Tasks using Macros (Introduction) - Cloud-Based Collaboration and File Sharing (Google Docs, Sheets, and Slides) -Cyber security Best Practices for Office Applications

Teaching Methodology	Chalk and talk, PPT, Hands-on practice with software applications, Online tutorials and video demonstrations
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. S. Jain & M. Geetha (2022). *Office Automation: Concepts and Tools* (3rd Ed.), BPB Publications, New Delhi
2. Steve Schwartz (2021). *Mastering MS Office: Hands-On Training for Word, Excel, and PowerPoint* (2nd Ed.), McGraw Hill Education, New York

Books for Reference:

1. Curtis Frye (2023). *Microsoft Excel Step by Step* (1st Ed.), Microsoft Press, Redmond, USA
2. Joan Lambert (2022). *Microsoft Word Step by Step* (9th Ed.), Microsoft Press, Redmond, USA
3. David W. Beskeen (2021). *Microsoft Office 365: Office Applications* (2nd Ed.), Cengage Learning, Boston, USA

Websites and eLearning Sources:

1. GCF Global (Goodwill Community Foundation) – https://edu.gcfglobal.org/en/

2. Microsoft Learn – https://learn.microsoft.com
3. Google Digital Garage – https://learndigital.withgoogle.com/digitalgarage
4. Kevin Stratvert - Microsoft Office Tutorials – https://www.youtube.com/c/KevinStratvert
5. Simplilearn –Office Automation–https://www.youtube.com/c/Simplilearn

Course Outcomes		
CO No.	**Co – Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	Recall key concepts of digital tools and office automation, including their applications in data management.	**K1**
CO2	Explain the functions of word processors, spreadsheets, and presentation software in organizing and presenting data.	**K2**
CO3	Use MS Word, Excel, and PowerPoint to create documents, analyse data, and design effective presentations.	**K3**
CO4	Compare different digital tools and evaluate their effectiveness for specific data management tasks.	**K4**
CO5	Integrate multiple office automation tools and implement secure, efficient workflows for managing and sharing data.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**25UST13AC01**			**Allied Course - 1:** Office Automation						**4**	**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	2	1	2	1	3	2	1	2	1	1.8
CO-2	3	2	2	2	1	3	3	2	3	2	2.3
CO-3	3	3	3	2	1	3	3	3	3	2	2.6
CO-4	3	3	2	3	2	3	3	3	3	2	2.7
CO-5	3	3	3	3	2	3	3	3	3	3	3.0
									Mean Overall Score		**2.48 (High)**

Semester	Course Code	Title of the Course	Hours/ Weeks	Credits
1	25UST13AP01	**Allied Practical - 1:** Office Automation Lab	2	1

Course Objectives
To practice file management techniques, including organizing, storing, and retrieving digital documents efficiently.
To perform hands-on exercises in creating, formatting, and editing professional documents using MS Word.
To implement data entry, formulas, sorting, filtering, and chart creation in MS Excel for real-world data management.
To design visually appealing presentations with transitions, animations, and multimedia elements using MS PowerPoint.
To experiment with integrating Word, Excel, and PowerPoint for seamless data sharing and automation in office environments.

List of Exercises:

1. Document Formatting – Create and format a professional document with headings, tables, and images.
2. Mail Merge – Generate personalized letters using an Excel dataset in MS Word.
3. Creating a Report – Insert headers, footers, page numbers, and citations in a structured document.
4. Basic Excel Functions – Use SUM, AVERAGE, MIN, MAX, COUNT, IF functions in an Excel dataset.
5. Charts & Graphs – Create bar, line, and pie charts to visualize given data.
6. Pivot Tables – Summarize large datasets using pivot tables and pivot charts.
7. Analysis ToolPak – Analyze Descriptive Statistics, Correlation and Regression to interpret the given data
8. Creating a PowerPoint Presentation – Design a 5-slide presentation with images and animations.
9. Slide Transitions & Animations – Apply slide transitions, text animations, and multimedia integration.
10. Cloud Collaboration– Use Google Docs for online document and spreadsheet preparation

Teaching Methodology	Demonstration, Technology-based learning, Hands-on training and Project-based learning
Assessment Methods	Execution of practical exercises, and Time-bound problem-solving based on real-world data management

Websites and eLearning Sources:

1. Technology for Teachers and Students – https://www.youtube.com/c/TechnologyforTeachersandStudentsMicrosoft
2. Google Workspace Learning Center – https://support.google.com/a/users

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Apply advanced document formatting techniques, including structured reports with tables, images, headers, and citations for professional documentation.	**K1**
CO2	Automate document personalization using mail merge by integrating Excel datasets into MS Word for bulk communication.	**K2**
CO3	Implement spreadsheet formulas and functions for accurate data computation, filtering, and logical analysis in Excel.	**K3**
CO4	Develop interactive data visualizations using charts, graphs, and pivot tables to summarize and present complex datasets effectively.	**K4**
CO5	Collaborate in real-time using cloud-based tools (Google Docs/Sheets) for document sharing, editing, and team-based data management	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
1	**25UST13AP01**			**Allied Practical - 1:** Office Automation Lab					**2**		**1**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	3	2	2	1	3	3	2	3	2	2.4
CO-2	3	3	3	2	2	3	3	2	3	2	2.5
CO-3	3	3	3	2	2	3	3	2	3	3	2.5
CO-4	3	3	3	2	2	3	3	3	3	3	2.7
CO-5	3	3	3	3	2	3	3	3	3	2	2.7
										Mean Overall Score	**2.56 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UHE14VE01	**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 holistic development
To assimilate human values comprehensively

UNIT I: 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: Human Personality (6 Hours)

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

UNIT III: Human Development (6 Hours)

Areas of Development: Physical, Intellectual, Emotional, Social Development, Moral & Spiritual development – Practical Sessions on Health and Wellness

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 - Crimes against Women - Women rights - Time-line of Women achievements in India

Teaching Methodology	Power point
Assessment Methods	Seminars, Reports, Group Discussion, Online Tests, Assignments

Books for Study:

1. Department of Human Excellence. (2023). *Essentials of Humanity.* St. Joseph's College.

Books for Reference:

1. Alex, K. (2009). *Soft Skills.* S. Chand.
2. Norman Vincent Peale (1952). *The Power of Positive Thinking Norman Vincent Peale.* New York Times
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. https://www.psychologytoday.com/us/basics/defense-mechanisms.Accessed 12 March 2025.
3. http://www.apa.org/topics/personality#. Accessed 05 March 2021.
4. http://www.peacecorps.gov/educators/resources/global-issues-gender-equaligy-and-womens-empowerment/. Accessed 05 March 2021.
5. https://www.nextias.com/blog/women-empowerment/Accessed 12 March 2025.

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Recall the prescribed values and the 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	**25UHE14VE01**			**Value Education - 1:** Essentials of Humanity					**2**		**1**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	3	3	3	2	3	3	2	3	3	**2.8**
CO-2	3	2	2	3	3	2	3	3	2	2	**2.5**
CO-3	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
2	25UTA21GL02	பொதுத்தமிழ் – 2: General Tamil - 2	4	3

கற்றலின் நோக்கங்கள் (Course Objectives)
காப்பியங்களின் தோற்றம், வகையறை, வகைகள் அகியவற்றை அறிந்து கொள்ளல்
பெருங்காப்பியம், சிறுகாப்பியம் இடையேயான வேறுபாட்டைக் கண்டறிதல்
சைவ வைணவ சமயப் பாடல்களில் சிறப்பினை வெளிப்படுத்தல்
காப்பியங்கள் வெளிப்படுத்தும் விழுமியங்களையும் உணர்தல்
சமூகத்திற்கும், காப்பியத்திற்குமான பிணைப்புகள் குறித்துத் தெரிந்துகொள்ளுதல்

அலகு-1 **(12 மணி நேரம்)**

சிலப்பதிகாரம் - ஆய்ச்சியர் குரவை
மணிமேகலை – ஊர் அலர் உரைத்த காதை
இலக்கிய வரலாறு – சைவம் வளர்த்த தமிழ் முதல் புராணங்கள் முடிய
இலக்கணம் – அகப்பொருள் இலக்கணம்

அலகு-2 **(12 மணி நேரம்)**

திருநாவுக்கரசர் – திருவதிகை வீரட்டானம்
(கூற்றாயினவாறு எனத் தொடங்கும் முதல் 10 பாடல்கள்)
திருவாசகம் - அடைக்கலப்பத்து
(செழுக்கமலத் திரளனநின் எனத் தொடங்கும் முதல் 10 பாடல்கள்)
திருமந்திரம் – மாகேசுர பூசை (11 பாடல்கள்)
சிவவாக்கியர் பாடல்கள் (15 பாடல்கள்)
பாடல் எண்கள் – 16,22,27,33,34,35,37,38,47,81,91,225,237,242,495

அலகு-3 **(12 மணி நேரம்)**

பெரியாழ்வார் திருமொழி – திருப்பல்லாண்டு – தாலப்பருவம் (10 பாடல்கள்
திருமங்கையாழ்வாரின் பெரிய திருமொழி – திருவரங்கம் -1 (10 பாடல்கள்)
கம்பராமாயணம் – கங்கை காண் படலம் - (தேர்ந்தெடுக்கப்பட்ட 35 பாடல்கள்)
பாடல் எண்கள்: 1, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 22, 24, 25, 26, 27, 29, 30, 32,33,35,39,40,41,42,43,47,62,64,65,67,69,70
நற்றமிழ்க் கோவை – முதல் மூன்று கட்டுரைகள்.

அலகு-4 **(12 மணி நேரம்)**

சீறாப்புராணம் – நதி கடந்த படலம் – 1 முதல் 31 முடிய உள்ள பாடல்கள்
கள்வரை நதிமறித்த படலம் – 1 முதல் 16 முடிய உள்ள பாடல்கள்
இலக்கணம் – புறப்பொருள் இலக்கணம்
இலக்கிய வரலாறு – தமிழ் இலக்கண நூல்கள் முதல் சிற்றிலக்கியங்கள் முடிய

அலகு-5 **(12 மணி நேரம்)**

வீரமாமுனிவரின் தேம்பாவணி – (காசா) காசை சேர் படலம்
(1 முதல் 50 முடிய உள்ள பாடல்கள்)
சீனயி (சீனாய்) - மாமலை காண்படலம் -(1 முதல் 56 முடிய உள்ள பாடல்கள்)
நற்றமிழ்க் கோவை – இறுதி மூன்று கட்டுரைகள்.

கற்பித்தல் முறை (Teaching Methods)	விரிவுரை **(Lecture),** காணொளிக் காட்சி **(Videos),** விளக்கக் காட்சி **(PPT presentation)**
மதிப்பீட்டு முறைகள் (Assessment Pattern)	இயங்கலைத்தேர்வு **(Online Test),** நூல் நோக்குத் தேர்வு (open book test) வீட்டுப்பாடம் **(Assignment),** வினாடி வினா **(Quiz),** கருத்தரங்கு **(Seminar)**

பாடநூல்கள்:

1. பொதுத்தமிழ் (2025), தமிழாய்வுத்துறை, தூய வளனார் கல்லூரி
2. நற்றமிழ்க் கோவை - கட்டுரைத்தொகுப்பு (2025), தமிழாய்வுத்துறை வெளியீடு, தூய வளனார் கல்லூரி

Websites and eLearning Sources:

1. https://www.tamiluniversity.ac.in/english/library2-/digital-library/
2. https://www.tamilvu.org/ta/library-l3100-html-l3100pl1-132372

3. https://www.tamilvu.org/ta/courses-degree-p202-p2021-html-p202121-28011
4. https://www.chennailibrary.com/vaishnava/naalayiradivyaprabhandham.html
5. https://www.tamilvu.org/ta/library-l4310-html-l4310por-141616
6. https://www.tamilvu.org/slet/l4100/l4100pd2.jsp?bookid=80&pno=287

Course Outcomes

CO No.	CO–Statements இப்பாடத்தின் நிறைவில் மாணவர்கள்	Cognitive Levels (K –Levels)
CO–1	தமிழர் வாழ்வியலையும் பண்புக அருமைகளையும் அறிவர்	K1
CO–2	தமிழரின் பல்துறை அறிவு, மாப பேரன்றவற்றை அறிந்து கொள்வர்	K2
CO–3	பெருங்காப்பிய மரபிற்குள் வரும் இலக்கியங்களை அடையாளம் காண்பதோடு அவற்றை விளக்கும் திறனையும் பெறுவர்	K3
CO–4	புராண இதிகாச மரபுகளிலிருந்து, காப்பியம் என்னும் புதிய இலக்கிய வடிவம் உருவான விதத்தை மதிப்பிடுவர்	K4
CO–5	இலக்கிய வரலாறு, இலக்கணம், காப்பியங்கள் ஆகியவற்றைக் கற்பதன் வழி பேரறிஞர்களை எதிர்கொள்ளும் திறன் பெறுவர்	K5

Relationship Matrix											
Semester	Course Code	Title of the Course								Hours	Credits
2	25UTA21GL02	பொதுத்தமிழ் – 2: General Tamil - 2								4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	3	3	3	3	3	3	3	2.8
CO-2	3	2	2	2	2	3	3	3	2	2	2.4
CO-3	2	3	1	3	1	3	3	3	1	2	2.2
CO-4	3	3	2	3	1	3	3	3	1	3	2.5
CO-5	3	3	2	2	3	3	3	2	2	2	2.5
Mean Overall Score											2.48 (High)

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	**25UFR21GL02**	Language French – 2	**4**	**3**

Course Objectives
Develop Communicative Competence in French enabling students to engage in simple, real-life conversations and interactions
Master Fundamental Grammar and Vocabulary by understanding and applying essential grammatical structures in context
Explore Francophone Culture and Civilization by integrating cultural elements of French-speaking regions
Enhance Practical Language Use in Everyday Situations
Express Ideas in Different Contexts Using Appropriate Tenses

UNIT I **(12 Hours)**

1. Titre - Qu'est-ce qu'on fait aujourd'hui ?
2. Lexique –l'heure, les activités quotidiennes, la description physique
3. Grammaire –les verbes pronominaux au présent, le passé récent, la fréquence
4. Production orale- demander l'heure, proposer une sortie
5. Production écrite - présenter ses activités quotidiennes, décrire une personne

UNIT II **(12 Hours)**

6. Titre - Chez -moi
7. Lexique – le logement, les meubles, les pièces, l'équipement
8. Grammaire – le passe compose avec avoir, les pronoms COD
9. Production orale- s'informer sur un logement
10. Production écrite - expliquer un problème domestique, écrire une annonce pour un logement

UNIT III **(12 Hours)**

11. Titre - En forme
12. Lexique – les parties du corps, les maladies, les médicaments, les sports
13. Grammaire –Le passé composé avec être, le pronom 'y',
14. Production orale- parler de sa santé, exprimer une émotion positive
15. Production écrite - Donner un conseil, exprimer son accord ou son désaccord

UNIT IV **(12 Hours)**

16. Titre - Bonne vacances
17. Lexique – les destinations, l'hébergement, la réservation, la nature
18. Grammaire – la comparaison, les verbes impersonnels à l'imparfait comme c'était
19. Production orale- réserver une chambre a l'hôtel, décrire une ville ou un paysage
20. Production écrite - réaliser une brochure touristique, écrire une carte postale

UNIT V **(12 Hours)**

21. Titre - Au travail
22. Lexique – les études, les disciplines, les lieux de travail, les taches
23. Grammaire – la durée, les pronoms relatifs
24. Production orale- parler de ses études et son projet professionnel
25. Production écrite - comparer le système scolaire français et indien
26. Indian knowledge system–Highlighting on Gurukulam Education System that focuses on traditional teacher-student relationships, oral learning methods, and holistic education while discussing education systems in India vs. France (5%)

Teaching Methodology	Visual-Linguistic Learning, Descriptive & Interpretative Learning, experiential learning, The Lexical Approach, Differentiated Instruction
Assessment Methods	*Role -play:* A mock phone call on hotel reservation, discuss daily routines, housing, and health. (Rubric – graded on grammatical accuracy, and use of appropriate vocabulary) *Picture description activity:* Describe a landscape or travel destination shown in a picture. (Rubric – Assessed on descriptive abilities and vocabulary use) *Experimental learning task:* Doctor-patient conversation about a health issue, Conduct a mock interview about career plans. (Rubric – Assessed on real-life application of language skills) *Project based assessment*: Create a travel brochure for a French-speaking destination, make a poster comparing education in France and India (Rubric – Assessed on Application of language skills in a creative way) *Written assessment*: Write a short daily routine using time expressions, write a postcard describing a recent trip (Rubric – Assessed on ability to write structured texts related to themes)

Books for Study:

1. Mensdorff - Pouilly, L., Opatski, S., Petitmengin, V., Pons, S., Sperandio, C., Djimli, H., & Veldeman - Abry, J. (2022). *Édito A1: Méthode de français* (2nd ed.). Didier FLE, Hatier. (p.87-p.165)

Books for Reference:

1. Dauda, P., Giachino, L., & Baracco, C. (2020). *Génération A1*. Didier.
2. Mérieux, R., &Loiseau, Y. (2012). *Latitudes A1*. Didier.

Websites and eLearning Sources:

1. https://www.podcastfrancaisfacile.com
2. https://www.flevideo.com
3. https://savoirs.rfi.fr/fr
4. https://www.french4me.net/
5. https://apprendre.tv5monde.com/en

Course Outcomes		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
CO1	Talk about daily routines, tell the time, describe people, and propose social outings using appropriate vocabulary and verb structures.	**K1**
CO2	Inquire about housing, describe household items, explain domestic issues, and write advertisements or announcements for accommodations.	**K2**
CO3	Describe body parts, discuss health conditions, give advice, express emotions, and use past tense structures to narrate past experiences.	**K3**
CO4	Make hotel reservations, describe destinations and landscapes, compare experiences, and write postcards or travel brochures.	**K4**
CO5	Discuss education, career plans, and workplace responsibilities while comparing educational systems in France and India.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
2	**25UFR21GL02**			Language 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	2	2	1	1	2	2	2	3	2	2	1.9
CO2	2	2	2	3	1	3	3	2	3	3	2.4
CO3	2	3	2	1	2	2	1	3	2	1	1.9
CO4	3	2	2	2	2	3	2	1	2	3	2.2
CO5	3	3	3	2	3	2	3	2	3	2	2.6
Mean Overall Score											**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	25UHI21GL02	Language 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)**

1. Moun hi Manthra Hay
2. Letter Writing - Chutti Patra
3. Bakthikal - Namakarn
4. Sarkari Kariyalayom Ka Naam

UNIT II **(12 Hours)**

5. Baathcheeth - Aspathal Mein
6. Letter Writing - Rishthedarom ko Patra
7. Bakthikal - Samajik Paristhithiyam
8. Kriya

UNIT III **(12 Hours)**

9. Premchand
10. Kriya visheshan
11. Letter Writing - Naukari Keliye Avedan Patra
12. Bakthikal - Sahithyik Paristhithiyam

UNIT IV **(12 Hours)**

13. Kabeer ke Dohae
14. Samas
15. Letter Writing - Kitab Maangne Keliye Patra
16. Bakthikal - Salient Features, Main Division

UNIT V **(12 Hours)**

17. Anuvad
18. Sandhi
19. Bakthikal - Visheshathayem
20. Apathit Gadyansh

Teaching Methodology	Peer Instruction Exercise, Videos, PPT, Quiz, Group Discussion
Assessment Methods	Group Discussion, Seminar, Snap Test

Books for Study:

1. Viswanath Tripaty. *(2021). Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd.
2. Kamathaprasad Gupth, M. (2020). *Hindi Vyakaran*. Anand Prakashan.
3. Dr. Sadananth Bosalae. *(2020). kavya sarang*, Rajkamal Prakashan.

Books for Reference:

1. Acharya Ramchandra Shukla. (2021). *Hindi Sahitya Ka Itihas*. Prabhat Prakashan.
2. Krishnakumar Gosamy. (2023). *Anuvad vigyan ki Bhumika*. Rajkamal Prakashan.
3. Aravind Kumar. (2022). *Sampoorna Hindi Vyakaran our Rachana*, Lucent publisher.
4. Lakshman Prasad Singh. (2021). *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**	**Cognitive Levels (K-Levels)**
	On successful completion of the course, the student will acquire thelisted skills	
CO1	Find out the Terms & Expressions related to letter writing.	**K1**
CO2	Providing knowledge of Letter writing in Hindi.	**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 Hindi writers	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**			**Hours/ week**				**Credits**	
2	**25UHI21GL02**		Language Hindi – 2			**4**				**3**	
Course Outcomes (Cos)	**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	**25USA21GL02**	Language 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) sarva naama sabdaha

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
Assessment Methods	Seminar, Quiz, Group Discussion.

Books for Study:

1. Saralasamkritham Siksha ,2021
2. Dhaatu Rupa Manjari ,2021

Books for Reference:

1. Paindrapuram Ashram, Srirangam – 620 006 Gopalavimshanthi 2021
2. R.S.Vadhyar & Sons book – Seller and Publishers , Kalpathi , Palghat – 678003 , Kerala , South Inida, shabdha manjari
3. Kulapthy, K.M Saral sankrit Balabodh, Bharathiys Vidya Bhavan, Munshimarg Mumbai – 400007, 2020

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**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO–1	Remembering names of different objects, remembering different verbal forms and sandhi	**K1**
CO–2	Contrast different verbal forms Explain good sayings, Relate good saying to life.	**K2**
CO–3	Apply and build small sentences	**K3**
CO–4	Analyze different forms of Verbs and nouns	**K4**
CO–5	Appreciate subhashitas and Sanskrit poetry	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**25USA21GL02**			Language Sanskrit - 2						**4**	**3**
Course Outcomes↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	1	3	2	2	2	3	3	2	1	2.1
CO-2	3	2	3	2	2	3	2	3	3	2	2.5
CO-3	2	2	3	2	2	2	2	3	3	1	2.1
CO-4	3	2	3	3	1	2	3	3	3	1	2.4
CO-5	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	25UEN22GE02A	**General English – 2:** Pre-Intermediate Stream	5	3

Course Objectives (CO)
To strengthen listening and speaking skills for identifying key ideas and details
To improve reading comprehension and analyze different texts
To express ideas clearly in conversations and presentations, using correct grammatical structures.
To develop writing skills by creating clear and structured texts
To assess and improve language use in both spoken and written communication

UNIT I: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening to respond to story-based questions
	(Practice)	**:**	"The Hare and His Friends"
Reading:	**(Skill)**	**:**	Understanding and interpreting proverbs
	(Practice)	**:**	"Necessity is the Mother of Invention"
Grammar:	**(Practice)**	**:**	Present Continuous Tense; Past Continuous Tense
Vocabulary:	**(Practice)**	**:**	Weather and Seasons
Speaking:	**(Skill)**	**:**	Describing on-going actions in the present and the past to describe real-life situations and activities
	(Practice)	**:**	Ongoing Actions: Present & Past
Writing:	**(Skill)**	**:**	Writing a biography of a famous personality using given details
	(Practice)	**:**	Writing a Biography

UNIT II: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening to identify factual details
	(Practice)	**:**	Recycling
Reading:	**(Skill)**	**:**	Reading to convert a story into a meaningful dialogue
	(Practice)	**:**	The Shepherd and the Stranger
Grammar:	**(Practice)**	**:**	Future Expressions: Simple Future & 'Going to'; Simple Present, Present Continuous and Future Continuous Tenses
Vocabulary:	**(Practice)**	**:**	Groceries
Speaking:	**(Skill)**	**:**	Developing conversational fluency by practising conversations on familiar and everyday topics
	(Practice)	**:**	Conversations on Familiar and Everyday Topics
Writing:	**(Skill)**	**:**	Writing clear, respectful and relevant online comments
	Practice	**:**	Writing Online Comments

UNIT III: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening for specific information
	(Practice)	**:**	Telephonic Conversation
Reading:	**(Skill)**	**:**	Reading a news report
	(Practice)	**:**	Iron Age in Tamil Nadu Began 5,300 Years Ago
Grammar:	**(Practice)**	**:**	Present Perfect Tense; Past Perfect Tense
Vocabulary:	**(Practice)**	**:**	Kitchen Utensils and Household Appliances
Speaking:	**(Skill)**	**:**	Using polite expressions in conversations to request, seek permission, grant or refuse permission, and apologise
	(Practice)	**:**	Polite Expressions in Conversations
Writing:	**(Skill)**	**:**	Expressing short reflective ideas in writing
	(Practice)	**:**	Thought for the Day

UNIT IV: **(15 Hours)**

Listening:	**(Skill)**	**:**	Predicting content and vocabulary before listening
	(Practice)	**:**	Our Earth
Reading:	**(Skill)**	**:**	Identifying direct and indirect speech
	(Practice)	**:**	Birbal story: "Hot Iron Test"

Grammar:	**(Practice)**	**:**	Active and Passive Voice
Vocabulary:	**(Practice)**	**:**	Human Diseases
Speaking:	**(Skill)**	**:**	Using polite expressions in conversations to interrupt, make suggestions, and agree or disagree
	(Practice)	**:**	Polite Expressions in Conversations
Writing:	**(Skill)**	**:**	Writing a report on a given topic
	(Practice)	**:**	Report Writing

UNIT V: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening to understand formal speeches
	(Practice)	**:**	"A Tryst with Destiny" by Jawaharlal Nehru
Reading:	**(Skill)**	**:**	Reading to understand an essay
	(Practice)	**:**	"Secularism"
Grammar:	**(Practice)**	**:**	Adverbs; Prepositions
Vocabulary:	**(Practice)**	**:**	**Occupations**
Speaking:	**(Skill)**	**:**	Delivering a short prepared speech on a familiar or inspiring topic
	(Practice)	**:**	Delivering a Short Speech
Writing:	**(Skill)**	**:**	Writing a clear and well-structured essay on a given topic
	(Practice)	**:**	Essay Writing

Teaching Methodology	Lectures, task-based activities, audio-visual listening tasks, guided reading and writing exercises, discussions
Assessment Method	Listening and reading comprehension exercises, verbal presentations, role plays and conversations, writing tasks

Books for Study:

Dr. M. John Britto, Dr. B. Sam Jerome Sharone, and Dr. S. Sajeev. *Nurturing English Skills*. Emerald Publishers, 2025.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	Recognize key ideas and details in spoken and written texts, demonstrating effective listening and comprehension skills.	**K1**
CO2	Understand and interpret different types of texts, enhancing reading comprehension and critical thinking abilities.	**K2**
CO3	Apply correct grammatical structures to express ideas clearly in conversations and presentations.	**K3**
CO4	Analyze and organize ideas to write clear, coherent, and well-structured texts for various purposes.	**K4**
CO5	Evaluate and improve language use, refining both spoken and written communication.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**25UEN22GE02A**			**General English – 2:** Pre-Intermediate Stream						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PS02**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	3	2	3	2	3	2	2	**2.4**
CO2	3	2	2	3	2	3	2	3	2	3	**2.5**
CO3	3	2	2	2	3	2	2	3	2	2	**2.3**
CO4	3	2	2	2	2	2	2	2	2	3	**2.2**
CO5	3	2	3	2	3	2	3	2	3	2	**2.5**
Mean Overall Score											**2.38 (High)**

Semester	Course Code	Title of the Course	Hours/ Week	Credits
2	25UEN22GE02B	**General English – 2:** Intermediate Stream	5	3

Course Objectives
To develop students' ability to listen, speak, read, and write effectively in English through interactive and contextualised activities.
To improve students' understanding and application of essential grammar concepts, including verb usage, auxiliary verbs, modals, adverbs, and sentence structures.
To equip students with strategies to deduce meanings of unfamiliar words using contextual clues.
To foster students' ability to brainstorm, organise information using graphic organisers, and structure written communication effectively for academic and professional contexts.
To enable students to engage in discussions, express opinions, seek and provide information, and navigate real-life situations confidently through role plays.

Unit 1: My College & Studies **15 Hours**

1. Listening: **(Skill)** Distinguishing between main ideas and supporting details
(Practice) "A Day in the Life of a College Student" (A conversation)
2. Reading: **(Skill)** Recognising the structure of written texts
(Practice) "Enter to learn, leave to serve"
3. Grammar: **(Practice)** Main Verb
4. Vocabulary: **(Practice)** Using synonyms as contextual clues to guess the meaning of unfamiliar words
5. Study skill: Brainstorming to gather ideas in a group
6. Speaking: **(Skill)** Asking for, giving and refusing permission – Requesting – Communication repair: Finding about pronunciation, spelling and meaning.
(Practice) Role Play
7. Writing: **(Skill)** Writing an outline
(Practice) Controlled composition: Writing an outline for a given passage

Unit 2: Travel **15 Hours**

1. Listening: **(Skill)** Listening for specific details
(Practice) "A Perfect Vacation" (A conversation)
2. Reading: **(Skill)** Identifying main ideas and supporting details
(Practice) "An Unforgettable Ride"
3. Grammar: **(Practice)** Auxiliary Verbs
4. Vocabulary: **(Practice)** Using antonyms as contextual clues to guess the meaning of unfamiliar words
5. Study skill: Mind mapping to visually organise information
6. Speaking: **(Skill)** Asking for and giving directions – Asking for and giving information
(Practice) Role Play
7. Writing: **(Skill)** Writing effective paragraphs
(Practice) Free-writing composition: An adventurous journey

Unit 3: My Social Network **15 Hours**

1. Listening: **(Skill)** Understanding the sequence of ideas
(Practice) "My Virtual Friends" (A conversation)
2. Reading: **(Skill)** Comprehending infographics
(Practice) "Social Media Etiquette
3. Grammar: **(Practice)** Modal Auxiliary Verbs
4. Vocabulary: **(Practice)** Using definitions and restatements as contextual clues to guess the meaning of unfamiliar words
5. Study skill: Using graphic organisers (sequence of events chain, timeline, and storyboard)
6. Speaking: **(Skill)** Asking for and giving advice – Asking if someone agrees – Agreeing and disagreeing – Warning someone
(Practice) Role Play

7. Writing: **(Skill)** Developing stories from hints
(Practice) Controlled composition: Developing a story from given hints

Unit 4: Shopping **15 Hours**

1. Listening: **(Skill)** Detecting signposts
(Practice) "Let's go shopping!" (A conversation)
2. Reading: **(Skill)** Recognising transition of ideas
(Practice) "Adventures of the Grocery Store"
3. Grammar: **(Practice)** Adverbs and WH Question Words
4. Vocabulary: **(Practice)** Using examples and illustrations as contextual clues to guess the meaning of unfamiliar words
5. Study skill: Using graphic organisers (Venn diagram, and cause-and-effect map)
6. Speaking: **(Skill)** Offering and accepting help – Asking for and giving opinions – Asking for and saying one's preference – Suggesting – Complaining
(Practice) Role Play
7. Writing: **(Skill)** Describing actions in a story
(Practice) Guided composition: Narrating a story in a comic strip

Unit 5: Ceremonies **15 Hours**

1. Listening: **(Skill)** Listening to intonations
(Practice) "Happy Birthday to You!" (A conversation)
2. Reading: **(Skill)** Understanding moods in a reading passage
(Practice) "The Light has Gone out" by Jawaharlal Nehru
3. Grammar: **(Practice)** Sentences
4. Vocabulary: **(Practice)** Using root words as clues to guess the meaning of words
5. Study skill: Using graphic organisers (idea wheel, idea web, and concept map)
6. Speaking: **(Skill)** Using intonations for different types of sentences – Expressing your feelings and emotions – Congratulating and wishing someone – Expressing sympathy
(Practice) Role Play
7. Writing: **(Skill)** Expressing emotions in narrative writing
(Practice) Controlled composition: Describing emotions and feelings conveyed in a picture story

Teaching Methodology	Lectures, Demonstrations, Discussions, Peer-Review Tasks, Role-plays, Pair and group activities
Assessment Tools	Listening and reading comprehension tasks, Individual talks, Role plays, Controlled and guided compositions

Books for Study:
M.S. Xavier Pradheep Singh, Amalaveenus, and A. Napoleon. English and My World, 2025.

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Identify key ideas, supporting details, and organisational patterns in spoken and written texts.	**K1**
CO2	Explain the meaning of conversations and passages by recognising their structure, tone, and purpose.	**K2**
CO3	Use appropriate language functions such as requesting, suggesting, and expressing opinions effectively in real-life interactions.	**K3**
CO4	Compare different communication styles and linguistic features in various types of texts and conversations.	**K4**
CO5	Assess the effectiveness of spoken and written communication, providing constructive feedback for improvement.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**25UEN22GE02B**			**General English – 2:** Intermediate Stream						**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**	
CO-1	3	2.5	2.5	2.5	2.5	3	2.5	2.5	2.5	3	2.65
CO-2	2.5	3	2.5	2.5	2.5	3	3	2.5	2.5	3	2.7
CO-3	3	2.5	2.5	3	2.5	2.5	2.5	2.5	3	2.5	2.65
CO-4	2.5	2.5	2.5	3	2.5	2.5	2.5	3	2.5	2.5	2.6
CO-5	3	2.5	2.5	2.5	3	2.5	2.5	2.5	3	2.5	2.65
Mean Overall Score											**2.65 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	25UST23CC04	**Core Course – 4:** Probability Theory	6	4

Course Objectives
To describe the importance and scope of probability theory.
To predict the chance of an experimental outcomes.
To understand the joint probability mass function and joint density function with two dimensional random variables.
To learn and apply the properties of mathematical expectation.
To compute the probability values for sum of random variables using central limit theorem.

Unit-I **(18 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 **(18 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 **(18 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.

Unit-IV **(18 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. Chebychev's Inequality (Statement and Proof).

Unit-V **(18 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). Law of Large Numbers (L.L.N): Convergence in probability - Properties: Weak L.L.N - properties-Bernoulli's L.L.N (Statement and Proof) - Khinchin's theorems (Statement only).

Teaching Methods	Chalk and talk, PPT, Handouts, Game and Gamification.
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. Gupta S.C. and Kapoor, V.K. (2020). *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons Pvt. Ltd., New Delhi

Books for Reference:

1. Rohatgi, V.K. (2015). *An introduction to probability theory and mathematical statistics*.
2. Hogg. R.V. and Craig. A.T. (2006). *Introduction to Mathematical Statistics*, McGraw Hill Publishing Co. Inc. New York.
3. Mood A.M. Graybill, F.A. and Bose. D.C. (1974). *Introduction to the theory of Statistics*, McGraw Hill Publishing Co. Inc. New York.
4. Sanjay Arora and Bansilal (2002). *New Mathematical Statistics*, Satyaprakashan, New Delhi.

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-variables-spring-2014/

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
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**	
2	**25UST23CC04**			**Core Course - 4:** Probability Theory					**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	3	3	2	2	1	3	3	3	2	1	**2.3**
CO2	3	2	3	2	1	3	3	3	2	1	**2.3**
CO3	3	3	3	3	1	3	3	3	2	3	**2.6**
CO4	3	2	3	3	1	3	3	3	3	1	**2.6**
CO5	3	2	3	3	1	3	3	3	3	1	**2.6**
										Mean Overall Score	**2.48 (High)**

Semester	Course Code	Title of the Course	Hours / Week	Credits
2	25UST23CC05	**Core Course – 5:** Numerical Methods	5	4

Course Objectives
To understand and apply methods for solving systems of equations.
To learn interpolation Techniques
To use central difference formulae.
To solve ordinary differential equations (ode) numerically.
To evaluate numerical differentiation and integration.

Unit-I **(15 Hours)**

System of equations: Bisection method – RegulaFalsi method – Newton–Raphson method. Gauss elimination method and Gauss–Jordan method. (Problems only).

Unit-II **(15 Hours)**

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

Unit-III **(15 Hours)**

Central Difference Formulae: Gauss forward and backward formula–Stirling's formula–Bessel's formula–Everett's formula–Appropriateness of formulae. (Problems only).

Unit-IV **(15 Hours)**

Numerical solution of ODE: 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 $1/3^{rd}$ and $3/8^{th}$ rules–Weddle's rule. (Problems only).

Teaching Methods	Demonstration, Problem solving, PPT and Handouts
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

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

Books for Reference:

1. Gerald, C.F. and 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 Resources:

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**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
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	**25UST23CC05**			**Core Course – 5:** Numerical Methods					**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	3	2	2	1	3	3	3	2	1	**2.3**
CO2	3	3	3	2	2	3	3	3	2	2	**2.6**
CO3	3	3	3	3	2	3	3	3	3	2	**2.6**
CO4	2	3	3	3	3	3	3	3	3	3	**2.6**
CO5	3	3	3	2	2	3	3	3	3	2	**2.6**
										Mean Overall Score	**2.74 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	25UST23AC02	**Allied Course - 2:** C – Programming	4	3

Course Objectives
To understand the basics computer architectures and programming fundamentals of C language.
To classify the decision making-looping and control statements.
To recognize the effective usage of arrays, string handling functions.
To exemplify the dynamics of memory through pointers and functions
To categorize the records with sequential and random operations.

Unit-I **(12 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 **(12 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 **(12 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 **(12 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 **(12 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	Chalk and talk, PPT, Online tutorials and video demonstrations, Technology-based learning and Demonstration
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. Balagurusamy E. (2016). *Programming in ANSI C*, (7th Edi.) Tata McGraw-Hill Publishing Company Ltd.
2. Byron S. Gottfried. (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 Ltd.
2. Kernighan and Ritchie. (2000). *C Programming Language*, Prentice Hall of India Pvt. Ltd.
3. Herbert Schildt. (2017).*C - The Complete Reference*, (4th Ed.) McGraw Hill Education.

Websites and e-learning sources:

1. Geeks for Geeks – C Programming – https://www.geeksforgeeks.org/c-programming-language/
2. Tutorials Point – C Programming Tutorial – https://www.tutorialspoint.com/cprogramming/index.htm
3. NPTEL – C Programming and Data Structures – https://nptel.ac.in/courses/106105171

4. Programiz – Learn C Programming – https://www.programiz.com/c-programming
5. Coursera – C for Everyone: Programming Fundamentals – https://www.coursera.org/learn/c-for-everyone

Course Outcomes		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
CO-1	Recognize the basic concepts of procedural programming paradigm	**K1**
CO-2	Exemplify the C code with its proper syntax	**K2**
CO-3	Utilize programming skills to write, compile, and debug	**K3**
CO-4	Draw inferences using structural programming	**K4**
CO-5	Choose the key statements for improving dynamic memory and decreasing execution time.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**25UST23AC02**			**Allied Course - 2:** C – Programming						**4**	**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	1	3	3	1	2	3	3	3	1	1	2.1
CO-2	2	3	2	2	2	3	3	3	3	2	2.5
CO-3	2	2	2	3	2	2	2	2	3	3	2.3
CO-4	3	2	1	3	3	2	2	1	3	3	2.3
CO-5	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	Credits
2	25UST23AP02	**Allied Practical - 2:** C Programming Lab	2	1

Course Objectives
To understand fundamental programming concepts and apply them to solve mathematical and statistical problems.
To develop problem-solving skills using control structures, functions, pointers, and file handling.
To implement string manipulation techniques and matrix operations efficiently.
To analyze and compute statistical measures such as mean, variance, standard deviation, correlation, and regression coefficients.
To apply programming logic for solving real-world problems like seasonal variations and index number construction.

List of Experiments:

1. Find Mean, Variance, and Standard Deviation using the Control loop statement.
2. Check if a string is a Palindrome or not.
3. Squeezing a given character string (Elimination of all white spaces).
4. Computation of Correlation and Regression Coefficients.
5. Perform Matrix Addition and Matrix Multiplication using Arrays.
6. Finding Factorial and Combinations.
7. Find the roots of a Quadratic Equation using Pointers and Functions.
8. Creation and Updating of an Inventory File.
9. Problems on Seasonal Variation.
10. Construction of Index Numbers.

Teaching Methodology	Chalk and talk, PPT, Online tutorials and video demonstrations, Technology-based learning and Demonstration
Assessment Methods	Execution of practical Exercise

Websites and e-learning sources:

1. Sanfoundry – C Program to Find Mean, Variance, and Standard Deviation:https://www.sanfoundry.com/c-program-mean-variance-standard-deviation/
2. Programiz – C Program to Check Palindrome: https://www.programiz.com/c-programming/examples/palindrome
3. GeeksforGeeks – Remove Spaces from a Given String: https://www.geeksforgeeks.org/remove-spaces-from-a-given-string/
4. GeeksforGeeks – Correlation Coefficient: https://www.geeksforgeeks.org/program-find-correlation-coefficient/
5. GeeksforGeeks – Matrix Addition: https://www.geeksforgeeks.org/c-program-add-two-matrices/
6. GeeksforGeeks – Matrix Multiplication: https://www.geeksforgeeks.org/c-program-multiply-two-matrices/
7. GeeksforGeeks – Factorial of a Number: https://www.geeksforgeeks.org/c-program-factorial-number/
8. GeeksforGeeks – File Handling in C: https://www.geeksforgeeks.org/basics-file-handling-c/
9. GeeksforGeeks – Seasonality Detection in Time Series Data:https://www.geeksforgeeks.org/seasonality-detection-in-time-series-data/
10. GeeksforGeeks – Index Numbers in Economics: https://www.geeksforgeeks.org/index-numbers-in-economics/

Course Outcomes		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
CO-1	Name the variables and select the suitable data types.	**K1**
CO-2	Identify the correct and efficient ways of solving problems	**K2**
CO-3	Understand the basic data structures and develop logic in well-structured programs	**K3**
CO-4	Make use of file input and output operations.	**K4**
CO-5	Analyze the mathematical and statistical functions.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**25UST23AP02**			**Allied Practical - 2:** C Programming Lab						**2**	**1**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	1	3	3	1	2	3	2	3	2	1	2.1
CO-2	2	3	3	2	2	3	3	3	2	1	2.4
CO-3	3	2	2	1	3	2	3	2	3	2	2.3
CO-4	2	1	2	2	3	1	3	1	3	3	2.1
CO-5	3	2	2	3	3	1	2	2	3	3	2.4
Mean Overall Score											**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	25UHE24AE02	**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 -Subsystems of Earth - Scope and Importance - Various Recycling Methods - Environmental Movements in India – Eco- Feminism - Public awareness - Suggestions to conserve environment

UNIT II: Natural Resources (6 Hours)

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

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

Kinds of Ecosystem - General structure of ecosystem - Functions of Ecosystem - Energy flow and Ecological pyramids - Levels of Biodiversity - Biodiversity at Global Level- 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

Teaching Methodology	Power point and Field visit
Assessment Methods	Seminar, Group Discussion.

Books for Study:

1. Department of Human Excellence, (2025). *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**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
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	**25UHE24AE02**		**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**	**PSO4**	**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	25UHE24VE02	**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 - Human Rights Organizations - NHRC - SHRC.

Teaching Methodology	Power point, Handouts and Group discussion
Assessment Methods	Seminars, Group Discussion, Assignments.

Books 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**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
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	**25UHE24VE02**			**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**	**PSO2**	**PSO3**	**PSO4**	**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
3	25UTA31GL03	பொதுத்தமிழ் – 3: General Tamil - 3	4	3

கற்றலின் நோக்கங்கள் (Course Objectives)
சங்க இலக்கியங்களின் இன்றியமையாமையை அறிந்து கொள்ளுதல்
இலக்கியக்கினை நுட்பமாக அறிகலின் வழியாக ஆற்றுப்படுத்தும் திறன் பெறுதல்
இலக்கிய அறநெறிகளைக் கற்காலு வாழ்வியலில் பயன்படுத்தும் திறன் பெறுதல்
திணை துறைகளைப் பகுத்தாராயும் அறிவு பெறுதல்
இலக்கிய இலக்கண நுட்பங்களை வாழ்வியலோடு வப்பிடுதல்

அலகு – 1 : **(12 மணி நேரம்)**

குறுந்தொகை: குறிஞ்சித் திணை - பரணர் பாடல் (199), முல்லை - ஔவையார் பாடல் (99), மருதம் - கொல்லிக்கண்ணனார் பாடல் (34), நெய்தல் - கச்சிப்பேட்டு நன்னாகையார் பாடல் (172), பாலை - வெண்பூதி பாடல் (174)

நற்றிணை: குறிஞ்சி - கபிலர் பாடல் (194), முல்லை - இடைக்காடனார் பாடல் (142), மருதம் – உறையூர்க் கதுவாய்ச் சாத்தனார் பாடல் (370), நெய்தல் - அறிவுடைநம்பி பாடல் (15), பாலை - கணக்காயனார் பாடல் (24)

ஐங்குறுநூறு: குறிஞ்சி - அன்னாய் வாழிப் பத்து - அன்னாய் வாழி வேண்டன்னை நம் படப்பை (203), முல்லை - செவிலி கூற்றுப் பத்து - மறியிடைபடுத்த மான்பிணைபோல (401), மருதம் - வேட்கைப் பத்து - வாழி ஆதன் வாழி அவினி (01), நெய்தல் - வெள்ளாங்குருகுப் பத்து - வெள்ளாங் குருகின் பிள்ளை (157), பாலை - உடன்போக்கின் கண் இடைச் சுரத்து உரைத்த பத்து - அறம்புரி அருமறை நவின்ற (387)

புறநானூறு: பிசிராந்தையார் (67), அரிசில் கிழார் (146), காக்கைப்பாடினி (278), அள்ளூர் நன்முல்லையார் (306), பரணர் (352)

அலகு – 2 : **(12 மணி நேரம்)**

சிறுபாணாற்றுப்படை

இலக்கணம் - யாப்பு

அலகு – 3 : **(12 மணி நேரம்)**

கலித்தொகை: குறிஞ்சிக்கலி – திருந்திழாய்! கேளாய் எனத் தொடங்கும் பாடல் (64), முல்லைக்கலி – கண் அகன் இரு விசும்பில் எனத் தொடங்கும் பாடல் (101), மருதக்கலி - நறவினை வரைந்தார்க்கும் எனத் தொடங்கும் பாடல் (98), நெய்தல்கலி - இவர்திமில் எறிதிரை எனத் தொடங்கும் பாடல் (135) பாலைக்கலி - அறனின்றி அயல்தூற்றும் எனத் தொடங்கும் பாடல் (2)

பதிற்றுப்பத்து: குமட்டூர்க் கண்ணனாரின் புண் உமிழ் குருதி (11), பாலைக் கௌதமனாரின் கயிறு குறு முகவை (22)

இலக்கிய வரலாறு: சங்க இலக்கியங்கள், சங்க இலக்கியங்களின் தனித்தன்மைகள்

அலகு – 4 : **(12 மணி நேரம்)**

அகநானூறு: அளிநிலை பொறாது அமரிய முகத்தள் எனத் தொடங்கும் பாடல் (5) , திதலை மாமை தளிர்வனப்பு எனத் தொடங்கும் பாடல் (135), திருந்துஇழை நெகிழ்ந்து எனத் தொடங்கும் பாடல் (387)

தனிப்பாடல் திரட்டு:- பிறவிக் குணமும் பழக்கமும் (196), கொடியது (242), பெரியது (244), அரியது (245), இதுவே நலம் (223)

இலக்கிய வரலாறு: பதினெண்கீழ்க்கணக்கு நூல்கள்

அலகு – 5 : **(12 மணி நேரம்)**

திருக்குறள்: இனியவை கூறல் (10), நட்பு ஆராய்தல் (80)

பழமொழி நானூறு: ஆற்றவும் கற்றார் அறிவுடையார் எனத் தொடங்கும் பாடல் (40), வைத்தனை வைப்பென்று எனத் தொடங்கும் பாடல் (95), உடைப்பெருஞ் செல்வத்து எனத் தொடங்கும் பாடல் (154), தத்தமக்குக் கொண்ட எனத் தொடங்கும் பாடல் (276), நோக்கி அறிகல்லா எனத் தொடங்கும் பாடல் (337)

இனியவை நாற்பது:- முதல் பத்து பாடல்கள் (1-10)

இலக்கணம் - அணி

நாடகம் - விந்தனின் வாழப்பிறந்தவன்

கற்பித்தல் அணுகுமுறை (Teaching Methodology)	**விரிவுரை** *(Lecture),* **காணொளிக் காட்சி** *(Videos),* **விளக்கக் காட்சி** *(PPT presentation)*
மதிப்பீட்டு முறைகள் (Assesment methods)	**கருத்துரை***(Seminar),* **குழுக் கலந்துரையாடல்** *(Group Discussion),* **உடனடித்தேர்வு** *(Snap Test),* **ஒப்படைவு** *(Assignment)*

பாடநூல்:
1. பொதுத்தமிழ்-3(2025), தமிழாய்வுத்துறை, தூய வளனார் கல்லூரி

பார்வை நூல்கள்:
1. சுப்பிரமணியன். ச. வே (உ.ஆ.), (2003), சங்க இலக்கியம் , கோவிலூர் மடாலயம்
2. கன்னியப்பன்.சிவ (உ.ஆ.), (2004),தனிப்பாடல் திரட்டு, முல்லை நிலையம்

Websites and eLearning Sources:
- *https://learnsangamtamil.com/*
- *https://www.tamilvu.org/library/*

Course Outcomes		
CO No.	***CO-Statements*** **இப்பாடத்தின் நிறைவில் மாணவர்கள்**	***Cognitive Levels (K-Level)***
CO1	சங்க இலக்கியக்கின் தனிக்கன்மைகளை அறிவர்	***K1***
CO2	ஆற்றுப்படை இலக்கியங்களைக் கற்பதன் வழி ஆற்றுப்படுத்தும் முறையை இனங்காண்பர்	***K2***
CO3	இலக்கிய நெறிகளை நடப்பியலில் பயன்படுத்துவர்	***K3***
CO4	திணை துறைகளை நன்கு கற்பதன் வாயிலாகப் பாடல்களைப் பகுப்பாய்வர்	***K4***
CO5	யாப்பு, அணியைக் கற்பதன் வாயிலாகப் புதிய இலக்கிய வடிவங்களைப் படைக்கும் திறன் பெறுவர்	***K5***

Relationship Matrix											
Semester	***Course Code***	***Title of the Course***								***Hours***	***Credits***
3	***25UTA31GL03***	*பொதுத்தமிழ் - 3: General Tamil - 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	*1*	*2*	*2*	*2*	*1*	*3*	*3*	*2*	*3*	*2*	*2.1*
CO2	*3*	*2*	*1*	*3*	*2*	*3*	*2*	*2*	*3*	*1*	*2.2*
CO3	*3*	*2*	*1*	*3*	*2*	*3*	*2*	*2*	*3*	*2*	*2.3*
CO4	*1*	*3*	*2*	*1*	*2*	*3*	*2*	*2*	*2*	*3*	*2.1*
CO5	*2*	*3*	*2*	*2*	*1*	*3*	*2*	*2*	*2*	*2*	*2.1*
										Mean Overall Score	***2.16 (High)***

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UFR31GL03	Language French – 3	4	3

Course Objectives	
1	Remember and Construct Narratives applying the *passé composé* with time indicators to recount past events
2	Understand and express personal memories using the *imparfait* in spoken and written communication to articulate likes, dislikes, and past events.
3	Analyze and interpret different housing options and engage in role-play scenarios to negotiate effectively.
4	Describe physical appearance and personality traits using appropriate adjectives, possessives, and comparatives to describe oneself
5	Evaluate future possibilities in science and communication, expressing hopes and possibilities using the *futur simple* and *conditionnel*

UNIT – I **(12 Hours)**

1. Titre - Nouvelles vies
2. Lexique – Parcours de vie, la vie personnelle, scolaire et professionnelle
3. Grammaire – le passé composé -formation, la phrase négative, les indicateurs de temps
4. Production orale- exprimer son intention de faire quelque chose
5. Production écrite - organiser une activité de loisir

UNIT – II **(12 Hours)**

6. Titre - Je me souviens
7. Lexique – le souvenir : la mémoire, les paysages : à la mer, à la montagne
8. Grammaire – l'imparfait -formation, les pronoms 'y' et 'en', la place de l'adjectif
9. Production orale- exprimer le fait d'aimer et de ne pas aimer
10. Production écrite - raconter un souvenir

UNIT – III **(12 Hours)**

11. Titre - Comme à la maison
12. Lexique – le logement et la location, les frais et les services, le cadre de vie
13. Grammaire – les pronoms relatifs, la comparaison, la condition
14. Production orale- jeu de rôle – louer un logement
15. Production écrite - Décrire un logement

UNIT – IV **(12 Hours)**

16. Titre - Tous pareils, tous différents
17. Lexique – l'apparence physique, les traits de caractère
18. Grammaire – les adjectifs indéfinis, les pronoms possessifs, la comparaison
19. Production orale- faire un compliment
20. Production écrite - faire le portrait physique de quelqu'un

UNIT – V **(12 Hours)**

21. Titre - En route vers le futur
22. Lexique – les sciences et les techniques, les technologies de communication
23. Grammaire – le futur simple, la condition avec 'si', le pronom 'on'
24. Production orale- exprimer un espoir – imaginer à l'avenir
25. Production écrite - Décrire l'utilité d'un objet
26. Indian knowledge system - Analyzing narrative structures in Indian epics vs. French literature by comparing the Mahabharata's moral stories especially the Panchatantra stories to French fables. Practicing French future tense by making simple predictions about personal life by referencing Indian astrology (5%)

Teaching Methodology	Project-Based Chronological Learning (PBL), Digital Media Integration, Genre-Specific Writing Approach, Scenario-based learning (SBL)
Assessment Methods	*Podcast creation:* Students record a short podcast episode on "Childhood Memory". (Rubric – assessed on ability to construct narratives using past tenses and expressing experiences. *Debate:* Debate on "Apartment vs. House: Students must compare housing options, rental costs, and services. (Rubric – evaluated on analytical skills through structured argumentation) *Timeline narrative activity:* Create a timeline about "A Typical College Day" (Rubric – Assessed on the ability to recall and construct a chronological narrative using past) *Letter writing:* Write a letter to a friend describing personal experiences. Write a formal inquiry to a landlord about an apartment (Rubric – Assessed on formal and informal written communication skills)

Books for Study:

1. Fafa, C., Gajdosova, F., Horquin, A., Pasquet, A., Perrard, M., Petitmengin, V., Sperandio, C., Dodin, M., &Veldeman-Abry, J. (2022). *Édito A2: Méthode de français* (2nd ed.). Didier FLE, Hatier. (p.13 – p.77)

Books for Reference:

1. Dauda, P., Giachino, L., &Baracco, C. (2016). *Génération A2*. Didier.
2. Girardet, J., &Pecheur, J. (2017). *Écho A2* (2nd ed.). CLE International

Websites and eLearning Sources:

1. https://www.bbc.co.uk/bitesize/subjects/zc7xpv4
2. https://conjuguemos.com/
3. https://www.busuu.com/en/course/learn-french-online
4. https://www.duolingo.com/learn
5. https://www.newsinslowfrench.com/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	Recall using vocabulary related to personal, academic, and professional life, and compose narratives using the *passé composé* and time indicators.	**K1**
CO2	Express experiences and preferences using *imparfait*to recount memories, express likes and dislikes accurately in spoken and written communication.	**K2**
CO3	Comparedifferent housing options and interpret rental-related expenses and services, and engage in role-play scenarios to negotiate accommodations.	**K3**
CO4	Characterise personal traits by describing physical appearance and personality traits, apply possessive and indefinite adjectives, and formulate comparisons effectively.	**K4**
CO5	Discuss advancements in science and communication, express hopes and possibilities using the *futur simple* and *conditionnel*structures.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
3	**25UFR31GL03**		Language 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	3	2	3	2	3	1	3	3	3	2.5
CO2	3	2	3	3	1	2	2	2	2	2	2.2
CO3	3	1	3	3	2	2	2	2	1	1	2.0
CO4	2	2	2	2	2	1	2	1	1	1	1.6
CO5	2	3	3	2	2	2	3	3	3	3	2.6
Mean Overall Score											**2.18 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UHI31GL03	Language 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)**

1. Tera Sneh na Khovoom
2. Samband Bodak
3. Reethikal - Namakarn
4. Chitra Varnan (Basic)

UNIT II **(12 Hours)**

5. Paribakshik Shabdavali
6. Smuchaya Bodak
7. Reethikal - Samajik Paristhithiya
8. Vachan Badalo

UNIT III **(12 Hours)**

9. Vismayadi Bodak
10. Reethikal - Sahithyik Paristhithiyam
11. Beerbal ki Chadurai
12. Patra-Patrikao mein Prakashit Gadyansho ka Patan(Basic)

UNIT IV **(12 Hours)**

13. Avikary Shabdh
14. Reethikal - Main Divisions
15. Ling Badalo
16. Karak

UNIT V **(12 Hours)**

17. Reethikal - Visheshathayem
18. Anuvad
19. Bahu Ki Vidha (One Act Play)
20. Bathcheeth - Kaksha mein

Teaching Methodology	Videos, PPT, Quiz, Group Discussion, Case Based Problem Solving
Assessment Methods	Quiz, Seminar, Assignment

Books for Study:

1. Dr. Sanjeev Kumar Jain. (2023). *Anuwad: Siddhant Evam Vyavhar*. Kailash Pustak Sadan.
2. Kamathaprasad Gupth, M. (2021). *Hindi Vyakaran*, Anand Prakashan.
3. Dr. Sadananth Bosalae. (2020). *kavya sarang*. Rajkamal Prakashan.

Books for Reference:

1. Ramdev. (2021). *Vyakaran Pradeep*. Hindi Bhavan.
2. Lakshman Prasad Singh. (2022). *Kavya Ke Sopan*. Bharathy Bhavan Prakashan.
3. Acharya Ramchandra Shukla. (2021). *Hindi Sahitya Ka Itihas*, Prabhat Prakashan.
4. Krishnakumar Gosamy. (2023). *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**	**Cognitive Levels (K-Level)**
	On successful completion of the course, the student will acquire thelisted skills	
CO1	Categorize the poetics in some selective poems.	**K1**
CO2	Practical application of grammar.	**K2**
CO3	Justify the social & political conditions of Riti Kaal in Hindi Literature.	**K3**
CO4	Find out the dialects of Hindi language.	**K4**
CO5	Illustrate the importance given to family ethics by the youth in the modern period according to "Bahoo Ki vidha" One Act play.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
3	**25UHI31GL03**	Language 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	**25USA31GL03**	Language 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
Assessment Methods	Seminar, Quiz, Group Discussion.

Books for Study:

1. VEDIC LITERATURE
2. RAMODANTAM

Books for Reference:

1. Parameshwara, Ramodantam, LIFCO Chennai 2020
2. R.S.Vadhyar & Sons , Book – sellers and publishers , Kalpathu ,Palaghat – 678003 , Kerala , south India , History of Sanskrit Literature 2021
3. Kulapathy, K.M Saral Sanskrit Balabodh , Bharathita vidya bhavan , Munshimarg Mumbai – 400 007 2020

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**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
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	**K2**
CO4	Appreciate the Vedic Philosophy	**K3**
CO5	Evaluate and create new words with upasargas	**K4**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
3	**25USA31GL03**			Language Sanskrit - 3					**4**		**3**
Course Outcomes	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**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/ Weeks	Credits
3	25UEN32GE03B	**General English - 3:** English for Science - 1	5	3

Course Objectives
To enable the students to comprehend the local and global issues through the lessons.
To enable the students to do the tasks centering on Skill Development and Grammar.
To empower the students with interactive skills.
To enhance their taste for reading that will naturally develop their vocabulary power and sentence structures
To develop the listening, speaking and writing skills of students through the prescribed texts.

UNIT I: Encounter Between Humans and Aliens (15 Hours)

1. "They're Made Out of Meat" by Terry Bisson
2. Vocabulary in Context: Meat Words
3. Writing: Informal Letter Writing
4. Speaking: Role Play
5. Grammar: Present Perfect Tense

UNIT II: Life After Death (15 Hours)

6. "The Egg" by Andy Weir
7. Vocabulary in Context: Cide Words
8. Writing: Formal Letter Writing
9. Speaking: Description of a Picture
10. Grammar: Present Perfect Continuous Tense

UNIT III: In Communion with Nature (15 Hours)

11. "A Tiger in the House" by Ruskin Bond
12. Vocabulary in Context: Animals and their babies
13. Writing: Job Application Writing (Writing Covering Letter and Curriculum Vitae)
14. Speaking: Description of an Advertisement
15. Grammar: Past Perfect Tense

UNIT IV: Mystery of Venus (15 Hours)

16. "All Summer in a Day" by Ray Bradbury
17. Vocabulary in Context: Rain Words
18. Writing: Drafting Invitation and Brochure
19. Speaking: Short Academic Presentation
20. Grammar; Past Perfect Continuous

UNIT V: Think Before You Trash (15 Hours)

21. "My Frog Recycles All His Trash" by Kenn Nesbitt
22. Vocabulary in Context: Ecological Words
23. Writing: Preparing an Advertisement
24. Speaking: Welcome Address and Vote of Thanks
25. Grammar: Future Perfect Tense and Future Perfect Continuous Tense

* Speaking Components are meant only for internal tests

Teaching Methodology	Lecture, Multimedia Presentations, Discussion and Enacting
Assessment Methods	Speaking, reading, listening and written tests

Books for Study:

1. Francis, V., Dr. D.R. Edwin Christy and Dr. D. Loyola Innaci. *Lingua Science – I*, St. Joseph's College (Autonomous), Tiruchirappalli.

Books for Reference:

1. Wilfred, D. Best. *Students Companion*. HarperCollins Publishers, 2020.

2. Wren & Martin. *Middle School English Grammar and Composition,* S Chand Publishing, 2023.
3. Carnegie, Dale. *The Quick and Easy Way to Effective Speaking*, Rupa Classics, 2013.

Websites and eLearning Sources:

1. https://jerrywbrown.com/wp-content/uploads/2020/02/They-are-made-out-of-meat-Bisson-Terry.pdf
2. https://www.are.na/block/12921440
3. https://pdfcoffee.com/andy-weir-the-egg-pdf-pdf-free.html
4. https://mrsdelcarmen.weebly.com/uploads/3/0/9/0/30908551/a_tiger_in_the_house_by_ruskin_bond.pdf
5. https://poetry4kids.com/poems/my-frog-recycles-all-his-trash/
6. https://www.stcypriansprimaryacademy.co.uk/wp-content/uploads/2021/01/All-Summer-in-a-Day-by-Ray-Bradbury.pdf

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	Identify and comprehend the local and global issues through the lessons	**K1**
CO2	Use interactive skills	**K2**
CO3	Develop the Listening and Reading Skills of the learners through teacher-led reading practice	**K3**
CO4	Enhance their Listening, Reading, Speaking, and Writing Skills	**K4**
CO5	Develop their Creative and Critical Thinking and Speaking Skills	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Paper**						**Hours**	**Credits**
3	**25UEN32GE03B**			**General English - 3:** English for Science - 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	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	**25UST33CC06**	**Core Course - 6:** Discrete Probability Distributions	**5**	**4**

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

Unit -I **(15 Hours)**

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

Unit-II **(15 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 **(15 Hours)**

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

Unit-IV **(15 Hours)**

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

Unit-V **(15Hours)**

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

Teaching Methods	PPT, Problem solving and Hand outs
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. Gupta S.C. and Kapoor, V.K. (2020). *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons Pvt. Ltd., New Delhi

Books for Reference:

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

Website and eLearning Resources:

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

Course Outcomes

CO No.	CO-Statements	Cognitive Levels (K-Level)
	On successful completion of this course, the students will be able to	
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	**25UST33CC06**			**Core Course - 6:** Discrete Probability Distributions					**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	3	3	3	2	3	3	3	2	2	**2.6**
CO2	3	3	3	3	2	3	3	3	3	2	**2.6**
CO3	3	3	3	3	2	3	3	3	3	2	**2.6**
CO4	3	3	3	3	2	3	3	3	3	2	**2.6**
CO5	3	3	3	3	2	3	3	3	3	2	**2.6**
									Mean Overall Score		**2.6 (High)**

Semester	Course Code	Title of the Course	Hours / Week	Credits

3	25UST33CC07	**Core Course – 7:** Continuous Probability Distributions	6	4

Course Objectives
To learn the characteristics of Normal distributions.
To learn the relationship between beta and gamma distribution.
To know the memory less property of exponential distribution.
To find the mean and variance of standard Laplace distribution and Weibul distribution.
To understand the relationship between t and F distributions.

Unit-I **(18 Hours)**

Normal Distribution: Introduction, Limiting form of Binomial Distribution, Chief characteristics and its curve- Mean, Median, Mode, M.G.F -- Characteristic function -Moments and Cumulants- Importance of Normal Distribution - Fitting of Normal distribution.

Unit-II **(18 Hours)**

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

Unit-III (**18 Hours)**

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

Unit-IV **(18 Hours)**

Standard Laplace distribution: Characteristic function – Mean – Variance.
Weibull distribution: M.G.F, Mean, Variance (simple problems only).

Unit -V **(18 Hours)**

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

Teaching Methodology	Chalk and talk, PPT, YouTube videos and Handouts.
Assessment Methods	Snap test, MCQ, Assignment

Books for Study:

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

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 Distributions*, Vol. I & Vol. II, John Wiley and Sons.

Website and eLearning Resources:

1. Khan Academy – Normal Distribution – https://www.khanacademy.org/math/statistics-probability/modeling-distributions-of-data
2. Stat Lect – Continuous Probability Distributions – https://www.statlect.com/probability-distributions
3. NPTEL – Probability and Statistics – https://nptel.ac.in/courses/111105090/
4. MIT Open Course Ware – Probability & Statistics – https://ocw.mit.edu/courses/mathematics/18-05-introduction-to-probability-and-statistics-spring-2014/
5. Penn State – Sampling Distributions (t, χ^2, F Distributions) –

https://online.stat.psu.edu/stat414/lesson/7

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/Week**		**Credit**
3	**25UST33CC07**			**Core Course – 7:** Continuous Probability Distributions					**6**		**4**
Course Outcomes↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	3	2	2	3	3	3	2	2	2	2.5
CO-2	3	2	2	3	3	3	3	3	3	2	2.7
CO-3	3	3	2	3	3	3	3	3	2	3	2.8
CO-4	3	3	3	3	3	3	3	3	3	3	3.0
CO-5	3	3	3	3	3	3	3	3	3	3	3.0
Mean Overall Score											**2.8 (High)**

Semester	Course Code	Title of the Course	Hours	Credits

3	25UST33AO01A	**Allied Optional – 1:** Mathematics for Statistics - 1	6	4

Course Objectives
To Understand the Fundamentals of Matrices
To Explore the Theory of Equations
To Master Techniques of Differentiation
To Apply Vector differentiation to Problem Solving
To Study Vector Integration to problem Solving.

Unit-I **(18 Hours)**

Matrices: Symmetric –Skew symmetric – Hermitian - Skew Hermitian - Orthognoal and Unitry matrices - Rank of a matrix – Consistency and solution of Liner equations -, Cayley - Hamilton theorem - Inverse of a matrix using Cayley - Hamilton theorem. Eigen values and Eigen-vectors.

Unit-II **(18 Hours)**

Theory of equations: Relation between the roots and coefficient of an equation –Imaginary and irrational roots – Reciprocal equations – Diminishing the roots of an equation- Horner's method.

Unit-III **(18 Hours)**

Differentiation: n^{th} Derivatives – Leibenitz's theorem and its applications –Partial differentiation – Maxima and minima of two independent variables -- Jacobians.

Unit-IV **(18 Hours)**

Vector differentiation: Gradient, divergence, curl, directional derivative, Unit normal to a surface.

Unit-V **(18 Hours)**

Vector Integration: Line, surface and volume integrals – Applications of Gauss, Stokes and Green's theorems – simple problems.

Teaching Methodology	Chalk and Talk, PPT, You Tube video and Handouts.
Assessment Methods	Seminar, Problem solving Assignment, Online test.

Books for Study:

1. Dr. P. R. Vittal, (2012), *Allied Mathematics*, Margham Publications.
2. Dr. S. Balaji (2013), *Engineering Mathematics–II*, Balaji Publishers.

Books for Reference:

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

Website and eLearning Resources:

1. https://www.maths.scot/pdf/ah/st-machar/Matrices%20Notes.pdf
2. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SMT1302.pdf
3. https://math.libretexts.org/Bookshelves/Calculus/Supplemental_Modules_(Calculus)/Vector_Calculus/3%3A_Multiple_Integrals/3.8%3A_Jacobians
4. file:///C:/Users/god/Downloads/56_binomial_series.pdf
5. https://www.govst.edu/uploadedFiles/Academics/Colleges_and_Programs/CAS/Trigonometry_Short_Course_Tutorial_Lauren_Johnson.pdf

Course Outcomes		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
CO1	Demonstrate the ability to integrate matrix theory	**K1**
CO2	Understand and apply the concepts of Theroy of equations	**K2**
CO3	Apply methods like nth Derivatives – Leibenitz's theorem and its applications.	**K3**
CO4	Develop problem-solving skills and critical thinking in applying Vector differentiation	**K4**
CO5	Gain proficiency in various methods to solve the problem for vector integration.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
3	**25UST33AO01A**			**Allied Optional - 1:** Mathematics for Statistics - 1					**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	3	2	3	2	3	3	2	1	3	3	2.5
CO2	2	3	2	2	3	1	2	3	2	1	2.1
CO3	2	2	3	2	3	3	2	3	1	2	2.3
CO4	2	3	2	2	3	3	2	3	2	1	2.3
CO5	2	2	3	2	1	3	2	3	2	1	2.1
Mean Overall Score											**2.6 (High)**

3	25UST33AO01B	**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 organizations
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
Assessment Method	Snap Test, Quiz, Open Book test

Theory 20% and Problems 80%

Books for Study:

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

Books for Reference:

1. SP. Jain &K.L. Narang, "Advanced Accountancy", Volume I, Kalyani Publishers, New Delhi (2015)
2. Reddy TS and Murthy, Financial Accounting (2020), Margham Publications, Chennai (2020)

Websites and eLearning Sources:

1. https://www.coursera.org/learn/wharton-accounting
2. https://www.coursera.org/courses?query=financial%20accounting
3. https://onlinecourses.nptel.ac.in/noc23_mg65/preview

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/Week**	**Credits**
3	**25UMA33AO01B**			**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**
Overall Mean Score											**2.2**
											High

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UHE34VE03A	**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

Teaching Methodology	Lecture, PPT, Power point
Assessment Methods	Online Test, Group Discussions

Books 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/Week**		**Credits**
3	**25UHE34VE03A**			**Value Education - 3:** Social Ethics - 1					**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	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	25UHE34VE03B	**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 **(6 Hours)**
God of salvation

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

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

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

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

Teaching Methodology	Power point, Assignment and Group discussion
Assessment Methods	Online Test, Group Discussions

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**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
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/Week**		**Credits**
3	**25UHE34VE03B**			**Value Education - 3:** Religious Doctrine - 1					**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	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
3	25USS34SE01	**Skill Enhancement Course - 1:** 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 u discussions

UNIT I Communication Skills (6 Hours)

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 (6 Hours)

*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 (6 Hours)

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 (6 Hours)

Average, Simple Interest, Compound Interest, Profit and Loss, Area, Volume and Surface Area

UNIT V (6 Hours)

Verbal Reasoning: Series Completion, Analogy. *Non-Verbal Reasoning.*

Teaching Methodology	Chart, PPT, chalk and talk, Video Presentation

Books 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.

Websites and eLearning Sources:

1. https://www.indeed.com/career-advice/resumes-cover-letters/communication-skills
2. https://www.seek.com.au/career-advice/article/50-communication-skills-for-the-workplace-your-resume
3. https://southeast.iu.edu/career/files/power-phrases.pdf
4. https://dese.ade.arkansas.gov/Files/20201209124449_Professional-Communication.docx
5. https://www.dol.gov/sites/dolgov/files/ETA/publications/00-wes.pdf
6. https://www.tmu.ac.in/other_websites/cdoe.tmu.ac.in.old/study-material/28-08-2024/COMMON/SEMESTER_2/MAIN_SOFT_SKILLS.pdf
7. https://byjus.com/maths/profit-and-loss-questions/
8. https://www.indiabix.com/

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Analyse problems directed at testing their cognitive abilities	**K1**
CO2	Present the best of themselves as job seekers and communicate effectively in all contexts	**K2**
CO3	Assess themselves, set goals, and manage conflicts that are expected of a good leader	**K3**
CO4	Enhance numerical ability required for the employees for various transactions	**K4**
CO5	Develop aptitude skills required by the employers	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
3	**25USS34SE01**		**Skill Enhancement Course - 1:** Soft Skills						**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	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
CO4	2	2	3	3	2	3	3	3	2	2	2.5
CO5	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	Credits
4	*25UTA41GL04B*	*General Tamil – 4: அறிவியல் தமிழ் (Scientific Tamil)*	*4*	*3*

கற்றலின் நோக்கங்கள் (Course Objectives)
அன்றாட வாழ்வில் அறிவியலின் செல்வாக்கை அறிந்துகொள்ளுதல்
பண்டைத்தமிழர் வாழ்வில் இடம்பெற்ற அறிவியல்கூறுகளைக் கண்டறிதல்
திரைப்படம், நூல் போன்றவற்றைத் திறனாய்வு நோக்கில் ஆராய்தல்
தமிழர்தம் பண்பாடும் அறிவியலும் கொண்ட தொடர்பைப் புலப்படுத்துதல்
படைப்பாற்றல் திறனைக் கண்டறிந்து அறிவியல் படைப்புகளை உருவாக்கல்

அலகு - 1 **(12 மணி நேரம்)**

கணிதவியல்: பார்ப்பார்க்கு அல்லது பணிபு அறியலையே (பதிற்றுப்பத்து : 63) - விசும்பில் ஊழி - ஊழ்-ஊழ் செல்லக் (பரிபாடல் : திருமால் : 4-15) - கண்ணுங்கால் கண்ணும் கணிதமே (சிறுபஞ்சமூலம் :92) - உண்ணாது வைக்கும் பெரும்பொருள் (இன்னா நாற்பது -16)

உயிரியல்: தொல்காப்பியம் : மரபியல் : (27-33) - சிறுவீ ஞாழல் (நற்றிணை 195) - நீடுவெயில் உழந்த (அகநானூறு 335) - வள் இதழ் ஒண் செங்காந்தள் (குறிஞ்சிப்பாட்டு 61-98) -வாள்வரி வயமான் (அகநானூறு 99) -புல்லாகிப் பூடாய்ப் புழுவாய் மரமாகிப் (திருவாசகம்- சிவபுராணம் 26-32

உரைநடைக்கட்டுரை: வியக்க வைக்கும் தமிழரின் அறிவியல்

பயன்முறை கற்றல்: வலைப்பூக்கள் உருவாக்கம்- அறிவியல்கலைச்சொல்லாக்கம்

அலகு - 2 **(12 மணி நேரம்)**

நீரியல்: அம்ம வாழி தோழி (குறுந்தொகை 287) -அம்ம வாழி, தோழி கைம்மிக (அகம் 141: 1-11) -முழங்கு முந்நீர் முழுவதும் வளைஇப் (புறநானூறு-18) -வீங்கு விளிம்பு உரீஇய விசை அமை நோன் சிலை (அகநானூறு-175) -விசும்பு ஆடு பறவை வீழ் பதிப் படா (குறிஞ்சிப்பாட்டு 46-53)- **திருக்குறள்** வான்சிறப்பு - **பதார்த்த சிந்தாமணி :** குளத்து சலந்தானே கொடிது தான (27) - எரிசலம் வாதமிகு மதுவே (31) -அருவிநீர் மேக மகற்றுந் (39)

அமிழ்போலை: வாழ்க எம் கோ மன்னவர் (சிலப்பதிகாரம் -காடுகாண் காதை15-22)- தீங்கனி நாவல் ஓங்கும்இத் தீவிடை (மணிமேகலை-பீடிகை கண்டு பிறப்புணர்ந்த காதை (17-22)

உரைநடைக்கட்டுரை: தமிழர்களின் மருத்துவ அறிவியல்

புதினம்: இரா.நடராசன் : சர்க்கஸ்.காம்

அலகு - 3 **(12 மணி நேரம்)**

உலகியல்: நிலம் தீ நீர் வளி விசும்போடு (தொல்.பொருள் 635) - நிலம் நீர் வளி விசும்பு என்ற நான்கின் (பதிற்று 14:1-4) - மண் திணிந்த நிலனும் (புறம் 2 1-6)

வானியல் : செஞ்ஞாயிற்றுச் செலவும் (புறம் 30 1-7) - அடு இயல் அழல் குட்டத்து புறநானூறு (229) - நெடுவெயின் ஒளிறு மின்னுப் பரந்தாங்கு (பதிற்று 24:1-26)

உரைநடைக்கட்டுரை: தமிழ் இலக்கியங்களில் வெளிப்படும் நீர் மேலாண்மையியல்

பயன்முறை கற்றல் : நூல் – திறனாய்வு

அலகு - 4 **(12 மணி நேரம்)**

மருத்துவம்: திருக்குறள்: மருந்து - இரும்பனம் புடையல் ஈகை வான்கழல் (பதிற்றுப்பத்து-42) – எற்றி இறக்கி இருகாலும் பரிக்கும் – (திருமந்திரம் 571) - இல்லையே வாதம் எழில்நடை தோழியாம் (கர்ப்ப வாதக் கிரீடு-23)

அணு இயற்பியல் : மணிமேகலை : சமயக் கணக்கர் தந்திறங் கேட்ட காதை (105-165) - மேவிய சீவன் வடிவது சொல்லிடில் (திருமந்திரம் –எட்டாம் தந்திரம் 29:1) - அணுவில் அணுவினை ஆதிபிரானை (திருமந்திரம் –எட்டாம் தந்திரம் 28:2) - அண்டப் பகுதியின் உண்டைப் பிறக்கம் (திருவாசகம்- திருவண்டப் பகுதி 106) - அண்டங்கள் எல்லாம் அணுவாக (திருவிளையாடல் புராணம் –அணுவியல் (பாயிரம்-6) - செகத்தையெல்லாம் அணுவளவுஞ் சிதறா வண்ணஞ் (தாயுமானவர் – தந்தை தாய் 6)

உரைநடைக்கட்டுரை: தமிழில் அறிவியல் புனைவுகள்

பயன்முறை கற்றல் : திரைப்படத் திறனாய்வு- ஆவணப்படத் திறனாய்வு

அலகு - 5 **(12 மணி நேரம்)**

கட்டடவியல் : வானம் ஊன்றிய மதலை போல (பெரும்பாண் : 346-351) - விரி கதிர் பரப்பிய வியல் வாய் மண்டிலம் (நெடுநல்வாடை 72-88) - காடுகொன்று நாடாக்கி (பட்டினப்பாலை 283-288) - பெருக்காறு சடைக்கணிந்த பெருமான் சேரும் (தேவாரம் 2801)

பகுத்தறிவியல்: தைச உள்ள கல்லை (சிவவாக்கியர் -412)- நட்ட கல்லைத் தெய்வமென்று (சிவவாக்கியர்-482)

உருவாக்கப்படுவது: அறிவியல் கட்டுரையின் வளர்ச்சி நிலைகள்

பயன்முறை கற்றல் : பலமொழிகளில் அறிவியல் மூலிகைகளைக் கண்டறிதல்

கற்பித்தல் அணுகுமுறை *(Teaching Methodology)*	விரிவுரை ***(Lecture),*** காணொளிக் காட்சி ***(Videos),*** விளக்கக் காட்சி ***(PPT presentation)***
மதிப்பீட்டு முறைகள் *(Assesment methods)*	வலைப்பூ உருவாக்கம், திரைப்படத் திறனாய்வு, மூலிகை சேகரிப்பு, நூல் திறனாய்வு

பாட நூல்கள்:

1. கபிலாய்வுக்குறை (2025), அறிவியல் கபிலர் காய வளனார் கன்னாட்சிக் கல்லூரி
2. இராசுடாசன்: (2010), சர்க்கஸ்.காம், Books for Children
3. ஹர்க்கி ஆகி (2001), அறிவியல் கலைச்சொல் அகராதி, மணிவாசகர் பதிப்பகம்

பார்வை நூல்கள்:

1. அரிமாப்பாமகன் .ஆ (2017), சங்க இலக்கியத்தில் சூழலியல், இராசகுணா பதிப்பகம்
2. குழந்தைசாமி.வா.செ., (2001), அறிவியல்தமிழ், பாரதி பதிப்பகம்

Websites and eLearning Sources:

- *https://www.tamilcomputingjournal.org/?page_id=2622*
- *https://archive.org/details/dli.jZY9lup2kZl6TuXGlZQdjZl3lMyy*
- *https://thamizhiyal.com/?p=2775*
- *https://www.valaitamil.com/jan-month-Article_19160.html*

Course Outcomes

CO No	***CO–Statements*** **இப்பாடத்தின் நிறைவில் மாணவர்கள்**	***Cognitive Levels (K –Levels)***
CO -1	அன்றாட வாழ்வில் அறிவியலின் செல்வாக்கை அறிந்துகொள்வர்	***K1***
CO -2	பண்டைத்தமிழர் வாழ்வில் இடம்பெற்ற அறிவியல்கூறுகளைக் கண்டறிவர்	***K2***
CO -3	திரைப்படம், நூல் போன்றவற்றைத் திறனாய்வு நோக்கில் ஆராய்வர்	***K3***
CO -4	தமிழர்தம் பண்பாடும் அறிவியலும் கொண்ட தொடர்பைப் பலப்படுத்துவர்	***K4***
CO -5	படைப்பாற்றல் திறனைக் கண்டறிந்து அறிவியல் படைப்புகளை உருவாக்கும் திறன் பெறுவர்	***K5***

Relationship Matrix

Semester	***Course Code***	***Title of the Course***	***Hours***	***Credits***
4	***25UTA41GL04B***	*General Tamil – 4: அறிவியல் தமிழ் (Scientific Tamil)*	***4***	***3***

Course Outcomes↓	***Programme Outcomes (PO)***					***Programme Specific Outcomes (PSO)***					***Mean Scores of COs***
	PO-1	***PO-2***	***PO-3***	***PO-4***	***PO-5***	***PSO-1***	***PSO-2***	***PSO-3***	***PSO-4***	***PSO-5***	
CO-1	*3*	*2*	*3*	*2*	*2*	*3*	*3*	*2*	*2*	*2*	*2.4*
CO-2	*2*	*3*	*3*	*2*	*3*	*2*	*3*	*2*	*3*	*2*	*2.5*
CO-3	*3*	*2*	*2*	*3*	*3*	*3*	*2*	*3*	*3*	*3*	*2.7*
CO-4	*2*	*3*	*3*	*2*	*2*	*3*	*2*	*3*	*3*	*2*	*2.5*
CO-5	*3*	*1*	*2*	*3*	*2*	*2*	*3*	*2*	*3*	*3*	*2.4*
										Mean Overall Score	***2.5 (High)***

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	**25UFR41GL04**	Language French – 4	**4**	**3**

Course Objectives
Express preferences and opinions with precision using quantity expressions, and pronouns to convey satisfaction or dissatisfaction.
Describe Health Conditions and provide medical advice using appropriate grammatical structures to engage in meaningful discussions
Communicate Effectively in Social and Professional Settings by expressing desires and requests and using polite expressions
Exchange Travel Information and construct well-structured narratives to recount journeys
Enhance communication through structured language with contextually appropriate statements across various topics

UNIT – I **(12 Hours)**

1. Titre - En cuisine
2. Lexique – les aliments, la restauration, les goûts et les sensations
3. Grammaire – les quantités et le pronom ‘en’, la restriction ‘ne…que’, l’obligation
4. Production orale- communiquer au restaurant
5. Production écrite - exprimer sa satisfaction et son insatisfaction

UNIT – II **(12 Hours)**

6. Titre - A votre sante
7. Lexique – les corps et la sante, la médecine et les urgences
8. Grammaire – les pronoms COD et COI, le superlatif, les pronoms interrogatifs
9. Production orale- parler des problèmes de santé
10. Production écrite - Donner un conseil pour une condition médicale

UNIT – III **(12 Hours)**

11. Titre - Dans les médias
12. Lexique – les médias audios et les réseaux sociaux
13. Grammaire – la cause et la conséquence, le subjonctif, la place des pronoms
14. Production orale- exprimer son intérêt et sa préférence
15. Production écrite - faire une critique positive et négative

UNIT – IV **(12 Hours)**

16. Titre - Consommer responsable
17. Lexique – la consommation, les catégories de produits, le travail manuel
18. Grammaire – le conditionnel présent – formation et emploi, le gérondif
19. Production orale- demander et proposer un service
20. Production écrite - exprimer un souhait ou un désir

UNIT – V **(12 Hours)**

1. Titre - Envies d’ailleurs
2. Lexique – le voyage, l’hébergement, le séjour, le tourisme
3. Grammaire – le passé composé et l’imparfait dans le récit, les pronoms démonstratifs
4. Production orale- demander des renseignements sur un voyage
5. Production écrite - parler d’une visite touristique
6. Indian knowledge system - Writing travel narratives based on ancient Indian pilgrimage sites and comparing with French monuments. Using French quantity expressions and pronouns to describe Ayurvedic food portions and dietary balance and offering Ayurvedic-based medical advice**.** (5%)

Teaching Methodology	L'approche communicative (Communicative Language Teaching -CLT), Genre-Based Approach, Experimental learning, Flipped Classroom Approach
Assessment Methods	*Role-Play:* Restaurant Experience: waiter and customer ordering food and expressing opinions on the meal. (Rubric – graded on usage of expressions related to food and grammatical accuracy) *Written assessment:* Write a short critique of a social media platform, movie, or advertisement. (Rubric – assessed on ability to express opinions and logical argumentation) *Travel Blog or Postcard Writing:* Write a blog post or postcard describing a recent travel experience, using descriptive language (Rubric – assessed on structured narrative writing in a travel context and usage of past tenses) *Group Debate:* Media & Society: Debate the impact of social media on education. (Rubric – graded on critical thinking, Argument clarity and participation

Books for Study:

1. Fafa, C., Gajdosova, F., Horquin, A., Pasquet, A., Perrard, M., Petitmengin, V., Sperandio, C., Dodin, M., &Veldeman-Abry, J. (2022). *Édito A2: Méthode de français* (2nd ed.). Didier FLE, Hatier. (p.83 – p.152)

Books for Reference:

1. Dauda, P., Giachino, L., & Baracco, C. (2016). *Génération A2*. Didier.
2. Girardet, J., &Pecheur, J. (2017). *Écho A2* (2nd ed.). CLE International

Websites and eLearning Sources:

1. https://cuisine-facile.com/
2. https://www.france.fr/en/
3. https://www.sncf-connect.com/
4. https://www.routard.com/
5. https://sante.lefigaro.fr/

Course Outcomes		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
CO1	Apply vocabulary related to food by using quantity expressions and pronoun to communicate satisfaction or dissatisfaction in oral and written contexts.	**K1**
CO2	Identify and describe health conditions, construct superlative forms, and formulate medical advice using appropriate grammatical structures.	**K2**
CO3	Express opinions, preferences, and critiques about various media platforms, apply cause-and-consequence structures	**K3**
CO4	Utilize vocabulary related to consumption, express desires and requests effectively in professional and social interactions.	**K4**
CO5	Request and provide travel-related information and describe tourist experiences using demonstrative pronouns and structured narratives.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**25UFR41GL04**			Language 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	2	1	2	2	1	3	2	1	2	2	1.8
CO2	2	2	2	3	1	2	2	2	2	2	2.0
CO3	2	3	2	3	3	2	2	3	1	1	2.2
CO4	3	3	3	2	3	3	1	2	2	2	2.4
CO5	3	2	2	3	2	2	2	1	1	2	2.0
Mean Overall Score											**2.08 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	**25UHI41GL04**	Language 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)**

1. Prathyay
2. Char Bhai
3. Adhunik Kaal - Introduction
4. Adhunik Kal – Namakarn

UNIT II **(12 Hours)**

5. Chitra Varnan(Advanced)
6. Paryayvachy Shabdh
7. Bathcheeth - Hotel mein
8. Adhunik Kal - Samajik Paristhithiyam

UNIT III **(12 Hours)**

9. Upasarg
10. Thulsi ke Dhoe
11. Apathit Gadyansh
12. Adhunik Kal – Sahithyakar

UNIT IV **(12 Hours)**

13. Review- Book/Film
14. Paryavaran Pradookshan
15. Adhunik Kal - Main Divisions
16. Anuvad

UNIT V **(12 Hours)**

17. Kaal
18. Patra-Patrikao mein Prakashit Gadyansho ka Patan (Advanced)
19. Sapnom Kee Home Delivery (Novel)
20. Adhunik Kal - Visheshathayem

Teaching Methodology	Debate Participation, Videos, PPT, Quiz, Project Work
Assessment Methods	Quiz, Snap Test, Group Discussion

Books for Study:

1. Dr. Sadananth Bosalae. (2022). *kavya sarang*. Rajkamal Prakashan.
2. Kamathaprasad Gupth, M. (2021). *Hindi Vyakaran*. Anand Prakashan.
3. Dr. Sanjeev Kumar Jain. (2022). *Anuwad: Siddhant Evam Vyavhar*. Kailash Pustak Sadan.

Books for Reference:

1. Rajeswar Prasad Chaturvedi. (2021). *Hindi vyakarana*. Upakar Prakashan.
2. Ramdev. (2021). *Vyakaran Pradeep*. Hindi Bhavan.
3. Krishnakumar Gosamy. (2023). *Anuvad vigyan ki Bhumika*. Rajkamal Prakashan.
4. Acharya Ramchandra Shukla. (2021). *Hindi Sahitya Ka Itihas*, Prabhat Prakashan.
5. Mamta Kaliya. (2022). *Sapno Ki Home Delivery*. Lokbharti 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**	**Cognitive Levels (K –Levels)**
	On successful completion of the course, the student will acquire the listed skills.	
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	Evaluate the film & Literary works in Hindi.	**K4**
CO5	Analyze the human values expressed in life and literature of Hindi Novelist "Mamatha Kaliya".	**K5**

Relationship Matrix											
Semester	**Course code**			**Title of the Course**					**Hours / week**		**Credits**
4	**25UHI41GL04**			Language Hindi – 4					**4**		**3**
Course Outcomes (COs)	**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	25USA41GL04	Language 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
Assessment Methods	Seminar, Quiz, Group Discussion.

Books for Study:

1. Karnabhavam & Literature Language
2. Dhaatu Manjari
3. Samskrita Vyavahara Sahasri (A Collection of One Thousand Sentances),Samskrita Bharati, Delhi,2021

Books for Reference:

1. R. S. Vadhyar & Sons, Book – sellers and publishers, Kalpathu, Palghat – 678003, Kerala, south India, History of Sanskrit Literature 2021
2. Kulapathy, K.M Saral Sanskrit Balabodh, Bharathita vidya bhavan, Munshimarg Mumbai – 400 007 2020
3. Samskrita Bharathi, Aksharam 8 th cross, 2nd phase Giri nagar Bangalore Vadatu sanskritam – Samaskara Binduhu 2021

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**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
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	**25USA41GL04**			Language Sanskrit - 4						**4**	**3**
Course Outcomes	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**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/ Weeks	Credits
4	25UEN42GE04B	**General English - 4:** English for Science - 2	5	3

Course Objectives
To expand vocabulary by learning and using context-specific words.
To improve writing through practice in reports, reviews, and social media posts.
To master grammar by focusing on question tags and subject-verb agreement.
To enhance speaking skills through debates and discussions.
To appreciate literature and science to boost creative thinking.

UNIT I: Simple Ways to Explore Nature **(15 Hours)**

1. "Marie Curie Biographical" Taken from The Nobel Prize
2. Vocabulary in Context: Radioactive Elements
3. Writing: Media Reports
4. Speaking: Expansion of a Proverb
5. Grammar: Question Tag

UNIT II: The Limits of Human Knowledge **(15 Hours)**

1. "The Marry Month of May" by O. Henry
2. Vocabulary in Context: Seasonal Words
3. Writing: Book or Film Review
4. Speaking: Debate
5. Grammar: WH Questions

UNIT III: Difference Between Original and Copy **(15 Hours)**

1. "The story of Dolly the sheep" taken from Natural World, Science and Technology, Scotland
2. Vocabulary in Context: Cloning Words
3. Writing: E-mail Etiquette
4. Speaking: Group Discussion
5. Grammar: Yes or No Questions

UNIT IV: The Other Worlds **(15 Hours)**

1. "The Star" by Arthur C. Clarke
2. Vocabulary in Context: Astronomical Words
3. Writing: Writing for Social Media (Blogs, Twitter, Instagram and Facebook)
4. Speaking: Story Telling
5. Grammar: Conditional Sentences

UNIT V: Scientific Temparament **(15 Hours)**

1. "The Particle Dance" by Emily Dickinson
2. Vocabulary in Context: Scientific Instruments
3. Writing: Creating Digital Profile
4. Speaking: Spin a Yarn
5. Grammar: Subject Verb Agreement

* Speaking Components are meant only for internal tests

Teaching Methodology	Lecture, Multimedia Presentations, Discussion and Enacting
Assessment Tools	Speaking, reading, listening and written tests

Books for Study:

1. Francis, V., Dr. D.R. Edwin Christy and Dr. D. Loyola Innaci. *Lingua Science – II,* St. Joseph's College (Autonomous), Tiruchirappalli.

Books for Reference:

1. Wilfred, D. Best. *Students Companion*. Harper Collins Publishers, 2020.
2. Dickinson, Emily. *The Complete Poems of Emily Dickinson*, Back Bay Books, 1973.

Websites and eLearning Sources:

1. https://www.nobelprize.org/prizes/physics/1903/marie-curie/biographical/
2. https://www.gutenberg.org/files/59637/59637-h/59637-h.htm
3. https://www.nms.ac.uk/discover-catalogue/the-story-of-dolly-the-sheep
4. https://sites.uni.edu/morgans/astro/course/TheStar.pdf
5. https://poemverse.org/short-poems-about-science/

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Identify and comprehend the local and global issues through the lessons	**K1, K2**
CO2	Use interactive skills	**K3**
CO3	Develop the Listening and Reading Skills of the learners through teacher-led reading practice	**K6**
CO4	Improve their General Writing Skills such as Note-Taking, Note- Making Précis Writing, Paragraph Writing, and Writing Short Essays on Current	**K6**
CO5	Develop their Creative and Critical Thinking and Speaking Skills	**K6**

Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**25UEN42GE04B**			**General English - 4:** English for Science - 2						**5**	**3**
Course Outcome (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO 1**	**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/ Weeks	Credits
4	25UST43CC08	**Core Course - 8:** Estimation Theory	5	4

Course Objectives
To understand the fundamental Estimation concepts and apply sufficient conditions
To evaluate the efficient and sufficient estimators using optimality considerations
To utilize MLE method and assess their properties to the solve estimation problem
To explore Alternative Estimation methods to solve the estimation problem
To construct and interpret confidence intervals for large and small samples

UNIT I **(15 Hours)**

Unbiasedness and Consistency: Estimator - Properties of Good Estimator - Unbiasedness – Biased Estimator, Mean Square Error and Variance – Consistency – Properties - Sufficient Conditions for Consistency.

UNIT II **(15 Hours)**

Efficiency and Sufficiency: Efficiency of Estimators – Optimality considerations– Cramer-Rao Inequality – Information in sample – Information in a statistic. Sufficient Statistics – Neyman's Factorization theorem (Statement only) – Rao-Blackwell Theorem.

UNIT III **(15 Hours)**

Point Estimation –I: Point estimation - Method of Maximum Likelihood Estimator (MLE) - Properties of MLEs (without proof) – Problems based on MLEs

UNIT IV **(15 Hours)**

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 V **(15 Hours)**

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

Teaching Methodology	Chalk & Talk, Conceptual Discussions, Hands-on Computational Exercises
Assessment Methods	Seminar, Snap Test, & Online MCQ

Books for Study:

1. Gupta S.P. &Kapoor V.K., (2020) "Fundamentals of Mathematical Statistics", (12th Ed.) Sultan Chand &Sons, New Delhi.
2. Dr. O.P. Gupta, & Dr. Vishal Sharma., (2021). Mathematical Statistics, (Revised Ed.), Mohan Print Media (P) Ltd, Meerut.

Books for Reference:

1. Kendall, M. and Stuart, A., (2010). *The advanced theory of Statistics*, Vol. II, Charles Griffin.
2. Rohatgi, V.K., (1985). *An Introduction to Probability Theory and Mathematical Statistics*, Wiley Eastern.
3. Alexander M. Mood, Franklin A. Graybill, Duane C. Boes, (1974). *An Introduction to the Theory of Statistics*, (3rd Ed.) McGraw Hill.

Websites and eLearning Sources

1. Coursera – https://www.coursera.org
2. MIT Open Course Ware (OCW) – https://ocw.mit.edu
3. StatLect (Statistical Lectures) – https://www.statlect.com
4. StatQuest with Josh Starmer – https://www.youtube.com/c/joshstarmer
5. Khan Academy (Statistics & Probability) – https://www.youtube.com/c/khanacademy

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Acquire the knowledge of unbiasedness, consistency, efficiency, and sufficiency of estimators	**K1**
CO2	Describe and compare different estimation methods, including MLE and the Method of Moments	**K2**
CO3	Solve numerical problems using MLE, Method of Moments, and MVUE.	**K3**
CO4	Evaluate and compare estimators using Cramer-Rao inequality and sufficiency principles.	**K4**
CO5	Assess and choose the most appropriate estimation technique for different statistical problems.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**25UST43CC08**			**Core Course - 8:** Estimation Theory					**5**		**4**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	2	2	2	1	3	2	2	3	2	2.2
CO-2	3	3	2	2	1	3	3	2	3	2	2.4
CO-3	3	3	3	2	2	3	3	3	3	3	2.7
CO-4	3	3	2	3	2	3	3	3	3	3	2.8
CO-5	3	3	3	3	2	3	3	3	3	3	2.8
Mean Overall Score											**2.58 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
4	25UST43CC09	**Core Course – 9:** Testing of Hypothesis (Internship Embedded Course)	6	4

Course Objectives
To draw the inference about unknown population parameters based on random samples.
To impart the knowledge on statistical hypothesis.
To understand Neyman-Pearson fundamental lemma for testing statistical hypothesis.
To Understand the test procedures MPT, UMPT and LRT.
To know the various parametric and non-parametric, test procedures.

Unit-I **(18 Hours)**

Basics for Testing of Hypothesis: 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. Testing Hypothesis in IKS Context.

Unit-II **(18 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 **(18 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 **(18 Hours)**

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

Unit-V **(18 Hours)**

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

Teaching Methodology	Chalk and Talk, PPT, You Tube video and Handouts.
Assessment Methods	Seminar, Problem solving Assignment, Online test.

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. and 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, England.
4. Dudewicz. E.J and Mishra. S. N. (1988). *Modern Mathematical Statistics*, John Wiley and Sons.

Website and eLearning Resources:

1. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=34Paper: 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 –Levels)**
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	**K4**
CO5	Provide the significance evidence with the likelihood of the hypothetical events	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**25UST43CC09**			**Core Course – 9:** Testing of Hypothesis (Internship Embedded Course)						**6**	**4**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	1	3	3	1	2	3	2	3	2	1	2.1
CO-2	3	3	2	2	3	3	3	2	3	2	2.6
CO-3	2	3	2	3	2	3	3	2	3	2	2.5
CO-4	3	2	1	3	3	1	3	1	3	3	2.3
CO-5	3	1	3	3	3	1	2	1	2	3	2.2
Mean Overall Score											**2.34 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
4	25UST43AO02A	**Allied Optional – 2:** Mathematics for Statistics - 2	6	4

Course Objectives
To Develop Integration Techniques
To Understand and Apply Multiple Integrals
To Solve Ordinary Differential Equations
To Master Partial Differential Equations
To Study Convergence and Divergence of Series

UNIT-I **(18 Hours)**

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

UNIT-II **(18 Hours)**

Multiple integrals: Double integral, Double integral in polar coordinates -Triple integrals, Simple applications related to area, Volume.

UNIT-III **(18 Hours)**

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

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UNIT-IV **(18 Hours)**

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

UNIT-V **(18 Hours)**

Sequence and series: 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, PPT, You Tube video and Handouts.
Assessment Methods	Seminar, Problem solving Assignment, Online test.

Books for Study:

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

Books for Reference:

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

Website and eLearning Resources:

1. https://nios.ac.in/media/documents/SrSec311NEW/311_Maths_Eng/311_Maths_Eng_Lesson31.pdf
2. https://users.math.msu.edu/users/gnagy/teaching/ode.pdf
3. https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/UNIT-IV.pdf

Course Outcomes		
CO No.	**CO–Statements**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO1	Ability to solve definite integrals and apply the properties of definite integrals to solve simple problems.	**K1**
CO2	Acquire the skills to evaluate double and triple integrals, including those in polar coordinates.	**K2**
CO3	Apply these methods in various engineering, physics, and applied mathematics and solve real-world problems.	**K3**
CO4	Solve common types of PDEs, including Lagrange's equations, and their applications in various fields.	**K4**
CO5	Analyze Sequence and Series for Convergence	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**25UST43AO02A**			**Allied Optional – 2:** Mathematics for Statistics - 2						**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	2	2	3	3	2	2	2	3	2.3
CO2	2	2	3	3	2	1	2	3	3	2	2.3
CO3	3	3	1	1	2	3	2	2	3	3	2.3
CO4	2	3	2	1	2	3	2	2	1	2	2
CO5	2	2	3	2	3	3	3	1	2	3	2.4
										Mean Overall Score	**2.6(High)**

Semester	Course Code	Title of the Course	Hours/ Week	Credits
4	25UST43AO02B	**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
Assessment Method	Snap Test, Quiz, Open Book test

Theory 20% and Problems 80%

Books for Study:

1. Reddy TS and Murthy A, Cost Accounting (2012), Margham Publications, Chennai (Unit-I).
2. Reddy TS and Murthy A, Management Accounting (2012), Margham Publications, Chennai. (Unit-II, III, IV & V)

Books for Reference:

1. S. N. Maheswari, (2017), Cost Accounting, S. Chand& Co, New Delhi.
2. Jain SP &Narang KL, (2014), Cost Accounting Principles and Practice, Kalyani Publishers, New Delhi (2018)

Websites and eLearning Sources:

1. https://icmai.in/studentswebsite/Foundation-Papers.php
2. https://icmai.in/studentswebsite/E-LKR.php
3. https://elearn.nptel.ac.in/shop/nptel/cost-accounting/

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/Week**	**Credits**
4	**25UST43AO02B**			**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**
Overall Mean Score											**2.2**
											High

Semester	Course Code	Title of the Course	Hours / Week	Credits
4	25UHE44VE04A	**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: Counseling for Adolescents (6 Hours)

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

Teaching Methodology	Power point, Assignment and Group discussion
Assessment Methods	Online Test, Group Discussions, Seminar, Assignment

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
2. Adolescence, page no: 211-224 (2011).
3. Larry, R. C. (2000). *Disaster Management and Preparedness,* Lewis Publications.
4. Hurlock, E.B. (2001). *Developmental Psychology: A: Life-Span Approach*. (5th Ed.). Tata McGraw-Hill.
5. Sangha., & Kamaljit. (2015). *Ways to Live in Harmony with Nature: Living Sustainably and*
6. *Working with Passion.* Australia, Woods lane 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	**25UHE44VE04A**			**Value Education - 4:** Social Ethics - 2						**2**	**1**
Course Outcome	**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	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	25UHE44VE04B	**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	Power point, assignment, and Group discussion
Assessment Methods	Seminars, Group Discussion, Online Tests, Assignments

Books for Study:

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

Books for Reference:

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

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
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	**25UHE44VE04B**			**Value Education - 4:** Religious Doctrine - 2						**2**	**1**
Course Outcome	**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	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	25UST44SE02	**Skill Enhancement Course - 2:** Statistics for Competitive Examinations	2	1

Course Objectives
To train students to efficiently interpret and analyze various forms of data visuals
To Provide practice on common types of statistical problems such as probability questions, data interpretation and descriptive statistics.

Unit-I **(6 Hours)**

Data Interpretation by Tabulation & Graph reading

Unit-II **(6 Hours)**

Averages – Combined Averages – Ratios, Proportions and Percentages

Unit-III **(6 Hours)**

Permutation and Combinations– Probability

Unit-IV **(6 Hours)**

Sampling Methods

Unit-V **(6 Hours)**

Testing Parametric Hypothesis

Teaching Methods	PPT, Problem solving and Hand outs
Assessment Methods	Snap Test, MCQ

Books for Study:

1. Aggarwal, R. S. (2017). *Quantitative aptitude*. S. Chand & Co.
2. Agarwal, B. L. (2005). *Programmed statistics*, New Age International Publishers.

Website and e -Learning Resources:

1. *https://www.bing.com/ck/a?!&&p=3b3664a5da2bb3722db6dda54e60c65d3a9ae64fa27463313e39c13cf006e8beJmltdHM9MTc0MTEzMjgwMA&ptn=3&ver=2&hsh=4&fclid=3020f160-03b6-6c1f-18ed-*

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Apply the quantitative methods to solve the real-life problems	**K3**
CO2	Utilize the mathematical, statistical, and quantitative information.	**K4**
CO3	Develop a scientific aptitude and sense of reasoning	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**25UST44SE02**			**Skill Enhancement Course - 2:** Statistics for Competitive Examinations					**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	3	3	2	**2.6**
CO2	3	3	3	2	2	3	3	3	3	2	**2.6**
CO3	3	2	3	3	2	3	3	3	3	3	**2.6**
										Mean Overall Score	**2.6 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
4	25UST44SL03	**Self - Learning:** Introduction to Data Mining	-	2

Course Objectives
To understand the role of separate database for decision making
To learn the core ideas of data mining techniques in different case studies.
To 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
Assessment Methods	Online test

Books for Study:

1. Pang-Ning Tan, Michael Steinbach, &Vipin Kumar. (2005). *Introduction to Data Mining*. (Introduction to Data Mining (umn.edu), 2005

Books for Reference:

1. Han, J., & Kamber, M. (2000) *Data Mining – Concepts and Techniques*.

Websites and eLearning Sources:

1. Data Mining Tutorial: What is | Process | Techniques & Examples (guru99.com)ch4.pdf (umn.edu)
2. ch4.pdf (umn.edu)
3. ch6.pdf (umn.edu)
4. ch8.pdf (umn.edu)
5. 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 –Levels)**
CO-1	Understand the necessity of data mining	**K1**
CO-2	Rephrase basic concepts, methods, and applications of cluster analysis	**K2**
CO-3	Select various types of visualization techniques	**K3**
CO-4	Classify the different patterns in association	**K4**
CO-5	Decide the given data set for analysis	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**25UST44SL03**			**Self - Learning:** Introduction to Data Mining						**-**	**2**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	3	3	1	1	3	3	3	3	1	2.4
CO-2	2	2	2	3	1	2	3	2	3	3	2.3
CO-3	3	2	3	2	1	3	2	2	3	2	2.3
CO-4	1	2	2	3	1	3	3	2	3	3	2.3
CO-5	3	2	3	2	3	1	2	3	2	1	2.2
Mean Overall Score											**2.3 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
5	25UST53CC10	**Core Course - 10:** Sampling Theory	5	4

Course Objectives
To Understand the Fundamentals of Sampling and Survey Design
To Explore Probabilistic Sampling Methods
To Master Stratified Random Sampling
To Learn Systematic Sampling Techniques
To Study Non-Probabilistic Sampling Methods

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 Error in a survey. Sampling and Non-sampling errors.

Unit-II **(15 Hours)**

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

Unit-III **(15 Hours)**

Stratified Random Sampling: Properties - Estimates of population mean and their variances - Proportional and Optimum Allocation – Neyman's Allocation – Comparison of Stratified and Simple Random Sampling.

Unit-IV **(15 Hours)**

Systematic Sampling: Procedure - Estimates of population mean and their variances – 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, PPT, You Tube video and Handouts.
Assessment Methods	Seminar, Problem solving Assignment, Online test.

Books for Study:

1. Gupta, S.C. and Kapoor, V.K. (2019) *Fundamentals of Applied Statistics*, Sultan Chand
2. William G. Cochran.: *Sampling Techniques*, John Wiley Sons.
3. Priest H. Susanna (1995) *An Introduction to Sampling Techniques*, Sage Publications, New Delhi.

Books for Reference:

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

Websites and eLearning Sources:

1. Non – Probability sampling - http://dissertation.laerd.com/non-probability-sampling.php
2. https://obssr.od.nih.gov/sites/obssr/files/Sample-Surveys.pdf
3. www.investopedia.com/terms/s/simple-random-sample.asp
4. https://egyankosh.ac.in/bitstream/123456789/97930/3/Unit-9.pdf

Course Outcomes		
CO No.	**CO–Statements**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO1	Understand and Apply Basic Concepts of Sample Surveys	**K1**
CO2	Develop proficiency in probabilistic sampling methods.	**K2**
CO3	apply the different allocation methods.	**K3**
CO4	Apply Systematic Sampling and Its Techniques.	**K4**
CO5	ability to apply various non-probabilistic sampling techniques.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**25UST53CC10**			**Core Course – 10:** 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	Credits
5	25UST53CC11	**Core Course – 11:** Design of Experiments	5	3

Course Objectives
To impart the knowledge in Design of Experiments and analysis of variance.
To understand the factor level that optimizes the outcome of an experiment.
To develop analytical thinking in problem solving skills.
To learn the factorial design of experiments.
To 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. Randomization, Replication and Local control in IKS

Unit-II **(15 Hours)**

Analysis of Variance: Assumptions - One way classification- Lay out- Analysis –Two way classification - Lay out- Analysis. Analysis of Covariance (Concept only).

Unit-III **(15 Hours)**

Basic Designs: Completely randomized Design (CRD) - Randomized block designs (RBD) - Latin square designs (LSD) - Missing plot techniques RBD one missing observation - Efficiency of CRD, RBD and LSD.

Unit-IV **(15 Hours)**

Factorial Experiments: Introduction - 2^2, 2^3 designs and analysis, 3^2factorial designs (Concept only) - Confounding in 2^2experiments.

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	Black Board teaching, PPT and Handouts
Assessment Methods	Online test, Problem solving test

Books for Study:

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

Books for Reference:

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

Website and eLearning Resources

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 –Levels)**
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	**25UST53CC11**			**Core Course - 11:** Design of Experiments						**5**	**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	2	3	1	2	3	2	3	2	2	2.3
CO-2	2	3	2	2	3	2	2	2	2	3	2.3
CO-3	3	2	1	3	2	3	3	2	3	2	2.4
CO-4	2	3	2	3	1	3	2	3	2	2	2.3
CO-5	3	2	2	2	3	2	3	2	3	2	2.4
Mean Overall Score											**2.34 (High)**

Semester	Course Code	Title of the Course	Hours/ Weeks	Credits
5	25UST53CC12	**Core Course - 12:** Data Exploration with R	4	2

Course Objectives
To acquire the fundamental concept of statistical measures through R
To familiarize students with various diagrammatic and graphical representation techniques for visualizing statistical data.
To develop skills to compute and analyse measures of central tendency, dispersion, correlation, and regression using R.
To explore probability distributions and their applications in statistical modeling and decision-making.
To enable students to perform with parametric and non-parametric methods using R.

UNIT I **(12 Hours)**

Data Handling: Data objects – Datatypes – Methods of Data entry – Importing data from Excel – Classification on the aspect of Raw, Discrete and Continuous data – Univariate, Bivariate and Multivariate frequency distributions – Basic concepts, Properties & Problems with R commands.

UNIT II **(12 Hours)**

Diagrammatic Representation: Graphical function: Standard, Low-level functions and Arguments to plot functions – Plotting the proper graphs for the given data viz. Bar charts and their types, Pie charts – Histogram– Frequency Polygon – Stem leaf plot – Basic concepts, Properties & Problems with R commands.

UNIT III **(12 Hours)**

Univariate and Bivariate Analysis: Compare the R-commands between Mean, Median and Mode – Measures of Dispersion: Range, Quartile deviation, Mean deviation, standard deviation, and Coefficient of variation – Correlation: Scatter diagram, Karl Pearson's and Spearman's correlation coefficients – Regression.

UNIT IV **(12 Hours)**

Probability distributions: Recall the probability concepts – simple problems with R commands -. Hypergeometric distribution, Binomial distribution and, Poisson distribution, Normal and Exponential distribution problems with R commands.

UNIT V **(12 Hours)**

Statistical Inference: Hypothesis testing and computation of p-values and Confidence intervals – Parametric tests: One sample t-test, Independent t-test, and Paired t-test – Plots to check Normality – Shapiro test - Non-parametric tests: Kruskal Wallis and Mann Whitney U test - Basic concepts, Properties & Problems with R commands.

Teaching Methodology	Chalk and talk, PPT, Hands-on Coding Sessions, Project-Based Learning
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. Sudha G. Purohit, Sharad D. Gore, Shailaja R. Deshmukh (2019), *Statistics Using R*, (2nd Ed.) Narosa, Publishing House Pvt. Ltd.

Books for Reference:

1. John Main Donald and John Braun. (2010), *Data Analysis and Graphics Using R*. Cambridge University Press, Cambridge.
2. Brian Everitt and Torsten Hothorn. A (2009), *Handbook of Statistical Analyses Using R*. Chapman & Hall/CRC, Boca Raton, FL.
3. Moore, D.S. and McCabe, G.P. and Craig, B.A. (2014), *Introduction to the Practice of Statistics*, W.H. Freeman

Websites and eLearning Sources:

1. R Programming for Beginners (Bro Code) – https://www.youtube.com/c/BroCodez
2. Data Professor – https://www.youtube.com/c/DataProfessor

3. edX – https://www.edx.org
4. StatLect (Statistical Lectures) – https://www.statlect.com
5. DataCamp – https://www.datacamp.com

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recall fundamental data handling concepts, including data types, data objects, and methods of data entry in R	**K1**
CO2	Understand the graphical representation techniques and summaries visual data by using R functions.	**K2**
CO3	Compute suitable statistical measures for data analysis	**K3**
CO4	Examine different probability distributions and assess their applications in statistical problem-solving using R.	**K4**
CO5	Perform statistical inference, hypothesis testing, and model evaluation using parametric and non-parametric methods in R	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
5	**25UST53CC12**			**Core Course - 12:** Data Exploration with R					**4**		**2**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	2	2	2	1	3	2	2	3	2	**2.2**
CO-2	3	3	2	2	1	3	3	2	3	2	**2.4**
CO-3	3	3	3	2	2	3	3	3	3	3	**2.7**
CO-4	3	3	2	3	2	3	3	3	3	3	**2.8**
CO-5	3	3	3	3	2	3	3	3	3	3	**2.8**
										Mean Overall Score	**2.58 (High)**

Semester	Course Code	Title of the Course	Hours/ Weeks	Credits
5	25UST53CP01	**Core Practical - 1:** R- Software Lab	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 Exercises:

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 test for goodness of Fit
28. Wilcoxon Signed rank test
29. Kruskal Wallis test
30. Mann–Whitney U test

Teaching Methodology	Demonstration, Technology-based learning, Hands-on training and Project-based learning
Assessment Methods	Execution of practical exercises, and Time-bound problem-solving based on real-world data management

Websites and eLearning Sources:

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	Analyse 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**
5	**25UST53CP01**			**Core Practical - 1:** R - Software Lab						**4**	**2**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	3	2	2	1	3	3	2	3	2	**2.3**
CO-2	3	3	2	2	1	3	3	3	3	2	**2.5**
CO-3	3	3	3	3	2	3	3	3	3	3	**2.8**
CO-4	3	3	3	3	2	3	3	3	3	3	**2.8**
CO-5	3	3	3	3	2	3	3	3	3	3	**2.8**
										Mean Overall Score	**2.64 (High)**

Semester	Course Code	Title of the Course	Hours/ Weeks	Credits
5	25UST53ES01A	**Discipline Specific Elective – 1:** Actuarial Statistics	4	3

Course Objectives
Recognize the basic terms of redemptions of loan
Show interest rates / payments in different time periods
Calculate the different vital statistics measures
Use the mortality table to find the survival and death rates
Examine the various types of assurances, premiums and policy plans

UNIT I **(12 Hours)**

Interest and Annuities: Elements of simple & compound interest – Nominal rate and effective rate of interest – Force of interest – Accumulated value and present value with different rates of interest – Annuity – Classifications of annuities – Present accumulated values of annuities – Immediate annuity due and deferred annuity – Simple problems

UNIT II **(12 Hours)**

Amortization and Discounting: Amortization Table and Sinking Funds – Discounting: Basic terms, Bill of exchange, True and Banker's Discounts – Bankers Gain – Simple problems.

UNIT III **(12 Hours)**

Demography: Definition and uses– Measures of mortality – C.D.R., S.D.R., A.S.D.R. – measures of fertility – C.B.R., G.F.R., A.S.F.R., T.F.R., G.R.R. and N.R.R – Simple problems on Mortality and Fertility

UNIT IV **(12 Hours)**

Mortality Tables: Stationary and Stable population– Simple theorems on vital quantities – Central Mortality rate – Force of mortality – Assumption, Description and construction of mortality table – Uses of Mortality table – Completing an incomplete mortality table – Simple problems.

UNIT V **(12 Hours)**

Insurance and Premium: Introduction to Insurance – Types of insurance, basic principles, and the role of actuaries. Premium types and calculations – Natural, Level, Net, and Office premiums with formulas for temporary assurance, pure endowment, endowment, and whole life assurance. (Concept Only)

Teaching Methodology	Lecture-based learning, Technology-based learning and Flipped classroom
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. P.A. Navanitham, (2012). *Business Mathematics and Statistics*, Jai publishers.
2. Gupta, S.C. and Kapoor, V.K., (2019). *Fundamentals of Applied Statistics*, (4th Revised Ed.) Sultan Chand &Co.

Books for Reference:

1. Perna, C., & Sibillo, M. (2012). *Mathematical and statistical methods for actuarial sciences and finance*, Springer.
2. Klugman, S. A., Beckley, J. A., Scahill, P. L., Varitek, M. C., & White, T. A., (2012). *Understanding actuarial practice*, Society of Actuaries.
3. Frees, E. W., (2009). *Regression modeling with actuarial and financial applications*, Cambridge University Press.

Websites and eLearning Sources:

https://business.ucdenver.edu/sites/default/files/attached-files/rejda_12th_edition_textbook_principles_of_risk_management_and_insurance.pdf

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recognize basic terms of mathematical and statistical methods relevant to actuarial work	**K1**
CO2	Estimate interest rates using various premium models	**K2**
CO3	Calculate probability and likely cost of the occurrence of vital event	**K3**
CO4	Analyse, and solve the financial impact of uncertain future events	**K4**
CO5	Assesses financial risks in the insurance and finance fields	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
5	**25UST53ES01A**			**Discipline Specific Elective – 1:** Actuarial Statistics					**4**		**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	3	2	2	1	3	3	2	3	2	**2.3**
CO-2	3	3	3	2	2	3	3	3	3	2	**2.6**
CO-3	3	3	3	2	3	3	3	3	3	3	**2.8**
CO-4	3	3	3	3	3	3	3	3	3	3	**3.0**
CO-5	3	3	3	3	3	3	3	3	3	3	**3.0**
										Mean Overall Score	**2.74 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
5	25UST53ES01B	**Discipline Specific Elective – 1:** Stochastic Processes	4	3

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

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

UNIT III **(12 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 **(12 Hours)**

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

UNIT V **(12 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, PPT, You Tube video and Handouts.
Assessment Methods	Seminar, Problem solving Assignment, Online test.

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

1. https://egyankosh.ac.in/bitstream/123456789/20806/1/Unit-15.pdf
2. https://brilliant.org/wiki/markov-chains/
3. https://builtin.com/data-science/poisson-process

Course Outcomes		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
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**
5	**25UST53ES01B**			**Discipline Specific Elective – 1:** Stochastic Processes						**4**	**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	3	1	2	3	2	3	2	1	2.3
CO-2	1	3	2	2	2	2	3	2	3	3	2.3
CO-3	2	1	1	3	2	3	2	3	3	2	2.4
CO-4	1	2	2	3	1	3	2	3	2	1	2.3
CO-5	3	3	2	2	3	2	3	2	3	2	2.4
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
5	25UST53ES02A	**Discipline Specific Elective - 2:** Operations Research – 1	4	3

Course Objectives
To understand formulate linear programming models for service and manufacturing systems
To apply operations research techniques & algorithms to solve the LPP.
To know the minimum cost of transporting item from source and destination
To create an interest to solve the assignment problems with its physical significance.
To decide an optimal replacement period/policy for a given item/equipment/machine.

Unit -I **(12 Hours)**

Operations Research (OR): Nature and features of OR – Modeling in OR – Classification of models – General Solutions - Methods for OR models - Methodology of OR.

Linear programming problem–I: Definitions - Formulation of LPP - Graphical method.

Unit -II **(12 Hours)**

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

Unit -III **(12 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. Transportation problem in IKS.

Unit -IV **(12 Hours)**

Assignment problem: Assignment Problem – Solution by Koney method (Hungarian) -Travelling Salesmen Problem. Assignment problem in IKS.

Unit -V **(12 Hours)**

Replacement Problem: Deterministic and Probabilistic models -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.

Teaching Methodology	Chalk and Talk, YouTube video and Problem solving
Assessment Methods	Online test, Seminar and PPT

Books for Study

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

Books for Reference

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

Websites and e-learning sources:

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 –Levels)**
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	**25UST53ES02A**			**Discipline Specific Elective – 2:** Operations Research - 1						**4**	**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	1	3	2	2	1	2	3	2	3	2.2
CO-2	2	3	2	1	2	3	3	2	2	3	2.3
CO-3	3	2	2	3	2	3	3	2	1	2	2.3
CO-4	2	2	3	3	3	2	3	2	3	2	2.5
CO-5	3	3	2	2	3	1	3	2	3	1	2.3
Mean Overall Score											**2.32 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UST53ES02B	**Discipline Specific Elective – 2:** Linear Models, Econometrics and Random Processes	4	3

Course Objectives
To understand the General Linear Model and the Gauss-Markov theorem.
To learn about econometrics and its problems like autocorrelation and multicollinearity.
To study different types of random processes, including stationary and ergodic processes.
T**o** explore Markov processes like Binomial, Poisson, and Normal processes.
To understand autocorrelation, cross-correlation, and spectral densities.

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

Econometrics: Definition – Scope – Objective – Limitations – Divisions of Econometrics – Autocorrelation – Multicollinearity–Heteroscedasticity.

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

Auto Correlation: Spectral Densities - Cross correlation - Properties

Teaching Methodology	Chalk and Talk, PPT, YouTube video and Problem solving
Assessment Methods	Online test, MCQ and Seminar

Books for Study:

1. Graybill, F.A. (1961). *An Introduction to Linear Statistical Models – Vol. I*, McGraw Hill.
2. Singh, S.P., Parashar, K., and Singh, H.P. (1980). *Econometrics*, Sultan Chand & Co.
3. Ross, S. (2002). *A First Course in Probability*, (5th Ed.), Pearson Education, Delhi.
4. Peebles Jr., P.Z. (2002). *Probability, Random Variables, and Random Signal Principles*, Tata McGraw-Hill Publishers, Fourth Edition, New Delhi.

Books for Reference:

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

Website and eLearning Resources

1. Khan Academy –https://www.khanacademy.org
2. edX (Econometrics Courses) –https://www.edx.org
3. StatLect (Stochastic Processes) –https://www.statlect.com
4. Brilliant (Markov Processes) –https://www.brilliant.org
5. DataCamp (Time Series Analysis) –https://www.datacamp.com

Course Outcomes:		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
CO-1	Explain the General Linear Hypothesis Model and apply the Gauss-Markov theorem.	**K1**
CO-2	Identify econometric issues like autocorrelation, multicollinearity, and heteroscedasticity.	**K2**
CO-3	Classify random processes based on stationarity and ergodicity properties.	**K3**
CO-4	Analyze Markov processes, including binomial, Poisson, normal, and random telegraph processes.	**K4**
CO-5	Apply auto-correlation, cross-correlation, and spectral density analysis in time-dependent data.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**25UST53ES02B**			**Discipline Specific Elective – 2:** Linear Models, Econometrics and Random Processes						**4**	**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	2	3	2	2	1	3	2	3	2	2.3
CO-2	2	3	2	3	3	2	3	3	2	2	2.5
CO-3	3	3	2	1	2	2	3	3	3	2	2.4
CO-4	2	2	3	3	2	1	1	2	2	1	1.9
CO-5	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	Credits
5	**25UST53IS01**	Internship	**-**	**1**

Students are
Exposed to real work environment
Trained to use statistical concepts for solving real world problems
Able to prepare report
Able to explain practical utility in real life situations.

Semester	Course Code	Title of the Course	Hours / Week	Credits
5	25UST54OE01	**Open Elective - 1 (WS):** Quality Management and Official Statistics	4	2

Course Objectives
To understand the fundamental concepts of quality, quality improvement, and management strategies in modern business environments.
To analyze process quality using statistical tools such as stem-and-leaf plots, histograms, numerical summaries, and box plots
To explore the role and functions of official statistical organizations in India, particularly the Central Statistical Organisation (CSO).
To examine the structure, functions, and methodologies of the National Sample Survey Organisation (NSSO) in data collection.
To understand the methods of estimating national income and explore different approaches to population statistics and social accounting.

Unit - I **(12 Hours)**

Quality Improvement in the Modern Business Environment: The Meaning of Quality and Quality Improvement - Dimensions of Quality - Quality Engineering Terminology - Statistical Methods for Quality Control and Improvement - Management Aspects of Quality Improvement - Quality Philosophy and Management Strategies - Quality Assurance and ISO Standards - Six Sigma.

Unit – II **(12 Hours)**

Modeling Process Quality: Describing Variation: The Stem-and-Leaf Plot - The Histogram - Numerical Summary of Data - The Box Plot. (Simple problems)

Unit – III **(12 Hours)**

Official Statistics: Definition – Growth of Indian Statistics – Statistical organizations of India: Central Statistical Organisation (CSO) – Divisions of Central Statistical Organisation – Functions – Publications.

Unit – IV **(12 Hours)**

National Sample Survey Organisation (NSSO): Divisions of NSSO – Functions of NSSO – Procedure for collection of information – Agriculture Statistics, Yield Statistics – Official series: Traditional method, Random Sampling Method – NSS Series – Forest Statistics, Fisheries Statistics – Defects in agricultural Statistics.

Unit – V **(12 Hours)**

National income: Definition – Methods of estimating national income: The Income method, the Output method and the Expenditure method – Uses of National income estimates – Difficulties of estimation.

Social Accounting: Population statistics – Sources – Different methods of collecting population census – Methods of enumeration.

Teaching Methodology	Chalk and Talk, PPT, YouTube video and Problem solving
Assessment Methods	Online test, MCQ and Seminar

Books for Study:

1. Montgomery, D. C. (2019). *Introduction to statistical quality control* (8th Ed.). Wiley.
2. Pillai, R. S. N., & Bagavathi, V. (2019). *Statistics: Theory and practice* (8th Ed.). S. Chand & Company.

Books for Reference:

1. Grant, E. L., & Leavenworth, R. S. (2000). *Statistical quality control* (7th Ed.). McGraw-Hill.
2. Central Statistical Organization. (2011). *Statistical systems in India*. Department of Statistics, Ministry of Planning, Government of India.
3. Goon, A. M., Gupta, M. K., & Das Gupta, B. (1986). *Fundamentals of statistics* (Vol. II). The World Press Private Limited.

Websites and e-learning sources:

1. American Society for Quality (ASQ) (Quality Improvement & Six Sigma) – https://asq.org/quality-resources
2. International Organization for Standardization (ISO) (Quality Assurance & Standards) – https://www.iso.org
3. NIST/SEMATECH e-Handbook (Statistical Methods & Data Visualization) – https://www.itl.nist.gov/div898/handbook/
4. Ministry of Statistics and Programme Implementation (MoSPI) (Indian Statistical System) – http://mospi.nic.in/
5. National Sample Survey Office (NSSO) (Survey Methods & Data Collection) – http://mospi.nic.in/
6. StatLect (Sampling Methods & Official Series) – https://www.statlect.com
7. United Nations Statistics Division (UNSD) (National Income & Social Accounting) – https://unstats.un.org/unsd/nationalaccount/
8. edX (National Income Estimation & Economic Statistics Courses) – https://www.edx.org

Course Outcomes		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
CO-1	Demonstrate an understanding of quality improvement concepts, management strategies, and their applications in business environments.	**K1**
CO-2	Apply statistical tools such as stem-and-leaf plots, histograms, numerical summaries, and box plots to analyze process quality.	**K2**
CO-3	Explain the role, functions, and contributions of official statistical organizations in India, particularly the Central Statistical Organisation (CSO).	**K3**
CO-4	Analyze the structure, functions, and data collection methodologies of the National Sample Survey Organisation (NSSO).	**K4**
CO-5	Evaluate different methods of estimating national income and interpret population statistics and social accounting data.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
5	**25UST54OE01**			**Open Elective - 1 (WS):** Quality Management and Official Statistics					**4**		**2**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	2	3	2	2	3	2	2	2	3	2.4
CO-2	2	3	2	3	2	3	3	3	2	2	2.5
CO-3	3	3	2	3	3	2	2	2	3	3	2.6
CO-4	3	2	2	3	3	2	2	1	3	3	2.3
CO-5	2	2	1	3	3	2	1	1	3	3	2.1
										Mean Overall Score	**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UST54SL04	**Certificate Course:** Data Analysis and Visualization in JAMOVI	0	2

Course Objectives
To understand the features, interface, and installation process of JAMOVI for statistical analysis.
To compute and interpret measures of central tendency and dispersion
To develop skills in creating and customizing various graphs and charts for exploratory data analysis
To explore probability distributions (normal, binomial, Poisson) and assess normality using statistical tests and visual tools.
To perform and interpret t-tests, chi-square tests, and correlation analyses to draw meaningful conclusions from data

UNIT I

Introduction to JAMOVI and Data Handling: Overview of JAMOVI: Features, Interface, and Installation - Importing Data: CSV, Excel, and Other Formats - Data Types and Variable Management - Data Cleaning: Handling Missing Values, Recoding Variables

UNIT II

Data Visualization: Introduction to Graphs and Charts in JAMOVI - Creating Histograms, Boxplots, and Bar Charts - Scatter Plots and Line Graphs - Customizing and Exporting Graphs

UNIT III

Measures of Central Tendency and Dispersion: Calculation of Mean, Median, and Mode using JAMOVI - Range, Interquartile Range (IQR), Variance, and Standard Deviation - Coefficient of Variation (CV) - Interpretation and Applications in Real-world Data.

UNIT IV

Probability Distributions and Normality Testing: Introduction to Probability Distributions: Normal, Binomial, and Poisson - Generating and Analyzing Probability Distributions in JAMOVI - Normality Tests: Shapiro-Wilk, Kolmogorov-Smirnov - Q-Q Plots and Histograms for Checking Normality.

UNIT V

Hypothesis Testing and Correlation Analysis: Introduction to Hypothesis Testing - t-Tests: One-Sample, Independent, and Paired t-Tests - Chi-Square Test for Categorical Data - Correlation Analysis: Pearson and Spearman Correlation.

Teaching Methodology	PPT, YouTube video and Problem solving
Assessment Methods	Online test and MCQ

Books for Study:

1. Navarro, D. J., &Foxcroft, D. R. (2025). *Learning statistics with jamovi: A tutorial for beginners in statistical analysis* (1st Ed.). Open Book Publishers.LEARNSTATSWITHJAMOVI.COM

Books for Reference:

1. Diez, D. M., Çetinkaya - Rundel, M., & Barr, C. D. (2019). *Open Intro statistics* (4th Ed.). OpenIntro, Inc. OPEN.UMN.EDU
2. Illowsky, B., & Dean, S. (2023). *Introductory statistics 2e* (2nd Ed.). OpenStax.OPENSTAX.ORG
3. Lane, D. M. (2013). *Introduction to statistics* (Online Ed.). Rice University.ONLINESTATBOOK.COM

Websites and e-learning sources:

1. JAMOVI Official Website –https://www.jamovi.org
2. YouTube (JAMOVI Data Visualization Tutorials) – https://www.youtube.com/results?search_query=jamovi+data+visualization
3. OpenStax (Introductory Statistics) – https://openstax.org/details/books/introductory-statistics

4. Online Statistics Education (Rice University) –https://onlinestatbook.com
5. Coursera (Hypothesis Testing and Statistical Analysis) – https://www.coursera.org/courses?query=hypothesis%20testing

Course outcomes		
CO No.	**CO–Statements**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO-1	Demonstrate proficiency in using JAMOVI's interface, tools, and functions for statistical analysis.	**K1**
CO-2	Calculate measures of central tendency and dispersion and interpret their significance.	**K2**
CO-3	Generate and interpret graphs such as histograms, box plots, scatter plots, and bar charts to summarize data	**K3**
CO-4	Work with normal, binomial, and poisson distributions and apply normality tests to assess data distribution.	**K4**
CO-5	Perform and interpret t-tests and chi-square tests for categorical data analysis and Compute Pearson and Spearman correlation coefficients and interpret the strength and direction of relationships between variables.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
5	**25UST54SL04**			**Certificate Course:** Data Analysis and Visualization in JAMOVI					**0**		**2**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	2	2	1	3	3	2	1	2	**2.1**
CO-2	2	3	3	2	2	3	3	3	2	2	**2.5**
CO-3	3	2	2	3	2	2	2	2	3	3	**2.4**
CO-4	3	2	2	3	3	2	2	1	3	3	**2.3**
CO-5	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	Credits
6	25UST63CC13	**Core Course – 13:** Statistical Quality Control	6	4

Course Objectives
To understand the application of statistics in industrial environment
To acquire knowledge how on manufacturing process changes and process variability
To attain proficiency in process capability analysis
To instruct theory and practice of product control methodology
To provide 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. Basics of SQC in IKS

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. Producer's risk and Consumer's risk in IKS

Unit V **(18 Hours)**

Reliability: Concept, Basic elements, measures, maintenance and reliability, MTBF, MTTR, MTTF, components and systems, reliability of systems – serial, parallel and mixed systems - Life test -Acceptance Sampling plan Based on Life tests.

Teaching Methodology	Chalk and Talk, YouTube videos, PPT and Handouts.
Assessment Methods	Seminar, Online test

Books for Study:

1. Gupta S.P. &Kapoor V. K. (2019). *Fundamentals of Applied Statistics*. (4th Revised Ed). Sultan Chand &Co.
2. Montgometry, D.C. (2019). *Introduction to Statistical Quality Control*. (8th Ed). John Wiley and Sons.
3. Mahajan. (2016). *Statistical Quality Control*, Dhanpatrai & Sons.

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.

Website and eLearning Resources:

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 –Levels)**
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	**K2**
CO4	Effectively interpret the results from the control charts	**K3**
CO5	Find failure rate, identify failure rate distributions, compute reliability of components and system	**K4**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**25UST63CC13**			**Core Course – 13:** Statistical Quality Control						**6**	**4**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	2	3	1	2	3	3	3	3	2	2.4
CO-2	2	3	2	2	3	2	2	2	2	3	2.3
CO-3	3	3	2	2	3	2	1	2	2	3	2.3
CO-4	3	2	3	3	2	1	3	1	3	2	2.3
CO-5	2	2	2	3	2	3	2	3	2	2	2.3
										Mean Overall Score	**2.32 (High)**

Semester	Course Code	Title of the Course	Hours / Week	Credits
6	25UST63CP02	**Core Practical - 2:** Computational Statistics	6	4

Course Objectives
To develop a strong understanding of descriptive statistics and its key components
To understand the concept and applications of time series analysis.
To perform hypothesis testing and parametric tests.
To learn and apply non-parametric tests in real-world situations.

Unit-I **(18 Hours)**

Descriptive Statistics - I: Measures of Central Tendency - Correlation and Regression.

Unit-II **(18 Hours)**

Descriptive Statistics- II: Measures of Dispersion - Skewness, Moments and Kurtosis.

Unit-III **(18 Hours)**

Time Series and Index Numbers: Trend Analysis, Moving Averages, Method of Least squares – Tests of Index numbers.

Unit-IV **(18 Hours)**

Parametric Tests: t-tests, F-test (One way ANOVA and two way ANOVA) and Chi-square test – Goodness of fit and Independence of Attributes

Unit-V **(18 Hours)**

Non-Parametric Tests: Test for Randomness, Wald-Wolfowitz Run test, Median test, Sign test, and Mann-Whitney U test.

Teaching Methods	Demonstration, Problem solving and Hands on training
Assessment Methods	Snap Test.

Books for Study:

1. Gupta S.C. and Kapoor, V.K. (2020). *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons Pvt. Ltd., New Delhi
2. Gupta, S. P., &Kapoor, V. K. (2019). *Fundamentals of applied statistics*. Sultan Chand & Sons.
3. PA. Navanitham, (2012), *Business Mathematics and Statistics*, Jai publishers.

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Understand and apply the concepts of central tendency and measures of dispersion	**K1**
CO2	Apply statistical methods to solve practical problems,	**K2**
CO3	Analyze time series data	**K3**
CO4	Conduct and interpret parametric tests	**K4**
CO5	Develop skills in performing and interpreting non-parametric tests	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**25UST63CP02**			**Core Practical - 2:** Computational Statistics						**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	3	3	2	2	2	3	3	3	2	2	**2.4**
CO2	3	3	3	3	2	3	3	3	3	3	**2.6**
CO3	3	3	3	2	2	3	3	3	3	2	**2.6**
CO4	3	3	3	3	2	3	3	3	3	3	**2.6**
CO5	3	3	3	3	2	3	3	3	3	3	**2.6**
Mean Overall Score											**2.76 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
6	25UST63CP03	**Core Practical – 3:** Data Analysis Using Python	6	3

Course Objectives
To develop a regular work flow to execute reproducible research and analysis using Python
To learn Python language for specific application.
To import data from a variety of eternal sources.
To learn the Python functions using control and data structures
To know the basic concepts of Python.

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 test for goodness of Fit
28. Wilcoxon Signed rank test
29. Kruskal Wallis test
30. Mann–Whitney U test

Teaching Methodology	Demonstration, Technology-based learning, Hands-on training and Project-based learning
Assessment Methods	Execution of the Exercise

Websites and e-learning sources:

1. https://www.geeksforgeeks.org/python-programming-language-tutorial/?ref=shm
2. https://www.geeksforgeeks.org/statistics-with-python/
3. https://youtu.be/r-uOLxNrNk8?t=15593
4. https://youtu.be/3mELSEnGBvA
5. https://youtu.be/729Ye4-ps4s

Course Outcomes		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
CO-1	Acquire the knowledge learn how to do statistical analyses in Python	**K1**
CO-2	Understand the basic concepts in Python and is applications.	**K2**
CO-3	Apply various concepts to write programs in Python	**K3**
CO-4	Analyze data and generate reports based on the data	**K4**
CO-5	Measure essentials data structure in Python	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**25UST63CP03**			**Core Practical - 3:** Data Analysis Using Python						**6**	**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	3	2	3	3	3	3	2	2	2.6
CO-2	2	3	3	2	3	3	3	3	2	2	2.6
CO-3	3	2	2	3	3	2	3	2	3	3	2.6
CO-4	3	2	1	3	3	1	2	2	3	3	2.3
CO-5	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	25UST63ES03A	**Discipline Specific Elective - 3:** Population Studies	4	3

Course Objectives
To learn the methods of collecting and measuring vital statistics data, including the various sources such as registration systems, surveys, and censuses.
To Recall the population with standardized death rates
To solve theoretical problems and case studies to practice mortality rate calculations.
To learn how to construct life tables and solve related problems to understand the mortality and survival rates in populations.
To learn the calculation and significance of different fertility measures.

Unit-I **(12 Hours)**

Vital Statistics: Definition, Nature, Scope and Methods of vital statistics data - Measurement of Population – Development of Population Studies in India.

Unit-II **(12 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 **(12 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 **(12 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 **(12 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 Methods	Lecture – based learning, PPT and Hand outs
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. Gupta, S. P., &Kapoor, V. K. (2019). *Fundamentals of applied statistics*. Sultan Chand & Sons.

Books for Reference:

1. Peter R Cox, (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, New Delhi.

Websites and e-learning sources:

1. https://www.cdc.gov/csels/dsepd/ss1978/lesson3/section1.html

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
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 distributions	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
6	**25UST63ES03A**			**Discipline Specific Elective - 3:** Population Studies					**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	3	3	3	3	2	**2.6**
CO2	3	3	2	2	2	3	2	2	3	2	**2.4**
CO3	3	3	3	3	2	3	3	3	3	3	**2.6**
CO4	3	3	3	3	2	3	3	3	2	2	**2.6**
CO5	3	3	3	3	2	3	3	3	3	2	**2.6**
Mean Overall Score											**2.76 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UST63ES03B	**Discipline Specific Elective - 3:** Survival Analysis	4	3

Course Objectives
To Recognize the characteristics of survival data, e.g. censoring and truncation.
To Determine the proper method to be used in analyzing time-to-event data
To Understand the assumptions for the method chosen to analyze the data.
To Apply mathematical and graphical methods to check goodness of fit.
To Perform survival analysis using a computer statistical software package.

Unit-I (**12 Hours)**

Introduction to Survival Concepts: Survival functions and Hazard rates –Types of censoring-Type I& Type II censoring- Random censoring.

Unit –II (**12 Hours)**

Life time distribution: Weibull distribution, Raleigh distribution, lognormal distribution, Pareto distribution – Increasing failure rate (IFR) –Increasing failure rate average (IFRA) Maximum likelihood estimation.

Unit III (**12 Hours)**

One sample Non Parametric methods: Life tables –Acturial method – Types of life tables-Product –limit (Kaplan – Meier) Estimator –Redistribute to the Right Algorithms- Self –Consistency- Generalized Maximum likelihood estimator.

Unit –IV (**12 Hours)**

Two samples Non Paremteric 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 (**12 Hours)**

k sample Non Parametric methods: GeneralisedGehan 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, PPT, You Tube video and Handouts.
Assessment Methods	Seminar, Problem solving Assignment, Online test.

Books for Study:

1. Rupert G. Miller, JR, (2014). *Survival Analysis*, Willey CBS Publishers & Distributors PVT Ltd.

Books for Reference:

1. *Survival models and Data Analysis*, Elandt-Johnson-John Wiley and sons.

Website and eLearning Resources*:*

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**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO1	Select appropriate research designs to meet the needs of various survival modeling.	**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	**25UST63ES03B**			**Discipline Specific Elective - 3:** Survival Analysis						**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	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	Credits
6	25UST63ES04A	**Discipline Specific Elective - 4:** Operations Research – 2	4	3

Course Objectives
To Impart knowledge of various optimization techniques that makes use of statistical concepts abundantly.
To Make the student to equip him to use the resources such as capitals, materials, productions, controlling, directing, staffing, and machines more effectively.
To Make the students to understand and analyze managerial and engineering problems.
To Learn the operations research techniques and algorithms to solve the real life problems.
To Learn model competitive real-world phenomena using concepts from game theory.

UNIT-I: (12 Hours)

Sequencing problem: 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 (12 Hours)

Theory of games: Two person zero sum Games- Games without saddle points – Graphic 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 (12 Hours)

Network scheduling: Network and basic components – Logical sequencing -Rules for Network construction –Critical Path Analysis (CPM)-Program Evaluation Review Technique (PERT)

UNIT-IV (12 Hours)

Queueing theory: Queueing system –Elements of Queueing system –Operating characteristics of Queueing systems- Classification of Queueing models –Poisson Queueing systems – $\{(M/M/1):(\infty/FIFO)\}$ - problems

UNIT –V (12 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	Chalk and Talk, PPT, You Tube video and Handouts.
Assessment Methods	Seminar, Problem solving Assignment, Online test.

Books for Study:

1. KantiSwarup, Gupta, P.K. and Man Mohan (2014) "*Operations Research*", (13th Ed). Sultan Chand & Sons, New Delhi.

Books for Reference:

1. Philips, D.T., Ravindran, A and Solberg, J.J (2017) "*Operations Research Principle and Practice*",
2. Taha, H. A. (2014), "*Operations Research – An Introduction*", PHI, Publishers.

Website and eLearning Resources:

1. https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000025MS/P001336/M010140/ET/1527249666E-textofChapter4Module1.pdf
2. https://www.acsce.edu.in/acsce/wp-content/uploads/2020/03/MODULE-4-Queueing-Theory.pdf

Course Outcomes		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
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	**25UST63ES04A**		**Discipline Specific Elective - 4:** Operations Research – 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	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	25UST63ES04B	**Discipline Specific Elective - 4:** Big-Data Analytics	4	3

Course Outcomes
To make students understand the concept of machine learning
To know the terminologies used Big data environments
To impart the knowledge NoSQL databases
To make the students learn Mango DB
To develop Big Data Solutions using Hadoop Eco System

Unit-I **(12 Hours)**

Machine Learning: Introduction - Machine Learning Algorithms - Regression Model - Clustering - Collaborative Filtering - Association Rule Mining - Decision Tree.

Unit-II **(12 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 **(12 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 **(12 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 **(12 Hours)**

Hadoop – Hadoop ecosystem for processing big data – HDFS (Hadoop Distributed File System) - Processing data with Hadoop.

Teaching Methodology	PPT, YouTube video and Problem solving
Assessment Methods	Online test and MCQ

Books for Study:

1. Acharya, S., & Chellappan, S. (2018). *Big Data and Analytics*, Bhushan Print line.

Books for Reference:

1. Multiple Authors. (2011). *Big Data Analysis for Dummies.* Dummies Press.
2. Srivatsava, A. (2014). *Hadoop Blueprints.* PACKT.
3. Dipayan De. (2015). *Deep Learning with Hadoop.* PACKT.
4. Multiple Authors. (2012). *Hadoop Fundamentals.* Packet Publications.

Website and eLearning Resources:

1. DataCamp (Machine Learning Courses) –https://www.datacamp.com
2. Coursera (Big Data Specialization) –https://www.coursera.org
3. MongoDB University (NoSQL and MongoDB Courses) –https://university.mongodb.com
4. W3Schools (MongoDB Tutorial) – https://www.w3schools.com/mongodb
5. edX (Hadoop and Big Data Courses) –https://www.edx.org

Course Outcomes		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
CO1	Acquire the knowledge about few features of Mango DB	**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	Analyze the 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	**25UST63ES04B**			**Discipline Specific Elective - 4:** Big-Data Analytics					**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	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	Credits
6	25UST63EL01A / B / C	**Project Work /** Industrial Visit / Field Visit	-	1

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.

Semester	Course Code	Title of the Course	Hours	Credits
6	**25UST63CE01**	Comprehensive Examination	**-**	**2**

Students are trained to answer the MCQs related to the Core Courses mentioned below.
A question bank which consists of 150 MCQ's related to these 10 courses has been prepared and distributed to the students.

Assessment: CIA Test 1 for 25 marks (First five courses)
CIA Test 2 for 25 marks (Second five courses)
CIA Minimum 40 marks.
Semester Examination: 50 marks. (25% of the questions are from outside the question bank)

Core courses:

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

Semester	Course Code	Title of the Course	Hours/ Weeks	Credits
6	25UST64OE02	**Open Elective – 2:** Applied Statistics	4	2

Course Objectives
Recognize the basic terms of redemptions of loan
Show interest rates / payments in different time periods
Calculate the different vital statistics measures
Use the mortality table to find the survival and death rates
Examine the various types of assurances, premiums and policy plans

UNIT I **(12 Hours)**

Time Series: Concepts– Components– Additive and multiplicative models for the analysis of time series – Measurement of trend: Graphic method – Semi Average method – Method of Curve Fitting by principle of least squares – Method of Moving Averages.

UNIT II **(12 Hours)**

Measurement of Seasonal Variation: Method of simple average: Ratio–to – trend method - Ratio–to–Moving Average Method–Link Relatives method.

UNIT III **(12 Hours)**

Index Numbers: Definitions, uses – Construction of weighted index numbers – Laspeyre's, Paasche's and Fisher's index numbers.

UNIT IV **(12 Hours)**

Test for Index numbers: Criteria for a good index number – Time–reversal test, Factor – reversal test, Circular test. Fixed and Chain base index numbers – Cost of living index number –Base shifting, Splicing and Deflating of index numbers.

UNIT V **(12 Hours)**

Demand Analysis: Introduction – Definition of Demand and Supply – Laws of Supply - Equilibrium Price – Giffen's Paradox. Elasticity of Price and Demand – Elasticity of Supply: Definition, Interpretation (Simple problems).

Teaching Methodology	YouTube videos, Chalk and Talk, PPT and Handouts.
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. Gupta S.P. &Kapoor V. K. (2019). *Fundamentals of Applied Statistics*, (4th Revised Ed.), Sultan Chand & Sons, New Delhi.

Books for Reference:

1. Garret, H. E. (2005). *Education and Psychological Statistics*. Paragan International Publications.
2. Pillai R.S.N &Bagavathi (2013). *Statistics Theory and Practice* (7th Revised Ed.) S. Chand & Company Ltd. New Delhi.
3. Box, G.E.P., Jenkins, G.M., Reinsel, G.C. and Ljung, G.M. (2015). *Time Series*
4. Analysis (5th Ed.) *Forecasting and Control*. John Wiley & sons, Inc.
5. Brockwell, P.J. and Davis, R.A. (2003). *Introduction to Time Series Analysis*. Springer.

Websites and eLearning Sources:

1. https://www.toppr.com/guides/business-mathematics-and-statistics/time-series-analysis/components-of-time-series/
2. https://www.slideshare.net/Surekha98/measurement-of-seasonal-variations
3. https://onlinecourses.swayam2.ac.in/cec23_mg14/preview
4. https://edurev.in/t/113529/Tests-of-Adequacy-Index-Numbers--Business-Mathemat
5. https://openstax.org/books/principles-economics-3e/pages/5-1-price-elasticity-of-demand-and-price-elasticity-of-supply

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 time series and index numbers	**K1**
CO2	Explain the different measurements of time series, methods of index numbers and demand analysis.	**K2**
CO3	Compute the different measurements and index numbers.	**K3**
CO4	Analyse the importance of time series and index numbers.	**K4**
CO5	Evaluate the time series data, index numbers and demand analysis in real life problems.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**25UST64OE02**			**Open Elective – 2:** Applied Statistics						**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	3	2	2	2	1	3	2	2	3	2	**2.2**
CO2	3	3	2	2	1	3	3	2	3	2	**2.3**
CO3	3	3	3	2	2	3	3	3	3	3	**2.7**
CO4	3	3	3	3	2	3	3	3	3	3	**2.8**
CO5	3	3	3	3	3	3	3	3	3	3	**3.0**
Mean Overall Score											**2.60 (High)**